CA-1

Resolution No. STD- 1141

TRANSPORTATION DIVISION
TARIFF & LICENSE BRANCH
Tariff Section

Before the Public Utilities Commission of the State of California

RESOLUTION ORDERING DISPOSITION OF SPECIAL TARIFF DOCKET REQUESTS

Requests as identified hereinafter have been filed on the Special Tariff Docket for authority to make tariff changes for which permission of the Commission is requisite under provisions of the Public Utilities Code or orders of the Commission. Due consideration has been given to the representations contained in the verified requests, and good cause appearing, the following findings and order are made:

The Commission finds that the following requests are justified and should be granted subject to conditions specified in the orders which are attached hereto and by this reference made a part hereof:

Request and Order No.	*Request Filed By:*
STD-9972	Lopes Trucking Service, Inc.

The Commission finds that the following requests do not contain sufficient justification for the authority sought, and therefore should be denied without prejudice:

Request and Order No.	*Request Filed By:*
NONE	

The Commission finds that the following requests are of a nature not suitable for processing on the Special Tariff Docket, and therefore should be dismissed without prejudice:

Request and Order No.	*Request Filed By:*
NONE	

IT IS ORDERED that the aforesaid requests are granted, denied or dismissed, as the case may be, in accordance with the findings hereinbefore set forth, and as specified in the orders which are attached hereto and by this reference made a part hereof.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California, held on the 11th day of January, 1989, the following Commissioners voting favorably thereon.

G. MITCHELL WILK
President
FREDERICK R. DUDA
JOHN B. OHANIAN
Commissioners

Executive Director of the
Public Utilities Commission of the State of California

Order No. STD-9972

Before the Public Utilities Commission of the State of California

Request filed by:

Lopes Trucking Service, Inc.

Special Tariff Docket
Request Numbered Same as
Order Number Above.

In conformity with the findings and order made by the Commission in a resolution entered this day, the request, copy of which is attached hereto and by this reference made a part hereof, is granted, subject to the following conditions:

The authority herein granted is limited strictly to its terms, and shall expire unless the tariff provisions authorized herein are published and filed in the San Francisco office of this Commission within ninety days after the date hereof. The item of tariff or supplement issued pursuant to this order shall bear reference to this order in substantially the following form:

"Authorized by Cal. P.U.C. Order No. STD-9972."

This order issued January 11, 1989, by the Public Utilities Commission of the State of California by the adoption of the resolution of which this order is a part.

Executive Director of the
Public Utilities Commission of the State of California

State of California

Memorandum

Date : January 4, 1989

To : The Commission
(Meeting of January 11, 1989)

From : Public Utilities Commission—San Francisco -- Robert E. Walker, Principal
Tariff and License Branch

File No.:

Subject: CA-1

SPECIAL TARIFF DOCKET RESOLUTION NO. 1141

STD - 9972 - Lopes Trucking Service, Inc.

Requests authority to cancel its participation in Pacific Motor Tariff Bureau, Inc., Local Freight Tariff No. 14 naming commodity rates for the transportation of cement and other commodities and in lieu thereof concurrently publish rates in an individual tariff.

Recommended Denial

NONE

Recommended Dismissal

NONE

...SCOMM.
...OF CALIF.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Lopes Trucking Service, Inc. (T-110663) under Shortened Procedure Tariff Docket for authority to cancel its participation in Pacific Motor Tariff Bureau, Inc., Local Freight Tariff No. 14 naming commodity rates for the transportation of cement and other commodities and in lieu thereof concurrently publish rates in an individual tariff.	)	SPT Docket No. 9972

APPLICATION

The application of Lopes Trucking Service, Inc. hereinafter referred to as Lopes or applicant, respectfully shows:

I

Applicant is a corporation. Applicant's mailing address is 2127 S. Carpenter Rd., Modesto, California 95351. Applicant's telephone number is (209) 537-8901. A certified copy of the applicant's Articles of Incorporation is on file with the Commission under file T-110663.

II

Correspondence and communications in regard to this application are to be addressed to:

Rod Logan
Sam Miles, Inc.
2124 F Street
Bakersfield, California 93301
Telephone (805) 324-1663

III

Applicant operates as a cement carrier with authority authorized by Decision 84809. Applicant has authority to engage in the transpor-

SPTD #4

tation of portland or similar cements, either alone or in combination with lime or powdered limestone, in bulk or in packages, from any and all points of origin to any and all points within the following counties, namely: Merced, San Joaquin, Solano, and Stanislaus. Applicant also holds highway common carrier authority as well as the following permits: Tank Truck Carrier, Highway Contract Carrier, Agricultural Carrier, Dump Truck Carrier, Livestock Carrier, Heavy-Specialized Carrier, and Vacuum Truck Carrier. This application concerns only applicant's operation as a cement carrier.

IV

Applicant currently has on file with the Commission participation in Pacific Motor Tariff Bureau issues including Local Freight Tariff No. 14 which contains rates for the transportation of cement. By this application, applicant requests authority to cancel its participation in Local Freight Tariff No. 14 and to publish concurrently rates in an individual tariff at the same rate level. In the new publication, certain provisions would be deleted such as exceptions to the distance table and arbitrary charges. These items do not apply to delivery points where applicant has authority to transport shipments and consequently their deletion would not affect the rates of applicant. Also, the format of the individual tariff would be somewhat different than Local Freight Tariff No. 14 in that the individual tariff is based on the format established by former Minimum Rate Tariff 10 published by the California Public Utilities Commission. However, the substance of each item and its affect on applicant's rates would be no

different from what is currently in effect in Pacific Motor Tariff Bureau Local Freight Tariff No. 14. Concurrently with the filing of the proposed individual tariff, applicant also intends to file under General Order 147-A, Rule 7.7, an individual tariff containing rates on general commodities to replace applicant's current participation in Pacific Motor Tariff Bureau. With the filing of the cement carrier tariff and the general commodities tariff, applicant would then be completely withdrawn from Pacific Motor Tariff Bureau.

V

Since the new individual tariff proposed by applicant would contain the same rules and rates to which applicant is currently subject in Pacific Motor Tariff Bureau Local Freight Tariff No. 14, in no event would an increase in revenue resulting from this publication be as much as one percent.

VI

Applicant avers that this application is intended to simplify tariff publication and reduce tariff filing costs by allowing applicant to publish an individual tariff at the same rate level it now uses.

VII

This is not a major action under Sections 3502.1 and 3502.2 of the California Public Utilities Code.

VIII

Applicant alleges that the cost of reproducing and distributing copies of this application to all carriers operating in the state of

California would be excessive and that adequate notice of the intent of applicant will be accomplished through routine publication in the Commission's Daily Calendar. Therefore, in order to secure just, speedy and inexpensive determination of the issues present, waiver of Rule 21F of the Rules of Practice and Procedure is respectfully requested under Rule 87 of the Rules of Practice and Procedure. Applicant knows of no opposition to this application. A copy of this application will be served by first-class mail to any party upon request.

WHEREFORE applicant prays that relief sought by this application be granted; and that the Commission issue its ex parte order permitting applicant to publish its individual tariff; that increases resulting in an increase in applicant's gross revenue as a cement carrier of not more than one percent be authorized; that said order provide that the tariff be made effective within five days of its publication; that departure from Sections 460 and 461.5 of the Public Utilities Code be authorized to the extent necessary to apply the increase granted; and that the Commission grant such other order and further relief as may be reasonable and proper.

Executed on November 28, 1988, at Modesto, California.

By: /s/ Gerald V. Lopes, Pres.
Gerald V. Lopes, President
Lopes Trucking Service, Inc.
2127 S. Carpenter Rd.
Modesto, CA 95351

VERIFICATION

I am an officer of the applicant and am authorized to make this Verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters therein stated on information and belief, and as to those matters, I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 28, 1988, at Modesto, California.

By: Gerald V. Lopes, Pres.

Gerald V. Lopes, President
Lopes Trucking Service, Inc.
2127 S. Carpenter Rd.
Modesto, CA 95351

ATA 111-I

ICC ATA-111-I
FMC F-1-23

APSC 23	Ia DOT 25	Mont PSC 22	PUBNS 15	SDPUC 22
ATC 25	KCC 22	NPSC 22	PUCO 25	TPSC 25
Cal PUC 19	KY DOT 22	PSCN 22	CC Okla 24	RCT 22
PUC Colo 22	LPSC 25	NHDOT 25	PUC Ore 22	PSCU 22
Conn PUC-MF 25	MF-PSC Md 25	PUCNJ 25	Freight Pa PUC 25	MF-VCC 25
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(See Page 2 for cancellations)

ATA HAZARDOUS MATERIALS TARIFF

AMERICAN TRUCKING ASSOCIATIONS, INC., AGENT

DEPARTMENT OF TRANSPORTATION REGULATIONS

GOVERNING

TRANSPORTATION OF HAZARDOUS MATERIALS

BY AIR, MOTOR, RAIL AND WATER

INCLUDING SPECIFICATIONS FOR SHIPPING CONTAINERS

Applicable within the limits of the jurisdiction of the United States and binding upon participating carriers shown herein, and effective supplements, and upon all shippers using these participating carriers for the transportation of hazardous materials. The provisions published herein will not, if effective, result in an effect on the quality of the human environment. Published under authority of Federal Maritime Commission Special Permission No. 6192.

ISSUED SEPTEMBER 1, 1988

EFFECTIVE OCTOBER 5, 1988
(Except as otherwise provided herein)

ISSUED BY

MARTIN E. FOLEY, Issuing Officer
2200 Mill Road
Alexandria, VA 22314

Inquiries concerning subscriptions to this publication should be addressed to the ATA Traffic Department, 2200 Mill Road, Alexandria, VA 22314. (Subscription price per copy — $31.25).

(7,500) (Corley Printing Company, St. Louis, MO)

CANCELLATION NOTICE

Participating carriers and other provisions previously listed in Motor Carriers' Explosives and Hazardous Materials Tariff 111-H (described below) and not brought forward herein are hereby canceled.

ATA Hazardous Materials Tariff 111-I has been issued and filed with the following Commissions by American Trucking Associations, Inc., Agent, for the participating carriers named herein, and cancels Hazardous Materials Tariff 111-H now on file with the respective Commissions, as indicated.

Commission	Number	Cancels
Interstate Commerce Commission	ICC ATA 111-I	ICC ATA 111-H
Federal Maritime Commission	FMC F-1-23	FMC F-1-22
Alabama Public Service Commission	APSC 23	APSC 22
Arkansas Transportation Commission	ATC 25	ATC 24
California Public Utilities Commission	Cal PUC 19	Cal PUC 18
Public Utilities Commission of Colorado	PUC Colo 22	PUC Colo 21
Connecticut Public Utilities Commission	Conn PUC MF 25	Conn PUC MF 24
Georgia Public Service Commission	GPSC 25	GPSC 24
Idaho Public Utilities Commission	IPUC 22	IPUC 21
Illinois Commerce Commission	MF-III CC 25	MF-III CC 24
Indiana Department of Revenue	IMCA TR-25	PSCI TR 24
Iowa Department of Transportation	Ia DOT 25	Ia DOT 24
Kansas Corporation Commission	KCC 22	KCC 21
Kentucky Department of Transportation	KY DOT 22	KY DOT 21
Louisiana Public Service Commission	LPSC 25	LPSC 24
Maine Public Utilities Commission	Me PUC 25	Me PUC 24
Public Service Commission of Maryland	MF-PSC Md 25	MF-PSC Md 24
Michigan Public Service Commission	MPSC 25	MPSC 24
Minnesota Transportation Regulation Board	MTRB 22	MTRB 21
Mississippi Public Service Commission	MC 25	MC 24
Missouri Division of Transportation	Div OT Mo 25	Div OT Mo 24
Montana Public Service Commission	Mont PSC 22	Mont PSC 21
Nebraska Public Service Commission	NPSC 22	NPSC 21
Public Service Commission of Nevada	PSCN 22	PSCN 21
New Hampshire Department of Transportation	NHPUC 25	NHPUC 24
New Jersey Public Utilities Commission	PUCNJ 25	PUCNJ 24
State Corporation Commission of New Mexico	SCCNM 22	SCCNM 21
New York State Department of Transportation	DOT-NY-MT 22	DOT-NY-MT 21
North Carolina Utilities Commission	NCUC 23	NCUC 22
Public Service Commission of the State of North Dakota	NDPSC 22	NDPSC 21
Board of Commissioners of Public Utilities of Nova Scotia	PUBNS 14	PUBNS 13
The Public Utilities Commission of Ohio	PUCO 25	PUCO 24
Corporation Commission of Oklahoma	CC Okla 24	CC Okla 23
Public Utilities Commission of Oregon	PUC Ore 22	PUC Ore 21
Pennsylvania Public Utility Commission	Freight Pa PUC 25	Freight Pa PUC 24
Provincial Transportation and Communication Board (Quebec)	PTCB 25	PTCB 24
Rhode Island Public Utility Administration	RIDPU 19	RIDPU 18
Public Service Commission of South Carolina	PSCSC 25	PSCSC 24
Public Utilities Commission of South Dakota	SDPUC 22	SDPUC 21
Tennessee Public Service Commission	TPSC 25	TPSC 24
Railroad Commission of Texas	RCT 22	RCT 21
Public Service Commission of Utah	PSCU 22	PSCU 21
Virginia Corporation Commission	MF-VCC 25	MF-VCC 24
Washington Utilities and Transportation Commission	WN T 22	WN T 21
Public Service Commission of West Virginia	MF-PSC W Va 23	MF-PSC W Va 22
Public Service Commission of Wisconsin	PSC Wisc 22	PSC Wisc 21
Public Service Commission of Wyoming	Wyo PSC 22	Wyo PSC 21

INTERPRETATION OF HAZARDOUS MATERIALS REGULATIONS

(For Information only)

This publication contains the Department of Transportation regulations governing the transportation of hazardous materials as published in the Federal Register and in the Code of Federal Regulations (Title 49). Any official interpretation of these regulations must be obtained from the Department of Transportation, 400 Seventh Street, S. W., Washington, DC 20590. (Telephone (202) 366-4488).

For procedures to effect changes in these DOT regulations, see Part 106 herein.

For explanation of abbreviations and reference marks, see last page of this tariff.

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Subpart B—Preparation of Hazardous Materials for Transportation

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PARTICIPATING INTERSTATE CARRIERS

The following common carriers are participants to this tariff under authority of powers of attorney issued to American Trucking Associations, Inc., Agent.

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
ABFL	A & B FREIGHT LINE, INC., Rockford, IL	120384
AACC	A & C CARRIERS, INC., Muskegon, MI	114227
AFML	A & F MOTOR LINE, Don A. Simmons, d/b/a, Ashdown, AR	107348
AAHI	A & H, INC., Footville, WI	147891
ANJQ	A & J CARTAGE, INC., Oak Creek, WI	139957
AAMC	A & M CARTAGE OF TINLEY PARK, INC., Tinley Park, IL	145228
ANPT	A & P TRANS., INC., Marlboro, MA	120913
ANRI	A & R TRANSPORT, INC., Ottawa, IL	140820
ARUK	A & R TRANSPORT, INC., Knoxville, TN	164228
ARGC	A R G TRUCKING CORP., Phelps, NY	28562
AOPS	A-1 PUMPING SERVICE, INC., Spartanburg, SC	139389
APAC	A-P-A TRANSPORT CORP., North Bergen, NJ	26399
AZWS	A-Z WASTE SERVICE, INC., Falconer, NY	153322
AHTL	A. & H. TRUCK LINE, INC., Evansville, IN	2962
ANID	A. & L. DISTRIBUTORS, Automotive & Industrial Distributors of Billings, d/b/a, Billings, MT	207966
AJTM	A. J.L TRUCKING, Craig Smith, d/b/a, Rexburg, ID	155584
AAGC	A.A. CARTAGE CO., Arvid Hemenway, d/b/a, Ontario, OR	150894
AAAC	A.A.A. TRUCKING CORPORATION, Trenton, NJ	3763
AEFS	A.E.F-SELOVER TRANSPORTATION, INC., South River, NJ	37303
AMSK	A.M. & S. TRANSPORTATION CO., Gabriel B. Avila and Mateus E. Morias, d/b/a, Oakland, CA	162157
ACSG	A.M.E.I. CARGO, INC., Norcross, GA	159692
AACT	AAA COOPER TRANSPORTATION, Dothan, AL	66889
AAAD	AAA DELIVERY, INC., Kenai, AK	135222
AACK	AAC TRANSPORT, INC., Secaucus, NJ	172449
ABES	ABC EXPRESS, INC., Lebanon, TN	152268
ABNE	ABERDEEN EXPRESS, INC., Aberdeen, OH	165739
ABER	ABERNETHY TRANSFER & STORAGE COMPANY, INC., Hickory, NC	66988
ABFC	ABF CARTAGE, INC., Fort Smith, AR	176725
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR	29910
ACBE	AC-BERWICK TRANSPORTERS, INC., Keasbey, NJ	113041
ACEA	ACADIA EXPRESS COMPANY, INC., Southwest Harbor, ME	28806
ACYS	ACCEL COURIER SYSTEMS, INC., Waldwick, NJ	159558
ACEH	ACE DORAN HAULING & RIGGING CO., Cincinnati, OH	112304
ACLW	ACE LIQUID WASTE HAULERS, INC., Cincinnati, OH	164624
ATPH	ACE TRANSPORTATION, INC., Lafayette, LA	164740
ACHT	ACHENBERG, T., TRANSPORTATION CO., Perth Amboy, NJ	133078
AICF	ACME INTER-CITY FREIGHT LINES, Seattle, WA	42092
ACMK	ACME TRUCKING, INC., Newark, OH	141094
ACOB	ACORN BUILDING COMPONENTS, INC., Quincy, MA	160449
ACXS	ACTION EXPRESS, INC., Boise, ID	121044
ACOP	ACTION TRANSIT COMPANY, Mooresville, NC	149604
ADLD	ADCO TRUCKING, LTD., Hinsdale, IL	194517
ADCE	ADCOM EXPRESS, INC., Tinley Park, IL	164459
ADEN	ADEN BROS. TRUCKING, Gene H. Aden and Keith H. Aden, d/b/a, Avon, IL	155418
AMMF	ADMIRAL-MERCHANTS MOTOR FREIGHT, INC., Minneapolis, MN	76266
ADPH	ADOLPH'S TRUCKING COMPANY, INC., New York, NY	6254
ADTC	ADVANCE TRANSPORTATION COMPANY (Illinois Corporation), Milwaukee, WI	18121
ADUE	ADVANCE-UNITED EXPRESSWAYS, INC., (A Minnesota Corporation), Minneapolis, MN	107605
AROL	AERO LIQUID TRANSIT, INC., Lowell, MI	138713
ASDS	AERO SPECIAL DELIVERY SERVICE, INC., San Francisco, CA	58486
AERO	AERO TRUCKING, INC., Dover, DE	60014
AGMO	AGEE MOTOR FREIGHT, INC., Aurora, IL	202660
AGCE	AGRICULTURAL CARRIERS, INC., Wichita, KS	153560
AKNS	AIKINS, BOB, LINES, INC., Lawrenceburg, IN	29753
AIC	AIM INDUSTRIES, INC., Jersey City, NJ	134085
ARXS	AIR EXPRESS INTERNATIONAL USA, INC., Darien, CT	193047
AIFR	AIR FREIGHT, INC., Mills, WY	144759
ALDT	AIR LAND TRANSPORT, INC., Anchorage, AK	119402
AITL	AIR TAXI, LTD., Lexington, KY	Pending
ARXF	AIR-X, Interline Coordinators, Inc., d/b/a, Trenton, NJ	⊗
AIRB	AIRBORNE FREIGHT CORPORATION, Seattle, WA	123343
APDG	AIRPORT DRAYAGE COMPANY, Seattle, WA	129263
APXR	AIRPORT EXPRESS, INCORPORATED, South San Francisco, CA	121392
ATEN	ALABAMA-TENNESSEE EXPRESS, INC., Chattanooga, TN	136678
ALAE	ALAMO EXPRESS, INC., San Antonio, TX	107727
ALAN	ALAN MOTOR LINES, INC., Rahway, NJ	69340
AKFR	ALASKA FREIGHT LINES, INC., Valdez, AK	118444
ALTS	ALASKA TRANSFER & STORAGE, INC., Kodiak, AK	126136

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
ALWE	ALASKA WEST EXPRESS, INC., Anchorage, AK	118445
ALXT	ALEXANDER TRUCK LINE, INC., Lyons, KS	58992
AFOE	ALL 48 FREIGHT LINES, Jeanne Batson, d/b/a, Post Falls, ID	172768
ALWS	ALL-WAYS FREIGHT LINES, INC., Leavenworth, KS	138772
ALLE	ALLEGHENY FREIGHT LINES, INCORPORATED, Winchester, VA	1074
ABDE	ALLEGHENY-BEDFORD EXPRESS, INC., New Stanton, PA	65886
ALLO	ALLIED DELIVERY SYSTEM, INC., Detroit, MI	121082
ATRD	ALLTRANSPORT, INC., Chicago, IL	⊗
ALMD	ALMOND FREIGHT LINES, INC., Rockford, IL	121520
ALTT	ALTERMAN TRANSPORT LINES, INC., Opa Locka, FL	107107
ATOI	ALTOM TRANSPORT, INC., Chicago, IL	187735
ATFE	ALTRUK FREIGHT SYSTEMS, INC., Tampa, FL	116544
ALVN	ALVAN MOTOR FREIGHT, INC., Kalamazoo, MI	1395
ADSY	AMERICAN DELIVERY SYSTEMS, INC., Keego Harbor, MI	⊗
AMFO	AMERICAN FINE FOODS, INC., Payette, ID	150529
AFSI	AMERICAN FREIGHT SYSTEM, INC., Overland Park, KS	144678
AHCQ	AMERICAN HIGHWAY CARRIERS OF INDIANA, INC., Hammond, IN	165740
AMPF	AMERICAN PACIFIC FORWARDERS, Santa Ana, CA	142867
AETS	AMERICAN TRANSPORT, INC., Schererville, IN	174031
ATQW	AMERICAN TRANSPORT, INC., Weirton, WV	147734
ACDK	AMERICARRIER, INC., Elyria, OH	173704
AFHS	AMERICON FREIGHT SYSTEMS, INC., Kings Mountain, NC	168307
AMOL	AMOCO OIL COMPANY, Chicago, IL	148073
ANER	ANDERS TRUCKING, INC., Union Center, SD	153902
AASN	ANDERSON & SONS TRUCKING CO., INC., Sparks, NV	147145
ANET	ANDERSON TRUCKING, Albert Anderson and Albert B. Anderson, d/b/a, Lexington, IL	138272
ADAQ	ANDERSON, ART, TRUCKING, INC., Oakford, IL	145503
ANAE	ANDING TRANSIT, INC., Arena, WI	55700
AMXP	ANNISTON MOTOR EXPRESS, INC., Anniston, AL	121447
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO	263
AOLE	AOL EXPRESS, INC., Tacoma, WA	148329
APBQ	APEX BULK COMMODITIES, Whittier, CA	136720
APXL	APEX MOTOR LINES, INC., Medina, OH	166464
APIS	APOLIS TRANSPORT, INC., Petaluma, CA	173690
APCY	APPLE CITY EXPRESS, INC., Murphysboro, IL	159973
APPL	APPLE LINES, INC., Madison, SD	114632
APDC	APPLEGATE DRAYAGE COMPANY, Sacramento, CA	135865
ARZR	ARA TRAILBLAZER, INC., Carrollton, TX	172735
AREN	ARCADIA EXPRESS, INC., Scotch Plains, NJ	170800
ARSY	ARCHER SERVICES, INC., New York, NY	151449
AHSM	ARCHER SERVICES OF MASSACHUSETTS, INC., Boston, MA	184905
AORC	ARCO RAIL & CONTAINER CORP., Elizabeth, NJ	111574
AZXE	ARIZONA EXPRESS, INC., Phoenix, AZ	144256
AZFS	ARIZONA FREIGHT SYSTEMS, Phoenix, AZ	175241
ARZL	ARIZONA TANK LINES, INC., Des Moines, IA	99427
ARFW	ARKANSAS FREIGHTWAYS, INC., Harrison, AR	121805
AKOS	ARKOOSH BROTHERS, INC., Gooding, ID	185505
AELS	ARMELLINI EXPRESS LINES, INC., Palm City, FL	105638
ACAT	ARMENTROUT TRUCK LINE, William F. Armentrout and Janice Armentrout, d/b/a, Salisbury, MO	95711
ARNE	ARNIE'S MOTOR FREIGHT, INC., Altoona, IA	99532
ARNE	ARNIO, ARNIE M., Rapid City, SD	154173
AROT	ARROW TRANSPORTATION COMPANY, Arrow Transportation Company of Delaware, d/b/a, Portland, OR	2862
ATRF	ARROWHEAD TRANSFER, Ola Harang and Gordon S. Harang, A Partnership, d/b/a, Sitka, AK	124413
ARRT	ARROWHEAD TRANSPORTATION, Bill G. Carr and Phyllis R. Carr, d/b/a, Billings, MT	116698
ARVA	ARVADA TRANSFER CO., Johnstown, CO	39963
ASBS	ASBURY SYSTEM, Los Angeles, CA	133315
ASBY	ASBURY TRANSPORTATION CO., Wilmington, CA	23939
ASBM	ASBURY, M. L., INC., Detroit, MI	123074
ASHT	ASHWORTH TRANSFER, INC., Salt Lake City, UT	1872
ASPP	ASPHALT PRODUCTS TRANSPORT CO., INC., Tucson, AZ	113594
ASAF	ASSOCIATED AIR FREIGHT, INC., Jamaica, NY	⊗
ASPC	ASSOCIATED PETROLEUM CARRIERS, Spartanburg, SC	106119
ATTF	ATKINSON TRANSFER, INC., Dayton, OH	99896
ATML	ATLANTA MOTOR LINES INC., Conley, GA	58885
ACSE	ATLANTIC COAST EXPRESS, INC., Elizabeth, NJ	32967
ALFE	ATLAS MOTOR FREIGHT LINES, INC., Santa Fe Springs, CA	129711
ATIW	ATOMIC INTERPROVINCIAL TRANSPORT (EASTERN), LTD., Winnipeg, MB, CN	165351
AUAE	AURORA AREA EXPRESS, Loran Yoakum d/b/a, Aurora, IL	98756
AUFF	AURORA FAST FREIGHT, INC., Aurora, IL	120523
AUXP	AUSTIN'S EXPRESS, INC., Twin Falls, ID	177333

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

⊛Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
APAT	AUTO PURCHASING AGENCY, INC., Los Angeles, CA	121194
AWCC	AWC TRANSPORTATION CORPORATION, Sioux Falls, SD	150055
AYEL	AYRES, ELDON D., Spearfish, SD	119344
BAEY	B & A EXPRESS, Bronwood Corporation, d/b/a, Hinsdale, IL	172110
BADT	B & D TRANSFER, INC., Liberty, PA	107110
BAHF	B & H FREIGHT LINE, INC., Harrisonville, MO	61129
BMCE	B & M CARTAGE, INC., Shreveport, LA	153761
BAWC	B & W CARTAGE, INC., Detroit, MI	120924
BNWE	B & W EXPRESS, Boston & Woonsocket Express Co., Inc., d/b/a, Woonsocket, RI	1990
BPML	B AND P MOTOR LINES, INC., Forest City, NC	106074
BDTO	B D TRUCKING CO., Ripon, CA	145734
BDTG	B&D TRANSPORT, INC., Phoenix, AZ	194242
BLIB	B-LINE, J.E.P., Inc., d/b/a, West Bridgewater, MA	151473
BNSK	B. & S. TRANSPORTATION, INC., Nashville, TN	161809
BJJC	B.J.J. COMPANY, INC., Stockton, CA	175112
BAGT	BAGGETT TRANSPORTATION COMPANY, Birmingham, AL	76177
BAGG	BAGGS TRUCK LINE, Harold Baggs, d/b/a, Bogard, MO	69698
BSOT	BALISON TRUCKING, INC., Sandpoint, ID	166696
BAAG	BALLENSKY, ALAN G., Miles City, MT	192812
BALS	BALSER TRUCK CO., South Gate, CA	96630
BBAT	BAR TRANSPORTATION, INC., Calhoun, GA	166250
BGLG	BARGER LEASING, INCORPORATED, Hilton, VA	160200
BRNR	BARNER, JERRY M., & SONS, Roselle, NJ	77721
BEPL	BARNES EXPRESS, LTD., Honeoye Falls, NY	99531
BANM	BARR & MILES, INC., Chicago, IL	69557
BFSY	BARR FREIGHT SYSTEM, INC., Westmont, IL	161666
BTOW	BARSTOW, R. C., TRUCKING CO., INC., Hadley, MA	18202
BATL	BASSE TRUCK LINE, INC., San Antonio, TX	11603
BSVL	BATESVILLE TRUCK LINE, INC., Batesville, AR	97127
BAUQ	BAUDETTE TRANSFER, INC., Baudette, MN	140139
BAYA	BAY AREA-LOS ANGELES EXPRESS, INC., Sunnyvale, CA	159753
BAYG	BAY TRANSPORTATION CO., INC., Forest Park, GA	625
BGTO	BGT, INC., Boise, ID	133589
BMTC	BE-MAC TRANSPORT COMPANY, INC., St. Louis, MO	10872
BETP	BEASLEY TRANSPORT, INC., Colerain, NC	134511
BETC	BEAUFORT TRANSFER COMPANY, Gerald, MO	78400
BEAV	BEAVER EXPRESS, Beaver Express Service, Inc., d/b/a, Woodward, OK	117465
BOCP	BECK OIL COMPANY, INC., Mt Vernon, IL	166684
BMOO	BECKER MOTOR SERVICE, INC., West Milwaukee, WI	168007
BLNM	BEE LINE TRUCKING COMPANY, INC., St. Louis, MO	69402
BLIE	BEE LINE, INC., Fairfield, NJ	136366
BLMF	BEE-LINE MOTOR FREIGHT, Omaha, NE	60066
BEGL	BEGLEY TRUCKING, INC., Philadelphia, PA	97398
BLLV	BELL TRUCKING SERVICE, James Howard Bell, d/b/a, Oakhurst, CA	176538
BTGQ	BELL TRUCKING, Charles Straus Bell, d/b/a, Galva, IL	185200
BTLP	BELLEVILLE TRUCK LINE, INC., Cross Plains, WI	99956
BALM	BENDER & LOUDON MOTOR FREIGHT, INC., Akron, OH	3151
BNTA	BENDER TRANSPORTATION CO., Reno, NV	157047
BENV	BENLIN DISTRIBUTION SERVICES, INC., Buffalo, NY	121831
BENV	BENLIN DISTRIBUTION SERVICES, INC., Buffalo, NY	⊗
BTNB	BENTON BROS. FILM EXPRESS, INC., Atlanta, GA	110410
BERM	BERMAN'S MOTOR EXPRESS, INC., Binghamton, NY	111625
BEJH	BERMES, JOHN, INC., Billings, MT	171140
BERV	BERRY VAN LINES, INC., Dover, DE	2607
BDSV	BEST DELIVERY SERVICE, INC., Montebello, CA	158067
BRFC	BEST REFRIGERATED EXPRESS, INC., Omaha, NE	11592
BESI	BEST TRUCKING COMPANY, INC., Richmond, VA	151585
BEDJ	BETTENDORF TRANSFER, INC., River Falls, WI	35602
BITF	BIG T TRANSFER, INC., New Albany, IN	146108
BGGH	BIGGERS HAULING, Bill Biggers, d/b/a, Butte, MT	174554
BMEI	BIL-MAC EXPRESS, INC., Arlington Heights, IL	161522
BLKY	BILKAYS EXPRESS CO., Neptune, NJ	73616
BLIG	BILLIG TRUCKING SERVICE, INC., Allentown, PA	152906
BILT	BILLINGS TRANSFER CORP., INC., Lexington, NC	2473
BAGL	BINGHAMTON-GREENE TRUCK LINES, INC., Greene, NY	1795
BINE	BIRMINGHAM-NASHVILLE EXPRESS, INC., Nashville, TN	128521
BSET	BISETT TRUCKING COMPANY, Bradford, PA	90230
BISS	BISSON, LUCIEN, INC., Bath, ME	99625
BSBK	BLACK & SILVER BULK CARRIERS, INC., Totowa, NJ	202088
BLKD	BLACK DIAMOND SERVICE, INC., Buffalo, NY	120820
BTXS	BLACKMON TRANSPORTATION SERVICES, INC., Crest Hill, IL	198046

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
BLRC	BLAIR CARTAGE, INC., Newbury, OH	134798
BLTC	BLAIR TRANSFER COMPANY, Blair, NE	150730
BZMS	BLITZ MOVING SERVICES, James L. Wallace, d/b/a, Atlanta, GA	190979
BLGR	BLUE & GRAY TRANSPORTATION CO., INCORPORATED, Richmond, VA	11740
BLUE	BLUE LINE EXPRESS, INC., Nashua, NH	1783
BLTR	BLUE LINE TRANSFER CO., INC., Chester, PA	55888
BLII	BLUE LINE TRANSPORTATION COMPANY, INC., Bloomington, CA	141068
BLRS	BLUE RIBBON EXPRESS & MESSENGER SERVICE, Aliso, CA	121807
BRTR	BLUE RIDGE TRANSFER COMPANY INCORPORATED, Roanoke, VA	63417
BLRT	BLUE RIDGE TRUCKING COMPANY, Asheville, NC	67500
BCOB	BOCO, INC., Brockton, MA	169340
BDFQ	BOESDORFER TRUCKING, INC., Pleasant Plains, IL	138703
BOLD	BOLAND TRUCKING COMPANY, INC., San Francisco, CA	99694
BDGL	BOLDUC-GOULET EXPRESS, INC., Webster, MA	17764
BOLE	BOLE, LOU, CARPET CARRIERS, INC., Newark, NJ	138065
BKYR	BONCOSKY TRANSPORTATION, INC., Algonquin, IL	129410
BNDG	BONDY CARTAGE LIMITED, Windsor, ON, CN	93236
BNED	BOONE, DANIEL, TRUCKING, Daniel Boone, d/b/a, Santa Fe Springs, CA	108200
BOSD	BOSSONG'S COMMERCIAL DELIVERY, INC., North Syracuse, NY	121275
BDTL	BOULDER-DENVER TRUCK LINE, INC., Overland Motor Express, Inc., d/b/a, Boulder, CO	115232
BCGQ	BOULTER CARTING COMPANY, INCORPORATED, Webster, NY	81959
BPWP	BOWEN TRUCKING COMPANY, INC., Pocatello, ID	183222
BOWS	BOWERS TRANSFER & STORAGE, Mer-Buz Corp., d/b/a, Denver, CO	126183
BOWM	BOWMAN TRANSPORTATION, INC., Atlanta, GA	94201
BYTF	BOYCE TRANSFER & STORAGE, INC., Salmon, ID	179939
BYDP	BOYD TRANSPORT CO., INC., Dalton, GA	99317
BOBK	BOYD, BOB, TRUCKING, INC., Livingston, MT	158816
BOYL	BOYLE BROTHERS, INC., Medford, NJ	123383
BRFT	BRADLEY FREIGHT LINES CO., INC., Asheville, NC	120646
BRAK	BRAKE DELIVERY SERVICE-MEIER TRANSFER SERVICE, Los Angeles, CA	96679
BWTK	BRALLEY-WILLETT TANK LINES, INC., Richmond, VA	2368
BRIL	BRANDT TRUCK LINE, INC., Bloomington, IL	120346
BRPO	BRELUNCO CORPORATION, Sylvania, OH	180140
BRFS	BRIGHT'S FREIGHT SERVICE, Eldon O. Bright, d/b/a, Topeka, KS	59368
BWOI	BROADWAY OIL, INC., Spokane, WA	191748
BWND	BROCK WAREHOUSE & DRAYAGE CO., Lexington, KY	192969
BCKH	BROCKHOUSE TRUCKING, Edward H. & Janis A. Brockhouse, d/b/a, Lake Benton, MN	157395
BROM	BROMMER TRUCK LINE, INC., Sioux Center, IA	63968
BRKD	BROOKS ARMORED CAR SERVICE, INC., Wilmington, DE	128570
BRRS	BROTHERS TRANSPORTATION, INC., Paramount, CA	111230
BRBT	BROWN BROTHERS TRUCK LINE, O. W. Brown and J. N. Brown, d/b/a, Des Arc, AR	120995
BRWN	BROWN EXPRESS, INC., San Antonio, TX	46054
BFLM	BROWN FREIGHT LINE, INC., Nashville, TN	127939
BRFW	BROWN FROM WABASH, INC., Wabash, IN	22484
BRTC	BROWN TRANSFER COMPANY, A Corporation, Kearney, NE	107037
BRNT	BROWN TRANSPORT CORP., Atlanta, GA	56679
BRDA	BROWN, D. A., TRUCKING CO., Bakersfield, CA	98689
BDUP	BROWN-DUPREE OIL CO., INC., Ulysses, KS	182103
BUNP	BRUNS TRANSPORTATION, INC., Oregon, IL	191824
BRYN	BRYAN TRUCK LINE, INC., Bryan, OH	61470
BEXR	BUANNO EXPRESS COMPANY, INC., Melbourne, FL	157698
BUAN	BUANNO TRANSPORATION CO., INC., Fort Johnson, NY	113047
BUCI	BUCCANEER MOVING & STORAGE, INC., Fernandina Beach, FL	143080
BUFI	BUFFALO FUEL CORP., Niagara Falls, NY	149764
BCLT	BULK CARRIERS COMPANY, THE, Norcros Industries Limited, operating as, Mississauga, ON, CN	114933
BDNC	BULLARD, DON, AND CAROL BULLARD, Mableton, GA	189270
BTGD	BULLET TRUCKING, INC., Dayton, OH	170284
BNHC	BUNCH TRUCKING COMPANY, INC., Washington, NC	152800
BUTL	BURGGRABE TRUCK LINES, INC., Warrenton, MO	10457
BNTT	BURNETT, W. M., TRUCK LINE, INC., Haleyville, AL	85578
BRRN	BURNS MOTOR FREIGHT, INC., Marlinton, WV	111785
BUDR	BURNS, F. J., DRAYING, San Francisco, CA	99301
BRSC	BURNS, RALPH H., & SON, INC., Hillsboro, WV	113063
BRLE	BURR RIDGE LEASING, INC., Willowbrook, IL	170654
BUTC	BURREN TRANSFER COMPANY, Elgin, IL	311
BURY	BURRY TRUCK LINE, Lawrence G. Getty, d/b/a, Lee's Summit, MO	Pending
CNHC	C & H NATIONWIDE, INC., Dallas, TX	83539
CMCN	C & M CARTAGE, INC., Kansas City, KS	151180
CNMD	C & M DELIVERY, INC., Petaluma, CA	148524
CGNS	C G & S TRUCKING CO., Wood River, IL	153797
CNKP	C&K PETROLEUM TRANSPORTERS, INC., Middle Island, NY	120901

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

⊛ Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
CLNI	C-LINE, INC., Warwick, RI	156861
CTEP	C-T-S ENTERPRISES, INC., Hinsdale, IL	164257
CWEO	C-WAY EXPRESS, L. J. Cerkueira, d/b/a, Oakland, CA	99396
CNEB	C. & E. BRADLEY'S, INC., Ketchikan, AK	127166
CSCC	C. & S. CARTAGE, Dom Catrambone, Frank Catrambone and Gregory Catrambone, d/b/a, Elmwood Park, IL	101663
CNIM	C.A.N. TRANSPORT, INC., Oakland, CA	160549
CODG	C.O.D.E., INC., Denver, CO	99669
CUCV	C.U. TRANSIT COOPERATIVE, Cottage Grove, WI	164546
CVST	C.V.S. TRUCKING, INC., Bloomington, CA	163337
CNWK	CAL-NORTHWEST TRUCKING, INC., Hayward, CA	62653
CALP	CAL-PACIFIC TRUCK LINES, INC., San Carlos, CA	97135
CALD	CALDWELL FREIGHT LINES, INC., Lenoir, NC	116793
CALC	CALIFORNIA CARTAGE COMPANY, INC., Signal Hill, CA	6319
CCXP	CALIFORNIA CARTAGE EXPRESS, Signal Hill, CA	⊗
CFMM	CALIFORNIA MULTIMODAL INC., Long Beach, CA	162854
CNVB	CALIFORNIA/NEVADA BIG VALLEY EXPRESS, INC., Redding, CA	165793
CLZO	CALZONA TANKWAYS, INC., Phoenix, AZ	133965
CAMA	CAMALL TRUCKING, INC., Santa Fe Springs, CA	133372
CAMT	CAMBEIS TRUCKING COMPANY, INC., Brooklyn, NY	31962
CAAE	CAMPBELL'S AUTO EXPRESS, Pitman, NJ	109
CAMP	CAMPO'S EXPRESS, INC., Stafford Springs, CT	49318
CANR	CANADA TRANSPORT, INC., Norfolk, NE	11510
CFWL	CANADIAN FREIGHTWAYS LIMITED, Calgary, AB, CN	116975
CDPT	CANADIAN PACIFIC TRANSPORT (U.S.) LIMITED, Willowdale, ON, CN	100463
CAQC	CANAL CARTAGE COMPANY, Houston, TX	192935
CNNG	CANNING TRUCK SERVICE, INC., Fairbury, NE	120120
CTPH	CANTLAY TRANSPORTATION, INC., Long Beach, CA	163047
CCCG	CAPE COD CARTAGE, INC., South Yarmouth, MA	169449
CPNN	CAPTAIN TRUCKING, INC., Stickney, IL	159799
CRDT	CARDINAL TRANSPORT, INC., Channahon, IL	142059
CRGL	CARGO LINK EXPRESS, Salt Lake City, UT	⊗
CAGC	CARGO, INC., Sioux City, IA	140829
CGCT	CARGOCARE TRANSPORTATION COMPANY, INCORPORATED, Rocky Mount, NC	52669
CMCR	CARMAC TRANSPORT, INC., Chicago, IL	160172
CRMN	CARMAN, J. A., TRUCKING COMPANY, INC., Albany, NY	10321
CCAC	CARMICHAEL CARTAGE COMPANY (A Delaware Corporation), Chicago, IL	99761
CFCC	CAROLINA FREIGHT CARRIERS CORPORATION, Cherryville, NC	2253
CSDC	CAROLINA STORAGE CORPORATION, Raleigh, NC	15992
CWXI	CAROLINA WESTERN EXPRESS, INC., Gastonia, NC	136635
CEXM	CARPET EXPRESS, INC., Chicago, IL	161998
CRLS	CARROLL'S TRANSFER, INC., Dublin, NC	134257
CTRL	CARROLLTON TRUCK LINE, INC., Canton, OH	33782
CFLS	CARSTENSEN FREIGHT LINES, INC., Clinton, IA	15511
CASR	CASCO SERVICES, INC., Newark, NJ	129747
CTKC	CASSWAYS TRUCKING CORPORATION, Roselle, NJ	134938
CSTL	CASTLE ROCK TRANSFER, INC., Castle Rock, CO	36584
CTAW	CATAWBA TRUCKING CO., INC., Rock Hill, SC	99975
CAST	CAUSTIC SODA TRANSPORTATION COMPANY, Asheville, NC	106009
CEDA	CEDARTOWN-ATLANTA FREIGHT LINES, INC., Cedartown, GA	117018
CEXG	CENEX, Farmers Union Central Exchange, Inver Grove Heights, MN	169344
CCFI	CENTRAL CITIES FREIGHT LINE, INC., Columbia City, IN	165251
CETD	CENTRAL DIVISION, INC., Charlotte, NC	31675
CENF	CENTRAL FREIGHT LINES INC., Waco, TX	30867
COFE	CENTRAL OKLAHOMA FREIGHT LINES, INC., Tulsa, OK	120371
CPFL	CENTRAL PACIFIC FREIGHT LINES, INC., Portland, OR	164512
CSAC	CENTRAL STATES TRUCKING CO., Summit, IL	152337
CSAT	CENTRAL STORAGE & TRANSFER CO. OF HARRISBURG, Harrisburg, PA	99493
CNTH	CENTRAL TRANSPORT COMPANY, Paul Abler, d/b/a, Norfolk, NE	119489
CNTT	CENTRAL TRANSPORT, INC., High Point, NC	118831
CNTL	CENTRAL TRUCK LINES, INC., Tampa, FL	36473
LATR	CENTURY EXPRESS, LTD., Operator of Lansdale Transportation Co., Inc., Pottsville, PA	6592
CELS	CENTURY LINES, INC., Cleveland, OH	147909
CEMF	CENTURY MOTOR FREIGHT, INC., St. Paul, MN	108223
CFEP	CERTIFIED EXPRESS COMPANY, ST Freight Systems, d/b/a, San Francisco, CA	153899
CFIQ	CERTIFIED WAREHOUSE & TRANSFER CO., Salt Lake City, UT	163370
CFAQ	CF AIR FREIGHT, INC., Palo Alto, CA	175380
CFAR	CF ARROWHEAD SERVICES, INC., Menlo Park, CA	164299
CBEN	CHAMBLESS ENTERPRISES, Texarkana, AR	164598
CCCW	CHAPMAN CARTAGE CO., INC., Nashville, TN	179328
CBTC	CHARLTON BROS. TRANSPORTATION COMPANY, INC., Hagerstown, MD	29647

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
CSRC	CHASE, R., TRUCKING CO., Raymond R. Chase and Janice N. Chase, d/b/a, Sacramento, CA	163092
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA	110525
CETK	CHEMICAL TANK LINES, INC., Mulberry, FL	129326
CHOK	CHEROKEE TRANSPORT, INC., Nampa, ID	166605
CECV	CHESAPEAKE CARTAGE COMPANY, Portsmouth, VA	195619
CHMH	CHESSIE MOTOR EXPRESS, INC., Mount Laurel, NJ	152494
CHQS	CHESSOR CARTAGE COMPANY, Nashville, TN	182401
CSTR	CHESTER TRANSFER, INC., Chester, IL	68964
CWCR	CHEWNING, C. R., Clyde Russell Chewning, d/b/a, Great Falls, MT	171295
CCAN	CHI-CAN FREIGHT FORWARDING, LTD., Chicago, IL	⑥
CHMJ	CHICAGO MESSENGER SERVICE, INC., Chicago, IL	165935
CGMQ	CHICAGO MOTOR EXPRESS TERMINAL, INC., Lockport, IL	161191
CSEQ	CHICAGO SUBURBAN EXPRESS, INC., Chicago, IL	151275
CEXE	CHIEF EXPRESS, INC., Willowbrook, IL	160421
CHEF	CHIEFTAIN EXPRESS, INC., Lancaster, OH	128195
CHVE	CHILLICOTHE MOTOR EXPRESS, INC., Chillicothe, OH	85890
CHOC	CHOCTAW TRANSPORT, INC., Prichard, AL	111656
CHTL	CHURCHILL TRUCK LINES, INC., Chillicothe, MO	10343
CSCP	CISCO TRUCKING COMPANY, Carlinville, IL	154208
CTZN	CITIZEN EXPRESS LINES, Citizen Auto Stage Company, d/b/a, Nogales, AZ	64541
CDCQ	CITY DRAYAGE CO., INC., Sun Valley, CA	121752
CIEP	CITY EXPRESS, John W. & Joanne C. Hoogland, d/b/a, Seward, AK	128207
CTRN	CLAN TRANS, INC., Rochester, NY	174887
CLBT	CLARK BROS. TRANSFER, INC., Norfolk, NE	106195
CLTL	CLARK, BILL, TRUCK LINE, INC., Alamosa, CO	69579
CLKM	CLARK, TERRY, Terry L. & LaVada Clarke, d/b/a, Sun River, MT	157104
CLYN	CLAYTON'S, INC., Ucon, ID	136939
CLSG	CLEAR SPRINGS TROUT COMPANY, Buhl, ID	163977
CLVN	CLEVELAND EXPRESS, INC., Cleveland, TN	98701
CLEV	CLEVELAND'S TRUCK LINES, INC., Hornell, NY	113983
CLIC	CLICK MESSENGER SERVICE, INC., Newark, NJ	115279
CCOI	COAST COUNTIES EXPRESS, INC., Los Angeles, CA	141406
CTNL	COAST TANK LINES, INC., Seattle, WA	166010
CCEO	COASTAL CARRIER CORPORATION, Rahway, NJ	194689
CTFL	COASTAL FREIGHT LINES, INC., Milford, CT	142142
COHY	COHEY TRUCKING COMPANY, Baltimore, MD	139014
CJNC	COJAN CORPORATION, Westmont, IL	60961
CLBY	COLBY TRANSPORT, INC., Fargo, ND	184802
CCFO	COLE, CLIFFORD, OIL COMPANY, INC., Piggott, AR	175292
COLE	COLES EXPRESS, Bangor, ME	93682
CTRD	COLLINS TRANSPORT, INC., Markham, IL	180554
COLN	COLONIAL MOTOR FREIGHT LINE, INC., High Point, NC	1350
CBVE	COLUMBIA MOTOR EXPRESS, INC., Trenton, NJ	184545
CRTC	COLUMBIA RIVER TRUCKING CO., INC., Camas, WA	31307
CLMB	COLUMBIA TRUCKING, INC., Hammond, IN	118612
CSNT	COLUMBIAN STORAGE & TRANSFER CO., Grand Rapids, MI	52580
CBNS	COLUMBINE NEWS SERVICE, INC., Denver, CO	165563
COML	COLVIN MOTOR LINES, INC., Orange, VA	66592
COVH	COLVIN, C. H., INC., Cherry Creek, NY	34600
CCCP	COMMERCIAL CARRIER CORPORATION, Auburndale, FL	115491
CMLQ	COMMERCIAL CARTAGE CO., Fenton, MO	135457
CMRL	COMMERCIAL TRANSPORTATION, INC., Philadelphia, PA	2605
COMA	COMMERCIAL TRANSPORT, INC., Belleville, IL	104654
CTRI	COMMERCIAL TRANSPORT, INC., Lynchburg, VA	125114
CTGF	COMMERCIAL TRUCKING CO., Paterson, NJ	172616
CMMW	COMMERCIAL WAREHOUSE COMPANY, Broadview, IL	157010
COMP	COMPTON, T. H., INC., Berkeley Springs, WV	3114
CMPT	COMPTON, T. R., INC., Boise, ID	107044
CWCE	CON-WAY CENTRAL EXPRESS, INC., Ann Arbor, MI	165377
CWEE	CON-WAY EASTERN EXPRESS, INC., Rochester, NY	165442
CWSE	CON-WAY SOUTHERN EXPRESS, INC., Palo Alto, CA	194161
CWWE	CON-WAY WESTERN EXPRESS, INC., Orange, CA	165436
CNPF	CONCEPT FREIGHT SERVICE, INC., Akron, OH	195396
CDTT	CONCORD TRANSPORTATION, INC., Thornhill, ON, CN	179733
CFRI	CONDOR FREIGHT LINES, Los Angeles, CA	96697
CTGD	CONESTOGA TRANSPORTATION, INC., Boise, ID	177267
CLEY	CONLEY MOTOR EXPRESS, INC., Pittsburgh, PA	37840
COJN	CONNER, JIM, ENTERPRISES, INC., Benton, IL	146285
CNRQ	CONROY TRUCKING, INC., Staunton, IL	199913
CGTG	CONSOLIDATED CARTAGE COMPANY, INC., Argo, IL	908
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA	42487

For explanation of abbreviations and reference marks, see last page of this tariff.

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@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
CMXP	CONSOLIDATED MOTOR EXPRESS, INC., Bluefield, WV	8744
CMFR	CONSOLIDATED MOTOR FREIGHT, INC., Hastings, NE	30470
CTCE	CONTAINER TRANSPORT COMPANY, Division of Fibreboard Corporation, Antioch, CA	67156
CFRT	CONTAINERFREIGHT TRANSPORTATION COMPANY, Long Beach, CA	107841
CWTN	CONTAINERS WEST, INC., Nampa, ID	205178
CONV	CONTINENTAL VANGUARD, INC., Bellmawr, NJ	158978
CTSM	CONTRACT TRANSPORTATION SYSTEMS CO., Cleveland, OH	65890
CFSH	CONTRACTOR FREIGHT SERVICE, Steven D. Gentry and Deborah R. Gentry, d/b/a, Miles City, MT	120763
CNCR	CONTRACTORS CARGO COMPANY, South Gate, CA	149474
CNDL	CONTROLLED DELIVERY SERVICE, INC., San Dimas, CA	148158
CVYQ	CONVEY, INC., Addison, IL	149107
CYTY	CONYERS TRUCKING, Charles W. McFarlin, d/b/a, Conyers, GA	199438
COLH	COOL TRANSPORTS, INCORPORATED, Paramount, CA	146414
CMLA	COOPER MOTOR LINES, INC., Greenville, SC	47171
CPKN	COPECO TRUCKING, INC., Milford, OH	204218
COKH	CORCORAN TRUCKING, INC., Billings, MT	146668
CORD	CORDERA TRANSFER COMPANY, INC., Carlinville, IL	18163
CMFE	CORDIN MOTOR FREIGHT, INC., Burbank, IL	69742
CORM	CORNHUSKER MOTOR LINES, INC., Omaha, NE	184443
CTCO	CORONA TRUCKING CO., INC., Corona, CA	163254
CGEF	COTTAGE GROVE-EUGENE FREIGHT COMPANY, Gary William Miller, d/b/a, Cottage Grove, OR	4312
CTEG	COTTER TRUCKING, INC., Harvard, IL	161163
CUXS	COURIER EXPRESS, INC., Pittsburgh, PA	160890
COUR	COURIER SYSTEMS, INC., Kearny, NJ	35077
COWE	COWEN TRANSFER AND STORAGE CO., Colorado Springs, CO	120583
COXA	COX OIL & TRANSPORT COMPANY, INC., Carmi, IL	117511
CXTQ	COX TRANSFER, INC., Eureka, IL	142888
COYC	COY CARTING & STORAGE, INC., Amarillo, TX	142859
CRXP	CRAIG'S EXPRESS, INC., Falmouth, KY	48528
CNWB	CRANE WEST, INC., Boise, ID	201730
CZHT	CRAZY HORSE TRUCKING, Ben L. Jacobson, d/b/a, Hephzibah, GA	172010
CRNT	CRESCENT TRUCK LINES, INC., Hayward, CA	48205
CSLN	CRESCO LINES, INC., Harvey, IL	146380
CREW	CREWE TRANSFER, INC., Crewe, VA	36222
CRIT	CRITES TRANSFER, INC., Cumberland, MD	20084
CFTB	CROFT CO., Charles E. Croft, d/b/a, Billings, MT	194571
CSBI	CROSBY TRUCKING SERVICE, INC., Staunton, VA	142823
CPSH	CROSS PETROLEUM SERVICE, Cross Petroleum Service, Inc., d/b/a, Billings, MT	189762
CSST	CROSSETT, INC., Warren, PA	2633
CIRL	CROUSE CARTAGE COMPANY, Operator of Circle M Truck Line, Max W. Tunks and Maxie Lee Tunks, d/b/a, Carroll, IA	96969
CRPS	CRST, INC., Cedar Rapids, IA	114273
CRYG	CRYOGENIC CARRIERS, INC., Oregon, OH	157690
CRYI	CRYOGENIC TRANSPORTATION, INC., Omaha, NE	Pending
CETK	CTL DISTRIBUTION, INC., Mulberry, FL	129326
CUTC	CUMBERLAND TRUCKING CO., INC., Chicago, IL	121212
CUTF	CUMMINGS TRANSFER & STORAGE CO., Medford, OR	109302
CUMM	CUMMINGS TRUCKING COMPANY, INC., Tuscaloosa, AL	134925
CUXT	CURTIS EXPO TRANSPORTATION, INC., Chicago, IL	192429
CUTT	CURTIS TRANSPORT, INC., Arnold, MO	123476
CUSN	CURTIS, NEAL, Blandinsville, IL	150849
CUSG	CUSHING TRUCKING, INC., Chicago, IL	48004
CWKL	CW TANK LINES, INC., Summit, IL	Pending
DDTA	D & D TRANSPORTATION SERVICES, INC., Gooding, ID	176598
DDTG	D & D TRUCKING, INC., Bensenville, IL	152926
DKRE	D & K REFRIGERATED EXPRESS CO., Palos Heights, IL	193404
DANL	D & L TRANSPORT, INC., Cicero, IL	116273
DNTR	D & N TRANSPORTATION COMPANY, INC., Slatersville, RI	34952
DNSQ	D & S EXPRESS, INC., Bound Brook, NJ	139596
DAXI	D. A. EXPRESS, INC., Calumet Park, IL	52680
DJMO	D.J.M. OIL COMPANY, INC., Benton, IL	174064
DSDA	D.S.D. ASSOCIATES INCORPORATED, London, ON, CN	189230
DNTS	DANA TRANSPORT, INC., Avenel, NJ	36517
DART	DART TRANSIT COMPANY, St. Paul, MN	114457
DAUL	DAUL, W. N., TRANSFER LINES, INC., Kewaunee, WI	68717
DAUM	DAUM OVER-NITE EXPRESS, INC., Indianapolis, IN	69474
DAVS	DAVIS TRANSPORT, INC., Paducah, KY	111397
DDNS	DAVIS, DAN & SONS TRUCKING, Daniel E. Davis, d/b/a, Briggsdale, CO	162602
DSNT	DAVISON TRANSPORT, INC., Ruston, LA	129784
DRLT	DAY, RONALD L., TRANSPORTATION, INC., Oakland, CA	121778
DAME	DAYTON MOTOR EXPRESS, INC., Dayton, TN	121622

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
DYTN	DAYTON TRANSPORT CORPORATION, Dayton, VA	115268
DEBR	De BOER TRUCK LINES, INC., Ripon, CA	99870
DLRK	DE LA ROKA TRUCKING CO., San Diego, CA	166109
DPEN	DE-PEN LINE, INC., Phoenixville, PA	123159
DEAT	DEATON, INC., Birmingham, AL	11207
DEEH	DEEHAN'S EXPRESS, INC., Whitman, MA	76074
DPAF	DEER PARK AUTO FREIGHT, Lewis F. Reilly, d/b/a, Deer Park, WA	127676
DEFB	DeFAZIO EXPRESS, INC., Moosic, PA	44302
DEGR	DeGROOT MOTOR SERVICE, INC., Stickney Township, IL	120347
DEIK	DEIKE, AUGUST, TRANSFER, INC., Mankato, MN	99825
DLNY	DELANEY TRUCKING, Harold L. Delaney, Keith A. Delaney and Timothy L. Delaney, d/b/a, St. Charles, IL	181473
DELQ	DELLA ROSA TRUCKING CO., E & M Trucking, Inc., d/b/a, Martinez, CA	62919
DLMT	DELMOT MOTOR EXPRESS, INC., Elmira Heights, NY	30260
DNAL	DENALI TRANSPORTATION CORPORATION, Fairbanks, AK	118494
DNNY	DENNY TRANSPORT, INC., Jeffersonville, IN	123133
DRGW	DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY, THE, Denver, CO	166474
DRGW	DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY, THE, Denver, CO	⊕
DEVE	DENVER MOVING & STORAGE, INC., Denver, CO	166830
DSLF	DENVER-SALIDA-LEADVILLE FREIGHTLINE, INC., Denver, CO	165878
DSCT	DESERT COASTAL TRANSPORT, INC., Ontario, CA	134441
DEVN	DEVINE & SON TRUCKING CO., West Sacramento, CA	28599
DEYG	DeYOUNG TRANSFER & STORAGE CO., Chester A. DeYoung, d/b/a, Livingston, MT	110391
DGKT	DGK TRUCKING, Richard V. Keim and S. G. Keim, d/b/a, Nampa, ID	179372
DSAL	Di SALVO TRUCKING CO., San Francisco, CA	98768
DIAB	DIABLO TRANSPORTATION, INC., Diablo Systems, Incorporated, d/b/a, Pacheco, CA	105682
DTLI	DIAMOND TRUCK LEASING CORP., West Babylon, NY	166939
DITJ	DIAMOND TRUCKING, INC., Rexburg, ID	155380
DAXP	DICK'S AUTO EXPRESS, INC., East Syracuse, NY	97487
DTSY	DIETRICH TRANSPORTATION SYSTEMS, INC., Kitchener, ON, CN	177478
DILE	DILLIE MOTOR FREIGHT, INC., Washington, PA	105458
DICC	DILLON, C. C., COMPANY, Arnold, MO	163274
DIDP	DISPATCH DISTRIBUTION SERVICES, INC., Buffalo, NY	146894
DTTS	DISTILLERY TRANSFER SERVICE, INC., Bardstown, KY	67996
DSBC	DISTRIBUTION CARRIER, INC., Pittsburgh, PA	152013
DSBE	DISTRIBUTION EXPRESS, Carson, CA	38536
DVIN	DIVISION TRUCKING, Dart Warehouse Corporation, d/b/a, Los Angeles, CA	156209
DXMW	DIXIE MID-WEST TRANSPORTATION, INC., Franklin, IN	176513
DXIE	DIXIE TRUCKING COMPANY, INC., Charlotte, NC	120368
DIXB	DIXON BROS., INC., Newcastle, WY	128685
DOAK	DOAK, NOBLE E., Mattoon, IL	184381
DCTG	DOC'S CARTAGE CO., INC., Burbank, IL	151478
DOND	DON DEE TRUCKING CORPORATION, Jersey City, NJ	22005
DFDI	DONALDSON FREIGHT DELIVERY, INC., Montebello, CA	121836
DONC	DONCO CARRIERS, INC., Oklahoma City, OK	138469
DRAL	DORAL TRANSPORT COMPANY, John Bisgrove, Jr., Gerald Bisgrove, Mary Lou Jones, Betty Jean Kinsella, James A. Smith and Intrans Express Lines, Ltd., d/b/a, Blasdell, NY	92733
DOTT	DOT TRANSPORT, INC., Maspeth, NY	129782
DOLR	DOT-LINE TRANSPORTATION, Cal-Cleve, Limited, d/b/a, Pico Rivera, CA	151374
DBDE	DOUBLE D EXPRESS, INC., Peru, IL	194471
DOUD	DOUDELL TRUCKING COMPANY, San Jose, CA	75302
DGLS	DOUGLAS EXPRESS, INC., Norwalk, CT	95045
DVTO	DOVE TRANSPORTATION, INC., Buena Park, CA	171376
DOWN	DOWNING TRANSPORTS, INC., Locust Grove, OK	162265
DWRS	DRINKWALTER, W. R., AND SONS TRUCKING, Willard R. & Leta F. Drinkwalter, d/b/a, Billings, MT	175146
DRON	DRONE, TONY, Ridgway, IL	161188
DSIT	DSI TRANSPORTS, INC., Deer Park, TX	116077
DUGN	DUGAN TRUCK LINE, INC., Wichita, KS	120657
DUXP	DUGAS EXPRESS COMPANY, Lewiston, ME	58672
DUGS	DUGGAN'S TRUCKING, INC., Buffalo, NY	120951
DUTS	DUNCAN TRUCK SERVICE, INCORPORATED, Flandreau, SD	37490
DUSJ	DUNNE, STEVE J., CARTAGE, INC., Des Plaines, IL	121332
DRKD	DURKEE DRAYAGE COMPANY, South San Francisco, CA	121741
ENDL	E & D LEASING, Chicago, IL	177036
EPTA	E P TRANSPORTATION, INC., Abington, IL	205072
ETLN	E T LINES, INC., Carson, CA	158657
EFLT	E. F. L. TRANSPORTATION, INC., South San Francisco, CA	121748
EFTS	E. F. TRUCK SERVICE, INC., Highland, IL	183763
EGLL	EAGLE LINES, INC., Schererville, IN	192446
EGTL	EAGLE TANK LINES, INC., Crystal Lake, IL	Pending
EABD	EAST AURORA & BUFFALO DELIVERY, H. Edward Narbe, d/b/a, Orchard Park, NY	2134

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
ECTC	EAST COAST TRANSPORT COMPANY, INCORPORATED, Goldsboro, NC	125688
ENMT	EASTERN MOTOR TRANSPORT, INCORPORATED, Richmond, VA	126119
EFSI	EASTERN PARCEL SYSTEM, INC., Shawnee Mission, KS	177578
EAYW	EASYWAY TRANSPORTATION, Frederick J. & Emmy Anna Faurie, d/b/a, Bensenville, IL	157481
EKRT	ECKERT TRUCK LINE, William E. Wells, Jr., d/b/a, Cedaredge, CO	33951
ECOF	ECOFF TRUCKING, INC., Greenfield, IN	119934
ECOE	ECONEXPRESS, INCORPORATED, Pittsfield, IL	165021
ECLN	ECONO LINE EXPRESS, INC., Fremont, CA	133294
ECAR	ECONOMY CARRERS LIMITED, Calgary, AB, CN	138702
EMAS	EDDY MESSENGER SERVICE, INC., Port Chester, NY	94901
EWLT	EDENS, WILLIAM, TRUCKING, INC., Rolling Meadows, IL	193069
EDMC	EDMAC TRUCKING COMPANY, INC., Fayetteville, NC	60018
EDSN	EDSON EXPRESS, INC., Commerce City, CO	35227
EHTC	EDWARDS, HENRY, TRUCKING CO., Clinton, KY	69492
EEJA	Ee-JAY MOTOR TRANSPORTS, INC., E. St. Louis, IL	119422
EGRT	EGGERT TRANSFER, Floyd W. Timm, d/b/a, Crete, NE	90733
EICH	EICHLER TRUCK LEASING, Bob Eichler, d/b/a, Nyssa, OR	193662
EITT	EIT TRANSPORTATION, INC., Deer Park, NY	160714
EMFT	EL DORADO MOTOR FREIGHT, INC., Wichita, KS	96521
ELFT	ELFRINK TRUCK LINES, INC., Advance, MO	14582
ELTK	ELLIOTT TRUCK LINE, INC., Vinita, OK	69117
ELLP	ELLIS PETROLEUM TRANSPORT, INC., Springfield, MO	119768
EMTS	EMERALD TRANSPORTATION SYSTEMS, INC., Boise, ID	176782
EMDV	EMERGENCY DELIVERY, INC., Bridgeview, IL	166210
EAFC	EMERY AIR FREIGHT CORPORATION, Wilton, CT	⊗
ESME	EMPIRE STATE MOTOR EXPRESS, INC., Le Roy, NY	36809
EMTR	EMPIRE TRANSPORT, INC., Boise, ID	119567
EMRE	EMPIRE TRANSPORT, Empire Southwest Co., d/b/a, Phoenix, AZ	164259
EPES	EPES TRANSPORT SYSTEM, INCORPORATED, Blackstone, VA	44128
EGNT	ERGON TRUCKING, INC., Jackson, MS	138958
ERCK	ERICKSON TRANSPORT CORPORATION, Springfield, MO	113908
ERIJ	ERICKSON TRUCKING SERVICE, INC., North Muskegon, MI	99363
ESCR	ESCRO TRANSPORT LTD., Buffalo, NY	46421
EXLA	ESTES EXPRESS LINES, Richmond, VA	97275
EMTW	ETTINGER, M. W., INC., St. Paul, MN	152261
EOFF	EVANS DELIVERY COMPANY, INC., Pottsville, PA	57591
EVTL	EVANS TANK LINE, INC., Maywood, CA	120018
EVRT	EVERETT EXPRESS, INC., Tarboro, NC	78728
EVER	EVERSGERD TRUCK SERVICE, Maurice H. Eversgerd, d/b/a, Germantown, IL	90779
EXSC	EXHIBITORS SERVICE COMPANY, McKees Rocks, PA	647
EXPK	EXPEDITE TRUCK LINES, Montebello, CA	120764
EXDA	EXPEDITED AIR SERVICE, INC., Milwaukee, WI	163474
EXPR	EXPRESS FREIGHT LINES, INC., Milwaukee, WI	76993
FJTK	F & J TRUCKING, INC., Mansfield, OH	176850
FANM	F & M TRANSFER CO., Yakima, WA	76470
FCIJ	F C I TRANSPORT, INC., Freehold, NJ	194691
FABC	F.A.B. TRANSIT, INC., Forest Park, IL	60130
FAXP	FAIRBANKS EXPRESS, INC., Hoosick Falls, NY	79085
FAIR	FAIRBANKS TRUCKING, INC., Modesto, CA	120394
FFFS	FAIRWAY FAST FREIGHT SERVICE, Ervon E. Fairbanks and Leslie A. Fairbanks, d/b/a, Skagway, AK	125778
FTPO	FAIRWAY TRANSPORT, INC., Anaheim, CA	194509
FLNP	FALCON EXPRESS, INC., Bensalem, PA	164199
FCFS	FALCON FREIGHT SYSTEMS, INC., Wanaque, NJ	201196
FALK	FALK TRANSPORTATION CO., INC., Spring Valley, NY	110624
FSVS	FARM SERVICE & SUPPLIES, INC., Marengo, IL	150656
FRKG	FARMER TRUCKING, Bill Farmer, d/b/a, Jacksonville, IL	172193
FAUQ	FARMERS UNION CO-OP TRANSPORT, Stetsonville, WI	161946
FBPE	FARRUGGIO'S BRISTOL AND PHILADELPHIA AUTO EXPRESS, INC., Bristol, PA	38481
FAST	FAST FREIGHT, INC., Chicago, IL	123272
FMXI	FAST MOTOR EXPRESS, INC., Brookfield, IL	160124
FSTQ	FAST MOTOR SERVICE, INC., Brookfield, IL	134612
FWMF	FASTEST WAY MOTOR FREIGHT, INC., Spokane, WA	123602
FFRS	FASTRAX FREIGHT SYSTEM, INC., Chicago, IL	⊗
FCHQ	FAUCHER BROS. CARTAGE, Donna M. Faucher, Michael E. Faucher and Suzanne Faucher Griffith, d/b/a, Chicago, IL	163996
FAJF	FAYARD, JOHN, FAST FREIGHT, INC., Gulfport, MS	165164
FETH	FEATHER, C. L., INC., Altoona, PA	140159
FEME	FEDERAL MOTOR EXPRESS, INC., Mt. Airy, NC	97906
FETC	FEDERAL TRANSFER COMPANY, Los Angeles, CA	36001
FEDC	FEDERAL TRANSFER COMPANY, INC., Seattle, WA	96619
FEET	FEE, E. D., TRANSFER, INC., New Castle, PA	67167

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
FTRI	FENTRESS TRUCKING, Forest W. Fentress, d/b/a, Farmer City, IL	185599
FERE	FERREE TRANSPORTATION, INC., Hammond, IN	118698
FIDC	FIDELITY TRUCKING CORPORATION, Chicago, IL	156317
FFTG	FIFE, FRED, TRUCKING, Fred Fife, d/b/a, Puyallup, WA	205165
FLMC	FILM SERVICE, INC., Milwaukee, WI	45876
FICQ	FINCH, N. E., CO., Peoria, IL	135561
FTLC	FINDLAY TRUCK LINE, INC., Findlay, OH	120378
FNLN	FINE LINE ENTERPRISES, INC., Albany, OR	172584
FILT	FINGER LAKES TRUCKING, INC., Horseheads, NY	4064
FITA	FINLEY TANK TRUCKING, INC., Parma, ID	153282
FSEP	1ST EXPRESS, INC., Toledo, OH	181440
FIVE	FIVE TRANSPORTATION COMPANY, Brunswick, GA	29642
FIWI	FIW, INC., Pecatonica, IL	154358
FLET	FLEET TRANSPORT COMPANY, INC., Brentwood, TN	103051
FLRL	FLEET RAIL, INC., Westmont, IL	159274
FLTN	FLEETLINE, INC., Arlington, TX	171130
FLWE	FLEETWAY EXPRESS, INC., Glen Ellyn, IL	163218
FLHE	FLINT HILLS EXPRESS, INC., Wichita, KS	35737
FLIT	FLITE LINE SERVICE, INC., Sharon Hill, PA	133846
FLOI	FLOIT SAND AND GRAVEL COMPANY, Sycamore, IL	160309
FLOE	FLORIDA EAST COAST HIGHWAY DISPATCH COMPANY, St. Augustine, FL	120975
FECI	FLORIDA EXPRESS CARRIER, INC., St. Augustine, FL	153915
FLRT	FLORIDA ROCK & TANK LINES, INC., Jacksonville, FL	126738
FBTC	FLOYD & BEASLEY TRANSFER COMPANY, INC., Sycamore, AL	18068
FOGS	FOGG'S DAILY SERVICE, Bridgeton, NJ	109098
FOOT	FOOT'S TRANSFER AND STORAGE CO., LTD., Harbor City, CA	64290
FORB	FORBES TRANSFER COMPANY, INC., Wilson, NC	19105
FORE	FORE WAY EXPRESS, INC., Wausau, WI	99565
FTED	FORT EDWARD EXPRESS CO., INC., Fort Edward, NY	139460
FTTQ	FORT TRANSFER CO., Morton, IL	146074
FTSC	FORT TRANSPORTATION & SERVICE COMPANY, INC., Fort Atkinson, WI	71296
FOSD	FOSTER DRAYAGE COMPANY, Oceanside, CA	10221
FOSR	FOUR STAR TERMINALS, INC., Anchorage, AK	113573
FOBL	FOUR B LINES, INC., Vineland, NJ	156050
FXTW	FOX TRANSPORTATION, INC., Racine, WI	182375
FXTI	FOX TRUCKING COMPANY, INC., Carrollton, TX	164429
FOXS	FOX-SMYTHE TRANSPORTATION CO., Oklahoma City, OK	114284
FMRE	FRAMES MOTOR FREIGHT, INC., West Chester, PA	120325
FVTS	FRANK'S VACUUM TRUCK SERVICE, INC., Tonawanda, NY	205256
FKLN	FRANKLIN EXPRESS, INCORPORATED, Franklin, KY	123189
FRKS	FRANKS EXPRESS, William L. Potter, d/b/a, Rhinebeck, NY	97059
FMBT	FRED'S MOBILE TRANSPORT, Fred Brewer, d/b/a, Caldwell, ID	188156
FTLI	FREDERICKSON TANK LINES, INC., West Sacramento, CA	145074
FMEC	FREDRICKSON MOTOR EXPRESS CORPORATION, Charlotte, NC	28307
FRTL	FREEMAN TRUCK LINE, INC., Oxford, MS	22179
FREA	FREEPORT TRANSPORT, INC., Freeport, PA	113666
FSPI	FREIGHT SPECIALIST, INC., Oak Brook, IL	167928
FREQ	FREIGHTWAY CORPORATION, Toledo, OH	119315
FRER	FRERICHS FREIGHT LINES, William F. Frerichs & Robert L. Frerichs, d/b/a, Belleville, IL	9411
FRMF	FREYMILLER TRUCKING, INC., Bakersfield, CA	145102
FSEI	FRICK SERVICES, INC., Wawaka, IN	124062
FTIN	FRIEDERS TRUCKING, INC., Plainfield, IL	176305
FXIT	FRIEDMAN'S EXPRESS INC., Wilkes-Barre, PA	60430
FTGE	FRIES TRUCKING, Ralph J. Fries, d/b/a, Escondido, CA	194385
FROL	FROESEL OIL COMPANY, INC., Ellisville, MO	176157
FTPC	FRONTIER TRANSPORTATION COMPANY, Fairbanks, AK	133621
FUTA	FULL TRANSPORTATION SERVICE, INC., Chicago, IL	178677
FMTS	FULLERTON MOTOR TRUCK SERVICE, INC., Chicago, IL	119684
FOME	FULTON-OSWEGO MOTOR EXPRESS, INC., Fulton, NY	99560
FUNK	FUNK'S HAULING SERVICE, INC., Philadelphia, PA	43593
FUTN	FUTURE TRANSPORT, INC., Hauppauge, NY	Pending
GNDQ	G & D TRUCKING, INC., Morris, IL	172442
GAHM	G & H MOTOR FREIGHT LINES, INC., Greenfield, IA	110581
GPTC	G & P TRUCKING COMPANY, INC., Greenville, SC	60709
GNRM	G & R TRANSPORT, Brunk Corp., d/b/a, Goshen, IN	156685
GNRK	G & R TRUCKING, Eugene Bryant, d/b/a, Hampton, GA	291908
GNSF	G & S FREIGHT SERVICE, T. G. & D. S. Freight Service, Inc., d/b/a, Highland, IL	Pending
GITC	G. I. TRUCKING COMPANY, La Mirada, CA	99685
GMGT	G.M.G. TRANSPORTATION CORP., Lake Ronkonkoma, NY	164905
GADQ	GALE DELIVERY, INC., Bayshore, NY	134353
GANG	GANGLOFF & DOWNHAM TRUCKING CO., INC., Logansport, IN	133566

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
GARO	GARDEN CITY TRANSPORTATION CO., INC., Hayward, CA	144447
GARE	GARDINER'S EXPRESS, INC., Hammonton, NJ	118118
GARN	GARNSEY, PAUL, & SON, INC., Schuylerville, NY	119297
GRVT	GARVEY TRANSPORT, INC., Holbrook, MA	120380
GTFO	GARY TRANSFER COMPANY, INC., Gary, IN	156068
GATF	GATOR FREIGHTWAYS, Starke, FL	121669
GAYT	GAY TRUCK LINE, INC., Falkner, MS	104681
GMFC	GEM FUEL CO., A. H. Schade, Inc., d/b/a, Nampa, ID	195622
GTFF	GEMINI TRAFFIC SALES, INC., Closter, NJ	107062
GNTB	GEN TRANS LTD., Brampton, ON, CN	200288
GNCS	GENCOM SERVICES, Peter Jeffrey, d/b/a, Wheeling, IL	156411
GENE	GENE'S TRANSFER, Eugene E. Waskowiak, d/b/a, Ravenna, NE	120241
GECM	GENERAL COMMODITIES TRANSPORT, INC., Chicago Ridge, IL	174931
GETR	GENERAL TRANSFER COMPANY, Decatur, IL	96952
GTPN	GENERAL TRANSPORTATION, INC., Oakland, CA	146446
GSIS	GENESIS TRANSPORTATION CO., INC., Cape Girardeau, MO	165773
GTRC	GEORGE TRANSFER, INC., Parkton, MD	8535
GFAT	GEORGIA FLORIDA ALABAMA TRANSPORTATION COMPANY, Forest Park, GA	01788
GASR	GEORGIA SOUTHERN TRANSPORTATION, INC., Cartersville, GA	157719
GRDE	GERARD EXPRESS, INC., Elmwood Park, NJ	21694
GRMQ	GERARDO & SON MOTOR SERVICE, INC., Rosemont, IL	144369
GJKW	GERMANN, JAKE W., Woodlawn, IL	176223
GILD	GILDAY COMPANY, INC., THE, Kansas City, KS	13129
GITR	GILLILAND TRANSFER COMPANY, Fremont, MI	107323
GPSV	GIRTON PROPANE SERVICE, INC., Clay Center, KS	191537
GLBH	GLEBA, INCORPORATED, Conshohocken, PA	205236
GTAS	GLENDALE TRANSFER & STORAGE CO., INC., Glendale, CA	4297
GLET	GLENNON TRANSPORTS, INC., St. Louis, MO	67210
GLTL	GLENWOOD TRANSIT LINE, INC., Glenwood, IA	2729
GLOB	GLOBE TRANSPORTATION CO., Denver, CO	114385
GLOT	GLOBE TRUCK LINES, INC., Denver, CO	13719
GOTL	GOGGIN TRUCK LINE CO., INC., Shelbyville, TN	121396
GOAJ	GOLD DIGGER APPLES, INC., Oroville, WA	203795
GDEP	GOLD ENTERPRISE, INC., Chicago Heights, IL	172414
GBFL	GOLDEN BAY FREIGHT LINES, James William Livesay, d/b/a, Modesto, CA	120708
GLDT	GOLDEN CHARIOT TRUCK LINE, INC., San Diego, CA	121782
GOCF	GOLDEN COAST FORWARDING, LTD., Chicago, IL	⊗
GLPE	GOLDEN PYRAMID ENTERPRISES, INC., Blue Island, IL	Pending
GLGH	GOLDING, GEORGE H., INC., Lockport, NY	139579
GOTS	GOOD'S TRANSPORTATION SERVICE, INC., Lockport, NY	68104
GOLL	GOODALL TRANSPORTATION COMPANY, INC., Trenton, NJ	165873
GORY	GOTTRY CORP., Rochester, NY	14781
GOCS	GOVERNMENT CONTRACT SERVICES, INC., Annapolis, MD	Pending
GDSN	GRACE DISTRIBUTION SERVICES, INC., Duncan, SC	144843
GTCK	GRAFF TRUCKING COMPANY, INC., Kalamazoo, MI	105269
GRAM	GRAHAM SHIP BY TRUCK COMPANY, Kansas City, KS	47038
GRNL	GRANE TRANSPORTATION LINES, LTD., Chicago, IL	30032
GSTH	GRATO & SONS TRUCKING CO., INC., Port Newark, NJ	174373
GRCE	GREAT COASTAL EXPRESS, INCORPORATED, Richmond, VA	4491
GLBW	GREAT LAKES BULK SERVICE, INC., Remington, IN	188697
GBMG	GREATER BUFFALO MOVING & STORAGE CO., INC., Buffalo, NY	16684
GAOI	GREEN ARROW, INC., Caldwell, ID	152843
GBCL	GREEN BAY-CHICAGO LINES, Green Bay, WI	70635
GMXT	GREENLEAF MOTOR EXPRESS, INC., Ashtabula, OH	106223
GMLS	GREENWOOD MOTOR LINES, INC., Greenwood, SC	99074
GRES	GRESHAM TRANSFER, INC., Portland, OR	29960
GRIL	GRILEY FREIGHTLINES, Carson, CA	106054
GMTI	GRIMES TRUCKING COMPANY, Jacksonville, FL	152140
GRMW	GRISWOLD, M. W., TRUCKING, INC., Shingle Springs, CA	156892
GRTT	GROENDYKE TRANSPORT, INC., Enid, OK	111401
GEGT	GROGER, G. E., TRUCK LINE, INC., Walton, KY	39763
GRTP	GROOME TRANSPORTATION, INC., Richmond, VA	127900
GRCC	GROSS COMMON CARRIER, INC., Wisconsin Rapids, WI	1494
GUTO	GUARANTEED TRANSPORTATION, INC., St. Louis, MO	183665
GURJ	GUERRERA, R. J., INC., Naugatuck, CT	152990
GULI	GULLY TRANSPORTATION, INC., Quincy, IL	118776
GPSY	GYPSY TRANSPORTATION SYSTEM (Division of Transus, Inc.), Atlanta, GA (See Note)	68923
	Note—Gypsy Transportation System is not a separate carrier but a division of Transus, Inc. All provisions of this tariff that apply for Transus, Inc. are also applicable for Gypsy Transportation System (Division of Transus, Inc.).	
HJTL	H & J TRUCK LINE, INC., Nashville, TN	34772

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
HNOT	H & O TRANSPORT, INC., Campbellsville, KY	38227
HASW	H & S WAREHOUSE, INC., Fairbanks, AK	118475
HAWM	H & W MOTOR EXPRESS COMPANY, Dubuque, IA	69224
HCNM	H C & M TRANSPORTATION, INC., Flagstaff, AZ	188914
HCTH	H.C. TRUCKING, INC., Burbank, IL	82044
HZKF	HACKER, ZEKE, FARMS, INC., Homedale, ID	203033
HNTP	HAHN TRANSPORTATION, INC., Newmarket, MD	66388
HALB	HALBERT BROTHERS, INC., Los Angeles, CA	75692
HASY	HALL SYSTEMS, INC., Birmingham, AL	144011
HTCP	HALL TRUCKING COMPANY, INC., Orleans, IN	160805
HEMF	HALL'S FAST MOTOR FREIGHT, INC., South Plainfield, NJ	127346
HDLF	HALL, D & L, FREIGHT LINE, David L. and Lorena Ann Hall, d/b/a, Pendleton, OR	5874
HLWY	HALLWAY, INC., Greenview, IL	128742
HRAC	HAMILTON, RAY, COMPANY, THE, Cincinnati, OH	40326
HNDY	HANDY TRUCK LINE, INC., Heyburn, ID	128917
HTCY	HANOVER TRANSFER CO., Hanover, PA	68898
HNBD	HANSEN, BOBBY D., Pingree, ID	178057
HTRF	HANSON TRANSFER, INC., Fremont, NE	134330
HJAT	HANSON, JAMES T., Twin Bridges, MT	193575
HAFL	HARBIN FREIGHT LINE, Ira T. Harbin, d/b/a, Luverne, AL	115930
HABQ	HARBOR TRANSPORT, INC., Oakland, CA	196619
HAFS	HARBOURT AIR FREIGHT SERVICE, INC., Trenton, NJ	123579
HAXP	HARDER'S EXPRESS, INC., Claverack, NY	42212
HDGQ	HARDING EXPRESS, INC., Lockport, NY	160289
HRDY	HARDY TRUCKING CO., E. D. Hardy and E. M. Hardy, d/b/a, Lakewood, CA	120747
HARC	HARE CARTAGE, INC., Detroit, MI	156769
HRMY	HARMONY TRANSPORT, INC., Marengo, IL	194760
HPCO	HARPER TRUCKING COMPANY, INC., Raleigh, NC	174460
HRLT	HARPER'S RED LINE TRANFER CO., Joliet, IL	99289
HRRL	HARRELL, R. O., INC., South Boston, VA	103826
HRXQ	HARRIS MOTOR EXPRESS, INC., Cincinnati, OH	146814
HRTP	HARRIS TRANSPORTATION CO., Victorville, CA	121300
HAPR	HARRIS TRANSPORT COMPANY, Monroe, NC	195392
HDNS	HARRIS, DICK, & SON TRUCKING CO., INC., Lynchburg, VA	44901
HTLY	HARTLEY TRUCKING COMPANY, INC., Ravenswood, WV	133288
HRMC	HARTMAN TRUCKING CO., INC., Summit, IL	161220
HAHS	HARTMAN, H. A., & SON, INC., Steelton, PA	73390
HRSE	HARTSELL TRUCKING, George T. Galiotto, d/b/a, Redding, CA	168957
HSLD	HASLAM DISTRIBUTION AND EXPRESS COMPANY, Salt Lake City, UT	158140
HASL	HASLETT COMPANY, Oakland, CA	73826
HATB	HATBORO DELIVERY SERVICE, INC., Warminster, PA	121550
HATC	HATCH, W. S., CO., Woods Cross, UT	109689
HTCH	HATCHER TRUCKING COMPANY, INCORPORATED, Roanoke, VA	10169
HATF	HATFIELD TRUCKING SERVICE, INC., Sacramento, CA	117503
HAUV	HAUL TRANSPORT OF VA., INC., Milwaukee, WI	173554
HLNG	HAULING FREIGHT LINES, Angola, NY	179506
HXCT	HAWK OF CONNECTICUT, INC., Stamford, CT	30653
HAKY	HAWKEY TRANSPORTATION, INC., Redding, CA	97557
HYNM	HAYNES MOTOR LINES, INC., Baton Rouge, LA	154678
HAZD	HAZARD EXPRESS, INC., Hazard, KY	58777
HEVY	HEAVY TRANSPORT, INC., Long Beach, CA	14138
HECT	HECHT BROTHERS, INC., Toms River, NJ	59570
HEER	HEEREN TRUCKING COMPANY, INC., Lemmon, SD	1150
HLMR	HELMERS' FUEL & TRUCKING, INC., Old Forge, NY	56628
HEMS	HEMSATH, JACK, DRAYAGE, INC., Oakland, CA	99327
HEDN	HENDERSON, EARL L., TRUCKING COMPANY, Salem, IL	146209
HCST	HENRY, C. S., TRANSFER, INC., Rocky Mount, NC	38154
HERD	HERDER TRUCK LINES, INC., Weimar, TX	115938
HERL	HERLIHY, JAMES F., TRUCKING CO., INC., Binghamton, NY	116602
HERM	HERMAN BROS., INC., Omaha, NE	61396
HRRS	HERR'S MOTOR EXPRESS, INC., Quarryville, PA	105461
HRON	HERRON TRANSFER CO., Salem, OH	109537
HEST	HESS TRUCKING CO., Harrisburg, PA	121272
HWAY	HI-WAY DISPATCH, INC., Marion, IN	119654
HBD	HIBBARD TRUCKING COMPANY, Akron, OH	158805
HETV	HIEL TRUCKING, INC., Prairie City, IL	149588
HGI	HIGATE, INC., San Francisco, CA	170053
HGHW	HIGH WEST, INC., Billings, MT	193548
HWFT	HIGHWAY FREIGHT, INC., Port Newark, NJ	4095
HYTT	HIGHWAY TRANSPORT, INC., Knoxville, TN	111302
HISE	HILTON-SPENCERPORT EXPRESS, INC., Kendall, NY	98214

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
HRHR	HINRICHS, RUSSELL, Petersburg, IL	174782
HLOB	HLOBIK TRUCKING, Ladislav Hlobik, d/b/a, Apple Valley, CA	207353
HMLE	HMIELESKI TRUCKING CORP., South Plainfield, NJ	36974
HOBB	HOBBS TRUCKING CO., Anaheim, CA	119326
HOCE	HOC EXPRESS, INC., Wichita, KS	162068
HFFM	HOFFMAN TRUCKING, Scott G. Hoffman, Terry K. Hoffman and Kyle J. Hoffman, d/b/a, Marca, IL	169585
HOGT	HOGLAND TRANSFER COMPANY, Everett, WA	40505
HOHT	HOHENWALD TRUCK LINES, INC., Hohenwald, TN	17000
HLYT	HOLLY TRANSPORTATION, Joann Perrucci, d/b/a, San Jose, CA	177472
HLTC	HOLMEN LA CROSSE TRUCK LINE, Cletus A. Casey, d/b/a, Ettrick, WI	120077
HOFL	HOLMES FREIGHT LINES, INC., Omaha, NE	124830
HOLM	HOLMES TRANSPORTATION, INC., Framingham, MA	30139
HLTI	HOLTON TRANSPORT, INC., Holton, KS	203244
HLTN	HOLTON TRUCK LINE, INC., Topeka, KS	97375
HOME	HOME TRANSPORTATION COMPANY, INC., Marietta, GA	111545
HKAY	HONDA, KAY, Idaho Falls, ID	202964
HZTP	HORIZON TRANSPORTATION, INC., Baltimore, MD	170190
HMEE	HORN'S MOTOR EXPRESS, INC., Chambersburg, PA	2780
HSEP	HOT SHOT EXPRESS, INC., Spring City, PA	166984
HOTR	HOUFF TRANSFER, INCORPORATED, Weyers Cave, VA	66900
HOVR	HOVER TRUCKING CO., South Bend, IN	101819
HOXP	HOWARD'S EXPRESS, INC., Geneva, NY	97006
HUHB	HUGHES BROTHERS TRANSPORTATION, INC., Niles, IL	99017
HUZN	HUIZINGA, J., CARTAGE CO., INC., Cicero, IL	161181
HUSV	HUNT SUPER SERVICE, INC., Bradley, IL	146628
HUTL	HUNT TRUCK LINES, INC., St. Paul, MN	62979
HURN	HURON MOTOR, INC., Bridgeview, IL	9602
HUER	HUSTLERS, INC., Anchorage, AK	163948
HYDR	HYDER, CLAY, TRUCKING LINES, INC., Auburndale, FL	25798
HYMF	HYMAN FREIGHTWAYS, INC., Roseville, MN	108835
HTSL	HYNDMAN TRANSPORT (1972) LIMITED, Wroxeter, ON, CN	178142
ISTK	I & S TRUCKING, Simon Traylor, d/b/a, Oakland, CA	151749
IEEE	I-88 EXPRESS LINES, INC., Cobleskill, NY	4306
IGOS	I-GO VAN & STORAGE, INC., Bakersfield, CA	151094
IDCA	IDA-CAL FREIGHT LINES, INC., Nampa, ID	118318
IDTR	IDA-TRAN, INC., Boise, ID	181142
IDTJ	IDAMONT TRANSPORT, INC., Jerome, ID	203473
IDEL	IDEAL TRUCK LINES, INC., Norton, KS	989
IHCT	IHC TRANSPORTATION, Division of Ivy Hill Corporation, Terre Haute, IN	163469
ILNQ	ILLINI STATE TRUCKING CO., Thornton, IL	163849
ILBK	ILLINOIS BULK CARRIER, INC., Thornton, IL	177265
IPTP	IMPERIAL TRANSPORTATION, Industry, CA	163972
INEG	INCE MOTOR FREIGHT, Ronald Ince, d/b/a, Clay, NY	Pending
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL	161864
INRT	INDIAN RIVER TRANSPORT CO., Winter Haven, FL	109708
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN	108449
IDRL	INDUSTRIAL FREIGHT SYSTEM, INC., Sun Valley, CA	120822
INFT	INFINGER TRANSPORTATION COMPANY, INC., Charleston Heights, SC	109891
INLF	INLAND FREIGHT LINES, Orange, CA	121765
INFR	INLAND FREIGHTWAYS INC., Kearny, NJ	1768
IMEP	INTER MODAL XPRESS, Buffalo, NY	172833
ISXP	INTER STATE EXPRESS, INC., Maspeth, NY	©
ICTS	INTER-CITY TRUCKING SERVICE, INC., Detroit, MI	28658
IPDI	INTERAMERICAN PUBLIC DISTRUBUTION CORPORATION, Los Angeles, CA	121803
ICPT	INTERCEPT, INC., Bluffton, SC	121806
INTW	INTERCOASTAL LINES, LTD., Newport Beach, CA	146046
ICON	INTERCON CARTAGE, INC., Northlake, IL	190193
ITLN	INTERLINES, INC., R-G-M Corp., d/b/a, Vernon, CA	139496
IMDL	INTERMODAL TRANSPORT, INC., Louisville, KY	136903
ITSV	INTERMODAL TRANSPORTATION SERVICES, INC., Cincinnati, OH	142703
INTP	INTERNATIONAL TRANSPORT, INC., Rochester, MN	113855
ITTW	INTERNATIONAL TRANSPORT, INC., Towaway Division, Rochester, MN	113855
INST	INTERSTATE CONSOLIDATION, INC., Commerce, CA	97977
ITSC	IRELAND TRANSFER & STORAGE CO., Ketchikan, AK	123327
IRQS	IROQUOIS TRUCKING CO., INC., Gilman, IL	182109
IRVO	IRVING OIL CO., INC., Peabody, MA	180187
JNMI	J & M CARTAGE, INC., Oklahoma City, OK	147189
JAMK	J & M TANK LINES, INC., Americus, GA	148903
JNPE	J & P EXPRESS, Jean Powers, d/b/a, Lakeside, CA	162931
JARW	J & R TRUCKING, Jerry Diemoz, d/b/a, Rock Springs, WY	192005
JSTS	J & S TRUCKING SERVICE, INC., Linden, NJ	7647

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
JSTC	J & S TRUCKING, John M. Perley and Susan J. Perley, d/b/a, Sunburst, MT	202519
JNTT	J & T TRANSPORT, INC., Pennsauken, NJ	65429
JWTS	J & W TRUCKING COMPANY, Otis Jackson, d/b/a, Shreveport, LA	203569
JAFI	J. A. FRATE, INC., Crystal Lake, IL	144071
JDTO	J. D. TRANSPORTS, INC., Memphis, TN	151348
JJLD	J J L. DISTRIBUTION SYSTEMS, INC., Garden City, NY	66143
JLBT	J L B. TRUCKING CORP., Hasbrouck Heights, IL	198772
JMSI	J M S. TRANSPORTATION SERVICES, LTD., Sarnia, ON, CN	194106
JSGO	J S O. TRUCKING CO., San Jose, CA	184408
JACN	JACOBSON TRANSPORT, INC., Wheaton, IL	133666
JCDT	JACOBSON, DON, TRUCKING, Don Jacobson, d/b/a, Billings, MT	168597
JAME	JAMES, ORIN L., JR., Cameron, MO	105095
JMRQ	JAN'S MOTOR SERVICE, INC., Alsip, IL	129191
JSEP	JAY, STEVEN, CORPORATION, Arkansas City, KS	173254
JETS	JEFF'S TRUCKING, INC., Waupun, WI	8310
JEFF	JEFFRIES, H. J., TRUCK LINE, INC., Carlisle, PA	113459
JEFL	JENNEY FREIGHT LINE, INC., Wheeling, IL	120092
JOCP	JENSEN OIL COMPANY, INC., Challis, ID	200021
JERN	JERNICK, THOMAS L., Shelter Island, NY	99250
JECT	JERSEY CITY TRANSFER, Gary Stullo, d/b/a, Delran, NJ	26844
JCFL	JERSEY COAST FREIGHT LINES, INC., Neptune, NJ	107417
JAFS	JET DELIVERY SYSTEMS, INC., Portland, OR	138174
JTKG	JETTA TRUCKING, INC., Park Ridge, IL	166858
JMFI	JMF, INC., St. Maries, ID	141942
JORT	JOART TRUCKING CO., New Brunswick, NJ	89369
JOHC	JOHNCOX, RICHARD R., Avon, NY	145281
JOWH	JOHNS, W. H., INC., Lancaster, PA	78117
JHNL	JOHNSON LEASING, INC., Lynd, MN	161889
JOTB	JOHNSON TRUCKING, Joel W. Johnson, d/b/a, Billings, MT	199788
JOAR	JOHNSON, ARTHUR, CO., Cicero, IL	21040
JSON	JOHNSON, H. F., INC., Billings, MT	107151
JOPA	JOHNSON, P. A., & CO., Broadview, IL	121309
JSSN	JOHNSON, STEVE, & SONS TRUCKING, INC., Ontario, OR	182717
JSFL	JOHNSTON'S FUEL LINERS, INC., Newcastle, WY	108380
JEXI	JONES EXPRESS, INC., Spring City, PA	200308
JONS	JONES MOTOR CO., INC., Spring City, PA	4963
JTRC	JONES TRANSFER COMPANY, Monroe, MI	4966
JTLS	JONES TRUCK LINES, INC., Springdale, AR	111231
JOTK	JONES TRUCKING SERVICE, Aubrey L. Jones, d/b/a, Stewardson, IL	151642
JTWC	JONES, D. D., TRANSFER AND WAREHOUSE COMPANY, INCORPORATED, Chesapeake, VA	1630
JJEO	JONES, JOHN E., OIL COMPANY, INC., Stockton, KS	178051
JOBI	JOST BAR, INC., Vallejo, CA	135714
JUEG	JUENGER, FLOYD, INC., Mascoutah, IL	152044
JUBR	JUSTAX BROS. CO., INC., Hammond, TN	158054
KBFL	K & B FREIGHT LINE, Larry R. Billings, d/b/a, Saline, KS	120099
KKTG	K & K TRUCKING, INC., Carthage, TN	151880
KNRQ	K & R DELIVERY, INC., Hinsdale, IL	36255
KASJ	K & S RENTALS, INC., Jacksonville, FL	199171
KLNM	'K' LINE MOTOR SERVICE, INC., Berkeley, IL	187085
KTKL	K-TRUCK LINES, INC., Ord, NE	Pending
KCSE	K.C.S. EXPRESS COMPANY, Superior Delivery Systems, Inc., d/b/a, Poughkeepsie, NY	98068
KAHN	KAHAN DELIVERY SERVICE, INC., St. Louis, MO	667
KAJE	KAJE TRANSPORT, Winter Haven, FL	189474
KAEJ	KANE FREIGHT LINES, INC., Scranton, PA	99567
KANE	KANE TRANSFER COMPANY, Baltimore, MD	9859
KANN	KANE, E. I., INC., Baltimore, MD	34479
KANY	KANEY TRANSPORTATION, INC., Freeport, IL	115651
KSPB	KANSAS CITY PIGGYBACK, INC., Springfield, IL	151065
KRPR	KARPER, CHARLES W., INC., Chambersburg, PA	27903
KATE	KATO EXPRESS, INC., Elizabethtown, KY	124783
KAZJ	KATZMAN, J. KENNETH, JR., INC., Burlington, WI	162836
KANQ	KAUFFMAN & MINTEER, INC., Jobstown, NJ	135859
KAVL	KAVLI'S TRUCK LINE, Duane Kavli, d/b/a, Rolette, ND	120545
KWTC	KAW TRANSPORT COMPANY, Kansas City, MO	106400
KBCF	KBC FREIGHTWAYS, INC., Burbank, IL	15546
KEGQ	KEEGAN, JAMES P., CO., INC., Kinderhook, NY	145281
KTHQ	KEITH, DON E., Corcoran, CA	144587
KLDT	KELDORN TRUCKING, Donald R. Spence and Terri L. Spence, d/b/a, Chicago Heights, IL	166043
KELL	KELLER TRUCKING COMPANY, INC., Park City, IL	120544
KELY	KELLEY, E. J., CO., INC., THE, Torrington, CT	2830
KEJB	KELLEY, JACK B., INC., Amarillo, TX	123392

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@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
KNTC	KENAN TRANSPORT COMPANY, INCORPORATED, Chapel Hill, NC	124306
KENC	KENTCO, INC., American Falls, ID	200389
KYTF	KENTUCKY T.O.F.C. DELIVERY SERVICE, INC., Princeton, KY	138782
KERH	KERI CORPORATION, Maspeth, NY	164060
KRML	KERR MOTOR LINES, INC., Binghamton, NY	126588
KEWT	KEY WAY TRANSPORT, INC., Baltimore, MD	73533
KEYE	KEYCO MOTOR FREIGHT, INC., Glen Cove, NY	11928
KEYL	KEYSTONE LINES, Anaheim, CA	151658
KPFL	KICKAPOO FREIGHT LINES, LaVerne Baumgartner & Patrick Berns, d/b/a, LaCrosse, WI	157427
KINT	KING TRANSFER, LTD., Onana, IA	127745
KIDJ	KING, D. J., INCORPORATED, Branford, CT	116572
KITR	KING, JOHN M., TRANSPORTATION, INC., Philadelphia, PA	61622
KITL	KINGSWAY TRANSPORTS LIMITED, Rexdale, ON, CN	112908
KIBY	KIRBERRY TRANSPORTATION, INC., Woodbridge, NJ	123063
KLAN	KLANN, JOHN, MOVING & TRUCKING COMPANY, THE, Cleveland, OH	121261
KLIN	KLEIN, FRANK C., & CO., INC., Denver, CO	100431
KLEQ	KLEMM, CARL, INC., DePere, WI	147216
KNPE	KNAPP'S EXPRESS, INC., Ridgefield Park, NJ	59098
KNDE	KNIGHT'S DELIVERY SERVICE, INC., Rancho Dominguez, CA	163229
KNXC	KNOX CARTAGE COMPANY, INC., Knoxville, TN	150333
KHSI	KOCH SERVICE, INC., Wichita, KS	145149
KODA	KODIAK TRANSFER, INC., Kodiak, AK	126271
KHMQ	KOHL'S MOTOR TRANSFER COMPANY, Chicago, IL	151149
KOYM	KOOYMAN, PETE, TRUCKING, INC., Stockton, CA	99375
KOPP	KOPPERUD TRANSPORTATION, Herbert N. Kopperud, d/b/a, Palmer, AK	116489
KOKE	KOSCHKEE TRANSFER, INC., Fennimore, WI	98569
KOSS	KOSS, DONALD, INC., Billings, MT	152996
KRME	KRAMME, P. E., INC., Monroeville, NJ	119443
KRTV	KRANS TRUCKING, George Krans, d/b/a, LaFayette, IL	152705
KRSS	KRAUSS LEASING, INC., Joliet, IL	Pending
KUJA	KUJAK TRANSPORT, INC., Winona, MN	109449
KTZE	KURTZ, R. M., ENTERPRISES, Lititz, PA	166296
LDSV	L & D SERVICE, INC., Vermont, IL	150616
LGTJ	L & G TRUCKING, Lawence C. Junker, d/b/a, Boise, ID	203796
LALL	L & L LEASING, INC., Waterloo, IN	157042
LAAM	L & L MOTOR FREIGHT, INC., Oklahoma City, OK	149152
LPTQ	L.P. TRANSPORTATION, INC., Chester, NY	126247
LSBT	L.S.B. TRANSPORT, LTD., Hamilton, ON, CN	169820
LAMO	LA MARK TRANSPORT, Pittsburg, CA	166723
LAPT	LA PORTE TRANSIT CO., INC., LaPorte, IN	71043
LAST	LA SALLE TRUCKING COMPANY, Chula Vista, CA	109126
LCYS	LACY'S EXPRESS, INC., Penns Grove, NJ	5296
LAID	LAIDLAW TRANSPORT LIMITED, Hamilton, ON, CN	113784
LSTL	LAKE SHORE TRANSPORTATION LINES, INC., Oswego, NY	41091
LKLN	LAKELAND EXPRESS, INC., Dover, NJ	2257
LKBH	LAKEVIEW BOAT HAULERS, INC., Cayuga, NY	157476
LMXP	LAMBERT-MARKS EXPRESS, Edward Darby Lavender, d/b/a, Marks, MS	108220
LMNT	LAMONT TRUCKING, William Lamont, Kenneth E. Lamont & John T. Riley, d/b/a, Crossville, IL	157149
LAPN	LAMPTON-LOVE, INC., Jackson, MS	145304
LSPN	LAND SPAN, INC., Lakeland, FL	163573
LNDA	LANDA MOTOR LINES, Kansas City, MO	88370
LAMT	LANDGREBE MOTOR TRANSPORT, INC., Valparaiso, IN	2980
LNOV	LANDOVER TRUCKING, INC., Kearny, NJ	173613
LNTA	LANE TRANSPORTATION, INC., Sicklerville, NJ	164982
LANT	LANGE TRUCK LINE, Victor L. Lange, d/b/a, Pleasanton, TX	41870
LTRC	LANGER TRANSPORT CORP., Jersey City, NJ	42261
LCHE	LARSEN, CHARLES E., Billings, MT	201991
LBIY	LATTAVO BROTHERS, INC., Canton, OH	45194
LURL	LAUREL MOUNTAIN EXPRESS, INC., Pittsburgh, PA	120718
LRLT	LAUREL TRUCKING COMPANY, INC., East Bernstadt, KY	154337
LRET	LAUREL TRUCKING, INC., Merrillville, IN	178794
LAVD	LAVERY, DOUG, LIMITED, Alsip, IL	⊗
LAWB	LAWRENCEBURG TRANSFER, INC., Lawrenceburg, KY	98255
LEMR	Le MARS TRANSFER CO., INC., Le Mars, IA	58270
LEBI	LEBARNOLD, INC., Camp Hill, PA	149541
LEES	LEE & EASTES TANK LINES, INC., Seattle, WA	108703
LESR	LEESER TRANSPORTATION, INC., Palmyra, MO	135197
LXTO	LEESER TX, INC., Palmyra, MO	191968
LHMN	LEHMAN CARTAGE, INC., Elyria, OH	7573
LEIT	LEITCHFIELD TRANSFER CO., Leitchfield, KY	66667
LEMT	LEMMON TRANSPORT COMPANY, INCORPORATED, Marion, VA	107544

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Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
LENO	LENCO TRANSPORT, Leonard Kranz, d/b/a, Aurora, IL	158387
LBTC	LEONARD BROTHERS TRANSPORT COMPANY, INC., Kansas City, MO	13547
LEON	LEONI MOTOR EXPRESS, INC., Chicago Heights, IL	121123
LEST	LESTICIAN, JOHN, TRUCKING, INC., Trenton, NJ	35908
LETL	LEWIS TRUCK LINES, INC., Fargo, ND	106485
LXCO	LEXCO, INC., Lake In The Hills, IL	156679
LIBE	LIBE, E. B., INC., Phillipsburg, NJ	63908
LBYT	LIBERTY TRANSPORTATION CO., Morton, IL	195591
LMES	LIBERTY-MIDDLETOWN EXPRESS, INC., Liberty, NY	99340
LIET	LIEDTKA, P., TRUCKING, INC., Trenton, NJ	127974
LIFS	LIFSCHULTZ FAST FREIGHT, INC., New York, NY	152552
LICS	LIGHTNING CARGO SEVICES, INC., Elk Grove Village, IL	Ⓢ
LGDG	LIGHTNING DRAYAGE COMPANY, INC., Oakland, CA	185495
LGTA	LIGHTNING TRANSPORTATION, INC., Memphis, TN	158130
LIGS	LIGON NATIONWIDE, INC., Madisonville, KY	167225
LILO	LILLEY TRUCKING, INC., Princeton, IL	146521
LIMF	LINDEN MOTOR FREIGHT CO., INC., Linden, NJ	59247
LNSN	LINDSAY TRANSPORT, INC., Dade City, FL	165426
LINS	LINDSEY'S EXPRESS, INC., Mount Holly, NJ	107284
LINK	LINK TRUCKING, INC., Salt Lake City, UT	121043
LQCG	LIQUID CARGO, INC., Kearny, NJ	177137
LIQD	LIQUID TRANSPORT CORP., Greenfield, IN	119226
LQID	LIQUID TRANSPORTERS, INC., Louisville, KY	112617
LVEI	LITTLE VALLEY ENTERPRISES, INC., Harper, OR	203797
LBMF	Lo BIONDO BROTHERS MOTOR EXPRESS, INC., Rosenhayn, NJ	29934
LBDL	LOBDELL TRANSPORTATION, INC., Lena, IL	136093
LKTK	LOCK TRUCK LINE, Charles Lock and Timothy Lock, d/b/a, Carrollton, MO	141915
LODS	LODESKY, DAN, TRUCKING, INC., Gurnee, IL	124247
LOTF	LODI TRUCK SERVICE, INC., Lodi, CA	107104
LOFG	LOFGREN TRUCKING SERVICE, INC., Rush City, MN	146579
LOJT	LOGAN, JIM, TRUCKING, INC., Powell, WY	179795
LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA	138026
LONR	LONG ROCK CO., Princeville, IL	145827
LOMI	LOOMIX, INC., Arroyo Grande, CA	146024
LOPS	LOPES TRUCKING SERVICE, INC., Modesto, CA	121768
LORS	LORSBACH TRUCKING, INC., Granite City, IL	95296
LAYM	LOS ANGELES-YUMA FREIGHT LINES, INC., Yuma, AZ	14045
LOAG	LOTT, ARLO G., Arco, ID	152523
LACT	LOUISVILLE AND CORYDON TRANSFER, Louisville, New Albany & Corydon Railroad Company, d/b/a, Corydon, IN	64855
LOSE	LOUISVILLE-SHELBYVILLE EXPRESS, INC., Louisville, KY	121750
LOSD	LOUX & SON DRAYAGE, Harry Loux, d/b/a, Oakland, CA	96708
LVJY	LOVEJOY, ARDELL, Wakinda, SD	205936
LUKY	LUCKEY TRUCKING, INC., Streator, IL	145359
LUED	LUEDDEKE, WILLIAM M., MOTOR FREIGHT, William M. Lueddeke, d/b/a, Watchung, NJ	60933
LYCH	LYNCH, W. W., INC., Long Beach, CA	96748
LTIA	LYNDEN TRANSPORT, INC., Lynden, WA	65802
LYWF	LYNWAY FREIGHT SYSTEMS, INC., Jersey City, NJ	152998
LYNT	LYONS TRANSPORTATION LINES, INC., Erie, PA	109564
MNSA	M & S CARTAGE, INC., Cottondale, AL	154910
MTDR	M & T DRUM SERVICE, INC., Huntersville, NC	153180
MANL	M AND N TRUCK LINE, Oakland, CA	121391
MTIP	M T I, INC., Marine Transportation Intermodal, Inc., d/b/a, Colonia, NJ	147923
MDQT	M-D TRANSPORT, INC., Sterling Heights, MI	181213
MTNK	M. C. TANK TRANSPORT, INC., Hamilton, OH	116867
MTIR	M. C. TRUCKING, INC., Roselle, IL	193317
MSCC	M. S. CARRIERS, INC., Memphis, TN	145072
MGMC	M.G.M. TRANSPORT CORPORATION, Totowa, NJ	1117
MESN	M.H.C. MESSENGERS, INCORPORATED, Carteret, NJ	134270
MOVT	M.O.C. 1 TRANSPORT, INC., Grace, ID	206721
MGPO	MAGIC TRANSPORT, INC., Twin Falls, ID	140150
MGTL	MAGNA GARFIELD TRUCK LINE, Salt Lake City, UT	31439
MGME	MAGNUM MOTOR EXPRESS, INC., Elmhurst, IL	156356
MAJA	MAJORS TRANSIT, INC., Caneyville, KY	134038
MKEF	MAKEEFF TRUCKING, Arnie Makeeff, d/b/a, Billings, MT	148775
MLOY	MALLORY TRANSPORTATION SYSTEMS, INC., Memphis, TN	161514
MMAK	MAMMOTH OF ALASKA, INC., Anchorage, AK	118516
MAVI	MANATOR, Victor R. Crane, Jr., d/b/a, Vacaville, CA	156011
MAND	MANFREDI MOTOR TRANSIT CO., THE, Newbury, OH	128302
MTIQ	MANITO TRANSIT CO., Ashkum, IL	145517
MANY	MANY'S EXPRESS, INC., Ossining, NY	91725

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PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
MAXR	MAPLE LEAF EXPRESS, LTD., Chicago, IL	148708
MCOF	MARCOTTE, PAUL, FARMS, INC., Momence, IL	109083
MAGF	MARGO TRANSPORT, INC., Olney, IL	148432
MCMP	MARINA CARTAGE COMPANY, Michael Tadin, d/b/a, Chicago, IL	Pending
MRIN	MARINO BROS. TRUCKING CO., Stockton, CA	99802
MAXP	MARIPOSA EXPRESS, INC., Merced, CA	99793
MRKC	MARKS TRUCKING CO., George Marks, Nick Marks and Robert Marks, d/b/a, Chicago, IL	126714
MFDC	MARSHFIELD DRAYAGE COMPANY, Springfield, MO	121631
MTEN	MARTEN TRANSPORT, LTD, Mondovi, WI	103798
MRGP	MARTIN GAS TRANSPORT, INC., Kilgore, TX	164594
MPJT	MARTIN, PERRY, JR., TRUCKING, LTD., Chicago, IL	157842
MMYD	MARTY'S EXPRESS, INC., Philadelphia, PA	59249
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN	69583
MASD	MASON AND DIXON TANK LINES, INC., THE, Kingsport, TN	61403
MSNI	MASON, A. S., INC., Bakersfield, CA	139571
MCOT	MATCO TRANSPORTATION, INC., South Kearny, NJ	44513
MMVC	MATER MOVERS, INC., Billings, MT	206460
MFAF	MATHESON FAST FREIGHT, INC., Sacramento, CA	160003
MTLK	MATLACK, INC., Wilmington, DE	107403
MELD	MATSON EXPRESS LINES, INC., Secaucus, NJ	161464
MURC	MAURICE TRANSPORT CO., Morton, IL	117692
MXWL	MAXWELL CO., THE, Cincinnati, OH	117344
MYLN	MAY, LINDELL, TRUCKING SERVICE, Lindell May, d/b/a, Metropolis, IL	162639
MAZI	MAZCO SYSTEMS, INC., Carlstadt, NJ	145695
MCCD	McCARTHY DRAYING COMPANY, Long Beach, CA	1668
MCLY	McCAULEY TRUCKING COMPANY, THE, New Bethlehem, PA	116557
MCOM	McCOMBS FREIGHT LINE, INC., Birmingham, AL	121339
MCMK	McCORMACK TRANSPORTATION COMPANY, INCORPORATED, Rock Rapids, IA	121273
MCOR	McCORMICK DRAY LINE, INC., Avis, PA	110688
MMFG	McCRACKEN MOTOR FREIGHT, INC., Portland, OR	941
MUEP	McCUEN TRUCKING, INC., Telford, PA	166820
MCUL	McCULLOUGH, WM., TRANSPORTATION CO., INC., Linden, NJ	61502
MACD	McDONALD'S EXPRESS LINE, INC., Remsen, NY	24237
MGIE	McGILL'S INTERSTATE EXPRESS, INCORPORATED, Paterson, NJ	69628
MCKE	McKENZIE TANK LINES, INC., Tallahassee, FL	112520
MKEN	McKENZIE, HARRY, TRUCKING CO., Selma, CA	87207
MCKT	McKINLAY TRANSPORT LIMITED, Windsor, ON, CN	123282
MCLA	McLAIN TRUCKING, INC., Anderson, IN	119522
MLDC	McLAUGHLIN DRAYING CO., Sacramento, CA	61574
MCMF	McMINNVILLE FREIGHT LINE, INC., McMinnville, TN	120592
MNBT	McNULTY BULK TRANSPORT CO., INC., Essington, PA	167480
MVTD	McVEY, DEAN, TRUCKING, INC., Oakwood, IL	160748
MKOF	MEIKO FREIGHT SERVICE, INC., Carson, CA	32570
MLSR	MEL'S TRUCKING & BRAKE SERVICE, INC., Vestal, NY	166752
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA	100666
MENP	MENASHA TRANSPORT, INC., Neenah, WI	153113
MEPN	MEPPEN, DELOY, Idaho Falls, ID	156873
MRCD	MERCHANT'S DELIVERY & STORAGE, Hamilton, MT	Pending
MRDI	MERCHANTS DELIVERY SYSTEMS, Orange, CA	154141
MFML	MERCHANTS FAST MOTOR LINES, INC., A Delaware Corporation, Abilene, TX	2228
MMOF	MERCHANTS MOTOR FREIGHT, INC., Oakville, MO	205150
MTHK	MERCHANTS TRANSPORT OF HICKORY, INC., Hickory, NC	162035
MTLW	MERCHANTS TRUCK LINE, INC., New Albany, MS	169585
MTLN	MERCHANTS TRUCKLOAD COMPANY, INC., Abilene, TX	190523
MEFC	MERCHANTS' FORWARDING COMPANY, Dearborn, MI	6969
MRCN	MERCOUN, WILLIAM, INC., Carlstadt, NJ	69597
MGRQ	MERGENTHALER TRANSFER & STORAGE COMPANY, Helena, MT	158258
MERR	MERRILL TRANSPORT CO., Portland, ME	3252
MEID	MERRITT INTER-MODAL TRANSPORTATION, INC., Bridgeview, IL	165660
MEEM	MESSENGER MOUSE, H & K Transportation, Inc., d/b/a, Rockford, IL	168704
MESB	MESSER, BOYD, TRANSFER, INC., Fulton, KS	156493
METR	METRO CARRIER CORP., Clifton, NJ	85233
MTNN	METRO TRANSPORTATION SERVICES, INC., Memphis, TN	164269
MTDE	METROPOLITAN TRUCKING & DISTRIBUTION COMPANY, Elk Grove Village, IL	168718
MEJQ	MEYERS, EDWARD J., COMPANY, INC., Summit, IL	159422
MIMR	MICHIGAN MOTOR FREIGHT, INC., Flint, MI	24379
MICB	MID CITIES MOTOR FREIGHT, INC., St. Joseph, MO	146912
MKSH	MID KANSAS TRUCKING, INC., Salina, KS	98658
MATL	MID-AMERICAN LINES, INC., Kansas City, MO	6888
MIPS	MID-CONTINENT L P SERVICE, INC., Great Bend, KS	146831
MFIC	MIDDLEWEST FREIGHTWAYS, INC., St. Louis, MO	111651

PARTICIPATING INTERSTATE CARRIERS — Continued

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MDLP	MIDLAND TRANSPORT, INC. (An Illinois Corporation), Chicago Heights, IL	97257
MLXS	MIDLANTIC EXPRESS, INC., North Brunswick, NJ	169565
MDWY	MIDWAY MOTOR FREIGHT LINES, INC., Little Rock, AR	99149
MWSC	MIDWEST CARGO SYSTEMS, INC., Chicago, IL	146123
MWXP	MIDWEST EXPRESS, INC., Stevens Point, WI	170496
MWSF	MIDWEST FUELS, G. Holman, Inc., d/b/a, Macon, MO	Pending
MIDW	MIDWEST MOTOR EXPRESS, INC., Bismarck, ND	2153
MDTG	MIDWEST TRUCKING, INC., Billings, MT	199789
MWVE	MIDWEST VAN EXPRESS, Jerry Jenkins, d/b/a, Chicago, IL	166995
MWRN	MIDWESTERN TRANSPORT, INC., McCook, IL	166472
MLXP	MILAN EXPRESS CO., INC., Milan, TN	121649
MNSI	MILES & SONS TRUCKING SERVICE, INC., Pleasanton, CA	169311
MLPO	MILL TRANSPORTATION COMPANY, Bensenville, IL	168881
MIBR	MILLER BROS., Denver, CO	98979
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS	107002
ECKM	MILLER, ECK, TRANSPORTATION CORPORATION, Owensboro, KY	116915
MWLC	MILLER, W. L., COMPANY, Hamilton, IL	172535
MLSG	MILNER SUPER GAS, INC., Aiken, SC	154858
MMTC	MILWAUKEE MOTOR TRANSPORTATION COMPANY, THE, Bensenville, IL	19778
MINC	MINARET, INC., Rock Falls, IL	169753
MRVA	MINERVA TRANSFER COMPANY, THE, Minerva, OH	54529
MNRQ	MINIREM CORP., Los Alamitos, CA	167137
MMEI	MINUTE-MAN EXPRESS, INC., Orange, CA	162954
MAAQ	MISSANT, A. H., INC., Detroit, MI	151743
MIPE	MISSION PETROLEUM CARRIERS, INC., Houston, TX	157880
MOSN	MISSOURI-NEBRASKA EXPRESS, INC., St. Joseph, MO	22509
MPTL	MISSOURI PACIFIC TRUCK LINES, INC., St. Louis, MO	89723
MSRY	MISSOURI TRANSPORTS, Home Oil & Gas Corporation, d/b/a, St. Joseph, MO	119757
MIES	MISTLETOE EXPRESS SERVICE, Oklahoma City, OK	42405
MIEQ	MITCHELL, D. M., TRANSPORT CO., Dearborn, MI	167560
MITT	MITCHKO TRUCKING, Mota Trucking, Inc., d/b/a, Mountain Lakes, NJ	30114
MOBG	MOBERG TRANSPORT, INCORPORATED, Marshall, MN	135560
MBLE	MOBILE AIR TRANSPORT, INC., Latham, NY	135570
MDET	MODERN TRUCKING SERVICE, INC., Los Angeles, CA	140242
MODE	MODESTI BROS., INC., Long Island City, NY	62592
MOEN	MOEN TRUCK LINE, David Moen and Clair Moen, d/b/a, Langdon, ND	134867
MOWY	MOLERWAY FREIGHT LINES, INC., Billings, MT	135621
MVLE	MON VALLEY EXPRESS, Jon Golasheaski, d/b/a, Monessen, PA	174111
MFTC	MONFORT TRANSPORTATION COMPANY, Greeley, CO	138253
MORC	MONROE CONTRACTORS EQUIPMENT, INC., Rochester, NY	133129
MONG	MONTANA, C & D, TRUCKING, Charles G. Montana, d/b/a, Rockford, IL	177383
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL	127840
MOCN	MOORE OIL COMPANY, INC., Manning, SC	200566
MOOR	MOORE'S TRUCKING CO., Piscataway, NJ	77479
MORG	MORGAN EXPRESS, INC., Dallas, TX	120080
MNIF	MORGANTOWN-INDIANAPOLIS FREIGHT LINE, INC., Indianapolis, IN	67841
MADY	MORNING-AFTERNOON DELIVERY, Edward A. Daughn, d/b/a, San Leandro, CA	121685
MORR	MORRELL TRANSFER, INC., Elk River, MN	96687
MSST	MORRIS TRANSPORTATION, INC., Oakland, CA	121712
MFLS	MORVEN FREIGHT LINES, INCORPORATED, Wadesboro, NC	120307
MOSK	MOSKOWITZ MOTOR TRANSPORTATION, INC., Jewett City, CT	107542
MTRG	MOTOR CARGO, A Corporation, Salt Lake City, UT	114818
MOWS	MOTOR WEST, Dennis Moss and Gary Moss, d/b/a, Caldwell, ID	147553
MOWL	MOTORWAYS (1980) LIMITED, Winnipeg, MB, CN	110948
MTVL	MOUNTAIN VALLEY EXPRESS CO., INC., Manteca, CA	147640
MSCK	MST TRUCKING, INC., Salt Lake City, UT	159995
MPTC	MT. PLEASANT TRANSFER, INC., Mt. Pleasant, TN	71772
MUTJ	MULDER TRUCKING CO., Prinsburg, MN	146962
MUTF	MULTITRANS, INC., Malvern, PA	Pending
MNTK	MUNSON TRANSPORTATION, INC., Monmouth, IL	135410
MUME	MURPHY MOTOR EXPRESS, INC., Broadview, IL	52656
MUSA	MURPHY SURF-AIR TRUCKING COMPANY, INC., Lexington, KY	126625
MUTR	MURPHY TRANSPORTATION, INC., Long Beach, CA	114921
MUWQ	MURPHY WAREHOUSE COMPANY, Minneapolis, MN	150839
NAIE	N AND I EXPRESS, INC., Cobleskill, NY	76257
NANC	NANCE AND COLLUMS, INC., Fernwood, MS	116300
NASN	NASON'S DELIVERY, INC., Springville, NY	82186
NAFT	NATIONAL FREIGHT, INC., Vineland, NJ	2860
NFTL	NATIONAL FREIGHT TRUCK LINES, INC., Vineland, NJ	165050
NLTE	NATIONAL LTL EXPRESS, INC., San Leandro, CA	195709
NPKE	NATIONAL PACKERS EXPRESS, INC., North Bergen, NJ	138304

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@ Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
NAT	NATIONAL TRANSPORT SERVICES CO., INC., Elizabeth, NJ	149114
NATL	NATIONAL TRUCKING CO. OF LOS ANGELES, Los Angeles, CA	89006
NAES	NATIONWIDE EXPRESS SYSTEM, INC., Vernon, CA	166205
NMHE	NEAL MACHINERY ERECTORS, INC., Paris, IL	179410
NEBT	NEBRASKA TRANSPORT CO., INC., Scottsbluff, NE	121066
NEEI	NEELY TRANSPORT, INC., Birmingham, AL	150706
NEHL	NEHLS, R. L., TRANSFER, INC., Dundee, IL	97872
NEFW	NELSON FREIGHTWAYS, INC., Rockville, CT	60186
NELE	NELSON'S EXPRESS, Harrisburg, PA	76449
NLAS	NELSON, A. V., & SONS, A. V. Nelson, Charlie V. Nelson, & Kenneth D. Nelson, d/b/a, Payette, ID	201026
NEPE	NEPECO CORPORATION, Byron, WY	121186
NEMF	NEW ENGLAND MOTOR FREIGHT, INC., Elizabeth, NJ	112107
NOAP	NEW ORLEANS ATLANTA EXPRESS, INC., Meridian, MS	159494
NPME	NEW PENN MOTOR EXPRESS, INC., Lebanon, PA	70832
NYCI	NEW YORK CAROLINA EXPRESS, INC., Binghamton, NY	179754
NYMH	NEW YORK MID-HUDSON TRANS. CORP., Carlstadt, NJ	68324
NWLG	NEWLIN, GERALD, Yale, IL	191588
NAFS	NEWS & FILM SERVICE, INC., Denver, CO	117551
NETN	NEWTON TRANSPORTATION COMPANY, INC., Lenoir, NC	2421
NEXD	NEXT DAY MOTOR FREIGHT, INC., St. Louis, MO	145921
NIEW	NICE, ELWYN, TRUCKING, INC., Morrison, IL	146645
NFIC	NIEDERT FREIGHT, INC., Chicago Ridge, IL	34156
NIES	NIESEN TRUCK LINE, Britton, SD	115112
NATI	NORDANG, ART, TRUCKING, INC. Methow, WA	144208
NBAC	NORFOLK, BALTIMORE AND CAROLINA LINE, INCORPORATED, Norfolk, VA	Ⓟ
NONB	NORRENBERNS TRUCK SERVICE, TKT, Inc., d/b/a, Nashville, IL	77018
NASL	NORTH & SOUTH LINES, INCORPORATED, Harrisonburg, VA	28088
NAXP	NORTH ALABAMA EXPRESS, INC., Alexander City, AL	97260
NOBR	NORTH BEND TRANSFER CO., North Bend, NE	120465
NOBT	NORTH BRANCH TRANSFER, INC., Williamsport, PA	99318
NEMR	NORTH EASTERN MOTOR FREIGHT, INC., Denver, CO	30530
NOPK	NORTH PARK TRANSPORTATION CO., Denver, CO	105350
NOPT	NORTH PENN TRANSFER, INC., Lansdale, PA	62932
NSML	NORTH STATE MOTOR LINES, INC., Rocky Mount, NC	30513
NWPO	NORTH WEST TRANSPORTATION, INC., Boise, ID	181159
NTHE	NORTHERN EXPRESS, INC., Carteret, NJ	138574
NHTO	NORTHERN HILLS TRANSPORT, INC., Sturgis, SD	193020
NORV	NORTHERN ROUTES TRANSPORTATION, Paul Lambert, d/b/a, Bozeman, MT	188787
NNTL	NORTHERN TANK LINE, Miles City, MT	62869
NTXP	NORTHERN TEX-PACK EXPRESS, INC., Dallas, TX	113299
NRLT	NORTHLAND TRANSPORTATION, INC., Magnet, NE	Pending
NOPM	NORTHPORT MESSENGER SERVICE, INC., Burns Harbor, IN	155027
NSEP	NORTHSTAR EXPRESS, INC., Albany, NY	120007
NOTJ	NORTHUP'S PETROLEUM, INC., Stronghurst, IL	156099
NWTP	NORTHWEST TRANSPORT SERVICE, INC., Commerce City, CO	1977
NTAH	NTA, LTD., Huron, SD	189326
NBKS	NUBULK SERVICES, INC., Exton, PA	182712
NUST	NUSSBAUM TRUCKING, INC., Normal, IL	120436
OAFL	O&A TEX-PACK EXPRESS, INC., Lubbock, TX	114737
ONTR	O'NEILL TRANSFER, INC., O'Neill, NE	85479
OROR	O'ROURKE CARTAGE CO., Chicago, IL	121211
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH	2245
ONCF	O.N.C. FORWARDING, Palo Alto, CA	⊗
OAKH	OAK HARBOR FREIGHT LINES, INC., Seattle, WA	139763
OKMF	OAKLAND MOTOR FREIGHT, INC., Paterson, NJ	196474
OBSE	OBSERVER TRANSPORTATION COMPANY, THE, Charlotte, NC	19550
OCET	OCEAN TERMINALS, INC., Seattle, WA	142401
OGEN	OGDEN EXPRESS, Mitchell Dzik, Anthony Dzik and Francis Dzik, d/b/a, Berwyn, IL	101343
OILF	OILFIELDS TRUCKING COMPANY, Bakersfield, CA	79577
OKAT	OKA TRANSFER CO., INC., Los Angeles, CA	28247
OCEE	OKLAHOMA CITY EASTERN EXPRESS, INC., Tulsa, OK	165080
ODFL	OLD DOMINION FREIGHT LINE, INC., High Point, NC	107478
ORTC	OLSEN ROE TRANSFER COMPANY, Portland, OR	74311
OLTP	OLSON TRANSPORTATION COMPANY, INC., Milwaukee, WI	138144
OLWJ	OLSON, WAYNE, Wayne Olson and Judie Lynn Olson, d/b/a, Stevensville, MT	172964
OLWS	OLSON, WES, TRUCKING, Wesley A. Olson, d/b/a, Sandpoint, ID	183393
OOST	OOSTYDK, ENGLE, INC., Elmwood Park, NJ	45968
ORFW	OREGON FREIGHTWAYS, INC., Medford, OR	155988
ORTH	OREGON TRAIL EXPRESS, INC., Stanfield, OR	202521
OSGD	OSGOOD TRUCKING, Daniel Polatis and Larry Shelton, d/b/a, Idaho Falls, ID	189581
OSTT	OST TRUCKING, INC., Oilfield Service & Trucking, Inc., d/b/a, Ventura, CA	134609

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
OSKP	OSTERKAMP TRUCKING, INC., Orange, CA	138732
OTTQ	OTT, LaVERNE E., INCORPORATED, Tonawanda, NY	167197
OVCQ	OVERLAND TRANSPORTATION SYSTEM, INC., Indianapolis, IN	151119
OVEA	OVERLAND WESTERN INTERNATIONAL, INC., Detroit, MI	42125
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA	109533
OWXP	OWENTON EXPRESS, INC., Carrollton, KY	134817
OOPS	OWNER OPERATORS PETROLEUM CORPORATION, Bloomington, CA	168478
OZTC	OZARK TRANSFER COMPANY, Landes Ozark Transfer Co., d/b/a, Ozark, MO	14768
OZAT	OZARK TRANSPORTATION, INC., Poplar Bluff, MO	144844
PCTJ	P & C TRUCKING, Paul Wiltjer, d/b/a, Gary, IN	*197166
PNGT	P & G TRANSPORT, INC., Los Angeles, CA	95838
PNLK	P & L TRUCKING, INC., Petaluma, CA	159966
PDXI	P D EXPRESS, INC., Columbus, OH	146174
PIEC	P-I-E NATIONWIDE, INC., Jacksonville, FL	2900
PNEQ	P. & E. I. TRUCK LINES, INC., Rossville, IL	147198
PWKT	P.W.K. TERMINALS, INC., St. Charles, IL	142640
PBCD	PACIFIC BASIN CONSOLIDATORS, OFA/California Cooperative, d/b/a, Hilo, HI	Pending
PCNW	PACIFIC CARTAGE & WAREHOUSING, INC., Hayward, CA	121689
PFET	PACIFIC ENERGY TRANSPORT, INC., Paramount, CA	171941
PAIC	PACIFIC INLAND TRANSPORT, INC., Walnut Creek, CA	150498
PCMQ	PACIFIC MOTOR TRANSPORT COMPANY, De Soto, TX	54696
PCIR	PACIFIC RIM TRANSPORT, INC., Compton, CA	197579
PFAT	PACIFICA TRANSPORTATION, INC., Chula Vista, CA	172089
PDXP	PACKAGE DELIVERY EXPRESS AND PDX, Lawlor Motor Express, d/b/a, San Francisco, CA	160209
PLME	PALM EXPRESS, INC., West Palm Beach, FL	185715
PANA	PANAMA TRANSFER, INCORPORATED, Panama, IA	4519
PNTD	PANELLA TRUCKING, INC., Stockton, CA	162047
PARI	PAR TRUCKING, INC., Hesperia, CA	159832
PAMF	PARKER MOTOR FREIGHT, INC., Grand Rapids, MI	110656
PKRS	PARKER REFRIGERATED SERVICE, INC., Tacoma, WA	127539
PASC	PASCHALL TRUCK LINES, INC., Murray, KY	111485
PFRC	PATCO FREIGHT CARRIERS, Patsy R. Washington, d/b/a, Texarkana, TX	157499
PAUI	PAULIN TRANSPORTATION INC., McLeansboro, IL	153463
PWMS	PAWNEE MOTOR SERVICE, INC., Bellwood, IL	152822
PTNR	PEARSON TRUCKING & RIGGING, INC., Norwalk, CA	61168
PBLK	PEERLESS BULK TRANSPORT CORP., Pittsburgh, PA	197388
PEES	PEERLESS TRANSPORT CORP., Pittsburgh, PA	119689
PRLS	PEERLESS TRUCKING COMPANY, 4H Mountain Express, Inc., d/b/a, Commerce, CA	96622
PEET	PEET FRATE LINE, INC. (An Illinois Corporation), Woodstock, IL	113170
PERP	PEIRONE PRODUCE COMPANY, Spokane, WA	155270
PMBR	PEMBERTON TRUCK LINES, INC., Knoxville, TN	163374
PNRE	PENGUIN REFRIGERATED EXPRESS, Richard W. Russell, d/b/a, Alameda, CA	170493
PENS	PENINSULA TRUCK LINES, INC., Seattle, WA	113165
PTSL	PENNER INTERNATIONAL, INC., Steinbach, MB, CN	89782
PENN	PENNSYLVANIA TRUCK LINES, INC., Wynnewood, PA	19201
PRVL	PERILLO MOTOR LINES, INC., New Providence, RI	75627
PECN	PETCO, INC., INTERSTATE, Commerce City, CO	113760
PETR	PETERLIN CARTAGE CO., Chicago, IL	67450
PTLY	PETERS TRUCK LINES, Yreka, CA	97710
PETE	PETERS, TED, TRUCKING COMPANY, INC., Gustine, CA	98763
PTER	PETRO EXPRESS, INC., Gasport, NY	199526
PTRM	PETROLEUM CARRIERS COMPANY, Sioux Falls, SD	108460
PECA	PETROLEUM CARRIERS, INC., North Grafton, MA	47203
PTRI	PETROLEUM TANK LINE, West Sacramento, CA	145669
PTRP	PETROLEUM TRANSPORT SERVICE, INC., Council Bluffs, IA	105413
PFXP	PFEFFER'S EXPRESS, Henry A. Pfeffer, d/b/a, Elmer, NJ	193
PHLP	PHILLIPS TRUCK LINE, INC., Memphis, TN	46797
PHXE	PHOENIX MOTOR EXPRESS, INC., Elizabeth, NJ	155523
PFCR	PILOT FREIGHT CARRIERS, INC., Winston-Salem, NC	61264
PIOF	PIONEER FREIGHT SYSTEMS, INC., Whippany, NJ	153140
PIRK	PIRKLE REFRIGERATED FREIGHT LINES, INC., Madison, WI	111375
PITD	PITT-OHIO EXPRESS, INC., Pittsburgh, PA	30136
PNET	PITTSBURGH & NEW ENGLAND TRUCKING CO., Dravosburg, PA	113974
PLTL	PLANT TRUCK LINE, INC., Heber Springs, AR	120895
PLXP	PLASTIC EXPRESS, Ontario, CA	142935
PLTQ	PLATTE VALLEY FREIGHTWAYS, INC., Sterling, CO	72423
PLDE	PLUMMER, D & E, TRUCKING, INC., Culbertson, MT	198435
PLUN	PLUNKETT MOTOR FREIGHT, INC., Zelienople, PA	52008
PJSF	POCOCK, JOHN S., FARMS, John S. Pocock, d/b/a, Sugar City, ID	203035
POIN	POINT EXPRESS, INC., Columbus, OH	32562
POIT	POINT ROBERTS AUTO FREIGHT, Edward M. Hentz, d/b/a, Bellingham, WA	110429

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Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
POLM	POLMAN TRANSFER, INC., Wadena, MN	116227
PTPP	PONDEROSA TRANSPORTATION, A Division of Ponderosa Products, Inc., Albuquerque, NM	180800
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC	114533
POTK	POOLE TRUCK LINES, INC., Evergreen, AL	115162
PNOI	POOLE, NORM, OIL, INC., Ontario, OR	184991
PORM	PORT MOTOR LINES, INC., Secaucus, NJ	126873
POEP	PORTLAND EXPRESS, INC., Portland, TN	126877
PTOS	POTOSI EXPRESS, James A. Wood, d/b/a, Potosi, MO	121605
POTT	POTTER, WILLIAM FRANKLIN, Warrensburg, NY	98477
POFI	POWER FUELS, INC., Minot, ND	145095
PWRR	POWER TRANSPORT, INC., Mequon, WI	173898
POZA	POZAS BROS. TRUCKING CO., San Jose, CA	96641
PBTC	POZZI BROTHERS TRANSPORTATION, INC., Kent, WA	7205
PWSI	PRATT WELL SERVICE, INC., Pratt, KS	164464
PREF	PRE-FAB TRANSIT CO., (A Corporation), Farmer City, IL	107295
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD	1824
PCTF	PRICE TRANSFER, INC., Wilmington, CA	6178
PRIC	PRICE TRUCK LINE, INC., Wichita, KS	69834
PKAS	PRICKETT & SON, INC., Hoxie, KS	168708
PRNT	PRINS TRUCKING, INC., Hudsonville, MI	134210
PFTS	PRIORITY FREIGHT SYSTEMS, INC., Akron, OH	136277
PVCR	PRIVATE COURIER, INCORPORATED, Bensenville, IL	143206
PROO	PRO EXPRESS, INC., Montebello, CA	44927
PRCS	PROFESSIONAL CARGO SERVICES, INC., Wichita, KS	151681
PBAF	PROFIT FREIGHT SYSTEMS, INC., Valley Stream, NY	151337
PRPN	PROPANE TRANSPORT, INC., Milford, OH	114969
PPDP	PROVIDENCE PHILADELPHIA DISPATCH, INC., Providence, RI	⊗
PTLW	PTL INTERMODAL, INC., Wynnewood, PA	172332
PUFS	PUBLIC FREIGHT SYSTEM, Whittier, CA	128226
PSTS	PUGET SOUND TRANSFER & STORAGE, Jayhawk Enterprises, Inc., d/b/a, Port Angeles, WA	191952
PSTL	PUGET SOUND TRUCK LINES, INC., Seattle, WA	85255
PURL	PUROLATOR COURIER CORP., Basking Ridge, NJ	111729
PTSC	PUTNAM TRANSFER & STORAGE CO., Zanesville, OH	67311
PYLE	PYLE, A. DUIE, INC., West Chester, PA	39140
PYTN	PYRAMID TRANSPORTATION CO., Chicago, IL	145051
QTRK	Q TRUCKING COMPANY, Charles M. Reader, d/b/a, Nome, AK	128214
QDCC	Q. D. CARTAGE COMPANY, Chicago, IL	120839
QDLB	QUADREL BROS. TRUCKING COMPANY, INC., Rahway, NJ	127524
QUAY	QUALITY CAB COMPANY, James R. Simonson, d/b/a, Carpentersville, IL	178267
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI	110420
QATP	QUALITY TRANSPORT, INC., Fremont, CA	156404
QALT	QUALITY TRANSPORTATION, INC., Baker, MT	185031
QURY	QUARRY TRANSPORT CO., Lemont, IL	163528
QUAS	QUAST TRANSFER, INC., Winsted, MN	99123
QUAF	QUICK AIR FREIGHT, INC., Columbus, OH	116101
QUKD	QUICK DELIVERY, INC., Addison, IL	186285
QUTF	QUICKIE TRANSPORT CO., Minneapolis, MN	112223
QKSQ	QUIK SERVICE DELIVERY, Willie Jane McKinney, d/b/a, Houston, TX	140915
RNET	R & E TRUCKING, Roland I. Nisewander, Jr., d/b/a, Fullerton, CA	159831
RAJL	R & J LEASING CO., INC., North Arlington, NJ	140971
RJTQ	R & J TRUCK, INC., Pomona, CA	158305
RMLS	R & M LIVESTOCK AND TRUCKING, R. L. Bertolino, d/b/a, Billings, MT	200863
RRTI	R & R TRUCKING, INC., Oklahoma City, OK	143091
RSXL	R & S EXPRESS, William C. and Rodney L. Kilgore, d/b/a, Whitwell, TN	206825
RGWK	R AND G TRANSIT, INC., Waukegan, IL	196096
RRCG	R AND R CARTAGE, INC., Houston, TX	171530
RISF	R I S T TRANSPORT, LTD., Phelps, NY	193781
RPTR	R P TRUCKING, Ronald R. Payne, d/b/a, Commerce City, CO	138157
RDMT	R-D MOTOR, INC., Plano, IL	121163
RWXL	R-W SERVICE SYSTEM, INC., Taylor, MI	65896
RCSI	R. C. SERVICE, INC., Bensenville, IL	152082
RJMT	R. J. M. TRANSFER CO., St. Louis, MO	106510
RCTV	R.C. TRANSPORT, INC., Chicago, IL	182981
RCAT	R.C.A. TRUCK LINES, INC., Cartersville, GA	66637
RSYT	R.S.T., INC., Homedale, ID	174300
RACP	RAC TRANSPORT COMPANY, INC., Denver, CO	151444
RXTP	RADEX TRANSPORTATION, Statewide Distribution Services, Inc., d/b/a, Los Angeles, CA	144882
RAMR	RAEMARC, INC., Racine, WI	139360
RLDP	RAIL DISPATCH, INC., Chicago, IL	173148
RAFC	RAIL FLITE TRANSPORTATION, INC., Grimes, IA	148335
RLWE	RAILWAY EXPRESS, INC., Stroudsburg, PA	165665

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
RAPY	RAMPLEY TRANSPORT, INC., Augusta, IL	128750
RAPP	RAPP TRANSPORT, INC., Secaucus, NJ	166739
RASK	RASK TRANSPORTATION, INC., Victoria, IL	146759
RASN	RASMUSSEN ENTERPRISES, INC., Kodiak, AK	148145
RTUG	RATH TRUCKING, INC., West Sacramento, CA	121837
RAUH	RAUCH TRUCK LINES, INC., St. Charles, MO	55512
RLSQ	RAYLS BROTHERS TRANSFER, INC., Hoopestown, IL	143291
RAFL	RED ARROW FREIGHT LINES, INC., San Antonio, TX	2228
RAHH	RED ARROW HEAVY HAULING, INC., San Antonio, TX	102162
RBAL	RED BALL, INC., Sapulpa, OK	52921
RSEL	RED STAR EXPRESS LINES, Red Star Express Lines of Auburn, Incorporated, d/b/a, Auburn, NY	59135
RSXP	RED STAR EXPRESS LINES OF QUEBEC (1976), LTD., Dorval, PQ, CN	
RSEP	RED STAR EXPRESS LINES OF ONTARIO LIMITED, Toronto, ON, CN	141577
RETL	REDDAWAY'S TRUCK LINE, INC., Clackamas, OR	65895
REDK	REDDICK AUTO EXPRESS, INC., North Syracuse, NY	2091
REDY	REDDY TRUCKING CO., INC., Monticello, NY	95955
RDFT	REDFEARN TRUCKING, INC., Stockton, CA	157604
REDC	REDWING CARRIERS, INC., Tampa, FL	111045
RNGH	REED & GRAHAM, INC., San Jose, CA	187485
RBSG	REED BROTHERS, INC., Gooding, ID	200391
RRTG	REEDER, ROBERT, TRUCKING, Vernon, CA	136421
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH	60069
RFNR	REFINERS TRANSPORT, INC., Indianapolis, IN	116805
RFGD	REFRIGERATED TRUCKING SERVICE, INC., Buffalo, NY	121663
REGM	REGENCY MOTOR FREIGHT, INC., Dearborn, MI	150157
RGEC	REGIONAL EXPRESS COMPANY, Boise, ID	164484
REIS	REIS BROS., INC., Cleves, OH	127117
RESH	REISCH TRUCKING & TRANSPORTATION CO., INC., Pennsauken, NJ	16513
RFIS	RELIABLE FREIGHT SYSTEMS, INC., Sikeston, MO	176027
RTLW	RELIABLE TANK LINE, Limited Partnership, Winston-Salem, NC	107276
RMLO	REMLO TRANSPORTATION, INC., Melrose Park, IL	176454
RTOC	RENTAL TOOL CORPORATION, Houston, TX	189724
RIAF	RENTON-ISSAQUAH AUTO FREIGHT, INC., Renton, WA	41522
RNZC	RENZ TRUCK LINES, INC., Pacific, MO	1753
REXT	REX TRANSPORTATION COMPANY, Flint, MI	109595
RHEM	RHEMAN, GEO. A., CO., INC., THE, North Charleston, SC	103191
RILS	RICE LINES, INC., Edwardsville, IL	190381
RITK	RICE TRUCKING, Wallace Rice, d/b/a, Maddock, ND	121002
RIBL	RICHARDS BROS. TRANSPORT, LTD., Edgerton, WI	158583
RICM	RICHARDS MOTOR SERVICE, INC., Cicero, IL	128759
RHSO	RICHARDSON TRUCKING, INC., East St. Louis, IL	178898
RDDF	RIDDLE FUEL OIL CO., INC., Burnsville, NC	203539
RIMQ	RIED MOTOR EXPRESS, Edmund J. Riedlinger, Jr., d/b/a, Naperville, IL	176877
RIGS	RIGGS FOOD EXPRESS, INC., New Bremen, OH	106920
RIMS	RIMES, GEORGE, TRUCKING COMPANY, William G. Rimes, Mildred Gaylord, Florence Davis, Dorothy C. Orient and Leota Hildinger, d/b/a, Chardon, NE	5914
RINF	RING, FRANK RICHARD, Albert L. Ring, Andrew C. Ring, Bernard J. Ring and Ronald J. Ring, d/b/a, Neola, IA	62601
RINW	RING, NEIL, Buhl, ID	201197
RISN	RISINGER BROS. TRANSFER, INC., Morton, IL	172510
RISS	RISS INTERNATIONAL CORPORATION, Kansas City, MO	200
RTEL	RITE TRUCK LINES, INC., Grand Rapids, MI	162596
RITE	RITEWAY EXPRESS, INC., Elmwood Park, NJ	1668
RWSI	RITEWAY SERVICES, INC., Whittier, CA	200348
RITW	RITEWAY TRANSPORT, INC., Operator of Telluride Transfer, Thomas C. Hedlund, d/b/a, Phoenix, AZ	79148
RFCG	RIVERFRONT CARTAGE COMPANY, Cincinnati, OH	195625
ROAL	ROA OF LITTLE FALLS, INC., Little Falls, NY	59745
RDXI	ROADEX, INC., Ontario, CA	146688
ROWP	ROADS WEST, R. W. Transportation, Inc., d/b/a, Phoenix, AZ	167411
RDWY	ROADWAY EXPRESS, INC., Akron, OH	2202
RDWE	ROADWAY EXPRESS, LTD., Toronto, ON, CN	96134
RWEB	ROADWAY EXPRESS (BC), LTD., Langley, BC, CN	191111
RPSI	ROADWAY PACKAGE SYSTEM, INC., Pittsburgh, PA	179059
RDWW	ROADWAY SERVICES (WESTERN) LTD., Calgary, AB, CN	191195
RBJA	ROBB, JOHN A., Bensenville, IL	20872
ROMT	ROBBINS MOTOR TRANSPORTATION, INC., Essington, PA	45764
RBBI	ROBBINS TRUCKING, INC., Creston, WA	180637
ROEE	ROBERTS EXPRESS, INC., Akron, OH	141898
RTFN	ROBERTS TRANSPORTATION, Gil Roberts, d/b/a, Chicago Ridge, IL	192902
ROBK	ROBERTS, TOM M., TRUCKLINES, INC., Ashland, IL	134014
RBSM	ROBESONIA MOVERS, INC., Robesonia, PA	138693

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
ROBF	ROBINSON FREIGHT LINES, INC., THE, Knoxville, TN	128520
ROXP	ROBINSON'S EXPRESS, INC., Dover-Foxcroft, ME	121292
RCKS	ROCK TRANSFER & STORAGE, INC., West Allis, WI	154255
RKET	ROCKET EXPRESS, INC., North Arlington, NJ	159294
RMFQ	ROCKET MOTOR FREIGHT LINES, INC., Peoria, IL	152839
ROFS	ROCKFORD FREIGHT SERVICE, Robert C. Wilhelmi, d/b/a, Rockford, IL	99378
ROMD	ROCKFORD MILWAUKEE DISPATCH, INC., Rockford, IL	29563
RMTD	ROCKY MOUNTAIN SUPPLY, INC., Idaho Falls, ID	171590
RDGT	RODGERS TRUCKING CO., Ghiglione and Jensen, d/b/a, San Leandro, CA	121780
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL	64932
RMWT	ROGERS, M & W, TRUCKING, Myron L. Rogers and Wanda J. Rogers, d/b/a, Walla Walla, WA	166508
ROLL	ROLLO TRUCKING CORPORATION, INC., Keyport, NJ	108188
RWLI	RONWAL TRANSPORTATION, INC., Hammond, IN	144889
RRVT	ROOT RIVER VALLEY TRANSFER, Virgil Benson, d/b/a, Houston, MN	29498
ROOT	ROOT'S EXPRESS, INC., Binghamton, NY	99281
ROSI	ROSEVILLE MOTOR EXPRESS, INC., Crooksville, OH	69877
ROTR	ROSS TRANSFER, INC., Chadron, NE	28951
ROGY	ROSS, GARY, German Valley, IL	162136
RUPC	ROUNDUP POWDER COMPANY, INC., Miles City, MT	159600
RITC	ROWLEY INTERSTATE TRANSPORTATION COMPANY, INC., Dubuque, IA	114028
ROYR	ROY BROS., INC., Pinehurst, MA	112963
RYTK	ROYAL TRUCKING CO., Lemore Transportation, Inc., d/b/a, Concord, CA	121630
ROZA	ROZAY'S TRANSFER, Huntington Park, CA	120617
RUAN	RUAN TRANSPORT CORPORATION, Des Moines, IA	107496
RUDD	RUDDWAY DRAYAGE, INC., San Francisco, CA	121017
RUDE	RUDE TRANSPORTATION COMPANY, Arlen W. Rude, d/b/a, Redfield, SD	64732
REXP	RUDOLF EXPRESS CO., Bourbonnais, IL	68851
RSHV	RUSHVILLE TRUCK LINES, C. William Redshaw, d/b/a, Rushville, IL	96935
RUSL	RUSSELL, H. B., TRUCK SERVICE, INC., Red Bud, IL	167537
RTHG	RUTHG TRANSP. CORP., Vineland, NJ	108407
RUZE	RUZILA'S EXPRESS SERVICE, INC., Garfield, NJ	36979
SSTO	S & S TRANSPORTATION, INC., Commerce, CA	161384
SASW	S & S TRANSPORTATION, INC., Dewey, IL	192775
SSON	S & S TRUCK LINE, INC., Kansas City, MO	166859
SAWF	S & W FREIGHT LINES, INC., Murfreesboro, TN	121644
SJTP	S-J TRANSPORTATION CO., Woodstown, NJ	150546
SMFF	S. M. F., INC., Romulus, MI	160899
STSM	S. T. S. MOTOR FREIGHT, INC., Philadelphia, PA	136773
SMES	S.M.S. EXPRESS CORP., Suffern, NY	66170
SOST	S.O.S. TRANSPORTATION CO., INC., North Bergen, NJ	36196
SATC	SACRAMENTO AUTO TRUCK CO., Mark A. Bozaich, d/b/a, West Sacramento, CA	30018
SATO	SAFE TRANSPORT, INC., Hamilton, IL	146525
SAFT	SAFETY TANK LINES, INC., Danville, VA	103383
SAGV	SAGINAW VALLEY MARINE TERMINAL AND WAREHOUSE, INC., Bay City, MI	153402
SAIA	SAIA MOTOR FREIGHT LINE, INC., Houma, LA	87511
SALV	SALINAS VALLEY-SANTA CRUZ MOTOR EXPRESS, San Francisco, CA	121053
SLKT	SALT LAKE TRANSFER COMPANY, Commerce City, CO	196994
SLVB	SALVATORE BROS. TRUCKING, INC., Trenton, NJ	186740
SAMM	SAMMONS TRUCKING, Missoula, MT	124692
SMSN	SAMSON TRUCK LINE, Richard L. Edgar, d/b/a, Mountain Home, ID	86782
SJOE	SAN JOAQUIN VALLEY EXPRESS, Modesto, CA	164361
SULP	SAULT PETROLEUM TRANSPORTERS, Lloyd Gray Limited, d/b/a, Sault Ste. Marie, ON, CN	205331
SLSO	SAUNDERS CARRIERS, INC., Birmingham, AL	116254
SCIT	SAUNDERS CARTAGE, INC., Canton, OH	102858
SAVM	SAV-MOR TRANSPORTATION, INC., Everett, MA	120758
SWTH	SAWTOOTH FREIGHT LINES, INC., Salt Lake City, UT	121467
SAYE	SAWYER EASTERN, INC., Hammond, IN	149582
SCBD	SCANNELL BROS. DRAYAGE, John Scannell, d/b/a, San Francisco, CA	99323
SCJD	SCHAFFER, J. D., CARTAGE CO., Elmhurst, IL	31242
SCHA	SCHALLER TRUCKING CORPORATION, Indianapolis, IN	120618
SCHF	SCHEFFLER, J. L., TRANSPORT, INC., Chicago, IL	16567
SCEK	SCHENK, INC., Forsyth, MT	173543
SHBI	SCHIBER TRUCK COMPANY, INC. (A Delaware Corporation), Hartford, IL	148760
SCHK	SCHIEK MOTOR EXPRESS, INC., Joliet, IL	29328
SHND	SCHNEIDER TANK LINES, INC., Green Bay, WI	110988
SRMM	SCHRAMM TRUCKING, William Schramm, d/b/a, Addison, IL	183500
SCTN	SCHULTZ TRANSIT, INC., Winona, MN	118202
STCV	SCHWERMAN TRUCKING CO. OF VA., INC., Milwaukee, WI	133391
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI	124078
SCSP	SCOUT TRUCKING, INC., Spring City, PA	168293
SLSE	SEA-LAND FREIGHT SERVICE, INC., Seattle, WA	96812

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
SBTL	SEABOARD TANK LINES, INC., Dunmore, PA	109443
SEAE	SEAVER'S EXPRESS INC., Milford, MA	2234
SFLQ	SEAWAY FREIGHT LINES, INC., Lockport, NY	160082
SEBO	SEBURN BROS., Jack Seburn, Jr. and James Dean Seburn, d/b/a, Caldwell, ID	173217
SETP	SELECTIVE TRANSPORTATION CORP., West New York, NJ	1305
SVCA	SERVICE AIR CARGO, Arleta, CA	138215
SRVC	SERVICE TRANSFER, INC., Sitka, AK	124128
SVLQ	SERVICE TRANSPORT LINES, INC., West Sacramento, CA	127758
SERJ	SERVICE TRANSPORT, INC., Cookeville, TN	148392
SEVD	SERVICECRAFT DISTRIBUTION SYSTEMS, INC., Buena Park, CA	148399
SSIN	SESSIONS TRUCKING, INC., Idaho Falls, ID	172771
SEVW	SEVEN WHEELS, INC., Morristown, TN	169037
SEME	SEWELL MOTOR EXPRESS, INC., Wilmington, OH	61992
SEYT	SEYMOUR TRANSFER LINES, INC., Seymour, WI	28990
SHFS	SHAFFER, STEVE, TRUCKING, Steve Shaffner, d/b/a, Arcola, IL	147011
SHAL	SHALLCROSS EXPRESS, INC., Kenilworth, NJ	19260
SMRK	SHAMROCK TRUCK LINES, Jerry O'Connell, d/b/a, San Jose, CA	121641
SHXP	SHANAHAN'S EXPRESS, INC., Cinnaminson, NJ	28142
SHDI	SHANE INDUSTRIES, INC., Fresno, CA	146840
SCEF	SHARCO EXPRESS, Farmington Hills, MI	173875
SHKE	SHARKEY TRANSPORTATION, INC., Quincy, IL	135598
SHXF	SHARMAX FREIGHTLINES, INC., Lakeside, CA	158663
SHEE	SHEARERS EXPRESS, Suncrest Transportation, Inc., d/b/a, Oneonta, NY	92371
SLLY	SHELLEY FREIGHT LINES, INC., Los Angeles, CA	174962
SHEP	SHEPHERD TRUCK LINE, INC., Irvine, KY	120584
SHEL	SHERIDAN TRUCK LINE, INC., Sheridan, AR	70348
SHDT	SHIELDS TRUCKING, Ralph & Mildred Shields, d/b/a, Savage, MT	196596
SHPR	SHIPPERS EXPRESS, INC., Jackson, MS	66746
SIPL	SHIPPERS IMPERIAL, INC., Walnut Creek, CA	99745
SSXP	SHIPPERS SERVICES EXPRESS, Galo Moya, d/b/a, Norcross, GA	206226
SHKQ	SHOCKEY & SONS TRUCKING, Manteca, CA	160143
SCAG	SHOREWOOD CARTAGE, Gerald J. Pietrzak, d/b/a, Chicago, IL	173226
SHRY	SHOREY'S EXPRESS, INC., Ballston Spa, NY	71083
SHRT	SHORT FREIGHT LINES, INC., Bay City, MI	108382
SHOR	SHORTY'S EXPRESS, INC., Syracuse, NY	62832
SHMT	SHUTE'S MOTOR TRANSPORTATION, Westville, NJ	20415
SIBR	SIBR, FRANK J., & SONS, INC., Alsip, IL	111432
SIXR	SIERRA EXPRESS, INC., Powder Springs, GA	194269
SECG	SILVER EAGLE COMPANY, Portland, OR	32779
SVPI	SILVER PLUME INTERMOUNTAIN TRANSIT, Randal L. and Mary C. Dobyns, d/b/a, Silver Plume, CO	201993
SREM	SIMS, REMEL, Wenatchee, WA	160171
SLCO	SINCLAIR CARTAGE, INC., Hinsdale, IL	155364
SJTG	SINGLETON, JERRY, TRUCKING, Jerry Singleton, d/b/a, Miles City, MT	Pending
SIBI	SISBRO, INC., Quincy, IL	161649
SITR	SITAR, EDWARD, TRUCKING CO., INC., Chicago, IL	98864
SKVT	SKAGIT VALLEY TRUCKING CO., INC., Mt. Vernon, WA	112014
SKIT	SKINNER TRUCKING, Edward W. Skinner, Jr., d/b/a, Twin Falls, ID	138977
SKCY	SKY COUNTRY, INC., Bozeman, MT	179354
SKYT	SKYLINE TRANSPORTATION, INC., Knoxville, TN	99208
SLTR	SLATER, M. C., INC., Granite City, IL	107757
SMFS	SMISER FREIGHT SERVICE, Smiser Acquisition Corporation, d/b/a, South Gate, CA	120168
SANS	SMITH & SOLOMON TRUCKING COMPANY, New Brunswick, NJ	59264
SANW	SMITH AND WATERS, INC., Ware Shoals, SC	99735
SBXP	SMITH BROS. EXPRESS, INC., Staten Island, NY	3105
SMIB	SMITH BROS. TRUCKING, Harry R. Smith, d/b/a, Arcola, IL	106656
SMTC	SMITH TRANSPORTATION CO., Santa Maria, CA	85205
STLM	SMITH'S TRUCK LINES, Muncy, PA	111940
SMEF	SMITH, E. F., INC., Roaring Spring, PA	29648
SMEC	SMITH, EARL C., INC., Port Huron, MI	80498
SMSW	SMITH, M. M., STORAGE WAREHOUSE, INC., Fayetteville, NC	135075
SMFR	SMITHVILLE FREIGHT LINES, INC., Smithville, TN	95562
SMXT	SMX TRANSPORT, INC., Watertown, NY	188917
SNPE	SNAPS ENTERPRISES LTD., Plainview, NY	154981
SNIP	SNIDER TRUCKING SERVICE, INC., Ritzville, WA	121525
SNOM	SNOWY MOUNTAIN TRANSPORT, INC., Miles City, MT	181998
SYET	SNYDER TRUCKING, INC., Burlington, WI	190211
SONT	SONS TRANSPORTATION CO., INC., Worcester, MA	163791
SODE	SOURDOUGH EXPRESS, INC., Fairbanks, AK	118527
SABW	SOUTH ATLANTIC BONDED WAREHOUSE CORPORATION, Greensboro, NC	80262
SBFL	SOUTH BEND FREIGHT LINE, INC., South Bend, IN	31533

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
SBWD	SOUTH BEND MOTOR FREIGHT, South Bend Warehousing & Distributing Corporation, d/b/a, South Bend, IN	176189
SOHC	SOUTHCENTRAL AIR, INC., Kenai, AK	121817
SEXN	SOUTHEAST EXPRESS, INC., Fernandina Beach, FL	4687
SMLF	SOUTHEAST MOTOR LINE, James M. Chapman, d/b/a, Dade City, FL	168607
STXE	SOUTHEAST TEX-PACK EXPRESS, INC., Dallas, TX	98572
SEFL	SOUTHEASTERN FREIGHT LINES, Columbia, SC	111871
SOMF	SOUTHEASTERN MOTOR FREIGHT, INC., Metairie, LA	68828
SXPI	SOUTHERN EXPRESS, INC., Schaumburg, IL	173582
SMOF	SOUTHERN MISSOURI FREIGHT, INC., Springfield, MO	129207
SOSD	SOUTHERN SCREW, Div. Farley Metals, Inc., Statesville, NC	171495
SODC	SOUTHWEST DELIVERY CO., INC., Vancouver, WA	128714
SUWE	SOUTHWEST EXPRESS, INCORPORATED, East Walpole, MA	162384
SMTL	SOUTHWESTERN MOTOR TRANSPORT, INC., San Antonio, TX	80252
SPAI	SPAIN'S TRANSFER, INC., Minot, ND	121745
SLTL	SPARTA-LaCROSSE TRUCK LINES, INC., Sparta, WI	65210
SPXI	SPARTAN EXPRESS, INC., Greer, SC	62824
SPVT	SPARTAN TRUCKING, Dart Transportation Service, d/b/a, Los Angeles, CA	176256
SFSK	SPECIALIZED FREIGHT SERVICES, INC., Decatur, GA	190766
SICD	SPECTRAN, INC., Elk Grove Village, IL	176256
SPMO	SPEED MOTOR EXPRESS OF WESTERN NEW YORK, INC., Buffalo, NY	148408
SPWI	SPEEDWAY HAULERS, INC., South Bend, IN	142449
SPNC	SPENCER, ELDON, INC., Port Byron, IL	154567
SPOK	SPOKANE TRANSFER AND STORAGE CO., Spokane, WA	71718
SRHS	SPRAGUE, RALPH, & SON TRUCKING, Ralph Sprague, d/b/a, Thompsonville, IL	167275
SGMT	ST. GERMAIN MOTOR TRANSPORTATION, INC., Woonsocket, RI	74482
SJTC	ST. JOHNSBURY TRUCKING COMPANY, INC., Holliston, MA	108473
STLF	ST. LAWRENCE FREIGHTWAYS, INCORPORATED, Watertown, NY	7840
STAT	STAATS EXPRESS, INC., Rensselaer, NY	58944
STAH	STAHLEY CARTAGE CO., Edwardsville, IL	119702
SINR	STAMCO, INC., San Martin, CA	166611
STTC	STANDARD TRUCKING COMPANY, Charlotte, NC	155460
SDAT	STAR DELIVERY & TRANSFER, INC., Canton, IL	120737
STMF	STAR MOTOR FREIGHT, INC., Lewiston, ID	28670
SMFQ	STAR MOTOR FREIGHT LINES, INC., Colorado Springs, CO	148356
STRK	STARKWEATHER FREIGHT LINES, INCORPORATED, Albion, NY	99934
SNMI	STEEL & MACHINERY TRANSPORT, INC., East Chicago, IN	41406
STKL	STEERE TANK LINES, INC., Dallas, TX	107064
STIN	STEIN, JIMMY, MOTOR LINES, INC., Mobile, AL	99498
SDSB	STELLAR DISTRIBUTION, INC., Bedford, IN	169465
SLXR	STELLAR EXPRESS, INC., Green Bay, WI	172311
STER	STERLING TRANSIT COMPANY, INC., Montebello, CA	97382
STIL	STERNS TRANSPORT, INC., Bradley Beach, NJ	109581
STCB	STEUBENVILLE TRANSFER CO., Wintersville, OH	13253
SFSD	STEVENS FREIGHT SERVICE, INC., Greensboro, NC	165517
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH	107906
STST	STEWART STILES TRUCK LINE, INC., Forest Grove, OR	75523
STNO	STINSON TRUCKING, INC., Milpitas, CA	138342
STOP	STOOPS EXPRESS, INC., Anderson, IN	144630
STDA	STOTT & DAVIS MOTOR EXPRESS, INC., Auburn, NY	99569
STTM	STRATMAN TRUCK SERVICE, Cellus Stratman, d/b/a, Vienna, MO	68826
SNIK	STRIMBU, NICK, INC., Brookfield, OH	123091
STKY	STRITESKY TRUCKING, Otto Stritesky and Kenneth Stritesky, d/b/a, Silver Lake, MN	121080
SMAN	STROTHMAN EXPRESS, INC., Cincinnati, OH	120736
STDR	STUDER TRUCK LINE, INC., Beattie, KS	33037
STUM	STUMPF, H., & SONS, James Stumpf & Robert Stumpf, d/b/a, Worthington, MN	100109
SEAF	SUMAS-EVERSON AUTO FREIGHT, INC., Everson, WA	69626
SUMR	SUMMERS, LESTER R., INC., Ephrata, PA	123821
SUMW	SUMMIT TRANSPORTATION, Summit Express, Inc., d/b/a, Cerritos, CA	147692
SUXE	SUN EXPRESS, Hank's, Inc., d/b/a, Fontana, CA	126944
SURP	SUNRISE TRANSPORT, INC., Las Vegas, NV	192157
SUCR	SUPERIOR CARTAGE OF OREGON, INC., Portland, OR	147467
SULA	SUPERIOR EXPRESS, Superior Fast Drayage, d/b/a, Los Angeles, CA	121336
SUXP	SUPERIOR EXPRESS, INC., Waterloo, IL	62298
SUFQ	SURRATT FREIGHT LINES, INC., Beardstown, IL	140506
SUQT	SUSQUEHANNA TRANSPORTATION, INC., Englewood, CO	150818
SUWK	SUWAK TRUCKING COMPANY, Washington, PA	111956
SWAN	SWAN'S EXPRESS, Franklin W. Powell, d/b/a, Fryeburg, ME	97662
SWVI	SWARD TRUCKING, INC., Oakdale, CA	146045
SWHR	SWIFTHORSE, INC., Cambridge, ON, CN	189338
SYST	SYSTEM TRANSPORT, Long Beach, CA	120464

PARTICIPATING INTERSTATE CARRIERS — Continued

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
TKL	T P FREIGHT LINES, INC., Tillamook, OR	37563
TLNT	T-LINE TRANSPORT, Richard Thinnes and Thomas Thinnes, d/b/a, Cary, IL	166034
TCTN	T. C. TRANSPORTATION, INC., Crystal Lake, IL	150538
TAST	T.A.S. TRUCKING, INC., Nampa, ID	147528
TIME	T.I.M.E.-DC, INC., Dallas, TX	35320
TRBK	T.R.N. TRANSPORTATION, INC., Berkeley, IL	121242
TAFL	TACHICK FREIGHT LINES, INC., Soldotna, AK	118449
TACY	TACY'S EXPRESS, INC., Rensselaer, NY	81831
TLBR	TALBERT, J. O., Ulysses, KS	171189
TDMC	TANDEM CARTAGE, INC., Peru, IL	167954
TCXS	TCX, INC., Memphis, TN	153381
TEAL	TEAL'S EXPRESS, INC., Watertown, NY	6252
TETW	TEAMCO TRANSPORTATION, INC., Melrose Park, IL	191713
TEDF	TEDFORD, JACK N., INC., Fallon, NV	18038
TNOH	TENNESSEE OHIO EXPRESS, INC., Nashville, TN	157750
TXHW	TEXAS HIGHWAY TRANSPORT, INC., Dallas, TX	147517
TXSH	TEXAS SHIPPERS ASSOCIATION, INC., Dallas, TX	Ⓚ
TMOE	THERMO EXPRESS, INCORPORATED, Castro Valley, CA	121729
TWST	THOMAS, W. S., TRANSFER, INC., Fairmont, WV	64808
THTI	THOMPSON TRUCKING, INC., Charlotte, NC	121767
TPTM	THOMPSON, C. O., PETROLEUM CO., INC., Orange, CA	178145
THSN	THOMPSON, INC., Quincy, IL	39443
THPJ	THOMPSON, JOE E., Gridley, CA	118534
THST	THOMPSON, STEVE D., TRUCKING, INC., Winnsboro, LA	121658
THRT	THRIFT TRUCKING, INC., Elmhurst, IL	121079
THTT	THRIFTY TRANSPORT, INC., Maple Shade, NJ	155917
THRM	THRUWAY MESSENGER SERVICE, INC., Pearl River, NY	129529
THUN	THUNDER MOUNTAIN EXPRESS, Ray E. and Carol N. Arnold, d/b/a, Cascade, ID	180839
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC	105457
THFP	THURSTON, FREEMAN P., INC., Naugatuck, CT	170673
TITC	TIDEWATER TRANSIT COMPANY, INC., Kinston, NC	115831
TIGL	TIGER LINES, INC., Lodi, CA	156309
TGRP	TIGER TRANSPORT, INC., Waterloo, IA	204325
TIMS	TIM'S MOTOR SERVICE, INC., Bensenville, IL	163873
TIEE	TIME EXPRESS, INC., Westchester, IL	158230
TITN	TITAN TRUCKING CO., Anthony Zolner, d/b/a, Tinley Park, IL	160933
TMLG	TML, INC., Grand Rapids, MI	175157
TNBW	TNT BESTWAY TRANSPORTATION, INC., Phoenix, AZ	112123
TNTD	TNT CANADA, INC., Mississauga, ON, CN	111307
HMES	TNT HOLLAND MOTOR EXPRESS, INC., Holland, MI	59206
TNTG	TNT INSURED TOWING, Tommy N. Thompson, d/b/a, Boise, ID	204118
TODN	TODAY CARTAGE, INC., Plano, IL	145835
TODE	TODD, ERNIE, TRUCKING, Ernie Todd, d/b/a, Thompsonville, IL	177365
TOKD	TOK TRUCKING SERVICE, INC., Anchorage, AK	118534
TOKI	TOKAI SHIPPING OF AMERICA, INC., Wilmington, CA	120078
TOPD	TOPDRAW FREIGHT SYSTEM, INC., Chicago, IL	160301
TPLF	TOPLIFF TRUCK LINE, INC., Salina, KS	64189
TOTP	TORQUE TRANSPORT, INC., St. Laurent, PQ, CN	177416
TOFO	TOSE-FOWLER, INC., Scranton, PA	7698
TOTE	TOTEM OCEAN TRAILER EXPRESS, INC., Seattle, WA	Ⓚ
TOTN	TOTONI, NICK, & SONS, INC., Chicago, IL	120442
TOWR	TOWER LINES, INC., Wheeling, WV	65941
TWTR	TOWN TRUCKING CO., Roselle, IL	147446
TOST	TOWNS TRANSPORTATION, INC., Cordova, AL	96819
TRKN	TR TRUCKING, INC., Ranchester, WY	205030
TNES	TRANS-EAST CORP., Secaucus, NJ	167296
TIES	TRANS-ILLINOIS EXPRESS, INC., Decatur, IL	120977
TOHO	TRANS-OHIO HAULERS, INC., Columbus, OH	174938
TRNP	TRANS-PETRO, INC., Wood River, IL	150967
TWEL	TRANS-WESTERN EXPRESS, LTD., Denver, CO	58035
TCON	TRANSCON LINES, Los Angeles, CA	110325
TSCF	TRANSCONTINENTAL FREIGHT SYSTEMS, INC., Chicago, IL	150617
TSVG	TRANSIT SERVICING, INC., Cadillac, MI	148851
TREP	TRANSPORT EXPRESS, INC., Los Angeles, CA	138790
TNPT	TRANSPORT EXPRESS, INC. (A Kansas Corporation), Dodge City, KS	138181
TICL	TRANSPORT INTERNATIONAL COMMODITIES, INC., Dorval, PQ, CN	2056
TMSY	TRANSPORT MOTOR SYSTEMS, INC., Edison, NJ	165985
TPON	TRANSPORT NORDIQUE (1975) INC., Mont St-Hilaire, PQ, CN	112801
TRAP	TRANSPORT SERVICE CO., Hinsdale, IL	101075
TRSP	TRANSPORT, INC., Moorhead, MN	104683
TPIN	TRANSPORT, INC., Hattiesburg, MS	

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS — Continued

⊛Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
TSUS	TRANSUS, INC., Atlanta, GA	68923
TVIS	TRAVIS TRANSPORTATION, INC., San Antonio, TX	150954
TRVH	TREASURE VALLEY HOMES, INC., Boise, ID	109240
TREW	TREDWAYS EXPRESS, INC., Boonton, NJ	34975
TCYF	TRI COUNTY FEED & FARM SUPPLY, INC., Douglasville, GA	210038
TCTY	TRI COUNTY TRANSPORTATION CORPORATION, Suffern, NY	1547
TRGO	TRI GAS & OIL CO., INC., Federalsburg, MD	160232
TLXI	TRI LAKES EXPRESS, Bob G. White, d/b/a, Springfield, MO	152321
TMCN	TRI M CRANE & TRANSPORT, INC.	126080
TMFE	TRI M FREIGHT SYSTEMS, INC., Los Angeles, CA	168108
TMOD	TRI MODAL DISTRIBUTION SERVICES, INC., Los Angeles, CA	162381
TRIS	TRI-STATE CARRIER, INC., Carlstadt, NJ	69054
TRIA	TRIANGLE EXPRESS, INC., Oklahoma City, OK	99775
TRFQ	TRIANGLE FREIGHT CO., Springfield, CO	96929
TRGL	TRIANGLE LINES, INC., Fresno, CA	68832
TITP	TRIANGLE TRANSPORTATION, INC., Montebello, CA	157732
TNGN	TRIANGLE TRUCKING, INC., Salina, KS	169435
TSLD	TRIMAC TRANSPORTATION SERVICES LTD., Calgary, AB, CN	123329
TTOS	TRIMAC TRANSPORTATION SERVICES (WESTERN), INC., San Antonio, TX	170678
TTEI	TRIMAC TRANSPORT SYSTEM (EASTERN), INC., San antonio, TX	184753
TIPB	TRIPLE B TRANSPORT, INC., Payette, ID	169113
TRJW	TRIPLETT, JOHN W., Lewiston, ID	169971
TJTO	TROJAN TRANSPORTATION, INC., Chicago Heights, IL	184587
TRTP	TRUCK TRANSPORT, INCORPORATED, St. Louis, MO	115331
TKEC	TRUCKERS CORPORATION, Couer D'Alene, ID	170580
TTNK	TRUCKERS TANKERS, INC., Coeur d'Alene, ID	195146
TRUL	TRUCKING UNLIMITED, Santa Fe Springs, CA	96750
TUIT	TRUCKIT TRANSPORT, INC., Mississauga, ON, CN	184032
TSIM	TSI, A. J. Pellegrino, d/b/a, Trenton, MI	147039
TUVT	TUALATIN VALLEY TRANSPORT, INC., Hillsboro, OR	6920
TULL	TULLAHOMA FREIGHT COMPANY, Frank C. Martin, d/b/a, Tullahoma, TN	121592
TUNT	TUNICA TRUCK LINE, Virginia Sherman Lavender, d/b/a, Marks, MS	128038
TURN	TURNER TRUCKING COMPANY, INC., Clarks Hill, IN	97251
TWEN	20TH CENTURY TRUCKING COMPANY, Los Angeles, CA	99972
TCFL	TWIN CITY FREIGHT, INC., St. Paul, MN	111496
TCSA	TWIN CITY SHIPPERS ASSOCIATION, INC., Chicago, IL	⊛
TWFD	TWIN FALLS DISTRIBUTORS, INC., Twin Falls, ID	197568
TWSE	TWINS EXPRESS, INC., West Springfield, MA	155950
TOWY	TWO-WAY MESSENGER SERVICE, INC., Plainfield, NJ	169763
TYME	TYME DEDICATED TRUCK SERVICE, INC., Bowling Green, KY	181582
UTAW	U W FREIGHT LINE, INC., Salt Lake City, UT	40971
USBL	U. S. BULK CARRIERS, INC., Cicero, IL	178060
USIL	U. S. INTERNATIONAL COMPANY, Brookfield, IL	182961
USTC	U. S. TRUCK COMPANY, INC., Detroit, MI	59336
UBGT	UBBENGA TRUCKING, H. Robert Ubbenga and Kevin Ubbenga, d/b/a, Hartsburg, IL	166014
UUFW	UINTAH FREIGHTWAYS, Salt Lake City, UT	120093
UTCA	UNION TRUCKING CO., INC., Kenilworth, NJ	113313
UNCR	UNITED CARRIERS, INC., Fort Worth, TX	148404
UNDC	UNITED DRAYAGE COMPANY, Los Angeles, CA	96633
UPSS	UNITED PARCEL SERVICE, INC. (An Ohio Corporation), St. Charles, IL	115495
UPSN	UNITED PARCEL SERVICE, INC. (A NEW YORK CORPORATION), New York, NY	116200
UNPO	UNITED PETROLEUM TRANSPORTS, INC., Oklahoma City, OK	152151
UACL	UNIVERSAL AM-CAN, LTD., Tampa, FL	167922
UNIV	UNIVERSAL DELIVERIES, INC., Chicago, IL	148848
URBA	URBANA CARTAGE CO., Urbana, OH	96844
URBM	URBANA MOVING & TRANSFER CO., Rantoul, IL	162528
USEA	USA EASTERN, INC., Shawnee Mission, KS	174126
UOME	UTICA OSWEGO MOTOR EXPRESS, INC., Utica, NY	57878
VCTS	V. C. TRUCKING SERVICE, INC., Jersey City, NJ	1110
VCTN	V.C. TANK LINES, INC., Schererville, IN	183218
VIPW	V.I.P. TRUCKING & WAREHOUSE, Childs & Suarez, Inc., d/b/a, Cerritos, CA	175408
VALN	VALENCIA TRUCKING CO., Valencia Systems, Inc., d/b/a, Valencia, CA	134672
VLTE	VALENTE TRUCKING, INC., Calumet Park, IL	171316
VSTG	VALLAD & SON'S TRUCKING, Roberta J. Vallad and Anthony J. Vallad, d/b/a, Boise, ID	195277
VLEQ	VALLEY FREIGHT LINES, INC., New Castle, PA	171344
VLES	VALLEY SPREADER, INC., Brawley, CA	138345
VATL	VALLEY TRUCK LINE, Allen A. Kenninger, d/b/a, Cooperstown, ND	99050
VNAK	VAN AUKEN EXPRESS, INC., Greenville, NY	105843
VANB	VAN BRUNT & SON INC., Old Bridge, NJ	1486
VHZR	VAN HOOZER OIL, INC., Bethany, MO	176965
VASS	VAN SANT MOTOR FREIGHT, Willis Van Sant, d/b/a, Sully, IA	99390

PARTICIPATING INTERSTATE CARRIERS — Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
VNST	VAN SOMEREN TRANSFER, INC., Baldwin, WI	6117
VAZW	VAN ZUIDEN, WILLARD D., TRUCKING, INC., Albany, IL	147612
VANS	VAN'S AUTO & AIR EXPRESS, INC., Kingston, NY	99938
VKFL	VANDER KOOI FREIGHT LINE, Dennis Smit, d/b/a, Hull, IA	39904
VGTS	VANGUARD TRANSPORTATION SYSTEMS, INC., West Chester, OH	165581
VEZA	VENEZIA HAULING, INC., Limerick, PA	155348
VENT	VENTURA TRANSFER COMPANY, Long Beach, CA	7523
VETE	VETERAN EXPRESS, INC., San Jose, CA	206037
VIAE	VIA EXPRESS, INC., Hayward, CA	149166
VIGE	VIGEANT, A. E., & SON, INC., Marlboro, MA	120196
VIAJ	VINCENT, ALVA JAY, Berlin, NY	99285
VCFL	VIRGINIA-CAROLINA FREIGHT LINES, INCORPORATED, Martinsville, VA	37248
VOLD	VOLENTINE, DELMAR, Delmar Volentine, d/b/a, Sorento, IL	807
VOLP	VOLPE EXPRESS, INC., Norristown, PA	23550
WADS	WADSWORTH AND REILLY EXPRESS, INC., Washington Mills, NY	83151
WAGQ	WAGER TRANSFER, INC., Towanda, IL	168786
WAGP	WAGGONERS TRUCKING, THE, Billings, MT	26396
WAGN	WAGNER FREIGHT LINES, INC., Chattanooga, TN	121158
WGDE	WAGNER, DENNIS, Cottonwood, CA	Pending
WAGS	WAGNERS SERVICE, INC., Springfield, OH	60063
WPTN	WAGONER TRANSPORTATION COMPANY, Muskegon, MI	114070
WAJR	WAJER, P., & SONS EXPRESS CO., INC., Webster, MA	58946
WLIO	WALIN, INC., Coeur d'Alene, ID	207462
WKTL	WALKER, C. A., TRUCK LINES, INC., Chillicothe, IL	135340
WALL	WALL TRUCK LINE, INC., Holden, MO	547
WTAP	WALLACE TRANSPORT, Planada, CA	135803
WCAF	WALLACE-COLVILLE MOTOR FREIGHT, INC., Spokane, WA	1924
WLAK	WALLACK FREIGHT LINES, INC., Copiague, Long Island, NY	106222
WMES	WALSH MESSENGER SERVICE, INC., Garden City Park, NY	121454
WATS	WALSH TRUCKING SERVICE, INC., Massena, NY	29643
WRDT	WARD TRANSPORT, INC., Denver, CO	113624
WARD	WARD TRUCKING CORP., Altoona, PA	65916
WTLW	WARD TRUCKING SERVICE, LTD., Weyburn, SK, CN	201833
WNTN	WAREHOUSE & TERMINAL CARTAGE CO., Bridgeview, IL	135395
WRFN	WARNER, FRAN, TRUCKING, Fran Warner, d/b/a, Boise, ID	197693
WCFL	WARREN COUNTY FREIGHT LINE, INC., McMinnville, TN	121677
WART	WARREN TRANSPORTATION CO., Hayward, CA	121472
WNTT	WARREN TRANSPORT, INC., Waterloo, IA	114211
WRCY	WARRIOR COMPANY, Roger J. Kobusch, Jr., d/b/a, Chicago, IL	184671
WTRV	WATERVILLE EXPRESS, Thurston E. Browne, d/b/a, Waterville, NY	107472
WKSH	WATKINS AND SHEPARD TRUCKING, INC., Missoula, MT	176957
WWAT	WATKINS MOTOR LINES, INC., Lakeland, FL	95540
WMXP	WATROUS MOTOR EXPRESS, INC., Syracuse, NY	114631
WAEP	WATSON ENTERPRISES, INC., Pocatello, ID	179936
WTTE	WATTS EXPRESS, INC., Taberg, NY	99683
WEVN	WEAVER, NELSON, & SON, INC., Lititz, PA	157188
WBCC	WEBCO CHEMICAL CORPORATION, Dudley, MA	172079
WEKB	WEEKS BROS., INC., Swan Valley, ID	174801
WEIG	WEIGAND, A. J., INC., Dover, OH	119968
WCMS	WEIR-COVE MOVING & STORAGE CO., Weirton, WV	76262
WEIS	WEISS TRUCKING COMPANY, INC., Mongo, IN	94430
WELT	WELLING TRUCK SERVICE, INC., DeSoto, MO	38403
WELS	WELLS CARGO, INC., Reno, NV	43269
WNZQ	WENZEL'S DELIVERY SERVICE, INC., Lakewood, NJ	Pending
WCOT	WESCO TRANSPORT, INC., Murray, UT	168415
WEBE	WEST BEND TRANSIT & SERVICE COMPANY, West Bend, WI	44469
WEAS	WEST COAST AGENCIES, INC., Los Angeles, CA	172165
WFRM	WEST FARMS EXPRESS, INC., Bronx, NY	74164
WESM	WEST MOTOR FREIGHT, INC., Boyertown, PA	21866
WSGS	WEST SIDE TRANSPORT, INC., West Side Unlimited Corporation, d/b/a, Atkins, IA	168075
WEWT	WEST WORLD TRANSPORTATION CO., INC., Los Angeles, CA	95838
WEFW	WESTERN FREIGHTWAYS, Tampa, FL	71459
WSHC	WESTERN HARVEST CARRIERS, INC., Nampa, IL	197881
WHWD	WESTERN HYWAY DISTRIBUTING COMPANY, INC., Paramount, CA	142240
WKXQ	WESTERN KANSAS EXPRESS, INC., Wichita, KS	143112
WMEI	WESTERN MARINE EXPRESS, INC., J & J Webster, Inc., d/b/a, City of Industry, CA	193412
WTXP	WESTERN TEX-PACK EXPRESS, INC., Fort Worth, TX	121741
WTIC	WESTERN TRANSPORT, INC., A Joseph B. Card Company, Terre Haute, IN	189391
WTTH	WESTERN TRANSPORTATION SERVICES, Jerry J. Feliciello, d/b/a, West Sacramento, CA	192564
WCTT	WESTERN-COMMERCIAL TRANSPORT, INC., Fort Worth, TX	116063
WCTO	WESTERN-COMMERCIAL TRANSPORT OF ILLINOIS, INC., Fort Worth, TX	172934

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CARRIERS -- Continued

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
WGRD	WESTGARD TRANSFER & STORAGE COMPANY, Idaho Falls, ID	106528
WESN	WESTON TRUCKING, Weston Trucking Company, d/b/a, Encinitas, CA	126716
WMFR	WESTWAY MOTOR FREIGHT, INC., Commerce City, CO	99234
WETZ	WETZ, R. O., TRANSPORTATION, Roy O. Wetz, d/b/a, Marietta, OH	31438
WHAN	WHALEN TRUCKING, INC., Waverly, IL	147010
WTTS	WHEELER TRANSPORT SERVICE, INC., Omaha, NE	2392
WMPL	WHITE MOUNTAIN PASSENGER LINES, INC., Show Low, AZ	96678
WHTR	WHITE'S TRANSPORTATION, Francis D. White, d/b/a, Lockport, NY	61479
WHJT	WHITE, JAMES, TRUCKING, James White, d/b/a, Baton Rouge, LA	161009
WHFD	WHITEFORD TRUCK LINES, INC., South Bend, IN	156635
WTLT	WHITLEY TRANSPORT, INC., Winner, SD	172069
WITT	WHITTEN, C. I., TRANSFER COMPANY, Huntington, WV	47142
WHIC	WHITTEN, C. I., TRANSFER (QUEBEC), INC., Huntington, WV	136030
WHTD	WHITTLE, RILEY, INC., Phoenix, AZ	117786
WTWD	WICKERT, WALTER, DELIVERY SERVICE CO., East Peoria, IL	152223
WKOT	WICKLAND OIL TRANSPORT, Sacramento, CA	170766
WIDF	WILD, FLOYD, INC., Marshall, MN	143591
WKSQ	WILKES BARRE CONSOLIDATING CO., Wilkes-Barre, PA	176129
WKDC	WILKINS DRAYING CO., Reliable Crane and Rigging, Inc., d/b/a, Petaluma, CA	69827
WLLF	WILLEY FREIGHT WAYS, INC., Hammond, IN	143966
WILL	WILLAMETTE VALLEY TRANSFER CO., Salem, OR	44914
WMSF	WILLIAMS FREIGHT SYSTEMS, INC., Sycamore, IL	167205
WLMS	WILLIAMS TRANSPORTATION, INC., Los Angeles, CA	121171
WTNP	WILLIAMS TRANSPORT, INC., Cyril, OK	170157
WMAJ	WILLIAMS, ARLINGTON J., INC., Smyrna, DE	135040
WMJJ	WILLIAMS, JAMES, J., INC., Spokane, WA	110252
WLIG	WILLIG FREIGHT LINES, San Francisco, CA	48632
WIST	WILLISTON-SCOBEY TRANSFER, Plentywood, MT	110798
WTLD	WILLMS TRANSPORT (1964) LTD., Sherwood Park, AB, CN	179002
WMTO	WILMAR TRUCKING, INC., Oaks, PA	61624
WMOS	WILSON MOVING & STORAGE CO., INC., Buffalo, NY	16684
WTVA	WILSON TRUCKING CORPORATION, Fishersville, VA	64600
WSGC	WILTON STORAGE COMPANY, INC., Pittsburgh, PA	75491
WWMF	WISEWAY MOTOR FREIGHT, INC., St. Paul, MN	195111
WGTA	WITTIG TRANSPORT, INC., Pratt, KS	171863
WONG	WONG, ED, TRUCKING CO., Edward F. Wong, d/b/a, Monterey Park, CA	148254
WOOT	WOODLAND TRUCK LINE, INC., Woodland, WA	297
WTNS	WOODRUFF TRANSPORT SERVICE, Robert W. Woodruff, d/b/a, Shelbyville, IL	195198
WOSQ	WOOSTER MOTOR WAYS, INC., Wooster, OH	145194
WOTN	WOOTEN TRANSPORTS, INC., Memphis, TN	113361
WRED	WREDCO, INC., Gillette, WY	151681
WBKH	WRIGHT BROTHERS KITTY HAWK EXPRESS SYSTEMS, INC., White Plains, NY	155644
WRIC	WRIGHT CARRIERS, INC., Addison, IL	170821
WWNA	WRIGHTWAY AND ASSOCIATES, S. Warren Wright and Marvin L. Olson, d/b/a, Idaho Falls, ID	194069
WYNT	WYNNE TRANSPORT SERVICE, INC., Omaha, NE	114725
XTLT	XTL TRANSPORT, INC., Alexandria, ON, CN	191587
YAMF	YAMANE FARMS, Larry Yamane and William Yamane, d/b/a, Murtaugh, ID	207967
YAMK	YAMKO TRUCK LINES, Robert Nako Enterprises, Inc., d/b/a, Montebello, CA	121221
YANB	YANIK BROS. TRUCKING COMPANY, Michael S. Yanik, Steve Yanik, Andrew G. Yanik and Joseph P. Yanik, d/b/a, Buffalo, NY	112698
YARB	YARBROUGH TRANSFER COMPANY, Winston-Salem, NC	112288
YFSY	YELLOW FREIGHT SYSTEM, INC., Shawnee Mission, KS	112713
YLBC	YELLOW FREIGHT SYSTEM OF BRITISH COLUMBIA, INC., Shawnee Mission, KS	175477
YFSO	YELLOW FREIGHT SYSTEM OF ONTARIO, INC., Windsor, ON, CN	86247
YESK	YESKA, HENRY, & SON, INC., Nazareth, PA	155393
YRKT	YORK TRUCKING, INC., Jacksonville, IL	150147
YGEP	YOUNG'S, E., EXPRESS, INC., Watertown, NY	25343
YLKT	YOUNG, LOWELL KENT, Anna, IL	175193
YNGB	YOUNGER BROTHERS, INC., Houston, TX	531
YNGT	YOUNGER TRANSPORTATION, INC., Houston, TX	106509
YUKE	YUKON EXPRESS, INC., Bensalem, PA	176781
ZLNE	Z-LINE, Gary Zemlicka, d/b/a, Billings, MT	189914
ZAPP	ZAPPIA TRANSPORTATION SERVICES, INC., Buffalo, NY	174693
ZLHT	ZELHART TRUCKING, INC., Momence, IL	193155
ZENH	ZENITH TRANSPORTATION, INC., Hayward, CA	94540
ZIBE	ZIBERT TRANSPORT CO., Peru, IL	126428
ZILL	ZILLMER TRANSFER, INC., Sparta, WI	59726
ZNDL	ZINKE DRAY LINE, INC., Portage, WI	128400
ZORN	ZORN TRANSPORT, INC., Bloomington, IL	175572

PARTICIPATING INTERSTATE CONTRACT CARRIERS

The following contract carriers are participants to this tariff under authority of powers of attorney issued to American Trucking Associations, Inc., Agent.

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
ANRI	A & R TRANSPORT, INC., Ottawa, IL	140820
ABRQ	A B C RAPID DELIVERY, INC., Belvidere, IL	167659
AROL	AERO LIQUID TRANSIT, INC., Lowell, MI	135012
APGR	APGAR BROS., Sterling E. Apgar, John N. Apgar and Dorothy E. Anderson, A Partnership, d/b/a, Bound Brook, NJ	33322
BABN	BABSON BROS. TRUCKING CO., Oak Brook, IL	153524
BNTV	BARNES TRUCKING, INC., Burton, OH	160667
BRYL	BARY, INC., Louisville, KY	151508
BCTO	BCT, INC., Boise, ID	133589
BIET	BEITLER TRUCKING, INC., Pittsburgh, PA	151846
BGTQ	BERGER TRANSPORT, INC., Oshkosh, WI	151886
BUWT	BURNS, W. F., TRUCKING, INC., Ruffsdale, PA	128067
CBWS	C. B. W. TRANSPORT SERVICE, INC., Wood River, IL	115975
CECT	CECO TRANSPORT, INC., Oak Brook, IL	60521
CICS	CHEMICAL SERVICES CORP., Crestwood, IL	Pending
CLRE	CLEAR WATER TRUCK COMPANY, INC., Valley Center, KS	127304
CLIH	CLINE, HAROLD G., INC., Penns Grove, NJ	69668
CLNK	COLONIAL TRUCKING, INC., Brockton, MA	120799
CMMK	COMMERCIAL TRANSPORT CO., Portland, OR	142361
CCCE	CONDOR CONTRACT CARRIERS, INC., Lodi, OH	138054
CNHE	CONERTY-HENIFF TRANSPORT, INC., Alsip, IL	126040
CCCI	CONTINENTAL CONTRACT CARRIER CORP., City of Industry, CA	124796
CTRQ	CONTRACT FREIGHTERS, INC., Joplin, MO	119399
COPO	CORPORATE TRANSPORT, INC., Liverpool, NY	144189
CSLN	CRESCO LINES, INC., Harvey, IL	148380
CUOT	CUSTOMIZED TRANSPORTATION, INC., Jacksonville, FL	152620
DTIL	D.T.I., LTD., Newport, MN	158733
DAVI	DAVIS, JAMES T., INC., Lynchburg, VA	123218
DEPH	DECATUR PETROLEUM HAULERS, INC., Decatur, AL	114087
DEBD	DERBY DELIVERY SERVICE, INC., THE, Niles, MI	153683
DFCT	DFC TRANSPORTATION COMPANY, Huntley, IL	141721
DGNE	DINGLEDINE TRUCKING CO., THE, Urbana, OH	134679
DUTA	DUTRA TRUCKING CO., INC., Arcata, CA	150982
DYNA	DYNA BULK, INC., Summit, IL	170009
ETCT	EAST COAST TRANSPORTATION, Newport, RI	159397
ECOE	ECONEXPRESS, INCORPORATED, Pittsfield, IL	155021
FSVS	FARM SERVICE & SUPPLIES, INC., Marengo, IL	135539
FSTQ	FAST MOTOR SERVICE, INC., Brookfield, IL	126278
FERE	FERREE TRANSPORTATION, INC., Hammond, IN	118696
FOGL	FOGLEMAN TRUCK LINE, INC., Opelousas, LA	41116
FTTQ	FORT TRANSFER CO., Morton, IL	146074
FOXV	FOX VALLEY TRUCK LINES, INC., Carpentersville, IL	133334
FRMF	FREYMILLER TRUCKING, INC., Bakersfield, CA	145102
FUNH	FUNK, HAROLD J., Lancaster, WI	153348
GCFT	G-C-F TRANSPORTAT COOPERATIVE ASSOCIATION, Fennimore, WI	146791
GERC	GENERAL CARTAGE COMPANY, INC. (Iowa Corporation), Sterling, IL	114829
GNTT	GENTILINI, DANTE, TRUCKING, INC., West Chicago, IL	150206
GDSN	GRACE DISTRIBUTION SERVICES, INC., Duncan, SC	144843
GRYJ	GRAY, JACK, TRANSPORT, INC., Gary, IN	125777
GRLK	GREAT LAKES TERMINAL & TRANSPORT CORPORATION, Chicago, IL	109465
GEWT	GREENWOOD TRUCKING LTD., Bareboo, WI	150837
GRBK	GRIEBEL TRUCKING CO., Marengo, IL	143630
GRIC	GRIMM TRANSPORT CO., Morton, IL	152546
HAFQ	H & F TRUCKING CO., INC., Mattoon, IL	146742
HAMQ	H. & M. TRUCKING CO., Clinton, IL	145723
HCTK	HACKE TRUCKING, Ray Hacke, d/b/a, Waukegan, IL	148023
HARI	HARRINGTON, OZELLA, Benson, AZ	109515
HKTC	HAWKEYE TRUCKING COMPANY, Des Moines, IA	129695
HYTN	HAYES TRUCKING, Lyle Hayes, d/b/a, Kings, IL	Pending
HNCN	HENCO, INC., Selmer, TN	182080
HETV	HEIL TRUCKING, INC., Prairie City, IL	149588
HITB	HITCHCOCK BROS., INCORPORATED, Canaan, CT	149530
HULC	HULCHER TRUCKING COMPANY, Virden, IL	167714
HUPS	HUMPHREY SERVICES, INC., Madison, AL	162066
HOIT	HUSKY OIL TRANSPORTATION COMPANY, Englewood, CO	141205
INTP	INTERNATIONAL TRANSPORT, INC., Rochester, MN	113855
ITFT	ITOFCA TRUCK LINES, INC., Downers Grove, IL	160739
JOTK	JONES TRUCKING SERVICE, Aubrey L. Jones, d/b/a, Stewardson, IL	151642

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTERSTATE CONTRACT CARRIERS — (Continued)

Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
KEAI	KEATON TRUCK LINES, INC., Texarkana, TX	147676
KILB	KILBOURNE, W. H., Akron, OH	71207
KLSQ	KLIMAS PETROLEUM HAULING, Martha M. Klimas, d/b/a, Hickory Hills, IL	161192
LEFT	LEAF TRANSPORTATION, INC., Chicago, IL	161726
LNNE	LONNIE'S GRADING AND TRUCKING, INC., Mundelein, IL	167310
LOAG	LOTT, ARLO G., Arco, ID	162623
LXLC	LOUX LEASING CO., Peter H. Loux, d/b/a, Stratford, CT	167164
LOWJ	LOWERY, E. J., TRUCKING CO., McKeesport, PA	76817
MAFA	M. A. K. FREIGHT LTD., Brookfield, CT	169907
METS	MAE'S TRANSPORT SERVICE, INC., Webster, NY	173546
MAND	MANFREDI MOTOR TRANSIT CO., THE, Newbury, OH	128302
MKCR	MAR-KAY CARTAGE, INC., Solon, OH	135962
MAKS	MARKET SUPPORT SERVICES, INC., Gloucester, NJ	145128
MURC	MAURICE TRANSPORT CO., Morton, IL	117692
MCKW	McKEOWN TRANSPORTATION COMPANY, Chicago, IL	3018
MCNF	McNALLY, FRANK P., INC., Brooklyn, NY	124898
MEGT	MEIGS TRUCKING, INC., Portage, WI	160672
MEMD	MEMOREX DISTRIBUTION AND SERVICES CORPORATION, Santa Clara, CA	168073
MEJO	MEYERS, EDWARD J., COMPANY, INC., Summit, IL	169422
MSOF	MID SOUTH FREIGHT, INC., Hendersonville, TN	164103
MIRI	MILLER TRANSPORTS, INC., Pryor, OK	145825
MSCH	MISSISSIPPI CHEMICAL EXPRESS, INC., Bossier City, LA	118710
MOJL	MORGAN, JAMES L., Martinsville, IL	162469
MUEC	MUELLER CONTRACTING COMPANY, INC., Roselle, IL	Pending
MUFC	MURPHY, FRANK, CONTRACT CARRIER, INC., Staten Island, NY	35211
NINT	NINTH, INC., Oak Lawn, IL	154886
OHSL	OHIO SOIL TRANSPORTATION, INC., Mechanicsburg, OH	Pending
ORIL	ORIOLE CHEMICAL CARRIERS, INC., Lutherville, MD	109136
PFTR	P & F TRUCKING, INC., Hebron, OH	161749
PJTN	P. J. TRANSPORTATION, Hesperia, CA	159876
PAPR	PAPER RECLAIM, John A. Verhiha, d/b/a, Porterfield, WI	154766
PAYB	PAYSON, R., CARTAGE, Robert Payson, d/b/a, Orland Park, IL	165725
PHXB	PHOENIX BIRD, INC., Bensalem, PA	146568
PIAO	PIASA OILS TRANSPORT, INC., Hartford, IL	163135
PLTQ	PLATTE VALLEY FREIGHTWAYS, INC., Sterling, CO	72423
POWP	POWELL, E. L., & SONS TRUCKING CO., INC., Tulsa, OK	141648
PXIC	PRINTERS EXPRESS, INC., S. Kearny, NJ	143277
RMTR	R. M. TRANSPORT, INC., Hartford, WI	165448
RECF	REED, CLIFF, INC., Corvallis, MT	59828
RSET	REESE TRUCKING, INC., Dover, OH	135111
RSRT	RISER TRANSPORTATION, INC., Keithville, LA	156536
RCHE	ROACH, ED, TRUCKING COMPANY, INC., Ironton, OH	156646
RPSI	ROADWAY PACKAGE SYSTEM, INC., Pittsburgh, PA	179059
ROBK	ROBERTS, TOM M., TRUCKLINES, INC., Ashland, IL	134014
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL	64932
RITC	ROWLEY INTERSTATE TRANSPORTATION COMPANY, INC., Dubuque, IA	114028
RMXC	ROYAL MOTOR EXPRESS, INC., Lebanon, OH	1459
RUCC	RUDE, EDWARD M., CARRIER CORP., Falling Waters, WV	106688
RUSI	RUSSELL TRANSFER COMPANY, INC., Washington, GA	61506
SATO	SAFE TRANSPORT, INC., Hamilton, IL	135643
SNTY	SANTRY TRUCKING CO., Portland, OR	95920
SHBI	SCHIBER TRUCK COMPANY, INC. (A Delaware Corporation), Hartford, IL	148760
SHGL	SCHMIDGALL TRANSFER, INC., Morton, IL	111274
SNFO	SCHNEIDER NATIONAL FLEET SERVICES, INC., Cincinnati, OH	151138
SECO	SECO TRUCKING CO., Mason City, IA	105678
SEYL	SEYLLER TRANSPORT, INC., Algonquin, IL	123522
SIBR	SIBR, FRANK J., & SONS, INC., Alsip, IL	111432
SIGP	SIGNAL DELIVERY SERVICE, INC., Downers Grove, IL	106393
SNRQ	SNR DELIVERY, INC., Peekskill, NY	133415
STDF	STANDARD FORWARDING CO., INC., East Moline, IL	16536
STOH	STONE, EUGENE, TRUCKING, INC., Northfield, OH	133523
SYTB	STS TRANSPORTATION, INC., Somerville, NJ	163492
SPCY	SUPER CARRIER COMPANY, INC., Chicago, IL	157134
SUES	SUTTLES TRUCK LEASING, INC., Demopolis, AL	159006
TAST	T.A.S. TRUCKING, INC., Nampa, ID	147528
TACQ	TERRA COTTA TRUCK SERVICE, INC., Crystal Lake, IL	129987
TRNP	TRANS-PETRO, INC., Wood River, IL	128140
TRSH	TRANSHELD TRUCKING, INC., West Chicago, IL	142830
TTOS	TRIMAC TRANSPORTATION SERVICES (WESTERN), INC., San Antonio, TX	179678
TTEI	TRIMAC TRANSPORTATION SYSTEM (EASTERN), INC., San Antonio, TX	184753
UNMT	UNITED MERCHANTS TRUCKING, INC., Statesville, NC	150302

PARTICIPATING INTERSTATE CONTRACT CARRIERS — (Continued)

@Carrier "Alpha" Code	CARRIER	Certificate or Docket No. MC
VANM	VANHORN, MARVIN L., Pearl City, IL	159391
WANM	WANG, MELVIN, TRUCKING, Ramdo Transport, Inc., d/b/a, Fargo, ND	129484
WIAE	WILCOX, A. E., & SONS TRUCKING, INC., Watertown, NY	133284
WILP	WILLETT TRANSPORTS, INC., Chicago, IL	163383
WILF	WILLEY FREIGHT WAYS, INC., Hammond, IN	143968
WMAJ	WILLIAMS, ARLINGTON J., INC., Smyrna, DE	113024
WNTG	WINTERS TRUCKING, INC., Avenel, NJ	140038
WDWS	WOODWORTH & SONS, INC., Tolono, IL	116099

PARTICIPATING FMC CARRIERS

The following carriers are participants to this tariff under authority of Powers of Attorney issued to American Trucking Associations, Inc., Agent, and lawfully on file with the Federal Maritime Commission. (Authority to depart from the terms of Rule 5(b) of Tariff Circular No. 3 granted by Federal Maritime Commission Special Permission 4110-R, dated May 11, 1963).

@Carrier "Alpha" Code	
CCMW	CRESCENT CITY MARINE WAYS & DRYDOCK CO., INC., Portland, OR
LTIA	LYNDEN TRANSPORT, INC., Lynden, WA
SEFF	SEA FREIGHT FORWARDERS, Ray Transport, Inc., d/b/a, Seattle, WA
UNTT	UNITED TRANSPORTATION, INC., Bethel, AK
WEFW	WESTERN FREIGHTWAYS, Tampa, FL

PARTICIPATING INTRASTATE CARRIERS

The following carriers are participants to this tariff under authority of powers of attorney issued to American Trucking Associations, Inc., Agent, and lawfully on file with the state commission concerned. (Departure from the terms of State Commission regulations to the extent necessary to not publish power of attorney numbers has been authorized by the state commission.)

ALABAMA CARRIERS
(Operating under jurisdiction of Alabama Public Service Commission)

@Carrier "Alpha" Code	
AACT	AAA COOPER TRANSPORTATION, Dothan, AL
BAGT	BAGGETT TRANSPORTATION COMPANY, Birmingham, AL
BAYG	BAY TRANSPORTATION CO., INC., Forest Park, GA
BOWM	BOWMAN TRANSPORTATION, INC., Atlanta, GA
BNTT	BURNETT, W. M., TRUCK LINE, INC., Haleyville, AL
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CHOC	CHOCTAW TRANSPORT, INC., Prichard, AL
CUMM	CUMMINGS TRUCKING COMPANY, O. M. Cummings, Sr., d/b/a, Tuscaloosa, AL
DEAT	DEATON, INC., Birmingham, AL
DEPH	DECATUR PETROLEUM HAULERS, INC., Decatur, AL
FBTC	FLOYD & BEASLEY TRANSFER COMPANY, INC., Sycamore, AL
GFAT	GEORGIA FLORIDA ALABAMA TRANSPORTATION COMPANY, Forest Park, GA
HAFL	HARBIN FREIGHT LINE, Ira T. Harbin, d/b/a, Luverne, AL
MCOM	McCOMBS FREIGHT LINE, INC., Birmingham, AL
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS
NAXP	NORTH ALABAMA EXPRESS, INC., Alexander City, AL
REDC	REDWING CARRIERS, INC. (A Florida Corporation), Tampa, FL
SLSO	SAUNDERS CARRIERS, INC., Birmingham, AL
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI
SVCE	SERVICE EXPRESS, INC., Tuscaloosa, AL
STIN	STEIN, JIMMY, MOTOR LINES, INC., Mobile, AL
TOST	TOWNS TRANSPORTATION, INC., Cordova, AL
TCON	TRANSCON LINES, Los Angeles, CA

ALASKA CARRIERS
(Operating under jurisdiction of Alaska Transportation Commission)

AAAD	AAA DELIVERY, INC., Kenai, AK
ALDT	AIR LAND TRANSPORT, INC., Anchorage, AK
AIRB	AIRBORNE FREIGHT CORPORATION, Seattle, WA
AKFR	ALASKA FREIGHT LINES, INC., Valdez, AK
AKOL	ALASKA OIL SALES, INC., Soldotna, AK
ALTS	ALASKA TRANSFER & STORAGE, INC., Kodiak, AK
ALWE	ALASKA WEST EXPRESS, INC., Anchorage, AK
ANSQ	ANCO SHIPPING COMPANY, M. W. Odom, d/b/a, Anchorage, AK

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

@Carrier "Alpha" Code	ALASKA CARRIERS — (Continued) (Operating under jurisdiction of Alaska Transportation Commission)
ATRF	ARROWHEAD TRANSFER, Ola Harang and Gordon S. Harang, A Partnership, d/b/a, Sitka, AK
CNEB	C. & E. BRADLEY'S, INC., Ketchikan, AK
CHKI	CHILKAT FUEL, INC., Juneau, AK
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
DNAL	DENALI TRANSPORTATION CORPORATION, Fairbanks, AK
FFFS	FAIRWAY FAST FREIGHT SERVICE, Ervon E. Fairbanks and Leslie A. Fairbanks, d/b/a, Skagway, AK
FOSR	FOUR STAR TERMINALS, INC., Anchorage, AK
FTPC	FRONTIER TRANSPORTATION COMPANY, Fairbanks, AK
HASW	H & S WAREHOUSE, INC., Fairbanks, AK
HUER	HUSTLERS, INC., Anchorage, AK
ITSC	IRELAND TRANSFER & STORAGE CO., Ketchikan, AK
KODA	KODIAK TRANSFER, INC., Kodiak, AK
KOPP	KOPPERUD TRANSPORTATION, Herbert N. Kopperud, d/b/a, Palmer, AK
LTIA	LYNDEN TRANSPORT, INC., Lynden, WA
MMAK	MAMMOTH OF ALASKA, INC., Anchorage, AK
PTPQ	PETRO PRODUCTS, INC., Anchorage, AK
QTRK	Q TRUCKING COMPANY, Charles M. Reader, d/b/a, Nome, AK
SLSE	SEA-LAND FREIGHT SERVICE, INC., Seattle, WA
SRVC	SERVICE TRANSFER, INC., Sitka, AK
SODE	SOURDOUGH EXPRESS, INC., Fairbanks, AK
SOHC	SOUTHCENTRAL AIR, INC., Kenai, AK
TAFL	TACHECK FREIGHT LINES, INC., Soldotna, AK
TOFO	THOMPSON TRANSFER, Kodiak, AK
TOKD	TOK TRUCKING SERVICE, INC., Anchorage, AK

ARIZONA CARRIERS
(Operating under jurisdiction of Arizona Corporation Commission)

CTZN	CITIZEN EXPRESS LINES, Citizen Auto Stage Company, d/b/a, Nogales, AZ
JEFL	JENNEY FREIGHT LINE, INC., Wheeling, IL
LAYM	LOS ANGELES-YUMA FREIGHT LINES, INC., Yuma, AZ
RLPH	RALPH'S TRANSFER, INC., Tucson, AZ
RDWY	ROADWAY EXPRESS, INC., Akron, OH
TNBW	TNT BESTWAY TRANSPORTATION, INC., Phoenix, AZ
WELS	WELLS CARGO, INC., Reno, NV
WMPL	WHITE MOUNTAIN PASSENGER LINES, INC., Show Low, AZ

ARKANSAS CARRIERS
(Operating under jurisdiction of Arkansas Transportation Commission)

ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ARFW	ARKANSAS FREIGHTWAYS, INC., Harrison, AR
BRBT	BROWN BROTHERS TRUCK LINE, O. W. Brown and J. N. Brown, d/b/a, Des Arc, AR
JTLS	JONES TRUCK LINES, INC., Springdale, AR
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA
MDWY	MIDWAY MOTOR FREIGHT LINES, INC., Little Rock, AR
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS

CALIFORNIA CARRIERS
(Operating under jurisdiction of California Public Utilities Commission)

AATB	A & A TRANSPORT CO., INC., Los Banos, CA
ADTA	A & D TRANSPORTATION, Oakland, CA
ARAL	A & L TRUCKING, Norwalk, CA
ANMY	A & M TRUCKING, INC., Yuba City, CA
AMUC	A & M TRUCKING, Anita E. Matthews, d/b/a, Redding, CA
ANRI	A & R TRANSPORT, INC., Ottawa, IL
AWTV	A & W TRANSPORTATION, Visalia, CA
ABGT	A B & G HARBOR TRUCKING SERVICE, INC., Santa Fe Springs, CA
AAHF	A&H FREIGHT CO., Norwalk, CA
AODE	A-1 DELIVERY CO., Pico Rivera, CA
AOXQ	A-1 EXPRESS DELIVERY SERVICE, INC., Los Angeles, CA
ABKG	A. & B. TRUCKING, Covina, CA
AMDI	A. M. DELIVERY, INC., City of Industry, CA
AMPQ	A.M. - P.M. SPECIAL DELIVERY, INC., Los Angeles, CA
AAKG	AAA TRUCKING, South Gate, CA
ABSO	ABC MESSENGER SERVICE, INC., Los Angeles, CA
AELE	ABEL, LARRY, EXCAVATING, Placerville, CA
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ABTA	ABT, INC., Maxwell, CO

PARTICIPATING INTRASTATE CARRIERS — Continued

CALIFORNIA CARRIERS — (Continued)
(Operating under jurisdiction of California Public Utilities Commission)

Carrier "Alpha" Code	
AEQR	ACADEMY EQUIPMENT RENTALS, Norwalk, CA
ACRR	ACERET TRUCKING, Los Angeles, CA
ACTY	ACTION TRANSPORT, INC., Bellflower, CA
ADSR	ADAMS TRUCKING, INC., Woodland, CA
ADAM	ADAMS, ALLEN A., Clovis, CA
ADTE	ADEPT TRANSPORT CO., Pagdin Enterprises, Inc., d/b/a, Emeryville, CA
ADMT	ADMIRAL TRANSPORTATION, City of Industry, CA
ASDS	AERO SPECIAL DELIVERY SERVICE, INC., San Francisco, CA
AGIT	AGI TRUCKING COMPANY, Brea, CA
AJTO	AJASSA TRUCKING COMPANY, Gilroy, CA
AIMN	AIM TRANSPORTATION, INC., Orange, CA
AICP	AIR CARGO TRANSPORTATION, INC., San Mateo, CA
AICA	AIR CARTAGE ASSOCIATES, INC., Milpitas, CA
ACUP	AIR COURIER EXPRESS, INC., Los Angeles, CA
AELN	AIR EAGLE, INC., Hawthorne, CA
AIBC	AIR BY CHESS, INC., Los Angeles, CA
AIRB	AIRBORNE FREIGHT CORPORATION, Seattle, WA
AITT	AIRE, T. C., Thomas F. Callan, d/b/a, Burlingame, CA
AOCS	AIRLIMO/AIRLINE COURIER SERVICE, Burlingame, CA
APXR	AIRPORT EXPRESS, INCORPORATED, South San Francisco, CA
AKEI	AKE TRANSPORTATION COMPANY, INC., Ventura, CA
ATCG	AL'S TRUCKING CO., INC., San Jose, CA
ALRF	ALARCON TRUCKING, Livermore, CA
ALNK	ALBERTSON, N. K., Montebello, CA
ALGI	ALEGRE, FRANK C., TRUCKING, INC., Lodi, CA
AGLM	ALEGRE, LAWRENCE M., TRUCKING, Tracy, CA
ALXG	ALEXANDER TRUCKING, Earle B. Alexander, d/b/a, Earlimart, CA
AFLE	ALFLEX CORPORATION, Long Beach, CA
ALCP	ALL CORPS, Vista, CA
ALLV	ALLIED VAN LINES, INC., Chicago, IL
ALZF	ALONZO FARMS, INC., Dixon, CA
APHN	ALPHA TRANSPORTATION, INC., Los Angeles, CA
APHS	ALPHEUS, RAYMOND H. (RAY), Red Bluff, CA
APNT	ALPINE TRUCKING COMPANY, Stockton, CA
ASYI	ALTO SYSTEMS, INC., Los Angeles, CA
ATFE	ALTRUK FREIGHT SYSTEMS, INC., Tampa, FL
ALVQ	ALVAREZ TRUCKING, INC., Cudahy, CA
ALVF	ALVAREZ, ALFRED R., San Clemente, CA
ALVT	ALVAREZ, RAY R., TRUCKING, Ray R. Alvarez and Raynaldo Alvarez, Jr., d/b/a, Monterey Park, CA
AMKI	AMARAL TRUCKING, INC., Union City, CA
AMQC	AMARANT, CARL, Rio Vista, CA
AELN	AMELN, TONY, San Jose, CA
ACGQ	AMERICAN CARTAGE COMPANY, Bakersfield, CA
AMPF	AMERICAN PACIFIC FORWARDERS, Santa Ana, CA
APCE	AMERICAN PACIFIC EXPRESS, INC., Los Angeles, CA
AMRB	AMERICAN RED BALL TRANSIT COMPANY, INC., Indianapolis, IN
AMER	AMERICAN TRANSFER CO., Fresno, CA
ACHR	ANCHOR TRANSPORT, Norwalk, CA
ANCT	ANDCO TRANSPORTATION COMPANY, Planada, CA
ANRA	ANDRADE, MANUEL P., JR., Sunnyvale, CA
ANLT	ANELLO TRUCKING CO., San Jose, CA
ANSR	ANGELES METAL SYSTEMS, Los Angeles, CA
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
AVTI	ANTELOPE VALLEY TRUCKING COMPANY, Leroy R. Harrington, d/b/a, Palmdale, CA
APBQ	APEX BULK COMMODITIES, Whittier, CA
APDA	APODACA TRUCKING COMPANY, Los Angeles, CA
APDC	APPLEGATE DRAYAGE COMPANY, Sacramento, CA
ARIR	ARIES TRANSPORTATION COMPANY, INC., Bell, CA
ADLV	ARROW DELIVERY & TRANSFER CO., Al Occhipinti and Sons, Inc., d/b/a, San Jose, CA
ACRH	ART'S CART TRUCKING, Fremont, CA
ASBS	ASBURY SYSTEM, Los Angeles, CA
ASBY	ASBURY TRANSPORTATION CO., Wilmington, CA
ASHT	ASHWORTH TRANSFER, INC., Salt Lake City, UT
ASVB	ASVIDO, BEVAN, TRANSPORTATION, INC., Petaluma, CA
ASUR	ASTURIA TRUCKING COMPANY, INC., Los Angeles, CA
ATHT	ATHENS TRANSPORTATION SYSTEM, San Jose, CA
ATBO	ATHWAL BROTHERS TRUCKING, INC., Fresno, CA
AWDT	ATHWAL, DAVE, TRUCKING, Fresno, CA
ATMI	ATLAS MARINE, INC., Long Beach, CA
ALFE	ATLAS MOTOR FREIGHT LINES, INC., Santa Fe Springs, CA
AGTI	AUGIE'S TRUCKING SERVICE, INC., Tracy, CA

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

CALIFORNIA CARRIERS — (Continued)
(Operating under Jurisdiction of California Public Utilities Commission)

Carrier "Alpha" Code	
AUDG	AUSTIN DRAYING COMPANY, Oliver J. Austin, Oliver J. Austin, Jr. and Anthony C. Austin, d/b/a, San Francisco, CA
ALKS	AUSTIN-LAWS TRUCK LINES, INC., Fontana, CA
APAT	AUTO PURCHASING AGENCY, INC., Los Angeles, CA
AVTN	AVON TRANSPORT SERVICE, INC., Los Angeles, CA
AZTF	AZTECA FAST FREIGHT, INC., Torrance, CA
BNBK	B & B TRUCKING, Modesto, CA
BNEK	B & E TRUCKING, INC., Georgetown, CA
BAGQ	B & G TRUCKING, INC., Santa Fe Springs, CA
BGTN	B & G TRUCKING, Gedo, Inc., d/b/a, LaVerne, CA
BDRH	B & R TRANSPORTATION COMPANY, Houston, TX
BBPT	B B TRANSPORT, Charles L. Briscoe, d/b/a, Santa Maria, CA
BDTO	B D TRUCKING CO., Ripon, CA
BLTA	B L T TRUCKING, Stanton, CA
BJST	B-J'S SUPPLY & TRUCKING, INC., Orange, CA
BGTP	B. G. TRUCKING, B. Gunter Trucking, Inc., d/b/a, Olympia, WA
BJJC	B.J.J. COMPANY, INC., Stockton, CA
BNCB	BAESKENS & CHERBAK, Upland, CA
BKBR	BAKER BROTHERS TRUCKING, Ione, CA
BKEL	BAKER LOGGING, INC., Placerville, CA
BSVI	BAKER TRUCKING SERVICE, Grover W. Baker, d/b/a, Willows, CA
BAKA	BAKER, ART, TRANSPORTATION, Jack Robert Murray, d/b/a, Santa Fe Springs, CA
BKRJ	BAKER, JIM, TRUCKING, INC., Santa Rosa, CA
BLAM	BAKERSFIELD-L A MOTOR EXPRESS, Bakersfield, CA
BLWT	BALDWIN TRUCKING, INC., Oakland, CA
BALS	BALSER TRUCK CO., South Gate, CA
BBCO	BARBCO, Douglas Patrick Burke, d/b/a, Redwood City, CA
BNHW	BARNES, HENRY W., Anderson, CA
BARO	BARNETT TRUCKING, INC., Fillmore, CA
BTUI	BART TRUCKING COMPANY, San Francisco, CA
BAPD	BARTOLI'S RAPID TRANSIT DELIVERY, Pico Rivera, CA
BCSP	BASICS TRANSPORTATION, INC., Santa Fe Springs, CA
BSSB	BASSI, GEORGE, DISTRIBUTING COMPANY, A CALIFORNIA CORPORATION, Watsonville, CA
BLYG	BATES, LARRY, TRUCKING, Fontana, CA
BTFB	BATTENFIELD BROS. TRUCKING, Visalia, CA
BYAT	BAY AIR TRANSPORTATION, INCORPORATED, South San Francisco, CA
BAYR	BAY AREA RAPID DELIVERY, INC., San Francisco, CA
BAYO	BAY AREA WAREHOUSE CO., Wellson, Inc., d/b/a, Emeryville, CA
BAYA	BAY AREA-LOS ANGELES EXPRESS, INC., Sunnyvale, CA
BYCI	BAY CIRCUIT TRUCKING, INC., San Francisco, CA
BBXO	BAY CITIES WAREHOUSE COMPANY, INC., Hayward, CA
BBWO	BAY ORBIT TRUCKING, INC., San Mateo, CA
BYSC	BAYS, CARL D., & SONS, Modesto, CA
BAYN	BAYWOOD EXPRESS, INC., Fontana, CA
BBCY	BBC TRANSPORTATION CO., San Dimas, CA
BCTO	BCT, INC., Boise, ID
BDAM	BEACH, DONALD R., AND M. HARRELENE R., Brawley, CA
BECA	BEAR CAT, INC., Klamath Falls, OR
BEBH	BEARD BROS. LTD., Richard S. Core & Edwards Guess, Jr., d/b/a, Bakersfield, CA
BEKP	BECK, PAUL T., CONTRACTOR, Salinas, CA
BEDQ	BEDFORD FREIGHT LINES, INC., Los Angeles, CA
BEDM	BEDFORD, M. L., TRUCKING CO., Fremont, CA
BDOI	BEDOIAN, EARL M., Modesto, CA
BBMR	BEEBE, MIKE, TRUCKING, Michael C. Beebe, d/b/a, Lake Elsinore, CA
BEEP	BEETS TRUCKING, Billie Ray Beets, d/b/a, Rio Oso, CA
BEIA	BEINER, BERNARD E., Granada Hills, CA
BEKL	BEKINS MOVING & STORAGE CO. (A California Corporation), Glendale, CA
BAMA	BEL AIR MART, Sacramento, CA
BVTG	BEL-MEV TRUCKING, INC., Alameda, CA
BLBK	BELBECK TRUCKING, Ernest E. Belbeck, d/b/a, Riverside, CA
BLLV	BELL TRUCKING SERVICE, James Howard Bell, d/b/a, Oakhurst, CA
BEVE	BELMONT VAN & STORAGE COMPANY, Long Beach, CA
BNTK	BENETO TANK LINES, West Sacramento, CA
BGEH	BENGE, H. L., TRUCKING, Thornton, CA
BGME	BENNETT MOTOR EXPRESS, INC., McDonough, GA
BNNN	BENNETT, NORMAN E., West Sacramento, CA
BEMO	BENTLEY MOVING & STORAGE CO., Concord, CA
BRTO	BERGEN'S TRUCKING COMPANY, James L. Bergen, d/b/a, Rialto, CA
BKNQ	BERKELEY WAREHOUSE AND DRAYING CO., INC., Berkeley, CA
BYRS	BERRY, TREVIS R., Gilroy, CA
BTVT	BERRY, TREVIS, TRANSPORTATION, Gilroy, CA
BTAD	BERTINOLA, DONALD K., Winters, CA

PARTICIPATING INTRASTATE CARRIERS — Continued

Carrier "Alpha" Code	CALIFORNIA CARRIERS — (Continued) (Operating under jurisdiction of California Public Utilities Commission)
BDSV	BEST DELIVERY SERVICE, INC., Montebello, CA
BEIC	BEST LINE, INC., Hopkins, MN
BPMQ	BEVAN PEARSON MOVING & STORAGE, INC., Santa Rosa, CA
BHTN	BH TRANSPORT, INC., Oakland, CA
BIAP	BIAGI TRANSPORTATION, Santa Rosa, CA
BGTB	BIG 'T' TRANSPORT, INCORPORATED, South San Francisco, CA
BITL	BISHER FREIGHT SERVICE, Edwin N. Bacorn and Jill Bacorn, d/b/a, Ramona, CA
BFAT	BISHOP, FRANK A., JR., Atascadero, CA
BJDK	BJD TRUCKING, Sunnyvale, CA
BTUG	BLAIR TRUCKING, Riverdale, CA
BLKJ	BLAKE, GEORGE C., TRUCKING, INC., Littlerock, CA
BLHQ	BLANCHETT TRUCKING COMPANY, Rhudean Blanchett, d/b/a, Oakley, CA
BLKE	BLOCKER TRANSPORTATION, James A. Blocker, d/b/a, Blythe, CA
BBZE	BLUE BLAZER EXPRESS, INC., Santa Ana, CA
BLII	BLUE LINE TRANSPORTATION COMPANY, INC., Bloomington, CA
BLRS	BLUE RIBBON EXPRESS & MESSENGER SERVICE, Alviso, CA
BLXS	BLUELINE EXPRESS, Granada Hills, CA
BTHE	BLYTHE TRUCKING, Kenneth Blythe, d/b/a, Union City, CA
BUKM	BMT TRANSPORT, INC., Concord, CA
BOBS	BOB'S DELIVERY SERVICE, INC., Norwalk, CA
BOBM	BOBS MARKET TRANSPORT, INC., Sacramento, CA
BOLD	BOLAND TRUCKING COMPANY, INC., San Francisco, CA
BILO	BOLTON TRUCK LINES, INC., William E. Lorence, Inc., d/b/a, Fresno, CA
BOFI	BONFILS TRANSPORTATION SERVICES, INC., Cypress, CA
BNOA	BONORA, BENNIE V., Modesto, CA
BNED	BOONE, DAN, DIESEL REPAIR & WELDING, Dan Boone, d/b/a, Paramount, CA
BDNT	BORDEN TRUCKING, INC., Mira Loma, CA
BASN	BORNHOLDT & SONS TRUCKING, Selmer Richard Bornholdt, d/b/a, Ontario, CA
BWEL	BOUTWELL TRUCKING CO., Dwight A. Boutwell, d/b/a, City of Industry, CA
BWLE	BOWLIN TRUCKING LINES, INC., Selma, CA
BOWM	BOWMAN TRANSPORTATION, INC., Atlanta, GA
BYLI	BOYLE ENTERPRISES, L. B. Chapman, d/b/a, Los Angeles, CA
BTGY	BRAGG TRUCKING, Sonoma, CA
BRAK	BRAKE DELIVERY SERVICE-MEIER TRANSFER SERVICE, Los Angeles, CA
BMER	BRAKE MEIER TRUCKLOAD, INC., Paramount, CA
BRAE	BRANDT, E. I., TRUCKING CO., INC., Yuba City, CA
BEMT	BREM'S TRUCKING, Gilroy, CA
BTRM	BREWER TRUCKING, Jack Slaton, Jr. and Curtis W. Freeze, d/b/a, Merced, CA
BDGC	BRIDGES, CONNIE F., Tulare, CA
BRBP	BRINK, BOB, INC., Winona, MN
BKLF	BROOKLYN TRUCKING, Lakewood, CA
BMLE	BROOKS, MERLE L., Bloomington, CA
BRRS	BROTHERS TRANSPORTATION, INC., Paramount, CA
BRDA	BROWN, D. A., TRUCKING CO., Bakersfield, CA
BODE	BROWN, DEAN W., Riverside, CA
BWJE	BROWN, JESS, INC., Tracy, CA
BTSE	BTS TOW AND TRANSPORT SERVICE, Vallejo, CA
BUDI	BUD'S DELIVERY, INC., Anaheim, CA
BUDW	BUDWAY EXPRESS, Budway Enterprises, Inc., d/b/a, Pico Rivera, CA
BUAK	BUENA TRUCKING CO., INC., Ojai, CA
BLKP	BULK TRANSPORTATION, INC., Walnut, CA
BUGE	BURGESS TRANSPORTATION, Yorba Linda, CA
BGSD	BURGESS, DALE, TRUCKING, Arbuckle, CA
BKJC	BURKE, JAMES D., Vacaville, CA
BUSV	BURNHAM SERVICE COMPANY, INC., Columbus, GA
BRSJ	BURNS AND SONS TRUCKING, Jamul, CA
BUDR	BURNS, F. J., DRAYING, San Francisco, CA
BSRG	BURRIS TRUCKING, Rodger W. Burris, d/b/a, Waterford, CA
BUOA	BURROLA TRUCKING, Frank Burrola, d/b/a, Mentone, CA
BUII	BURTSCHI TRANSPORT, INC., Riverbank, CA
BSTF	BUSH TRUCKING, Santa Clara, CA
CNAJ	C & A TRUCKING, Cotati, CA
CNDD	C & D TRAILER TRANSPORT, Ridgecrest, CA
CNFE	C & F EQUIPMENT, INC., Apple Valley, CA
CNHC	C & H NATIONWIDE, INC., Dallas, TX
CLFL	C & L FREIGHT LINES, INC., Downey, CA
CALO	C & L TRUCKING CO., A California Corporation, Alameda, CA
CNMD	C & M DELIVERY, INC., Petaluma, CA
CNMN	C & M TRANSPORTATION, INC., Long Beach, CA
CDTK	C D TRUCKING, Santa Maria, CA
CJTG	C-J TRUCKING, Santa Paula, CA
CWEO	C-WAY EXPRESS, L. J. Cerkueira, d/b/a, Oakland, CA

For explanation of abbreviations and reference marks, see last page of this tariff.

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@Carrier "Alpha" Code	
CBSH	C B S TRUCKING, INC., Placentia, CA
CFOI	C.F.O. ENTERPRISES, INC., Lancaster, CA
CKCN	C.K.C., INC., Paso Robles, CA
CMUN	C.M.T. TRUCKING, Salinas, CA
CCAK	CAL CARGO, Pacific Warehousing, Inc., d/b/a, San Francisco, CA
CCKN	CAL STATE TRUCKING CO., INC., Stockton, CA
CTRS	CAL TRANS, INC., Long Beach, CA
CUND	CAL UNITED, West Covina, CA
CCHK	CAL-CHRIS TRUCKING, INC., Turlock, CA
CFPE	CAL-PACIFIC EXPRESS, Fresno, CA
CALP	CAL-PACIFIC TRUCK LINES, INC., San Carlos, CA
CAWK	CAL-WEST EXPRESS CO., LTD., Oakland, CA
CAWF	CAL-WESTERN TRANSPORT, INC., Tulare, CA
CLTB	CALA TRANSPORTATION, INC., South San Francisco, CA
CALC	CALIFORNIA CARTAGE COMPANY, INC., Signal Hill, CA
CCXP	CALIFORNIA CARTAGE EXPRESS, Signal Hill, CA
CCFS	CALIFORNIA CONSOLIDATED FREIGHT SYSTEMS, Atwood, CA
CFCE	CALIFORNIA CONSOLIDATED ENTERPRISES, INC., Santa Fe Springs, CA
CLDB	CALIFORNIA DISTRIBUTION CENTERS, INC., West Sacramento, CA
CLDS	CALIFORNIA DISTRIBUTION SERVICES, INC., Cerritos, CA
CLDE	CALIFORNIA DRAYAGE EXPRESS, James H. Jackson, d/b/a, San Francisco, CA
CFRQ	CALIFORNIA FREIGHT LINES, City of Industry, CA
CFIE	CALIFORNIA INLAND EMPIRE TRUCKING, INC., Chino, CA
CAXE	CALIFORNIA INTERSTATE EXPRESS, LTD., Paramount, CA
CFMM	CALIFORNIA MULTIMODAL INC., Long Beach, CA
CNVB	CALIFORNIA/NEVADA BIG VALLEY EXPRESS, INC., Redding, CA
CSFC	CALIFORNIA SEED & FERTILIZER CO., H. T. Johnston, d/b/a, Yuba City, CA
CALF	CALIFORNIA TANK LINES, INC., Stockton, CA
CFTM	CALIFORNIA TERMINAL CO., INC., Downey, CA
CAIE	CALIFORNIA TRANSPORT ENTERPRISES, INC., Gardena, CA
CFNW	CALIFORNIA TRANSPORTATION NETWORK, INC., Hayward, CA
CALW	CALIFORNIA WAREHOUSE CO., Daniel C. Fessenden Company, a Corporation, d/b/a, Los Angeles, CA
CAWT	CALIFORNIA WESTERN, Long Beach, CA
CLSI	CALKINS, LES, TRUCKING, INC., Lodi, CA
CLWK	CALWAY TRUCKING, Commerce Consolidators Corp., d/b/a, Los Angeles, CA
CLZO	CALZONA TANKWAYS, INC., Phoenix, AZ
CAMA	CAMALL TRUCKING, INC., Santa Fe Springs, CA
CTPH	CANTLAY TRANSPORTATION, INC., Long Beach, CA
CPNP	CAP TRANSPORT, INC., Fremont, CA
CDCG	CARDINAL CARTAGE, INC., Norco, CA
CCHI	CARMONA CHEMICAL CO., San Francisco, CA
CPMR	CARPINTERIA MOTOR TRANSPORT, Carpinteria, CA
CCRM	CARRASCO, CARMELO, C., Fresno, CA
CCRH	CARTEL CARRIERS, La Mirada, CA
CAZA	CASAZZA TRUCKING COMPANY, Reno, NV
CCPL	CASCI RENTAL AND TRANSPORT COMPANY OF CALIFORNIA, Sierra Rental and Transport Company, d/b/a, Sparks, NV
CSEK	CASE TRUCKING, INC., Mid Valley Transportation, d/b/a, Sanger, CA
CLTK	CASE, LONNIE, TRUCKING, INC., Sanger, CA
CMTO	CEMENT TRANSPORT CO., Lomita, CA
CCSO	CENTRAL CONCRETE SUPPLY CO., INC., San Jose, CA
CTUM	CENTURY MOVING & STORAGE, INC., Huntington Beach, CA
CERT	CERTIFIED FREIGHT LINES, INC., Arroyo Grande, CA
CHCI	CHACON TRUCKING, INC., San Leandro, CA
CHWH	CHAFFEE WAREHOUSE & TRUCKING CO., Map Warehouse & Trucking Company, d/b/a, Los Angeles, CA
CHFN	CHALLENGER FREIGHT LINES, INC., Chino, CA
CMBC	CHAMBLIN, FLOYD, TRUCKING, Stockton, CA
CHAN	CHAN, LINCOLN, Courtland, CA
CHGY	CHARCY COMPANY, Sacramento, CA
CHZT	CHAVEZ TRUCKING, Riverside, CA
CHLR	CHEM LAB PRODUCTS, INC., Ontario, CA
CHEM	CHEMCENTRAL CORP., Santa Fe Springs, CA
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CHOF	CHEROKEE FREIGHT LINES, Scan-Vino, Inc., d/b/a, Stockton, CA
CCIO	CHICO TRANSPORTATION, Chico, CA
CHSG	CHRIS & SONS DELIVERY SERVICE, Ontario, CA
CDCM	CHURCH/DC EXPRESS, Sharon Marie Dalgleish, d/b/a, Chino, CA
CHCJ	CHURCHILL TRANSPORTATION COMPANY, THE, Hemet, CA
CICC	CIAPUSCI, CHARLES A., Santa Rosa, CA
CIFM	CIF MESSENGER, INC., Los Angeles, CA

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CIPN	CIPPONERI, TOM, TRUCKING, Tom Cipponeri, d/b/a, Modesto, CA
CBTI	CIRCLE BAY TRUCKING, San Francisco, CA
CCTJ	CIRCLE C TRUCK BROKERAGE, INC., Malin, OR
CTDR	CITY DISTRIBUTION SERVICES, Carson, CA
CDCQ	CITY DRAYAGE CO., INC., Sun Valley, CA
CTMG	CITY MOVING SYSTEMS, Moore Van & Storage of Sacramento, d/b/a, Sacramento, CA
CTYT	CITY TANK LINE, INC., Gardena, CA
CKFS	CLARK FREIGHT SYSTEMS, Vernon L. and Robert C. Clark, d/b/a, Eureka, CA
CKTD	CLARK TRUCKING SERVICE, INC., West Sacramento, CA
CLCS	CLASSIC CARTAGE CORP., Sylmar, CA
CYTO	CLAYTON COURIER SERVICE, INC., Santa Rosa, CA
CPHL	CLIPPER HILL TRANSPORTATION CO., Danville, CA
CLUR	CLOUTIER-LOTT ENTERPRISES, INC., Anaheim, CA
CLVF	CLOVERLEAF TRUCKING, INC., San Rafael, CA
CCOI	COAST COUNTIES EXPRESS, INC., Los Angeles, CA
CFSY	COAST FREIGHT SYSTEM, INC., Los Angeles, CA
CMAI	COAST MACHINERY MOVERS, INC., South El Monte, CA
CSRN	COAST RANGE TRANSPORT, INC., Morgan Hill, CA
CRRP	COASTAL CARRIERS, Ontario, CA
CEGC	COASTAL ENGINEERING COMPANY, Bakersfield, CA
CSWE	COASTWAY EXPRESS, INC., San Diego, CA
CDTR	COATS, DWIGHT F., TRUCKING, Dwight F. Coats, d/b/a, Blythe, CA
COBF	COBB FROZEN TRANSPORT, INC., Modesto, CA
CBBR	COBB TRUCKING, INC., San Jose, CA
CJCT	COELHO, JOE C., III, TRUCKING, Tulare, CA
CJOL	COELHO, JOE L., INC., Turlock, CA
CDLK	COLEMAN, DONALD L., TRUCKING, Turlock, CA
CLMA	COLMA DRAYAGE, INC., Daly City, CA
COVS	COLONIAL VAN & STORAGE OF FRESNO, INC., Fresno, CA
CMBD	COMBINED TRANSPORT, INC., Central Point, OR
COMJ	COMMERCIAL CARRIERS, INC., Southfield, MI
CMML	COMMERCIAL TRANSFER CO., R-B Corporation, d/b/a, Los Angeles, CA
CTRF	COMMERCIAL TRANSFER, INC., Fresno, CA
CEXP	COMMODITIES EXPRESS, INC., Long Beach, CA
CPAP	COMPAC TRANSPORTATION, John Karl Fish and Gloria McGuire, d/b/a, South San Francisco, CA
CPMM	COMPUTER MOVERS, INC., Milpitas, CA
CMNL	COMTRANS LTD., Huntington Beach, CA
CNMW	CON M TRUCKING, INC., Westminster, CA
CFRI	CONDOR FREIGHT LINES, Los Angeles, CA
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
CNKN	CONSTRUCTION TRUCKING, Redding, CA
CXPQ	CONTAINER EXPRESS, INC., Tracy, CA
CTCE	CONTAINER TRANSPORT COMPANY, Fibreboard Corporation, d/b/a, Antioch, CA
CFRT	CONTAINERFREIGHT TRANSPORTATION COMPANY, Long Beach, CA
COTI	CONTI TRUCKING, INC., Stockton, CA
CNCR	CONTRACTORS CARGO COMPANY, South Gate, CA
CTKP	CONTROL TRUCKING, INC., Long Beach, CA
CNDL	CONTROLLED DELIVERY SERVICE, INC., San Dimas, CA
CTDP	CONTROLLED TRANSPORT SYSTEM, INC., Pleasant Hill, CA
COKQ	COOK TRUCKING & EQUIPMENT RENTAL, Corona, CA
CSJI	COOK, S. J., & SONS, INC., Costa Mesa, CA
CKCR	COOKE'S CRATING, INC., Los Angeles, CA
CLTO	COOL TRANSPORTATION, J.K.C., Inc., d/b/a, Long Beach, CA
CPSK	COOPER AND SONS TRUCKING, INC., Ukiah, CA
CPSN	COOPER TRANSPORTATION, San Jose, CA
CVMQ	COR-O-VAN MOVING & STORAGE CO., San Francisco, CA
CMNI	CORCORAN MOTOR TRANSPORT, INC., Corcoran, CA
CRVJ	CORNELL CARTAGE COMPANY, San Diego, CA
CTCD	CORONA TRUCKING CO., INC., Corona, CA
CSTA	COSTA, JOHN M., Morro Bay, CA
CSAK	COSTA, TIM, TRUCKING, Brentwood, CA
CTGG	COTTON TRUCKING COMPANY, Vernon Zina Cotton, Jr., d/b/a, San Leandro, CA
CUNH	COUNIHAN TRUCKING, Orval R. Noeske, d/b/a, Dublin, CA
CPSE	CPS EXPRESS, Mira Loma, CA
CBTE	CRABTREE BROTHERS, Nathan & Lawrence Crabtree, d/b/a, Selma, CA
CFKG	CRAFT TRUCKING, Santa Ana, Ca
CRNT	CRESCENT TRUCK LINES, INC., Hayward, CA
CBDS	CRESSEY BEVERAGE DISTRIBUTING, Redding, CA
CRDS	CREST DISTRIBUTION CO., William S. Sosnowski, James M. Botheras and Ronald A. Spell, d/b/a, Orange, CA
CWAT	CRESTWAY TRANSPORTATION, Hayward, CA
CRKO	CRIKOS, F. J., TRUCKING, INC., Cotati, CA

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CKTT	CROCKETT, DONALD E., Castroville, CA
CSBO	CROSBY & OVERTON TRANSPORTATION COMPANY, Long Beach, CA
CCIE	CROSS CITY EXPRESS, Monaghan Enterprises, Inc., South San Francisco, CA
CWMV	CROWN MOVING & STORAGE COMPANY, San Leandro, CA
CWNK	CROWN TRUCKING, Gregory F. Sacca, Jr., d/b/a, Agua Dulce, CA
CRPS	CRST, INC., Cedar Rapids, IA
CUMP	CRUMPTON TRUCKING, Frolly F. Crumpton, d/b/a, Napa, CA
CRZO	CRUZ, ROBERT P., Corona, CA
CUDT	CUDDEBACK TRAILER & EQUIPMENT, Lakeside, CA
CUTC	CUMBERLAND TRUCKING CO., INC., Chicago, IL
CUPT	CUMPTON TRUCKING, INC., Red Bluff, CA
CUCM	CURTIS CONTRACTING CO., INC., Fresno, CA
CUDW	CUSHMAN, DAVID WILLIAM, Gridley, CA
CUTV	CUSTOM TRUCK SERVICE, INC., Los Angeles, CA
CUTS	CUSTOMER TRUCK SERVICE, Eureka, CA
CUZT	CUZ TRANSPORTATION, INC., La Mirada, CA
CYAE	CYA ENTERPRISES, INC., Fullerton, CA
DNDW	D & D WAREHOUSING & TRUCK SERVICE, Intra American Equipment Co., Inc., d/b/a, Wilmington, CA
DNFQ	D & F TRUCKING CO., INC., Norwalk, CA
DJTH	D & J TRUCKING COMPANY, INC., Goleta, CA
DJTG	D & J TRUCKING, Garden Grove, CA
DLCN	D & L CONSTRUCTION CO., INC., Taft, CA
DNTV	D & N TRUCKING, INC., Cupertino, CA
DRTA	D & R TRANSPORTATION, INC., Pittsburg, CA
DUTB	D & T TRUCKING, Terry J. Nisewander and Douglas R. Nisewander, d/b/a, Buena Park, CA
DCEQ	D C EQUIPMENT CORPORATION, Victorville, CA
DAMI	D.A.M. TRUCKING, Three G's, Inc., d/b/a, Anaheim, CA
DGRS	DAGGS, R., & SON, Kerman, CA
DLCQ	DALCO FREIGHT LINES, INC., Los Angeles, CA
DMFC	DALLAS & MAVIS FORWARDING CO., INC., Kenosha, WI
DLEP	DALTON ENTERPRISES, INC., Long Beach, CA
DLTK	DALTON TRUCKING, INC., Fontana, CA
DNIT	DANIELS TRANSPORTATION, Riverside, CA
DGTR	DANNCO TRANSPORT, Nipomo, CA
DAOR	DANOR FARMS INC., Woodland, CA
DRGS	DARGUS TRANSPORTATION, INC., Orange, CA
DTSV	DART SERVICE, Los Angeles, Ca
DVFL	DAVIS FREIGHT LINES, San Diego, CA
DVTR	DAVIS TRUCKING, Alpine, CA
DVKG	DAVIS TRUCKING, James D. Davis, d/b/a, Cypress, CA
DVWK	DAVIS WALKER CORPORATION, Los Angeles, CA
DRLT	DAY, RONALD L., TRANSPORTATION, INC., Oakland, CA
DEBR	De BOER TRUCK LINES, INC., Ripon, CA
DEDL	DEACON'S DELIVERY, INC., Novato, CA
DETO	DEARLE TRUCKING, INC., Fresno, CA
DERT	DEAN, RALPH, & SONS TRUCKING, Ralph C. Dean, d/b/a, City of Commerce, CA
DEVG	DEAN, VERNAL L., Chico, CA
DZAQ	DeANZA EXPRESS, Barney B. Beaver, Dale Timmons, Ron R. Beaver, d/b/a, Hemet, CA
DKTK	DECK TRUCKING, Dart Equipment Corp., d/b/a, Los Angeles, CA
DDTS	DEDICATED TRANSPORT, INC., Montebello, CA
DLPO	DEL PONTE TRUCKING, Gary R. Del Ponte, d/b/a, Salinas, CA
DLRE	DEL REY TRUCKING, INC., Gardena, CA
DLCS	DEL-COR SERVICES, INC., Sepulveda, CA
DRBR	DELLA ROSA BROS. TRUCKING, INC., Martinez, CA
DELQ	DELLA ROSA TRUCKING CO., E & M Trucking, Inc., d/b/a, Martinez, CA
DCOC	DELTA CONSTRUCTION CO., Norman Brown & Sons, d/b/a, Folsom, CA
DLTO	DeLYN TRANSPORTATION, INC., Los Alamitos, CA
DMJT	DENNIS, MORRIS, JR., TRUCKING CO., Richmond, CA
DPHE	DEPENDABLE HIGHWAY EXPRESS, Dependable Hawaiian Express, Inc., d/b/a, Los Angeles, CA
DSCT	DESERT COASTAL TRANSPORT, INC., Ontario, CA
DSEM	DESERT EMPIRE TRANSFER & STORAGE, INC., Riverside, CA
DAMC	DEVINCENZI TRUCKING, INC., San Francisco, CA
DEVN	DEVINE & SON TRUCKING CO., West Sacramento, CA
DEXK	DEXTER TRUCKING, Petaluma, Ca
DFCC	DFC TRUCKING COMPANY, Irvine, CA
DSAL	Di SALVO TRUCKING CO., San Francisco, CA
DIAB	DIABLO TRANSPORTATION, INC., Diablo Systems, Incorporated, d/b/a, Pacheco, CA
DMXP	DIAMOND EXPRESS, Kenneth Zeller, d/b/a, South El Monte, CA
DIFS	DIAMOND FREIGHT SYSTEM, INC., THE, San Francisco, CA
DIOQ	DIAMOND TANK LINES & TRANSPORTATION, INC., San Jose, CA
DIJE	DIAS, JAMES E., Chico, CA

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DIJT	DIAS, JIM, TRUCKING, INC., Chico, CA
DMLG	DIAS, MANUEL, TRUCKING, Kingsburg, CA
DAZJ	DIAZ, JESS, TRUCKING, INC., La Mirada, CA
DMKO	DIMARCO, San Diego, CA
DRKT	DIRKSEN TRANSPORTATION, Ripon, CA
DSBE	DISTRUBUTION EXPRESS, Carson, CA
DTIO	DITCO, INC., Hollister, CA
DTTF	DITTO FREIGHT LINES, San Jose, CA
DVTS	DIVERSIFIED TRANSPORT SYSTEMS, City of Industry, CA
DVIN	DIVISION TRUCKING, Dart Warehouse Corporation, d/b/a, Los Angeles, CA
DIXW	DIXON, WILLIE, Inglewood, CA
DOXS	DOMINGUEZ EXPRESS, Joe G. Dominguez, d/b/a, La Puente, CA
DNKG	DON'S TRUCKING, Donald Herbert Meierhoff, d/b/a, Santa Paula, CA
DFDI	DONALDSON FREIGHT DELIVERY, INC., Montebello, CA
DONC	DONCO CARRIERS, INC., Oklahoma City, OK
DOST	DOSS TRANSPORTATION, Compton, CA
DOSR	DOSS, RICH, INC., Santa Rosa, CA
DBMM	DOUBLE M. TRUCKING, INC., Winters, CA
DOUD	DOUDELL TRUCKING COMPANY, San Jose, CA
DVTO	DOVE TRANSPORTATION, INC., Buena Park, CA
DWTG	DOWNEY TRUCKING, Gene N. Nellan and Greg W. Nellan, d/b/a, Downey, CA
DOWD	DOWNING CONTAINER SERVICE, Dublin, CA
DREB	DREISBACH ENTERPRISES, INC., Oakland, CA
DREQ	DROSCHER EQUIPMENT SALES, Redding, CA
DTIG	DTI, George C. Cross and Gary K. Cross, d/b/a, Compton, CA
DBNP	DUBIN, PAUL, TRUCKING, Paul Franklin Dubin, d/b/a, Santa Clara, CA
DULA	DUNLAP, JAMES L., Cudahy, CA
DFRI	DURA FREIGHT LINES, INC., Diamond Bar, CA
DURE	DUREGGER SERVICES, Thomas Andrew DuRegger, d/b/a, Fremont, CA
DRKD	DURKEE DRAYAGE COMPANY, South San Francisco, CA
DTPS	DURNIL TRANSPORTATION SYSTEMS, INC., Industry, CA
DUTA	DUTRA TRUCKING CO., INC., Arcata, CA
DUAL	DUTRA, ALLEN, TRUCKING, Allen R. Dutra, d/b/a, Pleasant Hill, CA
EFLT	E. F. L. TRANSPORTATION, INC., South San Francisco, CA
EBXQ	EARLYBIRD EXPRESS, Montebello, CA
EAUO	EAST BAY FAST FREIGHT, INC., Fremont, CA
ETRR	EASTER RENTS, INC., Santa Maria, CA
ELTF	EASTLAND TRUCKING, Los Angeles, CA
ECKD	ECKDAHL WAREHOUSE COMPANY, Los Angeles, CA
ECLN	ECONO LINE EXPRESS, INC., Fremont, CA
ELFE	ECONO-LINE FREIGHT SYSTEMS, John D. Jacobson, d/b/a, Fremont, CA
EDMR	EDENS, MARTIN, TRUCKING, Cloverdale, CA
EWAR	EDWARDS, CLIFFORD ELLIS, Colfax, CA
EBLT	EIGHT BALL LINE TRUCKING, Richmond, CA
EIWT	EIGHTEEN WHEEL TRANSPORTATION, INC., Carson, CA
EVSM	ELECTRONICS VAN, SACRAMENTO, INC., Fair Oaks, CA
ELRI	ELLARS, INC., South Gate, CA
ELLC	ELLIS INTERSTATE CORPORATION, Indio, CA
ELRP	ELLIS, MARV, TRANSPORT, Marvin D. Ellis, d/b/a, Burlingame, CA
ELER	ELMS EQUIPMENT RENTAL, Glen John Huber, d/b/a, Brawley, CA
ELRM	ELSINORE READY MIX CO., INC., Lake Elsinore, CA
EMNS	EMBREY & STOKES TRUCKING, Orland, CA
EMTI	EMERIAN, W. S., TRUCKING, INC., Fresno, CA
EAFC	EMERY AIR FREIGHT CORPORATION, Wilton, CT
EMRE	EMPIRE TRANSPORT, Empire Southwest Co., d/b/a, Phoenix, AZ
ENDC	ENDICOTT TRUCKING, Clifford Bert Endicott, d/b/a, Chico, CA
ENDN	ENDICOTT, TOM, & SON TRUCKING, Corning, CA
ENNG	ENGEL & GRAY, INC., Santa Maria, CA
ERIK	ERICKSON, GENE, TRUCKING, INC., Mt. Shasta, CA
ERAS	ERNST AIR SPEED TRUCKING, Tobiac, Inc., d/b/a, Commerce, CA
ERSJ	ERSKINE-JOHNS COMPANY, Los Angeles, CA
EVTL	EVANS TANK LINE, INC., Maywood, CA
EXEM	EXETER MERCANTILE CO., Exeter, CA
EXPK	EXPEDITE TRUCK LINES, Montebello, CA
EXPO	EXPO INDUSTRIES, INC., San Diego, CA
EXMS	EXPRESS MESSENGER SYSTEMS, INC., Calgary, AB, CN
EZET	EZE TRUCKING, INC., Rancho Cucamonga, CA
FGDE	F & G DELIVERY SERVICE, Gardena, CA
FNSD	F & S DISTRIBUTING CO., INC., Vernon, CA
FASJ	F.A.S. TRUCKING CO., Somerset Dist., Inc., d/b/a, Carson, CA
FLSP	F.L.C. TRANSPORT, Francis L. Cochran, d/b/a, Rancho Cordova, CA
FAIR	FAIRBANKS TRUCKING, INC., Modesto, CA

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FTPO	FAIRWAY TRANSPORT, INC., Anaheim, CA
FDSA	FALCON DISPOSAL SERVICE - APPROPRIATE TECHNOLOGIES II, BKK Corporation, d/b/a, Torrance, CA
FWMO	FAR WEST MOVING SERVICES, Sunnyvale, CA
FADT	FARIS, DON, TRUCKING, Riverside, CA
FAWR	FARNSWORTH, EARL, EXPRESS, San Rafael, CA
FWDI	FAST-WAY DELIVERY, INC., Azusa, CA
FAUG	FAUGHN, WALT, TRUCKING, Walter Ray Faughn, d/b/a, Hughson, CA
FEPL	FEDERAL EXPRESS LOGISTICS, INC., Memphis, TN
FLRF	FELDSTEIN REFRIGERATED SERVICE, Thermal, CA
FRGQ	FERGIE'S FREIGHT, La Mirada, CA
FIKE	FIKE, DERAL H., TRUCKING, Hanford, CA
FIKB	FIKSE BROS., INC., Cerritos, CA
FISY	FIKSE TRUCKING COMPANY, John H. Fikse, d/b/a, Chino, CA
FKHQ	FIKSE, HENRY, TRUCKING, Cerritos, CA
FIMM	FISK MACHINERY MOVERS COMPANY, Los Angeles, CA
FISK	FISK TRUCKING AND TRANSFER COMPANY, Los Angeles, CA
FCHR	FLETCHER, K. A., INC., Los Angeles, CA
FLHT	FLIGHT TRUCKING, INC., Pico Rivera, CA
FLWT	FLOWERS TRANSPORTATION, INC., Auburn, CA
FOOT	FOOT'S TRANSFER AND STORAGE CO., LTD., Carson, CA
FTHB	FOOTHILL BULK TRANSPORT, INC., Mountain View, CA
FOHI	FOOTHILL INDUSTRIES, INCORPORATED, Los Angeles, CA
FDTK	FORD, ROBERT R., TRUCKING, Rowland Heights, CA
FOER	FORTIER TRANSPORTATION CO., LTD., Fresno, CA
FOSD	FOSTER DRAYAGE COMPANY, Oceanside, CA
FOSM	FOSTER MANUFACTURING, INC., Coachella, CA
FOXB	FOX, BOB, TRUCKING, Robert Lloyd Fox Enterprises, Inc., d/b/a, Hawthorne, CA
FMAT	FREDDIE MAC'S AUTO & TRUCK SERVICE, Fred G. Meister, d/b/a, South El Monte, CA
FRIK	FREDERICK TRUCKING CO., INC., Corona, CA
FOFT	FREEZE, FORREST, TRUCKING, INC., Merced, CA
FRFJ	FREIGHT FORCE, INC., Somerville, NJ
FRSI	FREIGHT SYSTEMS, INC., City of Commerce, CA
FTTI	FREIGHT TRAIN TRUCKING, INC., Paramount, CA
FTEP	FREIGHT TRANSPORT EXPRESS, INC., Rancho Cucamonga, CA
FGHW	FREIGHT WAYS, William R. Jordan, Billy R. Jordan and Richard E. Bolke, a partnership, d/b/a, Santa Paula, CA
FMOV	FREITAS MOVING AND STORAGE CO., INC., Concord, CA
FSJE	FREITAS, J. E., & RALPH D. FREITAS, Manteca, CA
FRXR	FRESNO EXPRESS, INC., Fremont, CA
FROL	FREY TRUCKING, INC., Inglewood, CA
FRYI	FRY, WILLIAM, TRUCKING, William Franklin Fry, d/b/a, Stockton, CA
FRYF	FRYE TRUCKING COMPANY, South Gate, CA
FLLR	FULLER, BRUCE L., Lebec, CA
FWRS	FULWIDER, RAYMOND L. & SHARON L., Willits, CA
GBEN	G & B ENTERPRISES, City of Industry, CA
GTEP	G-T EQUIPMENT, Glendale, CA
GWTK	G-W TANK LINES, INC., Sonoma, CA
GITC	G. I. TRUCKING COMPANY, La Mirada, CA
GKDT	G. K. DISTRIBUTING & TRUCKING CO., Fontana, CA
GIDQ	G.I. DRAYAGE CORPORATION, San Leandro, CA
GAED	GAEDE, R. L., Mt. Shasta, CA
GLPC	GALLOP COURIERS, INC., Van Nuys, CA
GLAG	GALVAN, AUGUSTIN, Fresno, CA
GATN	GAN-TRANS, LTD., San Leandro, CA
GVTC	GANDUGLIA, VINCENT, TRUCKING, Fresno, CA
GAJH	GARCIA, J. H., TRUCKING, Julian Handy Garcia, d/b/a, Selma, CA
GARO	GARDEN CITY TRANSPORTATION CO., INC., Hayward, CA
GAKL	GASKILL TRUCKING, Woodland, CA
GZDM	GAZDA MOVING COMPANY, INC. OF SOUTHERN CALIFORNIA, Buena Park, CA
GCSP	GC & SP TRUCKING, Newman, CA
GMSP	GEMINI MOVING SPECIALISTS, Mercury Van & Storage Co., Inc., d/b/a, North Hollywood, CA
GCRT	GENERAL CRANE AND TRUCKING SERVICE, General Crane Service, Inc., d/b/a, Fresno, CA
GEDG	GENERAL DRAYAGE, Luis Filipovich, d/b/a, San Leandro, CA
GEOA	GENERAL OVERLAND AUTO TRANSPORT, Benicia, CA
GTPN	GENERAL TRANSPORTATION, INC., Oakland, CA
GTNP	GENTRY TRANSPORTATION, Loy Gentry, d/b/a, Tracy, CA
GHDT	GERHARDT TRUCKING, Jack R. Gerhardt, d/b/a, Colma, CA
GIEB	GIESBRECHT, J & R, Jerry Giesbrecht and Rodney Giesbrecht, d/b/a, Glenn, CA
GIPS	GIPSON TRUCKING COMPANY, INC., Lynwood, CA
GSTI	GISLER, CARL, JR., Modesto, CA
GITT	GITTHENS, KENT, TRUCKING, Lodi, CA

PARTICIPATING INTRASTATE CARRIERS — Continued

CALIFORNIA CARRIERS — (Continued)
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@Carrier "Alpha" Code	
GTAS	GLENDALE TRANSFER & STORAGE CO., INC., Glendale, CA
GLNR	GLENN'S TRUCKING, Robert Glenn, d/b/a, Rio Linda, CA
GLOA	GLOBAL MOVING & STORAGE SACRAMENTO, INC., Sacramento, CA
GLOM	GLOBAL MOVING & STORAGE, San Bernardino, CA
GBRE	GLOBAL RELOCATION SYSTEMS, INC., Buena Park, CA
GLUL	GLOBAL VAN LINES, INC., Orange, CA
GVER	GLOVER, CAREY L., Corning, CA
GOJT	GO, JOHN, TRANSPORTATION COMPANY, INC., Bakersfield, CA
GOCS	GOLD COAST COURIERS, INC., Mountain View, CA
GDCS	GOLD COAST TRANSPORTATION SERVICE, B and A Air Freight Service Corp., d/b/a, Oxnard, CA
GBFL	GOLDEN BAY FREIGHT LINES, James William Livesay, d/b/a, Modesto, CA
GLDT	GOLDEN CHARIOT TRUCK LINE, INC., San Diego, CA
GOGI	GOLDEN GATE TERMINALS, INC., San Francisco, CA
GDWP	GOLDEN WEST TRANSPORT, Bakersfield, CA
GEYE	GOLDENEYE TRUCKING, James Tony Digilio, d/b/a, San Jose, CA
GMZL	GOMEZ, LAWRENCE J., Stockton, CA
GJJO	GONZALES, JOSEPH M., JR., Hayward, CA
GNZL	GONZALES, TONY, TRUCKING, INC., Escalon, CA
GOUA	GOULART TRUCKING, INC., San Diego, CA
GDSN	GRACE DISTRIBUTION SERVICES, INC., Duncan, SC
GRMP	GRAHAM, PAUL, DRILLING AND SERVICE CO., Rio Vista, CA
GCTN	GREAT CENTRAL TRANSPORT, INC., Long Beach, CA
GNDC	GREEN, DARRELL L., INC., Tulare, CA
GRFM	GRIFFIN MOTOR FREIGHT, Richard E. Griffin, d/b/a, Hawthorne, CA
GFIT	GRIFFITH TRUCKING, Pacheco, CA
GRGM	GRIGGS, N. M., COMPANY, Morgan Dale Griggs and Nathan Morgan Griggs, d/b/a, Brawley, CA
GRIL	GRILEY FREIGHTLINES, Carson, CA
GDTI	GRIMSLEY TRUCKING, INC., Hollister, CA
GIMD	GRIMSLEY TRUCKING, David Grimsley, d/b/a, Hollister, CA
GIMY	GRIMSLEY, STEVE, TRUCKING COMPANY, Hollister, CA
GRMW	GRISWOLD, M. W., TRUCKING, INC., Shingle Springs, CA
GWTG	GROSKOPF-WEIDER TRUCKING CO., INC., Sonoma, CA
GUID	GUILD WINERIES & DISTILLERIES, Lodi, CA
GULY	GUILEY TRUCKING, INC., Fontana, CA
GULB	GUILL, BILL, TRUCKING, INC., Anderson, CA
GAPS	GULF, ATLANTIC AND PACIFIC SHIPPER SERVICES, INC., Industry, CA
GUTQ	GUTHMILLER TRUCKING, INC., Union City, CA
GWRT	GWR TRANSPORTATION, INC., La Verne, CA
HNBE	H & B EQUIPMENT COMPANY, INC., Bakersfield, CA
HHOL	H & H OIL TOOL CO., INC., Santa Paula, CA
HNMT	H. & M. TRANSPORT, INC., French Camp, CA
HDDW	HADDICK'S TOWING, INC., City of Industry, CA
HDAQ	HADLEY AUTO TRANSPORT, Santa Ana, CA
HALB	HALBERT BROTHERS, INC., Los Angeles, CA
HMFP	HALF MOON FRUIT & PRODUCE CO., Woodland, CA
HLGT	HALL, GEORGE, TRUCKING COMPANY, INC., Sacramento, CA
HYUK	HAMADA, YUK, COMPANY, Kingsburg, CA
HMAL	HAMILTON MATERIALS, INC., Orange, CA
HMLR	HAMILTON, RICH, TRUCKING, Modesto, CA
HAON	HAMPTON TRUCKING, Antioch, CA
HNKF	HANK & FRANK DRAYAGE, INC., San Jose, CA
HTSI	HANNAH TRUCKING SERVICE, INC., Ivanhoe, CA
HDIT	HANSEN, DICK, TRUCKING, Louis R. Hansen, d/b/a, Madera, CA
HABQ	HARBOR TRANSPORT, INC., Oakland, CA
HRDY	HARDY TRUCKING CO., E. O. Hardy and E. M. Hardy, d/b/a, Lakewood, CA
HDYC	HARDY, CHARLES G., INC., Paramount, CA
HGIT	HARGIS TRANSPORT, Nathaniel E. White, d/b/a, Pomona, CA
HRGS	HARGIS TRUCK LINES, Donald E. Hargis, d/b/a, La Habra, CA
HLOW	HARLOW, ROBERT ROLLIN, Loomis, CA
HMNG	HARMON TRUCKING, Shaver Lake, CA
HRFD	HARRIS FEEDING CO., Coalinga, CA
HRTP	HARRIS TRANSPORTATION CO., Victorville, CA
HRRT	HARRIS TRUCKING COMPANY, James L. & Wm. A. Inc., d/b/a, Paramount, CA
HRKG	HARRISON TRUCKING, INC., Santee, CA
HSNI	HARRISON-NICHOLS COMPANY, LTD., Irwindale, CA
HRSE	HARTSELL TRUCKING, George T. Galiotto, d/b/a, Redding, CA
HWHI	HARTWICK & HAND, INC., Victorville, CA
HASL	HASLETT COMPANY, Oakland, CA
HATC	HATCH, W. S., CO., Woods Cross, UT
HATF	HATFIELD TRUCKING SERVICE, INC., Sacramento, CA
HTEP	HATLER ENTERPRISES, INC., Sonora, CA
HAEW	HAUSER, ED, TRUCK SERVICE, Hesperia, CA

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HAVS	HAVENS & SONS HARVESTING, El Centro, CA
HAKY	HAWKEY TRANSPORTATION, INC., Redding, CA
HKAS	HAWKINS & SON, Arthur D. Hawkins and Tyrance R. Hawkins, d/b/a, Lynwood, CA
HYSR	HAYS TRANSPORTATION, Donald Lee Hays, d/b/a, Woodland, CA
HYTH	HAYTER TRUCKING, INC., Taft, CA
HREC	HAZARD, R. E., CONTRACTING CO., San Diego, CA
HELW	HEARNE, L. A., WAREHOUSE CO., King City, CA
HEVY	HEAVY TRANSPORT, INC., Long Beach, CA
HEEO	HEFFINGTON FREIGHT SERVICE, INC., Jackson, CA
HTZI	HEITZ TRUCKING, INC., Oakland, CA
HMMT	HEMME, J. W., TRUCKING, John Hemme, d/b/a, Quartz Hill, CA
HEMS	HEMSATH, JACK, DRAYAGE, INC., Oakland, CA
HNME	HENSELL MATERIALS, INC., Eureka, CA
HRDP	HERD TRANSPORT COMPANY, San Jose, CA
HETT	HEWITT'S TRUCKING, William Samuel Hewitt, d/b/a, Yreka, CA
HTEC	HI-TECH CARGO, INC., Compton, CA
HIGI	HIGATE, INC., Oakland, CA
HIGW	HIGHWAY EXPRESS, INC., Pico Rivera, CA
HMVQ	HILFORD MOVING AND STORAGE, INC., Ventura, CA
HLGO	HILGO TRANSPORT, INC., Selma, CA
HLNI	HILL LINE INC., Fontana, CA
HRBI	HIRSON TRUCKING, INC., Oakland, CA
HIVE	HIVELY AND SONS TRUCKING, James R. Hively, d/b/a, Woodland, CA
HIVT	HIVELY, JAMES R. & PATRICIA K., Woodland, CA
HOGL	HOAGLAND'S TRANSPORT SERVICE, INC., Modesto, CA
HOAG	HOAGLAND'S TRANSPORT SERVICE, Lynn Hoagland, d/b/a, Modesto, CA
HBNR	HOBAN TRUCKING, INC., San Marcos, CA
HOBB	HOBBS TRUCKING CO., Anaheim, CA
HWHT	HOFER TRUCKING, William Henry Hofer, d/b/a, Santa Ana, CA
HOTI	HOLLIDAY TRUCKING, INC., Upland, CA
HLYT	HOLLY TRANSPORTATION, Joann Perrucci, d/b/a, San Jose, CA
HWDO	HOLLYWOOD DELIVERY SERVICE, INC., Los Angeles, CA
HOME	HOME TRANSPORTATION COMPANY, INC., Marietta, GA
HPRS	HOPKINS, ROBERT B. & SHERLEY M., Covina, CA
HFLQ	HORNET FREIGHT LINES, INC., Anaheim, CA
HSST	HORTON, ALBERT S., & SONS TRUCKING, Albert S. Horton, d/b/a, Oroville, CA
HSBQ	HOSKINS BROS. TRUCKING CO., INC., Oxnard, CA
HXRS	HOWARD'S X-RAY SERVICE, INC., Chatsworth, CA
HOWG	HOWLETT'S TRUCKING COMPANY, So. San Francisco, CA
HYSC	HOY & SONS CONSTRUCTION, INC., Anderson, CA
HRBB	HRIBAR, BOB, TRUCKING, Norco, CA
HSET	HSE TRUCKING, High Sierra Express, d/b/a, West Sacramento, CA
HUDR	HUDDLESTON TRUCKING, Taft, CA
HUMG	HUMPHREY, DALE, TRUCKING, INC., Etiwanda, CA
HTAE	HUNTER TRUCK & EQUIPMENT CO., Willits, CA
HDFT	HURD, FRITZ, TRUCKING, Francis Ivan Hurd, d/b/a, Redding, CA
HUSY	HUSSEY'S MOVING & STORAGE, INC., Vallejo, CA
HSLM	HUSTED, LESTER M., Idaho Falls, ID
ISTK	I & S TRUCKING, Simon Traylor, d/b/a, Oakland, CA
IGOD	I GO DELIVERY SERVICE, Chatsworth, CA
IGOS	I-GO VAN & STORAGE, INC., Bakersfield, CA
IBCT	I.B.C. TRUCKING CORPORATION, Kansas City, MO
ICWT	I.C.W. TRANSPORT, INC., Sacramento, CA
IPTP	IMPERIAL TRANSPORTATION, Industry, CA
IMPT	IMPERIAL TRUCK SERVICE, Industry, CA
INCE	INCO EXPRESS, INC., Seattle, WA
ICCP	INDEPENDENT CONSTRUCTION CO., A. J. Mc Cosker Construction Co., Inc., d/b/a, Oakland, CA
INET	INDEPENDENT TRUCKING COMPANY, Stockton, CA
IDDG	INDUSTRIAL DRAYAGE, INC., San Lorenzo, CA
IDRL	INDUSTRIAL FREIGHT SYSTEM, INC., Sun Valley, CA
IGEQ	INGLETT EQUIPMENT, INC., Reseda, CA
INLF	INLAND FREIGHT LINES, Orange, CA
INSR	INSURED TRANSPORTERS, INC., Benicia, CA
ICCN	INTER-CAL CONTRACT CARRIERS, Sacramento, CA
IPDI	INTERAMERICAN PUBLIC DISTRIBUTION CORPORATION, Los Angeles, CA
INTO	INTERCITY MOTOR EXPRESS, Kenneth W. Morris, d/b/a, Oakland, CA
INTW	INTERCOASTAL LINES, LTD., Newport Beach, CA
ITLN	INTERLINES, INC., R-G-M Corp., d/b/a, Vernon, CA
INTP	INTERNATIONAL TRANSPORT, INC., Rochester, MN
INVN	INTERNATIONAL VAN LINES, INC., Santa Maria, CA
INST	INTERSTATE CONSOLIDATION, INC., Commerce, CA
INTD	INTERSTATE DISTRIBUTOR CO., Tacoma, WA

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@ Carrier "Alpha" Code	
INNS	INTRANSCO, Los Angeles, CA
IPSN	IPSEN, L. M., & SONS, INC., Riverdale, CA
IHEC	IRON HORSE EQUIPMENT CORP., Victorville, CA
ITCN	IT TRANSPORTATION CORPORATION, Torrance, CA
JABM	J & B MURPHY TRUCKING, INC., San Jose, CA
JCTR	J & C TRUCKING, INC., Santa Fe Springs, CA
JNJQ	J AND J TRUCK LINE, San Jose, CA
JCCO	J C TRUCKING CO., Rialto, CA
JDDR	J D DRAYAGE CO., San Francisco, CA
JTMB	J T M DISTRIBUTORS, Garden Grove, CA
JGEM	J-GEM TRANSPORTATION, INC., Long Beach, CA
JBRN	J. B. RANCH, Stockton, CA
JCXP	J. C. EXPRESS CO., INC., Cupertino, CA
JCTO	J. C. TRUCKING CO., Jess Cervantes, Inc., d/b/a, Stockton, CA
JDTN	J. D. TRUCKING, Garden Grove, CA
JREP	J. R. ENTERPRISES, Scotts Valley, CA
JAED	J E. TRUCKING, Alta Loma, CA
JOED	J.E.T., INC., Johnnie Edgar Trucking, Inc., d/b/a, Cloverdale, CA
JJSL	J.J.S. TANK LINES, Johnnie J. Stout, d/b/a, Richmond, CA
JSGQ	J.S.G. TRUCKING CO., San Jose, CA
JKDS	JACK RABBIT DELIVERY SERVICE, INC., Long Beach, CA
JKDT	JACKSON, D., TRUCKING, Los Angeles, CA
JCTS	JACOBSON TRANSFER & STORAGE, Redding, CA
JMST	JAMES TRANSFER AND STORAGE CO., OCSAV, Inc., d/b/a, San Jose, CA
JZTK	JANTZ TRUCKING, Lloyd Jantz, d/b/a, Clovis, CA
JRRR	JARR TRUCKING, Tulare, CA
JEOT	JECO TRANSPORT, Jeco Equipment Co., d/b/a, Portland, OR
JNTG	JENSEN TRUCKING SERVICE, Santa Maria, CA
JESS	JESS'S TRUCKING, INC., Fremont, CA
JDLI	JET DELIVERY, INC., Los Angeles, CA
JORS	JOAQUIN TRUCKING SERVICE, San Lorenzo, CA
JHBA	JOHNSON, BOBBY, TRUCKING, Bobby Anthony Johnson, d/b/a, Rialto, CA
JOCT	JOHNSON, C. R., TRUCKING, Santa Fe Springs, CA
JHLT	JOHNSON, HARRY L., TRUCKING, Yuba City, CA
JONO	JOHNSON, LONNIE, & SON, INC., Palermo, CA
JHVQ	JOHNSTON VACUUM TANK SERVICE, INC., Taft, CA
JOIT	JOINER TRANSPORTATION COMPANY, Roy Franklin Joiner, d/b/a, Livermore, CA
JDTK	JONES, DICK, TRUCKING, INC., Swanton, VT
JJKQ	JONES, JACK, TRUCKING, INC., Orange, CA
JOJK	JONES, JULIO K., TRUCKING, Julio Kenneth Jones, d/b/a, Hayward, CA
JOBI	JOST BAR, INC., Vallejo, CA
JSAT	JSA TRUCKING, John Stephen Allegretti, d/b/a, Northridge, CA
JTXI	JTX, INC., San Francisco, CA
JUPI	JUPITER TRUCKING CO., Rafael P. Juarez, d/b/a, West Covina, CA
KNNL	K & L TRUCKING, INC., South San Francisco, CA
KARR	K & R TRANSPORTATION, INC., Los Angeles, CA
KSTK	K & S TRUCKING, Acampo, CA
KCTR	K-C TRANSPORTATION, Bakersfield, CA
KIBI	K-I-B INTERSTATE TRANSPORTATION, INC., Richmond, CA
KLYE	KEELEY RANCH, Colusa, CA
KOTC	KEEP ON TRUCKING CO., INC., Wilmington, CA
KTHQ	KEITH, DON E., Corcoran, CA
KDJT	KELLER, D. J., TRUCKING, INC., Lodi, CA
KLTQ	KELLEY TRUCKING CO., Bakersfield, CA
KLTI	KELLEY, C., TRUCKING, INC., Stockton, CA
KWMT	KENNEDY, W. M., TRUCKING, Paradise, CA
KENA	KENOSHA AUTO TRANSPORT CORPORATION, Kenosha, WI
KNTN	KENS TRUCKING CO., Lakewood, CA
KERB	KERN BROS., Bakersfield, CA
KSFL	KERNVILLE STAGE & FREIGHT LINES OF CALIFORNIA, Bakersfield, CA
KETI	KEYSTONE TRUCKING SERVICE, INC., City of Industry, CA
KIBM	KIBBEE, MELVIN E., Bakersfield, CA
KMKQ	KIMKRIS TRUCKING CO., INC., Richmond, CA
KGTP	KING TRANSPORTATION CO., King Contract Carrier, Inc., d/b/a, San Diego, CA
KJJO	KING, JOHN, TRUCKING, Visalia, CA
KKGC	KINGS COUNTY TRUCK LINES, INC., Tulare, CA
KNER	KINSER TRUCKING, Warren H. Kinser, d/b/a, Carson, CA
KRTY	KIRTLEY TRUCKING, Santa Rosa, CA
KSHQ	KISHIDA, GEORGE, INC., Lodi, CA
KIGJ	KISHIDA, GEORGE, JR., Lodi, CA
KHN	KISHIDA, N., TRUCKING, Albert Thomas, d/b/a, Lodi, CA
KLGQ	KITCHENS, L. G., TRANSPORTATION, INC., Lucerne Valley, CA

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KLXI	KLX INC., Visalia, CA
KMDI	KMD, INC., Woodland, CA
KEXI	KNAPP EXCAVATORS, INC., Richmond, CA
KTPO	KNIGHT TRANSPORT, INC., Brea, CA
KNDE	KNIGHT'S DELIVERY SERVICE, INC., Rancho Dominguez, CA
KNTO	KNOLL TRANSPORTATION, Los Angeles, CA
KWLS	KNOWLES, KENNIE C., TRUCKING, INC., Redding, CA
KOBA	KOBAYASKI, M., TRUCKING, Westmorland, CA
KONT	KOOKEN TRUCKING, INC., Stockton, CA
KWCI	KOWABUNGA CRANES, INC., Orcutt, CA
KOZY	KOZY MOVING AND STORAGE, Vallejo, CA
KRBS	KREBS, ALAN J., Spearfish, SD
KRNK	KREMENEK, RICHARD STEVEN, Redwood City, CA
KRET	KRETH, INC., Ione, CA
KFLI	KWIK FREIGHT LINES, INC., Santa Fe Springs, CA
KWIK	KWIK-TRUK DELIVERY SERVICE, Los Angeles, CA
LCPT	L & C PHILLIPS TRUCKING, Fontana, CA
LAED	L & E DELIVERY SERVICE, Carson, CA
LNSR	L & S TRUCKING, Central Point, OR
LGFF	L G FAST FREIGHT, Van Nuys, CA
LBTJ	L. & B. TRUCKING, Lemuel H. Cumberlidge and Betty Jo Cumberlidge, d/b/a, South Gate, CA
LAEL	L. A. EUREKA LINES, Montebello, CA
LAEA	L.A. XPRESS ASSEMBLY & DISTRIBUTION, INC., Los Angeles, CA
LAMO	LA MARK TRANSPORT, Pittsburg, CA
LAST	LA SALLE TRUCKING COMPANY, Chula Vista, CA
LSTJ	LA SARGE TRUCKING, INCORPORATED, Cypress, CA
LMAR	LA-MAR TRANSPORTATION, INC., City of Industry, CA
LBAK	LABAT TRUCKING, Castro Valley, CA
LDTK	LADE TRUCKING SERVICE, INC., Whittier, CA
LRTO	LADEIRA, RICHARD, TRUCKING, INC., Antioch, CA
LCVQ	LANCASTER'S VAN & STORAGE CO., Manteca, CA
LNGD	LANGDON TRANSPORTATION, INC., Commerce, CA
LBRC	LANGE BROS. CONSTRUCTION, INC., Lakeport, CA
LRHD	LANTING, R. J., HAY DEALER, INC., Ontario, CA
LRSJ	LARSEN TRUCKING, James F. Larsen, d/b/a, Walnut Creek, CA
LRWL	LARSEN, W. L., INC., Mountain View, CA
LMOE	LARSON'S MOTOR EXPRESS, Commerce, CA
LVTS	LAS VEGAS TRANSFER AND STORAGE, INC., Las Vegas, NV
LSTG	LASHA TRUCKING, Delmar R. Scott, d/b/a, Palo Cedro, CA
LTWN	LATTELL, WILLIAM NORMAN, Hayward, CA
LAUN	LAURSEN, RAY, TRANSPORTATION, Santa Fe Springs, CA
LAYY	LAY, ROY E., TRUCKING, Woodland, CA
LCRE	LCR TRUCK & EQUIPMENT CO., INC., Paramount, CA
LDSS	LDS TRUCK LINES, Oakland, CA
LWCT	LEASEWAY CUSTOMIZED TRANSPORT, INC., Downers Grove, IL
LTKG	LEES TRUCKING CO., Bell Gardens, CA
LMXF	LEIMGRUBER, MAX, FARMS, Holtville, CA
LENC	LENERTZ, INC., So. St. Paul, MN
LTZC	LENTZ, J. M., INC., Meadow Vista, CA
LENI	LEON'S TRUCKING SERVICE, INC., Hanford, CA
LEOR	LEONHARDT BROS. TRANSFER, Los Angeles, CA
LEPO	LEP EXPRESS, Lee E. Pate, d/b/a, Alta Loma, CA
LEAL	LEWIS, AL, TRUCKING, Santa Rosa, CA
LEIF	LEWIS, FRANK, TRUCKING CO., Frank Lewis, Jr., d/b/a, San Jose, CA
LCOD	LICO DISTRIBUTING COMPANY, INCORPORATED, Fremont, CA
LIET	LIEDTKA, P., TRUCKING, INC., Trenton, NJ
LGDG	LIGHTNING DRAYAGE COMPANY, INC., Oakland, CA
LGTO	LIGHTNING TRANSPORTATION CO., Woodland Hills, CA
LIGJ	LIGNELL, JOHN MARTIN, AND BEVERLY ANNE LIGNELL, Dublin, CA
LIGS	LIGON NATIONWIDE, INC., Madisonville, KY
LIAS	LIMA & SONS, Los Angeles, CA
LDGN	LINDGREN, LAWRENCE, Kingsburg, CA
LISY	LINDSEY TRUCKING, Norman R. Lindsey, d/b/a, Fontana, CA
LNUG	LINDSEY, EUGENE DALE, Redding, CA
LION	LION MESSENGER SERVICE, San Diego, CA
LIMT	LISA, MICHAEL, TRUCKING, INC., Los Angeles, CA
LAUD	LITTLE AUDREY'S TRANSPORTATION COMPANY, INC., Fremont, NE
LVES	LIVESTOCK EXPRESS, Edward A. & Steven Rocha, d/b/a, Stockton, CA
LOCD	LOCAL DELIVERY SERVICE CO., INC., Los Angeles, CA
LPSI	LOCAL PARCEL SERVICE, INC., Sunnyvale, CA
LOLI	LOCAL TRUCK LINES, INC., Paramount, CA
LOTF	LODI TRUCK SERVICE, INC., Lodi, CA

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LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA
LOHI	LOH INTERNATIONAL MOVERS, INC., Oakland, CA
LOMP	LOMPOC VAN & STORAGE, INC., Lompoc, CA
LPTR	LONE PINE TRUCKING COMPANY, A Calif. Corp., North Hollywood, CA
LOPS	LOPES TRUCKING SERVICE, INC., Modesto, CA
LUJK	LOU-JAK TRUCKING SERVICE, A California Corporation, San Lorenzo, CA
LPCO	LOUISIANA PACIFIC CORPORATION, Cloverdale, CA
LOSD	LOUX & SON DRAYAGE, Harry Loux, d/b/a, Oakland, CA
LWTY	LOWE TRUCKING COMPANY, Los Angeles, CA
LOHL	LOWER, WALTER J., ALAN J. HOLCOMB & MARSHAL W. HOLCOMB, La Puente, CA
LOYO	LOYOLA TRUCKING, INC., Westminster, CA
LUTC	LUCIO TRUCKING CO., Tulare, CA
LKPQ	LUCKY FRUIT & PRODUCE CO. AND LUCKY PRODUCE TRANSPORT, Lucky Fruit & Produce Co., Inc., d/b/a, Sacramento, CA
LCSI	LUMBER CARRIER SERVICE, INC., Wilmington, CA
LYCC	LYCO TRANSPORTATION COMPANY, Los Angeles, CA
LYAN	LYLY, ARVO, & SONS, Arvo, Alvin & Arnold Lyly, d/b/a, Ukiah, CA
LYCH	LYNCH, W. W., INC., Long Beach, CA
LHSQ	LYON, H. S., TRUCKING, INC., La Canada, CA
MBTD	M & B TRABSPORTATION, INC., Commerce, CA
MMRG	M & M TRUCKING, Mario Ernst Miscavish and Gloria Josephine Miscavish, d/b/a, Monrovia, CA
MMKG	M AND M TRUCKING, Milpitas, CA
MANL	M AND N TRUCK LINE, Oakland, CA
MHCI	M H C TRUCKING CO., INC., Santa Maria, CA
MPTO	M P TRANSIT, Yorba Linda, CA
MRTO	M R TRUCKING CO., Fullerton, CA
MVTP	M.A.V. TRANSPORTATION, Sherman Enterprises, Inc., d/b/a, Los Angeles, CA
MCRR	M.C.R. TRUCKING, Robert Vandermey, d/b/a, Alameda, CA
MDDS	M.D.D. TRUCK SERVICE, Marcos D. Diaz, d/b/a, Los Angeles, CA
MLEQ	MAC DONALD, L. C., EXPRESS, Paul A. Cooley, d/b/a, San Lorenzo, CA
MGET	MACIEL, GEORGE, TRUCKING, INC., Arviso, CA
MCSW	MAERSK CONTAINER SERVICE COMPANY, INCORPORATED, Compton, CA
MGFI	MAGNUM FREIGHT LINES, INC., Los Angeles, CA
MELQ	MAMMOTH FREIGHT LINES, INC., Mammoth of California, d/b/a, Fresno, CA
MANQ	MANN TRUCKING, Jan Nathan Meiselman, d/b/a, Santa Monica, CA
MAWK	MANNING, D. W., TRUCKING, Dale William Manning, d/b/a, Hesperia, CA
MRHC	MARATHON CARTAGE, INC., Hacienda Heights, CA
MSGQ	MARIN STORAGE & TRUCKING, INC., Petaluma, CA
MDBA	MARINER DISTRIBUTING COMPANY AND ANCHOR DISTRIBUTING COMPANY, R. J. Fassl, Incorporated, d/b/a, San Rafael, CA
MRIN	MARINO BROS. TRUCKING CO., Stockton, CA
MAXP	MARIPOSA EXPRESS, INC., Merced, CA
MAKE	MARKET EXPRESS, INC., Fresno, CA
MKET	MARKET TRANSPORT, LTD., Portland, OR
MKEG	MARKS, EUGENE L., Gilroy, CA
MRDE	MARSHALL DELIVERY, Bethel Island, CA
MTEN	MARTEN TRANSPORT, LTD, Mondovi, WI
MDVE	MARTIN, DAVE, SUPPLIES, INC., Lakeside, CA
MFTQ	MARTIN, FRED L., TRANSPORTATION, Los Angeles, CA
MRZS	MARTINEZ & SONS TRUCKING CO., Manteca, CA
MRAM	MARTINS, AMILCAR, Ceres, CA
MSNI	MASON, A. S., INC., Bakersfield, CA
MTKN	MASON, TOM, TRUCKING, Antioch, CA
MSSS	MASSOLO, JOE, & SONS TRUCKING COMPANY, INC., Salinas, CA
MSPS	MASTER TRANSPORTATION SERV., Robert Hernandez, d/b/a, Oakland, CA
MSRO	MASTRO TRUCKING, Steve R. Mastro, Jr., d/b/a, Gilroy, CA
MTLK	MATLACK, INC., Wilmington, DE
MJES	MATTESICH, J. E., & SONS, Stockton, CA
MHCD	MATTHES, C. D., INC., Fresno, CA
MPVM	MC VACUUM TRUCK SERVICE, Bakersfield, CA
MBEE	McABEE TRUCKING, INCORPORATED, Hollister, CA
MBRM	McCAMBRIDGE BROS. MATERIAL SUPPLIES, Sonoma, CA
MCCD	McCARTHY DRAYING COMPANY, Long Beach, CA
MLAI	McCLAIN TRUCK LINE, INC., Long Beach, CA
MCCJ	McCLINTON, J. C., TRUCKING CO., Fowler Trucking Company, Inc., d/b/a, Oceanside, CA
MKFA	McCORKLE FARMS, INC., Glenn, CA
MDDR	McDONALD, DANIEL RAY, Lancaster, CA
MCDH	McDONALD, DEAN I., Trivoli, IL
MGAH	McGRATH, C. W., INC., El Cajon, CA
MKAO	McKAY TRUCKING, Chemical Waste Management, Inc., d/b/a, Kettleman City, CA
MKFR	McKEE, FRANK R., San Lorenzo, CA
MKEN	McKENZIE, HARRY, TRUCKING CO., Selma, CA

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PARTICIPATING INTRASTATE CARRIERS — Continued

@ Carrier "Alpha" Code	CALIFORNIA CARRIERS — (Continued) (Operating under jurisdiction of California Public Utilities Commission)
MLDC	McLAUGHLIN DRAYING CO., Sacramento, CA
MRAE	McRAE, BILL, TRUCKING, Brookdale, CA
MCVG	McVEIGH TRANSPORTATION, William McVeigh, d/b/a, Corona, CA
MEMI	MEE'S MOVING & STORAGE, INC., Rancho Cordova, CA
MKOF	MEIKO FREIGHT SERVICE, INC., Carson, CA
MKAP	MELKONIAN, ARMEN PAUL, Eureka, CA
MELR	MELLO BROS. TRUCKING, Gary Mello, James Mello and Michael Mello, a Partnership, d/b/a, Hanford, CA
MLIC	MELLO, INCORPORATED, Woodland, CA
MELK	MELLOW TRUCK EXPRESS, INC., Tigard, OR
MLWD	MELLOW, DELBERT CHARLES, Earlimart, CA
MTOM	MELTON TRANSPORTATION, INC., Bakersfield, CA
MDKG	MENDES TRUCKING, Dick Mendes and Joseph L. Mendes, d/b/a, Fresno, CA
MDCG	MENDONCA TRUCKING, Guilherme M. Mendonca, d/b/a, Pleasanton, CA
MRDI	MERCHANTS DELIVERY SYSTEMS, Orange, CA
MCSM	MESSENGER AND COURIER SERVICE INTERNATIONAL, Torrance, CA
MVYP	METAL VINEYARD PRODUCTS, INC., Fresno, CA
MFRW	METROPOLITAN FREIGHTWAYS, INC., Long Beach, CA
MTPV	METROPOLITAN VAN & STORAGE, INC., Martinez, CA
MGCM	MGC TRUCKING, Milton G. Chrisman, d/b/a, San Jose, CA
MDOS	MID COAST, INC., Mid Coast Produce Co., d/b/a, Alamo, CA
MIVE	MID-VALLEY EQUIPMENT, INC., Toppenish, WA
MKRS	MIKES RAPID SERVICE, INC., Fresno, CA
MNSI	MILES & SONS TRUCKING SERVICE, INC., Pleasanton, CA
MMTS	MILES MOTOR TRANSPORT SYSTEM, Oakland, CA
MLCI	MILHOLLAN TRUCKING COMPANY, Arnold Lynn Milhollan, d/b/a, Cudahy, CA
MILY	MILLER'S TRANSFER & STORAGE, Watsonville, CA
MLCF	MILLER, C. F., Santa Rosa, CA
MLLR	MILLER, ROY, FREIGHT LINES, INC., Santa Fe Springs, CA
MMTJ	MILLER-MORRELL TRUCKING, INC., Whittier, CA
MKTF	MILTON, K. T., & SONS, Rodeo, CA
MNNS	MINNIS, RICK, TRUCKING, Milpitas, CA
MTZE	MINTZ EQUIPMENT COMPANY, Clifford E. Mintz, d/b/a, Ontario, CA
MMEI	MINUTE-MAN EXPRESS, INC., Orange, CA
MMXO	MINUTEMAN EXPRESS TRUCKING CO., Blue Jay, CA
MSBT	MIRAMONTES, BOB, TRUCKING, Woodland, CA
MIMG	MISSION MOTOR LINES, Lakewood, CA
MSOT	MISSION TRUCKING COMPANY, Los Angeles, CA
MOSN	MISSOURI-NEBRASKA EXPRESS, INC., St. Joseph, MO
MIES	MISTLETOE EXPRESS SERVICE, Oklahoma City, OK
MEFO	MITCHLER, E. F., CO., Stockton, CA
MDMA	MODERN MATERIALS, INC., Irvine, CA
MMIN	MODERN MESSENGER, INC., Studio City, CA
MDET	MODERN TRUCKING SERVICE, INC., Los Angeles, CA
MOGQ	MOG TRUCKING CO., INC., Santa Ana, CA
MHBG	MOHLER'S, B & G, TRUCKING, William H. Mohler, II, d/b/a, Norco, CA
MONT	MONSON TRUCK CO., National City, CA
MSSM	MONTESANO SAND, CEMENT AND TRANSPORTATION, Fresno, CA
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
MYMY	MONTGOMERY, MONTY, TRUCKING, Weston E. Montgomery, d/b/a, Claremont, CA
MNDF	MONTION, DAVID F., Stockton, CA
MOOQ	MOORE TRUCK LINES, Truck Investment Company and Best Way Investments, Limited partnerships, d/b/a, Stockton, CA
MOJE	MOORE, JAMES EUNICE, Los Angeles, CA
MJML	MOORE, JIM, TRUCKING, James L. Moore, d/b/a, Anaheim, CA
MOJR	MOORE, JIMMY R., Terra Bella, CA
MOBB	MOORS, BOB, TRUCKING, INC., Newark, CA
MJOT	MOR JON TRUCKING, Yuba City, CA
MOAG	MORAN TRUCKING, Susanville, CA
MGRK	MORGAN, ROCK, TRUCKING, Rock David Morgan, d/b/a, Jackson, CA
MRIY	MORIYAMA, TOM T., Del Ray, CA
MADY	MORNING-AFTERNOON DELIVERY, Edward A. Daughn, d/b/a, San Leandro, CA
MODY	MORRIS DRAYING COMPANY, Oakland, CA
MSST	MORRIS TRANSPORTATION, INC., Oakland, CA
MPNM	MORRISON PIANO MOVERS, Van Nuys, CA
MORF	MORRY'S FREIGHT SERVICE, Newbury Park, CA
MSNN	MORTENSEN TRUCKING, Donald E. Mortensen, d/b/a, La Habra, CA
MTRG	MOTOR CARGO, A Corporation, Salt Lake City, UT
MTRI	MOUNTAIN ROCK PRODUCTS, Irwindale, CA
MTVL	MOUNTAIN VALLEY EXPRESS CO., INC., Manteca, CA
MZTI	MOZETTI TRUCKING, INC., Fremont, CA
MTLQ	MT. LASSEN MOTOR TRANSIT, INC., Red Bluff, CA

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@Carrier "Alpha" Code	
MUTR	MURPHY TRANSPORTATION, INC., Long Beach, CA
MUPH	MURPHY TRUCKING, James M. Murphy, d/b/a, Turlock, CA
MRLL	MURRILL TRUCKING, Santa Rosa, CA
MWTH	MUSICH'S TOWING, TRAILER & MOBILE HOME TRANSPORT & SERVICE, West Covina, CA
NALK	N A L TRUCKING, Danville, CA
NACI	NACAL, INC., Santa Fe Springs, CA
NTEQ	NATE'S TRUCKING, Nathan R. Inman, d/b/a, Denair, CA
NACT	NATIONAL CITY TRANSFER AND STORAGE CO., INC., National City, CA
NALD	NATIONAL DISTRIBUTION AGENCY, Norwalk, CA
NATL	NATIONAL TRUCKING CO. OF LOS ANGELES, Los Angeles, CA
NAVT	NAVA TRUCKING, Calexico, CA
NLSB	NELSON BROS. TRUCKING CO., Santa Clara, CA
NEVS	NEVIL STORAGE CO. SACRAMENTO, Sacramento, CA
NVLS	NEVIL STORAGE CO. PALO ALTO, INC., Mt. View, CA
NVSG	NEVIL STORAGE CO. SAN JOSE, INC., San Jose, CA
NHWC	NEW HIGHWAY CARRIER, INC., Ripon, CA
NSCO	NEWMAN-SMALLEY CORPORATION, Hayward, CA
NWAS	NEWTON & SONS, INC., Clovis, CA
NFNJ	NFI, INC. OF CALIFORNIA, Vineland, NJ
NLFE	NIELSEN'S FEED, Salinas, CA
NIEO	NIETO AND SONS TRUCKING, INC., Anaheim, CA
NIMK	NILMEIER, KEITH A., Fresno, CA
NLNE	NILSSON, S., EXPRESS, Inglewood, CA
NPTS	NIPOMO TRANSIT, Richard A. Canada, d/b/a, Nipomo, CA
NLNT	NOLAN, DON E., TRUCKING, Fortuna, CA
NDSQ	NORCO DELIVERY SERVICE, INC., Anaheim, CA
NODL	NORM'S DELIVERY SERVICE, INC., North Hollywood, CA
NORP	NORTHERN LUMBER TRANSPORT, Verdi, NV
NORI	NORTHERN REDWOOD TRANSPORT, INC., Santa Rosa, CA
NRRF	NORTHERN REFRIGERATED TRANSPORTATION, INC., Ceres, CA
NOCI	NORTHERN TRUCK, INC., Arbuckle, CA
NWKQ	NORWALK TRANSFER & STORAGE, INC., Norwalk, CA
NOSK	NOSKE, KLAUS BERNARD, North Long Beach, CA
NOSC	NOSS BROS. TRUCKING, Clarksburg, CA
NOVQ	NOVA TRUCKING SVC., INC., Compton, CA
NWDW	NOW DOWNTOWN, INC., Los Angeles, CA
NSDW	NSD WAREHOUSING & DISTRIBUTING SYSTEMS, NSD Warehousing & Distributing Systems, Inc., d/b/a, Torrance, CA
NBKS	NUBULK SERVICES, INC., Exton, PA
OBRF	O'BRIEN, FRANK, Fontana, CA
ONMO	O'NEIL MOVING SYSTEMS, INC., Santa Ana, CA
OKTR	O. K. TRUCKING CO., Oakland, CA
OAKG	OAK GROVE TRUCKING COMPANY, Hughson, CA
ODIT	ODISCO TRANSPORTATION-CONSOLIDATED DISTRIBUTION SERVICES, Daymark Foods, Inc., d/b/a, Russellville, AR
OETT	OETTING & SONS, Arthur V. Oetting, d/b/a, Placerville, CA
OFSI	OF SERVICE TRANSPORTATION, Of Service, Incorporated, d/b/a, Commerce, CA
OFFC	OFFSHORE CRANE & SERVICE COMPANY, INC., Ventura, CA
OILF	OILFIELD EXPRESS, Bakersfield, CA
OIRC	OILFIELD REQUIREMENTS COMPANY, Port Hueneme, CA
OITF	OILFIELDS TRUCKING COMPANY, Bakersfield, CA
OKAT	OKA TRANSFER CO., INC., Los Angeles, CA
OLWT	OLD WAY TRUCKING CO., Barney Saladino, d/b/a, Elsinore, CA
OHGI	OLLENDORF, H. G., INC., San Francisco, CA
OLNT	OLSEN, S. G., TRUCKING, Sheldon G. Olsen, d/b/a, Crescent City, CA
ODDS	ONE DAY DELIVERY SERVICE, Cotati, CA
ORFW	OREGON FREIGHTWAYS, INC., Medford, OR
OSTT	OST TRUCKING, INC., Oilfield Service & Trucking, Inc., d/b/a, Ventura, CA
OSKP	OSTERKAMP TRUCKING, INC., Orange, CA
OSKT	OSTERKAMP TRUCKING COMPANY, Anthony H. Osterkamp, Jr., d/b/a, Orange, CA
OTAJ	OTA, JAMES, TRUCKING, Fountain Valley, CA
OTVQ	OTT'S VACUUM TRUCK SERVICE, INC., Anaheim, CA
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
ONBT	OWNBY TRUCKING, Carpinteria, CA
PNLK	P & L TRUCKING, INC., Petaluma, CA
PDQS	P D Q VAN & STORAGE, INC., Marysville, CA
PIEC	P-I-E NATIONWIDE, INC., Jacksonville, FL
PJMN	P-J-M TRANSPORTATION, Pamela Gay Michaels, d/b/a, Corona, CA
PSBV	P. S. B. TRUCKING, INC., Fremont, CA
PMET	P.M.E. TRUCKING, INC., Anaheim, CA
PWTT	PAC WEST TRANSPORTATION, California Pac West Transportation, Inc., d/b/a, Santa Clara, CA
PCFA	PACE FREIGHT SYSTEMS, Los Angeles, CA

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CALIFORNIA CARRIERS — (Continued)
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Carrier "Alpha" Code	
PCFA	PACIFIC AIR CARGO ENTERPRISES, INC., Los Angeles, CA
PCNW	PACIFIC CARTAGE & WAREHOUSING, INC., Hayward, CA
PCCI	PACIFIC COAST LINES SERVICE, INC., Artesia, CA
PACW	PACIFIC COAST WAREHOUSE CORPORATION, Los Angeles, CA
PCFC	PACIFIC CONSTRUCTION & MAINTENANCE, INC., Ventura, CA
PFDI	PACIFIC DELIVERY SYSTEM, Orange, CA
PMSQ	PACIFIC MESSENGER SERVICE, INC., San Diego, CA
PCMC	PACIFIC MOLASSES COMPANY, San Francisco, CA
PCMN	PACIFIC MOLASSES TRANSPORT CO., San Francisco, CA
PCMQ	PACIFIC MOTOR TRANSPORT COMPANY, De Soto, TX
PFST	PACIFIC STATES TRUCK BROKERAGE, INC., San Diego, CA
PACS	PACIFIC STORAGE COMPANY, Stockton, CA
PCFT	PACIFIC TRANSPORTATION, Sho-Len, d/b/a, Lynwood, CA
PWTO	PACIFIC WEST TRANSPORT, Long Beach, CA
PNWS	PACIFIC-NATIONAL TRANSPORTATION WAREHOUSE SYSTEMS CORPORATION, Torrance, CA
PDXP	PACKAGE DELIVERY EXPRESS AND PDX, Lawlor Motor Express, d/b/a, San Francisco, CA
PCKR	PACKER TRANSPORTATION CO., Reno, NV
PAMA	PACKWAY MATERIALS, INC., Hat Creek, CA
PADI	PADDISON TRUCK LINES, INC., Hughson, CA
PAFL	PADRE FREIGHT LINES, Anaheim, CA
PSNO	PAISANO TRUCKING COMPANY, Rosemead, CA
PNTD	PANELLA TRUCKING, INC., Stockton, CA
PNLR	PANELLA, RALPH, TRUCKING, Estate of Ralph Panella, d/b/a, Stockton, CA
PANL	PANTHER LINE, INC., Dublin, CA
PLSS	PAOLINA & SONS TRUCKING, La Mirada, CA
PPDH	PAPAZIAN, RONALD & DONALD HARGIS, Whittier, CA
PPRQ	PAPER TRANSPORT COMPANY, South San Francisco, CA
PPNT	PAPIN, NICK, TRUCKING, Vacaville, CA
PARI	PAR TRUCKING, INC., Hesperia, CA
PHAT	PARHAM TRUCKING, Thomas Parham, d/b/a, Orange, CA
PNST	PARKER & SON TRUCKING, INC., Vernon, CA
PKJT	PARKER, JACK, TRUCKING, Jack Edward Parker, d/b/a, San Pablo, CA
PMSR	PARKERS MOVING & STORAGE, A. D. Parker, d/b/a, San Francisco, CA
PJAT	PASLEY, JAMES, TRUCKING, James E. Pasley, d/b/a, Vacaville, CA
PTCE	PAT'S COAST EXPRESS, INC., La Habra, CA
PATD	PATHFINDER TRUCKING, Progressive Produce, d/b/a, Los Angeles, CA
PLTV	PAUL TRUCKING, Amar Transportation, Inc., d/b/a, Watsonville, CA
PATS	PAUL'S TRUCKING SERVICE, INC., Los Angeles, CA
PAUD	PAULS DELIVERY SERVICE, Apple Valley, CA
PEAI	PEARCE TANK LINE, Signal Hill, CA
PTNR	PEARSON TRUCKING & RIGGING, INC., Norwalk, CA
PRLS	PEERLESS TRUCKING COMPANY, 4H Mountain Express, Inc., d/b/a, Commerce, CA
PSTN	PEETERS TRANSPORTATION CO., INC., San Francisco, CA
PNRE	PENGUIN REFRIGERATED EXPRESS, Richard W. Russell, d/b/a, Alameda, CA
PEXQ	PEOPLES EXPRESS COMPANY, Oakland, CA
PEEA	PEREA, EFREN M., Pico Rivera, CA
PEHO	PERSONALIZED TRANSIT, San Leandro, CA
PSOT	PESCADOR TRANSPORTATION, Coachella, CA
PTLO	PETALUMA VAN & STORAGE, Bevan-Ashvido Transportation, Inc., d/b/a, Petaluma, CA
PTRH	PETE'S TRUCKING, Manuel Peter Goveia, d/b/a, Redding, CA
PTLY	PETERS TRUCK LINES, Yreka, CA
PETE	PETERS, TED, TRUCKING COMPANY, INC., Gustine, CA
PEOT	PETERSON TRANSPORT, Woodland Hills, CA
PEHS	PETITHOMME, HENRY F., San Jose, CA
PTRO	PETROLANE TRANSPORT, Signal Hill, CA
PHSI	PHARRIS TRUCKING, INC., Fremont, CA
PHGC	PHILLIPS GRAIN COMPANY, Delano, CA
PHLW	PHILLIPS, L., TRUCKING, Fontana, CA
PHPI	PHILLIPS, R., TRUCKING, Ralph Phillips, d/b/a, Stockton, CA
PHLR	PHILLIPS, RUSS, TRUCKING, INC., Fresno, CA
PIZA	PIAZZA, SAMUEL J., & SON, INC., Mission Viejo, CA
PNOQ	PINOLE VALLEY TRUCKING, INC., Martinez, CA
PIMB	PIOMBO BROS., San Rafael, CA
PITO	PIPELINE TRUCKING COMPANY, INC., Norwalk, CA
PLXP	PLASTIC EXPRESS, Ontario, CA
PNDF	PONDEROSA FARMS, INC., Elverta, CA
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC
PONQ	PONY EXPRESS, Huntington Park, CA
POOK	POOLE, KENNETH L., INC., Cottonwood, CA
PPTQ	POPPERT TRUCKING, INC., Monrovia, CA
PTMP	PORT TERMINAL TRANSPORT, INC., G.R.M., Inc., d/b/a, Portland, OR
PDRY	PORTOLA DRAYAGE, INC., Millbrae, CA
POTR	POTIGIAN TRANSFER, Fresno, CA

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CALIFORNIA CARRIERS — (Continued)
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@ Carrier "Alpha" Code	
POEN	POTTER ENTERPRISES, INC., Lodi, CA
POUD	POUND & POUND TRUCKING, Ripon, CA
PRNG	PIMENTAL, WILLIAM GENE, Shingle Springs, CA
PYTT	PRAYTOR TRUCKING, Madera, CA
PSNQ	PRECISION TRANSPORT COMPANY, INC., San Francisco, CA
PRCY	PRESTON TRUCKING COMPANY, Los Angeles, CA
PCTF	PRICE TRANSFER, INC., Wilmington, CA
PRCW	PRIMO CORPORATION, Vernon, CA
PISM	PRISM, Timothy L. Somers & Lonnie D. Unruh, d/b/a, Bloomington, CA
PROO	PRO EXPRESS, INC., Montebello, CA
PDTI	PRODUCE TRKG. CO., Chang Trucking, Inc. and Produce Trucking, Inc., a partnership, d/b/a, Reedley, CA
PBAF	PROFIT FREIGHT SYSTEMS, INC., Valley Stream, NY
PMJT	PROVENZANO, M. & J., INC., Santa Clara, CA
PUMO	PRUMO TRUCKING, INC., Salinas, CA
PTSJ	PTS, Poultry Transport Systems, Inc., Fresno, CA
PUFS	PUBLIC FREIGHT SYSTEM, Whittier, CA
PURL	PUROLATOR COURIER CORP., Basking Ridge, NJ
PYOC	PYRAMID OIL COMPANY, Taft, CA
PYRE	PYREDUCT, National City, CA
QTRI	QUALI-T-RUCK SERVICE, INC., Fresno, CA
QATP	QUALITY TRANSPORT, INC., Fremont, CA
QURB	QUERIO, BARBARA J., Alamo, CA
QSDS	QUICKWAY SPECIAL DELIVERY SERVICE, San Francisco, CA
QUFT	QUIRIN, FRITZ, TRUCKING, INC., Long Beach, CA
RNAI	R & A TRUCKING COMPANY, Oakland, CA
RNAT	R & A TRUCKING, Los Angeles, CA
RNET	R & E TRUCKING, Roland I. Nisewander, Jr., d/b/a, Fullerton, CA
RNHR	R & H TRUCKING, INC., Anaheim, CA
RJTO	R & J TRUCK, INC., Pomona, CA
RRTT	R & R TRANSPORTATION COMPANY, Shafter, CA
RIAT	R I A TRUCKING, Ruben Iniguez, d/b/a, Walnut, CA
RBUC	R. & B. TRUCKING, Tracy, CA
RTBR	R. & T. BURNS, INC., Yuba City, CA
RCSN	R. C. & SONS, INC., Commerce, CA
REER	R. E. ENTERPRISES, Roy E. Miers, d/b/a, Fremont, CA
RLVT	R. L. V. TRUCKING, Los Angeles, CA
RBJT	R.B.J. TRANSPORT, INC., Merced, CA
RGEK	R.G.E. TRUCK LINES, INC., South El Monte, CA
RABT	RABB BROS. TRUCKING, INC., San Joaquin, CA
RXTP	RADEX TRANSPORTATION, Statewide Distribution Services, Inc., d/b/a, Los Angeles, CA
RTFR	RAINTREE FREIGHT SYSTEM, Juan N. Meraz, d/b/a, Los Angeles, CA
RPHP	RALPH'S PRODUCE, Brentwood, CA
RAGC	RALPHS GROCERY COMPANY, Federated Department Stores, Inc., d/b/a, Los Angeles, CA
RAMS	RAM FREIGHTWAYS, INC., Commerce, CA
RTNL	RAM TRANSPORTATION & LEASING, Cerritos, CA
RMTK	RAM TRUCKING, INC., Davis, CA
RAMQ	RAMIREZ TRUCKING CO., Los Angeles, CA
RAMO	RAMOS TRUCKING, Fremont, CA
RNGR	RANGER TRANSPORTATION, INC., Jacksonville, FL
RAHO	RAPID FREIGHT SYSTEMS, Paramount, CA
RPFW	RAPID FREIGHTWAYS, Huntington Beach, CA
RDNT	RARDEN, JOE, TRUCKING, Joe E. Rarden, d/b/a, Vernalis, CA
RASA	RASAS TRUCKING, Robert Sandoval, d/b/a, Los Angeles, CA
RACP	RASCON, PAUL, TRUCKING, Paul A. Rascon, d/b/a, San Jose, CA
RTUG	RATH TRUCKING, INC., West Sacramento, CA
RLGT	RAWLINGS TRUCKING, INC., Santa Fe Springs, CA
RAYC	RAY'S TRUCKING, Raymond G. Rodrigues, d/b/a, Fremont, CA
REBM	REB TRANSPORTATION, Woodland, CA
RCRD	RECORD TRANSPORT, INC., Vernon, CA
REDP	REDDING LUMBER TRANSPORT, INC., Redding, CA
RLUT	REDDING LUMBER TRANSPORT, Al Shufelberger, d/b/a, Redding, CA
RDFT	REDFEARN TRUCKING, INC., Stockton, CA
RGCS	REDINGER, CLIFFORD S., TRUCKING, Tracy, CA
RDLC	REED LAND CLEARING, INC., Ventura, CA
RRTG	REEDER, ROBERT, TRUCKING, Vernon, CA
REKE	REEDY, KENNETH D., Tulare, CA
RVTC	REEVE TRUCKING CO., Fontana, CA
RGDT	REGAN DISTRUBUTORS TRANSPORTATION, INC., Santa Ana, CA
RDKG	REID TRUCKING, INC., Salinas, CA
RTNO	REITANO TRUCKING CO., Charles T. Reitano, d/b/a, San Jose, CA
RTPO	RELIANCE TRANSPORT CO., Los Angeles, CA

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Carrier "Alpha" Code	
RTOC	RENTAL TOOL CORPORATION, Houston, TX
REPV	REPUBLIC VAN LINES OF SAN DIEGO, INC., San Diego, CA
RDEV	RETAIL DELIVERY SYSTEMS, INC., San Diego, CA
RYNO	REYNOLDS, RICHARD L., Lindsay, CA
RICJ	RICE TRUCKING, Darrell E. (Bing) Rice, d/b/a, Cottonwood, CA
RSVI	RICH SAND SERVICE COMPANY, Orcutt, CA
RIBS	RICH, BOB, SCHROEDER TRUCKING, INC., San Francisco, CA
ROWV	RIGHT O WAY DELIVERY, INC., Santa Ana, CA
RLEY	RILEY, DENNIS G., East Nicolaus, CA
RLGR	RILINGER TRUCKING, Crescent Valley, NV
RSEC	RIOSECO, ARTURO, Calexico, CA
RIPP	RIPPEE, RICHARD A., La Palma, CA
RIOO	RITCHIE TRUCKING SERVICE, INC., Fresno, CA
RWSI	RITEWAY SERVICES, INC., Whittier, CA
RWYI	RITEWAY TRANSFER, INC., Los Angeles, CA
RIVV	RIVERA, LOUIS, Stockton, CA
RVSF	RIVERSIDE FREIGHT LINES, Riverside, CA
RDXI	ROADEX, INC., Ontario, CA
RRTQ	ROADRUNNER TRUCKING, INC., Albuquerque, NM
RWCN	ROADWAY CONSTRUCTION CO., INC., Long Beach, CA
RDWY	ROADWAY EXPRESS, INC., Akron, OH
RBTK	ROBCO TRUCKING CO., INC., Stockton, CA
ROEE	ROBERTS EXPRESS, INC., Akron, OH
RBTE	ROBERTS TRUCKING, Alex T. Roberts, d/b/a, Covina, CA
RORC	ROBERTSON TRUCK CO., John R. Robertson, d/b/a, Blythe, CA
RBEI	ROBERTSON, J., INC., San Leandro, CA
RBDL	ROBINSON, DONALD L., Auburn, CA
ROBI	ROBO TRUCKING, INC., Central Point, OR
RCEL	ROCHA, ED, LIVESTOCK TRANSPORTATION, INC., Stockton, CA
RDTK	ROD'S TRUCKING, Rodney E. Pozas, d/b/a, Newark, CA
RDTV	RODE TRUCKING, Dart Public Warehouse, Inc., d/b/a, Los Angeles, CA
RDGT	RODGERS TRUCKING CO., Ghiglione and Jensen, d/b/a, San Leandro, CA
RTEP	ROGERS TRUCKS & EQUIPMENT, INC., South San Francisco, CA
RGEJ	ROGERS, JAMES, TRUCKING CO., Corona Del Mar, CA
RLGS	ROLLING STONE TRUCKING CORP., Norwalk, CA
RLWL	ROLLING WHEEL TRANSPORT, INC., West Covina, CA
RONR	RON'S TRANSPORT, INC., Modesto, CA
RTKN	ROOT TRUCKING, INC., Los Angeles, CA
RNIS	ROSEN, NIS PETER, TRUCKING, Roseville, CA
RSTA	ROSSI TRANSPORT SERVICE, James L. Rossi, Inc., d/b/a, Templeton, CA
RSNG	ROSSING TRUCK CO., Arthur T. Rossing, Jr., d/b/a, Downey, CA
RDDR	ROUND, RON, TRUCKING, INC., Union City, CA
ROWG	ROWDEN, GERALD, Compton, CA
RYTK	ROYAL TRUCKING CO., Lemore Transportation, Inc., d/b/a, Concord, CA
RYTC	ROYAL TRUCKING CO., Roy F. Querio, d/b/a, Concord, CA
ROZK	ROZAK TRUCKING, INC., Los Angeles, CA
ROZA	ROZAY'S TRANSFER, Huntington Park, CA
RBNB	RUBIN, BEN, EXPRESS, Van Nuys, CA
RUDD	RUDDWAY DRAYAGE, INC., San Francisco, CA
RUZH	RUIZ, H. M., TRUCKING, Hilarion M. Ruiz, d/b/a, Indio, CA
RDYV	RUSHMORE DELIVERY SERVICE, Richard D. Meyer, d/b/a, Burlingame, CA
RUHW	RUSHWAY, INC., Newcastle, CA
SNEI	S & E TRUCKING, INC., North Hollywood, CA
SNHI	S & H TRUCK LINES, INC., Fontana, CA
SNKR	S & K TRUCKING, Joey Lee Creech, d/b/a, Fremont, CA
SNMQ	S & M MOVING SYSTEMS, Torrance Van & Storage Company, d/b/a, Torrance, CA
SSTO	S & S TRANSPORTATION, INC., Commerce, CA
SKGC	S & S TRUCKING CO., INC., Watsonville, CA
SSKG	S & S TRUCKING, Solomon Pierce, d/b/a, Garden Grove, CA
SMDS	S. M. D. S., INC., City of Industry, CA
SADC	SACCANI DISTRIBUTING COMPANY, Sacramento, CA
SATC	SACRAMENTO AUTO TRUCK CO., Mark A. Bozaich, d/b/a, West Sacramento, CA
SNSI	SACRE & SON, INC., San Fernando, CA
SFTW	SAFE(T)WAY TRUCKING, INC., Pomona, CA
SGEQ	SAGE TRANSPORTATION, INCORPORATED, South San Francisco, CA
SGSO	SAHAGUN AND SONS TRUCK SERVICE, Felipe F. Sahagun, d/b/a, Palermo, CA
SALV	SALINAS VALLEY-SANTA CRUZ MOTOR EXPRESS, San Francisco, CA
SDAY	SAME DAY DELIVERY SERVICE, INC., Norwalk, CA
SAMM	SAMMONS TRUCKING, Missoula, MT
SFSF	SAN FRANCISCO SEAFOOD EXPRESS, New San Francisco Bait Distributors, d/b/a, San Francisco, CA
SJQM	SAN JOAQUIN MOTOR TRUCK LINES, Modesto, CA
SCZF	SANCHEZ, FRANK, TRUCKING, INC., San Leandro, CA

PARTICIPATING INTRASTATE CARRIERS — Continued

CALIFORNIA CARRIERS — (Continued)
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@Carrier "Alpha" Code	
SJWT	SANCHEZ, J & W, TRUCKING CO., Joseph Sanchez and William David Sanchez, d/b/a, San Leandro, CA
SBRG	SANDBERG, NORMAN, Fresno, CA
SDVL	SANDOVAL TRUCKING CO., INC., Los Angeles, CA
SNFA	SANSONI FARMS, INC., Merced, CA
SACL	SANTA CLARA TRANSFER SERVICE, San Jose, CA
SCMI	SANTA CRUZ MOVING & STORAGE, INC., Santa Cruz, CA
SNOS	SANTOS, RAYMOND B., Castro Valley, CA
SAVG	SAVAGE BROTHERS, INCORPORATED, American Fork, UT
SYLT	SAYLOR'S TRUCKING, Winford Cleid Saylors, d/b/a, El Cajon, CA
SCAN	SCANNAVINO, AL, TRUCKING, INC., Stockton, CA
SCBD	SCANNELL BROS. DRAYAGE, John Scannell, d/b/a, San Francisco, CA
SCPB	SCARPETE, BILLY, Cotati, CA
SCLP	SCHALI TRANSPORT SYSTEMS, Oakdale, CA
SKLR	SCHECKLA TRUCKING CO., Burney, CA
SCMQ	SCHICK MOVING AND STORAGE COMPANY, Santa Ana, CA
SMVI	SCHICK MOVING SYSTEMS, INC., Tustin, CA
SCHZ	SCHULTZ BROS. VAN AND STORAGE, Santa Rosa, CA
SHZB	SCHULTZ, BILL, TRUCKING CO., INC., Madera, CA
SZTR	SCHULZ BROS. TRUCKING, Acampo, CA
SZTT	SCHULZ, TY, TRUCKING, INC., Ione, CA
SCUM	SCHUNEMAN TRUCKING, James G. Schuneman, d/b/a, Concord, CA
SFTR	SCOFFONE TRUCKING SERVICE, San Jose, CA
SOKN	SCOOT CO. TRUCK LINES, Pasadena, CA
SOUK	SCOTT'S TRUCKING, William Vernon Scott, d/b/a, French Camp, CA
SCSK	SCS TRUCKING, James Johnston, d/b/a, Chino, CA
SEVQ	SEARLES VAN & STORAGE CO., INC., San Francisco, CA
SEYN	SEAY TRUCKING CO., Jasper N. Seay, d/b/a, Baldwin Park, CA
SBGT	SEBRING TRANSPORT, INC., San Leandro, CA
SZTI	SEITZ TRUCKING, Fremont, CA
SLCE	SELECT CARRIERS EXPRESS, INC., Hayward, CA
SPLI	SEMPER TRUCK LINES, INC., Fresno, CA
STSI	SENATOR TRUCK SERVICE, Montebello, CA
SIQT	SENTINEL TRANSPORTATION SYSTEMS, INC., Whittier, CA
SEQR	SEQUOIA ROCK COMPANY, Visalia, CA
SVCA	SERVICE AIR CARGO, Arleta, CA
SEDR	SERVICE DRAYAGE CO., Santa Clara, CA
SESY	SERVICE SYSTEMS, R. L. Cramer, Inc., d/b/a, Santa Barbara, CA
SVLQ	SERVICE TRANSPORT LINES, INC., West Sacramento, CA
SEYD	SERVICECRAFT DISTRIBUTION SYSTEMS, INC., Buena Park, CA
SETJ	SETTLE TRUCKING, Robert Settle, d/b/a, Brawley, CA
SHKR	SHAKER EXPRESS, California Air Cartage, Inc., d/b/a, San Diego, CA
SMRK	SHAMROCK TRUCK LINES, Jerry O'Connell, d/b/a, San Jose, CA
SIDI	SHANE INDUSTRIES, INC., Fresno, CA
SHXF	SHARMAX FREIGHTLINES, INC., Lakeside, CA
SWHI	SHATTO, WM. H., INC., Irwindale, CA
SHWV	SHAWVER TRUCKING CO., INC., Stockton, CA
SVTR	SHAWVER TRUCKING COMPANY, Stockton, CA
SHDC	SHEEDY DRAYAGE CO., San Francisco, CA
SRDM	SHEPPA READY-MIX CONCRETE, INC., Tulare, CA
SHLC	SHIELDS TRUCKING, Richard Joseph Shields, d/b/a, Gridley, CA
SHIF	SHIFFLET BROS., INC., Gridley, CA
SHIM	SHIMA TRANSFER CO., San Francisco, CA
SIPL	SHIPPERS IMPERIAL, INC., Walnut Creek, CA
SHKQ	SHOCKEY & SONS TRUCKING, Manteca, CA
SHRS	SHROPSHIRE TRUCKING, INC., Lindsay, CA
SFBG	SHUFELBERGER, VERN, Redding, CA
SICH	SIERRA CHEMICAL COMPANY, Reno, NV
SRDS	SIERRA DELIVERY SERVICE, Clarence B. Blythe, d/b/a, Pinedale, CA
SPTO	SIERRA PACKERS, Modesto, CA
SIRA	SIERRA RENTAL & TRANSPORT CO., Aaron W. Hurst, d/b/a, Reno, NV
SRAC	SIERRA TRUCKING, INC., Reno, NV
SIAE	SILVER ARROW EXPRESS, INC., Tulare, CA
SLVE	SILVER EXPRESS, Oakley, CA
SVYQ	SILVEY TRANSPORTATION, INC., Newark, CA
SMTG	SIMMERSON TRUCKING, W. E. Simmerson & D. N. Simmerson, d/b/a, Windsor, CA
SITI	SIMON TRUCKING, INC., Downey, CA
SMSK	SIMS TRUCKING COMPANY, San Mateo, CA
SJHI	SIMS, J. H., TRUCKING COMPANY, INC., Ontario, CA
SJHT	SIMS, J. H., TRUCKING AND J. H. SIMS, Ontario, CA
SINS	SINES TRUCKING COMPANY, INC., Newark, CA
SSKW	SISKIYOU WEST, INC., Yreka, CA

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

@Carrier "Alpha" Code	CALIFORNIA CARRIERS — (Continued) (Operating under jurisdiction of California Public Utilities Commission)
SKVT	SKAGIT VALLEY TRUCKING CO., INC., Mt. Vernon, WA
SKTI	SKY TRUCKING CO., Chula Vista, CA
SKCS	SKYLINE CONCRETE SALES CO., Sun Valley, CA
SKFS	SKYWAY FREIGHT SYSTEMS, INC., Santa Cruz, CA
SMTC	SMITH TRANSPORTATION CO., Santa Maria, CA
SMDR	SMITH, DON R., TRUCKING, Ventura, CA
SMOE	SMITH, HAROLD EUGENE, Gridley, CA
SNZS	SNOOZIE SHAVINGS, INC., Crescent City, CA
SNOF	SNOW FREIGHT LINES, INCORPORATED, Chula Vista, CA
SOAJ	SOARES, JAMES M., Sacramento, CA
SLOO	SOLOMON, TED, TRUCKING, INC., Los Angeles, CA
SOAO	SOLORIO, ALFREDO, Long Beach, CA
SEXR	SOONER EXPRESS FREIGHT LINES, Canoga Park, CA
SKST	SOUTH COAST TRUCKING, INC., Inglewood, CA
SOCF	SOUTHERN CALIFORNIA MOTOR DELIVERY, INC., Montebello, CA
SCNI	SOUTHERN CALIFORNIA TRUCKING, INC., Fullerton, CA
SCFK	SOUTHERN CALIFORNIA TRUCK LEASING, INC., Norwalk, CA
SCYC	SOUTHERN COUNTIES COURIER, Conejo Courier & Cartage, d/b/a, Newbury Park, CA
SSIR	SOUTHERN SIERRA TRANSPORT, Timothy W. Fillmore, d/b/a, Bishop, CA
SLNI	SOUTHLAND FREIGHT SERVICE, INC., Castaic, CA
SOWN	SOUTHWEST MOTOR FREIGHT, Southwest Equipment Rental, Inc., d/b/a, Chattanooga, TN
SUGT	SOUTHWEST TRANSPORTATION, INC., Gardena, CA
SUZT	SOUZA'S MILK TRANSPORTATION CO., INC., Gustine, CA
SPDL	SPACE AGE DELIVERY SERVICE, INC., Paramount, CA
SPMF	SPARKS MOTOR FREIGHT, Long Beach, CA
SPFR	SPARTAN FREIGHT LINES, INC., Pico Rivera, CA
SPVT	SPARTAN TRUCKING, Dart Transportation Service, d/b/a, Los Angeles, CA
SSKN	SPATES TRUCKING CO., INC., Gardena, CA
SDBA	SPECIAL DISPATCH OF THE BAY AREA, INC., Hayward, CA
SPLS	SPECIALIZED TRUCKING SERVICE, INC., Tacoma, WA
SPOI	SPEED'S OIL TOOL SERVICE, INC., Santa Maria, CA
SPRS	SPRAGUES ROCK AND SAND COMPANY, Irwindale, CA
SAJN	STADLER & JENSEN MOVING, Lawndale, CA
SFFO	STAFFORD, WILLIAM M., Gridley, Ca
SLLO	STALLION TANK LINES, INC., Santa Fe Springs, CA
SINR	STAMCO, INC., San Martin, CA
SDSP	STAN DUR STEEL PRODUCTS COMPANY, Wilmington, CA
SNSR	STAN'S TRUCKING, Ceres, CA
SVCI	STANDARD CONCRETE MATERIAL, INC., Santa Ana, CA
SDCO	STANDON COMPANY, INC., Colton, CA
STKW	STAR TRUCKING, Ventura, CA
SDUT	STARDUST TRUCKING, Riverbank, CA
SAVE	STATES WAREHOUSES, INC., Buena Park, CA
SWPQ	STATEWIDE TRANSPORT SERVICE, INC., Richmond, CA
STOC	STEEL TRANSPORTERS OF CALIFORNIA, Wilmington, CA
SNEH	STEINER, JOHN, Lathrop, CA
STER	STERLING TRANSIT COMPANY, INC., Montebello, CA
SWTB	STEWART TRUCKING, Ricky Stewart, d/b/a, Fresno, CA
STID	STIDHAM TRUCKING, INC., Yreka, CA
SRHO	STIDHAM, RICHARD O., Yreka, CA
STNO	STINSON TRUCKING, INC., Milpitas, CA
SKTB	STOCKTON TRUCKING, Bakersfield, CA
SWJJ	STOWELLS, FOREST JAY, JR., Indio, CA
SRND	STRAND, NORM, TRUCKING, Norman K. Strand, d/b/a, Benecia, CA
SRKN	STRICKLAND'S UNLIMITED SERVICE, James E. Strickland, d/b/a, Oakland, CA
SUHF	STUHAAN FARMS, Bob Stuhaan, d/b/a, Hanford, CA
SMFB	SUMMERTIME FARMS, INC., Berkeley, CA
SUMW	SUMMIT TRANSPORTATION, Summit Express, Inc., d/b/a, Cerritos, CA
SUMN	SUMNER & SON TRANSPORT, INC., Santa Ana, CA
SUXE	SUN EXPRESS, Hank's, Inc., d/b/a, Fontana, CA
SBNC	SUNBELT NCK, INC., City of Industry, CA
SCTM	SUNCOAST TRANSPORTATION, INC., Hayward, CA
SDFS	SUNDANCE FREIGHT SYSTEM, INC., Anaheim, CA
SNEP	SUNRISE ENTERPRISES, Robert L. Kim, d/b/a, West Sacramento, CA
SREW	SUNRISE EXPRESS, INC., Vancouver, WA
SPQM	SUPER MOVERS, INC., Sunnyvale, CA
SUAD	SUPERIOR ASSEMBLY & DISTRIBUTION CENTER, INC., Los Angeles, CA
SUCA	SUPERIOR CALIFORNIA TRUCKING COMPANY, West Sacramento, CA
SULA	SUPERIOR EXPRESS, Superior Fast Drayage, d/b/a, Los Angeles, CA
SUAM	SUPERIOR FARMING COMPANY, Bakersfield, CA
SURD	SUR-T DRAYAGE, INC., San Jose, CA
SUFA	SURFAIR TRUCKING, Inglewood, CA

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CALIFORNIA CARRIERS — (Continued)
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@Carrier "Alpha" Code	
SUAT	SUSANA TRANSPORT SYSTEMS, INC., Whittier, CA
SWVI	SWARD TRUCKING, INC., Oakdale, CA
SWFT	SWIFT TRANSPORTATION CO., INC., Phoenix, AZ
SWOP	SWOPE TRUCKING, Raymond E. Swope, d/b/a, West Covina, CA
SYRS	SYSTEM REEFER SERVICE, INC., Cypress, CA
SYST	SYSTEM TRANSPORT, Long Beach, CA
TDTF	T & D TRANSFER, Vernon, CA
TJTI	T J TRUCKING CO., Anthony Pardo and Jess Gonzales, d/b/a, San Francisco, CA
TWTN	T-W TRANSPORT, INC., Spokane, WA
TFTR	T. F. TRUCKING, Brawley, CA
TCTI	T.C. TRANSPORTATION, INC., South San Francisco, CA
TIME	T.I.M.E.-DC, INC., Dallas, TX
TABR	TAB TRANSPORTATION, INC., Bell Gardens, CA
TABS	TABLOID SHIPPERS, INC., Merced, CA
TAGR	TAGUS RANCH TRUCKING, INC., Jones Transportation, Inc., d/b/a, Visalia, CA
TANK	TANKSLEY, SAM, TRUCKING, INC., Cape Girardeau, MO
TAPP	TAPP TRUCKING, Fresno, CA
TAEQ	TARGET EXPRESS, INC., Chino, CA
TRJO	TARICCO, JOE D., TRUCKING, INC., Ontario, CA
TTSH	TARTAN TRANSPORT SERVICES, INC., San Clemente, CA
TTUM	TATUM TRUCKING, Marvin E. Tatum, d/b/a, Fresno, CA
TAYF	TAYIAN, BARRY, Selma, CA
TAYO	TAYLORMADE TRUCKING COMPANY, INC., Baldwin Park, CA
TZXQ	TAZ EXPRESS, INC., Whittier, CA
TBXM	TBX MOTOR EXPRESS, INC., Hayward, CA
TECN	TECHNOLOGY DISTRIBUTION SYSTEM, INC., San Jose, CA
TLFR	TELFER TANK LINES, INC., Martinez, CA
TRSQ	TERESI TRUCKING, INC., Lodi, CA
TESI	TERESI, JOHNNY, TRUCKING, John Manuel Teresi, d/b/a, Lodi, CA
TERE	TERMINAL MOTOR EXPRESS, INC., Los Angeles, CA
TECM	TERRA COMMERCIAL TRANSPORT, San Jose, CA
THAR	THARP, R. E., INC., Chowchilla, CA
TMOE	THERMO EXPRESS, INCORPORATED, Castro Valley, CA
THON	THOEN TRUCK RENTALS, Monte L. & Doris R. Thoen, d/b/a, Portland, OR
THMF	THOMAS TRANSFER & STORAGE CO., INC., Mountain View, CA
THAT	THOMAS, AL, TRUCKING, Albert Thomas, d/b/a, Lodi, CA
THJO	THOMAS, JOHN A., CRANE & TRUCKING COMPANY, INC., Huntington Beach, CA
THOP	THOMAS, PATRICK J., Canyon Country, CA
TRYV	THOMAS, ROY VANCE, Stockton, CA
TMTO	THOMASON TRANSPORT, Whittier, CA
THBM	THOMPSON BUILDING MATERIALS, INC., Orange, CA
TPTM	THOMPSON, C. O., PETROLEUM CO., INC., Orange, CA
THPJ	THOMPSON, JOE E., Gridley, CA
THHE	THORPE & HALL ENTERPRISES, Chico, CA
THWQ	THREE WAY VAN LINES COMPANY, INC., Sunnyvale, CA
THRB	THREE-B FREIGHT SERVICE, INC., Fontana, CA
THDR	THREESTREETS DRAYAGE, Sunnyvale, CA
TDBP	THUNDERBIRD PACIFIC, Thunderbird Freight Lines, Inc., d/b/a, Oakland, CA
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC
TIGO	TIAGO, Los Angeles, CA
TIGL	TIGER LINES, INC., Lodi, CA
TGHD	TIGHE DRAYAGE COMPANY, Veronica Turri, d/b/a, San Francisco, CA
TIMN	TIMKOE TRUCKING, Woodland, CA
TNBW	TNT BESTWAY TRANSPORTATION, INC., Phoenix, AZ
TJHT	TODD, JAMES H., TRUCKING, D. K. Misko, Inc., d/b/a, Simi Valley, CA
TOKI	TOKAI SHIPPING OF AMERICA, INC., Wilmington, CA
TOFJ	TOMBS, FRANK P., JR., Fresno, CA
TOND	TONDO TRUCKING, Burlingame, CA
TONI	TONY'S EXPRESS, INC., Glendale, CA
TJFS	TORRES, J., FREIGHT SERVICE, Pico Rivera, CA
TOTQ	TOTAL TRANSPORTATION, Edward C. Hargis, d/b/a, La Habra, CA
TWI-	TRAILWAYS LINES, INC., Dallas, TX
TACD	TRAMMELL CROW DISTRIBUTION CORP. OF LOS ANGELES, Commerce, CA
TRNV	TRANS VALLEY TRANSPORT, INC., Gilroy, CA
TBAY	TRANS-BAY TRUCKING, INCORPORATED, Berkeley, CA
TSCL	TRANS-CAL TRUCKING, Distribution Centers, Inc., d/b/a, Commerce, CA
TNEC	TRANS-FREIGHT SERVICES,INC., Vernon, CA
TCON	TRANSCON LINES, Los Angeles, CA
TMCI	TRANSMEDIC CARRIERS, INC., Clarksville, IN
TMCC	TRANSMIX CORPORATION, Los Angeles, CA
TREP	TRANSPORT EXPRESS, INC., Los Angeles, CA
TSUS	TRANSUS, INC., Atlanta, GA

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Carrier "Alpha" Code	
TRYL	TRAYNHAM, LEE, TRUCKING, INC., Arbuckle, CA
TVTG	TREASURE VISTA TRUCKING, Lawrence C. Beltran, d/b/a, Newhall, CA
TMBF	TREMBLE, F. A., FREIGHTWAYS, F. A. Tremble, d/b/a, City of Industry, CA
TRIJ	TRI-J TRUCKING, INC., Union City, CA
TMFE	TRI-M FREIGHT SYSTEMS, INC., Los Angeles, CA
TMOD	TRI-MODAL DISTRIBUTION SERVICES, INC., Los Angeles, CA
TTIC	TRI-S TRUCKING, INC., Fresno, CA
TRGL	TRIANGLE LINES, INC., Fresno, CA
TITP	TRIANGLE TRANSPORTATION, INC., Montebello, CA
TRDT	TRIDENT TRUCK LINE, INC., Hayward, CA
TNCI	TRINCO, INC., Marysville, CA
TMMM	TRIPLE M TRANSPORTATION & EQUIPMENT, INC., Porterville, CA
TPLE	TRIPLE-E MACHINERY MOVING, INC., El Monte, CA
TRWM	TRIWAYS, INC., Whittier, CA
TRJI	TROJAN TRANSPORTATION, INC., Grand Terrace, CA
TKCP	TRUCK AND COMPANY, Paul Giammona, d/b/a, San Jose, CA
TKWY	TRUCK-A-WAY, Vacaville, CA
TRUL	TRUCKING UNLIMITED, Santa Fe Springs, CA
TTTI	TTT, INC., South Gate, CA
TUDR	TUDOR WAREHOUSE CO., Jack C. Carpenter and George M. Carpenter, Sr., d/b/a, Yuba City, CA
TLLY	TULLEY TRUCKING, INC., Los Angeles, CA
TURW	TURLEY TRUCKING, INC., Grants Pass, OR
TFRS	TURRI FREIGHT SYSTEMS, San Francisco, CA
TWEN	20TH CENTURY TRUCKING COMPANY, Los Angeles, CA
TWIT	TWINS TRUCKING, Bakersfield, CA
TBDS	TWO BOY DELIVERY SERVICE, Daly City, CA
USDV	U S DELIVERY, INC., Fullerton, CA
USCI	U.S. COURIER CORPORATION, Los Angeles, CA
UMDS	U.S. MESSENGER & DELIVERY SERVICE, INCORPORATED, San Francisco, CA
UTWS	UNION TERMINAL WAREHOUSE, INC., Vernon, CA
UNDC	UNITED DRAYAGE COMPANY, Los Angeles, CA
UNLP	UNITED LPG TRANSPORTATION, Gardena, CA
UPSS	UNITED PARCEL SERVICE, INC. (An Ohio Corporation), St. Charles, IL
URGE	UNITED RIGGERS & ERECTORS, INC., Santa Fe Springs, CA
UVLN	UNITED VAN LINES, INC., Fenton, MO
UNIM	UNIVERSAL MAIL DELIVERY SERVICE, Los Angeles, CA
UTST	UTSUKI, TOM, TRUCKING, Culver City, CA
UYMT	UYEMA, GEORGE, TRUCKING, George Kiyoski Uyema, d/b/a, Torrance, CA
VASO	V & S TRANSPORTATION, INC., Long Beach, CA
VTSL	V. T. SUPPLY, L. J. Tavernetti, Jr., d/b/a, Bakersfield, CA
VTSI	V.T.S., INC., Gilroy, CA
VADS	VALDEZ DELIVERY SERVICE, Anaheim, CA
VLEC	VALENCIA TRUCKING CORPORATION, Yorba Linda, CA
VALN	VALENCIA TRUCKING CO., Valencia Systems, Inc., d/b/a, Valencia, CA
VLMQ	VALIANT MOTOR LINES, INC., Downey, CA
VASJ	VALLES, J., TRUCKING, Fremont, CA
VLIS	VALLEY INTERMODAL SYSTEMS, INC., Modesto, CA
VLES	VALLEY SPREADER, INC., Brawley, CA
VANB	VAN BRUNT & SON INC., Old Bridge, NJ
VNDL	VAN DER LINDEN, LEONARD, INC., Paramount, CA
VANR	VAN SURKSUM, JOHN M., Bellflower, CA
VTKC	VANIER TRUCKING COMPANY, INC., Hayward, CA
VSSR	VASSAR, MITCHELL M., Bishop, CA
VZLT	VASZIL TRUCKING, INC., Riverside, CA
VNCI	VENTURA CRANE, INC., Santa Paula, CA
VNHY	VENTURA HIGHWAY, John Allen Stodghill and Ronald Lee Earnest, d/b/a, Los Angeles, CA
VENT	VENTURA TRANSFER COMPANY, Long Beach, CA
VDAL	VIDA-LINES, INC., San Jose, CA
VLLG	VILLEGAS, EMILIO, Los Angeles, CA
VIFF	VISALIA FAST FREIGHT, Visalia, CA
VONS	VONS COMPANIES, INC., THE, Los Angeles, CA
WDEA	WADE TRANSPORTATION COMPANY, INC., Los Angeles, CA
WAHK	WAHL, A., TRUCKING, LeRoy Wahl, d/b/a, Woodland, CA
WDIC	WAID, INC., Oakland, CA
WLEY	WALEYE COMPANY, INC., Coarsegold, CA
WKCL	WALKER, CLIFFORD, L., JR., Willits, CA
WADA	WALKUP DRAYAGE AND WAREHOUSE CO., Oakland, CA
WLSP	WALLACE & SON, Planada, CA
WTAP	WALLACE TRANSPORT, Planada, CA
WLGR	WALNUT GROVE TRANSPORTS, Walnut Grove, CA
WAJF	WALTER, J. F., TRUCKING, Joan F. Walter, d/b/a, Vista, CA
WATR	WALTER, R. D., TRUCKING, INC., San Marcos, CA

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WRDR	WARE, DARREL DAVID, Redding, CA
WWYT	WAROWAY TRUCKING COMPANY, INC., Hesperia, CA
WART	WARREN TRANSPORTATION CO., Hayward, CA
WRRM	WARREN TRUCKING CO., INC., Long Beach, CA
WGTG	WASHINGTON TRUCKING, Wilford Randall Washington, d/b/a, San Jose, CA
WTKD	WATKINS DRAYAGE, Gary B. Watkins, d/b/a, Aromas, CA
WWAT	WATKINS MOTOR LINES, INC., Lakeland, FL
WAAJ	WATSON, ARTHUR J., Red Bluff, CA
WTDJ	WATSON, D. J., TRUCKING, Dan Watson, d/b/a, Modesto, CA
WACE	WATTS, CHARLES E., Bakersfield, CA
WECV	WEATHERFORD, D. K., COMPANY, INC., Phoenix, AZ
WBEL	WEIBEL, INCORPORATED, Mission San Jose, CA
WELK	WELLBROCK TRUCKING, Bend, OR
WELS	WELLS CARGO, INC., Reno, NV
WDLR	WENDLAND TRUCKING, Warren F. Wendland, d/b/a, Hayward, CA
WEAS	WEST COAST AGENCIES, INC., Los Angeles, CA
WCFR	WEST COAST FREIGHT LINE, Whittier, CA
WCMO	WEST COAST MOVERS, Marina, CA
WCMV	WEST COAST MOVING & STORAGE, INC., Long Beach, CA
WCTB	WEST COAST TRANSPORTATION, Robert D. Shepherd, Inc., d/b/a, Bakersfield, CA
WAAN	WEST VAN TRANSPORT, INC., Stoughhouse, CA
WEWT	WEST WORLD TRANSPORTATION CO., INC., Los Angeles, CA
WSCR	WESTERN CARRIERS, INC., Modesto, CA
WEFW	WESTERN FREIGHTWAYS, Tampa, FL
WMEI	WESTERN MARINE EXPRESS, INC., J & J Webster, Inc., d/b/a, City of Industry, CA
WWWQ	WESTERN WAY WAREHOUSING & TRUCKING, San Leandro, CA
WESN	WESTON TRUCKING, Weston Trucking Company, d/b/a, Encinitas, CA
WSWE	WESTWAY EXPRESS, INC., Hayward, CA
WETW	WESTWAY TRANSPORTATION CO., William J., William H. Chambers, d/b/a, Camarillo, CA
WEXO	WESTWIND EXPRESS COURIER, Westwind Express, Inc., d/b/a, Westlake Village, CA
WLRF	WHEELER FREIGHTWAYS, Las Vegas, NV
WHLO	WHEELER TRUCKING, John R. Wheeler, d/b/a, Brentwood, CA
WWTO	WHIRLWIND TRUCKING CO., Woodland Hills, CA
WTFD	WHITFIELD TRUCKING, Edward L. Whitfield, d/b/a, San Lorenzo, CA
WTTT	WHITTIER TRANSFER & STORAGE CO., INC., Whittier, CA
WLBN	WILBURN TRUCKING CO., Ralph A. Wilburn, d/b/a, Modesto, CA
WIKS	WILKEY & SONS TRUCKING, Henry C. Wilkey, d/b/a, Lakewood, CA
WKDC	WILKINS DRAYING CO., Reliable Crane and Rigging, Inc., d/b/a, Petaluma, CA
WLMS	WILLIAMS TRANSPORTATION, INC., Los Angeles, CA
WLMD	WILLIAMS, EDWARD E., Clovis, CA
WDNE	WILLIAMSON, DON E., Campbell, CA
WMRK	WILLIAMSON, RICK E., San Jose, CA
WLIG	WILLIG FREIGHT LINES, San Francisco, CA
WSKL	WILLIS TRUCK LINES, INC., Martinez, CA
WOTO	WILLIS, O. L., Martinez, CA
WLFQ	WILLS FREIGHT LINE, INC., Oakland, CA
WIBA	WILMINGTON BOAT MOVERS & STORAGE, Long Beach, CA
WTGC	WILSON TRUCKING COMPANY, San Francisco, CA
WKTR	WILSON, KENT, TRUCKING, Sacramento, CA
WRUS	WILSON, RUSS, TRUCKING, INC., Talmage, CA
WLWI	WILSON, WALT, TRUCKING, INC., Petaluma, CA
WCMQ	WINEGAR, C. M., TRUCKING COMPANY, Bell, CA
WIDV	WINTER, DAVID, TRUCKING, Tracy, CA
WMBT	WMB TRANSPORTATION, Colton, CA
WFTQ	WOLF TRUCKING COMPANY, Long Beach, CA
WVNT	WOLVERTON TRUCKING, INC., Anderson, CA
WONG	WONG, ED, TRUCKING CO., Edward F. Wong, d/b/a, Monterey Park, CA
WOPR	WOOD PRODUCTS TRANSPORTATION, Lloyd Dunkin, d/b/a, Palo Cedro, CA
WOOD	WOODEN VALLEY WINERY, Lena Mae Lanza, d/b/a, Suisun, CA
WOOT	WOODLAND TRUCK LINE, INC., Woodland, WA
WODW	WOODS, W. A., INDUSTRIES, INC., South Gate, CA
WLYP	WOOLLEY TRANSPORTATION, Ukiah, CA
WLDM	WORLD MOVERS, INC., San Leandro, CA
WGHJ	WRIGHT, JAMES L., Hayward, CA
WGWM	WRIGHT, WILLIAM M., Covina, CA
WVLT	WVL TRANSPORTATION, South San Francisco, CA
WYRC	WYROC, INC., Vista, CA
XPTG	XPRESS TRUCKING, Paul C. James, d/b/a, Anaheim, CA
YAMK	YAMKO TRUCK LINES, Robert Nako Enterprises, Inc., d/b/a, Montebello, CA
YBOR	YBANEZ ORCHARDS, INC., Chico, CA
YCCI	YEAGER, E. L., CONSTRUCTION CO., INC., Riverside, CA
YFSY	YELLOW FREIGHT SYSTEM, INC., Shawnee Mission, KS

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

CALIFORNIA CARRIERS — (Continued)
(Operating under jurisdiction of California Public Utilities Commission)

Carrier "Alpha" Code	
YNGC	YOUNG'S COMMERCIAL TRANSFER, INC., Porterville, CA
YUBA	YUBA TRUCKING, INC., Marysville, CA
ZTRK	'Z' TRUCKING CO., INC., Ventura, CA
ZLJT	ZAMUDIO, LOUIS, J., TRUCKING COMPANY, Louis J. Zamudio, d/b/a, Los Angeles, CA
ZENH	ZENITH TRANSPORTATION, INC., Hayward, CA
ZWST	ZERO WASTE SYSTEMS, INC., Oakland, CA
ZMMN	ZIMMERMAN, CHARLES EDWARD, Canyon Country, CA
ZIMJ	ZIMMERMAN, JESS A., Healdsburg, CA
ZIPQ	ZIP TRUCKING CO., F.F.G., Corp., d/b/a, Fontana, CA
ZISK	ZISK TRUCKING, Roseville, CA

COLORADO CARRIERS
(Operating under jurisdiction of Public Utilities Commission of Colorado)

ANAQ	A & A TRUCK LINES, INC., Colorado Springs, CO
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ACKL	ACKLEY TRUCK LINE, INC., Commerce City, CO
ACME	ACME DELIVERY SERVICE, INC., Denver, CO
AWTH	ALL WAYS TRUCKING, INC., Denver, CO
AMTA	AMERICAN TRANSFER & STORAGE, INC., R. L. Kinney & Company, d/b/a, Denver, CO
AMWQ	AMERICAN WAREHOUSE CO., INC., Denver, CO
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
APPL	APPLE LINES, INC., Madison, SD
AROK	ARROW TRUCKING CO., Tulsa, OK
ARVA	ARVADA TRANSFER CO., Johnstown, CO
ASMA	ASAMERA PETROLEUM CORPORATION, Denver, CO
APSP	ASPEN SEPTIC, INC., Conifer, CO
ALNR	ATLANTIC NORTH AMERICAN, Aurora, CO
BTKA	B T TRUCKING COMPANY, Colorado Springs, CO
BNTQ	BARNETT COMPANY, Allied Trades, Inc., d/b/a, Denver, CO
BTIL	BASIN TRANSPORTATION, INC., Roosevelt, UT
BKRA	BECKER CORPORATION, El Dorado, KS
BRTA	BERTA BROS. TRANSPORTATION, INC., Penrose, CO
BRFE	BEST REFRIGERATED EXPRESS, INC., Denver, CO
BTKE	BETHKE TRUCK LINES, Frederic A. Bethke, d/b/a, Gilcrest, CO
BLHI	BLACK HILLS TRUCKING, INC., Casper, WY
BDTL	BOULDER-DENVER TRUCK LINE, INC., Overland Motor Express, Inc., d/b/a, Boulder, CO
BODR	BOULDER VALLEY TRANSFER, INC., Lynx Corporation, d/b/a, Boulder, CO
BOWS	BOWERS TRANSFER & STORAGE, Mer-Buz Corp., d/b/a, Denver, CO
BFNK	BREIDENBACH, FRANK, TRUCKING, INC., Iliff, CO
BUEA	BUEHLER MOVING & STORAGE CO., Denver, CO
BJTC	BUNNING, JOHN, TRANSFER CO., INC., Franch Transportation Co., Inc., d/b/a, Rock Springs, WY
CAHR	CACHE ENTERPRISES, INC., Denver, CO
CFDQ	CANFIELD DRILLING CO., Ft. Morgan, CO
CSTL	CASTLE ROCK TRANSFER, INC., Castle Rock, CO
CLTL	CLARK, BILL, TRUCK LINE, INC., Alamosa, CO
CMAA	CMA DELIVERY SERVICE, Charles M. Ask, d/b/a, Denver, CO
COLO	COLORADO ALL STATE TRANSPORTATION, South Park Motor Lines, Inc., d/b/a, Denver, CO
COEP	COLORADO MOTOR EXPRESS, Wheat Ridge, CO
CODI	COLORADO-DENVER/WAREHOUSE-DELIVERY, INC., Denver, CO
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
CMAT	CONSTRUCTION MATERIALS TRANSPORT, INC., Grand Junction, CO
CRSP	COORS TRANSPORTATION COMPANY, Wheat Ridge, CO
CTLI	CORMAN TRUCKS, INC., Burlington, CO
CRNE	CORNELIUS TRANSFER & STORAGE CO., Lamar, CO
CCGH	CORNELL CARTAGE COMPANY, Denver, CO
COWQ	COWBOY TRANSFER & STORAGE, INC., Cowboy Trash Disposal System, Inc., d/b/a, Englewood, CO
COWE	COWEN TRANSFER & STORAGE COMPANY, Colorado Springs, CO
CWNS	COWEN TRANSPORTATION CO., Colorado Springs, CO
CDCI	CRAIG'S DISTRIBUTION AND CONSOLIDATION CO., AAA Warehouse, Inc., d/b/a, Denver, CO
CIDI	CRAIG-IMPERIAL DISTRIBUTION CO., Denver, CO
CRET	CRESTED BUTTE TRUCK LINE, John E. Cobal, d/b/a, Crested Butte, CO
CUSD	CUSTOM DELIVERIES, INC., Birmingham, MI
DDTH	D & D TRUCKING, INC., Lakewood, CO
DAEM	D & E MAIL CONTRACTORS, INC., Canon City, CO
DLBO	DALBO, Robert H. Williams, d/b/a, Vernal, UT
DEFJ	DeFOREST, J. M., INC., Brawley, CA
DNFW	DENVER FREIGHTWAYS, INC., Denver, CO
DEVE	DENVER MOVING & STORAGE, INC., Denver, CO
DSLF	DENVER-SALIDA-LEADVILLE FREIGHTLINE, INC., Denver, CO
DOCD	DOCTOR'S DELIVERY SERVICE, Rod MacDonald, d/b/a, Aurora, CO

PARTICIPATING INTRASTATE CARRIERS — Continued

COLORADO CARRIERS — (Continued)
(Operating under jurisdiction of Public Utilities Commission of Colorado)

Carrier "Alpha" Code	
DUGE	DUGGAN, ED, INC., Windsor, CO
DTFQ	DURANGO TRANSFER & STORAGE, Durango, CO
ERTK	E&R TRUCKING, INC., Duane D. Zabka, Inc., d/b/a, Henderson, CO
EAPE	EASTERN PLAINS EXPRESS, Murray A. Pierce and Charles R. Wranosky, d/b/a, Commerce City, CO
EKRT	ECKERT TRUCK LINE, William E. Wells, Jr., d/b/a, Cedaredge, CO
EDSN	EDSON EXPRESS, INC., Commerce City, CO
ELBR	ELBERT TRANSFER CO., Colorado Springs, CO
EPEP	EMPIRE EXPRESS, INC., Denver, CO
EVFS	EVEREADY FREIGHT SERVICE, INC., Buena Vista, CO
EVFL	EVERGREEN FREIGHT LINE, Murray A. Pierce and Charles R. Wranosky, d/b/a, Commerce City, CO
FTTA	FATTOR TRANSPORTATION COMPANY, Glenwood Springs, CO
FLIQ	FLINT ENGINEERING & CONSTRUCTION CO., Billings, MT
FXTK	FOX TRUCKING COMPANY, INC., Denver, CO
FCTF	FRITCHLEY'S TRANSFER, Lakewood, CO
GNGO	G & G TRUCKING CO., INC., Alamosa, CO
GNLP	G & L TRANSPORT CO., Gary L. Dinger, d/b/a, Byers, CO
GITL	GIBSON TRUCK LINES, INC., La Jara, CO
GLOB	GLOBE TRANSPORTATION CO., Denver, CO
GLOT	GLOBE TRUCK LINES, INC., Denver, CO
GOLT	GOLDEN TRANSFER CO., Longmont, CO
GRTT	GROENDYKE TRANSPORT, INC., Enid, OK
GNTN	GUNNISON TRUCKING, INC., Gunnison, CO
HVTR	H V H TRANSPORTATION, INC., Denver, CO
HATC	HATCH, W. S., CO., Woods Cross, UT
HWHB	HAWKS, HARRY B., Montrose, CO
HAWO	HAWKS, MILT, & SON, INC., Montrose, CO
HRRQ	HOPSON, ROBERT R., Colorado Springs, CO
HUCR	HUNT, CHRIS, WATER HAULING CONTRACTOR, INC., Keyes, OK
IDEL	IDEAL TRUCK LINES, INC., Norton, KS
IMDB	IMPERIAL DISTRIBUTION SERVICES, INC., Denver, CO
JGTK	J. C. TRUCKING, INC., Denver, CO
JACC	JACKSON CARTAGE CO., Alfred R. Jackson, d/b/a, Lamar, CO
JKCC	JACKSON CARTAGE, INC., Denver, CO
JSNQ	JACKSON TRUCKING CO., Elinor L. Pope and Alfred R. Jackson, d/b/a, Lamar, CO
JEFF	JEFFRIES, H. J., TRUCK LINE, INC., Carlisle, PA
JMWS	JIM'S WATER SERVICE OF COLORADO, INC., Brighton, CO
JOTM	JOE'S TRUCKING, Colorado Springs, CO
KSDS	K & S DELIVERY SERVICE, Colorado Springs, CO
KCDT	K.C.D. TRANSPORT, Hiran R. Trim, d/b/a, Colorado Springs, CO
KANG	KANGAROO EXPRESS, INC./KANGAROO PACKAGING SERVICE, INC., Kangaroo Pickup & Delivery Service, Inc., d/b/a, Durango, CO
KTNC	KELLY TRUCKING & CRANE SERVICE, INC., Pueblo, CO
KNCG	KINSELLA CARTAGE, INC., Commerce City, CO
KLIN	KLEIN, FRANK C., & CO., INC., Denver, CO
KHSI	KOCH SERVICE, INC., Wichita, KS
KUZR	KURTZER, KENNETH, Haxtun, CO
LRTQ	LARSEN TRANSFER & STORAGE CO., Denver, CO
LEGO	LESCO TRUCKING COMPANY, INC., Dallas, TX
LILF	LILLY TRANSFER & MOVING COMPANY, Colorado Springs, CO
LTMQ	LITTON MOVING & STORAGE COMPANY, Grand Junction, CO
LDRC	LOADER CONSTRUCTION, Penrose, CO
LOGE	LOGEX OF COLORADO, Logistics Express, Inc., d/b/a, Anaheim, CA
MGTJ	M & G TRANSFER, Gary L. McCallister and Monte A. McCallister, d/b/a, Rock Springs, WY
MSIS	MACSISS DELIVERY, Manuel Jiron, d/b/a, Denver, CO
MTLK	MATLACK, INC., Wilmington, DE
MGLQ	McGILTON TRUCK LINE, Paul McGilton, d/b/a, Craig, CO
MKIN	McKINLEY TRUCKING CO., Philip E. McKinley and Diane L. McKinley, d/b/a, Grover, CO
MCVT	McVAY BROTHERS TRANSFER, INC., Denver, CO
MDLV	METRO DELIVERY SERVICE, Terrill M. Rogers and Jane M. Lee, d/b/a, Colorado Springs, CO
MLBR	MILLER BROS., Denver, CO
MJTL	MILLIKEN JOHNSTOWN TRUCK LINE, INC., Johnstown, CO
MFTC	MONFORT TRANSPORTATION COMPANY, Greeley, CO
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
MNFQ	MONTROSE TRANSFER & STORAGE, Montrose, CO
MSOQ	MUSSO TRUCKS, INC., Pueblo, CO
NSGS	NATIONAL STORAGE SYSTEMS, INC., Spencer, WI
NJMT	NEALY, JAMES M., TRUCKING CO., Greeley, CO
NAFS	NEWS & F&M SERVICE, INC., Denver, CO
NIFS	NICHOLS FLUID SERVICE, INC., Liberal, KS
NCOL	NICOLL WAREHOUSING CO., INC., Colorado Springs, CO
NOAM	NORTH AMERICAN VAN LINES, INC., Fort Wayne, IN
NEMR	NORTH EASTERN MOTOR FREIGHT, INC., Denver, CO

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

Carrier "Alpha" Code	COLORADO CARRIERS — (Continued) (Operating under jurisdiction of Public Utilities Commission of Colorado)
NOPK	NORTH PARK TRANSPORTATION CO., Denver, CO
NCOM	NORTHERN COLORADO MOVING & STORAGE CO., Fort Collins, CO
NWTP	NORTHWEST TRANSPORT SERVICE, INC., Commerce City, CO
OFEN	OFFEN, INC., Commerce City, CO
PAOI	PALMER OIL CO., INC., Lamar, CO
PADE	PAR DELIVERY SERVICE, INC., Englewood, CO
PEBH	PEBBLE HAULERS, INC., Colorado Springs, CO
PERH	PERRY TRANSFER & STORAGE CO., Bry & Co., Inc., d/b/a, Denver, CO
PECN	PETCO, INC., INTERSTATE, Commerce City, CO
PTLQ	PIERCE TRUCK LINE, Wilbur J. and Bettie Jean Pierce, d/b/a, Jefferson, CO
PLTQ	PLATTE VALLEY FREIGHTWAYS, INC., Sterling, CO
PECC	PONY EXPRESS COURIER CORPORATION, Charlotte, NC
PEPE	PONY EXPRESS PETROLEUM, INC., Fort Collins, CO
PURL	PUROLATOR COURIER CORP., U.S. COURIER DIVISION, Basking Ridge, NJ
QUNQ	QUEEN CITY TRANSFER, INC., Denver, CO
RKTQ	R & K TRUCKING, INC., Limon, CO
RPTR	R P TRUCKING, Ronald R. Payne, d/b/a, Commerce City, CO
RACP	RAC TRANSPORT COMPANY, INC., Denver, CO
RAFG	RETRIEVER AIR FREIGHT, Grand Junction, CO
RKTA	RICK'S TRANSFER, INC., Aurora, CO
ROBM	ROBINSON TRANSPORTATION, INC., Denver, CO
RUAN	RUAN TRANSPORT CORPORATION, Des Moines, IA
SPDT	S P D TRUCK LINE, INC., Abilene, KS
SKTQ	SCHOCK TRANSFER AND WAREHOUSE CO., INC., Denver, CO
SCOQ	SCHOLL OIL & TRANSPORTATION CO., Holyoke, CO
SMSY	SECURITY MOVING & STORAGE COMPANY, Colorado Springs, CO
SWLR	SHOWALTER AGRICULTURAL CENTER, INC., Law Motor Lines, Inc., d/b/a, Swink, CO
SVPI	SILVER PLUME INTERMOUNTAIN TRANSIT, Randal L. and Mary C. Dobyns, d/b/a, Silver Plume, CO
SJYT	SMITH, JERRY, TRUCKING, Jerry Smith, d/b/a, Yuma, CO
SORN	SORENSON TRUCK SERVICE, INC., Longmont, CO
SVMQ	ST. VRAIN MOVING & STORAGE, INC., Longmont, CO
SMFQ	STAR MOTOR FREIGHT LINES, INC., Colorado Springs, CO
SMMK	SUMMIT TRANSFER, INC., The Krista Corp., d/b/a, Leadville, CO
SFNQ	SWIFT TRUCK LINE, Ralph Swift, d/b/a, Walden, CO
TGTV	TARGET TRUCKING CO., INC., Vernal, UT
THTD	THOMAS TRANSFER, INC., Denver, CO
TSDS	THOMPSON, DENNIS L., TRUCKING, INC., Commerce City, CO
TIPD	TIP TOP DELIVERY, Anthony R. Jiron, d/b/a, Lakewood, CO
TMMQ	TRAMMELL CROW DISTRIBUTION CORPORATION OF DENVER, Denver, CO
TWEL	TRANS-WESTERN EXPRESS, LTD., Denver, CO
TRFQ	TRIANGLE FREIGHT CO., Springfield, CO
TDAD	TRINIDAD FREIGHT SERVICE, Joe Costa, Jr., d/b/a, Trinidad, CO
USCC	U.S. CARGO CORPORARION, Denver, CO
UPSS	UNITED PARCEL SERVICE, INC. (An Ohio Corporation), St. Charles, IL
VYTQ	V-Y TRUCK LINE, INC., Crook, CO
VLEY	VALLEY TRANSFER, Claude A. Baker, d/b/a, Steamboat Springs, CO
VARA	VARRA COMPANIES, INC., Broomfield, CO
WRDT	WARD TRANSPORT, INC., Denver, CO
WBFL	WATSON, BILL, FREIGHT LINE, James G. Watson and Marsha B. Watson, d/b/a, Estes Park, CO
WEIC	WEICKER MOVING & STORAGE CO., Walt Wilson, Inc., d/b/a, Denver, CO
WENP	WERNER ENTERPRISES, INC., Omaha, NE
WSED	WEST 8 DELIVERY SERVICE, INC., Denver, CO
WEEP	WEST END EXPRESS, Richard L. Starks, Jr. and Phyllis Starks, d/b/a, Naturita, CO
WSKQ	WESTERKAMP EXPRESS, Bernard Westerkamp, d/b/a, Denver, CO
WOIL	WESTERN OIL TRANSPORTATION CO., INC., The Permian Corporation, d/b/a, Houston, TX
WTPB	WESTERN TRANSPORTATION, INC., Lamar, CO
WMFR	WESTWAY MOTOR FREIGHT, INC., Commerce City, CO
WTGQ	WHITT TRANSFER & STORAGE CO., INC., Pueblo West, CO
WMRC	WILLIAMS R. C., INC., Russell, KS
WRMV	WRAYCO MOVING & STORAGE, INC., Wrayco Enterprises, Inc., d/b/a, Greeley, CO
WRWT	WRIGHT WAY TRUCKING, INC., Cortez, CO
YERI	YEAROUS TRUCKING, INC., Ft. Morgan, CO
YERQ	YEAROUS, W. WAYNE, JR., Fort Morgan, CO

	FLORIDA CARRIERS (Operating under jurisdiction of Florida Public Service Commission)
BUCI	BUCCANEER MOVING & STORAGE, INC., Fernandina Beach, FL
CETK	CHEMICAL TANK LINES, INC., Mulberry, FL
FLRT	FLORIDA ROCK & TANK LINES, INC., Jacksonville, FL
GATF	GATOR FREIGHTWAYS, Starke, FL
MCKE	McKENZIE TANK LINES, INC., Tallahassee, FL
REDC	REDWING CARRIERS, INC., Tampa, FL

PARTICIPATING INTRASTATE CARRIERS — Continued

GEORGIA CARRIERS
(Operating under Jurisdiction of Georgia Public Service Commission)

@Carrier "Alpha" Code	
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
BOWM	BOWMAN TRANSPORTATION, INC., Atlanta, GA
BYDP	BOYD TRANSPORT CO., INC., Dalton, GA
CEDA	CEDARTOWN-ATLANTA FREIGHT LINES, INC., Cedartown, GA
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
DSIT	DSI TRANSPORTS, INC., Deer Park, TX
GASR	GEORGIA SOUTHERN TRANSPORTATION, INC., Cartersville, GA
GMLS	GREENWOOD MOTOR LINES, INC., Greenwood, SC
HOME	HOME TRANSPORTATION COMPANY, INC., Marietta, GA
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
MAND	MANFREDI MOTOR TRANSIT CO., THE, Newbury, OH
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS
ODFL	OLD DOMINION FREIGHT LINE, INC., High Point, NC
OYNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
SNBO	SCHNEIDER NATIONAL BULK CARRIERS, INC., Green Bay, WI
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC

IDAHO CARRIERS
(Operating under Jurisdiction of Idaho Public Utilities Commission)

ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
AROT	ARROW TRANSPORTATION COMPANY, Arrow Transportation Company of Delaware, *d/b/a*, Portland, OR
ASHT	ASHWORTH TRANSFER, INC., Salt Lake City, UT
BCTO	BCT, INC., Boise, ID
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
HATC	HATCH, W. S., CO., Woods Cross, UT
SMSN	SAMSON TRUCK LINE, Richard L. Edgar, *d/b/a*, Mountain Home, ID
SWTH	SAWTOOTH FREIGHT LINES, INC., Salt Lake City, UT
SRUM	SPECIAL RESOURCE MANAGEMENT TRANSPORT, Billings, MT
STMF	STAR MOTOR FREIGHT, INC., Lewiston, ID
SUCR	SUPERIOR CARTAGE OF OREGON, INC., Portland, OR

ILLINOIS CARRIERS
(Operating under Jurisdiction of Illinois Commerce Commission)

AASI	A & A SPECIAL DELIVERY, Adelbert Vincent Styczynski, *d/b/a*, Chicago, IL
ABFL	A & B FREIGHT LINE, INC., Rockford, IL
ANJQ	A & J CARTAGE, INC. (A Wisconsin Corporation), Franklin, WI
AAMC	A & M CARTAGE OF TINLEY PARK, INC., Tinley Park, IL
AARM	A & R MOTOR SERVICE, INC., Cicero, IL
ANRI	A & R TRANSPORT, INC., Ottawa, IL
ANTG	A & T TRUCKING CO., Bensenville, IL
ABRQ	A B C RAPID DELIVERY, INC., Belvidere, IL
AFTH	A F TRUCKING, Michael E. Fitzgibbons, *d/b/a*, Jerseyville, IL
ANOE	A NO. 1 EXPRESS & CARTAGE CO., INC., Bridgeview, IL
ACDD	A-C DISTRIBUTING CO., Springfield, IL
AJDQ	A. J. D. CARTAGE, Armand Dumont, *d/b/a*, Fox River Grove, IL
ASMC	A.B.C. STORAGE & MOVING CO., Chicago, IL
AIPN	A.I.P. TRUCKING, INC., Schiller Park, IL
AMWT	A.M.A. WAREHOUSING AND TRANSPORTATION, INC., Franklin Park, IL
AMMV	A.M.S. MOTOR SERVICE, INC., South Holland, IL
ASOP	A.S.A.P. SERVICES, INC., Palatine, IL
ASMR	A.S.M.R. DELIVERY SERVICE, Peter J. Cleary, *d/b/a*, Des Plaines, IL
ALPQ	AAA LOOP OFFICE FURNITURE MOVERS AND CHICAGOLAND TURTLE EXPRESS, Statland Cartage Co., *d/b/a*, Chicago, IL
APLO	AABLE PALLET COMPANY, INCORPORATED, Chicago, IL
ABEQ	ABEL FREIGHT LINES, INC., Aurora, IL
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ABFO	ABLE FUEL OIL, INC., Markham, IL
ABDS	ABOVE DELIVERY SERVICE, INC., Villa Park, IL
ACKI	ACKERS INDUSTRIES, INC., Orland Park, IL
AMFS	ACME MOTOR FREIGHT SERVICE, INC., Chicago, IL
APDQ	ACME PARCEL DELIVERY SERVICE, INC., Berwyn, IL
ACVS	ACTIVE SEPTIC CO., Verne L. Barnes, *d/b/a*, Carol Stream, IL
ADFA	ADAMS FARMS, James F. Adams, *d/b/a*, Bloomington, IL
ADCE	ADCOM EXPRESS, INC., Tinley Park, IL
ADCF	ADCOR, INC., Melrose Park, IL
ADEF	ADE FARMS, James E. Ade and Rick Ade, *d/b/a*, Pana, IL
ADMH	ADM TRUCKING, INC., Decatur, IL
AMMF	ADMIRAL-MERCHANTS MOTOR FREIGHT, INC., Minneapolis, MN
APUS	ADVANCE PICK-UP SERVICE, INC., Chicago, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
(Operating under jurisdiction of Illinois Commerce Commission)

@Carrier "Alpha" Code	
ADTC	ADVANCE TRANSPORTATION COMPANY (An Illinois Corp.), Milwaukee, WI
AVMS	ADVANCED MESSENGER SERVICE, INC., Chicago, IL
ADRV	ADVOCATE SERVICES, INC., Butler, PA
AROL	AERO LIQUID TRANSIT, INC., Lowell, MI
AERO	AERO TRUCKING, INC., Dover, DE
AERL	AERO-LINE TRANSIT, INC., Chicago, IL
AEES	AERONAUTICS EXPRESS OF ILLINOIS, INC., Elk Grove Village, IL
AFTO	AFFETTO, LEWIS A., CARTAGE, INC., Chicago, IL
AGMO	AGEE MOTOR FREIGHT, INC., Aurora, IL
AGCG	AGGREGATE CARTAGE, Jack R. Deschauer, d/b/a, Lake Zurich, IL
AGPR	AGPRO, INC., Woodsung, IL
AGTS	AGRI-TECH SERVICE, INC., Goodaine, IL
AGTO	AGRUTTO CARTAGE, INC., Arlington Heights, IL
AIMI	AIM CARTAGE & LEASING, INC., Chicago, IL
ARXS	AIR EXPRESS INTERNATIONAL USA, INC., Darien, CT
ALVP	AIR-LAND TRANSPORT SERVICE, INC., Morton, IL
ASIO	AIRSPED, INC., Chicago, IL
ATKP	AITKEN TRUCKING, Ray Aitken, d/b/a, Paris, IL
AJXT	AJAX TRUCKING CO., INC., Chicago, IL
AKSI	AKRON SERVICES, INC., Edelstein, IL
ALUD	AL'S UPTOWN DELIVERY, Phillip A. Anselmini, d/b/a, Chicago, IL
ABGR	ALBRECHT GRAIN COMPANY, Harmon, IL
ABRV	ALBRECHT, VICTOR, Worden, IL
ACCY	ALERT CARTAGE CO., INC., Alsip, IL
ATUG	ALEXANDRIA TRUCKING & UNDERGROUND CONSTRUCTION CO., INC., Glendale Heights, IL
ALLC	ALL TRUCK TRANSPORTATION CO., Bridgeview, IL
AGII	ALLEGIANCE INDUSTRIES, INC., Rolling Meadows, IL
ALGL	ALLEGRO LIMOUSINE SERVICE, Daniel Schultz, d/b/a, Dolton, IL
ALDL	ALLENDALE GRAVEL CO., James E. Litherland, d/b/a, Allendale, IL
ALLD	ALLIED DELIVERY SYSTEM, INC., Detroit, MI
AJHT	ALLS, JOHN, TRUCKING, John W. Alls, d/b/a, Erie, IL
ALMD	ALMOND FREIGHT LINE, INC., Rockford, IL
ALHA	ALOHA FREIGHTWAYS, INC., Addison, IL
ALTE	ALTIER TRUCKING COMPANY, Daniel Altier, d/b/a, Chicago, IL
ATOI	ALTOM TRANSPORT, INC., Chicago, IL
ALON	ALTON CARTAGE, INC., South Roxana, IL
ABLJ	AMBLER, JAMES W., Mendota, IL
ABNC	AMERICAN BUSINESS COURIER, INC. (An Illinois Corporation), Oak Forest, IL
ACRL	AMERICAN CENTRAL TRANSPORT, INC., Liberty, MO
AFSI	AMERICAN FREIGHT SYSTEM, INC., Overland Park, KS
AHCQ	AMERICAN HIGHWAY CARRIERS, INC., Hammond, IN
AMMD	AMERICAN MOTOR DISPATCH, INC., Hickory Hills, IL
AMOL	AMOCO OIL COMPANY, Chicago, IL
AMOQ	AMSCO, INC., Niles, IL
AMGB	ANDERSON & MANDLE GRAIN CO., Milan, IL
ADFM	ANDERSON FARM SERVICE, INC., Newark, IL
ANET	ANDERSON TRUCKING, Albert Anderson and Albert B. Anderson, d/b/a, Lexington, IL
ACOC	ANDERSON, A., COURIER & TRANSPORTATION SERVICE, INC., Schaumburg, IL
ADAQ	ANDERSON, ART, TRUCKING, INC., Oakford, IL
AGRE	ANDERSON, GERALD E., Aurora, IL
AJMT	ANDERSON, JIM, TRUCKING, INC., Geneseo, IL
ANRE	ANDERSON, ROBERT, JR., Decatur, IL
AWRC	ANDERSON, W. R., CO., Maywood, IL
ANWK	ANDERSON, WARREN, AND KELVIN ANDERSON, Tampico, IL
ANWM	ANDERSON, WILLIAM D., William D. Anderson, David D. Anderson and Edward K. Anderson, d/b/a, Towanda, IL
AAGH	ANDOC AG SERVICES, INC., Orion, IL
ADCN	ANDRICH, D., CARTAGE, INC., Chicago, IL
AJOQ	ANJO'S MOTOR SERVICE, INC., Orland Park, IL
ANKT	ANKER TRUCKING, INC., Lynwood, IL
ANNC	ANNIE CARTAGE, INC., Chicago, IL
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
ANWL	ANTHONY, WILLIAM, Greenville, IL
APMV	APEX MOVING & STORAGE CO., Rockford, IL
APIS	APOLIS TRANSPORT, INC., Peotone, CA
APMD	APOLLO MESSENGER & DELIVERY SERVICE, Harry C. and Judy J. Patel, d/b/a, Schaumburg, IL
APPA	APPERSON, ANDY, & SONS, Paxton, IL
ATFY	ARAN TRANSFER, INC., Palos Park, IL
ACUC	ARCURI CARTAGE, Jennie Rose Roselli, d/b/a, Schaumburg, IL
ARDJ	ARD TRUCKING, Ted Ard, d/b/a, Hindsboro, IL
ATRO	AREA TRANSPORTATION CO., Harvey, IL
ATSY	ARIES TRANSPORTATION SYSTEM, INC., Spring Valley, IL

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
(Operating under jurisdiction of Illinois Commerce Commission)

Carrier "Alpha" Code	
ARLI	ARLINGTON TRUCKING COMPANY, an Illinois Corporation, Westmont, IL
ARUR	ARMBRUSTER, STEVEN L., Byron, IL
ARDV	ARMSTRONG, DAVID, AND PAUL ARMSTRONG, Jacksonville, IL
ARJH	ARMSTRONG, JOHN, Chicago, IL
ARMP	ARMSTRONG, MERVYN E., Lyndon, IL
AMRJ	ARMSTRONG, R. J., Eureka, IL
ASWA	ARMSTRONG, WILLIAM A., Hettick, IL
ANMR	ARNE, MORRIS, Malta, IL
AGKQ	ARNOLD, GERALD K., Elizabeth, IL
ACGC	ARROW CARTAGE AND CRATING, INC., Franklin Park, IL
AFMO	ARROW FUEL & MOTOR SERVICE, INC., Chicago, IL
AILO	ARROW-ILLINOIS COMPANY, Chicago, IL
ANCY	ARTIS & CLAYTON, Ted Artis and Eugene Clayton, d/b/a, Camden, IL
ASLO	ASALCO CORP., Chicago, IL
ABRC	ASBRAND, CHRISTIAN C., Peotone, IL
ASFR	ASCHE TRANSFER, INC., Shannon, IL
ASEG	ASHPOLE, C. EUGENE, Morrison, IL
ASUQ	ASHUM MOTOR EXPRESS, INC., Orland Park, IL
ASTD	ASSOCIATED TRANSFER & STORAGE, INC., Champaign, IL
ASTO	ASTRO TRUCKING, INC., Hoffman Estates, IL
ATOS	AT-ONCE DELIVERY SYSTEM, INCORPORATED, Glenview, IL
ASVC	ATHERTON SERVICE, INC., Thomson, IL
ATIP	ATICO TRANSPORT, INC., Chicago, IL
AUAE	AURORA AREA EXPRESS, Loran Yoakum d/b/a, Aurora, IL
AUFF	AURORA FAST FREIGHT, INC., Aurora, IL
AUSA	AUSTIN, ALAN, Maquon, IL
AUTE	AUTO EXPRESS & TRANSFER CO., East St. Louis, IL
AVRQ	AVERY TRANSPORTATION COMPANY, Richmond, IL
AVDO	AVERY, DONALD, Donald R. Avery, d/b/a, Mendota, IL
AVRR	AVERY, ROBERT, F. Robert Avery, d/b/a, Mendota, IL
BNBM	B & B MOBILE HOMES SERVICE, INC., Decatur, IL
BBTI	B & B TANK TRUCK & CONSTRUCTION, INC., Norris City, IL
BAEI	B & E CARTAGE, INC., Lockport, IL
BHFS	B & H OIL FIELD SERVICE, INC., Robinson, IL
BJDY	B & J DELIVERY, Bart Volante, d/b/a, Palos Park, IL
BANK	B & K TRANSPORTS, INC., Harvard, IL
BSTP	B & S TRUCKING, David Ballegeer and Timothy Schneider, d/b/a, Colona, IL
BNVT	B & V TRUCKING, Valarie Linton, d/b/a, Chicago, IL
BAWC	B & W CARTAGE, INC., Detroit, MI
BJER	B-J EXPRESS, Robert F. Wilbus and Jacalyn Wilbus, d/b/a, Crystal Lake, IL
BCER	B. C. EXPRESS COMPANY, INC., Bloomingdale, IL
BFCQ	B. F. CARTAGE COMPANY, Chicago, IL
BITA	B. I. TRANSPORTATION, INC., Burlington, NC
BBGC	B.B. CARTAGE CO., INC., Lockport, IL
BABN	BABSON BROS. TRUCKING CO., Oak Brook, IL
BTJT	BACHMAN, TIM, JR., TRUCKING, Tilman L. Bachman, Jr., d/b/a, Roanoke, IL
BACT	BACON TRANSPORT COMPANY, Ardmore, OK
BAEH	BAEHR, JAMES, TRUCK SERVICE, James E. Baehr, d/b/a, New Baden, IL
BGLY	BAGLEY, D. LEE, Roseville, IL
BHLH	BAHLER BROS., Marvin H. Bahler, Ralph A. Bahler and Arthur S. Bahler, d/b/a, Fairbury, IL
BHLH	BAHLER, HARVEY, Fairbury, IL
BTAF	BAILEY TRANSFER CO., Quincy, IL
BATH	BAILEY TRANSIT, Donald E. Bailey, d/b/a, Flora, IL
BWAM	BAINTER, WAYNE, AND MARVIN BAINTER, Lewistown, IL
BKQE	BAKER EXCAVATING, Terry Baker, d/b/a, Benton, IL
BKRF	BAKER FARMS TRUCKING, David C. Baker, Carl Baker and Kenneth E. Baker, d/b/a, Maquon, IL
BMXQ	BAKER MOTOR EXPRESS, INC., Downers Grove, IL
BKFJ	BAKER TRUCKING, L. Charles Baker and Janet L. Payne, d/b/a, Sandoval, IL
BKDO	BAKER, DALE C., Downs, IL
BKGE	BAKER, GLENN E., Greenfield, IL
BLFH	BALENSIEFEN, HAROLD, Henry, IL
BGWJ	BALL, GERALD W., JR., Franklin, IL
BGRW	BALL, GERALD W., Murraysville, IL
BLBS	BALLARD BROTHERS TRUCKING, James H. Ballard, Lawrence K. Ballard and Daniel S. Ballard, d/b/a, White Hall, IL
BLLY	BALLY, RANDALL, Roanoke, IL
BTKP	BALSTER TRUCK SERVICE, INC., Petersburg, IL
BNND	BANNER COURIER, INC., Lombard, IL
BALY	BANTA, LYNN L., INC., Lowpoint, IL
BAFC	BARBARA, FRED, TRUCKING CO., Chicago, IL
BCLY	BARCLAY, DONALD P., Lewistown, IL
BKAB	BARKER, ALBERT, Davis, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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@Carrier "Alpha" Code	
BNRS	BARNARD'S SOIL SERVICE, Leon Barnard, d/b/a, Wayne City, IL
BJIT	BARNES, JIM, TRUCKING & EXCAVATING CO., Leonard James Barnes, d/b/a, Marseilles, IL
BANM	BARR & MILES, INC., Chicago, IL
BFSY	BARR FREIGHT SYSTEM, INC., Westmont, IL
BAEA	BARRERA TRUCKING, Benito G. Barrera, d/b/a, Grant Park, IL
BAPS	BARRETT'S PICK UP SERVICE, INC., Orland Park, IL
BJJO	BARRY, J. J., TRUCKING, INC., Streator, IL
BAJK	BARTISON TRUCKING, Denzil H. Bartison, d/b/a, Cerro Gordo, IL
BTBR	BARTON TRUCKING, INC., South Roxana, IL
BAPE	BASIN TRANSPORTS, Steven L. Pattillo and James R. Pattillo, d/b/a, St. Elmo, IL
BSSD	BASS, DON, TRUCKING, INC., Island Lake, IL
BTIG	BAT TRUCKING, INC., Bloomingdale, IL
BTDD	BATTEN, DAVID, Tampico, IL
BDJK	BAUDINO, JACK, Verona, IL
BAUF	BAUER FARMS, J. Freddy Bauer, d/b/a, Carrollton, IL
BACD	BAUER, CAROL I., Tuscola, IL
BBII	BBI, INC., Clarendon Hills, IL
BGTO	BGT, INC., Boise, ID
BMTC	BE-MAC TRANSPORT COMPANY, INC., St. Louis, MO
BCKI	BECK TRUCKING CO., INC., Chicago, IL
BKSS	BECKER & SONS TRUCKING, John C. Becker, Dana F. Becker and David Becker, d/b/a, Stanford, IL
BKEG	BECKER TRUCKING, INC., Cullom, IL
BKDG	BECKER, DEAN GORDON, San Jose, IL
BEKQ	BECKER, E. P., INC., Princeton, IL
BKLG	BECKER, LYLE G., Deland, IL
BDMS	BEDFORD MOTOR SERVICE, INC., Bedford Park, IL
BDGR	BEDINGER, JAMES E., AND BRENT C. BEDINGER, Catlin, IL
BLNM	BEE LINE TRUCKING COMPANY, INC., St. Louis, MO
BLMN	BEELMAN TRUCK CO. (A Delaware Corporation), St. Libory, IL
BMBC	BEEMSTERBOER CO., INC., Orland Park, IL
BEGJ	BEEMSTERBOER, GEORGE J., INC., South Holland, IL
BHRE	BEHRENDS, RONALD W., Mason City, IL
BEIB	BEIERMANN BROS., Gerald E. Beiermann & Roman C. Beiermann, d/b/a, Jerseyville, IL
BHMS	BELCHER MOVING & STORAGE, William F. Belcher, d/b/a, Alton, IL
BTGQ	BELL TRUCKING, Charles Straus Bell, d/b/a, Galva, IL
BEBD	BELL, BRAD, TRUCKING, INC., Roadhouse, IL
BLWY	BELL, WAYNE, Wayne E. Bell, d/b/a, Colusa, IL
BLFL	BELLFLOWER AG SERVICE, INC., Bloomington, IL
BLGL	BELLINGER, LLOYD A., Little York, IL
BEWD	BELWOOD MOTOR EXPRESS, Albert Ariola, d/b/a, Cicero, IL
BELE	BEN-LEE MOTOR SERVICE CO., Chicago, IL
BDUG	BEND, DOUG, TRUCKING, Douglas Robert Bend, d/b/a, Shabbona, IL
BDCA	BENDER, CHARLES A., Beason, IL
BNHR	BENESH, STEVE, & SONS, Steven G. Benesh and Timothy J. Benesh, d/b/a, Oregon, IL
BETI	BENNETT FARMS, Toby A. Bennett and Tim D. Bennett, d/b/a, Windsor, IL
BSSO	BENNY'S SERVICE STATION, Benny La Mantia, d/b/a, Downers Grove, IL
BNDJ	BENOIT, DONALD G., Kankakee, IL
BNDB	BENSON, DONALD B., Mazon, IL
BRGJ	BERG, JOHN, El Paso, IL
BTAM	BERGER TRANSFER & STORAGE, INC., St. Paul, MN
BGMT	BERGMAN TRUCKING CO., Vernon L. Bergman, d/b/a, Palatine, IL
BRGQ	BERGSCHNEIDER, L. E., TRUCK SERVICE, Betty L. Bergschneider, d/b/a, Harvel, IL
BNAJ	BERNA MOVING & STORAGE, INC., Elgin, IL
BRDI	BERNARD MOVERS, INC., Chicago, IL
BRRQ	BERRYMAN TRANSFER AND STORAGE COMPANY, INC., Joliet, IL
BSFC	BESSEN, FRANCIS C., Kinsman, IL
BMSC	BEST MESSENGER SERVICE, Sylvester Lyles & Delfa I. Lyles, d/b/a, Chicago, IL
BMES	BEST MESSENGER SERVICE, INC., Chicago, IL
BMON	BEST MOVERS, INC., Lake Zurich, IL
BTPQ	BEST TRANSPORT CO., INC., South Holland, IL
BEHR	BETCHER, CRAIG, TRUCKING, INC., Annawan, IL
BTAC	BETLEY, A., CARTAGE, INC., Crestwood, IL
BROE	BETLINSKI, RON, AND ED BETLINSKI, Harvard, IL
BHTA	BETTENHAUSEN TRANSPORT, INC., Tinley Park, IL
BHDR	BETTER HOME DELIVERIES, INC., Downers Grove, IL
BTSL	BETTIS, LARRY, Carlinville, IL
BEYR	BEYER CARTAGE CO., Hickory Hills, IL
BIFR	BIALAS FARMS, William G. Bialas, Lloyd H. A. Bialas and Herbert R. W. Bialas, d/b/a, Rochelle, IL
BINJ	BIG INJUN, INC., Casey, IL
BGSP	BIG S TRANSPORTS, INC., DuQuoin, IL
BIGE	BIGANE OIL COMPANY, Chicago, IL
BMEI	BIL-MAC EXPRESS, INC., Arlington Heights, IL

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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Carrier "Alpha" Code	
BIDE	BILDERBACK TRUCK SERVICE, J. G. Bilderback, d/b/a, Carthage, IL
BNSO	BILL AND SON'S CARTAGE CO., Chicago, IL
BIEQ	BILL'S CARTAGE, INC., Bedford, IL
BMIG	BILL'S MOVING & STORAGE, INC., Rock Island, IL
BILI	BILLINGSLEY, JOHNNY, Goreville, IL
BGOC	BINGO CARTAGE, Vito Benigno, d/b/a, Chicago, IL
BKGQ	BINKELE TRUCKING SERVICE, INC., East Peoria, IL
BOSV	BIONE TRUCK SERVICE, Ramon R. Bione, d/b/a, Christopher, IL
BMRE	BISHOP MOTOR EXPRESS, INC., Grand Rapids, MI
BPRS	BISHOP'S ROCK SERVICE, Robert C. Robinson, d/b/a, East Peoria, IL
BHCI	BLACK HORSE CARRIERS, INC., Barrington, IL
BLKB	BLACK TRANSFER, Ray C. Black, d/b/a, Colchester, IL
BKRD	BLACK, R. A., & SON TRUCKING, William F. Black, d/b/a, La Salle, IL
BLGD	BLACKERT, GORDON, Prophetstown, IL
BLCM	BLACKHAWK MOVING & STORAGE, INC., Sycamore, IL
BTXS	BLACKMON TRANSPORTATION SERVICES, INC., Crest Hill, IL
BPVQ	BLACKTOP PAVING OF JOLIET, INC., Joliet, IL
BKLQ	BLAKELY MOTOR CARTAGE, INC., Chicago, IL
BLJE	BLEICH, JERALD E., Rankin, IL
BVTD	BLEVINS TRUCKING, Dwayne Blevins, d/b/a, Davenport, IA
BLIK	BLICK'S TRUCK SERVICE, Carl J. Blickhan, d/b/a, Quincy, IL
BLGT	BLISS, PALMER, GENERAL TRUCKING, Palmer Bliss, d/b/a, Tremont, IL
BLMC	BLOMBERG TRUCKING COMPANY (an Illinois Corporation), Kinmundy, IL
BTMG	BLR TRUCKING, Larry Gillespie, Robert Ward and Russell Ward, d/b/a, Geneseo, IL
BLFS	BLUFF SPRINGS FARMERS ELEVATOR CO., Bluff Springs, IL
BLMH	BLUMHORST, R. H., TRUCK SERVICE, Ralph H. Blumhorst, d/b/a, Venedy, IL
BMDP	BMD TRUCKING, Matthew J. DeCap, d/b/a, Port Byron, IL
BBEK	BOBEK, ROMAN, Ingleside, IL
BORF	BOCHERS, FRED W., Davis Junction, IL
BOHE	BOCKLER, HAROLD E., Washington, IL
BDNB	BODNER BROS., Rose Bodner, d/b/a, Staunton, IL
BOEL	BOELK, R. H., TRUCK LINES, Ralph H. Boelk, d/b/a, Mendota, IL
BDFQ	BOESDORFER TRUCKING, INC., Pleasant Plains, IL
BOAS	BOLDUC & SONS, INC., Woodhull, IL
BOLR	BOLEN, ROBERT, Odell, IL
BLSQ	BOLES TRUCKING, INC., Ina, IL
BOLA	BOLLINGER-KERWIN, INC., Stonington, IL
BKYR	BONCOSKY TRANSPORTATION, INC., Algonquin, IL
BONJ	BONE, JACK D., Bethany, IL
BNTC	BONNETT TRUCKING, Kenneth Bonnett and George Bonnett, d/b/a, Pittsfield, IL
BOKD	BOOK TRUCKING, INC., Dixon, IL
BOKR	BOOK, H. & S., TRUCKING, INC., Leaf River, IL
BKTI	BORK TRANSPORT, INC., Des Moines, IA
BOSH	BOSCH TRUCKING COMPANY, Bartonville, IL
BSLP	BOSEO, LOUIS P., Louis Phillip Boseo, d/b/a, Manhattan, IL
BOTS	BOST TRUCK SERVICE, INC., Murphysboro, IL
BOCW	BOUIE CONSTRUCTION, INC., Joliet, IL
BOJR	BOULOS, JAMES RAPHEL, Eldorado, IL
BTUS	BOWER TRUCK SERVICE, Glen A. Bower, d/b/a, Ava, IL
BOWQ	BOWMAN'S TRUCK SERVICE, Kenneth Bowman, d/b/a, Greenfield, IL
BOMW	BOWMAN, WILLIAM G., Chesterfield, IL
BCKK	BRACKETT TRUCKING, Robert A. Brackett, d/b/a, Aurora, IL
BRKT	BRACKETT, DORRIS I, AND SON, Dorris I. Brackett and Deneen Brackett, d/b/a, Newton, IL
BDE8	BRADEN & SON TRUCKING, Paul S. Braden and Ronald D. Braden, d/b/a, Maroa, IL
BDEK	BRADEN TRUCKING, Edwin R. Braden and Robert E. Braden, d/b/a, Maroa, IL
BJHT	BRADY, JOHN, John Brady, d/b/a, Carpentersville, IL
BRUY	BRANDAU, AL. C., CONSTRUCTION COMPANY, Tinley Park, IL
BRIL	BRANDT TRUCK LINE, INC., Bloomington, IL
BTNH	BRANSON TRUCKING, Jon Branson, d/b/a, Ipava, IL
BADS	BRASEL, DALE S., Milford, IL
BSJF	BRASEL, JOHN F., Milford, IL
BAUE	BRAUN, EDWIN, Red Bud, IL
BMVC	BREDA MOVING COMPANY, INC., Schaumburg, IL
BDEM	BREEDEN TRUCKING, Gene R. Breeden, d/b/a, Ashkum, IL
BMJD	BRIGGS, M. J., DELIVERY SEVICE, Martin J. Briggs, d/b/a, Stone Park, IL
BRYO	BRINEY, OTIS L., Macomb, IL
BBOG	BRINK BROS. GRAIN & TRUCKING, INC., Shattuc, IL
BBRG	BRISBIN, BRUCE, GRAIN SERVICE, Bruce Brisbin, d/b/a, Yorkville, IL
BSCK	BRISCOE'S TRUCKING, Stanley W. Briscoe, d/b/a, Gladstone, IL
BROL	BRISTOL TRANSPORT, INC., Northlake, IL
BROJ	BRODERICK TEAMING COMPANY, Chicago, IL
BROT	BROMS, W. P., INC., Chicago, IL

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Carrier "Alpha" Code	
BOEC	BROOKS EXCAVATING, Lyle R. Brooks, d/b/a, Erie, IL
BKDT	BROOKS, DAVID, TRUCKING, David Brooks, d/b/a, Hillsdale, IL
BOAL	BROWN & LABRECHT EARTHMOVERS, INC., Joliet, IL
BOWT	BROWN TRANSPORTATION CO., Pontiac, IL
BRDH	BROWN, DONALD, TRUCKING, Donald L. Brown, d/b/a, Warren, IL
BRUQ	BRUBAKER TRANSFER, INC., Eureka, IL
BHHR	BRUCE HEAVY HAULING & RIGGING, INC., Bonnie, IL
BTGE	BRUCE TRUCKING & EXCAVATING, Bruce L. Moore, d/b/a, Granite City, IL
BRFM	BRUNS FARMS, James T. Spees, d/b/a, Carthage, IL
BUNP	BRUNS TRANSPORTATION, INC., Oregon, IL
BBRT	BRUNT BROS. TRANSFER, INC., Chicago, IL
BRMF	BRUNTON MOTOR FREIGHT, INC. OF ILLINOIS, Streator, IL
BRUS	BRUTTO, SYLVESTER, TRUCK SERVICE, Sylvester Brutto, d/b/a, Belleville, IL
BRZC	BRZECZEK, CHESTER, Antioch, IL
BHTY	BUCH, TERRY, Sparta, IL
BTFW	BUCKLES TRANSFER & WAREHOUSE COMPANY, O'Fallon, IL
BUFS	BUCKLEY FREIGHT SYSTEM, INC. (An Illinois Corporation), Justice, IL
BKEE	BUCKNER, EARL, Yale, IL
BUYM	BUENTE, RAYMOND J., Bonfield, IL
BUHC	BUHR, S. B., Thomasboro, IL
BUHY	BUHRE, LE-ROY, Layson, IL
BUIQ	BUILDERS TRANSIT TRUCKING & SUPPLY, INC., Evergreen Park, IL
BUKN	BUK TRUCKING, INC., Melrose Park, IL
BUFN	BULK FEED TRANSPORTS, Roman Weber, d/b/a, Bartselo, IL
BULJ	BULKMATIC TRANSPORT COMPANY, Chicago, IL
BUNG	BUNGER, RONALD, Davis Junction, IL
BUND	BUNTING, DENZIL, Metropolis, IL
BUBR	BURGER BROS., Robert W. Burger and Russell E. Burger, d/b/a, Rock Falls, IL
BGSB	BURGESS BROS., Jack Burgess and Kenneth Burgess, d/b/a, Yates City, IL
BTGF	BURGESS TRUCKING, Kenneth L. Burgess, d/b/a, Chenoa, IL
BKHS	BURKHART & SON, John Marvin Burkhart and Timothy John Burkhart, d/b/a, Stanford, IL
BUHT	BURNHAM TRUCKING COMPANY, INC., East Chicago, IL
BUHW	BURNHAM, WILLIAM E., Morris, IL
BEXG	BURNS EXCAVATING, Richard L. Burns, d/b/a, Sterling, IL
BUWM	BURNS, WILLIAM, Belleville, IL
BUOR	BURRELL TRANSPORT, Charles R. Burrell, d/b/a, Delavan, IL
BUTC	BURREN TRANSFER CO., Elgin, IL
BUJT	BURTON, J. J., TRUCKING, INC., Naperville, IL
BBOO	BUSBOOM, EDWIN, Thomasboro, IL
BUSA	BUSCH FREIGHT SYSTEM, INC., Creve Coeur, IL
BUSW	BUSEN TRUCKING, Wanda L. Busen, d/b/a, Mt. Sterling, IL
BUST	BUSH MOTOR EXPRESS, INC., Belvidere, IL
BUSL	BUSSELL, LOUIS, AND SON TRUCKING, Harry Louis Bussell, d/b/a, Glasford, IL
BSBD	BUSY BEE DELIVERY, Buddy Earl Werntz, d/b/a, Freeport, IL
BTND	BUTLER TRUCKING CO., L. J. Butler, d/b/a, Chicago, IL
BUBH	BUTTEL BROTHERS, LaVerne Buttel, Walter Buttel and Edward Buttel, d/b/a, Egan, IL
BTSY	BUTTELL, STANLEY W., Elkhart, IL
BXTN	BUXTON TRUCKING CO., Blaine L. Buxton, d/b/a, Lovington, IL
CNBP	C & B TRANSPORT, Bruce Dickson and Carmelo Aiello, d/b/a, La Grange Park, IL
CDNR	C & D MOVING & STORAGE, INC., Chicago, IL
CNHM	C & H, INC., DeKalb, IL
CNKM	C & K TRANSPORT, INC., Mokena, IL
CMDI	C & M DELIVERY SERVICE, INC., Chicago, IL
CNPM	C & P MOTOR EXPRESS, INC., Niles, IL
CNRH	C & R TRANSPORT, Charles H. Felkamp, Jr., d/b/a, Casey, IL
CRFL	C AND R TRANSFER, INC., Mazon, IL
CGNS	C G & S TRUCKING CO., Wood River, IL
CJTY	C J TRUCKING, John Burzynski, d/b/a, Villa Park, IL
CWMT	C W TRANSPORT, INC. (A Delaware Corporation), Chicago, IL
CSCC	C. & S. CARTAGE, Dom Catrambone, Frank Catrambone and Gregory Catrambone, d/b/a, Elmwood Park, IL
CBWS	C. B. W. TRANSPORT SERVICE, INC., Wood River, IL
CCBH	C. C. CARTAGE, INC., Palatine, IL
CDCV	C. D. COURIER, INC., Elk Grove Village, IL
CDTE	C. D. TRANSFER, Carl Russell and Darrell Brown, d/b/a, Chicago, IL
CFSO	C. F. & SONS, INC., Merrionette Park, IL
CBAT	C.B.A. TRUCKING COMPANY, Hillside, IL
CUTW	C.U. TRUCKING COMPANY, McHenry, IL
CWTE	C.W. TRUCKING, INC., Chicago, IL
CAGW	CAGWIN TRUCK LINES, INC., Lockport, IL
CHGC	CAHILL GRAIN COMPANY, Blackstone, IL
CAHJ	CAHILL TRUCKING, James F. Cahill, d/b/a, Ransom, IL

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Carrier "Alpha" Code	
CTGH	CAIN'S TRUCKING, John D. Cain, d/b/a, Champaign, IL
CDOM	CALIENDO TRUCKING, Anthony J. Caliendo, d/b/a, Melrose Park, IL
CWCG	CALLAWA CARTAGE, INC., Callaway Enterprises, Inc., d/b/a, Downers Grove, IL
CCGI	CAMELOT CARTAGE, INC., Skokie, IL
CPTY	CAMPBELL TRUCKING, Roger L. Campbell, d/b/a, Carrollton, IL
CBCG	CAMPBELL, GREG, TRUCKING, INC., Modesto, IL
CBLQ	CANNON BALL EXPRESS LINE, INC., Aurora, IL
CBIQ	CANNONBALL, INC., Chicago, IL
CANI	CANTLIN TRUCKING SERVICE, Harlan L. Cantlin, John L. Cantlin and Gary Cantlin, d/b/a, Earlville, IL
CNBW	CANTON'S BESTWAY, INC., Canton, IL
CPOM	CAPITOL MOTOR SERVICE, INC., Elk Grove Village, IL
CCGE	CARDINAL CARTAGE CO., INC., Bensenville, IL
CDSI	CARDOSI CARTAGE & LEASING, INC., West Chicago, IL
CPJO	CARJO TRUCKING CO., Hanover Park, IL
CREG	CARL ENTERPRISES, Donald N. Carl, d/b/a, Wheeling, IL
CWAL	CARLEN, WALTER L., Beecher City, IL
CRMV	CARLEY'S MOVING & STORAGE CO., Neil Russell Carley, d/b/a, Merrillville, IN
CLLF	CARLS, LESLIE R., Minonk, IL
CLST	CARLSON TRANSPORT, INC., Byron, IL
CTKO	CARLSON TRUCKING, Ray Carlson, d/b/a, Oswego, IL
CMCR	CARMAC TRANSPORT, INC., Chicago, IL
CCAC	CARMICHAEL CARTAGE COMPANY (A Delaware Corporation), Chicago, IL
CMHL	CARMICHAEL, CLARENCE, Streator, IL
CRTP	CARNER TRUCKING SERVICE, Cecil Carner, d/b/a, Olive Branch, IL
CCGS	CAROL CARTAGE, Carol Sturtevant, d/b/a, Cary, IL
CRSQ	CAROL DELIVERY SERVICE, INC., Palatine, IL
CJTQ	CARRAO, J., TRUCKING AND WAREHOUSING CO., INC., Oak Brook, IL
CRRY	CARRY TRANSIT, INC., Carry Companies of Illinois, Inc., d/b/a, Bridgeview, IL
CFLS	CARSTENSEN FREIGHT LINES, INC., Clinton, IA
CTTH	CARTEL TRANSPORT, INC. (An Indiana Corporation), Munster, IN
CTCG	CARTER, CHARLES H., & SON, INC., Burnt Prairie, IL
CSFO	CASEY FUEL OIL CORPORATION, Chicago, IL
CACF	CASPER'S CARTAGE, INC., Alsip, IL
CSRY	CASPER, ROY A., Dongola, IL
CSGM	CAST CARTAGE, Joseph Castellano, d/b/a, Melrose Park, IL
CSTE	CASTLE EXPRESS, Ronald Studzinski, d/b/a, Melrose Park, IL
CTTG	CATOM TRUCKING, INC., Hampshire, IL
CJAS	CATRAMBONE, JOSEPH, & SONS, INC., Chicago, IL
CEJS	CATTANI, E. J., & SON, INC., Ladd, IL
CVCF	CAVALEA CONTINENTAL FREIGHT, INC., Chicago, IL
CDCO	CEDAR CO., THE, Galesburg, IL
CEIK	CELLI TRUCKING COMPANY, Schiller Park, IL
CTFH	CENTER TRANSFER SERVICE, INC., Des Plaines, IL
CBCH	CENTRAL BLACKTOP CO., INC., Hodgkins, IL
CILS	CENTRAL ILLINOIS TRANSFER & STORAGE, INC., Decatur, IL
CEIL	CENTRAL ILLINOIS FREIGHT SYSTEM, INC., Rossville, IL
CSAC	CENTRAL STATES TRUCKING CO. (A Delaware Corporation), Summit, IL
CSPK	CENTRAL STATES PACKING CO., Elk Grove Village, IL
CSPE	CENTRAL STATES PACKAGING, INC., Danville, IL
CIOM	CESARIO, M., EXCAVATING AND TRUCKING, INC., Glenview, IL
CSPP	CHAAS TRANSPORT, Stanley E. Pobol, d/b/a, Park Ridge, IL
CHLB	CHALLY BROTHERS, Alvin J. Chally & Robert E. Chally, d/b/a, Huntley, IL
CHBF	CHAM BANA TRUCKING, Shirley Dammerman, d/b/a, Champaign, IL
CDUR	CHAMBERLIN, DURRELL B., Nebo, IL
CBDD	CHAMBERS, DANIEL D., Atwood, IL
CPAG	CHAMPAIGN TRUCKS, INC., Champaign, IL
CHNC	CHANCE FREIGHT LINES, INC., Gardner, IL
CHLJ	CHANCELLOR, LARRY JOE, Arcola, IL
CJTW	CHAPA, J., TRUCKING, Jesus Chapa, d/b/a, Wood Dale, IL
CBAA	CHEBANSE AG SERVICE, INC., Chebanse, IL
CMEV	CHEETAH MESSENGER SERVICE, INC., Chicago, IL
CEKC	CHEROKEE CONSTRUCTION COMPANY, INC., Cuba, IL
CSTR	CHESTER TRANSFER, INC., Chester, IL
CFRM	CHICAGO FREIGHT SYSTEMS, INC., Chicago, IL
CHMJ	CHICAGO MESSENGER SERVICE, INC., Chicago, IL
CMRD	CHICAGO/MILWAUKEE RUSH DELIVERY, INC., Milwaukee, WI
CGMQ	CHICAGO MOTOR EXPRESS TERMINAL, INC., Lockport, IL
CGOV	CHICAGO OVERNITE, INC., Bellwood, IL
CSEQ	CHICAGO SUBURBAN EXPRESS, INC., Chicago, IL
CLQE	CHICAGOLAND-QUAD CITIES EXPRESS, INC., Chicago, IL
CEXE	CHIEF EXPRESS, INC., Willowbrook, IL
CWAE	CHIPPEWA AIR EXPRESS, INC., Addison, IL

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PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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@ Carrier "Alpha" Code	
CILN	CHRIS LYNN CARTAGE, INC., Lake in the Hills, IL
CHOL	CHRIST TRUCK SERVICE, INC., Lebanon, IL
CSRK	CHRISTENSEN TRUCKING, INC., Huntley, IL
CIML	CHRISTOPHER, MILES, & SON, Shipman, IL
CHTL	CHURCHILL TRUCK LINES, INC., Chillicothe, MO
CQUC	CINQUEGRANI, CHARLES, Chicago, IL
CIRM	CIRCLE M CARTAGE, INC., Northbrook, IL
CIWE	CIRCLE W EXPRESS, INC., Greenville, IL
CSNP	CISSNA PARK TILE, Gerald Schipperl, d/b/a, Cissna Park, IL
CIPE	CITGO PETROLEUM CORPORATION, Addison, OK
CTYC	CITY CARTAGE, INC., Palos Heights, IL
CIDV	CITY DELIVERY SERVICE, Sam F. Aiello, d/b/a, Springfield, IL
CIYH	CITY HAUL, INC., Chicago, IL
CWWQ	CITY-WIDE WAREHOUSE & TRUCKING, INC., Chicago, IL
CKSC	CLACKAMAS SERVICE CORPORATION, Oak Forest, IL
CTNV	CLANIN TRUCKING, INC. (A Nevada Corporation), Astoria, IL
CIIE	CLASS COURIER, INC., Chicago, IL
CCVC	CLEARY, CLEVELAND C., Chester, IL
CLHQ	CLEER, HARRY J., GERALD F. CLEER AND MICHAEL H. CLEER, LaSalle, IL
CTKI	CLEMONS TRUCKING, Elenor Clemons, d/b/a, Robbins, IL
CLFQ	CLIF'S CARTAGE, INC., Palatine, IL
CLFM	CLIFTON MOVERS, William D. Clifton, d/b/a, Rantoul, IL
CFTI	CLIFTON MOVING & STORAGE, INC., Decatur, IL
CLDI	CLINARD, DAVE, TRUCK SERVICE, INC., Mt. Sterling, IL
CPPQ	CLIPPER MOTOR SERVICE, INC., Chicago, IL
CLOO	CLOONEN TRUCKING, INC., Kankakee, IL
CLXQ	CLOUD EXPRESS CO., THE, Thomas Jones and Pearl Jones, d/b/a, Chicago, IL
CLGH	CLOUGH, J. H., OILFIELD CONTRACTING SERVICE, INC. (an Illinois Corporation), Beecher City, IL
CLWG	CLW TRUCKING, INC., Gilman, IL
CMMN	CMM TRANSPORTATION, INC., North Chicago, IL
COIT	COAL CITY TRUCKING, INC., Coal City, IL
CCNN	COAL CONTRACTORS, INC., Sesser, IL
CJHM	COAN, JOHN M., INC., Lyons, IL
COBA	COBANE AIR FREIGHT & EXPRESS, INC., Rock Falls, IL
CFEN	COFFEEN TRUCKING CO., Dale Nowlan, d/b/a, Coffeen, IL
CJNC	COJAN CORPORATION, Westmont, IL
COLA	COLAW, GERALD, Atlanta, IL
CBNQ	COLBURN, W. G., TRANSFER, Wilbur G. Colburn, d/b/a, Beason, IL
COEM	COLEMAN TRUCKING CO., Richard G. Coleman, d/b/a, Chicago, IL
CLUK	COLLINS, LUKE, Lawrence M. Collins, d/b/a, Decatur, IL
CLLV	COLLINSVILLE DELIVERY SERVICE, INC., Collinsville, IL
CLMB	COLUMBIA TRUCKING, INC., Hammond, IN
CWLK	COLWELL, FRANK R., Frank Robert Colwell, d/b/a, Alexander, IL
COMJ	COMMERCIAL CARRIERS, INC., Southfield, MI
CMLQ	COMMERCIAL CARTAGE CO., Fenton, MO
CDPO	COMMERCIAL DISPOSAL, INC., Bloomington, IL
COMA	COMMERCIAL TRANSPORT, INC., Belleville, IL
CDTY	COMMODITY TRANSIT, INC., Round Lake, IL
CMUQ	COMMUNITY CARRIERS, Norman D. Bishop, d/b/a, Oaklawn, IL
CPLY	COMPOST SUPPLY, INC., Glen Ellyn, IL
CMKN	COMSTOCK, ROGER D., & SONS, Roger D. Comstock, Larry D. Comstock, Dale E. Comstock and Gena M. Comstock, d/b/a, La Harpe, IL
CWCE	CON-WAY CENTRAL EXPRESS, INC., Ann Arbor, MI
CNXV	CONARD EXCAVATING, Curtis Alan Conard, d/b/a, Belvidere, IL
CDNI	CONDON MOTOR EXPRESS, INC., Chicago, IL
CNDA	CONDOR AIR CARGO, INC., Rosemont, IL
CNNO	CONNER, A. D., INC., Frankfort, IL
CNEJ	CONNERTON, A. J., Joseph A. Connerton, d/b/a, Marshall, IL
CCMA	CONNORS, C. M., Clarence Connors, d/b/a, Streator, IL
COCI	CONQUEST CARRIER, INC., Eureka, IL
CRDK	CONRAD TRUCKING, INC., Dandorth, IL
CNRQ	CONROY TRUCKING, INC., Staunton, IL
CCTG	CONSOLIDATED CARTAGE COMPANY, INC., Argo, IL
CMFV	CONSTRUCTION MATERIAL FLEET SERVICE, INC., Ingleside, IL
CSVI	CONSTRUCTION TRANSPORT, INC., Chicago, IL
CAAW	CONTE, A. A., INC., West Chicago, IL
CLXL	CONTINENTAL EXPRESS LINES, INC., Elk Grove Village, IL
COMN	CONTINENTAL MAILING SYSTEMS, INCORPORATED, Maywood, IL
COCJ	CONTRACT COURIER SERVICES, INC., Park Ridge, IL
CVYO	CONVEY, INC., Addison, IL
COKJ	COOK, JAMES R., INC., Fisher, IL
CKTC	COOK, R., TRUCKING, Roger J. Cook, d/b/a, Rolling Meadows, IL

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@Carrier "Alpha" Code	
COKW	COOK, W. L., Wilfred L. Cook, d/b/a, Onarga, IL
COBH	CORBIN TRUCKING CO., INC., Manhattan, IL
CORD	CORDERA TRANSFER COMPANY, INC., Carlinville, IL
CMFE	CORDIN MOTOR FREIGHT, INC., Burbank, IL
CZNE	CORZINE, CARL E., AND PHILLIP RAY CORZINE, Kansk, IL
CCFG	COSCO FREIGHT SERVICES, INC., Elk Grove Village, IL
CMUK	COTTOM'S TRUCKING, Ronald W. Cottom and Harold S. Cottom, d/b/a, Oneida, IL
CTXV	COUNTRY TRUCKING & EXCAVATING, INC., Wilmington, IL
CCSY	COURIER CO-OP SYSTEMS, Tommy Logsdon, d/b/a, Chicago, IL
CXVQ	COX BROTHERS, Dannie Cox and Cloyce J. Cox, d/b/a, Newton, IL
COXA	COX OIL & TRANSPORT COMPANY, INC., Carmi, IL
CXTQ	COX TRANSFER, INC., Eureka, IL
CXCL	COX, CONNIE LEE, Charleston, IL
CXTD	COX, THOMAS D., TRUCKING, INC., Murphysboro, IL
CWHA	CRAWFORD, HAROLD E., Potomac, IL
CSLN	CRESCO LINES, INC., Harvey, IL
CDRD	CRESS, DARRELL D., Effingham, IL
CRVF	CRESTVIEW FARMS, Robert E. Kern and Ronald R. Kern, d/b/a, Paw Paw, IL
CPGC	CRIPE GRAIN CO., Vandalia, IL
CRPM	CRIPPEN, MICKEY RAY, Iuka, IL
CSDL	CROSS, DAVID LYNN, Emden, IL
CSQI	CROSSTOWNS, INC., Oak Park, IL
CRSE	CROUSE CARTAGE COMPANY, Carroll, IA
CREI	CROWE, EVERETT LOREN, Riverton, IL
CRWY	CROWLEY, DANIEL M., Westchester, IL
CWMS	CROWN MOVING & STORAGE, INC., OF ILLINOIS, Indianapolis, IN
CWPT	CROWN POINT TRUCKING, Clyde M. Stone, d/b/a, Havana, IL
CWTM	CROWN TRUCKING, INC., Pawnee, IL
CDGE	CRUME AND DAUGHTER TRUCKING, Willie Crume and Lenore Lefiore, d/b/a, Chicago, IL
CRYI	CRYOGENIC TRANSPORTATION, INC., Omaha, NE
CSTM	CRYSTAL TRANSPORTATION, INC., Cicero, IL
CUTG	CULL TRUCKING AND SNOW PLOWING, Luella Cull, d/b/a, Lisle, IL
CUTC	CUMBERLAND TRUCKING CO., INC., Chicago, IL
CCBY	CUMPTON, CAMBY, Hillsboro, IL
CUCQ	CUNNINGHAM CARTAGE, INC., Antioch, IL
CMKE	CUNNINGHAM, MARK E., Greenfield, IL
CUNS	CUOMO & SON CARTAGE COMPANY, Lemont, IL
CUIC	CURRY ICE & COAL, INC., Carlinville, IL
CURJ	CURTIS FARMS, Glenn William Curtis, d/b/a, Farmer City, IL
CUTT	CURTIS TRANSPORT, INC., Arnold, MO
CUSN	CURTIS, NEIL, Blandinsville, IL
CURW	CURTIS, WILLIAM, & SON TRANSFER & STORAGE, Virginia R. Curtis, d/b/a, Taylorville, IL
CUSG	CUSHING TRUCKING, INC., Chicago, IL
CSBL	CUSTER, BILL, Holder, IL
CUSD	CUSTOM DELIVERIES, INC., Birmingham, MI
CZPB	CZAPLEWSKI BROS., INC., Buffalo Grove, IL
DDTG	D & D TRUCKING, INC., Bensenville, IL
DNGC	D & G TRUCKING CO., Roselle, IL
DNHR	D & H TRANSPORTATION, INC., Kewanee, IL
DHTV	D & H TRUCK SERVICE, Edwin E. Davison, Sharon K. Davison and Joseph E. Hinckle, d/b/a, New Holland, IL
DJKL	D & J KLUCKMAN, Donna J. Kluckman and James B. Kluckman, d/b/a, Springfield, IL
DJLS	D & J LEASING, Richard L. Nelson, d/b/a, Princeton, IL
DJTV	D & J TRUCK SERVICE, David W. Bean, d/b/a, Fowler, IL
DJTR	D & J TRUCKING, Donald J. Van Wieren, d/b/a, DeMotte, IN
DNJQ	D & J TRUCKING, INC., Westmont, IL
DANL	D & L TRANSPORT, INC., Cicero, IL
DANW	D & N TRUCKING, INC., Oswego, IL
DAXI	D. A. EXPRESS, INC., Calumet Park, IL
DBDL	D. B. DELIVERY SYSTEMS, INC. (An Illinois Corporation), Des Plaines, IL
DKHI	D. K. H. INCORPORATED, Arenzville, IL
DNTP	D.N.T. TRUCKING, Debra L. Cordes, d/b/a, Hampton, IL
DHLE	DAHLEN TRANSPORT, INC., Newport, MN
DHMC	DAHM, CHRISTOPHER G., Wonder Lake, IL
DHNS	DAHM, HAROLD, AND SON, Harold J. Dahm, d/b/a, Ashton, IL
DISN	DAILY SPRINT, INC., Lansing, IL
DTJT	DALEY, T. J., TRANSFER, INC., Ogiesby, IL
DATO	DALTON MOVING & STORAGE, Charles L. Dalton, d/b/a, Salem, IL
DDSR	DALY DRUM SERVICE, INC., Rockford, IL
DTSE	DAMBACHER TRUCK SERVICE, Richard N. Dambacher, d/b/a, Freeburg, IL
DAMP	DAMERELL, PAUL, Washburn, IL
DMCR	DAMIANI CARTAGE, Bonnie Damiani, d/b/a, Chicago Heights, IL

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@Carrier "Alpha" Code	
DNAH	DAN-ASH TRUCKING, Debra J. DeCap, d/b/a, Port Byron, IL
DTRY	DANIEL TRUCKING, Robert C. Daniel and Mark A. Daniel, d/b/a, Iroquois, IL
DNXP	DANNY'S EXPRESS, INC., Calumet Park, IL
DAFM	DARR FARMS, James B. Darr, d/b/a, Fairmount, IL
DRTH	DARR TRUCKING, Roger A. Darr, d/b/a, Eldred, IL
DRRB	DARST, ROBERT, Decatur, IL
DAUF	DAUFELDT TRANSPORT, INC., Muscatine, IA
DVCQ	DAVID CARTAGE, Anthony Irpino, d/b/a, Morton Grove, IL
DVMV	DAVID'S MOVING & STORAGE, Thompson Motor Service, Inc., d/b/a, Palos Park, IL
DVBI	DAVIS BANCOROP, INCORPORATED, Chicago, IL
DWMS	DAWSON MOTOR SERVICE, INC., Chicago, IL
DEML	De MARLIE TRUCKING, INC., Reynolds, IL
DRCC	DE ROSE CARTAGE CO., Berwyn, IL
DLYD	DEAN, LLOYD O., Newark, IL
DRUS	DEAN, RUSS, TRUCKING, Russell Dean, d/b/a, Island Lake, IL
DEMI	DEARDS, J. E., MOTOR EXPRESS, James E. Deards, d/b/a, Carpentersville, IL
DCKD	DECK, DON, Sleepy Hollow, IL
DKDE	DECKARD, DEE L., Rockford, IL
DKTF	DECKER TRUCKING, Edward M. Decker, d/b/a, Philo, IL
DEDS	DECKER, DELMER, AND SON, Delmer Decker and Richard Decker, d/b/a, Minonk, IL
DEEI	DEE TRANSPORT, INC., Mackinaw, IL
DNDI	DEE-N-DEE TRUCKING, INC., Plainfield, IL
DEED	DEEDRICH TRUCKING, Ernest Deedrich, d/b/a, Pesotum, IL
DEFQ	DEERFIELD MOVING AND STORAGE, INC., Deerfield, IL
DFBT	DEFENBAUGH TRUCKING, INC., Aurora, IL
DEHY	DeFRATES, HENRY, Hampshire, IL
DEGR	DeGROOT MOTOR SERVICE, INC., Stickney Township, IL
DROQ	DEL-RO TRANSPORTS, INC., Belleville, IL
DLNY	DELANEY TRUCKING, Harold L. Delaney, Keith A. Delaney and Timothy L. Delaney, d/b/a, St. Charles, IL
DVYS	DELIVERY SERVICE, INC., Chicago, IL
DKNI	DELLITT TRUCKING, INC., Aledo, IL
DNEL	DENNEL CARTAGE, INC., Round Lake, IL
DASP	DENNY & SIMPSON TRUCKING CO., INC., Harrisburg, IL
DNDN	DENTON, DENNIS, Princeton, IL
DTPA	DEON TRANSPORTATION, INC., Chicago, IL
DPEI	DEPENDABLE, INCORPORATED, Bloomington, IL
DPTS	DePORTER TRUCKING SERVICES, Allen DePorter, d/b/a, Milan, IL
DEVQ	DEVON MOVERS, INC., Chicago, IL
DZUL	DEZUTEL, INC., Wheaton, IL
DFCT	DFC TRANSPORTATION COMPANY, Huntley, IL
DHJA	DHAMER, J. A., TRUCKING, James A. Dhamer, d/b/a, Huntley, IL
DIVV	DI VITO, VINCENT, INC., Bloomingdale, IL
DILQ	DIAL MOTOR TRANSIT, INC., Granite City, IL
DIAT	DIAMOND TRANSPORTATION SYSTEM, INC., Racine, WI
DICO	DICK, H. O., TRANSFER, Mary Dick and Hollis A. Dick, d/b/a, Bethany, IL
DKNQ	DICKEN GRAIN CORP. (An Illinois Corporation), Sycamore, IL
DDXL	DIERCKS LTD., Steve Diercks, d/b/a, Eldridge, IA
DIEK	DIERCKS, ALLEN, Bettendorf, IA
DEJQ	DIETER, JOE, & SONS, INC., Naperville, IL
DIRW	DILLE, ROBERT W., Ottawa, IL
DLLT	DILLON TRANSPORT, INC., LaGrange Park, IL
DICC	DILLON, C. C., COMPANY, Arnold, MO
DIPL	DIPPEL, JOHN, McNabb, IL
DILH	DIPPOLD-LASH TRUCKING, Steven K. Dippold and Paul L. Lash, Jr., d/b/a, Farina, IL
DDYS	DIRECT DELIVERY SERVICE, INC., Schiller Park, IL
DSTA	DISTINCT TRANSPORTATION, INC., Huntley, IL
DXCC	DIXON CONSTRUCTION COMPANY, Robert Farster, d/b/a, Dixon, IL
DXCS	DIXON, CARL, & SON, INC. (A Delaware Corporation), Saunemin, IL
DIXM	DIXON-MEYERS TRANSPORTATION, INC., Mt. Morris, IL
DZTK	DIZ TRUCKING, INC., Chicago, IL
DMJL	DMJ LEASING & TRUCKING, INC., Melrose Park, IL
DOCR	DOANE, CHARLES R., Perry, IL
DNCW	DOBCZYK, WILLIAM, Joliet, IL
DCTG	DOC'S CARTAGE CO., INC., Burbank, IL
DODR	DODSWORTH, ROBERT A., Franklin, IL
DBRC	DOETSCH BROS. CO., Prospect Heights, IL
DOIT	DOLCI TRUCKING, INC., Steger, IL
DOLC	DOLEN CONSTRUCTION, INC. (An Illinois Corporation), Peoria, IL
DNMK	DOMINICK CARTAGE SERVICE, INC., Summit, IL
DNDV	DON'S DELIVERY SERVICE, Don Pascua, d/b/a, Chicago, IL
DONT	DONLEY TRUCKING, INC., Chrisman, IL

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@ Carrier "Alpha" Code	
DORL	DORRELL, CLIFFORD M., Gridley, IL
DOTL	DOT FREIGHT LINE, INC., Crestwood, IL
DOMM	DOUBLE 'M' TRUCKING, Mike Mrowicki, d/b/a, Peru, IL
DBDE	DOUBLE D EXPRESS, INC., Peru, IL
DBJT	DOUBLE J. TRUCKING, INC., Coal City, IL
DBNT	DOUBLE NICKEL TRUCK SERVICE, INC., N. Aurora, IL
DOZT	DOUBLE Z TRUCKING, INC., McNabb, IL
DGLA	DOUGLAS, ALAN, Rossville, IL
DWTD	DOWNTOWN DELIVERY, INC., Anagram, Inc., d/b/a, Chicago, IL
DLTB	DOYLE BROS. TRUCKING, INC., Blue Mound, IL
DRKO	DRAKE TRUCKING CO., Don A. Drake, d/b/a, Robinson, IL
DSET	DRESSEL TRUCKING COMPANY, O'Fallon, IL
DRSR	DRESSLER TRUCK SERVICE, INC., Marissa, IL
DRXH	DREXLER HORSE TRANSPORTATION, Sidney R. Drexler, d/b/a, Hampshire, IL
DRFC	DRIFTER TRUCKING COMPANY, Keith J. Fliegel, d/b/a, Chicago, IL
DRON	DRONE, TONY, Ridgway, IL
DUEM	DUBOIS, ELMER, Metamora, IL
DGNT	DUGGAN TRUCKING, Dave Duggan, d/b/a, McHenry, IL
DMMS	DUMELLE MOTOR SERVICE, Joseph L. Dumelle, d/b/a, Bartlett, IL
DBSW	DUNN BROS. STORAGE WAREHOUSES, INC., Chicago, IL
DUSJ	DUNNE, STEVE J., CARTAGE, INC., Des Plaines, IL
DULE	DURBIN, LEON E., Bement, IL
DUML	DURING, MILTON, Rantoul, IL
DUTF	DURST TRUCKING SERVICE, Larry W. Durst, d/b/a, Low Point, IL
DWIT	DWIGHT TRUCKING, INC., Dwight, IL
DYNA	DYNA BULK, INC., Summit, IL
DYNI	DYNASTY, INC., Darien, IL
ENDL	E & D LEASING, Ernest Stiller, Aileen Stiller and Ellen Kaye Burnham, d/b/a, Chicago, IL
EETI	E & E TRUCK LINE, INC., Charleston, IL
EJTI	E & J TRUCKING, INC., Bensenville, IL
ENLQ	E & L TRUCKING CO., Alsip, IL
EAPC	E & P COURIERS, Ernest G. Bleskovits, d/b/a, Chicago, IL
EASQ	E & S TRANSPORT, Michael Erich and Phil Strike, d/b/a, Mundelein, IL
ELMX	E L M TRANSIT CO., Springfield, IL
EZTG	E-Z TRUCKING, INC., Champaign, IL
EDRQ	E. D. R. TRANSPORT CO., Oak Brook, IL
EFTS	E. F. TRUCK SERVICE, INC., Highland, IL
EWLQ	E. W. L. TRUCKING, INC., Glenview, IL
EKGI	E.I.G., INC., Clinton, IA
EWGT	E.W.G. TRUCKING, INC., Chicago, IL
EGTL	EAGLE TANK LINES, INC., Crystal Lake, IL
ETPI	EAGLE TRANSPORTATION, INC., Bensenville, IL
EAGV	EAGLE VALLEY, INC., Shawneetown, IL
ERSY	EARTH SYSTEMS, Carl Post, d/b/a, Woodridge, IL
ERTH	EARTH, INC., Bensenville, IL
EHLS	EARTHHAULERS, Max E. Branson, d/b/a, Mahomet, IL
EKTI	EASLEY, KENNETH W., TRUCKING SERVICE, Kenneth W. Easley, d/b/a, Salem, IL
EASA	EAST END CARTAGE, INC., Chicago, IL
EAMW	EASTIN, MARVIN W., Oakland, IL
EAYW	EASYWAY TRANSPORTATION, Fredrick J. Faurie & Emmy Anna Faurie, d/b/a, Bensenville, IL
EAEN	EATMAN ENTERPRISES, Joe B. Wastman, d/b/a, Rock Island, IL
EAOV	EATON, VANCE, Vance Duane Eaton, d/b/a, Berwick, IL
EBFC	EBERT FERTILIZER COMPANY, Dave Ebert, d/b/a, Mokena, IL
EKRK	ECKBERG, RICK, Walnut, IL
ECKW	ECKLER, W. A., Willard A. Eckler, d/b/a, Athens, IL
ECOF	ECOFF TRUCKING, INC., Greenfield, IN
ECOE	ECONEXPRESS, INCORPORATED, Pittsfield, IL
ECNS	ECONOMY SERVICE STATIONS, INC., Oak Lawn, IL
EDDI	EDDIE'S EXPRESS, Susan Paalbalog, d/b/a, Arlington Heights, IL
EDYM	EDDY'S MOVERS, Norman Bersh, d/b/a, Chicago, IL
EDEL	EDELING, W. E., EXPRESSING, INC., Chicago, IL
EDNE	EDENS EXPRESS, INC., Chicago, IL
EWLT	EDENS, WILLIAM, TRUCKING, INC., Rolling Meadows, IL
EDGN	EDGE, MILTON, Chandlerville, IL
EGGL	EDGECOMB, G. G., AND L. G. EDGECOMB, Utica, IL
EDKE	EDMONSON, KEITH, London Mills, IL
EDJS	EDWARDS, JOHN, AND SONS, Roscoe Edwards and Donald Edwards, d/b/a, McLean, IL
EDRO	EDWARDS, RONALD D., TRANSFER, Ronald D. Edwards, d/b/a, Elgin, IL
EWSL	EDWARDSVILLE SERVICE LINES CO., Edwardsville, IL
EEJA	Ee-JAY MOTOR TRANSPORTS, INC., E. St. Louis, IL
EFFI	EFFINGHAM READY MIX COMPANY, Effingham, IL
EHBC	EHRHART BROS. CARTAGE, Andy Ehrhart, d/b/a, Waterman, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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Carrier "Alpha" Code	
EIHC	EICH, C., TRUCKING, INC., Crete, IL
EPTT	EIPERS, TERRY, TRUCKING, Terry Eipers, d/b/a, Sandwich, IL
ELGQ	ELGIN MOTOR SERVICE, Robert R. Harney, d/b/a, Elgin, IL
ELWE	ELGIN WAREHOUSE & EQUIPMENT, INC., Elgin, IL
EGCW	ELK GROVE C & W TRUCKING, INC., Bensenville, IL
ELAW	ELLER & WILLEY BLOCK COMPANY, Dixon, IL
ELLE	ELLIS EXCAVATING, Terence R. and James A. Ellis, d/b/a, Penfield, IL
ELPT	ELP TRANSPORT, INC., El Paso, IL
EMDV	EMERGENCY DELIVERY, INC., Bridgeview, IL
EMCK	EMERICK ENTERPRISES, INC., Elmwood, IL
EMNE	EMMERT, NORMAN E., & SONS, Norman E. Emmert, Greg D. Emmert and Gary A. Emmert, d/b/a, Georgetown, IL
EMDW	EMSTROM, DWIGHT W., Dwight William Emstrom, d/b/a, Galesburg, IL
ENTM	ENERGY TRANSPORT, INC., Forest View, IL
ETOS	ENERGY TRANSPORT SYSTEMS, INC., Galatia, IL
ENDA	ENGEL, DONALD A., Arlington, IL
ENGK	ENGELKENS, GLENN R., Milledgeville, IL
ENGL	ENGELS MOTOR SERVICE, INC., Palatine, IL
EJTS	ENGLEJOHN TRUCKING SERVICE, Donnie Englejohn, d/b/a, St. Elmo, IL
EWTH	ENOCH, WOODROW, TRUCKING CO., Woodrow Enoch, d/b/a, Findlay, IL
ENRC	ENRICI, LAWRENCE, Gillespie, IL
EQTI	EQUIPMENT TRUCKING CO., Winchester, IL
ERAG	ERIE AG-SERVICE, Charles W. Brown and Paul D. Young, d/b/a, Erie, IL
ERFS	ERNAT, MRS. FRANK J., AND SONS, Mrs. Frank J. Ernat, d/b/a, La Salle, IL
ERRB	ERRAND BOY, INC., Oak Brook, IL
ERNT	ERVIN TRUCKING COMPANY, Carroll Ervin and Greg Ervin, d/b/a, Toledo, IL
ETAH	ETA SERVICES, INC., Lansing, IL
EURK	EUREKA CARTAGE COMPANY, INC., Cicero, IL
EVAC	EVANS CARTAGE, Rex D. Evans and Roy W. Evans, Jr., d/b/a, Murrayville, IL
EVRH	EVANS, RALPH, Ralph F. Evans and Ralph R. Evans, d/b/a, Thayer, IL
EVRE	EVEREADY TRUCKING, INC., Freeport, IL
EVAE	EVERGREEN AIR EXPRESS, INC., Chicago, IL
EVER	EVERSGERD TRUCK SERVICE, Maurice H. Eversgerd, d/b/a, Germantown, IL
EXNR	EXNER STOCK FARM TRUCKING, Dorothy Mae Schultz, d/b/a, Algonquin, IL
EXDA	EXPEDITED AIR SERVICE, INC., Milwaukee, WI
EXDF	EXPEDITED FREIGHT SYSTEMS, INC., Milwaukee, WI
EPMS	EXPERT MESSENGER SERVICE, INC., Chicago, IL
EXPR	EXPRESS FREIGHT LINES, INC., Milwaukee, WI
FNPQ	F & P MOTOR SERVICE, INCORPORATED, Chicago, IL
FABC	F.A.B. TRANSIT, INC., Forest Park, IL
FMTC	FAIRFIELD MOTOR TRANSPORTATION CO., Alsip, IL
FVWC	FAIRVIEW CARTAGE, INC., Crystal Lake, IL
FAOQ	FALCON EXPRESS, INC., Oak Forest, IL
FARW	FAREWAY MOVING & STORAGE CO., Rochelle, IL
FRKG	FARMER TRUCKING, William H. Farmer, d/b/a, Jacksonville, IL
FARQ	FARQUHAR TRUCKING COMPANY, Chicago, IL
FARR	FARR TRUCKING, INC., Table Grove, IL
FASE	FASO EXCAVATING CO., Chicago Heights, IL
FSTQ	FAST MOTOR SERVICE, INC., Brookfield, IL
FLLE	FATLAN, LEO E., Gardner, IL
FCHQ	FAUCHER BROS. CARTAGE, Donna M. Faucher, Michael E. Faucher and Suzanne Faucher Griffith, d/b/a, Chicago, IL
FAUT	FAULL TRANSFER & STORAGE CO., Robert W. Faull, d/b/a, Galesburg, IL
FAXN	FAXON CO., Ralph Faxon and Warren Faxon, d/b/a, Hinckley, IL
FAZE	FAZE II, LTD., Chicago, IL
FOBM	FEDERAL/O'BYRNE MOVING & STORAGE CO., Peoria, IL
FEOQ	FEDERAL WAREHOUSE COMPANY, Peoria, IL
FEDI	FEDERAL/DANVILLE TRANSFER & STORAGE CO., INC., East Peoria, IL
FEHB	FEHR BROS. TRUCKING, Kenneth W. Fehr and Stephen L. Fehr, d/b/a, Eureka, IL
FEKQ	FEKEN, J. A., TRUCKING SERVICE, John Feken, d/b/a, Streator, IL
FLXM	FELIX COMPANY, INC., Elmhurst, IL
FTRI	FENTRESS TRUCKING, Forest W. Fentress, d/b/a, Farmer City, IL
FERE	FERREE TRANSPORTATION, INC., Hammond, IN
FERL	FERRILL TRUCKING, Robert L. Ferrill and R. Michael Ferrill, d/b/a, Oreana, IL
FRRS	FERRIS MOVING & STORAGE COMPANY, Galesburg, IL
FERI	FERRY TRUCKING CO., Jack Gulick Ferry, d/b/a, Decatur, IL
FIDC	FIDELITY TRUCKING CORPORATION, Chicago, IL
FIES	FIELD TRUCK SERVICE, Marion Field, d/b/a, Toulon, IL
FTNE	FIERS TRUCKING & EXCAVATING, Charles P. Fiers, Jr., d/b/a, Coal Valley, IL
FILN	FILE, CLARENCE, REFRIGERATED LINE, Clarence File, d/b/a, Tower Hill, IL
FINL	FINCH, LEWIS D., Keithsburg, IL
FICQ	FINCH, N. E., CO., Peoria, IL

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FING	FINKENBINDER, GLENN, Cornell, IL
FINRE	FINLEY, ROBERT FRANK, Danville, IL
FCAQ	FISHEL TRUCKING, Charles Fishel and Kathleen Fishel, d/b/a, Beardstown, IL
FTSK	FITSKI INC., Chicago, IL
FTZJ	FITZPATRICK, JOSEPH B., Wilmington, IL
FZPR	FITZPATRICK, ROBERT M., Custer Park, IL
FVEM	5 M TRUCKING & LEASING CO., Howard Murphy, d/b/a, Mt. Prospect, IL
FMW	FMW, INC., Pecatonica, IL
FGGT	FLAGG TRCKING AND REPAIR, INC., Springfield, IL
FLMF	FLAMMANG, F. M., COMPANY, Chicago, IL
FLSQ	FLASH INTERSTATE DELIVERY SYSTEM, INC., Cicero, IL
FLHM	FLASH MESSENGER SERVICE, INC., Chicago, IL
FTUL	FLATT, TRUMAN L., & SONS CO., INC., Springfield, IL
FLRL	FLEET-RAIL, INC., Westmont, IL
FLWE	FLEETWAY EXPRESS, INC., Glen Ellyn, IL
FLSD	FLESCH, DONALD A., Oconee, IL
FLJE	FLESSNER, JOHN F., Dewey, IL
FXWT	FLEXWAY TRUCKING, INC., St. Louis, MO
FLOI	FLOIT SAND AND GRAVEL COMPANY, Sycamore, IL
FLWS	FLOWERS TRUCK SERVICE, Ronald Claude Flowers, d/b/a, Murphysboro, IL
FSTH	FOGERSON TRUCKING, Thomas B. Fogerson, Sr. and Thomas B. Fogerson, Jr., d/b/a, Decatur, IL
FLBT	FOLKERTS BROS. TRUCKING, INC., Flanagan, IL
FLKM	FOLKERTS TRANSFER, INC., Long Point, IL
FXTE	FOLKERTS, ELLERD, INC., Cicero, IL
FODS	FOLLRATH DELIVERY SEVICE, INC., Melrose Park, IL
FZJT	FOLTZ, JIM, TRUCKING, James R. Foltz, d/b/a, Prophetstown, IL
FMBL	FOMBELLE, ROBERT L., Decatur, IL
FOTY	FOOTE, RALPH AND STANLEY, Ralph I. Foote and Stanley W. Foote, d/b/a, Peru, IL
FORE	FORE WAY EXPRESS, INC., Wausau, WI
FRJQ	FORNEY, RAY J., INC., Ashton, IL
FTIL	FORREST TRUCKING, LTD., Roselle, IL
FTDQ	FORT DEARBORN CARTAGE CO., Chicago, IL
FTTQ	FORT TRANSFER CO., Morton, IL
FOTQ	FORTIN TRUCKING, Tom Fortin, d/b/a, Beaverville, IL
FSHY	FOSS, HENRY, Metropolis, IL
FSTJ	FOSTER TRANSFER, INC., Rockford, IL
FOCE	FOUR COLOR EXPRESS, INC., Winthrop Harbor, IL
FBGS	FOWLER BOTTLE GAS SERVICE, INC., Fowler, IN
FXTP	FOX TRANSPORT CO., Paxton, IL
FXTW	FOX TRANSPORTATION, INC., Racine, WI
FRSO	FRANCH & SONS TRUCKING, INC., Addison, IL
FRAS	FRANCOIS TRUCKING, INC., Centralia, IL
FRJM	FRANEY, JOHN M., Chatsworth, IL
FNKE	FRANKIE, BRIAN L., TRUCKING, INC., Thompsonville, IL
FRKQ	FRANKLIN CARTAGE COMPANY, INCORPORATED, Chicago, IL
FRAJ	FRATE SERVICE, INC., East Peoria, IL
FDNO	FRED, NORMAN, Leslie Norman Fred, d/b/a, De Soto, IL
FTSP	FREEDOM TRANSPORT CORPORATION, West Frankfort, IL
FLDJ	FREELAND, JERRY G., Vandalia, IL
FRGL	FREEMAN, GARY L., Sycamore, IL
FREA	FREEPORT TRANSPORT, INC., Freeport, PA
FSPI	FREIGHT SPECIALIST, INC., Oak Brook, IL
FRER	FRERICHS FREIGHT LINES, William F. Frerichs & Robert L. Frerichs, d/b/a, Belleville, IL
FTLN	FRIEDERS TRUCKING, INC., Plainfield, IL
FRIP	FRIETSCH, R., Roy G. Frietsch, d/b/a, Peoria, IL
FRIO	FRIGO, N., TRUCKING, INC., Midlothian, IL
FCSC	FRISCH CONTRACTING SERVICE CO., INC., Cary, IL
FKEL	FRISK, KENNETH L., Atkinson, IL
FRYM	FRY, MARVIN R., Jerseyville, IL
FUEL	FUEL CARRIERS, INC., St. Charles, MO
FSIT	FULL SERVICE TRUCKING, INC., Blue Island, IL
FMTS	FULLERTON MOTOR TRUCK SERVICE, INC., Chicago, IL
FUDT	FULMER, DONALD, TRUCKING, Donald Fulmer, d/b/a, Melrose Park, IL
FMSC	FULSANG'S MOTOR SERVICE, INC., Chicago, IL
FULI	FULTRAN, INC., Northbrook, IL
FNKR	FUNK, ROLAND, Palatine, IL
FVTK	FUNK, VERLAN, TRUCK SERVICE, INC., Freeburg, IL
FGCO	FURRY GRAIN CO. D.K.B., INC., Matloon, IL
FUTY	FUTHEY TRUCKING, Richard N. Futhey, d/b/a, Golden, IL
GADL	G & D TRANSPORTATION, INC., Creve Coeur, IL
GNDQ	G & D TRUCKING, INC., Morris, IL
GAGP	G & G EXPRESS, INC., Streamwood, IL

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@Carrier "Alpha" Code	
GGIL	G & G TRANSPORT, Nicholas S. Manno, d/b/a, Chicago, IL
GNJO	G & J FERTILIZER COMPANY, McNabb, IL
GGCC	G.G. CONSTRUCTION COMPANY, German E. Gomez, d/b/a, Orland Park, IL
GFLR	GAFFNEY, LEROY, Palymra, IL
GLCW	GALAXY C. W., INC., McHenry, IL
GALG	GALLAGHER BROTHERS, Lawrence Gallagher, Stephen Gallagher and Daniel Gallagher, d/b/a, Peotone, IL
GJGC	GALLICHIO, J. G., COMPANY, Frank J. Gallichio, d/b/a, Calumet City, IL
GLOY	GALLOWAY, LLOYD, Newton, IL
GAMQ	GAMMON, C. D., COMPANY, Addison, IL
GNLF	GANGLOFF TRUCKING, Douglas J. Gangloff, d/b/a, Peoria, IL
GCIR	GARCIA TRUCKING, INC., Schaumburg, IL
GARC	GARCIA, B., TRUCKING CO., Fairmont City, IL
GMAN	GARMAN TRUCKING COMPANY, Mildred Garman and Robert D. Scott, d/b/a, Fairfield, IL
GROH	GARO ENTERPRISES, INC., Niles, IL
GIRM	GARRISON, RAYMOND L., Carrollton, IL
GWLS	GARROW, L. S., & SONS, INC., Serena, IL
GTFO	GARY TRANSFER COMPANY, INC., Gary, IN
GAZA	GARZA TRANSPORTATION, INC., Hinsdale, IL
GAEC	GATES, CHARLES, Pittsfield, IL
GWFR	GATEWAY FREIGHTLINE, INC., East Peoria, IL
GDTE	GAUNT, DICK, TRUCKING & EXCAVATING, INC., Washington, IL
GYLD	GAYEDEN, LIMITED, Zion, IL
GEDD	GEDDES, R. C., INC., Rockford, IL
GHRK	GEHRKE, GARLAND, TRUCKING, INC., Lincoln, IL
GEGR	GEIGER TERMINAL COMPANY, Berwyn, IL
GNCS	GENCOM SERVICES, Peter Jeffrey, d/b/a, Wheeling, IL
GECM	GENERAL COMMODITIES TRANSPORT, INC., Chicago Ridge, IL
GETR	GENERAL TRANSFER COMPANY, Decatur, IL
GTMS	GENISIS TRANSPORTATION SYSTEMS, INC., Brookfield, IL
GNTT	GENTILINI, DANTE, TRUCKING, INC., West Chicago, IL
GRMQ	GERARDO & SON MOTOR SERVICE, INC., Rosemont, IL
GEBS	GERBER TRUCK SERVICE, INC., Belleville, IL
GRRG	GERDES, ROGER C., Saunemin, IL
GJKW	GERMANN, JAKE W., Woodlawn, IL
GLMW	GEROLD MOVING & WAREHOUSE CO., Belleville, IL
GE2T	GETZ TRUCKING, Jack D. Getz, Jeff D. Getz and Jody L. Getz, d/b/a, Findlay, IL
GFCT	GFC TRUCKING CORPORATION, Paramus, NJ
GIBQ	GIBSON TRANSPORTATION, INC., Onarga, IL
GIBH	GIBSON, HUGH H., Onarga, IL
GLID	GILLILAND, James W. Woodrow & Tommy W. Gilliland, d/b/a, Walnut Hill, IL
GINF	GINGERICH FARMS, Elva Gingerich, Edward Gingerich and Dannie Gingerich, d/b/a, Sullivan, IL
GGRO	GINGRICH, ROSS, Roanoke, IL
GIRT	GIRTON BROS., INC., Brazil, IN
GDFS	GLENDENNING FARM SERVICE, George B., III, Terry S., Todd A., and Brett A. Glendenning, d/b/a, Stillman Valley, IL
GLET	GLENNON TRANSPORTS, INC., St. Louis, MO
GLVM	GLENVIEW MATERIAL CO., INC., Glenview, IL
GNAK	GNA TRUCKING, INC., Palos Park, IL
GOTV	GOATLEY TRUCKING SERVICE, Wilbur Goatley and David Goatley, d/b/a, Pana, IL
GDBQ	GODBOUT DELIVERY SERVICE, INC., Blue Island, IL
GOEB	GOEBEL BROS., Norman Goebel & Wilbur Goebel, d/b/a, Dorsey, IL
GKNT	GOEKEN TRUCKING, Curtis J. Goeken, d/b/a, Green Valley, IL
GMHE	GOEMAN, HENRY E., Fieldon, IL
GOEC	GOESTENKORS EXCAVATING, James L. Goestenkors, d/b/a, Pocahontas, IL
GOFT	GOFF, JAMES W., Biggsville, IL
GDEP	GOLD ENTERPRISE, INC., Chicago Heights, IL
GBGQ	GOLDBERG, M., CARTAGE, INC., Chicago, IL
GLPE	GOLDEN PYRAMID ENTERPRISES, INC., Blue Island, IL
GOLM	GOLDMAN, RICKY D., Somonauk, IL
GNGM	GOODING, MAE E., Belleville, IL
GDNJ	GOODMAN, RANDALL JOE, DELIVERY SEVICE, Randall Joe Goodman, d/b/a, Carlinville, IL
GSVT	GOODMAN, STEVE, TRUCKING & EXCAVATING, Steven Russell Goodman, d/b/a, Lincoln, IL
GVTF	GOODMAN, V., TRANSFER AND GARAGE, Walter Goodman and Larry Goodman, d/b/a, Lincoln, IL
GORI	GORRELL, WILLIAM, TRUCKING, William J. Gorrell, d/b/a, Bement, IL
GHDS	GOTOH DISTRIBUTION SERVICES, INC., Bensenville, IL
GDSN	GRACE DISTRIBUTION SERVICES, INC., Duncan, SC
GRIQ	GRADEI'S EXPRESS CO., INC., Chicago, IL
GRFA	GRAF-AIR FREIGHT, INC., Chicago, IL
GRHD	GRAHAM, DALE, L., Medora, IL
GRHI	GRAHAM, H. P., CONSTRUCTION COMPANY, INC., Joliet, IL
GRHO	GRAHAM, STANFORD C., Moline, IL

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Carrier "Alpha" Code	
GRII	GRAMMER INDUSTRIES, INC., Grammer, IN
GRNL	GRANE TRANSPORTATION LINES, LTD., Chicago, IL
GRPE	GRAPHIC ARTS EXPRESS, INC., Oregon, IL
GBRH	GRAY BROTHERS, Oliver Gray and John C. Gray, d/b/a, Godfrey, IL
GRYJ	GRAY, JACK, TRANSPORT, INC., Gary, IN
GRRO	GRAY, ROBERT D., Lewistown, IL
GLBW	GREAT LAKES BULK SERVICE, INC., Remington, IN
GRLK	GREAT LAKES TERMINAL & TRANSPORT CORPORATION, Chicago, IL
GCOC	GRECO CONTRACTORS, INC., Des Plaines, IL
GNTS	GREEN TRUCKING SERVICE, INC., Mt. Vernon, IL
GNRO	GREENE, RICHARD L., Wapella, IL
GRNM	GREENVIEW MESSENGER SERVICE, INC., Des Plaines, IL
GREO	GREGORY MOTOR EXPRESS, William Noel, d/b/a, Chicago, IL
GGTY	GREGSON TRUCKING, Glen Gregson, d/b/a, Waterloo, IL
GCLJ	GREGSON, CLETUS J., Waterloo, IL
GMOS	GRIFFIN MOTOR SERVICE, Clarence Griffin and Patrick R. Griffin, d/b/a, Chicago, IL
GPPF	GRIPP, FRANK, Annawan, IL
GSCO	GROMANN SERVICE CO. - TRANSPORT, Mendota, IL
GRCC	GROSS COMMON CARRIER, INC., Wisconsin Rapids, WI
GTHS	GROTHAUS TRUCKING, Richard P. Grothaus, d/b/a, Plainview, IL
GRHC	GRR'L, INC., Blue Island, IL
GUAF	GUARANTEED AIR FREIGHT FORWARDING, INC., Mt. Vernon, IL
GUEP	GUARDIAN EXPRESS SERVICE, INC., Aurora, IL
GUTM	GUISEWITE TRUCKING, Edward K. Guisewite, d/b/a, Mt. Carmel, IL
GULI	GULLY TRANSPORTATION, INC., Quincy, IL
GUSQ	GUS MOTOR SERVICE, INC., Evergreen Park, IL
GUFY	GUSTAFSON, FLOYD, Floyd D. Gustafson, d/b/a, Walnut, IL
GWIL	GWILLIM TRUCKING, Nelson Gwillim, Richard Gwillim and Jimmy L. Gwillim, d/b/a, Carlinville, IL
HHSG	H & H SAND & GRAVEL HAULERS COMPANY, INC., Lake Zurich, IL
HHTR	H & H TRANSPORT, INC., Morrisonville, IL
HJTL	H & J TRUCK LINE, INC., Nashville, TN
HSTN	H & S TRUCKING, Patricia Hastings & Steven Solace, d/b/a, Winslow, IL
HSTJ	H & S TRUCKING, Harlan Hadden, d/b/a, Oakwood, IL
HAWM	H & W MOTOR EXPRESS COMPANY, Dubuque, IA
HLNM	H L & M TRANSPORT, INC., Yale, IL
HAMQ	H. & M. TRUCKING CO., Clinton, IL
HTGJ	H. TRUCKING, INC., Jerseyville, IL
HSIC	H.A.S.T.E., INC., Decatur, IL
HBCG	H.B.C. TRUCKING, INC., Cicero, IL
HCTH	H.C. TRUCKING, INC., Burbank, IL
HFPE	H.F.P. ENTERPRISES, INC., Chicago, IL
HPMS	H.P. MOTOR SERVICE, INC., Chicago, IL
HRBJ	HAAN, ROBERT J., CARTAGE, Robert J. Haan, d/b/a, Mt. Morris, IL
HBLR	HABETLER, ROBERT, Schaumburg, IL
HACK	HACKEL CARTAGE, INC., Evergreen Park, IL
HCKR	HACKER TRUCKING, Michael Hacker, d/b/a, Plainfield, IL
HGEM	HAGEMAN TRUCKING, Kenneth Fred Hageman and Kenneth J. Hageman, d/b/a, Plano, IL
HGMJ	HAGEMANN TRUCKING, Michael Hagemann and Jeffrey Hagemann, d/b/a, Freeport, IL
HAGQ	HAGEMASTER MOTOR SERVICE, INC., Chicago Heights, IL
HGGB	HAGGERTY BROTHERS, Donald L. Haggerty and Franklin Dale Haggerty, d/b/a, Ellisville, IL
HAIO	HAINES TRUCKING, INC., Oblong, IL
HLAH	HALL & HACKETT, INC., Tuscola, IL
HLWL	HALL, WILLIAM D., Pana, IL
HLWY	HALLWAY, INC., Greenview, IL
HAMJ	HAMMOND TRANSPORT COMPANY, Chicago, IL
HMPD	HAMPSON, DALE, TRUCKING, Dale Hampson and Judith Hampson, d/b/a, Streator, IL
HFDS	HAMSON FEED STORE, Marvin W. Hamson, d/b/a, Belle River, IL
HDNL	HANNA, DON L., Alexis, IL
HNCF	HANSEN CUSTOM FRAMING, Donald D. Hansen, d/b/a, Melvin, IL
HAPM	HAPP MOVERS, INC., Glenview, IL
HRCJ	HARDWICK, C. J., Hillview, IL
HRWH	HARDWICK, HOWARD, Howard Clinton Hardwick, d/b/a, Carrollton, IL
HRDA	HARLAN, DAYTON, Mt. Vernon, IL
HAGI	HARMAN, GILBERT, Trivoli, IL
HAAN	HARMON, AMBROSE, & SONS, Paul R. Harmon, Joseph A. Harmon and David J. Harmon, d/b/a, Utica, IL
HRMY	HARMONY TRANSPORT, INC., Marengo, IL
HTGH	HARMS TRUCKING CO., St. Joseph, IL
HRMS	HARMS TRUCKING, Timothy C. Harms, d/b/a, Plainfield, IL
HRLT	HARPER'S RED LINE TRANFER CO., Joliet, IL
HPWC	HARPER, WILLIAM, CARTAGE, William Harper, d/b/a, Maywood, IL

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Carrier "Alpha" Code	
HRWF	HARRAWOOD FARMS, Raymond E. Harrawood, Stanley Harrawood and David Harrawood, d/b/a, Galatia, IL
HRIC	HARRIS TRUCKING, INC., Palos Park, IL
HGAQ	HARRIS, GERALD A., Cowden, IL
HLCG	HARRIS, LEE, TRUCKING CO., Lee Harris, d/b/a, Chicago, IL
HRIR	HARRIS, R. G., TRUCKING COMPANY, Robert G. Harris, d/b/a, Peoria, IL
HTAC	HART'S TERMINAL & CARTAGE CO., Libertyville, IL
HRGC	HART, GLEN C., SR., Franklin Grove, IL
HRMC	HARTMAN TRUCKING CO., INC., Summit, IL
HMCF	HARTMAN, CLIFF, Hickory Hills, IL
HMNL	HARTMAN, LOREN T., Waverly, IL
HMWB	HARTMANN, WILMER, Chester, IL
HABG	HARTRICH BROTHERS FEED AND GRAIN, INC., St. Marie, IL
HRFI	HARTSTIRN, ROBERT F., Fairview, IL
HAED	HARTWIG, EDWARD R., Henry, IL
HVDT	HARVARD TRANSFER CO., Harvard, IL
HASN	HAS TRUCKING, INC., Cedar Rapids, IA
HSME	HASEMAN, EDWARD, TRUCKING CO., Joseph E. Elms, d/b/a, Palatine, IL
HSLR	HASSELMAN, RALPH, Tonica, IL
HSSW	HASSETT STORAGE WAREHOUSES, INC., Elmhurst, IL
HSTE	HASTIE TRUCKING, Donald Hastie and Robert L. Hastie, d/b/a, Cave-In-Rock, IL
HADA	HATCHER, DAN, TRUCKING, Danny R. Hatcher, d/b/a, Winchester, IL
HAUV	HAUL TRANSPORT OF VA., INC., Milwaukee, WI
HAUS	HAUSER'S TRUCKING, Neal J. Hauser & Barbara A. Hauser, d/b/a, Elburn, IL
HAYG	HAYES, LYLE E., Kings, IL
HYND	HAYNES TRANSFER, Danny D. Haynes, d/b/a, Clinton, IL
HAYJ	HAYS TRUCKING, Leslie M. Hays, d/b/a, Carlinville, IL
HAZY	HAZ WAY DELIVERY SERVICE, Mary Ann T. Hazlett, d/b/a, Park Ridge, IL
HMJC	HEAD, MARTIN C., Shawneetown, IL
HEAP	HEAP TRUCKING, Charles Heap, d/b/a, LeRoy, IL
HECM	HECATHORN, MARGARET, Earlville, IL
HREN	HEEREN, KARL, FERTILIZER SERVICE, Karl Heeren, d/b/a, Winnebago, IL
HCG	HEIDEL'S CARTAGE CO., INC., Park Ridge, IL
HEDH	HEIDENREICH TRUCKING COMPANY, Bolingbrook, IL
HLDD	HEIL, DONALD, MR., Marissa, IL
HIZR	HEINZ BROS. TRUCKING, INC., Brimfield, IL
HEIA	HEITMAN TRUCKING COMPANY, Manhattan, IL
HEIT	HEITZIG, HERBERT J., Fieldon, IL
HMTQ	HELDERS MOTOR SERVICE CO., Chicago, IL
HEFJ	HELFRICH, JOHN, TRUCKING, John Helfrich, d/b/a, Rochelle, IL
HKTY	HELKE, TERRY, Coal Valley, IL
HEDN	HENDERSON, EARL L., TRUCKING COMPANY, Salem, IL
HEDR	HENDREN TRUCKING, Kenneth M. Hendren, d/b/a, LeRoy, IL
HEXV	HENNE EXCAVATING & CONSTRUCTION CO., Robert Henne, d/b/a, Salem, IL
HNTC	HENNES, JOHN, TRUCKING COMPANY, Milwaukee, WI
HNNF	HENNINGS FARMS, Larry Hennings and Don Hennings, Jr., d/b/a, Shelbyville, IL
HNRQ	HENRY, VERNON, INC. (A Delaware Corp.), La Rose, IL
HNBG	HENSON AND BLAKEMAN GRAIN, Harold Henson, Jr. and James D. Blakeman, d/b/a, Pawnee, IL
HERN	HENTHORN CARTAGE, INC., Chicago, IL
HEPP	HEPP TRUCK SERVICE, Betty Rose Hepp, d/b/a, Hecker, IL
HEPQ	HEPPE, ED, George Edward Heppe, d/b/a, Homer, IL
HERI	HERBERT TRUCKING, INC., Macon, IL
HRBN	HERDER BROS., INC., Frankfort, IL
HLIE	HERING, LEWIS, ELEVATOR CO., Bellmont, IL
HERM	HERMAN BROS., INC., Omaha, NE
HRJC	HERNANDEZ, J., COMPANY, Woodstock, IL
HEMB	HERRMAN BROS., E. H. Herrman & R. N. Herrman, d/b/a, Manito, IL
HSTB	HESS TRUCKING, B. Kevin Hess and Ricky L. Hess, d/b/a, Georgetown, IL
HTGD	HESS TRUCKING, INC., Des Plaines, IL
HBBR	HESSELBACHER BROS., David Hesselbacher and John Hesselbacher, d/b/a, Scales Mound, IL
HEUB	HEUERMAN BROS., Oliver Heuerman, d/b/a, Teutopolis, IL
HEUF	HEUERMAN, FLOYD, TRUCKING, Floyd Heuerman, d/b/a, Effingham, IL
HETV	HEIL TRUCKING, INC., Prairie City, IL
HIGQ	HIGGINS CONSTRUCTION COMPANY, INC., Streator, IL
HTRD	HIGHLAND-TROY READY MIX MATERIAL DIVISION, INC., Highland, IL
HLBB	HILGENBRINCK BROS., Robert A. Hilgenbrinck, William A. Hilgenbrinck and Donald H. Hilgenbrinck, d/b/a, Ursa, IL
HTPD	HILL TRANSPORT, INC., Chicago, IL
HTAF	HILL TRUCKING CO., S. E. Hill, d/b/a, Hoffman, IL
HJTI	HILL, JOHN, TRUCK SERVICE, John M. Hill and George J. Hill, d/b/a, Dorchester, IL
HILG	HILLER TRUCKING, John Hiller, d/b/a, Argyle, WI
HSMO	HILLIER STORAGE & MOVING COMPANY, Springfield, IL

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
(Operating under jurisdiction of Illinois Commerce Commission)

⊕Carrier "Alpha" Code	
HNEG	HENDS EXCAVATING, Don Hinds, d/b/a, Sugar Grove, IL
HINP	HINKLE PRODUCE, Clifford Hinkle and Daniel Hinkle, d/b/a, Cissna Park, IL
HRHR	HINRICHS, RUSSELL, Petersburg, IL
HCLD	HINSDALE CARTAGE, LTD., Downers Grove, IL
HNDV	HINSHAW DELIVERY SERVICE, INC., Channahon, IL
HINT	HINTZ TRUCKING, INC., Elgin, IL
HTZF	HINTZSCHE FARMS, Robert Hintzsche and Gary Hintzsche, d/b/a, Plainfield, IL
HXTG	HIXSON TRUCKING, INC., Ivesdale, IL
HOKM	HOCKMAN, GARY L., Pearl City, IL
HGTD	HODGES, ED, TRUCKING, INC., Addison, IL
HWNS	HOEKSTRA, WILLIAM, AND SONS, INC., St. Anne, IL
HOEJ	HOEL, JAMES J., Oakland, IL
HOER	HOERBERT TRUCKING, Mark A. Hoerbert, d/b/a, Delavan, IL
HDVE	HOERR, DAVID, EXCAVATING, David Hoerr, Sr., David Hoerr, Jr., and Daniel Hoerr, d/b/a, Peoria, IL
HOFQ	HOFF BROS. CARTAGE, INC., Chicago, IL
HFFM	HOFFMAN TRUCKING, Scott G. Hoffman, Terry K. Hoffman and Kyle J. Hoffman, d/b/a, Maroa, IL
HOLF	HOFFMAN, LENNY, EXCAVATING, INC., Wilmette, IL
HFES	HOFSTATTER, EDWARD, AND SONS, Edward Hofstatter, Alan Hofstatter and Herman Hofstatter, d/b/a, Lowpoint, IL
HGRA	HOGAN GRAIN, INC., Macon, IL
HGAN	HOGAN TRUCKING, A. F. Hogan, d/b/a, Seymour, IL
HSAL	HOLESINGER, ALLEN, Fulton, IL
HDTP	HOLLAND TRUCKING, Dan J. Holland, d/b/a, Utica, IL
HLHR	HOLLAND, HAROLD, TRUCKING CO., Harold Holland, d/b/a, Lake Zurich, IL
HLEV	HOLLANDER EXPRESS & VAN COMPANY, INC., Elk Grove Village, IL
HLYQ	HOLLEY TRANSFER, INC., Plano, IL
HOME	HOME TRANSPORTATION COMPANY, INC., Marietta, GA
HOMH	HOMRIGHAUSEN, HENRY, JR., Red Bud, IL
HODF	HOOD, FRED T., Fred T. Hook and Robert Gene Hood, d/b/a, Downs, IL
HORT	HORN TRUCKING CO., An Illinois Corporation, Highland, IL
HORA	HORN, ALBERT, TRUCKING, INC., Oakford, IL
HOJW	HORN, JOHN W., John W. Horn and Eugene Horn, d/b/a, Petersburg, IL
HNMQ	HORNSEY MOVING & STORAGE CO. (An Illinois Corporation), Wood River, IL
HTIQ	HORTON TRUCKING, Jay G. Horton, d/b/a, Tremont, IL
HTNI	HORTON TRUCKING, INC., Tremont, IL
HOEM	HORTON, EMMETT E., New Canton, IL
HTLM	HOT LINE MESSENGER, INC., Chicago, IL
HDSQ	HOWARD DELIVERY SERVICE, INC., Broadview, IL
HBVS	HOWELL BROTHERS VAN SERVICE, Yvonne Howell, d/b/a, Chicago, IL
HWTG	HOWLAND TRUCKING SERVICE, Gary L. Howland, d/b/a, Kampsville, IL
HBTI	HUB TRUCKING CO., INC., Rochelle, IL
HBCI	HUBBARD CARTAGE, INC., Chicago, IL
HUKS	HUCKSTORF, INC., Algonquin, IL
HUCM	HUDDLESON, CLIFFORD M., Fairmount, IL
HUEB	HUELLINGHOFF BROS., INC., Union, MO
HUEY	HUEY LUMBER CO., Wilbur Huey and Timothy Lee Huey, d/b/a, Arenzville, IL
HUHB	HUGHES BROTHERS TRANSPORTATION, INC., Niles, IL
HTHA	HUGHES, THOMAS A., Herscher, IL
HUZN	HUIZINGA, J., CARTAGE CO., INC., Cicero, IL
HZIQ	HUIZINGA, RICHARD, Chicago, IL
HULC	HULCHER TRUCKING COMPANY, Virden, IL
HTIM	HULL TRUCKING, A. Eugene Hull and Ika "Bud" Hull, d/b/a, Mason City, IL
HPRA	HUMPHREY, RAY, Dixon, IL
HUSV	HUNT SUPER SERVICE, INC., Bradley, IL
DGTQ	HUNT SUPER SERVICE, INC., Operator of Douglas Transit, Inc., Bradley, IL
HUTG	HURD TRUCKING, Dennis Hurd, d/b/a, Chicago, IL
HURN	HURON MOTOR, INC., Bridgeview, IL
HURP	HURT TRUCKING, Donna K. Hurt, d/b/a, Princeville, IL
HTGT	HUTCHINSON TRUCKING, Wilbur F. Hutchinson & Darrell W. Hutchinson, d/b/a, Atkinson, IL
HYMF	HYMAN FREIGHTWAYS, INC., Roseville, MN
IBID	IBID HAULING, Carl V. Bongiovanni, d/b/a, Arlington Heights, IL
IDAL	IDEAL CARTAGE COMPANY, Stanley Macey and Joseph Mihalic, d/b/a, Chicago, IL
IGNT	IGNOFFO TRUCKING CO. (An Illinois Corporation), Chicago, IL
ILAC	ILLIANA CONSTRUCTION CO., INC., Urbana, IL
ILLD	ILLIANA DISTRIBUTION SYSTEM, INC., Crete, IL
ILIQ	ILLINI EXPRESS, INCORPORATED, Round Lake, IL
ILNQ	ILLINI STATE TRUCKING CO., Thornton, IL
ILBK	ILLINOIS BULK CARRIER, INC., Thornton, IL
ILLQ	ILLINOIS CARGO, INC., Hazel Crest, IL
ILCG	ILLINOIS CARTAGE COMPANY, Chicago, IL
ILFS	ILLINOIS FREIGHT SYSTEM, INC., East Alton, IL
IFPS	ILLINOIS FRUIT & PRODUCE CORP., Streator, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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◎ Carrier "Alpha" Code	
ILGN	ILLIOPOLIS GRAIN CO., Illiopolis, IL
IMMY	IMMY TRUCKING CO., Hoffman, IL
INBI	IN BULK, INC., Ottawa, IL
INAJ	INA LINE, THE, Jay E. Miller, d/b/a, Ina, IL
IDEC	INDEPENDENT CARRIERS, INC., Morton, IL
ICKT	INDIAN CREEK TRUCKING, INC., Earlville, IL
INLI	INLAND TRANSPORT & TERMINAL, INC., Chicago, IL
INOR	INO TRUCKING, INC., Melrose Park, IL
INKT	INTANK TRUCKING, INC., LaGrange, IL
ICON	INTERCON CARTAGE, INC., Northlake, IL
ITKN	INTERFACE TRUCKING CORPORATION, Wood River, IL
IEXP	INTERSTATE EXPRESS, INC., St. Paul, MN
IOGC	IOERGER, CLIFFORD, Wenona, IL
IAJE	IOWA-ILLINOIS EXPRESS, LTD., Moline, IL
IRQS	IROQUOIS TRUCKING CO., INC., Gilman, IL
IMSQ	IRV'S MOTOR SERVICE, INC., Chicago, IL
ISDM	ISLEY, DENNIS M., Shelbyville, IL
ITTC	ITT CARTAGE, INC., Bridgeview, IL
IVER	IVERSEN TRUCKING, Gilbert R. Iversen, d/b/a, Paw Paw, IL
JAAR	J & A CARTAGE, INC. (An Illinois Corporation), Lyons, IL
JNBG	J & B TRUCKING, Everett H. Jones, d/b/a, Pana, IL
JNDI	J & D SERVICES, INC., Mattoon, IL
JNJM	J & J MOTOR SERVICE, INC., Chicago, IL
JPTM	J & P TRUCKING COMPANY, Chicago, IL
JRTY	J & R TRUCKING, John Wayne Johnson, d/b/a, Redding, CA
JDMI	J D M ENTERPRISES, INC., Big Rock, IL
JJSE	J J SERVICES, John Lesmeister, d/b/a, Chicago, IL
JMTT	J-M TRANSPORTS, INC., Newark, IL
JAFI	J. A. FRATE, INC., Crystal Lake, IL
JBNT	J. B. TRUCKING COMPANY, Jeanette Brown, d/b/a, Chicago, IL
JCBI	J. C. BLACKTOP, INC., Wood Dale, IL
JCMS	J. C. MOTOR SERVICE, John C. Hovancak, d/b/a, South Holland, IL
JCTI	J. C. TRUCKING, INC., Elmhurst, IL
JPVL	J. P. VAN LINES, INC., Elk Grove, IL
JWTK	J. W. TRUCKING, Joseph Wightman, d/b/a, Round Lake, IL
JCHN	J.-C. HAULING CO., Millstadt, IL
JMUN	J.A.M. TRUCKING, INC., Wood Dale, IL
JCWL	J.C.W. TRUCKING, INC., Tolono, IL
JDLL	J.D.L. EXPRESS, INC., Lombard, IL
JJTE	J.J.T. TRUCKING, INCORPORATED, Elk Grove Village, IL
JKTR	J.K. TRUCKING, John Kocisko, d/b/a, Schiller Park, IL
JLBC	J.L.B. CARTAGE COMPANY, Naperville, IL
JLGT	J.L.G. TRUCKING, INC., Hoffman Estates, IL
JRTT	J.R.'S TRANSPORT, Michael L. Biancofiori, Jr., d/b/a, Franklin Park, IL
JSVN	JACKSON STORAGE & VAN COMPANY, INC., LaGrange, IL
JAID	JACOBS, I., DELIVERY SERVICE, Isom Jacobs, Jr., d/b/a, Chicago, IL
JCJR	JACOBS, JERRY, TRUCKING, INC., St. Charles, IL
JBRD	JACOBS, RAYMOND DEAN, Ancona, IL
JCHR	JACOBSEN, H. & R., INC., Momence, IL
JTEY	JACOBSEN, TERRY, Morris, IL
JQTG	JACQUELINE TRUCKING, INC., Glencoe, IL
JADB	JADE CARTAGE, INC., Brookfield, IL
JAEW	JAEGLE, WILLIAM J., Tonica, IL
JRKD	JAGER, RICK, DELIVERY SERVICE, INC., McHenry, IL
JGEL	JAGUAR EXPRESS, LTD., Naperville, IL
JWTF	JAMESWAY TRANSFER, INC., Western Springs, IL
JMRQ	JAN'S MOTOR SERVICE, INC., Alsip, IL
JSEQ	JANSEN TRUCK SERVICE, Henry Jansen, d/b/a, Albers, IL
JADS	JARDEN, C. RICHARD, TRUCK SERVICE, C. Richard Jarden, d/b/a, Bunker Hill, IL
JABE	JAY-BEE CARTAGE CO., INC., Chicago, IL
JAYM	JAY-MAR LEASING, INC., Burbank, IL
JAYC	JAY-SEE CARTAGE CO., Chicago, IL
JEFP	JEFFERSON PARK CARTAGE, J. Michael Fletcher, d/b/a, Evanston, IL
JFMS	JEFFREY'S MOTOR SERVICE, Jeffrey A. Zarndt, d/b/a, Aurora, IL
JFCT	JEFFRIES, CHARLES, & SON TRUCKING, INC. (A Delaware Corporation), Cambridge, IL
JERL	JEFFRIES, R. L., TRUCKING CO., INC., Evansville, IN
JKNQ	JENKINS & KEY MOVING & STORAGE, INC., Urbana, IL
JRNT	JENSEN, RON, TRUCKING, Ron Jensen, d/b/a, Dundee, IL
JTTQ	JET TRANSIT CO., Wayne Molen, d/b/a, Virden, IL
JTKG	JETTA TRUCKING, INC., Park Ridge, IL
JFES	JIFFY ERRAND SERVICE, INC., Peoria, IL
JNEC	JIM N E SERVICES, INC., Elk Grove Village, IL

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ILLINOIS CARRIERS — (Continued)
(Operating under jurisdiction of Illinois Commerce Commission)

@Carrier "Alpha" Code	
JMVT	JMV TRUCKING, INC., Milan, IL
JHAN	JOHANNES TRUCKING, Gary R. Johannes and Herbert J. Johannes, d/b/a, Ashley, IL
JHMS	JOHNSON MOTOR SERVICE, Herman W. Johnson, d/b/a, Chicago, IL
JONF	JOHNSON TRANSFER & FUEL COMPANY, THE, Bloomington, IL
JTKS	JOHNSON TRUCK SERVICE, Steven D. Johnson, d/b/a, Caseyville, IL
JHST	JOHNSON TRUCKING CO., Thomas H. Johnson, d/b/a, McHenry, IL
JOAR	JOHNSON, ARTHUR, CO., Cicero, IL
JODF	JOHNSON, DEANE F., Gilson, IL
JPHS	JOHNSON, P & H, & SONS, Paul E. Johnson and Harold K. Johnson, d/b/a, Momence, IL
JOPA	JOHNSON, P. A., & CO., Broadview, IL
JHRE	JOHNSON, R. E., & SONS, Russell E. Johnson, Gary Johnson and Ronald E. Johnson, d/b/a, Athens, IL
JTHM	JOHNSON, THOMAS M., Woodhull, IL
JSRD	JOHNSRUD TRANSPORT, INC., Ankeny, IA
JOWL	JOHNSTON, WILLARD LEE, Wilmington, IL
JONS	JONES MOTOR CO., INC., Spring City, PA
JTRN	JONES TRANSFER COMPANY, H. Dwight Jones and Robert D. Jones, d/b/a, Centralia, IL
JTLS	JONES TRUCK LINES, INC., Springdale, AR
IVCQ	JONES TRUCK LINES, INC., Operator of Illinois Valley Cartage, Inc., Springdale, AR
JTSJ	JONES TRUCKING SERVICE, Jerry L. Jones, d/b/a, Stewardson, IL
JOTI	JONES, A. C., TRUCKING, INC., Beardstown, IL
JBTI	JONES, BOB, TRUCKING, Robert L. Jones, d/b/a, Olney, IL
JJHE	JONES, JOHN E., Macomb, IL
JSST	JONES, SAM, TRUCKING, Samuel E. Jones, d/b/a, Roundhouse, IL
JMNM	JORSTAD, MILFORD, AND MARK JORSTAD, Morris, IL
JOTL	JOSTES TRUCKING, INC., Argenta, IL
JOCM	JOYCE TRUCKING COMPANY, Chicago Heights, IL
JOYI	JOYNT, LES, & SONS, INC., Dixon, IL
JPNS	JUDGE, P., & SONS, INC., Elizabeth, NJ
JUGL	JUDY, GARY L., Claytonville, IL
JUEG	JUENGER, FLOYD, INC., Mascoutah, IL
KBUK	K & B TRUCKING, Kenneth Hogan, d/b/a, Montello, WI
KNRQ	K & R DELIVERY, INC., Hinsdale, IL
KKON	"K" KONCRETE, INC. (An Illinois Corporation), Wauconda, IL
KLNM	'K' LINE MOTOR SERVICE, INC., Berkeley, IL
KSMS	K'S MOTOR SERVICE, INC., Woodstock, IL
KJGC	K.J.G. CARTAGE, INC., Schaumburg, IL
KABQ	KABBES TRUCKING, Jack Kabbes and Richard Kabbes, d/b/a, Effingham, IL
KAEI	KAHLER, ERVIN, INC., Morton, IL
KMKI	KAISER, MIKE, Michael W. Kaiser, d/b/a, Alexander, IL
KANY	KANEY TRANSPORTATION, INC., Freeport, IL
KNKE	KANKAKEE INDUSTRIAL DISPOSAL, INC., Kankakee, IL
KPET	KAPLAN, E. L., TRUCKING CO., INC., Northbrook, IL
KARD	KARDUX TRANSFER, INC., Muscatine, IA
KRKG	KAREN'S KARTAGE, INC., Chicago, IL
KREN	KAREN'S TRANSPORTATION, INC., Wooddale, IL
KARQ	KARNES, LENDELL, West Frankfort, IL
KATG	KASPER TRUCKING, INC., Poplar Grove, IL
KACE	KATH, CARL E., JR., Morton, IL
KTJW	KATH, JOHN W., Bloomington, IL
KAFM	KAUFMAN GRAIN COMPANY, Calvin Kaufman and Archie Kaufman, d/b/a, Cissna Park, IL
KBCF	KBC FREIGHTWAYS, INC., Burbank, IL
KDRI	KDR, INC., Skokie, IL
KECM	KEENAN TRANSIT CO., Melrose Park, IL
KEMV	KEIM, VICTOR H., INC., Waterloo, IL
KLDT	KELDORN TRUCKING, Donald R. Spence and Terri L. Spence, d/b/a, Chicago Heights, IL
KELL	KELLER TRUCKING COMPANY, INC., Park City, IL
KLOP	KELLER, L., OIL PROPERTIES, INC., Effingham, IL
KEJB	KELLEY, JACK B., INC., Amarillo, TX
KLCG	KELLNER CARTAGE, INCORPORATED, Elk Grove Village, IL
KECC	KELLY, JOHN A., CARTAGE CO., INC., Chicago, IL
KLSF	KELSEY FARMS, Keith Kelsey, d/b/a, Minonk, IL
KMCO	KEMCO TRUCKING, INC., Lake Zurich, IL
KNSG	KEN'S GRAVEL, INC., Naperville, IL
KNCR	KENDALL CARTAGE CO., Owen E. Gillen, d/b/a, Millbrook, IL
KEDL	KENDALL TRUCKING, Larry R. Kendall, d/b/a, Davenport, IA
KNMT	KENNEDY, M., TRUCKING, INC., Bloomingdale, IL
KNLY	KENNELL, LYLE, TRUCKING, Lyle A. Kennell, d/b/a, Benson, IL
KEDI	KENNEY'S DELIVERY, Kenneth Barling and Fred Barling, d/b/a, Bloomington, IL
KWHI	KENT, W. H., INC., Morrisonville, IL
KTKN	KERANS TRUCKING, Robert F. Kerans, d/b/a, Kansas, IL
KEUC	KEROUAC, DONALD, Kankakee, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

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PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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@Carrier "Alpha" Code	
KEAE	KESSEL, A. E., CO., INC., Chicago, IL
KRVM	KETTLE RIVER MECHANICAL, INC., Glen Carbon, IL
KESG	KEYSER, STERLING, Mackinaw, IL
KEXL	KEYSTONE EXCAVATING & LANDFILL CO., Frank and Tessie Loniello, d/b/a, Oak Lawn, IL
KLNQ	KILIAN CORPORATION, THE, Mascoutah, IL
KBAQ	KILLEBREW, BOB A., Hillview, IL
KILE	KILLIAM, EDWIN, Carlinville, IL
KTGC	KIM'S TRUCKING COMPANY, Kimberly A. Keyt, d/b/a, Orland Park, IL
KAKI	KIMES AND KIMES, Fred Peck Kimes & Howard Stanton Kimes, d/b/a, Ottawa, IL
KIML	KIMLER, W. E., Willard E. Kimler, d/b/a, Williamsfield, IL
KIFT	KINDRED FARMS TRUCKING, John W. Kindred and Craig W. Kindred, d/b/a, Chrisman, IL
KIMM	KING'S MILL MESSENGER, James V. Hoffman, Sr., d/b/a, St. Charles, IL
KICA	KING, CLARENCE, CARTAGE, Clarence W. King, d/b/a, Chicago, IL
KIFK	KINGDON, FRANK, TRUCKING, Frank L. Kingdon, d/b/a, Brimfield, IL
KIWY	KINGSWAY TRANSPORT, INC., Algonquin, IL
KICO	KINSELLA CONSTRUCTION CO., Minooka, IL
KIZI	KINZINGER, RICHARD, Waterloo, IL
KIRM	KIRK, MIKE, TRUCKING, Michael K. Kirk, d/b/a, Mattoon, IL
KTKS	KLEIN TRUCK SERVICE, Vincent S. Klein and Clarence W. Klein, d/b/a, Red Bud, IL
KLSI	KLEPACK, STEPHEN H., Elizabeth, IL
KLTH	KLOTH TRUCK & EQUIPMENT CO., Sparta, IL
KLVT	KLOVER TRUCKING COMPANY, Joliet, IL
KBCT	KNAPP, BRUCE C., TRUCKING, Bruce C. Knapp, d/b/a, Goodfield, IL
KNRO	KNECHT, ROSS, TRUCKING, Ross Lee Knecht, d/b/a, Martinsville, IL
KGTK	KNIGHT TRUCKING, William E. Knight and Jeffrey W. Knight, d/b/a, Indianola, IL
KGTR	KNIGHT TRUCKING, Victor Knight, d/b/a, McLeansboro, IL
KNBO	KNOBLAUCH BROS., William Knoblauch and Eugene Knoblauch, d/b/a, Toluca, IL
KBLF	KNOBLOCH FARMS, Wm. A. Knobloch and Keith Knobloch, d/b/a, Wyoming, IL
KNXT	KNOXVILLE TRANSPORT, INC., Knoxville, IL
KHSI	KOCH SERVICE, INC., Wichita, KS
KOHE	KOEHLER TRUCKING, INC., Benson, IL
KOAL	KOEHNE, AL, TRUCKING, Al Koehne, d/b/a, Lockport, IL
KHMQ	KOHL'S MOTOR TRANSFER COMPANY, Chicago, IL
KTKQ	KOHLBRECHER TRUCK SERVICE, Clarence Kohlbrecher, d/b/a, Breese, IL
KLTS	KOLLMAN LANDSCAPING & TRUCKING SERVICE, Darrell L. Kollman, d/b/a, Hillside, IL
KRBO	KRAFT BROTHERS, Dean Kraft, d/b/a, Decatur, IL
KRDI	KRAFT DELIVERY & STORAGE SERVICE, Wayne Warren Kraft & Margaret Mary Kraft, d/b/a, Chicago, IL
KJAI	KRAFT, JOHN A., FERTILIZER, INC., Princeville, IL
KTNP	KRAMER TRANSPORTATION, INC., Wooddale, IL
KRTV	KRANS TRUCKING, George Krans, d/b/a, LaFayette, IL
KRSS	KRAUSS LEASING, INC., Joliet, IL
KRTS	KREIDER TRANSPORTATION SERVICE, INC., Fort Worth, TX
KRES	KRESSER MOTOR SERVICE, INC., Ottawa, IL
KREK	KRETTLER KARTAGE, Frank Krettler, d/b/a, Cary, IL
KROK	KROESCHEL, KENNETH, Kenneth Duane Kroeschel, d/b/a, Medora, IL
KRTQ	KRUGER TRANSFER, INC., Chillicothe, IL
KRUB	KRUMHOLZ, BERNARD, Eureka, IL
KRCQ	KRUMROY CARTAGE, INC., Chicago, IL
KTCI	KTC, INC., Melrose Park, IL
KUHW	KUHN, HARRY W., INC., Wheaton, IL
KUHF	KUHN, LOWELL F., Greenup, IL
LOSV	L & O SERVICE, INC., Vermont, IL
LLOS	L AND L DELIVERY SERVICE, Charles D. Lipari, d/b/a, Chicago, IL
LSSD	L S S D, INC., Griggsville, IL
LNCI	L. & N. CROP SPRAYING, INC., Manteno, IL
LOLF	L. D. L. TRANSFER, INC., Sandwich, IL
LARC	LA ROUSSA CARTAGE, INC., Chicago, IL
LABC	LaBUDA CARTAGE, Mitchell A. Kizior and Adeline P. Kizior, d/b/a, Chicago, IL
LAFA	LAFARY TRUCKING, Clair D. Lafary, d/b/a, Smithfield, IL
LGMS	LaGROU MOTOR SERVICE, INC., Chicago, IL
LCTO	LAKE COUNTY TRANSPORTS, INC., Waukegan, IL
LMFI	LAKE MOTOR FREIGHT, INC. (A Delaware Corporation), LaGrange, IL
LKEI	LAKE-COOK CARTAGE, INC., Waukegan, IL
LAKN	LAKESIDE LEASING, INC., South Holland, IL
LKNE	LAKIN, ERIC, Murrayville, IL
LBSM	LAMBERT, SAM, Pontiac, IL
LMNT	LAMONT TRUCKING, William Lamont, Kenneth E. Lamont & John T. Riley, d/b/a, Crossville, IL
LMPI	LAMPE, R., MOTOR SERVICE, Raymond Walter Lampe, d/b/a, Berwyn, IL
LAPB	LAMPING BLACKTOPPING AND TRUCKING, Edward Lamping, d/b/a, Minooka, IL
LGCG	LANDERS, GENE CRAIG, Marseilles, IL
LNTM	LANDES TRUCKING, INC., Jacksonville, IL

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ILLINOIS CARRIERS — (Continued)
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@Carrier "Alpha" Code	
LANE	LANE TRANSFER, INC., Farmington, IL
LAME	LANGE MOTOR EXPRESS, INC., Woodstock, IL
LANG	LANGE, N., TRUCKING & EXCAVATING, INC., Beecher, IL
LNZB	LANTZ BROTHERS, John J. Lantz, Myron C. Lantz & Raymond E. Lantz, d/b/a, Plainfield, IL
LAZW	LANTZ, WAYNE, Mt. Morris, IL
LAPE	LAPE TRUCKING, Max Lape, d/b/a, Shelbyville, IL
LRCD	LARIMER, CHARLES D., Monmouth, IL
LRBR	LARSEN BROS., James M. Larsen, d/b/a, Dwight, IL
LTRS	LATRONICA & SONS, INC., Chicago, IL
LAVD	LAVERY, DOUG, LIMITED (An Illinois Corporation), Alsip, IL
LWSW	LAWSON, WILLIAM R., Manchester, IL
LCTP	LC TRANSPORT, Robert O. Stamm, d/b/a, Red Bud, IL
LDLI	LEADILL, ERNEST, JR., Franklin, IL
LWCT	LEASEWAY CUSTOMIZED TRANSPORT, INC., Downers Grove, IL
LWYQ	LEASEWAY DELIVERIES, INC., Downers Grove, IL
LKNS	LEAVER, KENNETH, AND SHARON LEAVER, Danville, IL
LEBH	LEBRO, CHARLES, Gillespie, IL
LDFT	LEDFORD TRUCKING, INC., Pontiac, IL
LEPD	LEE'S PARCEL DELIVERY, Springfield, IL
LEJB	LEE, J. B., TRANSPORTATION CO., Bruce Lee, d/b/a, Pontiac, IL
LERH	LEERHOFF TRUCKING, Ralph J. Leerhoff, d/b/a, Versailles, IL
LEJC	LEGNER, J., CORPORATION, Pontiac, IL
LHNT	LEHN TRUCKING, Richard E. Lehn and Stanley D. Lehn, d/b/a, Decatur, IL
LDNK	LEMAN, DALE, & SONS TRUCKING, Dale R. Leman, d/b/a, Eureka, IL
LEMP	LEMPA TRUCKING, Stanley Louis Lempa, d/b/a, Chicago, IL
LCCG	LEN'S CROWN CARTAGE, INC., Oak Lawn, IL
LENO	LENCO TRANSPORT, Leonard Kranz, d/b/a, Aurora, IL
LEON	LEONI MOTOR EXPRESS, INC., Chicago Heights, IL
LEPI	LEPRECHAUN TRUCKING, INC., Assumption, IL
LESN	LESSEN TRUCKING, Virgil Lessen and Stanley Lessen, d/b/a, Emden, IL
LVNT	LEVANDER TRUCKING, Stanley Levander, d/b/a, Marengo, IL
LVCT	LEVCO TRANSPORT CO., Wilmette, IL
LWXC	LEWIS EXCAVATING & TRUCKING, Richard W. Lewis, d/b/a, Mokena, IL
LTAJ	LEWIS TRANSPORTATION, INC., Newton, IL
LWTS	LEWIS TRUCKING SERVICE, INC., Louisville, IL
LDNQ	LEYDEN TRANSPORTATION, INC., Franklin Park, IL
LITV	LIBERTY TRANSPORTATION CO., Chicago, IL
LLTD	LIEVENS, LARRY, TRUCKING, Larry D. Lievens, d/b/a, Port Byron, IL
LIFS	LIFSCHULTZ FAST FREIGHT, INC., New York, NY
LICS	LIGHTNING CARGO SEVICES, INC., Elk Grove Village, IL
LGCI	LIGHTNING COURIER, INC., Melrose Park, IL
LGSP	LIGHTNING SUPPLY, INC., Salem, IL
LIGS	LIGON NATIONWIDE, INC., Madisonville, KY
LILQ	LILLEY TRUCKING, INC., Princeton, IL
LILQ	LILLEY, LEALAND, Princeton, IL
LSLM	LIN-SAL, INC., Marion, IL
LLMV	LINCOLN LAND MOVING & STORAGE, INC., Champaign, IL
LDAQ	LINCOLN-DIXIE FREIGHT LINES, Adelaide Leoni, d/b/a, Chicago, IL
LINT	LINK TRUCK SERVICE, INC., Walsh, IL
LNMN	LINMAN TRUCKING, Don Linman, d/b/a, Monmouth, IL
LNAR	LIPPOLD & ARNETT, INC., Carlinville, IL
LQID	LIQUID TRANSPORTERS, INC., Louisville, KY
LSHQ	LISCHER TRUCKING, INC., New Athens, IL
LIDE	LITCHFIELD, DELBERT E., Rio, IL
LIFH	LITTLE'S FARM AND HOME SUPPLY, INC., Winchester, IL
LIWL	LITWILLER TRUCKING, INC., Emden, IL
LIVK	LIVEK TRUCKING, INC., Galva, IL
LLCS	LLAMAS CONSTRUCTION COMPANY, Algonquin, IL
LBNQ	LOBBINS, J., James E. Lobbins, d/b/a, Chicago, IL
LBDL	LOBDELL TRANSPORTATION, INC., Lena, IL
LKSB	LOCK, STOCK & BARREL EXPRESS, William Noordag, IV, d/b/a, Rockford, IL
LODS	LODESKY, DAN, TRUCKING, INC., Gurnee, IL
LOFQ	LOEFFLER, DON, INCORPORATED (A Delaware Corp.), Stanford, IL
LOPK	LOEPKER TRUCKING COMPANY, Eugene A. Loepker, d/b/a, Bartselo, IL
LOGA	LOGAN TRUCKING, INC., South Beloit, IL
LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA
LONA	LONA TRUCKING CO., Downers Grove, IL
LONR	LONG ROCK CO., Princeville, IL
LNNE	LONNIE'S GRADING AND TRUCKING, INC., Mundelein, IL
LOKB	LOOKINGBILL TRANSIT, INC., Alferton, IL
LORS	LORSBACH TRUCKING, INC., Granite City, IL
LUDN	LOUDEN TRUCKING, John R. Louden, Jr., d/b/a, LaHarpe, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

Carrier "Alpha" Code	ILLINOIS CARRIERS — (Continued) (Operating under jurisdiction of Illinois Commerce Commission)
LOUL	LOUDENBURG BROS., INC., Wyoming, IL
LOUI	LOUIE'S CARTAGE, Louis C. Hankins, d/b/a, Effingham, IL
LOAQ	LOURASH CONSTRUCTION, INC., Decatur, IL
LWYD	LOWRY, DONALD, Cherry, IL
LTCC	LTC TRUCKING, Lawrence Cristo, d/b/a, Des Plaines, IL
LUJE	LUCAS, JAMES E., Farmersville, IL
LUKY	LUCKEY TRUCKING, INC., Streator, IL
LKCI	LUKASIK CARTAGE, Robert Lukasik, d/b/a, Merionette Park, IL
LUKO	LUKOW BROTHERS, Donald Lukow, Larry Lukow and Ronald Lukow, d/b/a, Chebanse, IL
LMNO	LUMLEY, NORVIN O., Barry, IL
LUSO	LUSSLOW'S ECONOMY TRANSPORT CO., INC., Rolling Meadows, IL
LUVM	LUV MESSENGER & DELIVERY SERVICE, Sandra J. Loverher, Dennis J. Cesario and L. J. Loverher, d/b/a, Chicago, IL
LYCI	LYNN'S CARTAGE, INC., Chicago, IL
LYTN	LYON TRUCKING, Richard D. Lyon, William H. Lyon and Elizabeth A. Fesselmeyer, d/b/a, Thawville, IL
MADV	M & D TRANSFER, INC., Bonfield, IL
MJCG	M & J CARTAGE CO., INC., Chicago, IL
MJGM	M & J GROUND MAINTENANCE, INC., Chicago, IL
MNLP	M & L TRANSPORTS, INC., Roberts, IL
MRXP	M & R EXPRESS COMPANY, Westchester, IL
MANS	M & S TRANSPORT, INC., Stickney, IL
MVTN	M & V TRANSPORTATION, INC., Chicago, IL
MKGQ	M K GENERAL TRUCKING, Melvin J. Kasper, d/b/a, Chicago, IL
MTPW	M TRANSPORTATION, INC., March Transportation, Inc., d/b/a, Oak Creek, WI
MTIR	M. C. TRUCKING, INC., Roselle, IL
MJAC	M. J. A. CARTAGE, INC., Mount Prospect, IL
MKCS	M.A.K. EXPRESS, INC., Crestwood, IL
MBBC	M.B.B. CORP., Palatine, IL
MHTO	MACHINERY TRANSPORTS OF ILLINOIS, INC., Morton, IL
MKSV	MACK'S TRUCKING SERVICE, INC., Streamwood, IL
MCKQ	MACKINAW TRANSFER, INC., Mackinaw, IL
MKLT	MacKINLAY TRUCKING, Paul C. MacKinlay, d/b/a, Crystal Lake, IL
MHGT	MAD HOG TRUCKING, Todd S. Bruegger, d/b/a, Lena, IL
MDMC	MADDEN, THOS. M., COMPANY, Hodgkins, IL
MWLT	MADISON, WILLIE, TRUCKING COMPANY, Maywood, IL
MLSB	MADONNA'S LIMOUSINE SERVICE, INC., McHenry, IL
MAEG	MAEDGE, MIKE A., TRUCKING, INC., Marine, IL
MDIL	MAIDEN LINES, Nancy Ekins, d/b/a, Hinsdale, IL
MNXC	MAIN TRUCKING & EXCAVATING, Larry Main, d/b/a, Godfrey, IL
MDNG	MAIN, DEAN, Elmer Dean Main, d/b/a, Gibson City, IL
MJEV	MAJER EXCAVATING, INC., Rapids City, IL
MAYP	MALONEY TRANSPORT, LTD., Addison, IL
MLOW	MALONEY'S WABASH MOTOR SERVICE, INC., Oak Park, IL
MAND	MANFREDI MOTOR TRANSIT CO., THE, Newbury, OH
MTIQ	MANITO TRANSIT CO., Ashkum, IL
MNOQ	MANOR, Thomas K. Pacourek, d/b/a, Oak Lawn, IL
MNUF	MANUFACTURERS CARTAGE, INC., Grand Rapids, MI
MRJL	MAR-JOY-LEASING, Chicago Ridge, IL
MRAT	MARATHON COURIER SERVICE, Anmarie Hall, d/b/a, Naperville, IL
MRDD	MARC DELIVERY SERVICE, INC., Des Plaines, IL
MCOF	MARCOTTE, PAUL, FARMS, INC., Momence, IL
MAGF	MARGO TRANSPORT, INC., Olney, IL
MCMP	MARINA CARTAGE COMPANY, Michael Tadin, d/b/a, Chicago, IL
MJTS	MARJON TRANSPORTATION, INC., Elmwood Park, IL
MRKC	MARKS TRUCKING CO., George Marks, Nick Marks and Robert Marks, d/b/a, Chicago, IL
MALP	MARLOW, T. L., TRUCKING, Thomas L. Marlow, d/b/a, Sullivan, IL
MRQS	MARQUIS TRUCKING, Eldon Stanley Marquis and Keith A. Marquis, d/b/a, Donovan, IL
MASH	MARSHAL, HENRY O., St. Augustine, IL
MXEL	MARTIN EXPRESS, LTD., Taylor Ridge, IL
MLYI	MARTIN, LYMAN, TRUCKING, INC., Lyons, IL
MPJT	MARTIN, PERRY, JR., TRUCKING, LTD., Chicago, IL
MART	MARV TRUCKING, INC., Olympia Fields, IL
MYSQ	MARY'S CARTAGE, INC., Elmhurst, IL
MSNB	MASENGALE, BRIAN, Rossville, IL
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
MSSJ	MASSAT, DAVID, Crestwood, IL
MAXC	MATERIAL EXPRESS CORPORATION, Markham, IL
MTUI	MATHESIUS, LESLIE W., & LESLIE K. MATHESIUS, Earlville, IL
MAOW	MATHIAS, OWEN, TRUCKING, Marvin O. Mathias, d/b/a, Assumption, IL
MTLK	MATLACK, INC., Wilmington, DE
MTGJ	MATTINGLY, J. LEON, Joseph Leon Mattingly, d/b/a, Henry, IL

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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@ Carrier "Alpha" Code	
MXTJ	MAUCK TRUCKING, Donald D. Mauck and Robert D. Mauck, d/b/a, Atwood, IL
MAUF	MAUCK, FRANK, Atwood, IL
MURC	MAURICE TRANSPORT CO., Morton, IL
MCRJ	MAURO, CARL, JR., TRUCKING, Carlene K. Ator, d/b/a, La Salle, IL
MXTL	MAXWELL TANK LINES, INC., Westchester, IL
MABM	MAYBERRY TRUCKING COMPANY, Anthony Mayberry, d/b/a, Chicago, IL
MFLD	MAYFIELD TRANSFER CO., INC., Melrose Park, IL
MCMR	MC MORHAN TRUCKING CO., INC., Shullsburg, IL
MCRW	MC R'S TRUCKING, Stefanie A. McCain Ruby and Edward G. Ruby, d/b/a, Hampton, IL
MCBF	McCALEB TRUCKING, Bill McCaleb and Mary Kathleen McCaleb, d/b/a, Fairfield, IL
MSLT	McCASLAND TRUCK SERVICE, Lloyd B. McCasland and James B. McCasland, d/b/a, Greenville, IL
MCLI	McCAULEY TRANSPORT, INC., Oswego, IL
MCWS	McCLAIN, WM., AND SON, Wm. McClain, d/b/a, Springfield, IL
MCCY	McCOY, MAC, INCORPORATED, Oblong, IL
MCUR	McCURRIE, RICHARD, TEAMING COMPANY, Chicago, IL
MDNB	McDANIEL BROS., INC., Flora, IL
MDOI	McDANIEL OIL CO., INC., Newton, IL
MDKQ	McDONALD TRUCKING, INC., Ohio, IL
MCDK	McDOWELL TRUCKING, INC., Chicago, IL
MCEV	McEVERS TRUCKING, Gary W. McEvers, d/b/a, Greenfield, IL
MDJQ	McGLAUCHLEN, DERALD J., Milton, IL
MJAQ	McGUIRE, JAMES T., & SON, INC., Chicago, IL
MCHQ	McHENRY TRUCK LINE, INC., McHenry, IL
MKTO	McKAY TRUCK SERVICE, Bob McKay, d/b/a, Centralia, IL
MKDO	McKAY, DONALD E., Riverton, IL
MKIT	McKINNEY TRUCKING, INC., Montrose, IL
MKGT	McKINNIE, GLENN, TRUCKING, Glenn McKinnie, d/b/a, Morrison, IL
MCLA	McLAIN TRUCKING, INC., Anderson, IN
MMIG	McMANAMON'S MOVING & STORAGE, Thomas J. McManamon, d/b/a, Chicago, IL
MCAY	McNAY, RICHARD, INC., Quincy, IL
MCSS	MCS CARGO SYSTEMS, INC. (An Illinois Corporation), Elk Grove Village, IL
MMCW	MEARIDA, MERLE C., Wapella, IL
MGAT	MEGA TRUCKING CO., Chicago, IL
MEGN	MEGAN TRUCKING, John E. Megan, d/b/a, Princeville, IL
MEOQ	MEIER OIL SERVICE, INC., Ashkum, IL
MEIE	MEIER TRUCKING COMPANY, Pontiac, IL
MLSK	MEL'S TRUCKING, Melvin Chapman, d/b/a, Palos Hills, IL
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA
MBOB	MELTON, BOB, TRUCK SERVICE, INC., Normal, IL
MSCQ	MELVIN SALES CO., Streator, IL
MNZT	MEN-ZEL TRUCKING, INC., St. Charles, IL
MDGA	MENDOZA TRUCKING, INC. (An Illinois Corporation), Chicago, IL
MEGQ	MENINI CARTAGE, INC., Lincolnwood, IL
MCEM	MERCER CONSTRUCTION COMPANY, James D. Mercer, d/b/a, Silvis, IL
MRMG	MERCHANTS MOVING AND STORAGE, INC., North Chicago, IL
MPDC	MERCURY DELIVERY COMPANY, INC., Chicago, IL
MMVR	MERCURY MOVERS, INC., Elmhurst, IL
MKKT	MERKLE TRUCKING, John Merkle, d/b/a, Cary, IL
MELA	MERRILLS CONTRACTORS, INC. (An Illinois Corporation), Lincoln, IL
MITI	MERRITT TRANSFER, INC., Chicago, IL
MESP	MERSCHMAN TRUCKING CORPORATION, West Point, IA
MEEM	MESSENGER MOUSE, H & K Transportation, Inc., d/b/a, Rockford, IL
MTXN	METRO EXPRESS, INC., Chicago, IL
MMSJ	METRO MODAL SERVICES, INC., Melrose Park, IL
MMOD	METRO MOVING & DELIVERY SERVICE, William A. Gray, Jr., d/b/a, Peoria, IL
MTDE	METROPOLITAN TRUCKING AND DISTRUBUTION COMPANY, Metropolitan Traffic Associates, Inc., d/b/a, Elk Grove Village, IL
MEYQ	MEYER CONCRETE PRODUCTS, INC., Trenton, IL
MEYP	MEYER PAVING, INC., Lombard, IL
MYTW	MEYER TRUCK SERVICE, John G. Meyer, d/b/a, Waverly, IL
MEJQ	MEYERS, EDWARD J., COMPANY, INC., Summit, IL
MHTS	MICHELS TRUCKING, Morris Jay Michaels and Lisa Michaels, d/b/a, Cisne, IL
MWLR	MICHL, WILLIAM R., Newton, IL
MILT	MICHLIG TRUCKING, INC., Wyanet, IL
MKEY	MICKEY'S TRUCKING, Michael E. Barnes, Jr., d/b/a, Cary, IL
MWMS	MID WEST MOTOR SERVICE COMPANY, Joliet, IL
MISO	MID-SOUTH TRANSPORTATION, INC., Belleville, IL
MDLP	MIDLAND TRANSPORT, INC. (An Illinois Corporation), Chicago Heights, IL
MNXQ	MIDNIGHT EXPRESS, INC., Dana, IL
MSES	MIDSTATE EXPRESS, INC., Kankakee, IL
MICS	MIDWAY CARTAGE, INC., Chicago, IL
MDYK	MIDWAY TRUCKING CO., Desirae M. Moody, d/b/a, Mt. Sterling, IL

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PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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Carrier "Alpha" Code	
MWSC	MIDWEST CARGO SYSTEMS, INC., Chicago, IL
MWSI	MIDWEST SOLVENTS COMPANY, INC., Atchison, KS
MWRN	MIDWESTERN TRANSPORT, INC., McCook, IL
MKSE	MIKE'S EXPRESS FREIGHT, INC., Elk Grove, IL
MNSQ	MILAM AND SPROULE TRUCKING CO., Streator, IL
MLNH	MILES AND HANNAGAN, J. Gordon Hannagan and Eldon R. Miles, d/b/a, Renfield, IL
MLPO	MILL TRANSPORTATION COMPANY, Bensenville, IL
MCGQ	MILLER CARTAGE, INCORPORATED, Thornton, IL
MTRR	MILLER TRANSFER AND RIGGING CO., Cuyahoga, OH
MTPH	MILLER TRANSPORTATION, Michael P. Dunn, d/b/a, Rockford, IL
MLTJ	MILLER'S TRUCKING, Rosemary B. Miller, Richard L. Miller and Edward L. Miller, d/b/a, Newton, IL
MSVN	MILLER, STEVEN R., Shelbyville, IL
MLVG	MILLER, VIRGIL, Sheffield, IL
MMTC	MILWAUKEE MOTOR TRANSPORTATION COMPANY, THE, Bensenville, IL
MTKF	MIMS TRUCKING, Joseph Mims, d/b/a, Chicago, IL
MINC	MINARET, INC., Rock Falls, IL
MIYT	MINORITY TRANSPORT, INC., Bensenville, IL
MSET	MISSELHORN TRUCKING, Harold Misselhorn, d/b/a, Percy, IL
MPTL	MISSOURI PACIFIC TRUCK LINES, INC., St. Louis, MO
MHCG	MITCH CARTAGE, INC., Darien, IL
MHTP	MITCHELL TRANSPORT, INC., Downers Grove, IL
MJFS	MO-JO FREIGHT SYSTEMS, INC., Bensenville, IL
MASC	MOBILE-AIR-SURFACE-HAULAGE, Anna A. Sepanski, d/b/a, Naples, FL
MKEK	MOERKE TRUCKING, Randy D. Moerke, d/b/a, Woodstock, IL
MHRO	MOHR OIL COMPANY, Forest Park, IL
MNOL	MONROE LEASING AND TRANSPORTATION CO., Columbia, IL
MTRE	MONTES TRUCKING, Jose Montemayor, d/b/a, Elmhurst, IL
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
MNTS	MONTS, RICHARD E., Viola, IL
MBOC	MOORE BROTHERS CONTRACTORS, INC., Bridgeport, IL
MOBI	MOORE, BOBBIE L., TRUCK SERVICE, Bobbie L. Moore, d/b/a, Salem, IL
MRJF	MOORE, JOHN F., Buffalo, IL
MOGS	MORGAN & SONS, INC., LeRoy, IL
MORI	MORING, INC., Baileyville, IL
MROP	MORRISON, O. P., TRUCKING, John T. Tucker, d/b/a, Sullivan, IL
MOIR	MORRISON, ROBERT L., Plainview, IL
MRIB	MORRISON BENOIT CONSTRUCTION CO., Crescent City, IL
MRGV	MORTON GROVE TRANSPORT SYSTEM, INC., Morton Grove, IL
MOSI	MOSCARDELLI & SONS MOVERS, INC., Springfield, IL
MOPR	MOSER, PAUL R., Dundee, IL
MWED	MOWERY, DALE, Chenoa, IL
MLYL	MUELLER, LARRY L., Maple Park, IL
MUJC	MULLINS, JERRY, CARTAGE SERVICE, INC., Berwyn, IL
MMSH	MULROONEY MOVING & STORAGE, INC., Janesville, WI
MTSI	MULVANY TANK TRUCK SERVICE, Buren Mulvany and Raymond Mulvany, d/b/a, Salem, IL
MNTK	MUNSON TRANSPORTATION, INC., Monmouth, IL
MTGE	MUNSON TRUCKING & EXCAVATING, James Munson, d/b/a, Island Lake, IL
MRDK	MURDOCK, ERNEST, & SON, Ronald Earl Murdock, d/b/a, Aledo, IL
MUME	MURPHY MOTOR EXPRESS, INC., Broadview, IL
MTTI	MURPHY TANK TRUCK SERVICE, Max L. Murphy, d/b/a, Geff, IL
MURI	MURPHY TRUCKING, Margaret E. Murphy and Paul Eugene Murphy, d/b/a, Clinton, IL
MUKS	MURPHY TRUCKING, William D. Murphy, Donald J. Murphy and Edward F. Murphy, d/b/a, Harvel, IL
MUCJ	MURPHY, COLLINS, AND JOHN MURPHY, Marietta, IL
MPYH	MURPHY, JOHN A., Marietta, IL
MPHY	MURPHY, L., TRUCKING, Linda L. Murphy, d/b/a, Colona, IL
MPLE	MURPHY, LARRY E., Marshall, IL
MUPL	MURPHY, LELAND, Casey, IL
MUSY	MUSSER, RAY, Smithshire, IL
MYEM	MYERS MOTOR SERVICE, Jeff M. Myers, d/b/a, Sublette, IL
MYRK	MYERS TRUCKING, Roy Myers, d/b/a, Baileyville, IL
MYJM	MYERS, JAMES M., Lincoln, IL
MCUD	McCAULEY, DAVE, David L. McCauley, d/b/a, Oswego, IL
NBRF	NABER, FRED, Shelbyville, IL
NPRO	NAPIER, RONDELL, Hutsonville, IL
NAPQ	NAPLES TRUCKING COMPANY, INC., Palos Hills, IL
NARD	NARROD MOVING SERVICES, INC., Highland Park, IL
NAFT	NATIONAL FREIGHT, INC., Vineland, NJ
NAVL	NATIONAL VAN LINES, INC., Broadview, IL
NWCI	NATIONWIDE CARTAGE SERVICE, INC., Chicago, IL
NAVS	NAVALANY & SON, Steven S. Navalany, Sr., and Steven Navalany, Jr., d/b/a, Naperville, IL
NECV	NEECE, VICTOR H., Granite City, IL
NFET	NEFELD, ED, TRUCKING, Edwin Nefeld, d/b/a, Monee, IL

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Carrier "Alpha" Code	
NEHL	NEHLS, R. L., TRANSFER, INC., Dundee, IL
NLCQ	NEILL, L., CARTAGE CO., INC., Chicago, IL
NEIG	NEINER GRAIN SERVICE, INC., Manteno, IL
NWBY	NEWBY, LEE, Harold Goodman Excavating & Trucking, Harold Goodman, d/b/a, Operator of, Lincoln, IL
NWLG	NEWLIN, GERALD, Yale, IL
NWMM	NEWMAN, R., MACHINERY MOVERS, INC., Villa Park, IL
NERW	NEWTON READY MIX CONCRETE CO., Newton, IL
NYXC	NEWTON READY MIX CONCRETE CO., Newton, IL
NEXD	NEXT DAY MOTOR FREIGHT, INC., St. Louis, MO
NICW	NICE, ELWYN, TRUCKING, INC., Morrison, IL
NKWT	NICKELS, WILLIAM, TRUCKING, William E. Nickels, d/b/a, Aurora, IL
NKRA	NICKSON-RAMPLEY, INC., Carthage, IL
NITS	NIEDERBRACH TRUCK SERVICE, INC., Steeleville, IL
NFIC	NIEDERT FREIGHT, INC., Chicago Ridge, IL
NIWA	NIEKAMP, WILLIAM A., TRUCK SERVICE, William A. Niekamp, d/b/a, Quincy, IL
NIEJ	NIELSEN, JIM, DELIVERY, LTD., Hanover Park, IL
NIEV	NIEVES CARTAGE, Carmelo Nieves, d/b/a, Chicago, IL
NINT	NINTH, INC., Oak Lawn, IL
NOGG	NOGGLE, ROBERT O., & SONS, Robert O. Noggle, Dean R. Noggle and Lance S. Noggle, d/b/a, Plainfield, IL
NRGD	NORGAARD TRUCKING, INC., Bensenville, IL
NRKO	NORKUS TRUCKING, INC., Hinsdale, IL
NOXQ	NORTH EXPRESS COMPANY, INC., Northbrook, IL
NOLK	NORTH LAKE TRANSPORT, INC., Elmhurst, IL
NOSH	NORTH SHORE & CENTRAL ILLINOIS FREIGHT CO., Chicago, IL
NSHM	NORTH SHORE MOVERS, Francis R. Larkin, d/b/a, Northbrook, IL
NOSN	NORTH SUBURBAN MESSENGER SERVICE, INC., Northbrook, IL
NONC	NORTHERN CARRIERS, INC., Rockford, IL
NILD	NORTHERN ILLINOIS DELIVERY SYSTEMS, John C. McDonald, d/b/a, Libertyville, IL
NOTJ	NORTHUP'S PETROLEUM, INC., Stronghurst, IL
NTWT	NORTHWAY TRUCKING, Mitchel E. Blood, d/b/a, Port Allegany, PA
NWPQ	NORTHWEST P. & D. SERVICE, John T. Pearson, d/b/a, Mt. Prospect, IL
NOWP	NORTHWEST PACKAGE DELIVERY CO., Schiller Park, IL
NUWC	NU WAY CONCRETE CORP., Chicago, IL
NWMV	NU WAY MOVERS, Clifford E. Pearson, d/b/a, Galsburg, IL
NBKS	NUBULK SERVICES, INC., Exton, PA
NUEQ	NUELSEN, GEORGE A., TEAMING COMPANY, Chicago, IL
NUST	NUSSBAUM TRUCKING, INC., Normal, IL
NYBT	NYBERG TRUCKING, Donald Eugene Nyberg, d/b/a, Gridley, IL
OMCN	O & M CONSTRUCTION CO., Urbana, IL
OBCG	O'BRIEN CARTAGE CO., Thomas J. O'Brien, Jr., d/b/a, Chicago, IL
OBRJ	O'BRIEN, JOHN E., Newark, IL
OLRC	O'LEARY CONSTRUCTION CO., Leonard O'Leary and Bernard O'Leary, d/b/a, Woodstock, IL
OMAR	O'MARA MOVING & STORAGE, INC., Freeport, IL
OBTS	O'NEILL BROS. TRANSFER & STORAGE CO., Peoria, IL
ORCR	O'ROURKE CARTAGE CO., Chicago, IL
OSCI	O'SULLIVAN CARTAGE, INC., Chicago, IL
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH
OKCG	OAK CARTAGE, INC., Brookfield, IL
OBRQ	OBERLIN VAN SERVICE, INC., Kankakee, IL
OCTE	OC TESTING CO., John W. Saltink, d/b/a, Olney, IL
ODLC	ODLE CONSTRUCTION CO., Raymond K. Odle, d/b/a, Kankakee, IL
OGEN	OGDEN EXPRESS, Anthony J. Dzik and Francis Dzik, d/b/a, Berwyn, IL
OHLB	OHL BROTHERS FARMS, James Ohl and Michael Ohl, d/b/a, Danville, IL
OHLY	OHLEY TRANSFER COMPANY, INC., Alton, IL
OLBH	OLSEN BROTHERS, INC., Arlington Heights, IL
OLTP	OLSON TRANSPORTATION COMPANY, INC., Milwaukee, WI
OLJR	OLSON, JOHN ROY, Pittsfield, IL
OLTH	OLTHOFF, INC., South Holland, IL
OMKE	OMEGA KAPPA ENTERPRISES, INC., Hinsdale, IL
OESC	ORIENT EXPRESS SERVICE CO., Park Ridge, IL
OCIF	ORLANDO CARTAGE, INC., Calumet Park, IL
ORBM	ORMSBY & BAUMEZ, JR., Theodore J. Ormsby and Herman Baumez, Jr., d/b/a, Big Rock, IL
ORRS	ORRIS TRUCKING, INC., Plymouth, IL
OBTO	OSBORNE TRUCKING, William F. Osborne, d/b/a, Canton, IL
OTWA	OTTAWA TRANSPORT, INC., Sheridan, IL
OTOG	OTTO'S GAS COMPANY, INC., Brazil, IN
OUEQ	OUELLETTE, LUCIEN, CARTAGE, Lucien Ouellette, d/b/a, Melrose Park, IL
OVCQ	OVERLAND TRANSPORTATION SYSTEM, INC., Indianapolis, IN
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
OYEH	OYE, HERMAN L., Tuscola, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

@Carrier "Alpha" Code	ILLINOIS CARRIERS — (Continued) (Operating under jurisdiction of Illinois Commerce Commission)
OZIE	OZIER, BARNEY, TRUCKING, Byron E. Ozier, d/b/a, Sullivan, IL
PCTJ	P & C TRUCKING, Paul Wiltjer, d/b/a, Gary, IN
PNEQ	P. & E. I. TRUCK LINES, INC., Rossville, IL
PDDL	P. D. DELIVERY SERVICE, INC., Wood Dale, IL
PCMD	P.C.M. DELIVERY SERVICE, Patrick Christopher McTague, d/b/a, Chicago, IL
PFAW	P.F.A. SYSTEMS, INC., Lockport, IL
PJTI	P.J. TRUCKING, INC., Aurora, IL
PRDW	P.R.D. TRUCKING COMPANY, Forrest, IL
PAJD	PAINE, DENNIS, SERVICE CO., Carmi, IL
PAOC	PANICO, C., MOTOR SERVICE, Cuono Panico, d/b/a, Niles, IL
PTIK	PARENTI TRUCKING, Jim Parenti, d/b/a, Wooddale, IL
PTPI	PARIS TRANSPORT, INC., Paris, IL
PRKC	PARK RIDGE TRANSPORT, INC., Chicago, IL
PAKK	PARK TRUCKING, Rhes E. Park and Darrell R. Park, d/b/a, Loami, IL
PKWQ	PARKWAY CARTAGE, INC., Franklin Park, IL
PAHC	PARRISH, H. C., TRUCK SERVICE, INC., Freeburg, IL
PRJH	PARROTT, JOHN, Sumner, IL
PSLQ	PASSALACQUA AND POWELL TRUCKING, Clara Passalacqua, Rose A. Passalacqua and Janice K. Powell, d/b/a, Palmyra, IL
PDEV	PAT'S DELIVERY, Patrick J. Collins d/b/a, Park Ridge, IL
PVHE	PAVER, H. J., EXCAVATING, Howard J. Paver, d/b/a, Warrenville, IL
PWMS	PAWNEE MOTOR SERVICE, INC., Bellwood, IL
PCKT	PAY CHECK TRUCKING, INC., McHenry, IL
PAYB	PAYSON, R., CARTAGE, Robert Payson, d/b/a, Orland Park, IL
PCSI	PCS EXPRESS, INC., Rockford, IL
PEEI	PEACOCK ENTERPRISES, INC., Schaumburg, IL
PRLK	PEARL TRUCKING, James B. Pearl, Jeffrey M. Pearl, and Russell A. Pearl, d/b/a, Weldon, IL
PBLK	PEERLESS BULK TRANSPORT CORP., Pittsburgh, PA
PEET	PEET FRATE LINE, INC. (An Illinois Corporation), Woodstock, IL
PPUP	PEGASUS PICK UP AND DELIVERY SERVICE, Jerome J. Nowak, d/b/a, Bensenville, IL
PLKA	PELKA TRUCKING, Ron Pelka, d/b/a, La Salle, IL
PELI	PELLA TRUCKING, INC., Wolcott, IN
PENN	PENNSYLVANIA TRUCK LINES, INC., Wynnewood, PA
PCAG	PENNY CARTAGE, INC., Crystal Lake, IL
PEOR	PEORIA-CHICAGO EXPRESS, INC., Peru, IL
PEFC	PERFECT COURIER, LTD., Chicago, IL
PFCQ	PERFECTION TRUCKING, Walter Warachowski, d/b/a, Brookfield, IL
PTOD	PERFORMANCE TRANSPORT, INC. OF ILLINOIS, Performance Transport, Inc., d/b/a, Decatur, IL
PJNW	PERKINS, JOHN W., Geneseo, IL
PRRC	PERROTT, CHARLES T., SR., Sumner, IL
PPPC	PERRY PETROLEUM PRODUCT CARTAGE CORP., E. Chicago, IN
PRYQ	PERRY TRUCKING SERVICE, INC., Timewell, IL
PPUQ	PERSONALIZED PICK-UP SERVICE, INC., Chicago, IL
PETR	PETERLIN CARTAGE CO., Chicago, IL
PBOC	PETERSON BROS. OIL CO., INC., Lyons, IL
PJTM	PETERSON, JERRY, TRUCKING, Gerald L. Peterson, d/b/a, Moline, IL
PEVL	PETERSON, V. L., Vincent L. Peterson, d/b/a, New Douglas, IL
PLNC	PETRO-LINC CORP., Rockford, IL
PTAE	PETROFF TRUCKING & EXCAVATING CO., Steven R. Petroff, d/b/a, Collinsville, IL
PEZR	PEZANOSKI, ROBERT A., LaSalle, IL
PFIB	PFEIFER BROTHERS, Allen Pfeifer and Gregory K. Pfeifer, d/b/a, Mazon, IL
PHOL	PHOENIX COURIER, LTD., Chicago, IL
PTNE	PIANO TRANSPORTS CO., INC., Elmhurst, IL
PFCP	PIERCE FERTILIZER COMPANY, Sidney, IL
PIJE	PIERCESON, JOHN E., Deer Grove, IL
PWTI	PINEWAY TRUCKING CO., Oregon, IL
PIPF	PIPER FARMS, Michael J. Piper, d/b/a, Ohio, IL
PIFO	PITCHFORD, REX, TRUCKING, INC., Raymond, IL
PICF	PITTS CARTAGE, INC., Chicago, IL
PNET	PITTSBURGH & NEW ENGLAND TRUCKING CO., Dravosburg, PA
PLEO	PLETCH TRUCKING, William E. Pletch and Douglas Edward Pletch, d/b/a, Fairmount, IL
PMSM	PMS TRANSPORTATION CO., Westmont, IL
PTKT	POETTKER TRUCK SERVICE, Francis H. Poettker, d/b/a, Highland, IL
POHR	POLHEMUS, RICHARD, TRUCKING, Richard Polhemus, d/b/a, Hanna City, IL
PECC	PONY EXPRESS COURIER CORP., Charlotte, NC
POBR	POOL BROTHERS, Richard Pool and Gene Pool, d/b/a, Avon, IL
POBF	PORTER BROS. FERTILIZER, Joseph D. Porter and Marvin E. Porter, d/b/a, Shawnetown, IL
PSEI	POST EXPRESS, INC., Riverdale, IL
POSQ	POSTMA CARTAGE, INC., Dolton, IL
POUP	POULOS, PETER J., & SONS, INC., Naperville, IL
PODS	POWER DELIVERY SERVICE, INC., Addison, IL
POTM	POWER TRANSPORTATION SERVICES, INC., Elk Grove Village, IL

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PRAG	PRAGER STORAGE & VAN COMPANY, Naperville, IL
PREF	PRE-FAB TRANSIT CO., (A Corporation), Farmer City, IL
PFEC	PREMIER CARTAGE COMPANY, Thomas J. Tynan, d/b/a, Chicago, IL
PRES	PRESNELL BROS., Dallas Presnell and Harvey Presnell, d/b/a, Pana, IL
PRAH	PRESTIN, ALBERT E., Wenona, IL
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD
PRCN	PRINTCO ENTERPRISES, INC., Memphis, TN
PXPI	PRINTERS EXPRESS, INC., Chicago, IL
PMMS	PRIORITY MAIL AND MESSENGER SERVICE, INC., Chicago, IL
PRSE	PRIORITY SERVICE, INC., Alsip, IL
PRDQ	PRITCHARD, HENRY, INC., Geneseo, IL
PVCR	PRIVATE COURIER, INCORPORATED, Bensenville, IL
PROT	PRO TRANSPORT, INC., Chicago, IL
PSYC	PROCESS SUPPLY COMPANY, INC., Burbank, IL
PFTG	PROFFITT TRUCKING, Robert L. Proffitt, d/b/a, Hampshire, IL
PRGM	PROGRESS MESSENGER SERVICE, INC., Chicago, IL
PRPN	PROPANE TRANSPORT, INC., Milford, OH
PURL	PUROLATOR COURIER CORP., Basking Ridge, NJ
PYLQ	PYLES TRUCKING CO., Glenn Pyles, d/b/a, Deer Creek, IL
PYTN	PYRAMID TRANSPORTATION CO., Chicago, IL
QDCC	Q. D. CARTAGE COMPANY, Chicago, IL
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
QUAY	QUALITY COURIER & EXPRESS SERVICE, James R. Simonson, d/b/a, Carpentersville, IL
QUTI	QUANDT TRANSPORT SERVICE, INC., Omaha, NE
QUCI	QUARRY CONCRETE, INC., Yorkville, IL
QURY	QUARRY TRANSPORT CO., Lemont, IL
QMVS	QUESSE MOVING & STORAGE, William G. Quesse, Gary W. Quesse and James A. Quesse, d/b/a, Peru, IL
QUKD	QUICK DELIVERY, INC., Addison, IL
QKTP	QUICK TRIP, INC., Peoria, IL
QKTK	QUICK TRUCKING, Harold G. Quick, Jr., d/b/a, Sandoval, IL
RDKI	R & D TRUCKING, INC., Chicago, IL
RJTE	R & J TRUCKING & EXCAVATING, Joseph Paliska and Ronald Paliska, d/b/a, Hickory Hills, IL
RNKQ	R & K SALES, INC., Hillsboro, IL
RMTM	R & M TRUCKING, Robert J. May, Inc., d/b/a, Elk Grove Village, IL
RBGE	R B TRANSPORTATION, INC., Glen Ellyn, IL
RTMM	R T M TRUCKING, Tamara L. McAdams, d/b/a, Moline, IL
RAII	R-A INDUSTRIES, INC., Chicago, IL
RBSD	R-B'S DELIVERY SERVICE, Robert G. Hupp, d/b/a, Palatine, IL
RDMT	R-D MOTOR, INC., Plano, IL
RNRW	R-N-R TRUCKING, Nola K. Robinson, d/b/a, Decatur, IL
RWXL	R-W SERVICE SYSTEM, INC., Taylor, MI
RARI	R. & R. TRUCKING CO., Robert E. Ragon, d/b/a, Greenup, IL
RCSI	R. C. SERVICE, INC., Bensenville, IL
RMCQ	R. M. CARTAGE, INC., Schamburg, IL
RYCG	R. U. CARTAGE, INC., Burbank, IL
RBRN	R.B.R. TRUCKING, INC., Rockton, IL
RCMI	R.C. MOTOR TRANSPORT, INC., Tinley Park, IL
RCTV	R.C. TRANSPORT, INC., Chicago, IL
RFTF	R.F.F. TRUCKING & FERTILIZER, INC., Cabery, IL
RMET	R.M.E., INC., Streator, IL
RNBI	R.N.B., INC., Flora, IL
RXTP	RADEX TRANSPORTATION, Statewide Distribution Services, Inc., d/b/a, Los Angeles, CA
RDKC	RADTKE CARTAGE, INC., Willow Springs, IL
RTKE	RADTKE TRANSFER CO., Bolingbrook, IL
RGNA	RAGONA, DON, TRUCKING, Donald C. Ragona, d/b/a, Lombard, IL
RCGI	RAIL CARTAGE, INC., Chicago, IL
RLDP	RAIL DISPATCH, INC., Chicago, IL
RNEY	RAINEY, BILL, Ramsey, IL
RMTI	RALPH'S MOTOR SERVICE, INC., Chicago, IL
RAMI	RAM TRUCKING, INC., Mt. Pulaski, IL
RMEY	RAMEY WAREHOUSE COMPANY, Springfield, IL
RAPY	RAMPLEY TRANSPORT, INC., Augusta, IL
RRLR	RAMSEY, RAYMOND LEROY, Rochester, IL
RNGI	RAN-GAR, INC., Zion, IL
RPCN	RAPID CARTAGE, INC., Bolingbrook, IL
RARV	RAR SERVICES, INC., Bedford Park, IL
RASK	RASK TRANSPORTATION, INC., Victoria, IL
RSMQ	RASMUSSEN SERVICE, INC., Lombard, IL
RRRT	RAVAGNIE, RAYMOND R., TRUCKING, Raymond R. Ravagnie, d/b/a, Marengo, IL
RLSQ	RAYLS BROTHERS TRANSFER, INC., Hoopeston, IL
RLIN	RED LINE TRANSFER, INC., Gary, IN

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@Carrier "Alpha" Code	
RETG	REDIEHS TRUCK LINES, INC. (A Delaware Corporation), Hinsdale, IL
RVTH	REEVES TRUCKING, Tim A. Reeves, d/b/a, Elgin, IL
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH
RSIR	REISER, WM. C., William C. Reiser, Jr., d/b/a, Burlington, IL
REFM	REITER FARMS, Sherman R. Reiter, d/b/a, Mazon, IL
RMLO	REMLO TRANSPORTATION, INC., Melrose Park, IL
REPD	REPP, DAVID, James David Repp, d/b/a, Casey, IL
RNDO	REX 'N' DON VAN LINES, INC., Charleston, IL
REYA	REYNA TRUCKING, Rebecca Reyna, d/b/a, Green Rock, IL
RENM	REYNOLDS, MARLIN L., Milan, IL
RBBE	RIBBE, DANIEL L., TRUCKING, INC., Bismark, IL
RICM	RICHARDS MOTOR SERVICE, INC., Cicero, IL
RDNY	RICHARDS, DENNY, Pittsfield, IL
RCMC	RICHMOND TRUCKING, Ronald Richmond and Scott Richmond, d/b/a, Sheridan, IL
RCFJ	RICHTER, FRED J., & SON, Fred J. Richter and William J. Richter, d/b/a, Decatur, IL
RKTG	RICKS TRUCKING, Ricky Aue, d/b/a, Addison, IL
RCEI	RICO ENTERPRISES, INC., Elk Grove Village, IL
RBFM	RIDDEL-BURRIS FARMS, INCORPORATED, Villa Grove, IL
REIK	RIECHMANN TRANSPORT, INC., Granite City, IL
RIMQ	RIED MOTOR EXPRESS, Edmund J. Riedlinger, Jr., d/b/a, Naperville, IL
RNWM	RIGHT NOW MESSENGER SERVICE, INC., Worth, IL
RTLC	RIGHT TRUCKING LINES LTD., INC., Chicago, IL
RLYC	RILEY'S CARDINAL TRANSPORT, INC., Channahon, IL
RNGQ	RING, DARRELL, TRUCKING, Darrell Ring, d/b/a, Ashland, IL
RNKG	RINKER, GARY, Grand Ridge, IL
RSLI	RISELING MOTOR EXPRESS, INC., Aurora, IL
RISN	RISINGER BROS. TRANSFER, INC., Morton, IL
RIDW	RITE-WAY DELIVERY, INC., Chicago, IL
RTTS	ROADCO TRANSPORTATION SERVICES, INC., Chicago, IL
RRBT	ROARK TRUCKING, Robert J. Roark, d/b/a, Carmi, IL
RTGH	ROB'S TRUCKING, INC., Highland Park, IL
RTAN	ROBBINS TRANSPORTS, William Robbins, d/b/a, Moline, IL
RBGD	ROBERTS, GERALD D., Penfield, IL
ROBK	ROBERTS, TOM M., TRUCKLINES, INC., Ashland, IL
RBPQ	ROBERTSON, PAUL, Georgetown, IL
RBNC	ROBIN CARTAGE, INC., Chicago, IL
RLCN	ROBINCREST LANDSCAPING & CONSTRUCTION, INC., Skokie, IL
RBCG	ROBINS CARTAGE, Robin G. Stuck, d/b/a, Warrenville, IL
RMFQ	ROCKET MOTOR FREIGHT LINES, INC., Peoria, IL
ROFS	ROCKFORD FREIGHT SERVICE, Robert C. Wilhelmi, d/b/a, Rockford, IL
RDGS	RODGERS TRUCK SERVICE, Russel L. Rodgers, d/b/a, Fairfield, IL
ROJR	ROESNER, JIM, GENERAL TRUCKING, INC., Palatine, IL
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL
RCNT	ROGERS CONSTRUCTION, Steven L. Rogers, d/b/a, Argenta, IL
RGSQ	ROGERS TRUCKING, R. E. Rogers, d/b/a, Rock Falls, IL
RGTI	ROGERS, LOREN, TRUCKING COMPANY, Loren Rogers, d/b/a, Monticello, IL
RLDC	ROLLINS DEDICATED CARRIAGE SERVICES, INC., Wilmington, DE
REPY	ROME EXPRESS, INC., Oak Park, IL
ROMG	ROME'N SONS CARTAGE, INC., Skokie, IL
RWLI	RONWAL TRANSPORTATION, INC., Hammond, IN
ROFT	ROOFERS TRANSIT, Joseph F. Gilmartin, d/b/a, Palatine, IL
RSEI	ROSE CARTAGE SERVICE, INC., Lansing, IL
RMSQ	ROSKIN, H., MOTOR SERVICE, INC., Chicago, IL
ROGY	ROSS, GARY, German Valley, IL
RSYM	ROTH, SYLVESTER M., Saybrook, IL
ROES	ROWE & SON TRANSFER, Marwood Harry Rowe and David L. Rowe, d/b/a, Creve Coeur, IL
RPGS	ROWLAND'S TRANSFER AND PIGGYBACK SERVICES, INC., Rockford, IL
RITC	ROWLEY INTERSTATE TRANSPORTATION COMPANY, INC., Dubuque, IA
ROYI	ROY'S TRANSFER, INC., Rochelle, IL
RUAN	RUAN TRANSPORT CORPORATION, Des Moines, IA
REXP	RUDOLF EXPRESS CO., Bourbonnais, IL
RMNL	RUEBUSH, MAX & LARRY, Max Ruebush and Larry Ruebush, d/b/a, Good Hope, IL
RUET	RUETER, ELDEN, TRUCKING, INC. (An Illinois Corporation), Centralia, IL
RFTN	RUFFOLO TRANSPORTATION, INC., Franklin Park, IL
RUBD	RUMBOLD, EZRA, & SON, INC., Wyoming, IL
RUMK	RUMBOLD, KENNETH D., Sparland, IL
RGET	RUNGE TRUCKING, Carl Runge, d/b/a, Herrin, IL
RUPR	RUPPEL, RICHARD D., Ashland, IL
RUSH	RUSH FREIGHT, INC., Lemont, IL
RSHV	RUSHVILLE TRUCK LINES, C. William Redshaw, d/b/a, Rushville, IL
RUGR	RUSSELL'S GRAIN, INC., Industry, IL
RSLS	RUSSELL, FRANK, AND SON, William Carl Russell, d/b/a, West Frankfort, IL

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@ Carrier "Alpha" Code	
RUJT	RUSSELL, JACK, TRUCKING, Billie J. Russell, d/b/a, Canton, IL
RUTE	RUT'S MOVING & DELIVERY SERVICE, INC., Belleville, IL
RWNS	RW AND SON, INC., Chicago, IL
RYAN	RYAN'S EXPRESS, INC., Indian Head, IL
RYSN	RYAN, STANLEY, Blue Mound, IL
RYDD	RYDER DISTRIBUTION RESOURCES, INC., Miami, FL
SAAJ	S & A CARTAGE, INC., Streator, IL
SNCI	S & C TRANSPORT, INC., (A Michigan Corp.), Southgate, MI
SADM	S & D TRUCKING, Steven A. Lewis, d/b/a, Montrose, IL
SNFT	S & F TRUCKING COMPANY, Wyoming, IL
SNGG	S & G GROUP, INC., Calumet City, IL
SKTV	S & K TRUCKING, Larry L. Steepleton, d/b/a, Seaton, IL
SNSO	S & S CARTAGE COMPANY, Lloyd Seaton, d/b/a, Rockford, IL
SAQT	S AND Q TRUCK AND TRACTOR SERVICE, INC., Odin, IL
SDTY	S AND T DELIVERY, INC., Lemont, IL
SBST	S S TRANSPORT, INC., Chicago, IL
SCBF	SACHTLEBEN, FRANK, Nashville, IL
SKWT	SACKETT, WAYNE, TRUCKING, Wayne Sackett, d/b/a, Highland, IL
SACQ	SACKLEY CARTAGE COMPANY, INC., Des Plaines, IL
SRCW	SACRAMENTO CRUSHING CORPORATION, Chicago, IL
SDNE	SADNICK, EDWARD, Peru, IL
SATO	SAFE TRANSPORT, INC., Hamilton, IL
SAHS	SAHS TRANSPORT, INC., Downers Grove, IL
SPJI	SALCE, PAUL J., INC., Downers Grove, IL
SAGR	SALGADO, GREG, TRUCKING, INC., Hoffman Estates, IL
SLIE	SALINE TRUCKING, John A. Saline and Sterling G. Saline, d/b/a, Rio, IL
SAMI	SAM'S TRANSPORT SERVICE, INC., Olney, IL
SAML	SAMPSON, LOWELL, INC., Leland, IL
SNKN	SANCKEN TRUCKING, INC., Grayslake, IL
SATY	SANDBERG TRUCKING CO., John E. Sandberg, d/b/a, McNabb, IL
SNDF	SANDERS FARMS, John N. Sanders, Jr., d/b/a, Stonington, IL
SNRK	SANDROCK TRUCKING, Stanley K. Sandrock, d/b/a, Malta, IL
SDTV	SANDY'S TRUCKING, INC., Bolingbrook, IL
SNTO	SANS TRANSPORT CO., INC., Oak Lawn, IL
SNSM	SANSONE MOTOR SERVICE, Raymond Sansone, d/b/a, Lyons, IL
SSOE	SANSONE TRUCKING, Peter M. Sansone, d/b/a, Countryside, IL
SSOM	SASO MOTOR SERVICE, INC., Darien, IL
SLIQ	SATELLITE AIR LAND MOTOR SERVICE, INC., Rosemont, IL
SNER	SATNESS, RAY, TRUCKING, INC., Durand, IL
SAYR	SAYRE TRUCKING COMPANY, Melrose Park, IL
SRBF	SCARBROUGH FARMS, Garret Scarbrough and Donnie Scarbrough, d/b/a, Fairfield, IL
SHBB	SCHABACKER BROTHERS, James R. Schabacker and Jerry M. Schabacker, d/b/a, Ashton, IL
SCRE	SCHAFER EXPRESS AND TRANSFER, Eugene R. Schafer, d/b/a, Rock Island, IL
SCJD	SCHAFFER, J. D., CARTAGE CO., Elmhurst, IL
SBUG	SCHAUMBURG TRUCKING, INC., Dundee, IL
SCHF	SCHEFFLER, J. L., TRANSPORT, INC., Chicago, IL
SHBI	SCHIBER TRUCK COMPANY, INC. (A Delaware Corporation), Hartford, IL
SKMI	SCHICK MOVERS, INC., Davenport, IA
SCHK	SCHIEK MOTOR EXPRESS, INC., Joliet, IL
SCLW	SCHISLER TRUCKING, Terry L. Schisler, d/b/a, Roseville, IL
SCID	SCHMIDT, C., TRUCKING COMPANY, Salem, IL
STTR	SCHMITT TRUCKING, INC., Tonica, IL
SHND	SCHNEIDER TANK LINES, INC., Green Bay, WI
SJRA	SCHNEIDER, J. RAY, TRUCKING, J. Ray Schneider, d/b/a, Yorkville, IL
SCCG	SCHNIDT CARTAGE, INC., Elk Grove Village, IL
SHNK	SCHNITKER TRUCK LINES, Michael E. Schnitker, d/b/a, Arenzville, IL
SGHR	SCHOGER, HARRY R., & SONS, INC., Big Rock, IL
SDKT	SCHRADER-KOELLER TRUCKING AND TILLING, Arlene Koeller, d/b/a, Lanark, IL
SRMM	SCHRAMM TRUCKING, William Schramm, d/b/a, Addison, IL
SCZQ	SCHRANZ, STEVE, TRUCKING, INC., Belleville, IL
SRKL	SCHROCK, LESTER L., Lovington, IL
SSCQ	SCHROEDER & SONS CARTAGE, INC., Morton Grove, IL
SDOS	SCHROEDER, S., TRUCKING, INC., Elmhurst, IL
SHLN	SCHROETLIN, LEONARD, Mendota, IL
SHWN	SCHULTE, WILLIAM, AND SONS TRUCK SERVICE, INC., Trenton, IL
SCNM	SCHULTEN, A., MOVERS, INC., Chicago, IL
SZTB	SCHULTZ TRUCKING, Loren Schultz, d/b/a, Bloomington, IL
SZFA	SCHULTZ, FLOYD A., Plainfield, IL
SHJM	SCHULTZ, J. M., SEED COMPANY, Dieterich, IL
SHZR	SCHULTZ, R. J., Robert J. Schultz, d/b/a, Orland Park, IL
SCUH	SCHUMACHER TRUCKING CORPORATION, LaRose, IL
SHSG	SCHUPBACH-STREITMATTER TRANSPORT CO., Wyoming, IL

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SHSI	SCHWARM SERVICE, Floyd Schwarm, Jr. and Paul Schwarm, d/b/a, Ohlman, IL
SWBS	SCHWARTZ BROTHERS STORAGE AND VAN COMPANY, South Holland, IL
SCPN	SCORPION TRANSPORT, Carol A. Sanders and George W. Stuthridge, d/b/a, Wauconda, IL
SBRS	SCOTT BROS. TRUCKING, INC., Calumet City, IL
SCTG	SCOTT TRUCKING, Steven D. Scott, d/b/a, Rock Falls, IL
SCRQ	SCRANTON TRUCKING, Gene Scranton and Clarence Scranton, d/b/a, Nebo, IL
SEGH	SCREAMIN EAGLE CARTAGE, INC., Elk Grove Village, IL
SEGS	SEARS, GEORGE S., Atkinson, IL
SEMS	SECURITY MOTOR SERVICE, INC., Chicago, IL
SEFC	SEEFELDT TRUCKING, Kenneth W. Seefeldt, d/b/a, Lincoln, IL
SEIW	SEIWERT, M. J., CARTAGE CO., Chicago, IL
SERE	SERVICE EQUIPMENT & TRUCKING, INC., Mattoon, IL
SVBI	SEVERSON BROS., INC., Minooka, IL
SEYL	SEYLLER TRANSPORT, INC., Algonquin, IL
SYMR	SEYMOUR TRUCK LINES, INC., Ellis Grove, IL
SEYD	SEYMOUR, DEAN, Franklin, IL
SHFW	SHAFFER, W. H., INC., Springfield, IL
SBTJ	SHAMBAUGH, T. J., III, Cerro Gordo, IL
SNNI	SHANAHOWE TRANSPORTATION, INC., Rockford, IL
SHBK	SHANE BROS. TRUCKING, Philip Shane, Gerald Shane and William Shane, d/b/a, Wyoming, IL
SMSB	SHARI MOTOR SERVICE, INC., Brookfield, IL
SHKE	SHARKEY TRANSPORTATION, INC., Quincy, IL
SJTE	SHAVER, JERRY, TRUCKING & EXCAVATING, Gerald A. Shaver, d/b/a, Island Lake, IL
SDYL	SHEEDY, LARRY E., Mt. Vernon, IL
SHCT	SHEFFIELD CARTAGE, INC., LaSalle, IL
SHME	SHEPLEY MOTOR EXPRESS, INC., Thornton, IL
SRNC	SHERWOOD, RON, Watson, IL
SIKT	SHIKE TRANSPORTATION, INC., Mundelein, IL
SMVS	SHIPPERT'S MOVING & STORAGE, INC., Dixon, IL
SRLY	SHIRLEY'S TRUCKING, INC., Hanover Park, IL
SCAG	SHOREWOOD CARTAGE, Gerald J. Pietrzak, d/b/a, Chicago, IL
STXC	SHULE TRUCKING AND EXCAVATING, Bruce A. Shule, d/b/a, Clifton, IL
SHUW	SHUR-WAY MOVING & CARTAGE CO., Libertyville, IL
SIBR	SIBR, FRANK J., & SONS, INC., Alsip, IL
SIBT	SIEBERT, Russell L. Siebert, d/b/a, Fillmore, IL
SILI	SILICA SAND TRANSPORT, INC., Yorkville, IL
SIAW	SILVER ARROW, INC., Rockford, IL
SLVL	SILVER LINE EXPRESS, INC., Gurnee, IL
SVTA	SILVER TRANSPORT, INC., Manhattan, IL
SIFS	SIMONSON FREIGHT SERVICE, Ervin Simonson, d/b/a, Kiester, MN
SLCQ	SINCLAIR CARTAGE, INC., Hinsdale, IL
SIBI	SISBRO, INC., Quincy, IL
SILM	SISILIANO MOTOR SERVICE, Anthony Sisiliano, d/b/a, Chicago, IL
SITR	SITAR, EDWARD, TRUCKING CO., INC., Chicago, IL
SKDM	SKELTON, DARRELL M., Virden, IL
SKNL	SKINNER, LARRY B., TRUCKING, Larry B. Skinner, d/b/a, Newman, IL
SKHE	SKYHAWK EXPRESS, Frederick W. Marshall, III, d/b/a, Glen Ellyn, IL
SLFA	SLATER FARMS, William G. Slater, d/b/a, Monmouth, IL
SLTR	SLATER, M. C., INC., Granite City, IL
SLUE	SLUIS, R., EXCAVATING CO., Worth, IL
SMSE	SMALL SHIPMENT EXPRESS, INC., Skokie, IL
SSDY	SMALL SHIPMENT DELIVERY, INC., Oswego, IL
SMLK	SMIT, M. L., TRUCKING, INC., South Holland, IL
SMMW	SMITH MOTOR SERVICE, INC., Maywood, IL
SMMV	SMITH MOVERS, INC., Chicago, IL
SHS	SMITH TRANSFER SERVICE, Joan Smith Maltry, d/b/a, Freeport, IL
SMJM	SMITH TRUCKING, INC., Petersburg, IL
SFCG	SMITH, F., CARTAGE, INC., Barrington Hills, IL
SMCG	SMITH, L., CARTAGE CO., Joliet, IL
SMIM	SMITH, M., INC., Orland Park, IL
STHV	SMITH, ROBERT A., Morrison, IL
SMID	SMITH, RON, TRUCKING, INC., Arcola, IL
SMCQ	SMITH, W., CARTAGE COMPANY, INC., Crystal Lake, IL
SHE	SMITHENRY, ED, Newton, IL
SMWY	SMITHWAY MOTOR XPRESS, INC., Fort Dodge, IA
SNEL	SNELTON TRUCKING, David M. Snelton and Donald Snelton, d/b/a, McHenry, IL
SYTI	SNYDER, BRUCE & DOUGLAS, TRUCKING SERVICE, Bruce Snyder and Douglas Snyder, d/b/a, Roodhouse, IL
SOEB	SONNEBORN BROTHERS, William P. Sonneborn, d/b/a, Hettick, IL
SGTM	SONNTAG TRUCKING, Donald L. Sonntag, d/b/a, Marengo, IL
STWD	SORENSEN TRUCKING, Joseph M. Sorensen and David J. Sorensen, d/b/a, Wilmington, IL
SBFL	SOUTH BEND FREIGHT LINE, INC., South Bend, IN

PARTICIPATING INTRASTATE CARRIERS — Continued

ILLINOIS CARRIERS — (Continued)
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Carrier "Alpha" Code	
SSMR	SOUTH SHORE MOTOR SERVICE, INC., Crystal Lake, IL
SSXQ	SOUTH SIDE MOTOR EXPRESS, INC., South Holland, IL
SGDS	SPAG'S DELIVERY SERVICE, Gary Spagnola, d/b/a, Oakbrook Terrace, IL
SPCJ	SPAIN CONSTRUCTION SERVICE, INC. (An Illinois Corporation), St. Elmo, IL
SPAO	SPARROW CARTAGE, INC., Chicago, IL
SPHT	SPECHT TRUCKING, INC., Lake Villa, IL
SSCI	SPECIAL SERVICE COMPANY, INC., Chicago, IL
SICD	SPECTRAN, INC., Elk Grove Village, IL
SDEE	SPEE-DEE SPECIAL DELIVERY, Gus Strelow, d/b/a, Villa Park, IL
SDCB	SPEE-DEE TAXI CAB SERVICE, Michael Borgetti, d/b/a, Rockford, IL
SPSQ	SPEEDY DELIVERY SERVICE, INC., Peoria, IL
SPQR	SPENCER TRUCKING, Howard E. Spencer, d/b/a, Nokomis, IL
SPNC	SPENCER, ELDON, INC., Port Byron, IL
SPGE	SPINGEES TRUCKING, INC., Chicago, IL
SPMH	SPIRIT OF MARANATHA SERVICES, INC., Addison, IL
SPMH	SPIRIT OF MARANATHA SERVICES, LTD., Addison, IL
SFTD	SPITFIRE TRUCKING, Scott Duros, d/b/a, Lombard, IL
SPTB	SPRAGUE TRUCK SERVICE, Marie Sprague Weis, d/b/a, Belleville, IL
STAH	STAHLEY CARTAGE CO., Edwardsville, IL
STXQ	STALEY EXPRESS, INC., Decatur, IL
SLLN	STALLION TRANSPORT, INC., Worth, IL
SORB	STAMM, OSCAR, TRUCKING, Oscar Stamm, d/b/a, Red Bud, IL
SCCI	STANDARD CARTAGE COMPANY, INC., Chicago, IL
STDF	STANDARD FORWARDING CO., INC., East Moline, IL
SAPN	STAPLETON TRANSFER, John H. Stapleton, d/b/a, Clinton, IL
SDAT	STAR DELIVERY & TRANSFER, INC., Canton, IL
SBKI	STARBREAKER, INC., O'Fallon, IL
SRLC	STARLINE CONSTRUCTION COMPANY, Frank D. Cattani, d/b/a, Ladd, IL
SLEI	STARLINE TRANSIT, INC., Ottawa, IL
SWDM	STATEWIDE MOTOR FREIGHT, INC., Streator, IL
STJK	STATLAND, JACK, EXPRESS, INC., Chicago, IL
SUOI	STAUNTON, INC., Chicago, IL
SNMI	STEEL & MACHINERY TRANSPORT, INC., East Chicago, IN
SRHC	STEHL, RICHARD, CONSTRUCTION, Richard Stehl, d/b/a, Magnolia, IL
SDAV	STEIDINGER, DAVID L., SHELLING SERVICE, INC., Cropsey, IL
STJV	STEIDINGER, JOHN, Strawn, IL
SERL	STEIL TRUCK LINE, INC., Aurora, IL
SNHK	STEINACHER TRUCKING, Donald D. Steinacher and Mary F. Steinacher, d/b/a, Carrollton, IL
STTG	STEININGER TRUCKING, Mike C. Steininger, d/b/a, Plano, IL
STMN	STEINMANN, PAUL F., Hamel, IL
SLXR	STELLAR EXPRESS, INC., Green Bay, WI
SMNP	STELLMAN TRUCKING, INC., Naperville, IL
STQE	STEPHENS TRUCKING & EXCAVATING, Raymond L. Stevens, d/b/a, Granite City, IL
SPXE	STEPINA EXPRESS CARTAGE, INC., Crystal Lake, IL
SEVE	STEVE'S TRUCKING, INC., Decatur, IL
SVET	STEVENS TRUCKING, Donald Stevens, d/b/a, Ransom, IL
SUAF	STEWART FARMS, Larry E. Stewart, d/b/a, Lexington, IL
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
SPSI	STILLPASS TRANSIT COMPANY, INC. OF ILLINOIS, Cincinnati, OH
SROD	STITES, RONALD, Oakland, IL
STOL	STOKES TRUCKING, Robert C. Stokes, d/b/a, Batavia, IL
SSEV	STONE, STEVE, Wataga, IL
SHOJ	STONEHOUSE, JACK, John M. Stonehouse, d/b/a, Riverton, IL
SRYR	STORY, ROY, Jerseyville, IL
STBT	STOVER BROS. TRUCKING CO., Elburn, IL
SRSA	STRANGE, SHERYL A., Bridgeport, IL
SRYQ	STRASSEY'S SERVICE SYSTEM, INC., Kankakee, IL
STJO	STRAWLOW, E. H., INC., Morrison, IL
STKA	STREATOR TRUCK LINES, INC., Streator, IL
STFK	STRICKLIN, ALLEN D., Omaha, IL
SRGW	STRIGGOW, MONROE M., AND LLOYD H. STRIGGOW, Monee, IL
SFSW	STROKA, F. S., TRANSPORT, INC., Des Plaines, IL
SCKL	STRUCK, CLIFFORD, McLean, IL
SROS	STUDER, RODRICK S., Roanoke, IL
STLT	STULTS, MORRIS, Palmyra, IL
SUET	STURTEVANT'S ELEVATOR, Merle Sturtevant, M. Max Sturtevant and Kim Sturtevant, d/b/a, Lanark, IL
SBDV	SUBURBAN DELIVERY, Paul E. Klaus, d/b/a, Downers Grove, IL
SUBO	SUBURBAN MOVING & STORAGE COMPANY, Downers Grove, IL
SUCL	SUCHOMSKI, LOUIS, Pinckneyville, IL
SULG	SULLIVAN, G. P., COMPANY, Cicero, IL
SUEF	SUMMERFIELD TRUCKING, INC., Trenton, IL

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

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@Carrier "Alpha" Code	
STOO	SUMMIT TRANSPORTATION, INC., Elk Grove Village, IL
SUCG	SUPER CARTAGE COMPANY, INC. (An Illinois Corporation), Chicago, IL
SUXP	SUPERIOR EXPRESS, INC. (An Illinois Corporation), Waterloo, IL
SSVD	SUPERIOR SERVICE DELIVERY, Michael P. Messina, d/b/a, Glendale Heights, IL
SSVG	SUPERIOR SERVICING, INC., Crossville, IL
SUPD	SUPREME DAIRY PRODUCTS CO., Oglesby, IL
SUCQ	SURMAN CARTAGE COMPANY, Bridgeview, IL
SUFO	SURRATT FREIGHT LINES, INC., Beardstown, IL
SURO	SURRATT TRUCK SERVICE, Richard D. Surratt, d/b/a, Chapin, IL
SURR	SURRATT, IRA, & SON, Ira Surratt, d/b/a, Beardstown, IL
SUSL	SUSMILCH, LEONARD H., Hinsdale, IL
SWCN	SWAN CONSTRUCTION COMPANY, Daryl D. Swan, d/b/a, Paxton, IL
SBDE	SWANBERG, DALE E., Cornell, IL
SWBR	SWANSON BROTHERS, Leroy Swanson and Maurice Swanson, d/b/a, Geneseo, IL
SWSH	SWANSON TRUCKING, INC., Ohio, IL
SWCE	SWANSON, CHARLES L., Prophetstown, IL
SWNJ	SWANSON, JACK, INC., Franklin Grove, IL
SWRE	SWANSON, ROLLIN E., Roseville, IL
SWIE	SWARTZ, STEVE G., McLeansboro, IL
SWJM	SWEENEY, J. M., COMPANY, Chicago, IL
STML	SWEENEY, T. M., & SONS L.T.L. SERVICE, INC., Palos Park, IL
SWSV	SWIFT SERVICES, George W. Swift, d/b/a, Davenport, IA
TNBT	T & B TRUCKING CO., INC., Downers Grove, IL
TNRF	T & R FLEE TRANSPORTATION SERVICE, INC., Westmont, IL
TNRT	T & R TRANSIT CO., Decatur, IL
TCTN	T. C. TRANSPORTATION, INC., Crystal Lake, IL
TLRW	T.L.R. TRUCKING, INC., Woodridge, IL
TRBK	T.R.N. TRANSPORTATION, INC., Berkeley, IL
TAQM	TAM TRUCKING, INC., Bensenville, IL
TBLT	TAMBLING TRUCKING, Lyle A. Tambling, d/b/a, Dwight, IL
TZLO	TANZILLO CONTRACTORS, INC., Wheeling, IL
TAPS	TAPSCOTT TRUCKING CO., George Lewis Tapscott and George Earl Tapscott, d/b/a, Springfield, IL
TARN	TARVIN, RICHARD, INC., Dewey, IL
TSHT	TASCHE, W., TRUCKING, Wallace Tasche, d/b/a, Hampshire, IL
TAXC	TAXI-CAB SERVICE COMPANY, Louis Wurster and Walter Wolff, d/b/a, Evanston, IL
TYTK	TAYLOR TRUCKING SERVICE, Edward Taylor, d/b/a, Olympia Fields, IL
TYEG	TAYLOR, EUGENE, Chrisman, IL
TYLS	TAYLOR, LESLIE, Earlville, IL
TLNQ	TAYLOR, NORMAN, TRUCKING, H. L. Taylor, d/b/a, Danville, IL
TAYW	TAYLOR, WAYNE B., Hume, IL
TETW	TEAMCO TRANSPORTATION, INC., Melrose Park, IL
TECA	TEMPO CARTAGE, INC., Palatine, IL
TACO	TERRA COTTA TRUCK SERVICE, INC., Crystal Lake, IL
TERG	TERVEN, GERALD W., Ellsworth, IL
TCLB	TEWES CO. OF LIBERTYVILLE, INC., THE, Waukegan, IL
TETK	TEX'S TRUCKING, Cannie Shaw, Jr., d/b/a, Chicago, IL
TGWT	TGW TRUCKING, Terry G. Weber, d/b/a, Crystal Lake, IL
THEH	THEBEN, HARRY, Melrose Park, IL
THGO	THIES GENERAL TRUCKING, Donald Thies, d/b/a, Streator, IL
TRMI	THINNES, RICHARD, MOTOR SERVICE, Richard R. Thinnes, d/b/a, Cary, IL
TCCM	THOMAS CARTAGE COMPANY, Elk Grove Village, IL
TMSK	THOMAS TRUCKING, Trent Thomas, d/b/a, Watseka, IL
THOK	THOMAS, KENT, McHenry, IL
TLEE	THOMAS, LEE, TRUCKING, Amy E. Thomas and Lee S. Thomas, III, d/b/a, Moline, IL
THWL	THOMEWAY LINES, Robert W. Thome, d/b/a, Rock Falls, IL
THPG	THOMPSON TRUCKING, Jerald B. Thompson and Bruce C. Thompson, d/b/a, Big Rock, IL
TGSI	THOMPSON, GEORGE, & SON, INC., Prophetstown, IL
THSN	THOMPSON, INC., Quincy, IL
TMPE	THOMPSON, PHILIP E., Mt. Vernon, IL
TOMG	THOMPSON, ROBERT G., Robert George Thompson, d/b/a, Kirkwood, IL
TMAH	THORNCREEK MATERIAL HAULERS, INC., Glenwood, IL
THCB	303 CAB ASSOCIATION, INC., Wilmette, IL
THRT	THRIFT TRUCKING, INC., Elmhurst, IL
TBBS	TIBBS, RICH, J. Richard Tibbs, d/b/a, Pekin, IL
TIMS	TIM'S MOTOR SERVICE, INC., Bensenville, IL
TMBV	TIMBER VALLEY, INC., Chicago, IL
TBLN	TIMBERLINE TRUCKING, INC., Crestwood, IL
TIEE	TIME EXPRESS, INC., Westchester, IL
TTPD	TIP TOP DELIVERY, Lyle Tempel, d/b/a, Freeport, IL
TITN	TITAN TRUCKING CO., Anthony Zolner, d/b/a, Tinley Park, IL
HMES	TNT HOLLAND MOTOR EXPRESS, INC., Holland, MI
TOBC	TOBEY'S CONSTRUCTION & CARTAGE, INC., Herscher, IL

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Carrier "Alpha" Code	
TOTF	TODD TRANSIT, INC., Rockford, IL
TDDE	TODD, ERNIE, TRUCKING, Ernie Todd, d/b/a, Thompsonville, IL
TMTK	TOM'S TRUCKING,Thomas Kruk, d/b/a, Lemont, IL
TMLT	TOMLINSON TRUCKING, John A. Tomlinson and Larry A. Tomlinson, d/b/a, Paris, IL
TONE	TONE TRUCKING, INC., Palos Hills, IL
TNYS	TONY'S TRUCKING, INC., Bensenville, IL
TYNQ	TONYAN BROS., INC., McHenry, IL
TPJE	TOPPERT, J. E., TRUCKING, Judith E. Toppert, d/b/a, Hillsdale, IL
TTGP	TOPS TRUCKING, INC., Pekin, IL
TOAT	TOTAL TRUCK SERVICE, INC. (An Ill. Corp.), Trenton, IL
TOTN	TOTONI, NICK, & SONS, INC., Chicago, IL
TTPQ	TOURES TRANSPORT, Alexander Toures, d/b/a, La Grange, IL
TNCF	TOWN AND COUNTRY FARMS, INC., Carol Stream, IL
TACP	TRACY TRUCKING CO., Marine, IL
TTGS	TRACY TRUCKING SERVICE, INC., Mt. Auburn, IL
TRMM	TRAMMELL, CHARLES, TRUCKING, Charles Trammell, d/b/a, Robbins, IL
TCEH	TRANS CITY EXPRESS, INC., Lombard, IL
TILI	TRANS ILLINOIS, INC., Belleville, IL
TRSH	TRANSFIELD TRUCKING, INC., West Chicago, IL
TCRR	TRANSPORT COURIER, INC., Chicago, IL
TRAP	TRANSPORT SERVICE CO., Hinsdale, IL
TPTG	TRANSPORT TRUCKING, INC., Montgomery, IL
TPTO	TRANSPORTATION 'PLUS', INC., Libertyville, IL
TPRN	TRAP ROCK TRANSPORT, Joseph V. Krempp, d/b/a, Downers Grove, IL
TAVL	TRAVELITE TRANSFER, Robert A. Pippin, d/b/a, Bradley, IL
TRXR	TRAXLER, RALPH, JR., LaPlace, IL
TLAC	TRI L & C TRUCKIN, Larry Lamar Caulk, Loren Lee Caulk and Lance Leon Caulk, d/b/a, Irving, IL
TADL	TRI-AIR DELIVERY, LTD., Elk Grove Village, IL
TRCT	TRI-CITY TRANSPORTATION, INC., Milwaukee, WI
TCUC	TRI-COUNTY CHEMICAL, INC., Eldorado, IL
TRBI	TRIMBLE TRUCKING, Boyd E. Trimble, d/b/a, Blue Mound, IL
TBEN	TRIMBLE, KEN, INC., Mackinaw, IL
TPMF	TRIPLE 'M' FARMS, Kevin A. Maloney, Shaun R. Maloney and Michael J. Maloney, d/b/a, Ridgway, IL
TPEG	TRIPLE G TRUCKING, Eugene Wasowicz, d/b/a, Lockport, IL
TPMS	TRIPP MOTOR SERVICE, INC., Forest View, IL
TKUT	TRKULA TRANSPOTATION, INC. (An Illinois Corporation), Bartlett, IL
TJTO	TROJAN TRANSPORTATION, INC., Chicago Heights, IL
TUUK	TRU TRUCK LINE, INC., Palos Hills, IL
TTJT	TRUAX, THOMAS JAMES, TRUCKING, Thomas James Truax, d/b/a, Harvard, IL
TRTP	TRUCK TRANSPORT, INCORPORATED, St. Louis, MO
TRBQ	TRUMBO TRUCKING CO., Centralia, IL
TMBB	TRUMBULL BROTHERS, INC., River Grove, IL
TSCH	TSC TRUCKING, Terry Englert, d/b/a, McHenry, IL
TSDC	TSDC, INC., Chicago, IL
TKRO	TUCKER TRUCKING, Harold D. Tucker & Garry O. Tucker, d/b/a, Armington, IL
TUKD	TUCKER, DALE, Flanagan, IL
TLLS	TULLIS TRUCK SERVICE, Jerry G. Tullis, Jack L. Tullis and F. Kay Trotter, d/b/a, Fairfield, IL
TNET	TUNE TRUCKING, Kenneth M. Tune and Kenneth R. Tune, d/b/a, Paloka, IL
TUIO	TURK'S MOTOR EXPRESS, INC., Chicago, IL
TIXR	TURTLE EXPRESS, INC., Streamwood, IL
TUCG	TUTT CARTAGE CO., Barry Tutt, d/b/a, Lincolnwood, IL
TCYC	TWIN CITY CONSTRUCTION, Richard L. Tessmann, d/b/a, Sterling, IL
TRVS	TWO RIVERS TRUCKING, INC., East St. Louis, IL
UBGT	UBBENGA TRUCKING, H. Robert Ubbenga and Kevin Ubbenga, d/b/a, Hartsburg, IL
UICT	UNICORN TRUCKING, INC., Streamwood, IL
UAIF	UNIFIED AIR FREIGHT TRUCKING, INC., Elk Grove Village, IL
UEDS	UNION EXPRESS DESIGNER SERVICE MOVING & STORAGE, INC., Chicago, IL
UFTQ	UNION FREIGHTWAYS, INC., Elk Grove Village, IL
UNIA	UNION INTERMODAL, INC., Chicago, IL
UDSL	UNITED DELIVERY SERVICE, LTD., Rosemont, IL
UEXS	UNITED EXPRESS SYSTEM, INC., Aurora, IL
UPSS	UNITED PARCEL SERVICE, INC. (An Ohio Corporation), St. Charles, IL
UTCQ	UNITED TRANSIT COMPANY, Alsip, IL
UNIV	UNIVERSAL DELIVERIES, INC., Chicago, IL
URBM	URBANA MOVING & TRANSFER CO., Rantoul, IL
URWR	URFER FARMS, Vernon R. Urfer, d/b/a, West Liberty, IL
USRY	USSERY'S TRUCKING, INC., Plymouth, IL
VNKT	V & K TRUCKING CO., Dale, IL
VNRC	V & R CARTAGE, INC. (An Illinois Corporation), Bensenville, IL
VBMQ	V. B. MOTOR SERVICE, INC., Franklin Park, IL
VLTE	VALENTE TRUCKING, INC., Calumet Park, IL

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@Carrier "Alpha" Code	
VLCO	VALLEY CONSTRUCTION COMPANY, Rock Island, IL
VAVI	VALLEY VIEW INDUSTRIES, INC., Cornell, IL
VWLI	VALLEY WEST LEASING, INC., Batavia, IL
VHZQ	VAN HERZEELE TRUCKING, Paul G. Van Herzeele, d/b/a, Atkinson, IL
VAHM	VAN HORN, MARVIN L., Pearl City, IL
VNOP	VAN OPDORP, STEVEN, TRUCKING, INC. (An Iowa Corporation), Annawan, IL
VZTQ	VAN ZANDT TRUCKING SERVICE, INC., Centralia, IL
VNEP	VAN'S ENTERPRISES, LTD., Mundelein, IL
VNCL	VANCIL, CECIL, Avon, IL
VNTO	VANDERSNICK, TONY, TRUCKING, INC., Osco, IL
VKBT	VANEK BROS. TRUCKING CO., Chicago, IL
VANG	VANGENIEN AND SON, INC., Belleville, IL
VCVO	VEATCH BROS. FARM SERVICES, INC., Roanoke, IL
VEXI	VEST EXCAVATING, Richard D. Vest, d/b/a, Collinsville, IL
VCCO	VETERAN'S MESSENGER SERVICE, INC., Bellwood, IL
VETT	VETERAN'S TRUCKING CORP., Chicago, IL
VIAJ	VIA COURIER, Scott C. Gilmore, d/b/a, Schaumburg, IL
VICM	VICTORY MOVERS, Art Lea and James F. Lea, d/b/a, Villa Park, IL
VGTN	VIEREGGE, R. D., TRUCKING, Robert D. Vieregge and Mike D. Vieregge, d/b/a, Moro, IL
VOLO	VOLENTINE, DELMAR, Delmar Volentine, d/b/a, Sorento, IL
VOSY	VON SYDOW'S FIREPROOF WAREHOUSE, INC., Arlington Heights, IL
VSMT	VSM TRUCKING, INC., Abington, IL
WDCL	W & D TRUCK LINES, INC., Chicago, IL
WUTC	W/U TRANS CO., Highland, IL
WPCP	W.P.C., Patrick J. Collins, d/b/a, Bloomingdale, IL
WWTR	W.W. TRANSPORTATION, INC., Burbank, IL
WABR	WABEL, ROSCOE A., II, Kingston, IL
WCOI	WACO, INC., Ogden, IL
WBDT	WADE BROS. TRUCKING, Jay Wade, d/b/a, Gilman, IL
WAGQ	WAGER TRANSFER, INC., Towanda, IL
WAGP	WAGGONERS TRUCKING, THE, Billings, MT
WGRQ	WAGNER MOTOR SERVICE, INC., Chicago, IL
WKTL	WALKER, C. A., TRUCK LINES, INC., Chillicothe, IL
WAKD	WALKER, DONALD E., Shobonier, IL
WLYS	WALLY'S CARTAGE, Walter J. Buske, d/b/a, Litchfield, IL
WLCI	WALSH CONSTRUCTION COMPANY OF ILLINOIS, Chicago, IL
WLFM	WALSH FARMS, Mark J. Walsh, d/b/a, Salem, IL
WNSO	WALTER & SONS CONSTRUCTION CO., Walter Sally, d/b/a, Joliet, IL
WLTC	WALTERS TRUCKING, INC., Minier, IL
WTGH	WARD TRUCKING, John E. Ward, d/b/a, Harrisburg, IL
WVNE	WARD, VAN E., Enfield, IL
WNTN	WAREHOUSE & TERMINAL CARTAGE CO., Bridgeview, IL
WBOT	WARNER BROS. TRUCKING, INC., Rantoul, IL
WRGF	WARREN GRAIN FARM, Frank Warren, d/b/a, Windsor, IL
WARQ	WARRENVILLE CARTAGE CO., INC., Chicago, IL
WTGT	WARTERS TRUCKING, Steven W. Warters, d/b/a, Tuscola, IL
WMTW	WAS, M., TRUCKING, INC., Westmont, IL
WCFE	WASHBURN, C. F., EXCAVATING, Charles F. Washburn, d/b/a, Vandalia, IL
WASQ	WATTS TRANSFER & DELIVERY SERVICE, Eudell Watts, III, d/b/a, Rock Island, IL
WGNI	WAUKEGAN CARTAGE, INC., Warrenville, IL
WYCT	WAYNE CITY TRANSPORTATION, INC., Wayne City, IL
WYME	WAYNE MOTOR EXPRESS, INC., Elk Grove Village, IL
WEDI	WE DELIVER, INC., Buffalo Grove, IL
WRKT	WEBB, RICK, TRUCKING, INCORPORATED, Carmi, IL
WANQ	WEBBER, A. N., INC., Chebanse, IL
WBRW	WEBER, WILBUR L., LaFayette, IL
WBTA	WEBER-TAETS TRUCKING, INC., Coal Valley, IL
WEDM	WEEDMAN TRUCKING, Lois L. Weedman and Roger D. Weedman, d/b/a, Victoria, IL
WKSG	WEEKS, GEORGE, JR., Plano, IL
WEKR	WEEKS, R., TRUCKING, Ronnie E. Weeks, d/b/a, Chicago, IL
WHNJ	WEHNES TRUCKING, INC., Washington, IL
WEHG	WEHRLE GRAIN CO., Ivan Wehrle, d/b/a, Mulberry Grove, IL
WEIG	WEIGAND, A. J., INC., Dover, OH
WNTV	WENTE TRUCKING, Virginia L. Wente, d/b/a, Palatine, IL
WFSD	WES DELIVERY SERVICE, INC., Schaumburg, IL
WSBF	WEST BROOKLYN FARMER'S CO-OPERATIVE CO., West Brooklyn, IL
WTFE	WEST TRANSFER CO., INC., Orland Park, IL
WLLI	WESTEN, WILLIAM D., Beason, IL
WXGE	WEXELL, GAIL E., Bishop Hill, IL
WHLM	WHALEN MOVING & WAREHOUSE OF MILWAUKEE, INC., Milwaukee, WI
WHAN	WHALEN TRUCKING, INC., Waverly, IL
WHEV	WHATEVER, INC., Dixon, IL

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◎Carrier "Alpha" Code	ILLINOIS CARRIERS — (Continued) (Operating under jurisdiction of Illinois Commerce Commission)
WKGC	WHEATLEY TRUCKING, Donald E. Wheatley, d/b/a, Bloomington, IL
WHRB	WHEELER, ROBERT, M, Canton, IL
WGTM	WHEELING TRANSPORTATION CO., INC., Palatine, IL
WHBR	WHITE BROTHERS TRUCKING CO., Wasco, IL
WEGV	WHITE EAGLE TRUCKING CO., INC., Villa Park, IL
WMRS	WHITE MOTOR SERVICE, Eleonore Berkelman, d/b/a, Chicago, IL
WHRN	WHITE, R. W., TRUCKING COMPANY, Margo A. White, d/b/a, Knoxville, IL
WHFD	WHITEFORD TRUCK LINES, INC., South Bend, IN
WRAL	WHITTINGTON, RANDALL L., Sesser, IL
WTWD	WICKERT, WALTER, DELIVERY SERVICE CO., East Peoria, IL
WEHL	WIEHLE, LeROY, Iuka, IL
WSC-	WIERSEMA, STEVEN L., TRUCKING, Steven Lee Wiersema, d/b/a, Milledgeville, IL
WIEQ	WIESBROCK TRUCKING, INC., Leonore, IL
WKTI	WILKE TRUCK SERVICE, INC., Trenton, IL
WIKL	WILKING TRUCKING, INC., Chebanse, IL
WLBG	WILKINS, BOBBY G., Oblong, IL
WCGE	WILL CARRIER EXPRESS, Zack Winfrel Cameron, d/b/a, Chicago, IL
WMSF	WILLIAMS FREIGHT SYSTEMS, INC., Sycamore, IL
WLTH	WILLIAMS TRUCKING, Dale Williams, d/b/a, Fillmore, IL
WCKI	WILLIAMS, CLARKE, TRANSPORT, INC., Belleville, IL
WLME	WILLIAMS, MAURICE, Maurice B. Williams, d/b/a, Feldon, IL
WKEI	WILLIAMS-KINSELLA EXCAVATING, Donald W. Williams & Kenneth F. Kinsella, d/b/a, Minooka, IL
WLOO	WILLIAMSON, DONALD, Kankakee, IL
WLOE	WILSON DELIVERY SERVICE, INC., Franklin Park, IL
WDLP	WILSON, DALE L., Piasa, IL
WCTY	WINDY CITY MESSENGER, INC., Chicago, IL
WKTY	WINKELMAN, TERRY L., Steeleville, IL
WRZQ	WIRTZ CARTAGE COMPANY, Chicago, IL
WSEM	WISEMAN TRUCKING, Walter Wiseman, d/b/a, Virden, IL
WTHM	WITHAM, DELMAR W., TRUCKING, Delmar W. Witham, d/b/a, Stanford, IL
WLFI	WOLFF OIL, INC., Litchfield, IL
WOKN	WOLKEN, STANLEY, Gilford, IL
WTNS	WOODRUFF TRANSPORT SERVICE, Robert W. Woodruff, d/b/a, Shelbyville, IL
WDFG	WOODSON FREIGHT, Terry L. Woodson, d/b/a, Dalton City, IL
WOBY	WOODSON ORDER BUYERS, Roland C. Erixon, d/b/a, Woodson, IL
WDWS	WOODWORTH & SONS, INC., Tolono, IL
WOTI	WOOSLEY TRUCKING, Darrell Woosley, d/b/a, Carlock, IL
WOSL	WOOSLEY, LORAN H., Carlock, IL
WTPV	WORLD TRANSPORT, INC., Elk Grove Village, IL
WRCS	WUJEK, RICK, CUSTOM CROP SERVICE, Richard J. Wujek, d/b/a, Troy Grove, IL
WURQ	WURTH BROTHERS, Scott Wurth and Ross Wurth and Jo Ann Biedenharn, d/b/a, Beason, IL
WNCT	WYNN, CHRIS, TRUCKING, Christopher L. Wynn, d/b/a, Reynolds, IL
XLDP	XL DISPOSAL CORPORATION, Crestwood, IL
YLLO	YELLOW CAB TRANSFER, Lawrence "Larry" J. Uranich, Jr., d/b/a, LaSalle, IL
YFSY	YELLOW FREIGHT SYSTEM, INC., Shawnee Mission, KS
YESC	YESLEY SERVICE CO., INC., Steelville, IL
YOMT	YO-MAC TRANSPORT, INC., Peoria, IL
YRKT	YORK TRUCKING, INC., Jacksonville, IL
YWMS	YOUR-WAY MESSENGER SERVICE, INCORPORATED, Chicago, IL
ZLIC	Z LINE COMPANY, Spring Valley, IL
ZATJ	ZACHERY, THOMAS J., Ottawa, IL
ZLDQ	ZALUD MOTOR EXPRESS, Laddie P. Zalud and Dennis Zalud, d/b/a, LaGrange Park, IL
ZART	ZARNDT, ROBERT D., TRUCKING, Aurora, IL
ZELM	ZELLMER TRUCK LINES, INC., Granville, IL
ZENQ	ZENITH TRANSPORTATION CORPORATION, Milwaukee, WI
ZILK	ZILK ENTERPRISES, INC., Westchester, IL
ZIMA	ZIMMERMAN, ART, AND SON, Arthur D. Zimmerman and Richard A. Zimmerman, d/b/a, Pecatonica, IL
ZORN	ZORN TRANSPORT, INC., Bloomington, IL
ZOSS	ZOSS, EUGENE C., Roanoke, IL

	INDIANA CARRIERS (Operating under jurisdiction of Indiana Department of Revenue)
AHTL	A & H TRUCK LINE, INC., Evansville, IN
AKNS	AIKINS, BOB, LINES, INC., Lawrenceburg, IN
ATOI	ALTOM TRANSPORT, INC., Chicago, IL
AANN	AMERICAN TRANSPORTATION CO., INC., Fort Wayne, IN
ARTM	ARTIM TRANSPORT, INC., Hammond, IN
BRFW	BROWN FROM WABASH, INC., Wabash, IN
COCA	CHAMBERS OIL COMPANY, INC., Hillsboro, IN
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

INDIANA CARRIERS — (Continued)
(Operating under jurisdiction of Indiana Department of Revenue)

§ Carrier "Alpha" Code	
CLMB	COLUMBIA TRUCKING, INC., Hammond, IN
CNND	CONNER, A. D., INC., Frankfort, IL
DANL	D & L TRANSPORT, INC., Cicero, IL
GTFO	GARY TRANSFER COMPANY, INC., Gary, IN
HTCP	HALL TRUCKING COMPANY, INC., Orleans, IN
HGET	HERITAGE TRANSPORT, INC., Indianapolis, IN
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN
JTRC	JONES TRANSFER COMPANY, Monroe, MI
KOHS	KOCH SERVICE, INC., Wichita, KS
LAMT	LANDGREBE MOTOR TRANSPORT, INC., Valparaiso, IN
LWSQ	LEWIS TRANSPORT, INC., Columbia, KY
LQID	LIQUID TRANSPORTERS, INC., Louisville, KY
LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
MTLK	MATLACK, INC., Wilmington, DE
MCLA	McLAIN TRUCKING, INC., Anderson, IN
MATL	MID-AMERICAN LINES, INC., Kansas City, MO
MWOT	MIDWEST OIL TRANSIT, INC., Indianapolis, IN
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
MNIF	MORGANTOWN-INDIANAPOLIS FREIGHT LINE, INC., Indianapolis, IN
NUGE	NUGGET EXPRESS, INC., Portage, IN
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH
OVCO	OVERLAND TRANSPORTATION SYSTEM, INC., Indianapolis, IN
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PITC	PIERCETON TRUCKING CO., INC., Laketon, IN
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH
RFNR	REFINERS TRANSPORT, INC., Indianapolis, IN
RMFQ	ROCKET MOTOR FREIGHT LINES, INC., Peoria, IL
ROGR	ROGERS CARTAGE COMPANY OF INDIANA, INC., Oak Lawn, IL
RWLI	RONWAL TRANSPORTATION, INC., Hammond, IN
SCHA	SCHALLER TRUCKING CORPORATION, Indianapolis, IN
SIBR	SIBR, FRANK J., & SONS, INC., Alsip, IL
SLOL	SILER OIL CO., INC., Washington, IN
SBFL	SOUTH BEND FREIGHT LINE, INC., South Bend, IN
SBWD	SOUTH BEND MOTOR FREIGHT, South Bend Warehousing & Distributing Corporation, d/b/a, South Bend, IN
SNMI	STEEL & MACHINERY TRANSPORT, INC., East Chicago, IN
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
TFTO	TFT OF INDIANA, INC., Shirley, IN
TJMP	TRIPLE J MAR PETROLEUM, INC., Wanatah, IN
TURN	TURNER TRUCKING COMPANY, INC., Clarks Hill, IN
WEIS	WEISS TRUCKING COMPANY, INC., Mongo, IN

IOWA CARRIERS
(Operating under jurisdiction of Iowa Department of Transportation)

ALLA	ALL-AMERICAN, INC., Overland Park, KS
ARNE	ARNIE'S MOTOR FREIGHT, INC., Altoona, IA
BROM	BROMMER TRUCK LINE, INC., Sioux Center, IA
CHTL	CHURCHILL TRUCK LINES, INC., Chillicothe, MO
GAHM	G & H MOTOR FREIGHT LINES, INC., Greenfield, IA
GLTL	GLENWOOD TRANSIT LINE, INC., Glenwood, IA
HAWM	H & W MOTOR EXPRESS COMPANY, Dubuque, IA
HYMF	HYMAN FREIGHTWAYS, INC., Roseville, MN
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN
KINT	KING TRANSFER, LTD., Onana, IA
MATL	MID-AMERICAN LINES, INC., Kansas City, MO
NEXD	NEXT DAY MOTOR FREIGHT, INC., St. Louis, MO
PKDB	PARKER DISTRUBUTING COMPANY, INC., Bettendorf, IA
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
QUTF	QUICKIE TRANSPORT COMPANY, Minneapolis, MN
SHKE	SHARKEY TRANSPORTATION, INC., Quincy, IL
STOF	STANDARD FORWARDING CO., INC., East Moline, IL
TRTP	TRUCK TRANSPORT, INCORPORATED, St. Louis, MO
UPSS	UNITED PARCEL SERVICE, INC. (An Ohio Corporation), St. Charles, IL
VASS	VAN SANT MOTOR FREIGHT, Willis Van Sant, d/b/a, Sully, IA
VANK	VAN WYK FREIGHT LINES, INC., Grinnell, IA
VKFL	VANDER KOOI FREIGHT LINE, Dennis Smit, d/b/a, Hull, IA

PARTICIPATING INTRASTATE CARRIERS — Continued

KANSAS CARRIERS
(Operating under jurisdiction of Kansas Corporation Commission)

@Carrier "Alpha" Code	
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
BRFS	BRIGHT'S FREIGHT SERVICE, Eldon O. Bright, d/b/a, Topeka, KS
CAML	CAMPBELL "SIXTY-SIX" EXPRESS, INC., Springfield, MO
DUGN	DUGAN TRUCK LINE, INC., Wichita, KS
EMFT	EL DORADO MOTOR FREIGHT, INC., Wichita, KS
FLHE	FLINT HILLS EXPRESS, INC., Wichita, KS
GRAM	GRAHAM SHIP BY TRUCK COMPANY, Kansas City, KS
GRTT	GROENDYKE TRANSPORT, INC., Enid, OK
HLTN	HOLTON TRUCK LINE, INC., Topeka, KS
IDEL	IDEAL TRUCK LINES, INC., Norton, KS
KBFL	K & B FREIGHT LINE, Larry R. Billings, d/b/a, Salina, KS
LBTC	LEONARD BROTHERS TRANSPORT COMPANY, INC., Kansas City, MO
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA
MKSH	MID KANSAS TRUCKING, INC., Salina, KS
MPTL	MISSOURI PACIFIC TRUCK LINES, INC., St. Louis, MO
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC
PRIC	PRICE TRUCK LINE, INC., Wichita, KS
TPLF	TOPLIFF TRUCK LINE, INC., Salina, KS

KENTUCKY CARRIERS
(Operating under jurisdiction of Kentucky Department of Transportation)

CRXP	CRAIG'S EXPRESS, INC., Falmouth, KY
DAVS	DAVIS TRANSPORT, INC., Paducah, KY
DTTS	DISTILLERY TRANSFER SERVICE, INC., Bardstown, KY
GEGT	GROGER, G. E., TRUCK LINE, INC., Walton, KY
HNOT	H & O TRANSPORT, INC., Campbellsville, KY
IMDL	INTERMODAL TRANSPORT, INC., Louisville, KY
LAWB	LAWRENCEBURG TRANSFER, INC., Lawrenceburg, KY
LEIT	LEITCHFIELD TRANSFER CO., Leitchfield, KY
LQID	LIQUID TRANSPORTERS, INC., Louisville, KY
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
MTLK	MATLACK, INC., Wilmington, DE
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PASC	PASCHALL TRUCK LINES, INC., Murray, KY
POIN	POINT EXPRESS, INC., Columbus, OH
SHEP	SHEPHERD TRUCK LINE, INC., Irvine, KY
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
TIME	T.I.M.E.-DC, INC., Dallas, TX

LOUISIANA CARRIERS
(Operating under jurisdiction of Louisiana Public Service Commission)

AACT	AAA COOPER TRANSPORTATION, Dothan, AL
CETK	CHEMICAL TANK LINES, INC., Mulberry, FL
HYNM	HAYNES MOTOR LINES, INC., Baton Rouge, LA
MTLK	MATLACK, INC., Wilmington, DE
MPTL	MISSOURI PACIFIC TRUCK LINES, INC., St. Louis, MO
NANC	NANCE AND COLLUMS, INC., Fernwood, MS
PIEC	P-I-E NATIONWIDE, INC., Jacksonville, FL
SOMF	SOUTHEASTERN MOTOR FREIGHT, INC., Metairie, LA
STPN	STEPHENS TRUCK LINES, INC., Bossier City, LA
THST	THOMPSON, STEVE D., TRUCKING, INC., Winnsboro, LA

MAINE CARRIERS
(Operating under jurisdiction of Maine Public Utilities Commission)

ACEA	ACADIA EXPRESS COMPANY, INC., Southwest Harbor, ME
BISS	BISSON, LUCIEN, INC., Bath, ME
COLE	COLES EXPRESS, Bangor, ME
DUXP	DUGAS EXPRESS COMPANY, Lewiston, ME
MERR	MERRILL TRANSPORT CO., Portland, ME
ROXP	ROBINSON'S EXPRESS, INC., Dover-Foxcroft, ME
SJTC	ST. JOHNSBURY TRUCKING COMPANY, INC., Holliston, MA
SWAN	SWAN'S EXPRESS, Franklin W. Powell, d/b/a, Fryeburg, ME

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

MARYLAND CARRIERS
(Operating under jurisdiction of Public Service Commission of Maryland)

@Carrier "Alpha" Code	
AAAC	AAA TRUCKING CORPORATION, Trenton, NJ
CBTC	CHARLTON BROS. TRANSPORTATION COMPANY, INC., Hagerstown, MD
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
KANE	KANE TRANSFER COMPANY, Baltimore, MD
KANN	KANE, E. I., INC., Baltimore, MD
KEWT	KEY WAY TRANSPORT, INC., Baltimore, MD
MTLK	MATLACK, INC., Wilmington, DE
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD

MICHIGAN CARRIERS
(Operating under jurisdiction of Michigan Public Service Commission)

AACC	A & C CARRIERS, INC., Muskegon, MI
AMMF	ADMIRAL-MERCHANTS MOTOR FREIGHT, INC., Minneapolis, MN
ALVN	ALVAN MOTOR FREIGHT, INC., Kalamazoo, MI
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
CMSB	CMS TRUCK COMPANY, INC., Detroit, MI
CSNT	COLUMBIAN STORAGE & TRANSFER CO., Grand Rapids, MI
GITR	GILLILAND TRANSFER COMPANY (A Michigan Corporation), Fremont, MI
GTCK	GRAFF TRUCKING COMPANY, INC., Kalamazoo, MI
HARC	HARE CARTAGE, INC., Detroit, MI
HOVR	HOVER TRUCKING CO., South Bend, IN
ICTS	INTER-CITY TRUCKING SERVICE, INC., Detroit, MI
JTRC	JONES TRANSFER COMPANY, Monroe, MI
LALL	L & L LEASING, INC., Waterloo, IN
LTCK	LTC TRANSPORT, INC., Greenfield, IN
MAAR	MACOIT CARTAGE COMPANY, Dearborn, MI
MTLK	MATLACK, INC., Wilmington, DE
MKLI	McKINLEY TRUCKING CO., INC., Carson City, MI
MDTM	MODULAR TRANSPORTATION CO., Grand Rapids, MI
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
MWCO	MOTORWAY CARTAGE COMPANY, Detroit, MI
NOTQ	NORTH EAST TRANSPORTATION, INC., Bad Axe, MI
PAMF	PARKER MOTOR FREIGHT, INC., Grand Rapids, MI
PNKC	PARKER, N. K., TRANSPORT COMPANY, Dearborn, MI
PHRM	PETRO-HAUL, INC., Bay City, MI
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
RWXL	R-W SERVICE SYSTEM, INC., Taylor, MI
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH
REXT	REX TRANSPORTATION COMPANY, Flint, MI
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL
SHND	SCHNEIDER TANK LINES, INC., Green Bay, WI
SHRT	SHORT FREIGHT LINES, INC., Bay City, MI
TMLG	TML, INC., Grand Rapids, MI
USTC	U. S. TRUCK COMPANY, INC., Detroit, MI
WNDS	WARNER TRUCKING, INC., Belding, MI

MINNESOTA CARRIERS
(Operating under jurisdiction of Minnesota Transportation Regulation Board)

ALLA	ALL-AMERICAN, INC., Overland Park, KS
CEMF	CENTURY MOTOR FREIGHT, INC., St. Paul, MN
DHLE	DAHLEN TRANSPORT, INC., Newport, MN
DEIK	DEIKE, AUGUST, TRANSFER, INC., Mankato, MN
HYMF	HYMAN FREIGHTWAYS, INC., Roseville, MN
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN
MIDW	MIDWEST MOTOR EXPRESS, INC., Bismarck, ND
MOBG	MOBERG TRANSPORT, INCORPORATED, Marshall, MN
MORR	MORRELL TRANSFER, INC., Elk River, MN
POLM	POLMAN TRANSFER, INC., Wadena, MN
QUAS	QUAST TRANSFER, INC., Winsted, MN
QUTF	QUICKIE TRANSPORT COMPANY, Minneapolis, MN
RRVT	ROOT RIVER VALLEY TRANSFER, Virgil Benson, *d/b/a*, Houston, MN
STKY	STRITESKY TRUCKING, Otto Stritesky and Kenneth Stritesky, *d/b/a*, Silver Lake, MN
TCFL	TWIN CITY FREIGHT, INC., St. Paul, MN

PARTICIPATING INTRASTATE CARRIERS — Continued

MISSISSIPPI CARRIERS
(Operating under jurisdiction of Mississippi Public Service Commission)

Carrier "Alpha" Code	
AACT	AAA COOPER TRANSPORTATION, Dothan, AL
HYNM	HAYNES MOTOR LINES, INC., Baton Rouge, LA
LAPN	LAMPTON LOVE, INC., Jackson, MS
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA
MTLW	MERCHANTS TRUCK LINE, INC., New Albany, MS
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS
NANC	NANCE AND COLLUMS, INC., Fernwood, MS
SHPR	SHEPPERS EXPRESS, INC., Jackson, MS
TPIN	TRANSPORT, INC., Hattiesburg, MS

MISSOURI CARRIERS
(Operating under jurisdiction of Missouri Division of Transportation)

ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ACAT	ARMENTROUT TRUCK LINE, William F. Armentrout and Janice Armentrout, d/b/a, Salisbury, MO
BAHF	B & H FREIGHT LINE, INC., Harrisonville, MO
BAGG	BAGGS TRUCK LINE, Harold Baggs, d/b/a, Bogard, MO
BMTC	BE-MAC TRANSPORT COMPANY, INC., St. Louis, MO
BETC	BEAUFORT TRANSFER COMPANY, Gerald, MO
BUTL	BURGGRABE TRUCK LINES, INC., Warrenton, MO
BURY	BURRY TRUCK LINE, Lawrence G. Getty, d/b/a, Lee's Summit, MO
CHTL	CHURCHILL TRUCK LINES, INC., Chillicothe, MO
CMLQ	COMMERCIAL CARTAGE CO., Fenton, MO
COMA	COMMERCIAL TRANSPORT, INC., Belleville, IL
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
CUTT	CURTIS TRANSPORT, INC., Arnold, MO
DAVS	DAVIS TRANSPORT, INC., Paducah, KY
EEJA	Ee-JAY MOTOR TRANSPORTS, INC., E. St. Louis, IL
EIDS	EIDSON & USSERY, INC., Marshall, MO
ELFT	ELFRINK TRUCK LINES, INC., Advance, MO
GRAM	GRAHAM SHIP BY TRUCK COMPANY, Kansas City, KS
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
JAME	JAMES, ORIN L., JR., Cameron, MO
JTLS	JONES TRUCK LINES, INC., Springdale, AR
KWTC	KAW TRANSPORT COMPANY, Kansas City, MO
LBTC	LEONARD BROTHERS TRANSPORT COMPANY, INC., Kansas City, MO
LGTV	LONG'S TRUCKING, San Jose, CA
MFDC	MARSHFIELD DRAYAGE COMPANY, Springfield, MO
MICB	MID CITIES MOTOR FREIGHT, INC., St. Joseph, MO
MFIC	MIDDLEWEST FREIGHTWAYS, INC., St. Louis, MO
MPTL	MISSOURI PACIFIC TRUCK LINES, INC., St. Louis, MO
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
OZTC	OZARK TRANSFER COMPANY, Landes Ozark Transfer Co., d/b/a, Ozark, MO
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC
PTOS	POTOSI EXPRESS, James A. Wood, d/b/a, Potosi, MO
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
RAUH	RAUCH TRUCK LINES, INC., St. Charles, MO
RNZC	RENZ TRUCK LINES, INCORPORATED, Pacific, MO
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI
SMOF	SOUTHERN MISSOURI FREIGHT, INC., Springfield, MO
STAH	STAHLEY CARTAGE CO., Edwardsville, IL
STTM	STRATMAN TRUCK SERVICE, Cellus Stratman, d/b/a, Vienna, MO
TWEP	TIDWELL'S EXPRESS, INC., Manchester, MO
TRTP	TRUCK TRANSPORT, INCORPORATED, St. Louis, MO
WALL	WALL TRUCK LINE, INC., Holden, MO
WELT	WELLING TRUCK SERVICE, INC., DeSoto, MO

MONTANA CARRIERS
(Operating under jurisdiction of Montana Public Service Commission)

ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
ARRT	ARROWHEAD TRANSPORTATION, Bill G. Carr and Phyllis R. Carr, d/b/a, Billings, MT
CFWL	CANADIAN FREIGHTWAYS LIMITED, Calgary, AB, CN
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
DEYG	DeYOUNG TRANSFER & STORAGE CO., Chester A. DeYoung, d/b/a, Livingston, MT
ICFR	INTER-CITY FREIGHT LINES, Harvey L. Doty and Jean C. Doty, d/b/a, Plains, MT
MGRO	MERGENTHALER TRANSFER & STORAGE COMPANY, Helena, MT
MOWY	MOLERWAY FREIGHT LINES, INC., Billings, MT
RONF	ROANE TRANSFER, Cecile J. Roane, d/b/a, Lewistown, MT

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

NEVADA CARRIERS
(Operating under jurisdiction of Public Service Commission of Nevada)

Carrier "Alpha" Code	
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
MTRG	MOTOR CARGO, A Corporation, Salt Lake City, UT
RTCR	RTC TRANSPORTATION, INC., Forest Park, GA
SMSN	SAMSON TRUCK LINE, R. L. Edgar, d/b/a, Mountain Home, ID
WELS	WELLS CARGO, INC., Reno, NV

NEW JERSEY CARRIERS
(Operating under jurisdiction of New Jersey Public Utilities Commission)

CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
JECT	JERSEY CITY TRANSFER, Gary Stuffo, d/b/a, Delran, NJ
JONS	JONES MOTOR CO., INC., Spring City, PA
KANQ	KAUFFMAN & MINTEER, INC., Jobstown, NJ
MTLK	MATLACK, INC., Wilmington, DE
NEFW	NELSON FREIGHTWAYS, INC., Rockville, CT

NEW MEXICO CARRIERS
(Operating under jurisdiction of State Corporation Commission of New Mexico)

ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
GRTT	GROENDYKE TRANSPORT, INC., Enid, OK

NEW YORK CARRIERS
(Operating under jurisdiction of New York State Department of Transportation)

ARGC	A R G TRUCKING CORP., Phelps, NY
APAC	A-P-A TRANSPORT CORP., North Bergen, NJ
AZWS	A-Z WASTE SERVICE, INC., Falconer, NY
AFDC	A. F. D., INC., Syracuse, NY
AAAC	AAA TRUCKING CORPORATION, Trenton, NJ
ACBE	AC-BERWICK TRANSPORTERS, INC., Keasbey, NJ
ADPH	ADOLPH'S TRUCKING CO., INC., New York, NY
ALAN	ALAN MOTOR LINES, INC., Rahway, NJ
ALYI	ALNYE, INC., Moravia, NY
ANYT	ANYTIME DELIVERY SYSTEMS, INC., Tappan, NY
ASDQ	ASSOCIATES DELIVERY SERVICE, Raymond R. Hawley, d/b/a, Poughkeepsie, NY
AVOC	AVERY OIL COMPANY, INC., Gloversville, NY
AXEM	AXE & ARTHUR MOTOR EXPRESS, INC., Syracuse, NY
BDWN	BALDWIN TRANSPORTATION CORPORATION, Bronx, NY
BEPL	BARNES EXPRESS, LTD., Honeoye Falls, NY
BENV	BENLIN DISTRIBUTION SERVICES, INC., Buffalo, NY
BERM	BERMAN'S MOTOR EXPRESS, INC., Binghamton, NY
BLKY	BILKAYS EXPRESS CO., Neptune, NJ
BAGL	BINGHAMTON-GREENE TRUCK LINES, INC., Greene, NY
BING	BINGHAMTON-ITHACA EXPRESS, INC., Binghamton, NY
BLKD	BLACK DIAMOND SERVICE, INC., Buffalo, NY
BDLI	BOB'S DELIVERY SERVICE, Robert J. McGee, d/b/a, Clarence Center, NY
BOSD	BOSSONG'S COMMERCIAL DELIVERY, INC., North Syracuse, NY
BSBE	BOSTON-BUFFALO EXPRESS, INC., East Syracuse, NY
BCGQ	BOULTER CARTING COMPANY, INCORPORATED, Webster, NY
BOYL	BOYLE BROTHERS, INC., Medford, NJ
BUAN	BUANNO TRANSPORATION CO., INC., Fort Johnson, NY
BCNJ	BUELL, C & J, LTD., Oriskany Falls, NY
BDRP	BURDICK, RAYMOND, P., INC., Canaseraga, NY
CNKP	C&K PETROLEUM TRANSPORTERS, INC., Middle Island, NY
CALY	CALEDONIA LINES, INC., Caledonia, NY
CRMN	CARMAN, J. A., TRUCKING COMPANY, INC., Albany, NY
CTKR	CATARACT TRUCK & CAR RENTAL, Niagara Falls, NY
CVJQ	CHAIRVOLOTTI, JOSEPH, Waverly, NY
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CCOS	CHOICE COURIER SYSTEMS, INC., New York, NY
CLEV	CLEVELAND'S TRUCK LINES, INC., Hornell, NY
CLIH	CLINE, HAROLD G., INC., Penns Grove, NJ
CVLE	CLOVERLEAF ENTERPRISES, INC., Verbank, NY
COVH	COLVIN, C. H., INC., Cherry Creek, NY
CWEE	CON-WAY EASTERN EXPRESS, INC., Rochester, NY
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
COPB	COPE/BESTWAY EXPRESS, INC., Grand Island, NY
COPO	CORPORATE TRANSPORT, INC., Liverpool, NY
COUT	COUNTY TANK LINES, INC., Riverhead, NY

PARTICIPATING INTRASTATE CARRIERS — Continued

©Carrier "Alpha" Code	NEW YORK CARRIERS — (Continued) (Operating under jurisdiction of New York State Department of Transportation)
CSST	CROSSETT, INC., Warren, PA
CRYG	CRYOGENIC CARRIERS, INC., Oregon, OH
DJTS	D & J TRANSPORTATION SPECIALISTS, INC., Liverpool, NY
DLMT	DELMOT MOTOR EXPRESS, INC., Elmira Heights, NY
DT8Q	DeWITT, D. R., INC., Pavilion, NY
DFCT	DFC TRANSPORTATION COMPANY, Huntley, IL
DTLI	DIAMOND TRUCK LEASING CORP., West Babylon, NY
DAXP	DICK'S AUTO EXPRESS, INC., East Syracuse, NY
DOND	DON DEE TRUCKING CORP., Jersey City, NJ
DGLS	DOUGLAS EXPRESS, INC., Norwalk, CT
DYLC	DOYLE COURIER SERVICE, INC., Rochester, NY
DSIT	DSI TRANSPORTS, INC., Deer Park, TX
DTTP	DT TRANSPORTATION, Robert J. Dew, d/b/a, Torrington, CT
DUGS	DUGGAN'S TRUCKING, INC., Buffalo, NY
DYAQ	DYNA DISTRIBUTORS, INC., Brookfield, CT
ENFQ	E&F TRUCKING, INC., Melville, NY
EABD	EAST AURORA & BUFFALO DELIVERY, H. Edward Narbe, d/b/a, Orchard Park, NY
EMAS	EDDY MESSENGER SERVICE, INC., Port Chester, NY
EMEE	EMERSON EXPRESS CO., INC., Rochester, NY
EAFC	EMERY AIR FREIGHT CORPORATION, Wilton, CT
ESME	EMPIRE STATE MOTOR EXPRESS, INC., Le Roy, NY
ESCR	ESCRO TRANSPORT LTD., Buffalo, NY
FAXP	FAIRBANKS EXPRESS, INC., Hoosick Falls, NY
FALK	FALK TRANSPORTATION CO., INC., Spring Valley, NY
FESQ	FERRY STREET TERMINAL AND TRANSFER, INC., Renssalaer, NY
FILT	FINGER LAKES TRUCKING, INC., Horseheads, NY
FMNP	FLEMING, N. P., INC., East Bethany, NY
FOOH	FOOD HAULERS, INC., Elizabeth, NJ
FTED	FORT EDWARD EXPRESS CO., INC., Fort Edward, NY
FRKS	FRANKS EXPRESS, William L. Potter, d/b/a, Rhinebeck, NY
FOME	FULTON-OSWEGO MOTOR EXPRESS, INC., Fulton, NY
FUTN	FUTURE TRANSPORT, INC., Hauppauge, NY
GAEM	GARDNER, EARLE M., TRUCKING, INCORPORATED, Pine Plains, NY
GARN	GARNSEY, PAUL, & SON, INC., Schuylerville, NY
GLNG	GLENGARRY TRANSPORT LIMITED, Alexandria, ON, CN
GOTS	GOOD'S TRANSPORTATION SERVICE, INC., Lockport, NY
GISS	GRAND ISLAND SALES & SERVICE, INC., Grand Island, NY
GRVA	GRAY VAN EXPRESS, INC., Pittsfield, MA
GHTQ	GROSS & HECHT TRUCKING, INC., Edison, NJ
HAXP	HARDER'S EXPRESS, INC., Claverack, NY
HDGQ	HARDING EXPRESS, INC., Lockport, NY
HKCT	HAWK OF CONNECTICUT, INC., Stamford, CT
HEYQ	HEINY'S TRUCKING SERVICE, Arthur L. Hein, d/b/a, Albany, NY
HLMR	HELMERS' FUEL & TRUCKING, INC., Old Forge, NY
HGNQ	HIGGINS ERECTORS & HAULERS, INC., Buffalo, NY
HLDB	HILDEBRANDT, GEORGE, INC., Hudson, NY
HLGA	HILLIGAS, LTD., Philadelphia, NY
HISE	HILTON-SPENCERPORT EXPRESS, INC., Kendall, NY
HORO	HO-RO TRUCKING CO., INC., Woodbridge, NJ
HOLM	HOLMES TRANSPORTATION, INC., Framingham, MA
HOXP	HOWARD'S EXPRESS, INC., Geneva, NY
IEEE	I-88 EXPRESS LINES, INC., Cobleskill, NY
INEG	INCE MOTOR FREIGHT, Ronald Ince, d/b/a, Clay, NY
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN
JLTR	J & L TRANSPORT, Joseph Klenawicus and Linda Klenawicus, d/b/a, Shelter Island, NY
JPEQ	J. P.'S EXPRESS, INC., New Hartford, NY
JJLD	J.J.L. DISTRIBUTION SYSTEMS, INC., Garden City, NY
JAJH	JACKSON & JOHNSON, INC., Savannah, NY
JERN	JERNICK, THOMAS L., Shelter Island, NY
JOHC	JOHNCOX, RICHARD R., Avon, NY
JOJN	JONES, JOHN E., North Granville, NY
JOOR	JOOR TRUCKING, INC., New Rochelle, NY
KJET	K. J. TRANSPORTATION, INC., Farmington, NY
KCSE	K.C.S. EXPRESS COMPANY, Superior Delivery Systems, Inc., d/b/a, Poughkeepsie, NY
KYTM	KAY TERMINALS, INC., Binghamton, NY
KEGQ	KEEGAN, JAMES P., CO., INC., Kinderhook, NY
KELY	KELLEY, E. J., COMPANY, INC., THE, Torrington, CT
KEAM	KENNEDY, A. M., TRANSPORTATION CO., INC., Wappingers Falls, NY
KLJQ	KENNEDY, LOUIS J., TRUCKING COMPANY, Kearny, NJ
KRML	KERR MOTOR LINES, INC., Binghamton, NY
KEYE	KEYCO MOTOR FREIGHT, INC., Glen Cove, NY
KITL	KINGSWAY TRANSPORTS LIMITED, Rexdale, ON, CN

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

NEW YORK CARRIERS — (Continued)
(Operating under jurisdiction of New York State Department of Transportation)

@Carrier "Alpha" Code	
KBTG	KIRBY TRUCKING, INC., Massapequa, NY
KOSG	KOSA, GEORGE A., INC., Hudson, NY
KUWQ	KULP WACO CORP., Buffalo, NY
LALL	L & L LEASING, INC., Waterloo, IN
LPTQ	L P. TRANSPORTATION, INC., Chester, NY
LSTL	LAKE SHORE TRANSPORTATION LINES, INC., Oswego, NY
LKBH	LAKEVIEW BOAT HAULERS, INC., Cayuga, NY
LASL	LAMPERT, L.A.S., MOTOR FREIGHT, INC., New York, NY
LTRC	LANGER TRANSPORT CORP., Jersey City, NJ
LWYQ	LEASEWAY DELIVERIES, INC., Downers Grove, IL
LMES	LIBERTY-MIDDLETOWN EXPRESS, INC., Liberty, NY
LOKI	LOCK CITY TRUCKING, INC., Lockport, NY
LOOM	LOOMIS, JOHN R., West Pawlet, VT
LYNT	LYONS TRANSPORTATION LINES, INC., Erie, PA
MDTD	M.D. TRUCKING, Michael D'Filippo, d/b/a, Niagara Falls, NY
MACI	MACEY TRANSFER & STORAGE, INC., Jamestown, NY
MADD	MADDEN'S TRANSFER & STORAGE, INC., Saranac Lake, NY
MANY	MANY'S EXPRESS, INC., Ossining, NY
MMGR	MASTER MESSENGER, INC., White Plains, NY
MTLK	MATLACK, INC., Wilmington, DE
MTSQ	MAY'S TRUCKING SERVICE, Robert Malinowskki, d/b/a, Watervliet, NY
MDAQ	McDONALD TRUCKING COMPANY, INC., Glendale, NY
MACD	McDONALD'S EXPRESS LINE, INC., Remsen, NY
MHEQ	MERCHANTS EXPRESS SERVICE, Michael Harrison, d/b/a, Yorktown Heights, NY
MMJQ	METEOR MESSENGER SERVICE, INC., Cranford, NJ
MIXQ	MIX, HAROLD, Ithaca, NY
MORC	MONROE CONTRACTORS EQUIPMENT, INC., Rochester, NY
MKNW	MT. KISCO-NEW YORK EXPRESS CO., INC., Mount Kisco, NY
NAIE	N AND I EXPRESS, INC., Cobleskill, NY
NASN	NASON'S DELIVERY, INCORPORATED, Springville, NY
NIAT	NATIONAL TRANSPORT SERVICES CO., INC., Elizabeth, NJ
NEMF	NEW ENGLAND MOTOR FREIGHT, INC., Elizabeth, NJ
NSEP	NORTHSTAR EXPRESS, INC., Albany, NY
NVLQ	NORTHVILLE PETROLEUM CORP., Melville, NY
OBEN	O'BRIEN TRUCKING CO., INC., Liverpool, NY
ONOQ	ONONDAGA OIL CO., INC., Syracuse, NY
ORLI	ORLEANS TRUCKING, INC., Albion, NY
OSRM	OSTEGO READY MIX, INC., Oneonta, NY
OTTQ	OTT, LaVERNE E., INCORPORATED, Tonawanda, NY
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PAIQ	PAILLE EXPRESS, INC., Batavia, NY
PENN	PENNSYLVANIA TRUCK LINES, INC., Wynnewood, PA
PKMQ	PICKETT'S MOTOR EXPRESS, INC., Albany, NY
PFCR	PILOT FREIGHT CARRIERS, INC., Winston-Salem, NC
PECC	PONY EXPRESS COURIER CORPORATION OF AMERICA, Charlotte, NC
POTT	POTTER'S EXPRESS, William F. Potter, d/b/a, Warrensburg, NY
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD
PURL	PUROLATOR COURIER CORP., Basking Ridge, NJ
QWMS	QUICKWAY MESSENGER SERVICE, INC., Hicksville, NY
RISF	R I S T TRANSPORT, LTD., Phelps, NY
RJTI	R-JO TRUCKING CORP., Brooklyn, NY
RDEQ	RADIO EXPRESS SERVICE, INC., Cheektowaga, NY
RNDL	RANDALL'S EXPRESS, INC., Honeoye Falls, NY
RTAP	RAY'S TRANSPORTATION, INC., Putnam Valley, NY
RSEL	RED STAR EXPRESS LINES OF AUBURN, INC., Auburn, NY
REDK	REDDICK AUTO EXPRESS, INC., North Syracuse, NY
REDY	REDDY TRUCKING CO., INC., Monticello, NY
RRHC	RENTRITE HAULAGE CORP., Lake Success, NY
ROAL	ROA OF LITTLE FALLS, INC., Little Falls, NY
ROEE	ROBERTS EXPRESS, INC., Akron, OH
ROOT	ROOT'S EXPRESS, INC., Binghamton, NY
ROAE	ROSS, A. J., ENTERPRISES, INC., Keasbey, NJ
SMES	S.M.S. EXPRESS CORP., Suffern, NY
SNTW	SANTAROSA TRUCKING, INC., Niagara Falls, NY
SCHL	SCHULTZ TRANSPORTATION LINES, INC., Lockport, NY
SFLQ	SEAWAY FREIGHT LINES, INC., Lockport, NY
SHEE	SHEARERS EXPRESS, Suncrest Transportation, Inc., d/b/a, Oneonta, NY
SHRY	SHOREY'S EXPRESS, INC., Ballston Spa, NY
SHOR	SHORTY'S EXPRESS, INC., Syracuse, NY
SKDQ	SICKLER'S DELIVERY SERVICE, INC., Kingston, NY
SIGP	SIGNAL DELIVERY SERVICE, INC., Downers Grove, IL
SNRQ	SNR DELIVERY, INC., Peekskill, NY

PARTICIPATING INTRASTATE CARRIERS — Continued

@Carrier "Alpha" Code	NEW YORK CARRIERS — (Continued) (Operating under jurisdiction of New York State Department of Transportation)
SOGO	SOUTHGATE OIL COMPANY, INC., West Seneca, NY
SPMO	SPEED MOTOR EXPRESS OF WESTERN NEW YORK, INC., Buffalo, NY
SIEQ	SPIEGEL, P. T., CO., INC., Tuxedo, NY
SFHL	SPINELLA FREIGHT LINES, INC., Mattydale, NY
SJTC	ST. JOHNSBURY TRUCKING COMPANY, INC., Holliston, MA
STLF	ST. LAWRENCE FREIGHTWAYS, INC., Watertown, NY
STAT	STAATS EXPRESS, INC., Rensselaer, NY
STRK	STARKWEATHER FREIGHT LINES, INCORPORATED, Albion, NY
SFUL	STATE FUEL COMPANY, Robert Scarpulla, d/b/a, Rochester, NY
STDA	STOTT & DAVIS MOTOR EXPRESS, INC., Auburn, NY
SYRT	SYMER, RAYMOND L., TRUCKING CO., INC., Clay, NY
TNMD	T & M DELIVERY SERVICE, Phyllis Terilli & Anthony Maiello, d/b/a, Mahopac, NY
TACY	TACY'S EXPRESS, INC., Rensselaer, NY
TEAL	TEAL'S EXPRESS, INC., Watertown, NY
TPNQ	TERPENING, CHARLES A., TRUCKING CO., INC., Syracuse, NY
THRM	THRUWAY MESSENGER SERVICE, INC., Pearl River, NY
TORG	TOMPKINS, ROBERT G., INC., Prattsville, NY
TOFO	TOSE-FOWLER, INC., Scranton, PA
TCON	TRANSCON LINES, Los Angeles, CA
TREW	TREDWAY'S EXPRESS, INC., Boonton, NJ
TCTY	TRI-COUNTY TRANSPORTATION CORPORATION, Suffern, NY
UPSN	UNITED PARCEL SERVICE, INC. (A NEW YORK CORPORATION), New York, NY
UOME	UTICA OSWEGO MOTOR EXPRESS, INC., Utica, NY
VNAK	VAN AUKEN EXPRESS, INC., Greenville, NY
VANS	VAN'S AUTO & AIR EXPRESS, INC., Kingston, NY
VEEI	VENICE ENTERPRISE, INC., Venice Center, NY
VRKA	VERKEY, ABRAHAM, Seneca Falls, NY
VIAJ	VINCENT, ALVA JAY, Berlin, NY
VOSQ	VOSBURGH TRUCKING, Laurence M. Cooley, d/b/a, Wilson, NY
WADS	WADSWORTH AND REILLY EXPRESS, INC., Washington Mills, NY
WLAK	WALLACK FREIGHT LINES, INC., Coplague, Long Island, NY
WMES	WALSH MESSENGER SERVICE, INC., Garden City Park, NY
WATS	WALSH TRUCKING SERVICE, INC., Massena, NY
WEDY	WALTER E. DELIVERY, INC., North Tonawanda, NY
WRDI	WARD TRUCKING, INC., Auburn, NY
WTRV	WATERVILLE EXPRESS, Thurston E. Browne, d/b/a, Waterville, NY
WMXP	WATROUS MOTOR EXPRESS, INC., Syracuse, NY
WTTE	WATTS EXPRESS, INC., Taberg, NY
WFRM	WEST FARMS EXPRESS, INC., Bronx, NY
WHTR	WHITE'S TRANSPORTATION, Francis D. White, d/b/a, Lockport, NY
WIAE	WILCOX, A. E., & SONS TRUCKING, INC., Watertown, NY
WBKH	WRIGHT BROTHERS KITTY HAWK EXPRESS SYSTEMS, INC., White Plains, NY
YANB	YANIK BROS. TRUCKING COMPANY, Michael S. Yanik, Steve Yanik, Andrew G. Yanik and Joseph P. Yanik, d/b/a, Buffalo, NY
YGEP	YOUNG'S, E., EXPRESS, INC., Watertown, NY
YMCQ	YOUNG, M. L., MOTOR EXPRESS, INC., N. Tonawanda, NY

	NORTH CAROLINA CARRIERS (Operating under jurisdiction of North Carolina Utilities Commission)
AJMQ	A & J MOTOR LINES, INC., Louisburg, NC
AACT	AAA COOPER TRANSPORTATION, Dothan, AL
ABER	ABERNETHY TRANSFER & STORAGE COMPANY, INC., Hickory, NC
ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ACPT	ACE TRANSPORT, LTD., Kenly, NC
ALXN	ALEXANDER TRUCKING COMPANY, James B. Alexander, d/b/a, Davidson, NC
ASPC	ASSOCIATED PETROLEUM CARRIERS, (A Corporation), Spartanburg, SC
BPML	B AND P MOTOR LINES, INC., Forest City, NC
BACQ	B. & C. TRUCKING COMPANY, INCORPORATED, Hudson, NC
BETP	BEASLEY TRANSPORT, INC., Colerain, NC
BILT	BILLINGS TRANSFER CORPORATION, INC., Lexington, NC
BLVM	BLEVINS MOTOR EXPRESS, Hyte Blevins, d/b/a, West Jefferson, NC
BTBN	BLOUNT TRANSIT, INC., Bethel, NC
BLRT	BLUE RIDGE TRUCKING COMPANY, Asheville, NC
BWTK	BRALLEY-WILLETT TANK LINES, INC., Richmond, VA
BWOQ	BROWN OIL & TRANSIT COMPANY, INC., Conover, NC
BRNT	BROWN TRANSPORT CORP., Atlanta, GA
BYNB	BRYTRAN, INC., Roxobel, NC
BUIT	BUILDERS TRANSPORT, INC., Camden, SC
CEFN	C & E TRANSPORTATION COMPANY, Charles C. Fuller and Evelyn E. Fuller, d/b/a, Fayetteville, NC
CEYQ	CAREY, A. J., OIL COMPANY, C. W. Carey Oil Company, d/b/a, Kinston, NC
CGCT	CARGOCARE TRANSPORTATION COMPANY, INCORPORATED, Rocky Mount, NC

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

NORTH CAROLINA CARRIERS — (Continued)
(Operating under jurisdiction of North Carolina Utilities Commission)

@Carrier "Alpha" Code	
CFCC	CAROLINA FREIGHT CARRIERS CORPORATION, Cherryville, NC
CHLQ	CAROLINA HAULERS, INC., New Bern, NC
CSOC	CAROLINA STORAGE CORPORATION, Raleigh, NC
CTAQ	CAROLINA TANK LINES, INC., Burlington, NC
CARI	CARR TRANSPORT, INC., Lumberton, NC
CRLS	CARROLL'S TRANSFER, INCORPORATED, Dublin, NC
COIC	CARY OIL CO., INC., Cary, NC
CAST	CAUSTIC SODA TRANSPORTATION COMPANY, Asheville, NC
CNTT	CENTRAL TRANSPORT, INC., High Point, NC
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CSIQ	COASTAL TRANSPORT, INC., Goldsboro, NC
COLN	COLONIAL MOTOR FREIGHT LINE, INC., High Point, NC
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
DEDM	DEDMON, A. V., TRUCKING, INC., Shelby, NC
DXIE	DIXIE TRUCKING COMPANY, INC., Charlotte, NC
EAGN	EAGLE TRANSPORT CORPORATION, Rocky Mount, NC
EGTC	EAST COAST TRANSPORT CO., INC., Goldsboro, NC
ECOQ	ECONOMY TRANSPORT, INC., Winston-Salem, NC
EDMC	EDMAC TRUCKING COMPANY, INCORPORATED, Fayetteville, NC
EPES	EPES TRANSPORT SYSTEM, INCORPORATED, Blackstone, VA
EXLA	ESTES EXPRESS LINES, Richmond, VA
EZZQ	EZZELL TRUCKING, INC., Harrells, NC
FEME	FEDERAL MOTOR EXPRESS, INC., Mt. Airy, NC
FTPI	FEDERATED TRANSPORT, INC., Smithfield, NC
FLET	FLEET TRANSPORT COMPANY, INC., Brentwood, TN
FLEH	FLEMING SHAW TRANSFER AND STORAGE, INCORPORATED, Greensboro, NC
FORB	FORBES TRANSFER COMPANY, INC., Wilson, NC
FWLQ	FOWLER, M. M., INC., Durham, NC
FMEC	FREDRICKSON MOTOR EXPRESS CORPORATION, Charlotte, NC
GRCE	GREAT COASTAL EXPRESS, INCORPORATED, Richmond, VA
GEHQ	GREENE HAULERS, INC., Laurinburg, NC
GMLS	GREENWOOD MOTOR LINES, INC., Greenwood, SC
GRVF	GROVES, F. W., TRUCKING COMPANY (A CORPORATION), Leland, NC
HHTO	H. & H. TRANSPORT, Hooker - Hollowell Oil Company, Inc., d/b/a, Aurora, NC
HPCO	HARPER TRUCKING COMPANY, INC., Raleigh, NC
HCST	HENRY, C. S., TRANSFER, INC., Rocky Mount, NC
HOLT	HOLLAND TRANSFER COMPANY, Statesville, NC
HWEQ	HOLLOWELL TRANSPORTATION CO., INC., Pikeville, NC
HHRQ	HOLT, H. R., TRUCKING, INC., Troy, NC
HOME	HOME TRANSPORTATION COMPANY, INC., Marietta, GA
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
JEDT	J.E.D. TRANSPORT, INC., Richboro, PA
JENQ	JENKINS, J. W., INC., Henderson, NC
KNTC	KENAN TRANSPORT COMPANY, INCORPORATED, Chapel Hill, NC
LEBI	LEBARNOLD, INC., Camp Hill, PA
MGMC	M.G.M. TRANSPORT CORP., Totowa, NJ
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
MCMQ	McCAULEY MOVING & STORAGE OF FAYETTEVILLE, INC., Fayetteville, NC
MSRQ	MID-STATE SERVICE COMPANY, INCORPORATED, Winston-Salem, NC
MFLS	MORVEN FREIGHT LINES, INCORPORATED, Wadesboro, NC
MOSS	MOSS TRUCKING COMPANY, INC., Charlotte, NC
NCTI	N. C. TRANSPORT, INC., Charlotte, NC
NOTC	NATIONAL FREIGHT, INC., Operator of Northeastern Trucking Company, Vineland, NJ
NEUS	NEUSE TRANSPORT, INC., Wilsons Mills, NC
NWSQ	NEWSOM TRANSPORTS, INC., Roanoke Rapids, NC
NDNQ	NORDAN TRANSPORTATION COMPANY, Raleigh, NC
NSML	NORTH STATE MOTOR LINES, INC., Rocky Mount, NC
OBSE	OBSERVER TRANSPORTATION COMPANY, INC., Charlotte, NC
ODFL	OLD DOMINION FREIGHT LINE, INC., High Point, NC
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PARO	PAC TRANSPORT, INC., Richboro, PA
PRUQ	PETROLEUM TRANSPORT CO., INC., Mount Airy, NC
PIFQ	PIEDMONT FUEL & DISTRIBUTING CO., INC., Albemarle, NC
PFCR	PILOT FREIGHT CARRIERS, INC., Winston-Salem, NC
PPTN	POPE TRANSPORT CO., E. J. Pope & Son, Inc., d/b/a, Mount Olive, NC
PUBC	PUBLIC TRANSPORT CORPORATION, Troutman, NC
REDC	REDWING CARRIERS, INC., Tampa, FL
RTLW	RELIABLE TANK LINE, Limited Partnership, Winston-Salem, NC
RNYQ	RONEY, W. C., TRUCKING CO., W. C. Roney, t/a, Burlington, NC
STGI	S T G TRANSPORT, INC., Wilmington, NC
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI
SEDQ	SERVICE DISTRIBUTING COMPANY, INC., Albemarle, NC

PARTICIPATING INTRASTATE CARRIERS — Continued

NORTH CAROLINA CARRIERS — (Continued)
(Operating under jurisdiction of North Carolina Utilities Commission)

@ Carrier "Alpha" Code	
SMSW	SMITH, M. M., STORAGE WAREHOUSE, INC., Fayetteville, NC
SABW	SOUTH ATLANTIC BONDED WAREHOUSE CORPORATION, Greensboro, NC
SOOQ	SOUTHERN OIL TRANSPORTATION CO., INC., High Point, NC
STTC	STANDARD TRUCKING COMPANY, Charlotte, NC
SFSD	STEVENS FREIGHT SERVICE, INC., Greensboro, NC
TRHL	TARHEEL TRANSPORT, INC., Concord, NC
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC
TDWF	TIDEWATER FUELS, INC., Wilmington, NC
TITC	TIDEWATER TRANSIT COMPANY, INC., Kinston, NC
TPSH	TRANSPORT SOUTH, INC., Atlanta, GA
TRII	TRI COUNTY TRANSPORT, INCORPORATED, Wilmington, NC
TTNI	TRIAN TRANSPORT, INC., Asheboro, NC
UNMT	UNITED MERCHANTS TRUCKING, INC., Statesville, NC
WMWQ	WACCAMAW TRANSPORT, INC., Selma, NC
WTKQ	WALLACE TRUCKING COMPANY (a corporation), Laurinburg, NC
WWAT	WATKINS MOTOR LINES, INC., Lakeland, FL
WTPQ	WATSON TRANSPORTATION CO., H. Ewin Watson, d/b/a, Kenly, NC
WDLQ	WENDELL TRANSPORT CORP., Selma, NC
WDNH	WIDENHOUSE, A. C., INC., Concord, NC
WLCO	WILCO TRANSPORT COMPANY, INC., Winston-Salem, NC
WTVA	WILSON TRUCKING CORPORATION, Fishersville, VA
WRLQ	WORSLEY TRANSPORT, INC., Wilmington, NC
WRML	WRIGHT MOTOR LINES, INC., Asheville, NC
YARB	YARBROUGH TRANSFER COMPANY, Winston-Salem, NC

NORTH DAKOTA CARRIERS
(Operating under jurisdiction of Public Service Commission of the State of North Dakota)

CEMF	CENTURY MOTOR FREIGHT, INC., St. Paul, MN
KAVL	KAVLI'S TRUCK LINE, Duane Kavli, d/b/a, Rolette, ND
LETL	LEWIS TRUCK LINES, INC., Fargo, ND
MIDW	MIDWEST MOTOR EXPRESS, INC., Bismarck, ND
QUTF	QUICKIE TRANSPORT COMPANY, Minneapolis, MN
RITK	RICE TRUCKING CO., Wallace Rice, d/b/a, Maddock, ND
VATL	VALLEY TRUCK LINE, Allen A. Kenninger, d/b/a, Cooperstown, ND

NOVA SCOTIA CARRIERS
(Operating under jurisdiction of Board of Commissioners of Public Utilities of Nova Scotia)

COLE	COLES EXPRESS, Bangor, ME
NBKS	NUBULK SERVICES, INC., Exton, PA

OHIO CARRIERS
(Operating under jurisdiction of The Public Utilities Commission of Ohio)

ABFS	ABF FREIGHT SYSTEM, INC., Fort Smith, AR
ACEH	ACE DORAN HAULING & RIGGING CO., Cincinnati, OH
AROL	AERO LIQUID TRANSIT, INC., Lowell, MI
AERO	AERO TRUCKING, INC., Dover, DE
ADSY	AMERICAN DELIVERY SYSTEMS, INC., Keego Harbor, MI
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
ASBY	ASBURY TRANSPORTATION CO., Wilmington, CA
BALM	BENDER & LOUDON MOTOR FREIGHT, INC., Akron, OH
BLRC	BLAIR CARTAGE, INC., Newbury, OH
BRYN	BRYAN TRUCK LINE, INC., Bryan, OH
CTRL	CARROLLTON TRUCK LINE, INC., Canton, OH
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CHEF	CHEFTAIN EXPRESS, INC., Lancaster, OH
CHME	CHILLICOTHE MOTOR EXPRESS, INC., Chillicothe, OH
DNRO	D & R CARTAGE, INC., Valley View, OH
DATR	DAN'S TRANSIT, INC., Lexington, KY
DRAQ	DORAN TRANSFER & RIGGING CO., Cincinnati, OH
FTLC	FINDLAY TRUCK LINE, INC., Findlay, OH
GEVQ	GENEVA TRANSFER COMPANY, THE, Geneva, OH
GMXT	GREENLEAF MOTOR EXPRESS, INC., Ashtabula, OH
GGGQ	GREGG EXPRESS, INC., Cleveland, OH
HRAC	HAMILTON, RAY, COMPANY, THE, Cincinnati, OH
HRXQ	HARRIS MOTOR EXPRESS, INC., Cincinnati, OH
HITQ	HILLTOP TRANSPORTATION, INC., Columbus, OH
HTKQ	HOMBERGER TRUCKING, INC., Sandusky, OH
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

OHIO CARRIERS — (Continued)
(Operating under jurisdiction of The Public Utilities Commission of Ohio)

@ Carrier "Alpha" Code	
ITSV	INTERMODAL TRANSPORTATION SERVICES, INC., Cincinnati, OH
JTRC	JONES TRANSFER COMPANY, Monroe, MI
KSHQ	KISHLER, CHARLES L., Junction City, OH
KLAN	KLANN, JOHN, MOVING & TRUCKING CO., THE, Cleveland, OH
LBIY	LATTAVO BROTHERS, INC., Canton, OH
LHMN	LEHMAN CARTAGE, INC., Elyria, OH
LNXQ	LENOX TRUCKING, INC., Cincinnati, OH
LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA
LYNT	LYONS TRANSPORTATION LINES, INC., Erie, PA
MAND	MANFREDI MOTOR TRANSIT CO., THE, Newbury, OH
MASD	MASON AND DIXON TANK LINES, INC., THE, Kingsport, TN
MTLK	MATLACK, INC., Wilmington, DE
MXWL	MAXWELL CO., THE, Cincinnati, OH
MAYN	MAYBERRY'S VAN & STORAGE, INC., Dayton, OH
MRVA	MINERVA TRANSFER COMPANY, THE, Minerva, OH
MRAC	MOORE & SON CO., Columbus, OH
OKTC	O. K. TRUCKING COMPANY, THE, Cincinnati, OH
OHAQ	OHIO DELIVERY, INC., Columbus, OH
OHTQ	OHIO TRUCK SERVICE, INC., Martins Ferry, OH
OTCQ	OSBORNE TRUCKING COMPANY, Cincinnati, OH
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PNET	PITTSBURGH & NEW ENGLAND TRUCKING CO., Dravosburg, PA
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD
PRPN	PROPANE TRANSPORT, INC. (A California Corporation), Milford, OH
PTSC	PUTNAM TRANSFER & STORAGE CO., Zanesville, OH
RWXL	R-W SERVICE SYSTEM, INC., Taylor, MI
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH
REIS	REIS BROS., INC., Cleves, OH
RIMS	RIMES, GEORGE, TRUCKING COMPANY, William G. Rimes, Mildred Gayford, Florence Davis, Dorothy C. Orient and Leota Hildinger, d/b/a, Chardon, NE
ROEE	ROBERTS EXPRESS, INC., Akron, OH
ROGR	ROGERS CARTAGE CO., Oak Lawn, IL
ROSI	ROSEVILLE MOTOR EXPRESS, INC., Crooksville, OH
SCIT	SAUNDERS CARTAGE, INC., Canton, OH
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI
SEME	SEWELL MOTOR EXPRESS, INC., Wilmington, OH
STCB	STEUBENVILLE TRANSFER CO., Wintersville, OH
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
SMAN	STROTHMAN EXPRESS, INC., Cincinnati, OH
SUWK	SUWAK TRUCKING COMPANY, Washington, PA
TIME	T.I.M.E.-DC, INC., Dallas, TX
TMSA	TMS GROUP, INC., Columbus, OH
TOHQ	TRANS-OHIO HAULERS, INC., Columbus, OH
URBA	URBANA CARTAGE CO., Urbana, OH
WKRO	WALKER TRUCKING CO., Columbus, OH
WEIG	WEIGAND, A. J., INC., Dover, OH
WCMS	WEIR-COVE MOVING & STORAGE CO., Weirton, WV
WOSQ	WOOSTER MOTOR WAYS, INC., Wooster, OH

OKLAHOMA CARRIERS
(Operating under jurisdiction of Corporation Commission of Oklahoma)

ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
COFE	CENTRAL OKLAHOMA FREIGHT LINES, INC., Tulsa, OK
GRTT	GROENDYKE TRANSPORT, INC., Enid, OK
HPKI	HOPKINS TRANSPORTS, INC., Stilwell, OK
JTLS	JONES TRUCK LINES, INC., Springdale, AR
MTLA	MELTON TRUCK LINES, INC., Shreveport, LA

OREGON CARRIERS
(Operating under jurisdiction of Public Utilities Commissioner of Oregon)

AROT	ARROW TRANSPORTATION COMPANY, Arrow Transportation Company of Delaware, d/b/a, Portland, OR
ASBY	ASBURY TRANSPORTATION CO., Wilmington, CA
CPFL	CENTRAL PACIFIC FREIGHT LINES, INC., Portland, OR
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
CGEF	COTTAGE GROVE-EUGENE FREIGHT COMPANY, Gary William Miller, d/b/a, Cottage Grove, OR
CUTF	CUMMINGS TRANSFER & STORAGE CO., Medford, OR
GRES	GRESHAM TRANSFER, INC., Portland, OR
HOLF	HALL, D & L, FREIGHT LINE, David L. and Lorena Ann Hall, d/b/a, Pendleton, OR
LEES	LEE & EASTES TANK LINES, INC., Seattle, WA

PARTICIPATING INTRASTATE CARRIERS — Continued

OREGON CARRIERS — (Continued)
(Operating under jurisdiction of Public Utilities Commissioner of Oregon)

Carrier "Alpha" Code	
MMFG	McCRACKEN MOTOR FREIGHT, INC., Portland, OR
ORTC	OLSEN ROE TRANSFER COMPANY, Portland, OR
ORFW	OREGON FREIGHTWAYS, INC., Medford, OR
RETL	REDDAWAY'S TRUCK LINE, INC., Clackamas, OR
SECG	SILVER EAGLE COMPANY, Portland, OR
STST	STEWART STILES TRUCK LINE, INC., Forest Grove, OR
SUCR	SUPERIOR CARTAGE OF OREGON, INC., Portland, OR
TILL	T P FREIGHT LINES, INC., Tillamook, OR
TUVT	TUALATIN VALLEY TRANSPORT, INC., Hillsboro, OR
WILL	WILLAMETTE VALLEY TRANSFER CO., Salem, OR

PENNSYLVANIA CARRIERS
(Operating under jurisdiction of Pennsylvania Public Utility Commission)

AOLV	A-1 OIL SERVICES, INC., Charleroi, PA
APAC	A-P-A TRANSPORT CORP., North Bergen, NJ
AEFS	A E F-SELOVER TRANSPORTATION, INC., South River, NJ
AAAC	AAA TRUCKING CORPORATION, Trenton, NJ
ADWI	ADW, INC., Lebanon, Inc., t/d/b/a, Camp Hill, PA
APTM	AL'S PETROLEUM SERVICE, INC., Manheim, PA
ABDE	ALLEGHENY-BEDFORD EXPRESS, INC., New Stanton, PA
BBNG	B & B TRUCKING, INC., New Ringgold, PA
BAGT	BAGGETT TRANSPORTATION COMPANY, Birmingham, AL
BXER	BAXTER, E. R., INC., Mercer, PA
BCTO	BCT, INC., Boise, ID
BEGL	BEGLEY TRUCKING, INC., Philadelphia, PA
BNDW	BENDER, LEE C., INC., Waymart, PA
BNZJ	BENTZ, JIM, INC., Stoystown, PA
BTCB	BLATT TRUCKING CO., INC., Bernville, PA
BLTR	BLUE LINE TRANSFER CO., INC., Chester, PA
BRJB	BURKE, R. & J., INC., Bath, PA
BUWT	BURNS, W. F., TRUCKING, INC., Ruffsdale, PA
CBWS	C. B. W. TRANSPORT SERVICE, INC., Wood River, IL
BCIC	CAL BERN, INC., Friedens, PA
CSAT	CENTRAL STORAGE & TRANSFER CO. OF HARRISBURG, Harrisburg, PA
LATR	CENTURY EXPRESS, LTD., Operator of Lansdale Transportation Co., Inc., Pottsville, PA
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CIMI	CINIMOD TRUCKING, INC., Philadelphia, PA
CPPM	COPE, PAUL, INC., Danville, PA
CUXS	COURIER EXPRESS, INC., Pittsburgh, PA
CICH	CRAINE, CHARLES, INC., Altoona, PA
CSST	CROSSETT, INC., Warren, PA
CRYG	CRYOGENIC CARRIERS, INC., Oregon, OH
DAPR	D.A. TRANSPORT, INC., Gettysburg, PA
DAHD	DASH DELIVERY, Dash Enterprises Corp., t/d/b/a, Pittsburgh, PA
DPEN	DE-PEN LINE, INC., Phoenixville, PA
DEKS	DEAVEN, K. S., INC., Harrisburg, PA
DEFB	DeFAZIO EXPRESS, INC., Moosic, PA
DLMT	DELMOT MOTOR EXPRESS, INC., Elmira Heights, NY
DWIC	DODSWORTH, INCORPORATED, Erie, PA
EBRN	EABORN TRUCK SERVICE, INC., Pittsburgh, PA
EDMF	EDMIL FUELS, INC., Carlisle, PA
EDFF	EVANS DELIVERY COMPANY, INC., Pottsville, PA
EXSC	EXHIBITORS SERVICE COMPANY, McKees Rocks, PA
FNMY	FALCO & MAY, INC., Easton, PA
FBPE	FARRUGGIO'S BRISTOL AND PHILADELPHIA AUTO EXPRESS, INC., Bristol, PA
FETH	FEATHER, C. L., INC., Altoona, PA
FLET	FLEET TRANSPORT COMPANY, INC., Brentwood, TN
FMRE	FRAME'S MOTOR FREIGHT, INC., West Chester, PA
FREA	FREEPORT TRANSPORT, INC., Freeport, PA
FXIT	FRIEDMAN'S EXPRESS INC., Wilkes-Barre, PA
FNJW	FUNFER, JOHN W., INC., West Sunbury, PA
FUNK	FUNK'S HAULING SERVICE, INC., Philadelphia, PA
GTAH	G. T. & H., INC., Clymer, PA
GEBD	GERBER, DEAN A., INC., Volant, PA
GRLK	GREAT LAKES TERMINAL & TRANSPORT CORPORATION, Chicago, IL
HNGQ	HARDINGER TRANSFER CO., INC., Erie, PA
HATB	HATBORO DELIVERY SERVICE, INC., Warminster, PA
HEGT	HEGAN TRUCKING, INC., Laughlintown, PA
HRRS	HERR'S MOTOR EXPRESS, INC., Quarryville, PA
HEST	HESS TRUCKING CO., Harrisburg, PA
HLVT	HLAVATY, T. W., INC., Olyphant, PA
HONE	HOFFMAN, DENNIS E., INC., Brookville, PA

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

PENNSYLVANIA CARRIERS — (Continued)
(Operating under Jurisdiction of Pennsylvania Public Utility Commission)

@Carrier "Alpha" Code	
HFMR	HOFFMAN, RAY E., SR., INC., Hamburg, PA
HOBD	HOLBY, DONALD L., INC., Homer City, PA
HODV	HOME DELIVERY, INC., Spangler, PA
HPSW	HOPKINS, S. W., INC., Trout Run, PA
HMEE	HORN'S MOTOR EXPRESS, INC., Chambersburg, PA
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
JAJP	J & J FRY, INC., Port Royal, PA
JTCN	J-T CONTRACTING, INC., Myerstown, PA
JOWH	JOHNS, W. H., INC., Lancaster, PA
JONS	JONES MOTOR CO., INC., Spring City, PA
KAEJ	KANE FREIGHT LINES, INC., Scranton, PA
KANQ	KAUFFMAN & MINTEER, INC., Jobstown, NJ
KFWP	KAUFFMAN, W. P., INC., Lewistown, PA
KING	KING TRUCKING, INC., Pittsburgh, PA
KIJC	KITCHEN, JAMES C., INC., Latrobe, PA
KPTM	KNAPP, T. MERLE, INC., Guys Mills, PA
KWME	KOWALSKI, MICHAEL K., INC., Corry, PA
KREE	KRONE, EARL E., INC., Ickesburg, PA
KRWR	KRUG, W. R., INC., Nicktown, PA
LURL	LAUREL MOUNTAIN EXPRESS, INC., Pittsburgh, PA
LEDI	LIEB, ED, INC., Carrolltown, PA
LNRT	LINDSAY RUN TRUCKING, INC., Avonmore, PA
LIPD	LIPTAK, DANIEL A., INC., Honesdale, PA
LCML	LOCH, M AND L., INC., Kutztown, PA
LOGE	LOGEX, Logistics Express, Inc., t/d/b/a, Anaheim, CA
LOJL	LOKUTA, J. L., JR., INC., Avoca, PA
LYNT	LYONS TRANSPORTATION LINES, INC., Erie, PA
MMVD	MARTY'S EXPRESS, INC., Philadelphia, PA
MTLK	MATLACK, INC., Wilmington, DE
MCLY	McCAULEY TRUCKING COMPANY, THE, New Bethlehem, PA
MCCH	McCAULEY, CHARLES A., INC., Hawthorn, PA
MHYI	McCONAHY, INC., Martinsburg, PA
MLRE	McCONNELL, RUSSELL J., INC., Slippery Rock PA
MCOR	McCORMICK DRAY LINES, INC., Muncy, PA
MUEP	McCUEN TRUCKING, INC., Telford, PA
MKNK	McKNIGHT, KENNETH N., INC., Harrisville, PA
MEIO	MINCIE'S, INC., Winfield, PA
MYLE	MON VALLEY EXPRESS, Jon Golashewski, t/d/b/a, Monessen, PA
MOTA	MONTGOMERY TANK LINES, INC., Summit, IL
NFRD	NEFF, R. D., INC., State College, PA
NELE	NELSON'S EXPRESS, Harrisburg, PA
NWGO	NEWAYGO, INC., Montrose, PA
NIDI	NICHOLS, DON, INC., Bloomsburg, PA
NSLI	NORTH AND SOUTH LINES, INCORPORATED, Harrisonburg, VA
NOBT	NORTH BRANCH TRANSFER, INC., Williamsport, PA
NOPT	NORTH PENN TRANSFER, INC., Lansdale, PA
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PIEC	P-I-E NATIONWIDE, INC., Jacksonville, FL
PHXT	PHOENIX TRANSPORT, INC., New Castle, PA
PITD	PITT-OHIO EXPRESS, INC., Pittsburgh, PA
PJAE	PITTSBURGH-JOHNSTOWN-ALTOONA EXPRESS, INC., Pittsburgh, PA
PVOE	PITTSBURGH-VERONA-OAKMONT EXPRESS, George Kress, Jr. and Kenneth P. Kress, Copartners, t/d/b/a, Verona, PA
PLUN	PLUNKETT MOTOR FREIGHT, INC., Zelienople, PA
PRES	PRESTON TRUCKING COMPANY, INC., Preston, MD
PRPN	PROPANE TRANSPORT, INC., Milford, OH
PURL	PUROLATOR COURIER CORP., Basking Ridge, NJ
PYLE	PYLE, A. DUIE, INC., West Chester, PA
PYRL	PYRAMID LINES, INC., Harrisburg, PA
RKTP	RAC-KUHN TRANSPORT, INC., Carlisle, PA
RSEL	RED STAR EXPRESS LINES OF AUBURN, INC., Auburn, NY
RESJ	REED, STEPHEN J., INC., Cogan Station, PA
RDJC	REEDER, J. C., INC., Montoursville, PA
RTTC	REFINERS TRANSPORT & TERMINAL CORPORATION, Oregon, OH
REFW	REIFSNYDER, FRANKLIN, W., SR., INC., Mohrsville, PA
RPSO	REPLOGLE STORAGE COMPANY, Johnstown, PA
RILD	RILEY, DALE A., INC., Gibsonia, PA
RKDL	RINKER, DALE F., INC., Knox, PA
ROMT	ROBBINS MOTOR TRANSPORTATION, INC., Essington, PA
RBSM	ROBESONIA MOVERS, INC., Robesonia, PA
RUFR	RUFFNER, LARRY A., TRUCKING, Latrobe, PA

PARTICIPATING INTRASTATE CARRIERS — Continued

PENNSYLVANIA CARRIERS — (Continued)
(Operating under jurisdiction of Pennsylvania Public Utility Commission)

@ Carrier "Alpha" Code	
STSM	S. T. S. MOTOR FREIGHT, INC., Philadelphia, PA
SRNV	SCHRADER, R AND V, INCORPORATED, Canton, PA
SCSP	SCOUT TRUCKING, INC., Spring City, PA
SBTL	SEABOARD TANK LINES, INC., Dunmore, PA
SLKB	SIERK, LUKE B., INC., Kinzer, PA
SVDO	SILVERADO, INC., East Smithfield, PA
SMPL	SIMMONS, PAUL, INC., Berlin, PA
SMON	SIMON'S EXPRESS, INC., Pittsburgh, PA
SMXI	SIMPSON EXPRESS, INC., Coraopolis, PA
SMSV	SMITH'S TANK SERVICE CORP., Philadelphia, PA
STLM	SMITH'S TRUCK LINES, Muncy, PA
SGDI	SMITH, G. D., INC., Sellersville, PA
SLIR	SMITH, L., INC., Nazareth, PA
SNCO	SNOW, CLAYTON O., INC., Saegertown, PA
SYDR	SNYDER'S TRUCKING, INC., Ebensburg, PA
SJTC	ST. JOHNSBURY TRUCKING COMPANY, INC., Hollliston, MA
SNJM	STERNER, J. M., INC., Seven Valleys, PA
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
SFLO	STRAITIFF, LEONARD E., INC., Brookville, PA
SUWK	SUWAK TRUCKING COMPANY, Washington, PA
TYLQ	TAYLOR, ELMER P., EXPRESS, Elmer P. Taylor, t/d/b/a, Pittsburgh, PA
TOFO	TOSE-FOWLER, INC., Scranton, PA
TFLH	TREXLER, FLOYD H. G., INC., Orefield, PA
UPSN	UNITED PARCEL SERVICE, INC. (A NEW YORK CORPORATION), New York, NY
VLEQ	VALLEY FREIGHT LINES, INC., New Castle, PA
VOLP	VOLPE EXPRESS, INC., Norristown, PA
WKJH	WALKER, JOHN H., INC., Somerset, PA
WARD	WARD TRUCKING CORPORATION, Altoona, PA
WVML	WEAVER, MERVIN L., INC., Manheim, PA
WESM	WEST MOTOR FREIGHT, INC., Boyertown, PA
WCTH	WHITE CIRCLE TRUCK RENTAL, INC., Lansdale, PA
WHOW	WHITE, HOWARD R., TRUCKING, INC., Meshoppen, PA
WITT	WHITTEN, C. I., TRANSFER COMPANY, Huntington, WV
WKGA	WICKHAM, GILES A., INC., Sunbury, PA
WKSQ	WILKES-BARRE CONSOLIDATING CO., Wilkes-Barre, PA
WSGC	WILTON STORAGE COMPANY, INC., Pittsburgh, PA
WTIP	WITT, R., INC., Perkasie, PA
WRBJ	WRUBLE, J. J., INC., Avoca, PA
ZSXD	Z-6 DELIVERIES, INC., Everett, PA

QUEBEC CARRIERS
(Operating under jurisdiction of Provincial Transportation and Communication Board (Quebec))

CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA

SOUTH CAROLINA CARRIERS
(Operating under jurisdiction of Public Service Commission of South Carolina)

AACT	AAA COOPER TRANSPORTATION, Dothan, AL
ASPC	ASSOCIATED PETROLEUM CARRIERS, INC., Spartanburg, SC
BRFT	BRADLEY FREIGHT LINES CO., INC., Asheville, NC
CTAW	CATAWBA TRUCKING CO., INC., Rock Hill, SC
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
CMLA	COOPER MOTOR LINES, INC., Greenville, SC
GPTC	G & P TRUCKING COMPANY, INC., Greenville, SC
GMLS	GREENWOOD MOTOR LINES, INC., Greenwood, SC
ICPT	INTERCEPT, INC., Bluffton, SC
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
ODFL	OLD DOMINION FREIGHT LINE, INC., High Point, NC
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PFCR	PILOT FREIGHT CARRIERS, INC., Winston-Salem, NC
SANW	SMITH AND WATERS, INC., Ware Shoals, SC
SEFL	SOUTHEASTERN FREIGHT LINES, Columbia, SC
STTC	STANDARD TRUCKING COMPANY, Charlotte, NC
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC
UNMT	UNITED MERCHANTS TRUCKING, INC., Statesville, NC

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

@Carrier "Alpha" Code	
	SOUTH DAKOTA CARRIERS (Operating under jurisdiction of Public Utilities Commission, State of South Dakota)
ALLA	ALL-AMERICAN, INC., Overland Park, KS
HYMF	HYMAN FREIGHTWAYS, INC., Roseville, MN
LETL	LEWIS TRUCK LINES, INC., Fargo, ND
RUDE	RUDE TRANSPORTATION COMPANY, Arlen W. Rude, d/b/a, Redfield, SD
	TENNESSEE CARRIERS (Operating under jurisdiction of Tennessee Public Service Commission)
ATML	ATLANTA MOTOR LINES INC., Conley, GA
BINE	BIRMINGHAM-NASHVILLE EXPRESS, INC., Nashville, TN
BFLM	BROWN FREIGHT LINE, INC., Nashville, TN
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CLVN	CLEVELAND EXPRESS, INC., Cleveland, TN
DAME	DAYTON MOTOR EXPRESS, INC., Dayton, TN
GOTL	GOGGIN TRUCK LINE CO., INC., Shelbyville, TN
HOHT	HOHENWALD TRUCK LINES, INC., Hohenwald, TN
JDTO	J. D. TRANSPORTS, INC., Memphis, TN
JTLS	JONES TRUCK LINES, INC., Springdale, AR
MADL	MASON AND DIXON LINES, INCORPORATED, THE, Kingsport, TN
MCMF	McMINNVILLE FREIGHT LINE, INC., McMinnville, TN
MSOL	MID-STATE OILS TRANSPORT, INC., Shelbyville, TN
MLXP	MILAN EXPRESS CO., INC., Milan, TN
MITN	MILLER TRANSPORTERS, INC. (A Mississippi Corporation), Jackson, MS
MPTC	MT. PLEASANT TRANSFER, INC., Mt. Pleasant, TN
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
PIEC	P-I-E NATIONWIDE, INC., Jacksonville, FL
POEP	PORTLAND EXPRESS, INC., Portland, TN
SAWF	S & W FREIGHT LINES, INC., Murfreesboro, TN
SERJ	SERVICE TRANSPORT, INC., Cookeville, TN
SKYT	SKYLINE TRANSPORTATION, INC., Knoxville, TN
SMFR	SMITHVILLE FREIGHT LINES, INC., Smithville, TN
THUR	THURSTON MOTOR LINES, INC., Charlotte, NC
TCON	TRANSCON LINES, Los Angeles, CA
TULL	TULLAHOMA FREIGHT CO., Frank C. Martin, d/b/a, Tullahoma, TN
WAGN	WAGNER FREIGHT LINES, INC., Chattanooga, TN
	UTAH CARRIERS (Operating under jurisdiction of Public Service Commission of Utah)
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
ASHT	ASHWORTH TRANSFER, INC., Salt Lake City, UT
HATC	HATCH, W. S., CO., Woods Cross, UT
INFY	INDEPENDENT FREIGHTWAY, INC., Rockford, IL
LINK	LINK TRUCKING, INC., Salt Lake City, UT
MTRG	MOTOR CARGO, A Corporation, Salt Lake City, UT
SLKT	SALT LAKE TRANSFER COMPANY, Commerce City, CO
UUFW	UINTAH FREIGHTWAYS, Salt Lake City, UT
	VIRGINIA CARRIERS (Operating under jurisdiction of Virginia Corporation Commission)
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
CREW	CREWE TRANSFER, INC., Crewe, VA
EXLA	ESTES EXPRESS LINES, Richmond, VA
ODFL	OLD DOMINION FREIGHT LINE, INC., High Point, NC
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
STCV	SCHWERMAN TRUCKING CO. OF VA., INC., Milwaukee, WI
WTVA	WILSON TRUCKING CORPORATION, Fishersville, VA
	WASHINGTON CARRIERS (Operating under jurisdiction of Washington Utilities and Transportation Commission)
AICF	ACME INTER-CITY FREIGHT LINES, Seattle, WA
ANRF	ANR FREIGHT SYSTEM, INC., Denver, CO
AROT	ARROW TRANSPORTATION COMPANY, Arrow Transportation Company of Delaware, d/b/a, Portland, OR
CRTC	COLUMBIA RIVER TRUCKING CO., INC., Camas, WA
CFWY	CONSOLIDATED FREIGHTWAYS CORPORATION OF DELAWARE, Menlo Park, CA
FANM	F & M TRANSFER CO., Yakima, WA
FWMF	FASTEST WAY MOTOR FREIGHT, INC., Spokane, WA
HOGT	HOGLAND TRANSFER COMPANY, Everett, WA
LEES	LEE & EASTES TANK LINES, INC., Seattle, WA

PARTICIPATING INTRASTATE CARRIERS — Continued

WASHINGTON CARRIERS — (Continued)
(Operating under jurisdiction of Washington Utilities and Transportation Commission)

◎ Carrier "Alpha" Code	
LTIA	LYNDEN TRANSPORT, INC., Lynden, WA
MMFG	McCRACKEN MOTOR FREIGHT, INC., Portland, OR
NATI	NORDANG, ART, TRUCKING, INC. Methow, WA
OAKH	OAK HARBOR FREIGHT LINES, INC., Seattle, WA
PENS	PENINSULA TRUCK LINES, INC., Seattle, WA
PBTC	POZZI BROTHERS TRANSPORTATION, INC., Kent, WA
PSTL	PUGET SOUND TRUCK LINES, INC., Seattle, WA
RIAF	RENTON-ISSAQUAH AUTO FREIGHT, INC., Renton, WA
SECG	SILVER EAGLE COMPANY, Portland, OR
SODC	SOUTHWEST DELIVERY CO., INC., Vancouver, WA
SEAF	SUMAS-EVERSON AUTO FREIGHT, INC., Everson, WA
SUCR	SUPERIOR CARTAGE OF OREGON, INC., Portland, OR
WCAF	WALLACE-COLVILLE MOTOR FREIGHT, INC., Spokane, WA
WMJJ	WILLIAMS, JAMES, J., INC., Spokane, WA
WOOT	WOODLAND TRUCK LINE, INC., Woodland, WA

WEST VIRGINIA CARRIERS
(Operating under jurisdiction of Public Service Commission of West Virginia)

ALLE	ALLEGHENY FREIGHT LINES, INCORPORATED, Winchester, VA
CLEA	CHEMICAL LEAMAN TANK LINES, INC., Lionville, PA
DILE	DILLIE MOTOR FREIGHT, INC., Washington, PA
KNAQ	KANASHA CARTAGE COMPANY, Columbus, OH
LEMT	LEMMON TRANSPORT COMPANY, INCORPORATED, Marion, VA
MTLK	MATLACK, INC., Wilmington, DE
OVNT	OVERNITE TRANSPORTATION COMPANY, Richmond, VA
POIN	POINT EXPRESS, INC., Columbus, OH
SWRI	STEWART INTERMODAL TRANSPORT, INC., Cincinnati, OH
TWST	THOMAS, W. S., TRANSFER, INC., Fairmont, WV
TOMS	TOM'S EXPRESS, INC., Weirton, WV
TOWR	TOWER LINES, INC., Wheeling, WV
WCMS	WEIR-COVE MOVING & STORAGE CO., Weirton, WV
WITT	WITTEN, C. I., TRANSFER COMPANY, Huntington, WV

WISCONSIN CARRIERS
(Operating under jurisdiction of Transportation Commission of Wisconsin)

ADSI	ADAMS TRANSIT, INC., Friesland, WI
ADTC	ADVANCE TRANSPORTATION COMPANY, Milwaukee, WI
AGKQ	ARNOLD, GERALD K., Elizabeth, IL
BGUQ	BADGER TRUCK LINES, INC., Abbotsford, WI
BLUR	BALTUS TRANSPORT CO., INC., Three Lakes, WI
BAAQ	BARABOO ASPHALT COMPANY, INC., Baraboo, WI
BMOO	BECKER MOTOR SERVICE, INC., West Milwaukee, WI
BTLP	BELLEVILLE TRUCK LINE, INC., Cross Plains, WI
BGTQ	BERGER TRANSPORT, INC., Oshkosh, WI
BSTI	BESTLINE TRANSFER, INC., Shawano, WI
BGRQ	BIG RED TRUCKS, INC., Antigo, WI
BOPL	BONDED PETROLEUM TERMINALS, INC., Oshkosh, WI
BKSQ	BROOKS OIL COMPANY, Mike Brooks, *d/b/a*, Kaukauna, WI
BFEQ	BULTMAN, FREDERICK L., INC., Milwaukee, WI
CSNW	CENTRAL STORAGE & WAREHOUSE COMPANY, Madison, WI
CSEQ	CHICAGO SUBURBAN EXPRESS, INC., Chicago, IL
CHWQ	CHIPPEWA FARMERS UNION CO-OPERATIVE, Chippewa Falls, WI
CHIQ	CHIPPEWA VALLEY TRANSPORTATION CO., INC., Chippewa Falls, WI
CLRC	CLARK CARTAGE COMPANY, INC., Green Bay, WI
CVTO	CLARK, V., & SON TRUCKING, Verlyn G. Clark & William Clark, *d/b/a*, Ashland, WI
CDOQ	CONDON TRANSPORT, INC., Ripon, WI
DMFQ	D.E.M. FEDERATED CO-OP TRANSPORT, INC., Ellsworth, WI
DHLE	DAHLEN TRANSPORT, INC., Newport, MN
DAUL	DAUL, W. N., TRANSFER LINES, INC., Kewaunee, WI
DIRO	DIRECT OIL COMPANY, Eau Claire, WI
DTTI	DONAHUE, TOM, TRUCKING, INC., Milwaukee, WI
DSTQ	DROSTE, DON, TRUCKING CO., Portage, WI
EGCO	ENERGY CARRIERS COMPANY, INC., Brookfield, WI
FAMQ	FAMAS CO-OP TRANSPORT, Mondovi, WI
FAUQ	FARMERS UNION CO-OP TRANSPORT, Stetsonville, WI
FETQ	FEDERATED CO-OP TRANSPORT, Barron, WI
FORE	FORE WAY EXPRESS, INC., Wausau, WI
FTSC	FORT TRANSPORTATION & SERVICE COMPANY, INC., Fort Atkinson, WI
FUNH	FUNK'S TRANSPORT, Harold J. Funk, *d/b/a*, Lancaster, WI
GNTK	G & T TRUCKING COMPANY, Elko, MN

For explanation of abbreviations and reference marks, see last page of this tariff.

PARTICIPATING INTRASTATE CARRIERS — Continued

WISCONSIN CARRIERS — (Continued)
(Operating under jurisdiction of Transportation Commission of Wisconsin)

@Carrier "Alpha" Code	
GCFT	G C & F COOPERATIVE ASSOCIATION, Fennimore, WI
GONQ	GOONAN, JAMES E., Browntown, WI
GRCC	GROSS COMMON CARRIER, INC., Wisconsin Rapids, WI
HFNQ	HAEFNER, ELMER C., Sullivan, WI
HLRQ	HALRON OIL COMPANY, INC., Green Bay, WI
HNBQ	HANEFELD BROS., INC., Burnett, WI
HERM	HERMAN BROS., INC., Omaha, NE
HLTC	HOLMEN LA CROSSE TRUCK LINE, Cletus A. Casey, d/b/a, Ettrick, WI
HPOQ	HOPSON OIL COMPANY, INC., Waukesha, WI
HFTP	HOT FLAME TRANSPORT CO., INC., Carney, MI
HZKQ	HUDZIAK, NORMAN, TRUCKING, INC., Wild Rose, WI
INDH	INDIANHEAD TRUCK LINE, INC., St. Paul, MN
JJPI	JJ TRANSPORT, INC., Mequon, WI
JHNW	JOHNSON OF WISCONSIN TRANSPORT CO., INC., Tomah, WI
JHSR	JOHNSON, RICHARD C., Brussels, WI
KANY	KANEY TRANSPORTATION, INC., Freeport, IL
KAZJ	KATZMAN, J. KENNETH, JR., INC., Burlington, WI
KEJB	KELLEY, JACK B., INC., Amarillo, TX
KLEQ	KLEMM, CARL, INC., DePere, WI
KOKE	KOSCHKEE TRANSFER, INC., Fennimore, WI
LANN	L & N TRANSFER, Lewis W. Groom, d/b/a, Cassville, WI
LMOQ	LAMONT'S SERVICE, INC., Abbotsford, WI
LOIL	LOCAL OIL CO., INC., Eau Claire, WI
LOGE	LOGEX, Logistics Express, Inc., d/b/a, Anaheim, CA
LRAQ	LoRAY, J., INCORPORATED, Hillsboro, WI
MTEN	MARTEN TRANSPORT, LTD, Mondovi, WI
MEFO	MEFFERT OIL COMPANY, INC., Waunakee, WI
MEGT	MEIGS TRUCKING, INC., Portage, WI
MENP	MENASHA TRANSPORT, INC., Neenah, WI
MIIN	MIDWEST INDUSTRIAL FUEL, INC., La Crosse, WI
MIJA	MILLER, JAMES A., Chippewa Falls, WI
OCTQ	O'CONNOR TRANSPORT, INC., Fond du Lac, WI
OLTP	OLSON TRANSPORTATION COMPANY, INC., Milwaukee, WI
PTTM	PITTMAN TRANSPORT, INC., Durand, WI
PRIQ	PRAIRIE TRANSPORTATION, INC., North Prairie, WI
PRJQ	PRINCL, JAMES, Green Bay, WI
QLYC	QUALITY CARRIERS, INC., Pleasant Prairie, WI
QUTF	QUICKIE TRANSPORT COMPANY, Minneapolis, MN
RMTR	R. M. TRANSPORT, INC., Hartford, WI
RIBL	RICHARDS BROS. TRANSPORT, LTD., Edgerton, WI
RISQ	RISER TRANSPORT, INC., Wausau, WI
RUAN	RUAN TRANSPORT CORPORATION, Des Moines, IA
SNWQ	S & W TRANSFER, INCORPORATED, Milwaukee, WI
SHFQ	SCHELLING, F. J., INC., Eau Claire, WI
SHND	SCHNEIDER TANK LINES, INC., Green Bay, WI
STKG	SCHWERMAN TRUCKING CO., Milwaukee, WI
SEYT	SEYMOUR TRANSFER LINE, INC., Seymour, WI
SIVG	SIVERLING, ALAN G., Chippewa Falls, WI
SITC	SKINNER TRANSFER CORPORATION, Reedsburg, WI
SLTL	SPARTA-LaCROSSE TRUCK LINES, INC., Sparta, WI
STLA	STARK, RALPH A., Menomonie, WI
TNKQ	TANK TRANSPORT, INC., Lennon,WI
TNPQ	TEN PAS, C. H., TRANSPORT, Plymouth, WI
TRGS	TRANSGAS, INC., Lowell, MA
TRSP	TRANSPORT, INC., Moorhead, MN
TRTP	TRUCK TRANSPORT, INCORPORATED, St. Louis, MO
VNHQ	VAN HANDEL TRANSIT, INC., Kaukauna, WI
WYTQ	WAYNE TRANSPORTS, INC., Inver Grove Heights, MN
WEBE	WEST BEND TRANSIT & SERVICE CO., West Bend, WI
WFTI	WOLF TRUCKING, M. A. Wolf, d/b/a, Stinger, WI
WOEH	WOLF, EDWARD, H., AND SONS, INC., Stinger, WI
WSOQ	WS-T CO-OP TRANSPORT, West Salem, WI
ZILL	ZILLMER TRANSFER, INC., Sparta, WI

WYOMING CARRIERS
(Operating under jurisdiction of Public Service Commission of Wyoming)

DIXB	DIXON BROS., INC., Newcastle, WY
HATC	HATCH, W. S., CO., Woods Cross, UT

Title 49 United States Code

CHAPTER 27—HAZARDOUS MATERIALS

TRANSPORTATION

SEC. 1801. Congressional declaration of policy.

It is declared to be the policy of Congress in this chapter to improve the regulatory and enforcement authority of the Secretary of Transportation to protect the Nation adequately against the risks to life and property which are inherent in the transportation of hazardous materials in commerce.

SEC. 1802. Definitions

As used in this chapter, the term—

(1) "commerce" means trade, traffic, commerce, or transportation, within the jurisdiction of the United States, (A) between a place in a State and any place outside of such State, or (B) which affects trade, traffic, commerce, or transportation described in clause (A);

(2) "hazardous material" means a substance or material in a quantity and form which may pose an unreasonable risk to health and safety or property when transported in commerce;

(3) "Secretary" means the Secretary of Transportation, or his delegate;

(4) "serious harm" means death, serious illness, or severe personal injury;

(5) "State" means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, or Guam;

(6) "transports" or "transportation" means any movement of property by any mode, and any loading, unloading, or storage incidental thereto; and

(7) "United States" means all of the States.

SEC. 1803. Designation of hazardous materials

Upon a finding by the Secretary, in his discretion, that the transportation of a particular quantity and form of material in commerce may pose an unreasonable risk to health and safety or property, he shall designate such quantity and form of material or group or class of such materials as a hazardous material. The materials so designated may include, but are not limited to, explosives, radioactive materials, etiologic agents, flammable liquids or solids, combustible liquids or solids, poisons, oxidizing or corrosive materials, and compressed gases.

SEC. 1804. Regulations governing transportation of hazardous materials

General

(a) The Secretary may issue, in accordance with the provisions of section 553 of Title 5, including an opportunity for informal oral presentation, regulations for the safe transportation in commerce of hazardous materials. Such regulations shall be applicable to any person who transports, or causes to be transported or shipped, a hazardous material, or who manufactures, fabricates, marks, maintains, reconditions, repairs, or tests a package or container which is represented, marked, certified, or sold by such person for use in the transportation in commerce of certain hazardous materials. Such regulations may govern any safety aspect of the transportation of hazardous materials which the Secretary deems necessary or appropriate, including, but not limited to, the packing, repacking, handling, labeling, marking, placarding, and routing (other than with respect to pipelines) of hazardous materials, and the manufacture, fabrication, marking, maintenance, reconditioning, repairing, or testing of a package or container which is represented, marked, certified, or sold by such person for use in the transportation of certain hazardous materials.

Cooperation

(b) In addition to other applicable requirements, the Secretary shall consult and cooperate with representatives of the Interstate Commerce Commission and shall consider any relevant suggestions made by such Commission, before issuing any regulation with respect to the routing of hazardous materials. Such Commission shall, to the extent of its lawful authority, take such action as is necessary or appropriate to implement any such regulation.

Representation

(c) No person shall, by marking or otherwise, represent that a container or package for the transportation of hazardous materials is safe, certified, or in compliance with the requirements of this Act, unless it meets the requirements of all applicable regulations issued under this Act.

SEC. 1805. Handling of hazardous materials

Criteria

(a) The Secretary is authorized to establish criteria for handling hazardous materials. Such criteria may include, but need not be limited to, a minimum number of personnel; a minimum level of training and qualification for such personnel, type and frequency of inspection; equipment to be used for detection, warning, and control of risks posed by such materials; specifications regarding the use of equipment and facilities used in the handling and transportation of such materials; and a system of monitoring safety assurance procedures for the transportation of such materials. The Secretary may revise such criteria as required.

Registration

(b) Each person who transports or causes to be transported or shipped in commerce hazardous materials or who manufactures, fabricates, marks, maintains, reconditions, repairs, or tests packages or containers which are represented, marked, certified, or sold by such person for use in the transportation in commerce of certain hazardous materials (designated by the Secretary) may be required by the Secretary to prepare and submit to the Secretary a registration statement not more often than once every 2 years. Such a registration statement shall include, but need not be limited to, such person's name; principal place of business; the location of each activity handling such hazardous materials; a complete list of all such

For explanation of abbreviations and reference marks, see last page of this tariff.

hazardous materials handled, and an averment that such person is in compliance with all applicable criteria established under subsection (a) of this section. The Secretary shall by regulation prescribe the form of any such statement and the information required to be included. The Secretary shall make any registration statement filed pursuant to this subsection available for inspection by any person, without charge, except that nothing in this sentence shall be deemed to require the release of any information described by subsection (b) of section 552 of title 5, United States Code, or which is otherwise protected by law from disclosure to the public.

Requirement

(c) No person required to file a registration statement under subsection (b) of this section may transport or cause to be transported or shipped hazardous materials, or manufacture, fabricate, mark, maintain, recondition, repair, or test packages or containers for use in the transportation of hazardous materials, unless he has on file a registration statement.

SEC. 1806. Exemptions

General

(a) The Secretary, in accordance with procedures prescribed by regulation, is authorized to issue or renew, to any person subject to the requirements of this chapter, an exemption from the provisions of this chapter, and from regulations issued under section 1804 of this chapter, if such person transports or causes to be transported or shipped hazardous materials in a manner so as to achieve a level of safety (1) which is equal to or exceeds that level of safety which would be required in the absence of such exemption, or (2) which would be consistent with the public interest and the policy of this title in the event there is no existing level of safety established. The maximum period of an exemption issued or renewed under this section shall not exceed 2 years, but any such exemption may be renewed upon application to the Secretary. Each person applying for such an exemption or renewal shall, upon application, provide a safety analysis as prescribed by the Secretary to justify the grant of such exemption. A notice of an application for issuance or renewal of such exemption shall be published in the Federal Register. The Secretary shall afford access to any such safety analysis and an opportunity for public comment on any such application, except that nothing in this sentence shall be deemed to require the release of any information described by subsection (b) of section 552 of title 5, United States Code, or which is otherwise protected by law from disclosure to the public.

Vessels

(b) The Secretary shall exclude, in whole or in part, from any applicable provisions and regulations under this chapter, any vessel which is excepted from the application of section 201 of the Ports and Waterways Safety Act of 1972 by paragraph (2) of such section (46 U.S.C. 391a (2)), or any other vessel regulated under such Act, to the extent of such regulation.

Firearms and Ammunition

(c) Nothing in this chapter, or in any regulation issued under this chapter, shall be construed to prohibit or regulate the transportation by any individual, for personal use, of any firearm (as defined in paragraph (4) of section 232 of title 18, United States Code) or any ammunition therefor, or to prohibit any transportation of firearms or ammunition in commerce.

Limitation on Authority

(d) Except when the Secretary determines that an emergency exists, exemptions or renewals granted pursuant to this section shall be the only means by which a person subject to the requirements of this chapter may be exempted from or relieved of the obligation to meet any requirements imposed under this chapter.

SEC. 1807. Transportation of radioactive materials on passenger-carrying aircraft

General

(a) Within 120 days after the date of enactment of this section, the Secretary shall issue regulations, in accordance with this section and pursuant to section 1804 of this chapter, with respect to the transportation of radioactive materials on any passenger-carrying aircraft in air commerce, as defined in section 1301(4) of this title. Such regulations shall prohibit any transportation of radioactive materials on any such aircraft unless the radioactive materials involved are intended for use in, or incident to, research, or medical diagnosis or treatment, so long as such materials as prepared for and during transportation do not pose an unreasonable hazard to health and safety. The Secretary shall further establish effective procedures for monitoring and enforcing the provisions of such regulations.

Definition

(b) As used in this section, "radioactive materials" means any materials or combination of materials which spontaneously emit ionizing radiation. The term does not include materials in which (1) the estimated specific activity is not greater than 0.002 microcuries per gram of material; and (2) the radiation is distributed in an essentially uniform manner.

SEC. 1808. Powers and Duties of the Secretary

General

(a) The Secretary is authorized, to the extent necessary to carry out his responsibilities under this chapter, to conduct investigations, make reports, issue subpoenas, conduct hearings, require the production of relevant documents, records, and property, take depositions, and conduct, directly or indirectly, research, development, demonstration, and training activities. The Secretary is further authorized, after notice and an opportunity for a hearing, to issue orders directing compliance with this chapter or regulations issued under this chapter; the district courts of the United States shall have jurisdiction, upon petition by the Attorney General, to enforce such orders by appropriate means.

Records

(b) Each person subject to requirements under this chapter shall establish and maintain such records, make such reports, and provide such information as the Secretary shall by order or regulation prescribe, and shall submit such reports and shall make such records and information available as the Secretary may request.

Inspection

(c) The Secretary may authorize any officer, employee, or agent to enter upon, inspect, and examine, at reasonable times and in a reasonable manner, the records and properties of persons to the extent such records and properties relate to—

(1) the manufacture, fabrication, marking, maintenance, reconditioning, repair, testing, or distribution of packages or containers for use by any person in the transportation of hazardous materials in commerce; or
(2) the transportation or shipment by person of hazardous materials in commerce.
Any such officer, employee, or agent shall, upon request, display proper credentials.

Facilities and duties; contract limitations

(d)(1) The Secretary shall—
(A) establish and maintain facilities and technical staff sufficient to provide, within the Federal government, the capability of evaluating risks connected with the transportation of hazardous materials and materials alleged to be hazardous;
(B) establish and maintain a central reporting system and data center so as to be able to provide the law enforcement and firefighting personnel of communities, and other interested persons and government officers, with technical and other information and advice for meeting emergencies connected with the transportation of hazardous materials; and
(C) conduct a continuing review of all aspects of the transportation of hazardous materials in order to determine and to be able to recommend appropriate steps to assure the safe transportation of hazardous materials.
(2) Nothing in this subsection shall be construed to limit the authority of the Secretary to enter into a contract with a private entity for use of a supplemental reporting system and data center operated and maintained by such entity.

Annual Report

(e) The Secretary shall prepare and submit to the President for transmittal to the Congress on or before June 15 of each year a comprehensive report on the transportation of hazardous materials during the preceding calendar year. Such report shall include, but need not be limited to—
(1) a thorough statistical compilation of any accidents and casualties involving the transportation of hazardous materials;
(2) a list and summary of applicable Federal regulations, criteria, orders, and exemptions in effect;
(3) a summary of the basis for any exemptions granted or maintained;
(4) an evaluation of the effectiveness of enforcement activities and the degree of voluntary compliance with applicable regulations;
(5) a summary of outstanding problems confronting the administration of this title, in order of priority; and
(6) such recommendations for additional legislation as are deemed necessary or appropriate.

SEC. 1809. Penalties

Civil

(a)(1) Any person (except an employee who acts without knowledge) who is determined by the Secretary, after notice and an opportunity for a hearing, to have knowingly committed an act which is a violation of a provision of this title or of a regulation issued under this chapter, shall be liable to the United States for a civil penalty. Whoever knowingly commits an act which is a violation of any regulation, applicable to any person who transports or causes to be transported or shipped hazardous materials, shall be subject to a civil penalty of not more than $10,000 for each violation, and if any such violation is a continuing one, each day of violation constitutes a separate offense. Whoever knowingly commits an act which is a violation of any regulation applicable to any person who manufactures, fabricates, marks, maintains, reconditions, repairs, or tests a package or container which is represented, marked, certified, or sold by such person for use in the transportation in commerce of hazardous materials shall be subject to a civil penalty of not more than $10,000 for each violation. The amount of any such penalty shall be assessed by the Secretary by written notice. In determining the amount of such penalty, the Secretary shall take into account the nature, circumstances, extent, and gravity of the violation committed and, with respect to the person found to have committed such violation, the degree of culpability, any history of prior offenses, ability to pay, effect on ability to continue to do business, and such other matters as justice may require.
(2) Such civil penalty may be recovered in an action brought by the Attorney General on behalf of the United States in the appropriate district court of the United States or, prior to referral to the Attorney General, such civil penalty may be compromised by the Secretary. The amount of such penalty, when finally determined (or agreed upon in compromise), may be deducted from any sums owed by the United States to the person charged. All penalties collected under this subsection shall be deposited in the Treasury of the United States as miscellaneous receipts.

Criminal

(b) A person is guilty of an offense if he willfully violates a provision of this chapter or a regulation issued under this title. Upon conviction, such person shall be subject, for each offense, to a fine of not more than $25,000, imprisonment for a term not to exceed 5 years, or both.

SEC. 1810. Specific relief

General

(a) The Attorney General, at the request of the Secretary, may bring an action in an appropriate district court of the United States for equitable relief to redress a violation by any person of a provision of this chapter, or an order or regulation issued under this chapter. Such district courts shall have jurisdiction to determine such actions and may grant such relief as is necessary or appropriate, including mandatory or prohibitive injunctive relief, interim equitable relief, and punitive damages.

Imminent Hazard

(b) If the Secretary has reason to believe that an imminent hazard exists, he may petition an appropriate district court of the United States, or upon his request the Attorney General shall so petition, for an order suspending or restricting the transportation of the hazardous material responsible for such imminent hazard, or for such other order as is necessary to eliminate or ameliorate such imminent hazard. As used in this subsection, an "imminent hazard" exists if there is substantial likelihood that serious harm will occur prior to the completion of an administrative hearing or other formal proceeding initiated to abate the risk of such harm.

SEC. 1811. Relationship to other laws

General

(a) Except as provided in subsection (b) of this section, any requirement, of a State or political subdivision thereof, which is inconsistent with any requirements set forth in this chapter, or in a regulation issued under this chapter, is preempted.

State Laws

(b) Any requirement, of a State or political subdivision thereof, which is not consistent with any requirement set forth in this chapter, or in a regulation issued under this chapter, is not preempted if, upon the application of an appropriate State agency, the Secretary determines, in accordance with procedures to be prescribed by regulation, that such requirement (1) affords an equal or greater level of protection to the public than is afforded by the requirements of this chapter or of regulations issued under this chapter and (2) does not unreasonably burden commerce. Such requirement shall not be preempted to the extent specified in such determination by the Secretary for so long as such State or political subdivision thereof continues to administer and enforce effectively such requirement.

Other Federal Laws

(c) The provisions of this chapter shall not apply to pipelines which are subject to regulation under the Natural Gas Pipeline Safety Act of 1968 (section 1671 et seq. of this title) or to pipelines which are subject to regulation under Hazardous Liquid Pipeline Safety Act of 1979 [49 U.S.C.A. §2001 et seq.]

SEC. 1813. Evaluation of training programs for incident prevention and response

Evaluation

(a) The Secretary and the Director of the Federal Emergency Management Agency (hereinafter in this section referred to as the "Director"), in coordination with other Federal, State, and local agencies with responsibilities relating to transportation of hazardous materials (including but not limited to the Environmental Protection Agency, the Department of Energy, and the Nuclear Regulatory Commission), shall each evaluate—

(1) programs conducted by Federal, State, and local agencies and private organizations which provide training to shippers, carriers, inspectors, and enforcement personnel involved in the transportation of hazardous materials with respect to compliance with and enforcement of rules, regulations, standards and orders promulgated by the Secretary under the authority of this title;

(2) programs conducted by Federal, State, and local agencies and private organizations which provide training to agencies or organizations responsible for responding to incidents involving transportation of hazardous materials; and

(3) planning programs conducted by Federal, State, and local agencies and private organizations for responding to incidents involving transportation of hazardous materials.

Report

(b) Not later than five months after October 30, 1984, enactment of this section, the Secretary and the Director shall each submit an interim report to the Congress on the results of their respective evaluations under subsection (a) of this section. Not later than 10 months after October 30, 1984, the Secretary and the Director shall complete such evaluations and submit the results of such evaluations to the Congress. Such reports shall include, but not be limited to—

(1) a description of existing planning programs for responding to incidents involving transportation of hazardous materials;

(2) a description of Federal, State, and (to the extent feasible) local training programs for responding to incidents involving transportation of hazardous materials and for compliance with and enforcement of rules, regulations, standards, and orders promulgated by the Secretary under the authority of this title;

(3) the amounts of funds expended per fiscal year in fiscal years 1980, 1981, 1982, 1983, and 1984 by Federal and State agencies on training programs described in paragraph (2); and

(4) recommendations concerning methods of funding such training programs, including but not limited to methods which assure long-term funding for such programs.

RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

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101 Office of Transportation Security - Cargo Security Advisory Standards
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106 Rulemaking Procedures
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Subchapter D—Pipeline Safety

PART 106—RULEMAKING PROCEDURES

Subpart A

GENERAL

§ 106.1 Scope. This part prescribes general rulemaking procedures for the issue, amendment, and repeal of regulations of the Research and Special Programs Administration of the Department of Transportation.

§ 106.3 Delegations. For the purposes of this part, Administrator means the Administrator, Research and Special Programs Administration or any of the following to whom he has delegated authority to conduct rulemaking proceedings:

(a) Director, Office of Hazardous Materials Transportation.
(b) Director, Office of Pipeline Safety.

§ 106.5 Regulatory dockets. (a) Information and data considered relevant by the Administrator relating to rulemaking actions, including notices of proposed rulemaking; comments received in response to notices; petitions for rulemaking and reconsideration; denials of petitions for rulemaking and reconsideration; records of additional rulemaking proceedings under § 106.25; and final regulations are maintained by the Research and Special Programs Administration at 400 7th St., SW, Washington, D.C. 20590.

(b) Any person may examine any docketed material at the offices of the Research and Special Programs Administration at any time during regular business hours after the docket is established, except material which the Administrator determines should be withheld from public disclosure under applicable provisions of any statute administered by the Administrator and section 552(b) of Title 5, United States Code, and may obtain a copy of it upon payment of a fee.

§ 106.7 Records. Records of the Research and Special Programs Administration relating to rulemaking proceedings are available for inspection as provided in section 552(b) of Title 5, United States Code, and Part 7 of the Regulations of the Office of the Secretary of Transportation (Part 7 of this title).

§ 106.9 Where to file petitions. Petitions for extension of time to comment submitted under § 106.19, petitions for hearings submitted under § 106.27, petitions for rulemaking submitted under § 106.31, and petitions for reconsideration submitted under § 106.35 must be submitted to: Administrator, Research and Special Programs Administration, U.S. Department of Transportation, 400 7th St., SW, Washington, D.C. 20590.

Subpart B

PROCEDURES FOR ADOPTION OF RULES

§ 106.11 General. Unless the Administrator, for good cause, finds that notice is impracticable, unnecessary, or contrary to the public interest, and incorporates that finding and a brief statement of the reasons for it in the rule, a notice of proposed rulemaking is issued and interested persons are invited to participate in the rulemaking proceedings with respect to each substantive rule.

§ 106.13 Initiation of rule making. The Administrator initiates rulemaking on his own motion. However, in so doing, he may, in his discretion, consider the recommendations of other agencies of the United States or of other interested persons including those of any technical advisory body established by statute for that purpose.

§ 106.15 Contents of notices of proposed rulemaking. (a) Each notice of proposed rulemaking is published in the *Federal Register*, unless all persons subject to it are named and are personally served with a copy of it.

(b) Each notice, whether published in the *Federal Register* or personally served, includes:

(1) A statement of the time, place, and nature of the proposed rulemaking proceeding;
(2) A reference to the authority under which it is issued;
(3) A description of the subjects and issues involved or the substance and terms of the proposed regulation;
(4) A statement of the time within which written comments must be submitted; and
(5) A statement of how and to what extent interested persons may participate in the proceeding.

§ 106.17 Participation by interested persons. (a) Any interested person may participate in rulemaking proceedings by submitting comments in writing containing information, views or arguments.

(b) In his discretion, the Administrator may invite any interested person to participate in the rulemaking proceedings described in § 106.25.

(c) For the purposes of this part, an interested person includes any Federal or State government agency or any political subdivision of a State (as defined in §107.201(b) of this subchapter).

§ 106.19 Petitions for extension of time to comment. A petition for extension of the time to submit comments must be received not later than 10 days before expiration of the time stated in the notice. It is requested, but not required, that three copies be submitted. The filing of the petition does not automatically extend the time for petitioner's comments. A petition is granted only if the petitioner shows good cause for the extension, and if the extension is consistent with the public interest. If an extension is granted, it is granted to all persons, and it is published in the *Federal Register*.

§ 106.21 Contents of written comments. All written comments must be in English. It is requested, but not required, that five copies be submitted. Any interested person must submit as part of his written comments all the material that he considers relevant to any statement of fact made by him. Incorporation of material by reference is to be avoided. However, if such incorporation is necessary, the incorporated material shall be identified with respect to document and page.

§ 106.23 Consideration of comments received. All timely comments and the recommendations of any technical advisory body established by statute for the purpose of reviewing the proposed rule concerned are considered before final action is taken on a rulemaking proposal. Late filed comments are considered so far as practicable.

§ 106.25 Additional rulemaking proceedings. The Administrator may initiate any further rulemaking proceedings that he finds necessary or desirable. For example, interested persons may be invited to make oral arguments, to participate in conferences between the Administrator or his representative and interested persons at which minutes of the conference are kept, to appear at informal hearings presided over by officials designated by the Administrator at which a transcript of minutes are kept, or participate in any other proceeding to assure informed administrative action and to protect the public interest.

§ 106.27 Hearings. (a) If a notice of proposed rulemaking does not provide for a hearing, any interested person may petition the Administrator for an informal hearing. The petition must be received by the Administrator not later than 20 days before expiration of the time stated in the notice. The filing of the petition does not automatically result in the scheduling of a hearing. A petition is granted only if the petitioner shows good cause for a hearing. If a petition for a hearing is granted, notice of the hearing is published in the *Federal Register*.

(b) Sections 556 and 557 of Title 5, United States Code, do not apply to hearings held under this part. Unless otherwise specified, hearings held under this part are informal, nonadversary, fact-finding proceedings, at which there are not formal pleadings or adverse parties. Any regulation issued in a case in which an informal hearing is held is not necessarily based exclusively on the record of the hearing.

(c) The Administrator designates a representative to conduct any hearing held under this part. The Chief Counsel designates a member of his staff to serve as legal officer at the hearing.

§ 106.29 Adoption of final rules. Final rules are prepared by representatives of the office concerned and the Office of the Chief Counsel. The regulation is then submitted to the Administrator for his consideration. If the Administrator adopts the regulation, it is published in the *Federal Register*, unless all persons subject to it are named and are personally served with a copy of it.

§ 106.31 Petitions for rulemaking. (a) Any interested person may petition the Administrator to establish, amend, or repeal a regulation.

(b) Each petition filed under this section must:

(1) Set forth the text or substance of the regulation or amendment proposed, or specify the rule that the petitioner seeks to have repealed, as the case may be;

(2) Explain the interest of the petitioner in the action requested; and

(3) Contain any information and arguments available to the petitioner to support the action sought.

§ 106.33 Processing of petition. (a) General. Unless the Administrator otherwise specifies, no public hearing, argument, or other proceeding is held directly on a petition before its disposition under this section.

(b) Grants. If the Administrator determines that the petition contains adequate justification, he initiates rulemaking action under this Subpart B.

(c) Denials. If the Administrator determines that the petition does not justify rulemaking, he denies the petition.

(d) Notification. Whenever the Administrator determines that a petition should be granted or denied, the Office of the Chief Counsel prepares a notice of that grant or denial for issuance to the petitioner, and the Administrator issues it to the petitioner.

§ 106.35 Petitions for reconsideration. (a) Any interested person may petition the Administrator for reconsideration of any regulation issued under this part. It is requested, but not required, that three copies be submitted. The petition must be received not later than 30 days after publication of the rule in the *Federal Register*. Petitions filed after that time will be considered as petitions filed under §106.31. The petition must contain a brief statement of the complaint and an explanation as to why compliance with the rule is not practicable, is unreasonable, or is not in the public interest.

(b) If the petitioner requests the consideration of additional facts, he must state the reason they were not presented to the Administrator within the prescribed time.

(c) The Administrator does not consider repetitious petitions.

(d) Unless the Administrator otherwise provides, the filing of a petition under this section does not stay the effectiveness of the rule.

§ 106.37 Proceedings on petitions for reconsideration. (a) The Administrator may grant or deny, in whole or in part, any petition for reconsideration without further proceedings. In the event he determines to reconsider any regulation he may issue a final decision on reconsideration without further proceedings, or he may provide such opportunity to submit comment or information and data as he deems appropriate. Whenever the Administrator determines that a petition should be granted or denied, the Office of Chief Counsel prepares a notice of the grant or denial of a petition for reconsideration, for issuance to the petitioner, and the Administrator issues it to the petitioner. The Administrator may consolidate petitions relating to the same rules.

(b) It is the policy of the Administrator to issue notice of the action taken on a petition for reconsideration within 90 days after the date on which the regulation in question is published in the *Federal Register* unless it is found impracticable to take action within that time. In cases where it is so found and the delay beyond that period is expected to be substantial, notice of that fact and the date by which it is expected that action will be taken is issued to the petitioner and published in the *Federal Register*.

APPENDIX A

Pursuant to § 106.3, the following officials of the Research and Special Programs Administration are authorized to conduct rule-making proceedings under this part, as specified in this appendix:

(a) The Director, Office of Hazardous Materials Transportation, is authorized to conduct all rule-making proceedings except the issuance of final rules and the grant or denial of petitions for reconsideration, under:

(1) [Reserved]

(2) Section 902(h)(1) of the Federal Aviation Act, as amended, 49 U.S.C. 1472(h)(1), and

(3) The Hazardous Materials Transportation Act, 49 U.S.C. 1801 et seq., except to the extent it relates to (i) Ship's stores or supplies, (ii) the bulk transportation of hazardous materials which are loaded or carried onboard a vessel without benefit of containers or labels, and received and handled by the vessel without mark or count, or (iii) pipelines.

(b) The Director, Office of Pipeline Safety is authorized to conduct all rule-making proceedings, except the issuance of final rules and the grant or denial of petitions for reconsideration, under:

(1) The Hazardous Liquid Pipeline Safety Act of 1979 (Title II of Pub. L. 96-129, 93 Stat. 1003, 49 U.S.C. 2001 et seq.);

(2) The Natural Gas Pipeline Safety Act of 1968, as amended, 49 U.S.C. 1671 et seq.;

(3) Section 21(a) of the Deepwater Port Act of 1974, 33 U.S.C. 1520(a).

PART 107—HAZARDOUS MATERIALS PROGRAM PROCEDURES

Subpart A

GENERAL PROVISIONS

§ 107.1 Purpose and scope. (a) This part prescribes procedures utilized by the Research and Special Programs Administration, the Office of Hazardous Materials Transportation and the Office of Chief Counsel in carrying out their duties under the laws pertaining to the transportation of hazardous materials.

(b) This subpart defines certain terms and prescribes procedures that are applicable to each proceeding described in this part.

§ 107.3 Definitions. As used in this part—

8700 "Act" means the Hazardous Materials Transportation Act.

"Approval Agency" means an organization or a person designated by the RSPA to certify packagings as having been designed, manufactured, tested, modified, marked or maintained in compliance with applicable DOT regulations.

"Competent Authority" means a national agency responsible under its national law for the control or regulation of a particular aspect of the transportation of hazardous materials (dangerous goods). The term "Appropriate authority", as used in the ICAO Technical Instructions, has the same meaning as "Competent Authority". The Director, Office of Hazardous Materials Transportation, Research and Special Programs Administration, is the United States Competent Authority for purposes of this part.

"OHMT" means the Office of Hazardous Materials Transportation.

"MTB" means the Materials Transportation Bureau.

"Person" includes a corporation, company, association, firm, partnership, society, and joint stock company, joint venture, sole proprietorship, as well as any officer, director, owner or duly authorized representative of any such unit or an individual.

"Respondent" means a person upon whom the RSPA has served a notice of probable violation.

"State" means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, or Guam.

§ 107.5 Request for confidential treatment. (a) If any person filing a document with the OHMT claims that some or all the information contained in the document is exempt from the mandatory public disclosure requirements of the Freedom of Information Act (5 U.S.C. 552 (1970)), is information referred to in 18 U.S.C. 1905 (1970), or is otherwise exempt by law from public disclosure, and if that person requests the OHMT not to disclose the information, that person shall file together with the documents a second copy of the document from which has been deleted the information for which confidential treatment is claimed. The person shall indicate in the original document that it is confidential or contains confidential information and may file a statement specifying the justification for which confidential treatment is claimed. If the person states that the information comes within the exception in 5 U.S.C. 552 (b)(4) for trade secrets and commercial or financial information, that person must include a statement as to why the information is privileged or confidential. If the person filing a document does not submit a second copy of the document with the confidential information deleted, the OHMT may assume that there is no objection to public disclosure of the document in its entirety.

(b) The OHMT retains the right to make its own determination with regard to any claim of confidentiality. Notice of a decision by the OHMT to deny the claim, in whole or in part, and an opportunity to respond shall be given to a person claiming confidentiality of information no less than five days prior to its public disclosure.

§ 107.7 Service of process on non-residents of the United States. (a) **Designation of agent for service.** When a person who is not a resident of the United States is required by this subchapter or Subchapter C of this chapter to designate a permanent resident of the United States as his agent upon whom service of process may be made for him and on his behalf, the agent may be an individual, a firm, or a domestic corporation. Any number of principals may designate the same person as agent. A designation is binding on a principal even if the designation is not in compliance with all the requirements of this section, until rejected by the OHMT. A designated agent may not assign performance of his functions under the designation to another person.

(b) **Form and contents of designation.** The designation shall:

(1) Be in writing and dated;

(2) Be made in the legal form required to make it valid and binding on the principal under the laws, corporate bylaws, or other requirements governing the making of the designation by the principal at the place and time where it is made and the person or persons signing the designation shall certify that it is so made;

(3) State the full legal name, principal name of business and mailing address of the principal;

(4) Provide that it remains in effect until withdrawn or replaced by the principal;

(5) State the legal name and mailing address of the agent, and

(6) Bear a declaration of acceptance duly signed by the designated agent.

(c) **Method of service.** Service of any process, notice, order, decision, or requirement of the OHMT may be made by registered or certified mail addressed to the agent with return receipt requested or in any other manner authorized by law. If service cannot be effected because the agent has died (or, if a firm or a corporation ceases to exist) or moved, or otherwise does not receive correctly addressed mail, service may be made by publication in the *Federal Register*.

§ 107.9 Public docket room. There is established in the RSPA offices at 400 7th Street, SW, Washington, D.C., a public docket room in which there is available for public inspection and copying:

(a) Copies of notices of proposed rulemaking issued by the RSPA or OOE or its predecessor agency, including advance notices, together with the comments received thereon during rulemaking proceedings, copies of any related *Federal Register* notices, final rules, petitions for reconsideration, and decisions issued in response to petitions for reconsideration;

(b) Applications for exemptions from the Department of Transportation's regulations governing the transportation of hazardous materials, including supporting data, memoranda of any informal meetings with applicants, related *Federal Register* notices, comments received thereon during the public comment period and copies of decisions issued granting or denying applications for exemptions;

(c) Applications for inconsistency rulings and nonpreemption determinations under Subpart C of this part, together with the comments received thereon, related documents filed with the RSPA, copies of related Federal Register notices, and rulings, determinations and orders issued in response to those applications;

(d) Records of compliance order proceedings and copies of RSPA compliance orders;

(e) Appeals filed under this part and RSPA decisions issued in response to those appeals; and

(f) Such other information pertaining to the RSPA hazardous materials program required by statute to be made available for public inspection and copying and any information which the RSPA determines should be made available to the public.

§ 107.11 Service. (a) Each order, notice, or other document required to be served under this part shall be served personally or by registered or certified mail, except as otherwise provided.

(b) Service upon a person's duly authorized representative constitutes service upon that person.

(c) Service by registered or certified mail is complete upon mailing. An official United States Postal Service receipt from the registered or certified mailing constitutes prima facie evidence of service.

§ 107.13 Subpoenas; witness fees. (a) The Administrator, RSPA, the Chief Counsel, Research and Special Programs Administration, or the Official designated to preside over a hearing convened in accordance with this part, may sign and issue subpoenas either on his own initiative or, upon an adequate showing that the information sought will materially advance the proceeding, upon the request of any person participating in that proceeding.

(b) A subpoena may require the attendance of a witness, or the production of documentary or other tangible evidence in the possession or under the control of the person served, or both.

(c) A subpoena may be served personally by any person who is not an interested person and is not less than 18 years of age, or by certified or registered mail.

(d) Service of a subpoena upon the person named therein shall be made by delivering a copy of the subpoena to such person and by tendering the fees for one day's attendance and mileage as specified by paragraph (f) of this section. When a subpoena is issued at the instance of any officer or agency of the United States, fees and mileage need not

For explanation of abbreviations and reference marks, see last page of this tariff.

be tendered at the time of service. Delivery of a copy of a subpoena and tender of the fees to a natural person may be made by handing them to the person, leaving them at his office with the person in charge thereof, leaving them at his dwelling place or usual place of abode with some person of suitable age and discretion then residing therein, by mailing them by registered or certified mail to him at his last known address, or by any method whereby actual notice is given to him and the fees are made available prior to the return date. When the person to be served is not a natural person, delivery of a copy of the subpoena and tender of the fees may be effected by handing them to a registered agent for service, or to any officer, director, or agent in charge of any office of the person, or by mailing them by registered or certified mail to that representative at his last known address or by any method whereby actual notice is given to the representative and the fees are made available prior to the return date.

(e) The original subpoena bearing a certificate of service shall be filed with the RSPA official having responsibility for the proceeding in connection with which the subpoena was issued.

(f) A witness subpoenaed by the RSPA shall be paid the same fees and mileage as would be paid to a witness in a proceeding in the district courts of the United States. The witness fees and mileage shall be paid by the person at whose instance the subpoena was issued.

(g) Notwithstanding the provisions of paragraph (f) of this section, and upon request, the witness fees and mileage may be paid by the RSPA if the RSPA official who issued the subpoena determines on the basis of good cause shown, that:

(1) The presence of the subpoenaed witness will materially advance the proceeding; and

(2) The person at whose instance the subpoena was issued would suffer a serious hardship if required to pay the witness fees and mileage.

(h) Any person to whom a subpoena is directed may, prior to later than 10 days after service thereof, to the person who issued the subpoena, to quash or modify it. The application shall contain a brief statement of the reasons relied upon in support of the action sought therein. The person who issued the subpoena may:

(1) Deny the application;

(2) Quash or modify the subpoena; or

(3) Condition denial of the application to quash or modify the subpoena upon the satisfaction of certain just and reasonable requirements. The denial may be summary.

(i) If there is a refusal to obey a subpoena served upon any person under the provisions of this section, the RSPA may request the Attorney General to seek the aid of the United States District Court for any District in which the person is found to compel that person, after notice, to appear and give testimony, or to appear and produce the subpoenaed documents before the RSPA, or both.

Subpart B

EXEMPTIONS

§ 107.101 Purpose and scope. This subpart prescribes procedures by which persons who are subject to the requirements of this subchapter, Subchapter C or this chapter, 46 CFR Part 64 or Part 146 may obtain administrative relief therefrom on the basis of equivalent levels of safety or levels of safety consistent with the public interest and the policy of the Hazardous Materials Transportation Act.

§ 107.103 Application for exemption. (a) Any person who is subject to the requirements of this subchapter, Subchapter C of this chapter, 46 CFR Part 64 or Part 146 may apply to the Director, OHMT, for an exemption from those requirements.

(b) Each application filed under this section for an exemption must—

(1) Be submitted in triplicate to: Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590, Attention: Exemptions Branch;

(2) Set forth the text or substance of the regulation from which the exemption is sought;

(3) State the name, address, and telephone number of the applicant;

(4) Include a detailed description of the proposal, including when appropriate, drawings, plans, calculations, procedures, test results, previous exemptions, approvals or permits, a list of specification containers, if any, to be used, a list of modified specification containers, if any, to be used, and a description of the modifications, and any other supporting information;

(5) State the chemical name, common name, hazard classification, form, quantity, properties, and characteristics of the material covered by the proposal, including composition and percentage (specified by volume or weight) of each chemical, of a solution or mixture;

(6) Describe all relevant shipping and accident experience;

(7) Specify the proposed mode of transportation, identify any increased risks that are likely to result if the exemption is granted, and specify the safety control measures which the applicant considers necessary or appropriate to compensate for those increased risks;

(8) Specify the proposed duration or describe the proposed schedule of events for which the exemption is sought;

(9) State why the applicant believes the proposal including any safety control measures specified by the applicant will achieve a level of safety which:

(i) Is at least equal to that specified in the regulation from which the exemption is sought, or

(ii) If the regulations do not contain a specified level of safety, will be consistent with the public interest and will adequately protect against the risks to life and property which are inherent in the transportation of hazardous materials in commerce;

(10) If the applicant seeks to have the application processed on a priority basis, set forth the supporting facts and reasons and

(11) If the applicant is not a resident of the United States, include a designation of a permanent resident of the United States as his agent for service of process in accordance with §107.7.

(c) Unless the Director, OHMT, finds that there is good reason for priority processing of an application, each application is processed in the order in which it is received. To permit timely consideration, an application should be submitted at least 120 days before the requested effective date.

(d) If the applicant wishes to claim confidential treatment for any information contained in the application, the procedures set forth in §107.5 apply.

§ 107.105 Application for renewal. (a) Each application for the renewal of an exemption issued under this subpart must:

(1) Be submitted in triplicate to: Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590, Attention: Exemptions Branch;

(2) Identify the exemption for which a renewal is requested;

(3) State the name, address, and telephone number of the applicant;

(4) Include (i) a certification by the applicant that the descriptions, technical information and safety assessment submitted in the original application, or as may have been updated by any subsequent application for renewal, remain accurate and correct, or (ii) such amendments to the previously submitted descriptions, technical information and safety assessment as is necessary to update them and assure their accuracy and correctness;

(5) A statement describing all relevant shipping and all accident experience that has occurred in connection with the exemption since its issuance or most recent renewal or, if no accidents have been experienced, a certification to that effect. This statement must include the approximate number of shipments made or packages shipped, as the case may be, and the number of shipments or packages involved in any loss of contents, including loss by venting when transporting a compressed or cold temperature gas.

(b) To permit timely consideration, an application for renewal should be submitted at least 60 days before the expiration date of the exemption.

(c) If, at least 60 days prior to the expiration of an existing exemption of a continuing nature, the holder files an application for renewal which is complete and conforms with the requirements of this section, the exemption will not be considered to have expired until the application for renewal has been finally determined.

§ 107.107 Administrative review. In the case of a written application for an exemption submitted as provided in §107.103(b) or the renewal of an exemption submitted as provided in §107.105, the Direc-

for, OHMT, reviews it to determine whether it is complete and conforms with the requirements of this subpart. This determination will be made within 30 days of the receipt of an exemption application and within 15 days of the receipt of a renewal application. If it is not returned to the applicant by the end of that period, it will be processed as provided in §107.109. If an application is returned, the applicant will be informed in what respects the application is incomplete.

§ 107.109 Processing of application. (a) After an application for an exemption or renewal of an exemption is determined to be complete, the Director, OHMT, dockets the application and publishes a notice in the *Federal Register* affording an opportunity for interested persons to comment. All comments received before the close of the comment period are considered before final action is taken on an application.

(b) No public hearing, argument, or other formal processing is held directly on an application filed under this subpart before its disposition under this section. However, during the processing of an application the Director, OHMT, may require the applicant to supply additional information.

(c) The Director, OHMT denies an application in accordance with the following:

(1) The application is denied if it does not contain adequate justification or if it contains any materially false or materially misleading statements, or fails to state a material fact.

(2) If the Director, OHMT denies an application under this paragraph, he notifies the applicant in writing of his reason therefore and publishes notice of the denial in the *Federal Register*.

(d) If the Director, OHMT, determines that the application contains adequate justification, he grants it subject to the conditions set forth in Appendix B to this subpart and such other terms as he considers necessary, and notifies the applicant in writing. He also publishes in the *Federal Register* a notice of the grant.

(e) If the Director, OHMT determines that an application concerns a matter of such general applicability and future effect as to warrant being made the subject of rule making, he may initiate rule making under Part 106 of this chapter in addition to or in lieu of granting or denying the application.

§ 107.111 Party to an exemption. (a) Any person who is eligible to apply under §107.103 for an exemption may apply to the Director, OHMT, to be made a party to an application filed under that section or §107.105 or to an exemption or renewal granted under §107.109(d).

(b) Each application filed under this section must:

(1) Be submitted to: Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590, Attention: Exemptions Branch;

(2) Identify the exemption application or exemption to which the applicant seeks to become a party;

(3) State the name, address and telephone number of the applicant; and

(4) If the applicant is not a resident of the United States, include a designation of a permanent resident of the United States as his agent for service of process in accordance with §107.7.

(c) The applicant becomes a party to an exemption application or exemption if the Director, OHMT, determines that:

(1) The applicant is a person who is eligible to apply under §107.103 for an exemption; and

(2) The exemption application or exemption to which the applicant seeks to become a party concerns a matter of a continuing nature and does not depend upon information entitled to confidential treatment.

(d) The Director, OHMT, publishes in the *Federal Register* a notice of each application received, each initial determination made and each renewal granted under this section.

(e) A person who becomes a party to an exemption under this section is subject to terms of that exemption, including the expiration date stated therein. If a party to an exemption wishes to renew his status as a party to an exemption, the procedures set forth in §§107.105 through 107.109 with respect to an application for renewal of an exemption apply.

§ 107.113 Application for and processing of emergency exemption. (a) Any person who is subject to the requirements of this subchapter, Subchapter C of this chapter, 46 CFR Part 64 or Part 146 who seeks an exemption from any of those requirements on the basis of an existing emergency shall apply for that exemption through the appropriate Department of Transportation official listed in Appendix A to this subpart.

(b) An application submitted under this section must include such supporting information with respect to each of the topics specified in §107.103(b)(2) through (11) as the receiving Department of Transportation official considers necessary for processing the application.

(c) Upon receipt of all of the information necessary for processing the application, the receiving Department of Transportation official shall transmit to the Director, OHMT, by the most rapid available means of communication, his evaluation as to whether an emergency exists and his recommendations with respect to the conditions to be included in the exemption. If the Director, OHMT, determines that an emergency exists and that there is adequate justification for the exemption, he grants the exemption subject to the applicable conditions set forth in Appendix B to this subpart and such other terms as he considers necessary, and immediately notifies the applicant. If the Director, OHMT, cannot determine that an emergency exists or determines that there is not adequate justification for the exemption, he immediately so notifies the applicant.

§ 107.115 Determination of existing emergency. (a) The Director, OHMT, shall determine that an emergency exists if, on the basis of information submitted in the application and his own investigation, he finds that:

(1) Existing conditions require the hazardous material concerned to be transported in commerce for the protection of life or property (other than the hazardous material to be transported); and

(2) The protection of life or property to be provided by the hazardous material would not be possible if the application is processed on a routine basis.

(b) The Director, OHMT, may determine that an emergency exists if, on the basis of information submitted in the application he finds that:

(1) Existing conditions require the hazardous material concerned to be transported in commerce to prevent or minimize serious economic loss; and

(2) The prevention or minimizing of serious economic loss to be provided by the hazardous material would not be possible if the application is processed on a routine basis.

(c) In determining what constitutes serious economic loss under paragraph (b) of this section, the Director, OHMT, considers the nature and extent of the expected loss.

§ 107.117 Withdrawal. (a) An applicant may withdraw an application at any time prior to it being finally determined. When an application is withdrawn after publication of the notice of application in the *Federal Register*, the Director, OHMT, publishes a notice of withdrawal in the *Federal Register*.

(b) Except for documents for which confidential treatment was requested by the applicant, withdrawal of an application does not authorize the removal of any related records from the dockets or files of the RSPA.

§ 107.119 Amendment, suspension, termination, and referral for enforcement action. (a) An exemption and any renewal thereof terminates according to its terms but not later than two years after the date of issuance unless terminated sooner under paragraph (c) of this section.

(b) The Director, OHMT may suspend an exemption if:

(1) He determines that an activity under the exemption is not being performed in accordance with the terms of the exemption; or

(2) On the basis of information not available at the time the exemption was granted or renewed, such action is necessary to protect against risks to life or property.

(c) The Director, OHMT may terminate an exemption if:

(1) He determines that the exemption is no longer consistent with the public interest;

(2) The exemption is no longer necessary because of an amendment to the regulations; or

(3) The exemption was granted on the basis of false or misleading material information.

(d) Unless the Director, OHMT determines that immediate amendment, suspension or termination of an exemption is necessary to abate the risk of an imminent hazard, he notifies the holder of the exemption or a party thereto in writing of the reasons therefore and provides that person an opportunity to show cause why the exemption should not be amended, suspended, or terminated under paragraph (b) or (c) of this section.

(e) Notwithstanding paragraphs (b), (c) and (d) of this section, the Director, OHMT may refer an exemption to the Office of Chief Counsel for initiation of an enforcement case under Subpart D of this part. If, as the result of the enforcement proceeding, the holder of the exemption or a party thereto is determined to have violated the terms of the exemption, the Director, OHMT may amend, suspend, or terminate the exemption.

§ 107.121 Appeal. Any applicant for an exemption or the renewal of an exemption aggrieved by an action taken by the Director, OHMT or OE under this subpart and any holder of an exemption suspended or terminated by the Director, OHMT or OE under §107.119 (b) or (c) may file an appeal with the Associate Administrator, RSPA. The appeal must be filed within 30 days of service of notification of that action, suspension or termination. There has not been an exhaustion of administrative remedies until an appeal has been filed and the applicable process is completed by the issuance of an order by the Associate Administrator, RSPA, granting or denying the appeal.

§ 107.123 Availability for public inspection. (a) Information relevant to an application under this part, including the application and supporting data, memoranda of any informal meetings with the applicant, and the grant or denial of the application is available for public inspection, except as specified in paragraph (b) of this section, at the

For explanation of abbreviations and reference marks, see last page of this tariff.

Office of Hazardous Materials Transportation, 400 7th Street, SW, Washington, D.C. 20590. Copies of available information may be obtained, as provided in Part 7 of this title.

(b) Information made available for inspection does not include materials which the Director, OHMT, determines should be withheld from public disclosure under § 107.5 and in accordance with the applicable provisions of section 552 (b) of Title 5, United States Code, and Part 7 of this title.

APPENDIX A

LIST OF DEPARTMENT OF TRANSPORTATION OFFICIALS THROUGH WHOM APPLICATION FOR EXEMPTIONS SEEKING PRIORITY TREATMENT ON THE BASIS OF EXISTING EMERGENCIES MAY BE INITIATED BY TELEPHONE

CERTIFICATE HOLDING AIRCRAFT OPERATIONS

The Federal Aviation Administration Civil Aviation Security Office which serves the place where the flight(s) will originate or which is responsible for the operators overall aviation security program.

NONCERTIFICATE HOLDING AIRCRAFT OPERATORS (OPERATORS OPERATING UNDER FAR PART 91)

The Federal Aviation Administration Civil Aviation Security Office which serves the place where the flight(s) will originate. The nearest Civil Aviation Security Office may be located by calling the FAA Duty Officer. Day or Night, 202-863-5100.

MOTOR CARRIERS

Chief, Field Programs Division, Office of Motor Carrier Safety Field Operations, Federal Highway Administration, Department of Transportation, Washington, DC 20590. Day 202-366-1975 and Night 202-267-2100.

RAIL CARRIERS

Associate Administrator for Safety, Federal Railroad Administration, Department of Transportation, Washington, D.C. 20590. Day 202-366-9178 or 366-0483 and Night 202-267-2100.

WATER CARRIERS

Chief, Hazardous Materials Branch, Marine Technical and Hazardous Materials Division, United States Coast Guard, Washington, D.C. 20590. Day 202-267-1577 or Night 202-267-2100.

APPENDIX B

STANDARD CONDITIONS APPLICABLE TO EXEMPTIONS

PACKAGES, CONTAINERS, SHIPMENTS

Exemptions from the regulations governing packages, containers, and the preparation and offering of hazardous materials for shipment are subject to the following conditions.

(1) The outside of each package must be plainly and durably marked "DOT-E" followed by the number assigned. On portable tanks, cargo tanks and tank cars, the markings must be in letters at least two inches high on a contrasting background.

(2) Each shipping paper issued in connection with a shipment made under an exemption must, in association with the entries required by 49 CFR 172.203, bear the notation "DOT-E" followed by the number assigned.

(3) When an exemption issued to a shipper contains special carrier requirements, the shipper shall furnish a copy of the exemption to the carrier before or at the time a shipment is tendered.

FLIGHTS OF CARGO-ONLY AIRCRAFT

Exemptions from the regulations governing the transportation of hazardous materials on cargo-only aircraft are subject to the following conditions.

(1) No person other than a required flight crewmember, an FAA inspector, the shipper or consignee of the material or a representative of the shipper or consignee so designated in writing, or a person necessary for handling the material may be carried on the aircraft.

(2) The operator of the aircraft must have advance permission from the owner or operator of each manned airport where the material is to be loaded or unloaded or where the aircraft is to land while the material is on board.

(3) At any airport where the airport owner or operator or authorized representative thereof has designated a location for loading or unloading the material concerned, the material may not be loaded or unloaded at any other location.

(4) If the material concerned can create destructive forces or have lethal or injurious effects over an appreciable area as a result of an accident involving the aircraft or the material, the loading and unloading of the aircraft and its operation in takeoff, enroute, and in landing must be conducted at a safe distance from heavily populated areas and from any place of human abode or assembly.

(5) If the aircraft is being operated by a holder of a certificate issued under Part 121 or Part 135 of Title 14, CFR, operations must be conducted in accordance with conditions and limitations specified in the certificate holder's operations specifications or operations manual accepted by the FAA. If the aircraft is being operated under Part 91 of Title 14, CFR, operations must be conducted in accordance with an operations plan accepted and acknowledged in writing by the Civil Aviation Security Office responsible for the operator's overall Aviation Security Program.

(6) Each crewmember of the aircraft must be provided written instructions on the conditions and limitations of the operation being conducted.

(7) The aircraft and the loading arrangement to be used must be approved for safe carriage of the particular materials concerned by the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the FAA Civil Aviation Security Office serving the place where the material is to be loaded.

(8) When Class A explosives are carried aboard a cargo aircraft under the provisions of Subchapter C, the aircraft operator shall take all possible action to insure that routes over heavily populated areas are avoided commensurate with considerations of flight safety. During the approach and landing phase, the aircraft operator shall request appropriate vectors when under radar control to avoid heavily populated areas.

SUBPART C

PREEMPTION

§ 107.201 Purpose and scope. (a) This subpart prescribes procedures by which (1) a State or a political subdivision of a State having a requirement pertaining to the transportation of hazardous materials or any person affected by the requirement may obtain an administrative ruling as to whether the requirement is inconsistent with the Act or regulations issued under the Act, and (2) a State or a political subdivision of a State may obtain a determination as to whether a requirement of that State or political subdivision, which is inconsistent with the Act or regulations issued under the Act and therefore preempted by section 112(a) of the Act is not so preempted.

(b) For purposes of this subpart "political subdivision" includes a municipality; a public agency or other instrumentality of one or more States, municipalities, or other political subdivisions of a State; or a public corporation, board, or commission established under the laws of one or more States.

(c) For purposes of this subpart regulations issued under the Act means the regulations contained in this subchapter, Subchapter C of this chapter and 46 CFR Part 146.

(d) Unless otherwise ordered by the Director, OHMT, an application for an inconsistency ruling which includes an application for a determination that the requirement is not preempted will be treated and processed solely as an application for an inconsistency ruling.

INCONSISTENCY RULINGS

§ 107.203 Application. (a) Any State or political subdivision or any person affected by a requirement of a State or political subdivision may apply to the OHMT for an administrative ruling as to whether a particular existing requirement of the State or political subdivision concerned is inconsistent with a requirement of the Act or the regulations issued under the Act.

(b) Each application filed under this section for a ruling must:

(1) Be submitted to the Office of Hazardous Materials Transportation, Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590. Attention: Hazardous Materials Preemption Docket;

(2) Set forth the text of the State or political subdivision requirement for which the determination is being sought;

(3) Specify each requirement of the Act or the regulations issued under the Act with which the applicant seeks the State or political subdivision requirement to be compared for consistency; and

(4) State why the applicant believes the State or political subdivision requirement to be consistent or inconsistent with the requirements of the Act or the regulations issued under the Act.

(c) The filing of an application for a ruling under this section does not constitute grounds for noncompliance with any requirement of the Act or a regulation issued under the Act.

§ 107.205 Notice. (a) If the applicant is other than a State or political subdivision, the applicant shall mail a copy of the application to the State or political subdivision concerned accompanied by a statement that the State or political subdivision may submit comments regarding the application to the OHMT within 45 days. The application filed with the OHMT must include a certification that the applicant has complied with this paragraph and must include the names and addresses of each State or political subdivision official to whom a copy of the application was sent.

(b) The OHMT may by serving notice on any other persons readily identifiable by the OHMT as persons who will be affected by the ruling sought or by publication in the *Federal Register* afford those persons an opportunity to file written comments on the application.

(c) Each person submitting written comments to the OHMT with respect to an application filed under this section shall send a copy of the comments to the applicant and certify to the OHMT that he has complied with this requirement. The OHMT may notify other persons participating in the proceeding of the comments and provide an opportunity for those other persons to respond.

§ 107.207 Processing. (a) The Director, OHMT, may initiate an investigation of any statement in an application and utilize in his evaluation any relevant facts obtained by that investigation. The Director, OHMT may solicit and accept submissions from third persons relevant to an application and will provide the applicant an opportunity to respond to all third person submissions. In evaluating an application, the Director, OHMT, may consider any other source of information. The Director, OHMT, on his own initiative may convene a hearing or conference, if he considers that a hearing or conference will advance his evaluation of the application.

(b) The Director, OHMT may dismiss the application without prejudice if:

(1) He determines that there is insufficient information upon which to base a ruling; or

(2) He requests additional information from the applicant and it is not submitted.

§ 107.209 Ruling. (a) Upon consideration of the application and other relevant information received or obtained during the proceeding, the Director, OHMT, issues his ruling.

(b) Notwithstanding that application for a ruling has not been filed under § 107.203, the Director, OHMT, on his own initiative, may issue a ruling as to whether a particular State or political subdivision requirement is inconsistent with the Act or the regulations issued under the Act.

(c) In determining whether a State or political subdivision requirement is inconsistent with the Act or the regulations issued under the Act, the Director, OHMT, considers:

(1) Whether compliance with both the State or political subdivision requirement and the Act or the regulations issued under the Act is possible; and

(2) The extent to which the State or political subdivision requirement is an obstacle to the accomplishment and execution of the Act and the regulations issued under the Act.

(d) The ruling includes a written statement setting forth the relevant facts and the legal basis for the ruling and provides that any person aggrieved thereby may file an appeal with the Administrator, RSPA.

(e) The OHMT serves a copy of the ruling upon the applicant, any other person who participated in the proceeding and upon any other person readily identifiable by the OHMT as one who is affected by the ruling. A copy of each ruling is placed on file in the public docket. The OOE may publish the ruling or notice of the ruling in the *Federal Register*.

(f) A ruling issued under this section constitutes an administrative determination as to whether a particular requirement of a State or local subdivision is inconsistent with the Act or the regulations issued under the Act. The fact that a ruling has not been issued under this section with respect to a particular requirement of a State or political subdivision carries no implication as to the consistency or inconsistency of that requirement with the Act or any regulations issued under the Act.

§ 107.211 Appeal. Any person aggrieved by a ruling issued under § 107.209 may file an appeal with the Administrator, RSPA. The appeal must be filed within 30 days of service of the ruling. There has not been an exhaustion of administrative remedies until an appeal has been filed and the appellate process is completed by the issuance of an order by the Administrator, RSPA, granting or denying the appeal.

NON PREEMPTION DETERMINATIONS

§ 107.215 Application. (a) Any State or political subdivision may apply to the OHMT for a determination that a particular existing requirement of that State or political subdivision which is inconsistent with the Act or the regulations issued under the Act is not preempted.

(b) Each application filed under this section for a nonpreemption determination must:

(1) Be submitted to the Office of Hazardous Materials Transportation, Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590. Attention: Hazardous Materials Preemption Docket.

(2) Set forth the text of the State or political subdivision requirement for which the determination is being sought;

(3) Include a copy of any court order and any ruling issued under § 107.209 having a bearing on the application;

(4) Contain an express acknowledgment by the applicant that the State or political subdivision requirement is inconsistent with one or more requirements of the Act or the regulations issued under the Act, unless it has been so determined by a court of competent jurisdiction or in a ruling issued under § 107.209;

(5) Specify each requirement of the Act or the regulations issued under the Act with which the State or political subdivision requirement is acknowledged or has been determined to be inconsistent;

(6) State why the applicant believes the State or political subdivision requirement affords an equal or greater level of protection to the public than is afforded by the requirements of the Act or the regulations issued under the Act;

(7) State why the applicant believes the State or political subdivision requirement does not unreasonably burden commerce; and

(8) Specify what steps the State or political subdivision is taking to administer and enforce effectively its inconsistent requirement.

§ 107.217 Notice. (a) The applicant State or political subdivision shall mail a copy of the application and any subsequent amendments or other documents relating to the application to each person who is reasonably ascertainable by the applicant as a person who will be affected by the determination sought. The copy of the application must be accompanied by a statement that the person may submit comments regarding the application to the OHMT within 45 days. The application filed with the OHMT must include a certification that the application has complied with this paragraph and must include the names and addresses of each person to whom the application was sent.

(b) Notwithstanding the provisions of paragraph (a) of this section, if the State or political subdivision determines that compliance with paragraph (a) of this section would be impracticable, the applicant shall:

(1) Comply with the requirements of paragraph (a) of this section with regard to those persons whom it is reasonable and practicable to notify; and

(2) Include with the application filed with the OHMT a description of the persons or class or classes of persons to whom notice was not sent.

(c) The OHMT may require the State or political subdivision to provide notice in addition to that required by paragraphs (a) and (b) of this section, or may determine that the notice required by paragraph (a) of this section is not impracticable, or that notice should be published in the *Federal Register*.

(d) The OHMT may serve notice on any other persons readily identifiable by the OHMT as persons who will be affected by the determination sought and may afford those persons an opportunity to file written comments on the application.

(e) Any person submitting written comments to the OHMT with respect to an application filed under this section shall send a copy of the comments to the applicant. The person shall certify to the OHMT that he has complied with the requirements of this paragraph. The OHMT may notify other persons participating in the proceeding of the comments and provide an opportunity for those other persons to respond.

§ 107.219 Processing. (a) The Director, OHMT, may initiate an investigation of any statement in an application and utilize in his evaluation any relevant facts obtained by that investigation. The Director, OHMT, may solicit and accept submissions from third persons relevant to an application and will provide the applicant an opportunity to respond to all third person submissions. In evaluating an application, the Director, OHMT, on his own initiative, may convene a hearing or conference, if he considers that a hearing or conference will advance his evaluation of the application.

(b) The Director, OHMT, may dismiss the application without prejudice if:

(1) He determines that there is insufficient information upon which to base a determination;

(2) Upon his request, additional information is not submitted by the applicant; or

(3) The applicant fails to provide the notice required by § 107.217.

(c) Except as provided in § 107.201(c), the Director, OHMT, will only consider an application for a non-preemption determination if—

(1) The applicant State or political subdivision expressly acknowledges in its application that the State or political subdivision requirement

for which the determination is sought is inconsistent with the requirements of the Act or the regulations issued under the Act; or

(2) The State or political subdivision requirement has been determined by a court of competent jurisdiction or in a ruling issued under § 107.209 to be inconsistent with the requirements of the Act or the regulations issued under the Act.

(d) When the OHMT has received all substantive information it considers necessary to process an application for a non-preemption determination, it serves notice of that fact upon the applicant and all other persons who received notice of the proceeding pursuant to § 107.217.

(e) To the extent possible, each application for a non-preemption determination will be acted upon in a manner consistent with the disposition of previous applications for non-preemption determinations.

§ 107.221 Determination and order. (a) Upon consideration of the application and other relevant information received or obtained during the proceeding, the Director, OHMT, issues an order setting forth his determination.

(b) The Director, OHMT, may issue a non-preemption order only if he finds that the State or political subdivision requirement affords to the public a level of safety at least equal to that afforded by the requirements of the Act and the regulations issued under the Act and does not unreasonably burden commerce. In determining whether the State or political subdivision requirement unreasonably burdens commerce, the Director, OHMT, considers the following factors:

(1) The extent to which increased costs and impairment of efficiency result from the State or political subdivision requirement.

(2) Whether the State or political subdivision requirement has a rational basis.

(3) Whether the State or political subdivision requirement achieves its stated purpose.

(4) Whether there is need for uniformity with regard to the subject concerned and if so, whether the State or political subdivision requirement competes or conflicts with those of other States and political subdivisions.

(c) The order includes a written statement setting forth the relevant facts and the legal basis for the determination. The order provides that any person aggrieved thereby may file an appeal with the Administrator, RSPA.

(d) The OHMT serves a copy of the order upon the applicant, any other person who participated in the proceeding and upon any other person readily identifiable by the OHMT as one who is affected by the order. A copy of each order is placed on file in the public docket. The Director, OHMT, may publish the order or notice of the order in the *Federal Register*.

(e) An order issued under this section constitutes an administrative determination as to whether a particular requirement of a State or local subdivision of a State, which is inconsistent with the requirements of the Act or the regulations issued under the Act is not preempted.

§ 107.223 Timeliness. If the OHMT fails to take action on the application within 90 days of serving the notice required by § 107.219(d), the applicant may treat the application as having been denied in all respects and may appeal therefrom as provided in § 107.225.

§ 107.225 Appeal. Any person aggrieved by an order issued under § 107.221 may file an appeal with the Administrator, RSPA. The appeal must be filed within 30 days of service of the order. There has not been an exhaustion of administrative remedies until an appeal has been filed and the appellate process is completed by the issuance of an order by the Administrator, RSPA, granting or denying the appeal.

SUBPART D

ENFORCEMENT

§ 107.299 Definitions. In this subpart, and in enforcement actions initiated thereunder, "Investigation" includes investigations authorized under 49 U.S.C. 1809(a) and inspections authorized under 49 U.S.C. 1809(c).

"Knowledge" or "knowingly" means that a person who commits an act which is a violation of the Act or of the requirements of this subchapter or Subchapter C of this chapter commits that act with knowledge or knowingly when that person (1) has actual knowledge of the facts that give rise to the violation, or (2) should have known of the facts that give rise to the violation. A person knowingly commits an act if the act is done voluntarily and intentionally. Knowledge or knowingly means that a person is presumed to be aware of the requirements of the Act and this subchapter and Subchapter C of this chapter. Knowledge or knowingly does not require that a person have an intent to violate the requirements of the Act or the requirements of this subchapter or Subchapter C of this chapter.

§ 107.301 Delegated authority for enforcement. Under redelegation from the Administrator, Research and Special Programs Administration, the OHMT and the Office of the Chief Counsel exercise their authority for enforcement of the Act, this subchapter, and Subchapter C of this subchapter, in accordance with § 1.53 of this title.

§ 107.303 Purpose and scope. This subpart describes the various enforcement authorities exercised by the OHMT and the Office of Chief Counsel and the associated sanctions and prescribes the procedures governing the exercise of those authorities and the imposition of those sanctions.

§ 107.305 Investigations. (a) General. In accordance with its delegated authority under Part 1 of this title, the OHMT may initiate investigations relating to compliance by any person with any provisions of this subchapter or Subchapter C of this chapter, or any exemption, approval, or order issued thereunder, or any court decree relating thereto. The OHMT encourages voluntary production of documents in accordance with and subject to § 107.13, and hearings may be conducted, and depositions taken pursuant to section 109(a) of the Act. The OHMT may conduct investigative conferences and hearings in the course of any investigation.

(b) Investigators. Investigations under Section 109(a) of the Act are conducted by OHMT personnel duly authorized for that purpose by the Director, OHMT. Inspections under Section 109(b) of the Act, are conducted by OHMT Hazardous Materials Enforcement Specialists who are duly designated for that purpose. Each official so designated may administer oaths and receive affirmations in any matter under investigation by the OHMT.

(c) Notification. Any person who is the subject of an OHMT investigation and who is requested to furnish information or documentary evidence is notified as to the general purpose for which the information or evidence is sought.

(d) Termination. When the facts disclosed by an investigation indicate that further action is unnecessary or unwarranted at that time, the person being investigated is notified and the investigative file is closed without prejudice to further investigation by the OHMT.

(e) Confidentiality. Information received in an investigation under this section, including the identity of the person investigated and any other person who provides information during the investigation, shall remain confidential under the investigatory file exception, or other appropriate exception, to the public disclosure requirements of 5 U.S.C. 552.

COMPLIANCE ORDERS AND CIVIL PENALTIES

§ 107.307 General.

(a) When the OHMT has reason to believe that a person is knowingly engaging or has knowingly engaged in conduct which is a violation of the Act or any provision of this subchapter or Subchapter C of this chapter, or any exemption, or order issued thereunder, for which the OHMT exercises enforcement responsibility, and if time, the nature of the violation, and the public interest permit, the OHMT may conduct proceedings to assess a civil penalty or to issue an order directing compliance, or both, or seek any other remedy available under the Act.

(b) In the case of a proceeding initiated for failure to comply with an exemption, the allegation of a violation of a term or condition thereof is considered by the OHMT to constitute an allegation that the exemption holder or party to the exemption is failing, or has failed to comply with the underlying regulations from which relief was granted by the exemption.

§ 107.309 Warning letters.

(a) In addition to the initiation of proceedings under § 107.307 for the imposition of sanctions or other remedies, the OHMT may issue a warning letter to any person whom the OHMT believes to have committed a probable violation of the Act or any provision of this subchapter, Subchapter C of this chapter, or any exemption issued thereunder.

(b) A warning letter issued under this section includes:

(1) A statement of the facts upon which the OHMT bases its determination that the person has committed a probable violation;

(2) A statement that the recurrence of the probable violations cited may subject the person to enforcement action; and

(3) An opportunity to respond to the warning letter by submitting

pertinent information or explanations concerning the probable violations cited therein.

§ 107.311 Notice of probable violation.

(a) The Office of Chief Counsel begins an enforcement action under § 107.307, by serving a notice of probable violation on a person alleging the violation of one or more provisions of the Act, this subchapter, or Subchapter C of this chapter, or any exemption issued thereunder.

(b) A notice of probable violation issued under this section includes the following information:

(1) A citation of the provisions of the Act, this subchapter, Subchapter C of this chapter, or the terms of any exemption issued thereunder which the Office of Chief Counsel believes the respondent is violating or has violated.

(2) A statement of the factual allegations upon which the demand for remedial action, a civil penalty, or both, is based.

(3) A statement of the respondent's right to present written or oral explanations, information, and arguments in answer to the allegations and in mitigation of the sanction sought in the notice of probable violation.

(4) A statement of the respondent's right to request a hearing and the procedures for requesting a hearing.

(5) In addition, in the case of a notice of probable violation proposing a compliance order, a statement of the proposed actions to be taken by the respondent to achieve compliance.

(6) In addition, in the case of a notice of probable violation proposing a civil penalty:

(i) A statement of the maximum civil penalty for which the respondent may be liable;

(ii) The amount of the preliminary civil penalty being sought by the Office of Chief Counsel, constitutes the maximum amount the Chief Counsel may seek throughout the proceedings; and

(iii) A description of the manner in which the respondent makes payment of any money due the United States as a result of the proceeding.

(c) The Office of Chief Counsel may amend a notice of probable violation at any time before issuance of a compliance order or an order assessing a civil penalty. If Office of Chief Counsel alleges any new material facts or seeks new or additional remedial action or an increase in the amount of the proposed civil penalty, it issues a new notice of probable violation under this section.

§ 107.313 Reply.

(a) Within 30 days of receipt of a notice of probable violation, the respondent must either:

(1) Admit the violation under § 107.315;

(2) Make an informal response under § 107.317; or

(3) Request a hearing under § 107.319.

(b) Failure of the respondent to file a reply as provided in this section constitutes a waiver of the respondent's right to appear and contest the allegations and authorizes the Chief Counsel, without further notice to the respondent, to find the facts to be as alleged in the notice of probable violation and issue an order directing compliance or assess a civil penalty, or, if proposed in the notice, both. Failure to request a hearing under paragraph (a)(3) of this section constitutes a waiver of the respondent's right to a hearing.

(c) Upon the request of the respondent, the Office of Chief Counsel may, for good cause shown and filed within the 30 days prescribed in the notice of probable violation, extend the 30-day response period.

§ 107.315 Admission of violations.

(a) In responding to a notice of probable violation issued under § 107.311, the respondent may admit the alleged violations and agree to accept the terms of a proposed compliance order or to pay the amount of the preliminarily assessed civil penalty, or, if proposed in the notice, both.

(b) If the respondent agrees to the terms of a proposed compliance order, the Chief Counsel issues a final order prescribing the remedial action to be taken by the respondent.

(c) Payment of a civil penalty must be made by certified check or money order payable to the "Department of Transportation" and sent to the Chief, General Accounting Branch (M–86.2), Accounting Operations Division, Office of the Secretary, Room 2228, Department of Transportation, 400 Seventh Street, S.W., Washington, D.C. 20590.

§ 107.317 Informal response.

(a) In responding to a notice of probable violation under § 107.311, the respondent may submit to the official who issued the notice, written explanations, information, or arguments in response to the allegations, the terms of a proposed compliance order, or the amount of the preliminarily assessed civil penalty.

(b) The respondent may include in his informal response a request for a conference. Upon the request of the respondent, the conference may be either in person or by telephone. A request for a conference must set forth the issues the respondent will raise at the conference.

(c) Upon receipt of a request for a conference under paragraph (b) of this section, the Chief Counsel's Office, in consultation with the OHMT, arranges for a conference as soon as practicable at a time and place of mutual convenience.

(d) The respondent's written explanations, information, and arguments as well as the respondent's presentation at a conference are considered by the Chief Counsel in reviewing the notice of probable violation. Based upon a review of the proceeding, the Chief Counsel may dismiss the notice of probable violation in whole or in part. If he does not dismiss it in whole, he issues an order directing compliance or assessing a civil penalty, or, if proposed in the notice, both.

§ 107.319 Request for a hearing.

(a) In responding to a notice of probable violation under § 107.311, the respondent may request a formal administrative hearing on the record before an Administrative Law Judge (ALJ) obtained by the Office of the Chief Counsel.

(b) A request for a hearing under paragraph (a) of this section must:

(1) State the name and address of the respondent and of the person submitting the request if different from the respondent;

(2) State which allegations of violations, if any, are admitted; and

(3) State generally the issues to be raised by the respondent at the hearing. Issues not raised in the request are not barred from presentation at the hearing; and

(4) Be addressed to the official who issued the notice.

(c) After a request for a hearing that complies with the requirements of paragraph (b) of this section, the Chief Counsel assigns an ALJ to preside over the hearing and notifies the respondent of this fact. Upon assignment of an ALJ, all further matters in the proceeding are conducted by and through the ALJ.

§ 107.321 Hearing.

(a) To the extent practicable, the hearing is held in the general vicinity of the place where the alleged violation occurred or at a place convenient to the respondent. Testimony by witnesses shall be given under oath and the hearing shall be recorded verbatim.

(b) Hearings are conducted in accordance with the Federal Rules of Evidence and Federal Rules of Civil Procedure; however, the ALJ may modify them as he determines necessary in the interest of a full development of the facts. In addition, the ALJ may:

(1) Administer oaths and affirmations;

(2) Issue subpoenas as provided by § 107.13;

(3) Adopt procedures for the submission of motions, evidence, and other documents pertinent to the proceeding;

(4) Take or cause depositions to be taken;

(5) Rule on offers of proof and receive relevant evidence;

(6) Examine witnesses at the hearing;

(7) Convene, recess, reconvene, adjourn and otherwise regulate the course of the hearing;

(8) Hold conferences for settlement, simplification of the issues, or any other proper purpose; and

(9) Take any other action authorized by, or consistent with, the provisions of this subpart and permitted by law which may expedite the hearing or aid in the disposition of an issue raised therein.

(c) The official who issued the notice of probable violation, or his representative, has the burden of proving the facts alleged therein.

(d) The respondent may appear and be heard on his own behalf or through counsel of his choice. The respondent or his counsel may offer relevant information including testimony which he believes should be considered in opposition to the allegations or which may bear on the sanction being sought and conduct such cross-examination as may be required for a full disclosure of the facts.

§ 107.323 ALJ's decision.

(a) After consideration of all matters of record in the proceeding, the ALJ shall issue an order dismissing the notice of probable violation in whole or in part or granting the sanction sought by the Office of Chief Counsel in the notice. If the ALJ does not dismiss the notice of probable violation in whole, he issues an order directing compliance or assessing a civil penalty, or, if proposed in the notice, both. The order includes a statement of the findings and conclusions, and the reasons therefore, on all material issues of fact, law, and discretion.

(b) If, within 20 days of receipt of an order issued under paragraph (a) of this section, the respondent does not submit in writing his acceptance of the terms of an order directing compliance, or, where appropriate, pay a civil penalty, or file an appeal under § 107.325, the case may be referred to the Attorney General with a request that an action be brought in the appropriate United States District Court to enforce the terms of a compliance order or collect the civil penalty.

§ 107.325 Appeals.

(a) *Hearing proceedings.* A party aggrieved by an ALJ's decision and order issued under § 107.323, may file a written appeal in accordance with paragraph (c) of this section with the Administrator, Research and Special Programs Administration (RSPA), 400 Seventh Street, S.W., Washington, D.C. 20590.

(b) *Non-Hearing proceedings.* A respondent aggrieved by an order issued under § 107.317, may file a written appeal in accordance with paragraph (c) of this section with the Administrator, RSPA, 400 Seventh Street, S.W., Washington, D.C. 20590.

(c) An appeal of an order issued under this subpart must:

(1) Be filed within 20 days of receipt of the order by the appealing party; and

For explanation of abbreviations and reference marks, see last page of this tariff.

(2) State with particularity the findings in the order that the appealing party challenges, and include all information and arguments pertinent thereto.

(d) If the Administrator, RSPA, affirms the order in whole or in part, the respondent must comply with the terms of the decision within 20 days of the respondent's receipt thereof, or within the time prescribed in the order. If the respondent does not comply with the terms of the decision within 20 days of receipt, or within the time prescribed in the order, the case may be referred to the Attorney General for action to enforce the terms of the decision.

(e) The filing of an appeal stays the effectiveness of an order issued under § 107.317 or § 107.323. However, if the Administrator, RSPA, determines that it is in the public interest, he may keep an order directing compliance in force pending appeal.

§ 107.327 Compromise and settlement.

(a) At any time before an order issued under § 107.317 or § 107.323 is referred to the Attorney General for enforcement, the respondent or the Office of Chief Counsel may propose a compromise as follows:

(1) In civil penalty cases, the respondent or the Chief Counsel may offer to compromise the amount of the penalty by submitting an offer for a specific amount to the other party. An offer of compromise by the respondent shall be submitted to the Chief Counsel who may, after consultation with Office of Chief Counsel, accept or reject it.

(i) A compromise offer stays the running of any response period then outstanding.

(ii) If a compromise is agreed to by the parties, the respondent is notified in writing. Upon receipt of payment by Office of Chief Counsel, the respondent is notified in writing that acceptance of payment is in full satisfaction of the civil penalty proposed or assessed, and Office of Chief Counsel closes the case with prejudice to the respondent.

(iii) If a compromise cannot be agreed to, the respondent is notified in writing and is given 10 days or the amount of time remaining in the then outstanding response period, whichever is longer, to respond to whatever action was taken by the Office of Chief Counsel or the Administrator, RSPA.

(2) In compliance order cases, the respondent may propose a consent agreement to the Associate Director for OE. If the Chief Counsel accepts the agreement, he issues an order in accordance with its terms. If the Chief Counsel rejects the agreement, he directs that the proceeding continue. An agreement submitted to the Chief Counsel must include:

(i) A statement of any allegations of fact which the respondent challenges;

(ii) The reasons why the terms of a compliance order or proposed compliance order are or would be too burdensome for the respondent, or why such terms are not supported by the record in the case;

(iii) A proposed compliance order suitable for issuance by the Chief Counsel;

(iv) An admission of all jurisdictional facts; and

(v) An express waiver of further procedural steps and all right to seek judicial review or otherwise challenge or contest the validity of the order.

(b) Notwithstanding paragraph (a)(1) of this section, the respondent or Office of Chief Counsel may propose to settle the case. If the Chief Counsel agrees to a settlement, the respondent is notified and the case is closed without prejudice to the respondent.

§ 107.329 Maximum penalties.

(a) A person who knowingly violates a requirement of the Act, this chapter or an exemption issued under Subchapter B of this chapter applicable to the transporting of hazardous materials or the causing of them to be transported or shipped is liable for a civil penalty of not more than $10,000 for each violation. When the violation is a continuing one, each day of the violation constitutes a separate offense.

(b) A person who knowingly violates a requirement of the Act, this chapter or an exemption issued under Subchapter B of this Chapter applicable to the manufacture, fabrication, marking, maintenance, reconditioning, repair, or testing of a packaging or container which is represented, marked, certified or sold by that person as being qualified for use in the transportation of hazardous materials in commerce is liable for a civil penalty of not more than $10,000 for each violation.

§ 107.331 Assessment considerations.

In assessing a civil penalty under this subpart, the Chief Counsel takes into account:

(a) The nature and circumstances of the violation;
(b) The extent and gravity of the violation;
(c) The degree of the respondent's culpability;
(d) The respondent's history of prior offenses;
(e) The respondent's ability to pay;
(f) The effect on the respondent's ability to continue in business; and
(g) Such other matters as justice may require.

CRIMINAL PENALTIES

§ 107.333 Criminal penalties generally.

Section 110(b) of the Act (49 U.S.C. 1809(b)) provides a criminal penalty of a fine of not more than $25,000 and imprisonment for not more than five years, or both, for any person who willfully violates a provision of the Act or a regulation issued under the Act.

§ 107.335 Referral for prosecution.

If the OHMT becomes aware of a possible willful violation of the Act, this chapter, Subchapter C of this chapter, or any exemption, or order issued thereunder, for which the OHMT exercises enforcement responsibility, it shall report it to the Office of the Chief Counsel, Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590. If appropriate, the Chief Counsel refers the report to the Department of Justice for criminal prosecution of the offender.

INJUNCTIVE ACTION

§ 107.337 Injunctions generally.

Whenever it appears to the Office of Chief Counsel that a person has engaged, or is engaged, or is about to engage in any act or practice constituting a violation of any provision of the Act, this subchapter, Subchapter C of this chapter, or any exemption, or order issued thereunder, for which the Office of Chief Counsel exercises enforcement responsibility, the Administrator, RSPA, or his delegate, may request the Attorney General to bring an action in the appropriate United States District Court for such relief as is necessary or appropriate, including mandatory or prohibitive injunctive relief, interim equitable relief and punitive damages as provided by section 111(a) of the Act.

§ 107.339 Imminent hazards.

Whenever it appears to the Office of the Chief Counsel that there is a substantial likelihood that death, serious illness, or severe personal injury will result from the transportation of a particular hazardous material or hazardous material's container, before a compliance order proceeding or other administrative hearing or formal proceeding to abate the risk of that harm can be completed, the Administrator, RSPA, or his delegate, may bring an action under section 111(b) of the Act in the appropriate United States District Court for an order suspending or restricting the transportation of that hazardous material or those containers or for such other equitable relief as is necessary or appropriate to ameliorate the hazard.

SUBPART E—DESIGNATION OF APPROVAL AGENCIES AND CERTIFICATION AGENCIES

§ 107.401 Purpose and scope.

(a) This subpart establishes procedures for the designation of agencies to issue approval certificates and certifications for types of packagings designed, manufactured, tested, or maintained in conformance with the requirements of this subchapter, Subchapter C of this chapter, and standards set forth in the United Nations (U.N.) Recommendations (Transport of Dangerous Goods). Except for certifications of compliance with U.N. packaging standards, this subpart does not apply unless made applicable by a rule in Subchapter C of this chapter.

(b) The Associate Director for HMR may issue approval certificates and certifications addressed in paragraph (a) of this section.

§ 107.402 Application for designation as an approval or certification agency. (a) Any organization or person seeking designation as an approval or certification agency shall apply in writing to the Director, Office of Hazardous Material's Transportation (DMT-20), Department of Transportation, 400 Seventh Street, S.W., Washington, D.C. 20590. Each application must be signed and certified to be correct by the applicant or, if the applicant is an organization, by an authorized officer or official representative of the organization. Any false statement or representation, or the knowing and willful concealment of a material fact, may subject the applicant to prosecution under the provisions of 18 U.S.C. 1001, result in the denial or termination of a designation.

(b) Each application for designation must be in English and include the following information:

(1) Name and address of the applicant, including place of incorporation if a corporation. In addition, if the applicant is not a resident of the United States, the name and address of a permanent resident of the United States designated in accordance with § 107.7 to serve as agent for service of process.

(2) If the applicant's principal place of business is in a country other

than the United States, a copy of the designation from the Competent Authority of that country delegating to the applicant an approval or designated agency authority for the type of packaging for which a DOT designation is sought, and a statement that the Competent Authority also delegates similar authority to U.S. Citizens or organizations having designations under this subpart from the RSPA.

(3) A listing, by DOT specification (or exemption) number, or UN designation, of the types of packagings for which approval authority is sought.

(4) A personnel qualifications plan listing the qualifications that the applicant will require of each person to be used in the performance of each packaging approval or certification function. As a minimum, these qualifications must include—

(i) The ability to review and evaluate design drawings, design and stress calculations;

(ii) A knowledge of the applicable regulations of Subchapter C of this chapter and, when applicable, U.N. standards; and

(iii) The ability to conduct or monitor and evaluate test procedures and results; and

(iv) The ability to review and evaluate the qualifications of materials and fabrication procedures.

(5) A statement that the applicant will perform its functions independent of the manufacturers and owners of the packagings concerned.

(6) A statement that the applicant will allow the Director, OHMT or his representative to inspect its records and facilities in so far as they relate to the approval or certification of specification packagings and shall cooperate in the conduct of such inspections.

(c) The applicant shall furnish any additional information relevant to the applicant's qualifications, if requested by the Director, OHMT.

§ 107.403 Designation of approval agencies. (a) If the Director, OHMT determines that an application contains all the required information, the applicant is sent a letter of designation and assigned an identification code.

(b) If the Director, OHMT determines that an application does not contain all the required information, the application is denied and the applicant is sent a written notice containing all the reasons for the denial.

(c) Within 30 days of an initial denial of an application under paragraph (b) of this section, the applicant may file an amended application. If after considering the amended application, the Director, OHMT determines that it should be denied, he notifies the applicant, and the denial constitutes the final action of the Director, OHMT on the application. Within 60 days of receipt of the final denial the applicant may appeal the denial to the Administrator, RSPA, setting forth in writing where the Director, OHMT erred in this determination.

§ 107.404 Conditions of designation. (a) Each designation made under this subpart contains the following conditions:

(1) The designated approval or certification agency may use only testing equipment that it has determined, through personal inspection, to be suitable for the purpose.

(2) Each approval certificate and certification issued by the designated approval agency must contain the name and identification code of the approval agency.

(3) Each approval certificate and certification must be in a format acceptable to the Director, OHMT.

(b) The designated approval agency shall notify the Director, OHMT within 20 days after the date there is any change in the information submitted under § 107.402.

(c) The designated approval agency shall comply with all of the terms and conditions stated in its letter of designation under the subpart.

(d) Nothing in this part relieves a manufacturer or owner of a packaging of responsibility for compliance with any of the applicable requirements of this title.

§ 107.405 Termination of designation. (a) Any designation issued under § 107.403 of this subchapter may be suspended or terminated if the Director, OHMT determines that:

(1) The application for designation contained a misrepresentation, or the applicant willfully concealed a material fact.

(2) The approval agency failed to comply with a term or condition stated in the agency's letter of designation.

(3) The Competent Authority of an approval agency of a country outside the United States has failed to initiate, maintain or recognize a qualified U.S. approval agency.

(b) Before a designation is suspended or terminated, the Director, OHMT shall give to the approval agency:

(1) Written notice of the facts or conduct believed to warrant suspension or termination of the designation.

(2) Sixty days in which to show in writing why the designation should not be suspended or terminated.

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

§ 171.1 Purpose and scope. This subchapter prescribes the requirements of the Department of Transportation governing: (a) The transportation of hazardous materials by, and their offering to:

(1) Carriers by rail car, aircraft and vessel (except as delegated at §1.46(t) of this title);

(2) Interstate and foreign carriers by motor vehicle; and

(3) Intrastate carriers by motor vehicle so far as this subchapter relates to:

(i) Hazardous waste.

(ii) Hazardous substances

(iii) Flammable cryogenic liquids in portable tanks and cargo tanks.

(b) The manufacture, fabrication, marking, maintenance, reconditioning, repairing, or testing of a packaging or container which is represented, marked, certified, or sold for use in such transportation as specified in paragraph (a) of this section.

§ 171.2 General requirements. (a) No person may offer or accept a hazardous material for transportation in commerce unless that material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by this subchapter (including §§171.11, 171.12 and 176.11), or

(b) No person may transport a hazardous material in commerce unless that material is handled and transported in accordance with this subchapter, or an exemption issued under Subchapter B of this chapter.

(c) No person may represent, mark, certify, sell, or offer a packaging or container as meeting the requirements of this subchapter or an exemption issued under Subchapter B of this chapter, governing its use in the transportation in commerce of a hazardous material, whether or not it is used or intended to be used for the transportation of a hazardous material, unless the packaging or container is manufactured, fabricated, marked, maintained, reconditioned, repaired, or retested, as appropriate, in accordance with this subchapter, an approval issued thereunder, or an exemption issued under Subchapter B of this chapter.

(d) The representations, markings, and certifications subject to the prohibitions of paragraph (c) of this section include:

(1) Specification identifications that include the letters "DOT" or "UN";

(2) Exemption, approval, and registration numbers that include the letters "DOT;" and

(3) Test dates displayed in association with specification, registration, approval, or exemption markings indicating compliance with a test or retest requirement of this subchapter, an approval issued thereunder, or an exemption issued under Subchapter B of this chapter.

§ 171.3 Hazardous waste. (a) No person may offer for transportation or transport a hazardous waste (as defined in §171.8 of this subchapter) in interstate or intrastate commerce except in accordance with the requirements of this subchapter.

(b) No person may accept for transportation, transport, or deliver a hazardous waste for which a manifest is required unless that person:

(1) Has marked each motor vehicle used to transport hazardous waste in accordance with §397.21 or §1058.2 of this title even though placards may not be required;

(2) Complies with the requirements for manifests set forth in §172.205 of this subchapter; and

(3) Delivers, as designated on the manifest by the generator, the entire quantity of the waste received from the generator or a transporter to:

(i) The designated facility or, if not possible, to the designated alternate facility;

(ii) The designated subsequent carrier; or

(iii) A designated place outside the United States.

Note: Federal law specifies penalties up to $25,000 fine and 5 years imprisonment for the willful discharge of hazardous waste at other than designated facilities. 49 U.S.C. 1809

(c) With regard to hazardous waste subject to this subchapter, any requirement of a state or its political subdivision is inconsistent with this subchapter if it applies because that material is a waste material and applies differently from or in addition to the requirements of this subchapter concerning:

(1) Packaging, marking, labeling, or placarding;

(2) Format or contents of discharge reports (except immediate reports for emergency response); and

(3) Format or contents of shipping papers, including hazardous waste manifests.

Note: See § 172.205, each manifest must be prepared in accordance with 40 CFR 262.20 including the instructions and limitations specified for preparation of a manifest.

(d) If a discharge of hazardous waste or other hazardous material occurs during transportation, and an official of a State or local government or a Federal agency, acting within the scope of his official responsibilities, determines that immediate removal of the waste is necessary to prevent further consequence, that official may authorize the removal of the waste without the preparation of a manifest. [NOTE: In such cases, EPA does not require carriers to have EPA identification numbers.]

(e) If a hazardous material that is a hazardous waste is required by this subchapter to be shipped in a closed head DOT specification drum, and the hazardous waste contains solids or semisolids that would make its placement in a closed head drum impracticable (e.g., a drum with a 2.3 inch bung opening), an equivalent specification open head drum (except for closure) may be used for such a waste.

Note 1: EPA requires shippers (generators) and carriers (transporters) of hazardous wastes to have identification numbers which must be displayed on hazardous waste manifests. See 40 CFR 262.20(a) and 263.11. (Identification number application forms (EPA Form 8700-12) may be obtained from EPA Regional Offices.)

Note 2: The following EPA regulation is set forth in 40 CFR Part 263:

§263.31 Discharge clean up. A transporter must clean up any hazardous waste discharge that occurs during transportation or take such action as may be required or approved by Federal, State, or local officials so that the hazardous waste discharge no longer presents a hazard to human health or the environment.

§ 171.4 Changes in specifications for tank cars. (a) See §179.4 of this subchapter.

§ 171.5 Procedure covering tank car construction. (a) See §179.3 of this subchapter.

§ 171.6 [Reserved]

§ 171.7 Matter incorporated by reference. (a) There is incorporated by reference in Parts 170–189 of this subchapter all matter referred to that is not specifically set forth. These materials are hereby made a part of the regulations in Part 170–189 of this subchapter. Unless the reference provides otherwise, matter subject to change is incorporated only as it is in effect on the date of issuance of the regulation referring to that matter.

(b) All incorporated matter is available for inspection in the Dockets Branch, Room 8426, Nassif Building, 400 7th Street SW., Washington, D.C. 20590.

(c) Matter incorporated by reference is available for distribution as follows:

(1) ASME: American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

(2) American National Standard: American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

(3) CGA: Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, Virginia 22202.

(4) Bureau of Explosives: Haz Mat Systems (BOE), Association of American Railroads, American Railroads Building, 50 F Street NW, Washington, D.C. 20001.

(5) AAR: Association of American Railroads, 59 East Van Buren Street, Chicago, Il. 60605.

(6) ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

(7) API: American Petroleum Institute, 1801 K Street NW., Washington, DC 20037.

(8) AISI: American Iron and Steel Institute, 1000 16th Street NW., Washington, D.C. 20036.

(9) The Chlorine Institute, 342 Madison Avenue, New York, N.Y. 10017.

(10) CMA: Chemical Manufacturers Association, 2501 M Street, NW., Washington, D.C. 20037.

(11) NFPA: National Fire Protection Association, Batterymarch Park, Quincy, Mass. 02269.

(12) Aluminum Association: The Aluminum Association, 818 Connecticut Ave., NW., Washington, D.C. 20006.

(13) NACE: National Association of Corrosion Engineers, 1440 South Creek, Houston, Texas 77084.

(14) IME: Institute of Makers of Explosives, 1575 Eye Street, NW., Washington, D.C. 20005.

(15) IAEA: International Atomic Energy Agency, Wagramerstrasse 5, P.O. Box 100, A-1400, Vienna, Austria (IAEA publications may be purchased in the United States from: Unipub, Inc., Post Office Box 433, New York, NY 10016).

(16) USDOE: United States Department of Energy, Washington, D.C. 20545. Regulations of the USDOE are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Other publications by the USDOE may be obtained from the National Technical Information Center, U.S. Department of Commerce, Springfield, Va. 22151.

(17) Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(18) National Wooden Box Association, Post Office Box 1010, Cumberland, Md. 21502.

(19) TFI: The Fertilizer Institute, 1015 18th Street N.W., Washington, D.C. 20036.

(20) AWWA: American Water Works Association, 1010 Vermont Ave., NW., Washington, D.C. 20005.

(21) AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, Florida 33126.
(22) USDC: U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151.
(23) International Maritime Organization, 4 Albert Embankment, London, SE 1 7SR, United Kingdom.
(24) Uniform Classification Committee, 222 South Riverside Plaza, Chicago, Ill. 60606.
(25) [Reserved]
(26) USNRC: United States Nuclear Regulatory Commission, Washington, D.C. 20555.
(27) UN: United Nations: United Nations Sales Section, New York, New York 10017.
(28) OPPSD: Organic Peroxide Producers Safety Division, Society of the Plastic Industries, Inc., 355 Lexington Avenue, New York, N.Y. 10017.
(29) ISO: International Organization for Standardization, Case Postale 56, CH-1211 Geneve 20, Switzerland. Also available from the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.
(30) National Motor Freight Traffic Association, Inc., Agent, 2200 Mill Road, Alexandria, VA 22314.
(31) ICAO: International Civil Aviation Organization, P.O. Box 400, Place de l'Aviation Internationale, 1000 Sherbrooke Street West, Montreal, Quebec, Canada H3A 2R2. ICAO Technical Instructions available from INTEREG, International Regulations Publishing and Distribution Organization, 4000 West Victoria Avenue, Chicago, Illinois 60646.
(32) TDG Regulations: Canadian Government Publishing Center, Supply and Services Canada, Ottawa, Ontario, Canada K1 A 0S9.

(d) The full title and application of the matter incorporated by reference in Parts 170-189 of this chapter are as follows:

(1) ASME Code means Sections II (Parts A and B), V, VIII (Division 1), and IX of the 1986 edition of the "American Society of Mechanical Engineers Boiler and Pressure Vessel Code," and addenda thereto through June 30, 1985."

(2) AAR Specifications for Tank Cars means the 1985 edition of the "Association of American Railroads Specifications for Tank Cars, Specification M-1002".

(3) Compressed Gas Association:
(i) CGA Pamphlet C-3 is titled, "Standards for Welding and Brazing on Thin Walled Containers," 1968 edition;
(ii) CGA Pamphlet C-6 is titled, "Standards for Visual Inspection of Steel Compressed Gas Cylinders," 1984 edition;
(iii) CGA Pamphlet C-7 is titled, "Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers," 1983 edition including Appendix A issued April 15, 1983.
(iv) CGA Pamphlet C-8 is titled, "Standard for Requalification of DOT-3HT Seamless Steel Cylinders," 1985 edition.
(v) CGA Pamphlet S-1.2 is titled, "Pressure Relief Device Standards, Part 2—Cargo and Portable Tanks for Compressed Gases," 1980 edition.
(vi) CGA Pamphlet S-1.1 is titled, "Pressure Relief Device Standards Part 1—Cylinders for Compressed Gases," 1979 edition.
(vii) CGA Pamphlet C-12 is titled, "Qualification Procedure for Acetylene Cylinder Design," 1979 edition.
(viii) CGA Pamphlet C-14 is titled "Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems," 1979 edition.
(ix) CGA Pamphlet G-4.1 is titled, "Cleaning Equipment for Oxygen Service," 1985 edition.
(x) CGA Pamphlet G-2.2 is titled, "Guideline Method for Determining Maximum of 0.2% Water in Anhydrous Ammonia", 1985 edition.
(xi) CGA Technical Bulletin TB-2 is titled, "Guidelines for Inspection and Repair of MC-330 and MC-331 Cargo Tanks", 1980 edition.
(xii) CGA Pamphlet C-6.1 is titled, "Standards for Visual Inspection of Aluminum Compressed Gas Cylinders", 1984 edition.

(4) American National Standards:
(i) American National Standard B9.1, is titled, "Safety Code for Mechanical Refrigeration," 1964 edition.
(ii) American National Standard B16.5 is titled, "Steel Pipe Flanges and Fittings," 1968 edition.
(iii) American National Standard N14.1 is titled, "Packaging of Uranium Hexafluoride for Transport," 1982 edition.

(5) American Society for Testing and Materials:
(i) ASTM D1310 is titled, "Standard Method of Test for Flash Point of Volatile Flammable Materials By Tag Open-Cup Apparatus," 1967 edition;
(ii) ASTM D323 is titled, "Test for Vapor Pressure of Petroleum Products (Reid Method)," 1968 edition.
(iii) ASTM D1056 is titled, "Sponge and Expanded Cellular Rubber Products, Spec. and Tests for," 1968 edition.
(iv) ASTM G 23-69 is titled, "Standard Recommended Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials," 1969 edition (reapproved 1975).
(v) ASTM G 26-70 is titled, "Standard Recommended Practice for Operating Light- and Water-Exposure Apparatus (Xenon-Arc Type) for Exposure of Nonmetallic Materials," 1970 edition.
(vi) ASTM D-638 is titled, "Test for Tensile Strength of Plastics", 1976 edition.
(vii) ASTM D-1505 is titled, "Test for Density of Plastics by the Density Gradient Technique", 1968 edition.
(viii) ASTM C148-77 is titled, "Standard Methods of Polariscopic Examination of Glass Containers," 1977 edition.
(ix) ASTM E437-74 is titled, "Standard Test Method for Constant-Temperature Stability of Chemical Materials," 1974 edition.
(x) ASTM B 557-79 is titled "Tension Testing Wrought and Cast Aluminum and Magnesium—Alloy Products" 1979 Edition.
(xi) ASTM B-221-76 is titled "Standard Specification for Aluminum Alloy Extruded Bars, Rods, Shapes and Tubes," 1976 Edition.
(xii) ASTM E 290-77 is titled "Semi-Guided Bend Test for Ductility of Metallic Materials," 1977 edition.
(xiii) ASTM D56-79 is titled "Standard Method of Test for Flash Point by Tag Closed Tester," 1979 edition.
(xiv) ASTM D3278-78 is titled "Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester," 1978 edition.
(xv) ASTM D93-80 is titled "Standard Method of Test for Flash Point by Pensky-Martens Closed Tester," 1980 edition.
(xvi) ASTM 88-56 is titled "Standard Method of Test for Saybolt Viscosity" 1956 edition (reapproved 1968).
(xvii) ASTM D2161-79 is titled "Standard Method for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity," 1979 edition.
(xviii) ASTM D445-79 is titled "Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity," 1979 edition.
(xix) ASTM A 20-81 is titled, "Standard Specification for General Requirements for Steel Plates for Pressure Vessels," revision C, 1982 edition.
(xx) ASTM A 240-82 is titled, "Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Fusion-Welded Unfired Pressure Vessels," revision A, 1982 edition.
(xxi) ASTM A 370-77 is titled, "Standard Methods and Definition for Mechanical Testing of Steel Products," 1982 edition.
(xxii) ASTM A 516-79b is titled, "Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service," 1982 edition.
(xxiii) ASTM A 537-80 is titled "Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese Silicon Steel," 1982 edition.
(xxiv) ASTM A 242-81 is titled "Standard Specification for High-Strength Low-Alloy Structural Steel," 1981 edition.
(xxv) ASTM A 441-81 is titled "Standard Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel," 1981 edition.
(xxvi) ASTM A 514-81 is titled "Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding," 1981 edition.
(xxvii) ASTM A 572-82 is titled "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality," 1982 edition.
(xxviii) ASTM A 588-81 is titled "Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 in. Thick," 1981 edition.
(xxix) ASTM A 606-75 (Reapproved 1981) "Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold Rolled, High-Strength, Low-Alloy, with Improved Atmospheric Corrosion Resistance," 1981 edition.
(xxx) ASTM A 607-75 is titled "Standard Specification for Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy Columbium and or Vanadium," 1975 edition.
(xxxi) ASTM A 633-79a is titled "Standard Specification for Normalized High-Strength Low-Alloy Structural Steel," 1979 edition.
(xxxii) ASTM A 715-81 is titled "Standard Specification for Steel Sheet and Strip, Hot-Rolled, High-Strength, Low-Alloy, with Improved Formability," 1981 edition.
(xxxiii) ASTM B 580-79 is titled "Standard Specification for Anodic Oxide Coatings on Aluminum," 1979 edition.
(xxxiv) ASTM D4359-84 is titled, "Standard Test Method for Determining Whether a Material is a Liquid or a Solid", 1984 edition.

(6) NFPA Pamphlet No. 58 is titled, "Standard for the Storage and Handling of Liquefied Petroleum Gases," 1979 edition.

(7) Bureau of Explosives, Association of American Railroads:
(i) Bureau of Explosives Pamphlet No. 6 is titled, "Illustrating Methods for Loading and Bracing Carload and Less Than Carload Shipments of Explosives and Other Dangerous Articles," 1962 edition.
(ii) Bureau of Explosives Pamphlet No. 6A (includes appendix No. 1, October 1944, and appendix No. 2, December 1945) is titled, "Illustrating Methods for Loading and Bracing Carload and Less Than Carload Shipments of Loaded Projectiles, Loaded Bombs, etc.," 1943 edition.
(iii) Bureau of Explosives Pamphlet No. 6C is titled, "Illustrating Methods for Loading and Bracing Trailers and Less-Than Trailer Shipments of Explosives and Other Dangerous Articles via Trailer-on-Flat-Car (TOFC) or Container-on-Flat-Car (COFC)," September 1968.
(iv) Bureau of Explosives Pamphlets 1 and 2 titled "Emergency Handling of Hazardous Materials in Surface Transportation", April 1981.

For explanation of abbreviations and reference marks, see last page of this tariff.

(8) NACE Standard TM 01-69 is titled, "Test Method Laboratory Corrosion Testing of Metals for the Process Industries," 1969 edition.
(9) IME Safety Library Publication No. 22 (IME Standard 22) is titled, "Recommendations for the Safe Transportation of Detonators in a Vehicle With Certain Other Explosive Materials." Revised January 1, 1985.
(10) IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)."
(11) United States Nuclear Regulatory Commission (USNRC) 10 CFR Part 71, "Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions."
(12) Federal Standard 1128 is titled "Screw-Thread Standards for Federal Services," March 31, 1978, edition.
(13) National Wooden Box Association's Specification 1-1B is titled "Specifications for Nailed Wooden and Lock Corner Boxes for Industrial Use" May 1958. Amended in part October 1961.
(14) American Water Works Association (AWWA) Standard C207-55 is titled, "AWWA Standard for Steel Pipe Flanges," 1955 edition.
(15) American Welding Society (AWS):
(i) AWS Code B-3.0 is titled, "Standard Qualification Procedure," 1972 edition.
(ii) AWS Code D-1.0 is titled, "Code for Welding in Building Construction," 1966 edition.
(16) USDC, CAPE-1662, one of the series of "Civilian Applications Program Engineering Drawings" which is a package of information including drawings and bills of material, describing phenolic-foam insulated, protective overpacks
(i) USDC, USDOE Material and Equipment Specification No. SP-9, Rev. 1, and Supplement, is titled, "Fire Resistant Phenolic Foam."
(ii) USDC, ORO-651 is titled, "Uranium Hexafluoride Handling Procedures and Container Criteria," Revision 3, 1972 edition.
(17) "International Maritime Dangerous Goods Code (IMDG Code)," Volumes I, II, III, and IV, 1977 Edition, and Amendments 14-76, 15-77, 16-78, 17-79, 18-79, 19-80, and 20-82 thereto.
(18) "Uniform Freight Classification 11."
(19) Federal Specification RR-C-901b is titled "Cylinders, Compressed Gas: With Valve or Plug and Cap; ICC 3AA, August 1, 1967."
(20) NIOSH Registry is titled, "Registry of Toxic Effects of Chemical Substances," 1978 edition, available from the Superintendent of Documents.
(21) United Nations Recommendations (UN Recommendations) is titled, "Recommendations on the Transport of Dangerous Goods" (Fourth revised edition 1986).
(22) SADT is titled, "Self Accelerating Decomposition Temperature Test," published by the OPPSD.
(23) USDOT, "Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials."
(24) "ISO 82-1974(e) Steel-Tensile Testing." First Edition 1974-08-01.
(25) Aluminum Associations' Handbook is titled "Aluminum Standards and Data," Sixth Edition, 1979.
(26) National Motor Freight Classification, NMF 100-I, 1982.
(27) International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air, DOC 9284-AN 905 (ICAO Technical Instructions), 1987-88 edition.
(28) "Transportation of Dangerous Goods Regulations" of Transport Canada (TDG Regulations), amended as of July 1, 1985. (Incorporating Registration Numbers SOR 85-77, SOR 85-585 and SOR 85-609).
(e) Matters referenced by footnote are included as part of the regulations of this subchapter.
(f) The material listed in this section has been approved for incorporation by reference by the Director of the Federal Register. These materials are incorporated as they exist on the date of the approval and a notice of any change in these materials will be published in the *Federal Register*. The material incorporated by reference is available for inspection at the Office of the Federal Register Information Center, Room 8301, 1100 L Street, NW, Washington, D.C. 20408.

§ 171.8 Definitions and abbreviations. In this subchapter,
"Approved" means approval issued or recognized by the Department unless otherwise specifically indicated in this subchapter.
"Atmospheric gases" means gases that are commercially derived through an air separation process. For purposes of this subchapter, "atmospheric gases" means argon, krypton, neon, nitrogen, oxygen and xenon.
"Away from" See § 176.83.
"Barge" means a non-self-propelled vessel.
"Bottle" means a container having a neck of relatively smaller cross section than the body and an opening capable of holding a closure for retention of the contents.
"Break-bulk" means packages of hazardous materials that are handled individually, palletized, or unitized for purposes of transportation as opposed to bulk and containerized freight.
"Btu" means British thermal unit.
"Bulk packaging" means a packaging, other than a vessel or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment and which has: (1) An internal volume greater than 450 liters (118.9 gallons) as a receptacle for a liquid; (2) a capacity greater than 400 kilograms (881.8 pounds) as a receptacle for a solid; or (3) a water capacity greater than 1000 pounds (453.6 kilograms) as a receptacle for a gas as defined in § 173.300.
"Bureau of Explosives" means the Bureau of Explosives (BOE) of the Association of American Railroads.
"C" means Celsius or Centigrade.
"Captain of the Port" means the Officer of the Coast Guard, under the command of a District Commander, so designated by the Commandant for the purpose of giving immediate direction to Coast Guard law enforcement activities within his assigned area or, with respect to remaining areas in his District not assigned to officers designated by the Commandant, the District Commander.
"Carfloat" means a vessel that operates on a short run on an irregular basis and serves one or more points in a port area as an extension of a rail line or highway over water, and does not operate in ocean, coastwise, or ferry service.
"Cargo aircraft only" means an aircraft that is used to transport cargo and is not engaged in carrying passengers.
"Cargo tank" means any tank permanently attached to or forming a part of any motor vehicle or any bulk liquid or compressed gas packaging not permanently attached to any motor vehicle which by reason of its size, construction, or attachment to a motor vehicle, is loaded or unloaded without being removed from the motor vehicle. Any packaging fabricated under specifications for cylinders is not a cargo tank.
"Cargo vessel" means: (1) Any vessel other than a passenger vessel, and
(2) Any ferry being operated under authority of a charge of character certificate issued by a Coast Guard Officer-in-Charge, Marine Inspection.
"Carrier" means a person engaged in the transportation of passengers or property by: (1) Land or water, as a common, contract, or private carrier, or
(2) Civil aircraft.
"CC" means closed-cup.
"Character of vessel" means the type of service in which the vessel is engaged at the time of carriage of a hazardous material
"Class A explosives" See § 173.53.
"Class B explosives" See § 173.88.
"Class C explosives" See § 173.100.
"COFC" means container-on-flat-car.
"Combustible liquid" See § 173.115.
"Competent authority" means a national agency responsible under its national law for the control or regulation of a particular aspect of the transportation of hazardous materials (dangerous goods). The term "Appropriate authority", as used in the ICAO Technical Instructions, has the same meaning as "Competent Authority". The Director, Office of Hazardous Materials Transportation, Research and Special Programs Administration, is the United States Competent Authority for purposes of this subchapter and 46 CFR Parts 64 and 146.
"Compressed gas" See § 173.300.
"Consumer commodity" means a material that is packaged and distributed in a form intended or suitable for sale through retail sales agencies or instrumentalities for consumption by individuals for purposes of personal care or household use. This term also includes drugs and medicines.
"Containership" means a cargo vessel designed and constructed to transport, within specifically designed cells, portable tanks and freight containers which are lifted on and off with their contents intact.
"Corrosive material" See § 173.240.
"Crewmember" means a person assigned to perform duty in an aircraft during flight time.
Cryogenic liquid. See § 173.300(f).
"Cylinder" means a pressure vessel designed for pressures higher than 40 psia and having a circular cross section. It does not include a portable tank, multi-unit tank car tank, cargo tank, or tank car.
"DOD" means the U.S. Department of Defense.
"Designated facility" means a hazardous waste treatment, storage, or disposal facility that has been designated on the manifest by the generator.
"District Commander" means the District Commander of the Coast Guard, or his authorized representative, who has jurisdiction in the particular geographical area.
"Engine" means a locomotive propelled by any form of energy and used by a railroad.
"EPA" means U.S. Environmental Protection Agency
"Etiologic agent" See § 173.386.
"F" means degree Fahrenheit.
"Ferry vessel" means a vessel which is limited in its use to the carriage of deck passengers or vehicles or both, operates on a short run on a frequent schedule between two points over the most direct water route, other than in ocean or coastwise service, and is offered as a public service of a type normally attributed to a bridge or tunnel.
"Filling density" has the following meanings:
(1) For compressed gases in cylinders, see § 173.304(a)(2) Table Note 1.
(2) For compressed gases in tank cars; see § 173.314(c) Table Note 1.
(3) For compressed gases in cargo tanks and portable tanks, see § 173.315(a) Table Note 1.
(4) For cryogenic liquids in cylinders, except hydrogen, see § 173.316(c)(1).
(5) For hydrogen, cryogenic liquid in cylinders, see § 173.316(c)(3) Table Note 1.
(6) For cryogenic liquids in cargo tanks, see § 173.318(f)(1).
(7) For cryogenic liquids in tank cars see § 173.319(d)(1).
"Flammable gas" See § 173.300(b).

"Flammable liquid" See §173.115(a)(1).

"Flammable solid" See §173.150.

"Flash point" means the minimum temperature at which a substance gives off flammable vapors which in contact with spark or flame will ignite. For liquids, see §173.115 and for solids, see §173.150.

"Freight container" means a reusable container having a volume of 64 cubic feet or more, designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages (in unit form) during transportation.

"Fuel tank" means a tank other than a cargo tank, used to transport flammable or combustible liquid, or compressed gas for the purpose of supplying fuel for propulsion of the transport vehicle to which it is attached, or for the operation of other equipment on the transport vehicle.

"Gross weight" means the weight of a packaging plus the weight of its contents.

"Hazardous material" means a substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

"Hazardous substance" for the purposes of this subchapter, means a material, including its mixtures and solutions, that—

(1) Is listed in the Appendix to §172.101 of this subchapter;

(2) Is in a quantity, in one package, which equals or exceeds the reportable quantity (RQ) listed in the Appendix to §172.101 of this subchapter; and

(3) When in a mixture or solution, is in a concentration by weight which equals or exceeds the concentration corresponding to the RQ of the material, as shown in the following table:

RQ pounds (kilograms)	Concentration by weight	
	Percent	PPM
5000 (2270)	10	100 000
1000 (454)	2	20 000
100 (45.4)	0.2	2 000
10 (4.54)	0.02	200
1 (0.454)	0.002	20

This definition does not apply to petroleum products that are lubricants or fuels (see 40 CFR 300.6).

"Hazardous waste", for the purposes of this chapter, means any material that is subject to the Hazardous Waste Manifest Requirements of the U.S. Environmental Protection Agency specified in 40 CFR Part 262.

"Hermetically sealed" means closed by fusion, gasketing, crimping, or equivalent means so that no gas or vapor can enter or escape.

"IAEA" means International Atomic Energy Agency.

"IATA" means International Air Transport Association.

"IMO" means International Maritime Organization.

"ICAO" means International Civil Aviation Organization.

"IM Tank Table" means the table (with preface) listing hazardous materials approved by the Director, OHMT for carriage in IM portable tanks under special conditions specified therein.

"Intermodal container" means a freight container designed and constructed to permit it to be used interchangeably in two or more modes of transport.

"Intermodal portable tank" or "IM portable tank" means a specific class of portable tanks designed primarily for international intermodal use.

"Irritating material" See §173.381.

"Limited quantity," when specified as such in a section applicable to a particular material with the exception of Poison B materials, means the maximum amount of a hazardous material for which there is a specific labeling and packaging exception.

"Liquid" means a material that has a vertical flow of over 2 inches (50 mm) within a three minute period, or a material having one gram (lg) or more liquid separation, when determined in accordance with the procedures specified in ASTM D 4359-84, "Standard Test Method for Determining whether a Material is a Liquid or Solid", 1984 edition.

"Magnetic materials" See §173.21(f).

"Magazine vessel" means a vessel used for the receiving, storing, or dispensing of explosives.

"Marking" means applying the descriptive name, instructions, cautions, weight, or specification marks or combination thereof required by this subchapter to be placed upon outside containers of hazardous materials.

"Mixture" means a material composed of more than one chemical compound or element.

"Mode" means any of the following transportation methods: rail, highway, air, or water.

"Motor vehicle" includes a vehicle, machine, tractor, trailer, or semitrailer, or any combination thereof, propelled or drawn by mechanical power and used upon the highways in the transportation of passengers or property. It does not include a vehicle, locomotive, or car operated exclusively on a rail or rails, or a trolley bus operated by electric power derived from a fixed overhead wire, furnishing local passenger transportation similar to street-railway service.

"Name of contents" means the proper shipping name as specified in §172.101 or §172.102 (when authorized).

"Navigable waters" means, for the purposes of this subchapter, waters of the United States, including the territorial seas.

"Net weight" means a measure of weight referring only to the contents of a package, and does not include the weight of any packaging material.

"N.O.S." means not otherwise specified.

"Non-bulk packaging" means a packaging which has (1) an internal volume of 450 liters (118.9 gallons) or less as a receptacle for a liquid, (2) a capacity of 400 kilograms (881.8 pounds) or less as a receptacle for a solid, or (3) a water capacity of 1000 pounds (454.0 kilograms) or less as a receptacle for a gas as defined in §173.300.

"NPT" means an American Standard taper pipe thread in compliance with the requirements of Federal Standard H28, Part II, Section VII. See §171.7(d)(12).

"NRC (non-reusable container)" means a container whose reuse is restricted in accordance with the provisions of §173.28.

"Occupied caboose" means a rail car being used to transport non-passenger personnel.

"Officer in Charge, Marine Inspection" means a person from the civilian or military branch of the Coast Guard designated as such by the Commandant and who under the supervision and direction of the Coast Guard District Commander is in charge of a designated inspection zone for the performance of duties with respect to the enforcement and administration of Title 52, Revised Statutes, acts amendatory thereof or supplemental thereto, rules and regulations thereunder, and the inspection required thereby.

"Operator" means a person who controls the use of an aircraft, vessel, or vehicle.

"Organic peroxide" See §173.151.

"ORM" means Other Regulated Materials.

"Outage" or "ullage" means the amount by which a packaging falls short of being liquid full, usually expressed in percent by volume.

"Outside container" means the outermost enclosure used in transporting a hazardous material other than a freight container.

"Overpack" except when referenced to a packaging specified in Part 178 of this subchapter, means an enclosure that is used by a single consignor to provide protection or convenience in handling of a package or to consolidate two or more packages. "Overpack" does not include a freight container.

"Oxidizer" or "Oxidizing material" See §173.151.

"Package" or "Outside Package" means a packaging plus its contents. For radioactive materials, see §173.403 of this subchapter.

"Packaging" means the assembly of one or more containers and any other components necessary to assure compliance with the minimum packaging requirements of this subchapter and includes containers (other than freight containers or overpacks), portable tanks, cargo tanks, tank cars, and multi-unit tank car tanks. For radioactive materials, see §173.403 of this subchapter.

"Passenger" (With respect to vessels and for the purposes of Part 176 only) means a person being carried on a vessel other than:

(1) The owner or his representative,

(2) The operator;

(3) A bona fide member of the crew engaged in the business of the vessel who has contributed no consideration for his carriage and who is paid for his services; or

(4) A guest who has not contributed any consideration directly or indirectly for his carriage.

"Passenger-carrying aircraft" means an aircraft that carries any person other than a crewmember, company employee, an authorized representative of the United States, or a person accompanying the shipment.

"Passenger vessel" means—(1) A vessel subject to any of the requirements of the International Convention for the Safety of Life at Sea, 1960, which carries more than 12 passengers;

(2) A cargo vessel documented under the laws of the United States and not subject to the Convention, which carries more than 16 passengers;

(3) A cargo vessel of any foreign nation that extends reciprocal privileges and is not subject to the Convention and which carries more than 16 passengers; and

(4) A vessel engaged in a ferry operation and which carries passengers.

"Person" means an individual, firm, co-partnership, corporation, company, association, or joint-stock association, and includes any trustee, receiver, assignee, or personal representative thereof.

"Placarded car" means a rail car which is placarded in accordance with the requirements of Part 172 of this subchapter except those cars displaying only the FUMIGATION placards as required by §172.510.

"Poison A" See §173.326.

"Poison B" See §173.343.

"Portable tank" means a bulk packaging (except a cylinder having a water capacity of 1000-pound or less) designed primarily to be loaded onto, or on, or temporarily attached to a transport vehicle or ship and equipped with skids, mountings, or accessories to facilitate handling of the tank by mechanical means. It does not include a cargo tank, tank car, multi-unit tank car tank, or trailer carrying 3AX, 3AAX, or 3T cylinders.

"Preferred route" or "Preferred highway" is a highway for shipment of "highway route controlled quantities" of radioactive materials so designated by a State routing agency, and any Interstate System highway for which an alternate highway has not been designated by such State agency as provided by §177.825(b) of this subchapter.

"Private track" or "Private siding" means track located outside of a carrier's right-of-way, yard, or terminals where the carrier does not own

the rails, ties, roadbed, or right-of-way and includes track or portion of track which is devoted to the purpose of its user either by lease or written agreement, in which case the lease or written agreement is considered equivalent to ownership.

"Proper shipping name" means the name of the hazardous material shown in Roman print (not italics) in §172.101 of this subchapter.

"Ps I." or "psi" means pounds per square inch.

"Ps I a. or psia" means pounds per square inch absolute.

"Ps I g. or psig" means pounds per square inch gauge.

"Public vessel" means a vessel owned by and being used in the public service of the United States. It does not include a vessel owned by the United States and engaged in a trade or commercial service or a vessel under contract or charter to the United States.

"Pyrophoric liquid" See §173.115.

"Pyrophoric solid" See §173.150.

"Radioactive material's" See §173.403 of this subchapter for definitions relating to radioactive material's.

"Railroad" means a person engaged in transportation by rail.

"Rail freight car" means a car designed to carry freight or non-passenger personnel by rail, and includes a box car, flat car, gondola car, hopper car, tank car, and occupied caboose.

"Reportable quantity (RQ)" for the purposes of this subchapter means the quantity specified in Column 3 of the Appendix to §172.101 for any material identified in Column 1 of the Appendix.

"Research" means investigation of experimentation aimed at the discovery of new theories or laws and the discovery and interpretation of facts or revision of accepted theories or laws in the light of new facts.

"Residue" means the hazardous material remaining in a packaging, including a tank car, after its contents have been unloaded to the maximum extent practicable and before the packaging is either refilled or cleaned of hazardous material and purged to remove any hazardous vapors.

"RSPA" means the Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590.

"SCF" (standard cubic foot) means one cubic foot of gas measured at 60° F. and 14.7 psia.

"Separated by a complete hold or compartment from" See §176.83.

"Separated from" See §176.83.

"Separated longitudinally by a complete hold or compartment from" See §176.83.

"Sheathing" means a covering consisting of a smooth layer of wood placed over metal and secured to prevent any movement.

"Shipping paper" means a shipping order, bill of lading, manifest or other shipping document serving a similar purpose and containing the information required by §§172.202, 172.203 and 172.204.

"STC (single-trip container)" means a container that may not be refilled and reshipped after having been previously emptied, except as provided in §173.28.

"Solid" means a material which has a vertical flow of two inches (50 mm) or less within a three minute period, or a separation of one gram (lg) or less of liquid when determined in accordance with the procedures specified in ASTM D 4359-84 "Standard Test Method for Determining Whether a Material is a Liquid or Solid", 1984 edition.

"Solution" means any homogeneous liquid mixture of two or more chemical compounds or elements that will not undergo any segregation under conditions normal to transportation.

"Spontaneously combustible material (solid)" means a solid substance (including sludges and pastes) which may undergo spontaneous heating or self-ignition under conditions normally incident to transportation or which may upon contact with the atmosphere undergo an increase in temperature and ignite.

"State-designated route" means a preferred route selected in accordance with U.S. DOT "Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials" or an equivalent routing analysis which adequately considers overall risk to the public. Designation must have been preceded by substantive consultation with affected local jurisdictions and with any other affected States to ensure consideration of all impacts and continuity of designated routes.

"State routing agency" means an entity (including a common agency of more than one State such as one established by interstate compact) which is authorized to use State legal process pursuant to §177.825 of this subchapter to impose routing requirements, enforceable by State agencies, on carriers of radioactive material's without regard to intra-state jurisdictional boundaries. This term also includes Indian tribal authorities which have police powers to regulate and enforce highway routing requirements within their lands.

"Stowage" means the act of placing hazardous material's on board a vessel.

"Strong outside container" means the outermost enclosure which provides protection against the unintentional release of its contents under conditions normally incident to transportation.

"Technical name" means a recognized chemical name currently used in scientific and technical handbooks, journals, and texts. Generic descriptions authorized for use as technical names are, Organic phosphate compound, Organic phosphorus compound, Organic phosphate compound mixture, Organic phosphorus compound mixture, Methyl parathion, and Parathion.

"TOFC" means trailer-on-flat-car.

"Trailership" means a vessel other than a carfloat, specifically equipped to handle highway vehicles, and fitted with installed securing devices to tie down each vehicle.

"Train" means one or more engines coupled with one or more rail cars, except during switching operations or where the operation is that of classifying and assembling rail cars within a railroad yard for the purpose of making or breaking up trains.

"Trainship" means a vessel other than a rail car ferry or carfloat, specifically equipped to transport railroad vehicles, and fitted with installed securing devices to tie down each vehicle.

"Transport vehicle" means a cargo-carrying vehicle such as an automobile, van, tractor, truck, semitrailer, tank car or rail car used for the transportation of cargo by any mode. Each cargo-carrying body (trailer, rail car, etc.) is a separate transport vehicle.

"UFC" means Uniform Freight Classification.

"Unit load device" means any type of freight container, aircraft container, aircraft pallet with a net, or aircraft pallet with a net over an igloo.

"United States" means the fifty States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, or Guam.

"Vessel" includes every description of watercraft, used or capable of being used as a means of transportation on the water.

"Viscous liquid" means a liquid material which has a measured viscosity in excess of 2500 centistokes at 25° C (77° F) when determined in accordance with the procedures specified in ASTM Method D 445–72 "Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)" or ASTM Method D 1200-70 "Viscosity of Paints, Varnishes, and Lacquers by Ford Viscosity Cup".

"Volatility" refers to the relative rate of evaporation of material's to assume the vapor state.

"Water reactive material (solid)" means any solid substance (including sludges and pastes) which, by interaction with water, is likely to become spontaneously flammable or to give off flammable or toxic gases in dangerous quantities.

"Water resistant" means having a degree of resistance to permeability by and damage caused by water in liquid form.

"W.T." means watertight.

§ 171.9 Rules of construction. (a) In this subchapter, unless the context requires otherwise:

(1) Words imparting the singular include the plural,

(2) Words imparting the plural include the singular; and

(3) Words imparting the masculine gender include the feminine;

(b) In this subchapter, the word:

(1) "Shall" is used in an imperative sense;

(2) "Must" is used in an imperative sense;

(3) "Should" is used in a recommendatory sense;

(4) "May" is used in a permissive sense to state authority or permission to do the act described, and the words "no person may * * *" or "a person may not * * *" means that no person is required, authorized, or permitted to the act described; and

(5) "Includes" is used as a word of inclusion not limitation.

§ 171.10 Flammable or combustible liquids in bulk on board vessels. (a) Nothing in Parts 170–189 of this subchapter shall be construed as affecting the transportation of flammable or combustible liquids in bulk on board vessels which transportation is governed by the rules and regulations promulgated under R.S. 4417a; 46 U.S.C. 391a (46 CFR Part 146).

§ 171.11 Use of ICAO Technical Instructions. Notwithstanding the requirements of Parts 172 and 173 of this subchapter, a hazardous material may be transported by aircraft, and by motor vehicle either before or after being transported by aircraft, in accordance with the ICAO Technical Instructions if the hazardous material—

(a) Is packaged, marked, labeled, classified, described and certified on a shipping paper and otherwise in a condition for shipment as required by the ICAO Technical Instructions;

(b) Is within the quantity limits prescribed for transportation by either passenger-carrying or cargo aircraft, as appropriate, as specified in the ICAO Technical Instructions;

(c) Is not a forbidden material or package according to §173.21 or Column (3) of the Table to §172.101 of this subchapter; and,

(d) Fulfills the following additional requirements as applicable:

(1) When a hazardous material, which is subject to the requirements of the ICAO Technical Instructions, is also a hazardous substance as defined in this subchapter—

(i) One of the following additional descriptions shall be entered, in parentheses, in association with the basic description on shipping papers and in association with the proper shipping name required to be marked on packages:

(A) The name of the hazardous substance as shown in the appendix to §172.101 of this subchapter, unless the proper shipping name required by the ICAO Technical Instructions already includes the name of the hazardous substance; or

(B) For waste streams, the waste stream number; or

(C) For wastes which exhibit an EPA characteristic of ignitability, corrosivity, reactivity, or EP toxicity, the letters "EPA" followed by the word "ignitability", or "corrosivity", or "reactivity", or "EP toxicity", as appropriate or the corresponding "D" number, as appropriate.

(ii) The letters "RQ" shall be entered on the shipping paper either before or after the basic description required by the ICAO Tech-

nical Instructions and in association with the proper shipping name required to be marked on the package.

(2) When a hazardous material, which is subject to the requirements of the ICAO Technical Instructions, is also a hazardous waste as defined in this subchapter:

(i) The word "Waste" must precede the proper shipping name on shipping papers and package markings; and

(ii) It must comply with §172.205 with respect to the hazardous waste manifests.

(3) When a hazardous material is not subject to the requirements of the ICAO Technical Instructions, it must be transported as required by this subchapter.

(4) When a hazardous material, that is regulated by this subchapter for transportation by highway, is transported by motor vehicle on a public highway under the provisions of this section, the motor vehicle must be placarded in accordance with Subpart F of Part 172 of this subchapter and the shipping paper must include:

(i) With the exception of hazardous materials in ICAO Class 6.1, Packaging Group III, and in ICAO Class 9, the name of the DOT hazard class most closely corresponding to the ICAO class in association with the basic description required by the ICAO Technical Instructions unless the shipping name contains the key word or words of the hazard class of the material;

(ii) The letters "OFUM-E" in association with the basic description for a material in ICAO Class 6.1, Packing Group III or in ICAO Class 9, that is also a hazardous substance;

(iii) The words "Dangerous When Wet" in association with the basic description when the Class 4, Division 4.3 label is required to be applied by the ICAO Technical Instructions; and

(iv) Should include an indication that the shipment is being made under the provisions of this section or the letters "ICAO."

(5) If a liquid or solid material in a package meets the definition of a poison according to this subchapter, and the fact that it is a poison is not disclosed in the shipping name or by a class entry, an indication that the material is a poison shall be entered on the shipping paper in association with the basic description. For transportation by motor vehicle, this indication must be made by entering the word "Poison" on the shipping paper in association with the basic description.

(6) For radioactive materials:

(i) Shipping papers for highway route controlled quantity radioactive materials shipments must meet the requirements of §172.203(d)(1)(iii) of this subchapter.

(ii) Competent authority certification and any necessary revalidation for Type B, Type B(U), Type B(M), and fissile material's packages must be obtained from the appropriate authorities as specified in §§173.471, 173.472 and 173.473 of this subchapter, and all requirements of the certificates and revalidations must be met.

(iii) The provisions of §§172.204(c)(4), 173.448(e)(f) and (g)(3) of this subchapter apply.

(iv) Limited quantities of radioactive materials must meet the provisions of §173.421, §173.422 or §173.424, of this subchapter, as appropriate, and

(v) Type A package contents shall be limited in accordance with §173.431 of this subchapter.

(7) If a United States variation is indicated in the ICAO Technical Instructions for any provision governing the transport of the hazardous material, the hazardous material is transported in conformance with that variation.

(8) Abbreviations may not be used in shipping paper entries or package markings unless they are specifically authorized by this subchapter. ICAO class or division numbers are not considered to be abbreviations.

(9) When a hazardous material, which is subject to the requirements of the ICAO Technical Instructions, falls within the inhalation hazard criteria described in §173.3a(b)(2):

(i) The shipping description must include the words "Poison-Inhalation Hazard", except that only the word "Poison" is required when the material is shipped in a combination packaging with inner packagings containing one liter or less;

(ii) The material must be packaged in accordance with the requirements of §173.3a; and,

(iii) The package must be marked and labelled in accordance with the requirements of §§172.301(a) and 172.402(a)(10).

§ 171.12 Import and export shipments. (a) Except in the case of a shipment from Canada conforming to §171.12a, each person importing a hazardous material into the United States shall provide the shipper and the forwarding agent at the place of entry into the United States timely and complete information as to the requirements of this subchapter that will apply to the shipment of the material within the United States. The shipper, directly or through the forwarding agent at the place of entry, shall provide the initial carrier in the United States the certificate of compliance required by §172.204 of this subchapter. The carrier may not accept the material for transportation unless the required certification is provided.

(b) Except for Class A and Class B explosives and radioactive materials, a hazardous material which is classed and labeled in accordance with the conditions and limitations specified in §172.102 of this subchapter when being imported into or exported from the United States, or passing through the United States in the course of being shipped between places outside the United States, may be offered and accepted for transportation and transported within the United States if it is otherwise offered, accepted, and transported in accordance with this subchapter. In addition, an appropriate shipping name specified for a material in §172.102 may be substituted for its proper shipping name in §172.101 (subject to the conditions and limitations of this paragraph and §172.102) if all or a portion of the transportation of the material is by vessel.

(c) The requirements of §171.2 with respect to specification identification markings on packages notwithstanding, a package of hazardous materials (other than a compressed gas cylinder or a package of more than 110 gallons capacity) being imported into or exported from the United States or passing through the United States in the course of being shipped between places outside the United States may be offered and accepted for transportation and transported within the United States if the package specification identification markings required by Part 178 are clearly and legibly displayed on the surface of the package or on decals or tags securely affixed to the package, and the package is otherwise offered, accepted, and transported in accordance with this subchapter.

(d) Section 171.2 notwithstanding, a hazardous material (other than Class A or B explosives or radioactive materials) being imported into or exported from the United States or passing through the United States in the course of being shipped between places outside the United States may be offered and accepted for transportation and transported by motor vehicle within a single port area (including contiguous harbors) when packaged, marked, classed and labeled in accordance with the IMDG Code, if the hazardous material is offered and accepted in accordance with the requirements of Subparts C and F of Part 172 of this subchapter pertaining to shipping papers and placarding. (See §176.11 of this subchapter for exceptions applicable to vessels.)

(e) Radioactive materials being imported into or exported from the United States, or passing through the United States in the course of being shipped between places outside the United States, may be offered and accepted for transportation when packaged, marked, labeled and otherwise prepared for shipment in accordance with IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)", if:

(1) Highway route controlled quantities (see §173.403 of this subchapter) are shipped in accordance with §§172.203(d)(1)(iii), 172.507, 173.22(c), and 177.825 of this subchapter;

(2) For fissile materials and Type B packages, the competent authority certification and any necessary revalidation is obtained from the appropriate competent authorities as specified in §§173.471, 173.472 and 173.473 of this subchapter; and all requirements of the certificates and revalidations are met;

(3) Type A package contents shall be limited in accordance with §173.431 of this subchapter; and

(4) The country of origin for the shipment has adopted the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)"; and

(5) The requirements of §173.448(e), (f), and (g)(3) of this subchapter are fulfilled, when applicable.

(f) The provisions of paragraphs (b) and (d) of this section also apply to transportation, a portion of which includes transportation by vessel, between points in a State or between States.

§ 171.12a Canadian shipments and packagings.

(a) Notwithstanding the requirements of Part 172 and 173 of this subchapter, and except as provided in paragraph (b) of this section, a hazardous material that is classed, packaged, marked, labeled, placarded and described on a shipping paper in accordance with the Regulations Respecting the Handling, Offering for Transport and Transporting of Dangerous Goods (the Transportation of Dangerous Goods Regulations of TDG Regulations), issued by the Government of Canada, may be transported by rail or highway from the point of entry in the United States to its destination in the United States, or through the United States en route to a point in Canada, provided that it fulfills the following additional requirements as applicable:

(1) When a hazardous material is not subject to the requirements of the TDG Regulations, it must be transported as required by this subchapter.

(2) When a hazardous material, that is subject to this subchapter for transportation by rail or highway is transported under the provisions of this section, the shipping paper must include the following:

(i) The words "Dangerous When Wet" in association with the basic description when the Class 4, Division 4.3 label is required to be applied by the TDG Regulations.

(ii) The words "Poison" in association with the basic description if a liquid or solid material in a packaging meets the definition of a poison according to this subchapter, and the fact that it is a poison is not disclosed in the shipping name or by a class entry.

(3) When a hazardous material which is subject to the requirements of the TDG Regulations is also a hazardous substance as defined in this subchapter, the additional description requirements for hazardous substances in §§172.203(c) and 172.324 are applicable.

(4) When a hazardous material, which is subject to the requirements of the TDG Regulations, is also a hazardous waste as defined in this subchapter:

(i) The word "Waste" must precede the proper shipping name on shipping papers and package markings; and

(a) It must be accompanied by a hazardous waste manifest executed as required by §172.205 of this subchapter.

(5) Required shipping paper entries and package markings must be in English. Abbreviations may not be used in shipping paper entries or package markings unless they are specifically authorized by this subchapter. TDG Regulations class or division numbers are not considered to be abbreviations. Hazardous material's identification numbers must be preceded by "UN" or "NA". The use of an identification number preceded by "PIN" is not authorized.

(6) Shipments of radioactive materials must conform to the requirements of §171.12(e).

(b) This section does not apply to:

(1) A material which is a forbidden material according to §173.21 of this subchapter, or as indicated in Column (3) of the Table §172.101 of this subchapter;

(2) A material or article meeting the definition of a Class A, B or C explosive according to this subchapter, except that, notwithstanding the requirements of Part 172 of this subchapter—

(i) For transportation between the United States and Canada, a package may be labeled and a freight container, motor vehicle or rail car placarded, with the label or placard required by the TDG Regulations provided that label or placard also indicates the appropriate DOT hazard class in accordance with Schedule V of the TDG Regulations;

(ii) Explosives may be transported from the point of entry in the United States to their destination in the United States, or through the United States en route to a point in Canada, when described on a shipping paper in accordance with the TDG Regulations provided the shipping paper also includes the letters "DOT," followed by the proper shipping name and hazard class prescribed for explosives in this subchapter.

(c) Notwithstanding the requirements of Part 172 of this subchapter, a hazardous material included in Division 3 or 4 of Class 2 of the TDG Regulations may be transported from its point of origin in the United States to Canada, or through the United States en route to a point in Canada, if—

(1) The package is marked with the proper shipping name and identification number, and the freight container is marked, when appropriate, with the identification number, as required by the TDG Regulations;

(2) The package is labeled, and the freight container, motor vehicle or rail car is placarded, as required by the TDG Regulations; and

(3) The shipping paper contains an indication that these markings, labels and placards have been applied in conformance with this paragraph for the purpose of transport to Canada.

(d) Except as specified in 173.301(i) of this subchapter, specification packagings made and maintained in full compliance with the corresponding specifications prescribed by the Railway Transport Committee of the Canadian Transport Commission (formerly the Board of Transport Commissioner for Canada), in its Regulations for the Transportation of Dangerous Commodities by Rail, and marked in accordance therewith (e.g., BTC, CTC, etc.) may be used for the shipment of hazardous material's within the United States.

(e) For transportation by rail, hazardous material's transported in accordance with paragraph (a) of this section may, in addition, be packaged and otherwise transported in conformance with the regulations of the Canadian Transport Commission from the point of entry in the United States to their destination in the United States, or through the United States en route to a point in Canada. Subject to the conditions and limitations of paragraphs (a) and (b) of this section, empty rail tank cars may be transported in conformity with Canadian Transport Commission regulations from point of origin in the United States to point of entry into Canada.

(f) Except as provided in paragraphs (a) and (d) of this section, hazardous material's transported by highway in accordance with this section must be packaged and otherwise transported as required by this subchapter. Subject to the conditions and limitations of paragraphs (a) and (b) of this section, empty cargo tanks may be returned to Canada in conformance with TDG Regulations provided they are otherwise transported as required by this subchapter.

§ 171.13 Emergency regulations. (a) Until further order of the Department, shipments of explosives may be made upon requests of the Departments of the Army, Navy, and Air Force of the United States Government complying with the following:

(1) Shippers' and carriers' regulations; handling detonating agents and explosives and explosive ammunition in same car or vehicle. Detonating fuzes, class A explosives, primer-detonator assemblies or other detonating elements containing explosive components, if of a safe type, may be shipped either assembled in bombs, depth charges, mines, projectiles, or torpedoes (torpedo warheads) or in properly packed containers in the same car or vehicle with bombs, depth charges, mines, projectiles, boosters, or torpedoes (torpedo warheads) when separated from the explosive bombs, depth charges, mines, projectiles, boosters, or torpedoes (torpedo warheads) by not less than 3 feet. The intervening space of 3 feet must be filled with dry sand or dry earth in bags or in a crib so constructed or lined as to prevent sifting of the sand or earth. The crib must be secured against movement.

(2) When bomb fuzes are packed with bomb fin assemblies, either crated or boxed in wooden or metal containers, the sand or earth filled space between bombs and the fuzes may be omitted provided adequate blocking and bracing is supplied to prevent the bombs from crushing and injuring the detonating fuzes due to ordinary shocks incident to transportation.

§ 171.14 Specification markings. (a) Notwithstanding any other requirements of Parts 170–189 of this subchapter, the letters "ICC" may continue to be placed on any packaging requiring specification markings until January 1, 1970.

(b) Packagings with the specification markings "ICC" placed thereon before January 1, 1970, may be continued in service as marked.

§ 171.15 Immediate notice of certain hazardous materials incidents. (a) At the earliest practicable moment, each carrier who transports hazardous materials (including hazardous wastes) shall give notice in accordance with paragraph (b) of this section after each incident that occurs during the course of transportation (including loading, unloading and temporary storage) in which as a direct result of hazardous materials:

(1) A person is killed,

(2) A person receives injuries requiring his hospitalization;

(3) Estimated carrier or other property damage exceeds $50,000;

(4) Fire, breakage, spillage, or suspected radioactive contamination occurs involving shipment of radioactive material. (See also §§174.45, 175.45, 176.48, and 177.807 of this subchapter); or

(5) Fire, breakage, spillage, or suspected contamination occurs involving shipment of etiologic agents; or

(6) A situation exists of such a nature that, in the judgment of the carrier, it should be reported in accordance with paragraph (b) of this section even though it does not meet the criteria of paragraph (a)(1), (2), or (3) of this section; e.g., a continuing danger of life exists at the scene of the incident.

(b) Each notice required by paragraph (a) of this section shall be given to the Department by telephone (toll-free) on 800-424-8802. Notice involving etiologic agents may be given the Director, Center for Disease Control, U.S. Public Health Service, Atlanta, Ga., Area Code (404) 633-5313, in place of the notice to the Department or (toll call) on 202-267-2675. Each notice must include the following information:

(1) Name of reporter.

(2) Name and address of carrier represented by reporter.

(3) Phone number where reporter can be contacted.

(4) Date, time, and location of incident.

(5) The extent of injuries, if any.

(6) Classification, name, and quantity of hazardous materials involved, if such information is available.

(7) Type of incident and nature of hazardous material involvement and whether a continuing danger to life exists at the scene.

(c) Each carrier making a report under this section shall also make the report required by §171.16.

Note.—Under 40 CFR 302.6 EPA requires persons in charge of facilities (including transport vehicles, vessels, and aircraft) to report any release of a hazardous substance in a quantity equal to or greater than its reportable quantity, as soon as that person has knowledge of the release, to the U.S. Coast Guard National Response Center at (toll free) 800-424-8802 or (toll) 202-267-2675.

§ 171.16 Detailed hazardous materials incident reports. (a) Each carrier who transports hazardous materials shall report in writing in duplicate on DOT Form F 5800.1* to the Department within 15 days of the date of discovery, each incident that occurs during the course of transportation (including loading, unloading, or temporary storage) in which, as a direct result of the hazardous materials, any of the circumstances set forth in §171.15(a) occurs or there has been an unintentional release of hazardous materials from a package (including a tank) or any quantity of hazardous waste has been discharged during transportation. If a report pertains to a hazardous waste discharge—

(1) A copy of the hazardous waste manifest for the waste must be attached to the report, and

(2) An estimate of the quantity of the waste removed from the scene, the name and address of the facility to which it was taken, and the manner of disposition of any unremoved waste, must be entered in Part H of the report (Form F 5800.1).

(b) Each carrier making a report under this section shall send that report to the Information Systems Manager, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

(c) Except as provided in paragraph (d) of this section, the requirements of paragraph (a) of this section do not apply to incidents involving the unintentional release of hazardous materials being transported under the following proper shipping names:

(1) Consumer commodity

(2) Battery, electric storage, wet, filled with acid or alkali

(3) Paint and paint related material when shipped in packagings of five gallons or less.

*Filed as part of the original document.

(d) The exceptions to incident reporting provided in paragraph (c) of this section do not apply to:
(1) Incidents required to be reported under § 171.15(a);
(2) Incidents involving transportation aboard aircraft; nor
(3) Incidents involving the transportation of hazardous waste.

§ 171.17 [Reserved]

§ 171.18 Continuation of effectiveness of existing Bureau of Explosives registrations. A registration filed with the Bureau of Explosives in compliance with a requirement of this subchapter, which is valid at the time that registration function is assumed by RSPA remains valid to the same extent as if it had been filed originally with RSPA.

§ 171.19 Approvals or authorizations issued by the Bureau of Explosives. Unless otherwise specifically restricted by other requirements of this subchapter, any written approval or authorization issued by the Bureau of Explosives that is valid at the time the Bureau of Explosives authority to issue that approval or authorization is withdrawn or assumed by the Director, OHMT and which is available for inspection by representatives of the Department of Transportation, will be considered as having the same validity as if issued by the Director, OHMT, and remains valid under the conditions and for the period established by the Bureau of Explosives.

§ 171.20 Submission of Examination Reports. (a) When it is required in this subchapter that the issuance of an approval by the Director, OHMT be based on an examination by the Bureau of Explosives (or any other test facility recognized by RSPA), it is the responsibility of the applicant to submit the results of the examination to the Director, OHMT.

(b) Applications for approval submitted under paragraph (a) of this section, must be submitted to the Director, Office of Hazardous Materials Transportation, Research and Special Programs Administration, Washington, D.C. 20590.

(c) Any applicant for an approval aggrieved by an action by the Director, OHMT, under this subpart may file an appeal with the Administrator, RSPA within 30 days of service of notification of a denial.

PART 172—HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

Subpart A

General

§ 172.1 Purpose and scope. This Part lists and classifies those materials which the Department of Transportation has designated as hazardous materials for purposes of transportation and prescribes the requirements for shipping papers, package marking, labeling, and transport vehicle placarding applicable to the shipment and transportation of those hazardous materials.

§ 172.3 Applicability. (a) This Part applies to—

(1) Each person who offers a hazardous material for transportation, and

(2) Each carrier by air, highway, rail, or water who transports a hazardous material.

(b) When a person, other than one of those provided for in paragraph (a) of this section, performs a packaging labeling or marking function required by this part, that person shall perform the function in accordance with this Part

Subpart B

Tables of Hazardous Materials, Their Description, Proper Shipping Name, Class, Label, Packaging, and Other Requirements

§ 172.101 Purpose and use of hazardous materials table. (a) The hazardous materials table (Table) in this section designates the materials listed therein as hazardous materials for the purpose of transportation of those materials in commerce. The Table identifies the class of each listed material, and specifies or references requirements in this subchapter pertaining to its packaging, labeling, and transportation. However, those references do not include other requirements having general applicability such as those specified in Parts 171 and 172, and Subparts A and B of Part 173, of this Subchapter.

(b) Column 1 contains the three symbols as appropriate: Plus (+) and the letters "A" and "W"

(1) The plus (+) fixes the proper shipping name and the hazard class for that entry without regard to whether the material meets the definition of that class. An alternate proper shipping name and hazard class may be authorized by the Director, Office of Hazardous Materials Transportation, RSPA.

(2) A letter "A" restricts the application of this subchapter to materials offered or intended for transportation by aircraft unless the material is a hazardous substance or a hazardous waste.

(3) The letter "W" restricts the application of this subchapter to materials offered or intended for transportation by vessel unless the material is a hazardous substance or a hazardous waste.

(c) Column 2 lists the proper shipping name of materials designated as hazardous materials. Modification of a proper shipping name may otherwise be required or authorized by this section (see Paragraphs (c)(10), (c)(11), (c)(12) and (c)(13) of this section). Proper shipping names are limited to those shown in Roman type (not italics).

(1) Shipping names may be used in the singular or plural and in either capital or lower case letters.

(2) The words in italics are not part of the proper shipping name but may be used in addition to the proper shipping name. The word "or" in italics indicates that any terms in the sequence may be used as the proper shipping name as appropriate.

(3) The abbreviation "n.o.i.", which means "not otherwise indexed", or "n.o.i.b.n.", which means "not otherwise indexed by name", may be used interchangeably with "n.o.s.".

(4) Except for hazardous wastes, when qualifying words are used as part of proper shipping name, their sequence on the package markings and shipping paper descriptions is optional. However, the entry in the Table reflects the preferred sequence.

(5) Except for organic peroxides, when one entry references another entry by use of the word "see", if both names are in Roman type, either name may be used as the proper shipping name (e.g., Carbolic acid. *See* Phenol). For an organic peroxide, the technical name shall be used as the proper shipping name.

(6) The words "poison" or "poisonous" in this column refer to materials that would cause death by systemic poisoning rather than by corrosive destruction of tissue.

(7) When a shipping name includes a concentration range as part of the shipping description, the actual concentration being shipped, if it is within the range stated, may be used in place of the concentration range. For example, a hydrogen peroxide solution containing 30% peroxide may be shipped as either "Hydrogen peroxide solution (8% to 40% peroxide)" or "Hydrogen peroxide solution, 30% peroxide".

(8) The use of the prefix "mono" is optional in any shipping name when appropriate. Thus, Monoethanolamine may be used interchangeably with Ethanolamine. In "Difluoromonochloroethane" the term "mono" is considered to be a prefix to the term "chloroethane" and may be deleted.

(9) *Hazardous substance.* The Appendix to this section lists materials which are listed or designated as hazardous substances under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Proper shipping names for hazardous substances (See Appendix and § 171.8 of this subchapter) shall be determined as follows:

(i) If the hazardous substance appears in the table by technical name, then the technical name is the proper shipping name.

(ii) If the hazardous substance does not appear in the table and is not a forbidden material (See §§ 173.21, 173.51, 173.66, and 173.114a of this subchapter), then an appropriate generic shipping name must be selected corresponding to the hazard class of the material as determined by the defining criteria of this subchapter and the hazard precedence prescribed in § 173.2 of this subchapter. For example, a hazardous substance which meets the definition of a flammable liquid might be described as "Flammable liquid, n.o.s." or other appropriate shipping name corresponding to the flammable liquid hazard class.

(10) If the word "Waste" is not included in the hazardous material description in the Table, the proper shipping name for a hazardous waste must include the word "Waste" preceding the shipping name of the material. For example: Waste acetone.

(11) A mixture or solution comprised of a hazardous material identified in the Table by technical name and nonhazardous material may be described using the proper shipping name of the hazardous material, if:

(i) The mixture or solution is not specifically identified in the Table;

(ii) The hazard class of the mixture or solution is the same as that of the hazardous material, and

(iii) The qualifying word "mixture" or "solution", as appropriate, is added as part of the proper shipping name. For example, a solution of Acetone, mineral oil, and water, meeting the definition of a flammable liquid, may be described under this optional provision as "Acetone solution, Flammable liquid, UN 1090."

(12) A material for which the hazard class is to be determined by testing or a material that is a hazardous waste may be assigned a

tentative shipping name, hazard class and identification number, based on the shipper's tentative determination according to:

(i) Defining criteria in this subchapter;

(ii) The hazard precedence prescribed in § 173.2 of this subchapter; and

(iii) The shipper's knowledge of the material.

This paragraph does not apply to a material subject or to prohibited by §§ 173.21, 173.51, 173.86(d), 173.86(e)(1), and 173.114a(g)(2) of this subchapter.

(13) Except for proper shipping names in the Table that are preceded by a plus (+):

(i) If it is specifically determined that a material meets the definition of a hazard class other than the class shown in association with the proper shipping name, the material must be described by an appropriate shipping name listed in association with the correct class for the material or,

(ii) If an appropriate technical name is not shown in the Table, selection of a proper shipping name must be made from the general descriptions or n.o.s. entries corresponding to the specific hazard class of the material being shipped. The name that most appropriately describes the material must be used, e.g. an alcohol not listed by name in the Table must be shipped as "Alcohol, n.o.s." rather than "Flammable liquid, n.o.s." Some mixtures may be more appropriately described according to their application, such as "Compound, cleaning, liquid" or "Compound rust removing," rather than by an n.o.s. entry, such as "Corrosive liquid, n.o.s."

(iii) If a material meets the definition of more than one hazard class, and is not specifically identified in the Table, the hazard class of the material must be determined by using the precedence specified in § 173.2 of this subchapter, and an appropriate shipping description must be selected as described in paragraph (c)(13)(ii) of this section.

(iv) If it is specifically determined that a material is not a forbidden material and does not meet the definition of any hazard class, the material is not a hazardous material.

(d) Column 3 contains a designation of the hazard class corresponding to each proper shipping name, or the word "Forbidden".

(1) A material for which the entry in this column is "Forbidden" is prohibited from being offered or accepted for transportation. This prohibition does not apply if these materials are diluted, stabilized, or incorporated in devices and they are classed in accordance with the definitions of hazardous materials contained in Part 173 of this subchapter.

(2) When re-evaluation of test data or new data indicates a need to modify the "Forbidden" designation or the hazard class specified for a material specifically identified in the Table, this data should be submitted to the Director, Office of Hazardous Materials Transportation, RSPA.

(3) Notwithstanding the ORM class shown for a material in Column 3, such a material having a flash point of 100 F. to 200 F. is classed as Combustible liquid when in a packaging having a rated capacity of more than 110 gallons.

(e) Column 3(a) lists the identification numbers assigned to hazardous materials. Those preceded by a "UN" are associated with descriptions considered appropriate for international shipments as well as domestic shipments. Those preceded by an "NA" are associated with descriptions that are not recognized for international shipments, except to and from Canada. If an identification number is in the "NA9000" series, it is either associated with the description of a material that is not appropriately covered by international hazardous materials (dangerous goods) shipping standards or not appropriately addressed by such standards for emergency response information purposes, except for transportation between the United States and Canada.

(f) Column 4 specifies the labels required to be applied to each package, subject to the additional labeling requirements in § 172.402.

(g) Column 5 references the applicable packaging section of Part 173 of this subchapter. Exceptions from some of the requirements of this subchapter are noted in column 5(a); others are contained in §§ 173.3, 173.4, and 173.5 of this subchapter in addition to those contained in Parts 174, 175, 176, and 177 of this subchapter. References to specific packaging requirements and certain additional exceptions are noted in column 5(b).

(1) Each reference to a section in Column 5(b) for an ORM-A, B, or C that is a hazardous waste or a hazardous substance is modified to read § 173.510 if the section referenced is applicable only to a particular mode (or modes) and the material is transported by a mode not addressed in the section.

(h) Column 6 specifies the maximum net quantity in one package for transportation by aircraft or passenger railcar. In this column, "Forbidden" means the material may not be offered or carried and is limited in its applicability only to the types of transportation covered by the column. In addition, an exception for certain flammable liquids is provided in § 173.118 of this subchapter.

(1) Column 6(a) specifies the maximum net quantity permitted in one package for transportation by passenger-carrying aircraft or passenger railcar. For transportation by aircraft, any material forbidden on passenger-carrying aircraft but permitted on cargo aircraft, or which exceeds the maximum quantity authorized on passenger carrying aircraft, must be shipped by cargo-only aircraft and bear the CARGO AIRCRAFT ONLY label as described in § 172.448.

(2) Column 6(b) specifies the maximum net quantity permitted in one package for transportation by cargo-only aircraft. When offered for transportation by aircraft, a package must bear the CARGO AIRCRAFT ONLY label when the quantity of hazardous material in one package exceeds that authorized on passenger-carrying aircraft, or is forbidden on passenger-carrying aircraft.

(i) Column 7 specifies each of the authorized locations on board cargo vessels and passenger vessels and certain additional requirements for shipments of each listed hazardous material. Section 176.63 of this subchapter sets forth the physical requirements for each of the authorized locations listed in Column 7. (For bulk shipments by vessel see 46 CFR Parts 30 to 40, 70, 98, 148, 151, 153, and 154.)

(1) "1" means the materials must be stowed "on deck" subject to the requirements of § 176.63(b) of this subchapter. When both "on deck" and "under deck" are authorized, "under deck" should be used if available.

(2) "1,2" means the material must be stowed either "on deck" or "under deck"; however, "under deck" should be used if available.

(3) "1,3" means the material must be stowed either "on deck" or "under deck away from heat"; however, "under deck away from heat" stowage should be used if it is available.

(4) "2" means the material must be stowed "under deck" in a compartment or hold subject to the requirements of § 176.63(c). When both "on deck" and "under deck" are authorized, "under deck" should be used if available.

(5) "3" means the material must be stowed "under deck away from heat" in a ventilated compartment or hold subject to the requirements of § 176.63(d) of this subchapter.

(6) "4" means the material is authorized to be transported in only the limited quantities specified in the CFR section listed in column 5 and is subject to the stowage requirements specified for a cargo vessel for the same material.

(7) "5" means the material is forbidden and may not be offered or accepted for transportation.

(8) "6" means the material is authorized to be transported in a magazine subject to the requirements of §§ 176.135 through 176.144 of this subchapter.

(j) Unless specifically stated otherwise in the amendment or the "Effective date" entry in its preamble, if any entry in this Table is changed by an amendment to this subchapter:

(1) Such a change does not apply to the shipment of any package filled prior to the effective date of the amendment, and

(2) Stocks of preprinted shipping papers and package markings may be continued in use, in the manner previously authorized, until depleted or for a one year period, whichever is less.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 CFR ref.	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Accumulator, pressurized (pneumatic or hydraulic) containing nonflammable gas	Nonflammable gas	NA1956	Nonflammable gas	173.306		No limit	No limit	1.2	1.2	
	Acetal	Flammable liquid	UN1088	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	1	
	Acetaldehyde (ethyl aldehyde)	Flammable liquid	UN1089	Flammable liquid	None	173.119	Forbidden	10 gallons	1.3	5	
A	Acetaldehyde ammonia	ORM A	UN1841	None	173.505	173.510	No limit	No limit	1.2	1.2	
	Acetic acid (aqueous solution)	Corrosive material	UN2790	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	Stow separate from nitric acid or oxidizing materials
	Acetic acid, glacial	Corrosive material	UN2789	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	Stow separate from nitric acid or oxidizing materials
	Acetic anhydride	Corrosive material	UN1715	Corrosive	173.244	173.245	1 quart	1 gallon	1.2	1.2	
	Acetone	Flammable liquid	UN1090	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Acetone cyanohydrin	Poison B	UN1541	Poison	None	173.346 173.3a	Forbidden	55 gallons	1	5	Shade from radiant heat. Stow away from corrosive materials
	Acetone oil	Flammable liquid	UN1091	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Acetonitrile	Flammable liquid	NA1648	Flammable liquid	173.118	173.119	1 quart	10 gallons	1	4	Shade from radiant heat
	Acetyl acetone peroxide, in solution with not more than 9% by weight active oxygen. See Organic peroxide, liquid or solution, n.o.s.		UN2080								
	Acetyl acetone peroxide with more than 9% by weight active oxygen	Forbidden									
	Acetyl benzoyl peroxide, not more than 40% in solution. See Acetyl benzoyl peroxide solution, not over 40% peroxide		UN2081								
	Acetyl benzoyl peroxide, solid, or more than 40% in solution	Forbidden									
	Acetyl benzoyl peroxide solution, not over 40% peroxide	Organic peroxide	UN2081	Organic peroxide	None	173.222	Forbidden	1 quart	1.2	1	
	Acetyl bromide	Corrosive material	UN1716	Corrosive	173.244	173.247	1 quart	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Acetyl chloride	Flammable liquid	UN1717	Flammable liquid	173.244	173.247	1 quart	1 gallon	1	1	Stow away from alkalis. Keep cool and dry. Separate longitudinally by an intervening complete compartment or hold from explosives
	Acetyl cyclohexanesulfonyl peroxide more than 82%, wetted with less than 12% water	Forbidden									
	Acetyl cyclohexanesulphonyl peroxide, not more than 82%, wetted with not less than 12% water. See Organic peroxide, solid, n.o.s.		UN2082								
	Acetyl cyclohexanesulphonyl peroxide, not more than 32% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2083								
	Acetylene	Flammable gas	UN1001	Flammable gas	None	173.303	Forbidden	300 pounds	1	1	Shade from radiant heat
	Acetylene (liquid)	Forbidden									
	Acetylene silver nitrate	Forbidden									
A	Acetylene tetrabromide	ORM A	UN2504	None	173.505	173.510	10 gallons	55 gallons			
	Acetyl iodide	Corrosive material	UN1898	Corrosive	173.244	173.247	1 quart	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Acetyl peroxide, not more than 25% in solution. See Acetyl peroxide solution, not over 25% peroxide		UN2084								
	Acetyl peroxide, solid, or more than 25% in solution	Forbidden									
	Acetyl peroxide solution, not over 25% peroxide	Organic peroxide	UN2084	Organic peroxide	173.153	173.222	Forbidden	1 quart	1.2	1	
	Acid butyl phosphate	Corrosive material	UN1718	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	Glass carboys in hampers not permitted under deck
	Acid carboy, empty. See Carboy, empty										
	Acid, liquid, n.o.s.	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	5 pints	1	4	Keep cool
+	Acrolein, inhibited	Flammable liquid	UN1092	Flammable liquid and Poison	None	173.122	Forbidden	1 quart	1.2	5	Keep cool. Stow away from living quarters

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipment		
Symbols	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Acrylic acid	Corrosive material	UN2218	Corrosive	173.244	173.245	1 quart	5 pints	1	1	
	Acrylonitrile	Flammable liquid	UN1093	Flammable liquid and Poison	None	173.119	Forbidden	1 quart	1 2	5	Keep cool
	Actuating cartridge, explosive (See explosive, or note)	Class C explosive		Explosive C	173.114		50 pounds	150 pounds	1 2	1 2	Keep cool and dry
	Adhesive	Combustible liquid	UN1133	None	173.118a	None	No limit	No limit	1 2	1 2	
	Adhesive	Flammable liquid	UN1133	Flammable liquid	173.118	173.132	1 quart	10 gallons			
	Aerosol product. See Compressed gas, n.o.s.										
	Air, compressed	Nonflammable gas	UN1002	Nonflammable gas	173.306	173.302	150 pounds	300 pounds	1 2	1 2	
	Air, refrigerated liquid (cryogenic)	Nonflammable Gas	UN1003	Nonflammable Gas	173.320	173.316 173.318	Forbidden	300 pounds	1 2	1 2	Stow separate from flammables (fire may oxidize oil of cargo
	Air conditioning machine. See Refrigerating machine										
	Airplane flare. See Fireworks, special										
	Alcoholic beverage	Flammable liquid	UN1170	Flammable liquid	173.118	173.125	See 173.118(C)	10 gallons	1 2	1	
	Alcoholic beverage	Combustible liquid	UN1170	None	173.118a	None	No limit	No limit	1 2	1 2	
	Alcohol, n.o.s.	Flammable liquid	UN1987	Flammable liquid	173.118	173.125	1 quart	10 gallons	1 2	1	
	Alcohol, n.o.s.	Combustible liquid	UN1987	None	173.118a	None	No limit	No limit	1 2	1 2	
	Aldrin	Poison B	NA2761	Poison	173.364	173.376	50 pounds	200 pounds	1 2	1 2	
A	Aldrin, cast solid	ORM A	NA2761	None	173.505	173.510	No limit	No limit	1 2	1 2	
	Aldrin mixture, dry (with more than 65% aldrin)	Poison B	NA2761	Poison	173.364	173.376	50 pounds	200 pounds	1 2	1 2	
A	Aldrin mixture, dry, with 65% or less aldrin	ORM A	NA2761	None	173.505	173.510	No limit	No limit	1 2	1 2	
	Aldrin mixture, liquid (with more than 60% aldrin)	Poison B	NA2762	Poison	173.345	173.361	1 quart	55 gallons	1 2	1 2	If flash point less than 141 deg F segregation same as for flammable liquids
A	Aldrin mixture, liquid, with 60% or less aldrin	ORM A	NA2762	None	173.505	173.510	No limit	No limit	1 2	1 2	
	Alkaline (corrosive) liquid, n.o.s.	Corrosive material	NA1719	Corrosive	173.244	173.249	1 quart	5 gallons	1 2	1 2	
	Alkanesulfonic acid	Corrosive material	UN2584	Corrosive	173.244	173.245	5 pints	1 gallon	1 2	1	
	Alkyl aluminum halides. See Pyrophoric liquid, n.o.s.	ORM A									
A	Allethrin	ORM-A	NA2902	None	173.505	173.510	No limit	No limit			
	Allyl alcohol	Flammable liquid	UN1098	Flammable liquid and Poison	None	173.119 173.3a	1 quart	10 gallons	1 2	1	
	Allyl bromide	Flammable liquid	UN1099	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1 2	1	
	Allyl chloride	Flammable liquid	UN1100	Flammable liquid	None	173.119	Forbidden	10 gallons	1 3	5	
	Allyl chlorocarbonate	Flammable liquid	UN1722	Flammable liquid	None	173.288	Forbidden	5 pints	1	5	Keep dry. Separate longitudinally by an intervening complete hold or compartment from explosives. Segregation same as for corrosive materials
	Allyl chloroformate. See Allyl chlorocarbonate										
	Allyl trichlorosilane	Corrosive material	UN1724	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Aluminum alkyl. See Pyrophoric liquid, n.o.s.										
	Aluminum bromide, anhydrous	Corrosive material	UN1725	Corrosive	173.244	173.245b	25 pounds	100 pounds	1 2	1 2	Keep dry
	Aluminum chloride, anhydrous	Corrosive material	UN1726	Corrosive	173.244	173.245b	25 pounds	100 pounds	1 2	1 2	Keep dry
	Aluminum dross, wet or hot. See 173.173	Forbidden									
	Aluminum hydride	Flammable solid	UN2463	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solid labeled Dangerous When Wet
	Aluminum, metallic, powder	Flammable solid	UN1396	Flammable solid	173.232	173.232	25 pounds	100 pounds	1 2	1 2	Keep dry. Segregation same as for flammable solids labeled dangerous when wet
	Aluminum nitrate	Oxidizer	UN1438	Oxidizer	173.153	173.182	25 pounds	100 pounds	1 2	1 2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
ef A/ W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Aluminum phosphate solution	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Aluminum phosphide	Flammable solid	UN1397	Flammable solid and Dangerous when wet	None	173.154	Forbidden	25 pounds	1.2	1.2	Stow away from acids and oxidizing materials
A	Aluminum sulfate solution	ORM B	NA1760	None	173.505	173.510	25 pounds	100 pounds	1.2	1.2	
	Amatol. See High explosive										
	a Methylglucoside tetranitrate	Forbidden									
	a Methylglycol trinitrate	Forbidden									
	2-(2-Aminoethoxy) ethanol	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	N-Aminoethylpiperazine	Corrosive material	UN2815	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Aminopropylethanolamine	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	N-Aminopropylmorpholine	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Ammonia, anhydrous	Nonflammable gas	UN1005	Nonflammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	4	Stow in well ventilated space
	Ammonia solution (*containing more than 44% ammonia*)	Nonflammable gas	UN2073	Nonflammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	4	Stow in well ventilated space
	Ammonia solution (containing 44% or less ammonia in water). See Ammonium hydroxide										
	Ammonium arsenate, solid	Poison B	UN1546	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	Stow away from all alkali corrosives
	Ammonium azide	Forbidden									
	Ammonium bifluoride, solid or solution. *See* Ammonium hydrogen fluoride, solid or solution										
A	Ammonium bisulfite, solid	ORM B	NA2693	None	173.505	173.510	25 pounds	100 pounds	1.2	1.2	
	Ammonium bisulfite solution	Corrosive material	NA2693	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	
	Ammonium bromate	Forbidden									
A	Ammonium carbamate	ORM A	NA3083	None	173.505	173.510	50 pounds	No limit	1.2	1.2	Keep away from heat
A	Ammonium carbonate	ORM A	NA3084	None	173.505	173.510	50 pounds	No limit	1.2	1.2	Keep away from heat, acids, alum and salts of iron or zinc
	Ammonium chlorate	Forbidden									
	Ammonium dichromate (ammonium bichromate)	Oxidizer	UN1439	Oxidizer	173.153	173.154 173.235	25 pounds	100 pounds	1.2	1.2	
A	Ammonium fluoborate	ORM B	NA3068	None	173.505	173.510	25 pounds	100 pounds	1.2	1.2	
A	Ammonium fluoride	ORM B	UN2505	None	173.505	173.800	25 pounds	100 pounds	1.2	1.2	
	Ammonium fulminate	Forbidden									
	Ammonium hydrogen fluoride, solid	Corrosive material	UN1727	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Ammonium hydrogen fluoride solution	Corrosive material	UN2817	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	Keep dry
A	Ammonium hydrogen sulfate	ORM B	UN2506	None	173.505	173.800	25 pounds	100 pounds			
A	Ammonium hydrosulfide solution	ORM A	NA2683	None	173.505	173.605	10 gallons	55 gallons			
	Ammonium hydroxide (*containing not less than 12% but not more than 44% ammonia*)	Corrosive material	NA2672	Corrosive	173.244	173.245	2 gallons	2 gallons	1	4	
AW	Ammonium hydroxide (containing less than 12% ammonia)	ORM A	NA2672	None	173.505	173.510	10 gallons	55 gallons	1	1	
	Ammonium nitrate-carbonate mixture	Oxidizer	UN2068	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate fertilizer, containing no more than 0.2% carbon	Oxidizer	UN2067	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate - fuel oil mixture (*containing only prilled ammonium nitrate and fuel oil*)	Blasting agent		Blasting agent	None	173.114a	Forbidden	100 pounds	1.2	1.2	
	Ammonium nitrate - fuel oil mixture. See High explosive										
	Ammonium nitrate mixed fertilizer	Oxidizer	UN2069	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate (no organic coating)	Oxidizer	UN1942	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate (organic coating)	Oxidizer	NA1942	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate-phosphate	Oxidizer	UN2070	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Ammonium nitrate, solution (*containing not less than 15% water*) *See 173.154,a)(17) and 173.154,a)(18)*	Oxidizer	UN2426	Oxidizer							

§ 172.101 Hazardous Materials Table—Continued

(1) 49 A/W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(7) Water shipments (c) Other requirements
	Ammonium nitrite	Forbidden									
A	Ammonium oxalate	ORM A	NA2449	None	173.505	173.510	50 pounds	200 pounds	1,2	1,2	
	Ammonium perchlorate	Oxidizer	UN1442	Oxidizer	173.153	173.239a	25 pounds	100 pounds	1,2	4	Stow away from powdered metals
	Ammonium perchlorate. See High explosive										
	Ammonium permanganate	Oxidizer	NA3100	Oxidizer	None	173.154	Forbidden	Forbidden	1,2	1,2	Separate from ammonium compounds and hydrogen peroxide. This material may be forbidden in water transportation by certain carriers
	Ammonium persulfate	Oxidizer	UN1444	Oxidizer	173.153	173.154	50 pounds	200 pounds	1,2	1,2	
	Ammonium picrate, dry. See High explosive										
	Ammonium picrate, wet (with 10% or more water)	Flammable solid	UN1310	Flammable solid	173.192		1 pound	1 pound	1	4	Stow away from heavy metals and their compounds
	Ammonium picrate, wet, with 10% or more water, over 16 ounces in one outside packaging. See High explosive										
A	Ammonium polysulfide solution	ORM A	UN2818	None	173.505	173.505	10 gallons	55 gallons			
A	Ammonium silicofluoride	ORM B	UN2854	None	173.505	173.510	25 pounds	100 pounds	1,2	1,2	
W	Ammonium sulfide nitrate	ORM C	NA1477	None	173.505	173.510			1,2	1,2	Must not be accepted for transportation while hot. Separate by an intervening hold or compartment from Class A explosives. Separate from other explosives, combustible materials, flammable solids, liquids, or gases, oxidizing materials, organic peroxides or organic materials
	Ammonium sulfide solution	Flammable liquid	UN2683	Flammable liquid	173.118	173.118	1 quart	10 gallons	1,2	1,2	
	Ammunition, chemical (containing a Poison A liquid or gas). See Chemical ammunition, nonexplosive (containing a Poison A material)										
	Ammunition, chemical (containing a Poison B material). See Chemical ammunition, nonexplosive (containing a Poison B material)										
	Ammunition, chemical (containing an irritating liquid or solid). See Chemical ammunition, nonexplosive (containing an irritating material)										
	Ammunition, chemical, explosive, with Irritant	Class A explosive		Explosive A and Irritant	None	173.58	Forbidden	Forbidden	6	5	No other cargo may be stowed in the same hold with these items
	Ammunition, chemical, explosive, with Poison A material	Class A explosive		Explosive A and Poison gas	None	173.58	Forbidden	Forbidden	6	5	No other cargo may be stowed in the same hold with these items
	Ammunition, chemical, explosive, with Poison B material	Class A explosive		Explosive A and Poison	None	173.58	Forbidden	Forbidden	6	5	No other cargo may be stowed in the same hold with these items
	Ammunition for cannon with empty projectile	Class B explosive		Explosive B	None	173.89	Forbidden	Forbidden	1,2	5	
	Ammunition for cannon with explosive projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with gas projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with illuminating projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with incendiary projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with inert loaded projectile	Class B explosive		Explosive B	None	173.89	Forbidden	Forbidden	1,2	5	
	Ammunition for cannon without projectile	Class B explosive		Explosive B	None	173.89	Forbidden	Forbidden	1,2	5	
	Ammunition for cannon with smoke projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with solid projectile	Class B explosive		Explosive B	None	173.89	Forbidden	Forbidden	1,2	5	
	Ammunition for cannon with tear gas projectile	Class A explosive		Explosive A	None	173.54	Forbidden	Forbidden	6	5	
	Ammunition for cannon with tear gas projectile	Class B explosive		Explosive B	None	173.89	Forbidden	Forbidden	1,2	5	
	Ammunition for small arms with explosive projectile	Class A explosive		Explosive A	None	173.58	Forbidden	Forbidden	6	5	
	Ammunition for small-arms with incendiary projectile	Class A explosive		Explosive A	None	173.58	Forbidden	Forbidden	6	5	
	Ammunition, non-explosive. See 173.55										

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
+/A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Ammunition, rocket. See Rocket ammunition with ...										
	Ammunition, small arms. See Small-arms ammunition										
	Amyl acetate	Flammable liquid	UN1104	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Amyl acid phosphate	Corrosive material	UN2819	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Amylamine	Flammable liquid	UN1106	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Amyl chloride	Flammable liquid	UN1107	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Amylene, normal	Flammable liquid	UN1108	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	1.3	
	Amyl formate	Flammable liquid	UN1109	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Amyl mercaptan	Flammable liquid	UN1111	Flammable liquid	None	173.141	Forbidden	10 gallons	1.2	1	
	Amyl nitrite	Flammable liquid	UN1113	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	tert-Amyl peroxy-2-ethylhexanoate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2898								
	tert-Amyl peroxyneodecanoate, not more than 75% with phlegmatizer. See Organic peroxide, liquid or solution, n.o.s.		UN2891								
	Amyl trichlorosilane	Corrosive material	UN1728	Corrosive	None	173.280	Forbidden	10 gallons	1	5	Keep dry
	Anhydrous ammonia. See Ammonia, anhydrous										
	Anhydrous hydrazine. See Hydrazine, anhydrous										
	Anhydrous hydrofluoric acid. See Hydrogen fluoride										
	Aniline oil drum, empty. See 173.347(d)	Poison B							1.2	1	Do not accept unless returnable package notice is on drum and the instructions thereon have been carried out
+	Aniline oil, liquid	Poison B	UN1547	Poison	None	173.347	Forbidden	55 gallons	1.2	1.2	Stow away from oxidizing materials and acids
	Anisoyl chloride	Corrosive material	UN1729	Corrosive	173.244	173.279	1 quart	1 quart	1	1	Keep dry
	Antimonous chloride. See Antimony trichloride										
A	Antimony lactate, solid	ORM-A	UN1550	None	173.505	173.510	No limit	No limit			
	Antimony pentachloride	Corrosive material	UN1730	Corrosive	None	173.247	1 quart	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Antimony pentachloride solution	Corrosive material	UN1731	Corrosive	173.244	173.245	1 quart	5 pints	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Antimony pentafluoride	Corrosive material	UN1732	Corrosive	None	173.246	Forbidden	25 pounds	1	5	Keep dry
A	Antimony potassium tartrate, solid	ORM-A	UN1551	None	173.505	173.510	No limit	No limit	1.2	1.2	
	Antimony sulfide and a chlorate, mixtures of	Forbidden									
A	Antimony sulfide, solid	ORM-A	NA1325	None	173.505	173.510	No limit	No limit			
	Antimony tribromide, solid	Corrosive material	NA1549	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Antimony tribromide solution	Corrosive material	NA1549	Corrosive	173.244	173.245	1 quart	5 pints	1	1	Keep dry
	Antimony trichloride, solid	Corrosive material	UN1733	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Antimony trichloride solution	Corrosive material	UN1733	Corrosive	173.244	173.245	1 quart	5 pints	1	1	Keep dry
	Antimony trifluoride, solid	Corrosive material	NA1549	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Antimony trifluoride solution	Corrosive material	NA1549	Corrosive	173.244	173.245	1 quart	5 pints	1	1	Keep dry
	Aqua ammonia solution (containing 44% or less ammonia). See Ammonium hydroxide										
	Argon or Argon, compressed	Nonflammable gas	UN1006	Nonflammable gas	173.306	173.302 173.314	150 pounds	1,100 pounds	1.2	1.3	
	Argon, refrigerated liquid (cryogenic liquid)	Nonflammable gas	UN1951	Nonflammable gas	173.320	173.316 173.318	100 pounds	300 pounds	1.3	1.3	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
††/ A/ W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Arsenic acid, solid	Poison B	UN1554	Poison	173.364	173.366	50 pounds	200 pounds	1,2	1,2	
	Arsenic acid solution	Poison B	UN1553	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsenical compound, liquid, n.o.s., or Arsenical mixture, liquid, n.o.s.	Poison B	UN1556	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsenical compound, solid, n.o.s., or Arsenical mixture, solid, n.o.s.	Poison B	UN1557	Poison	173.364	173.367	50 pounds	200 pounds	1,2	1,2	Keep dry
	Arsenical dip, liquid (sheep dip)	Poison B	NA1557	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsenical dust	Poison B	UN1562	Poison	173.364	173.366	50 pounds	200 pounds	1,2	1,2	
	Arsenical pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2760	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Arsenical pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2759	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsenical pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2759	Poison	173.364	173.367	50 pounds	200 pounds	1,2	1,2	
	Arsenic bromide, solid	Poison B	UN1555	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Arsenic chloride, liquid. See Arsenic trichloride										
	Arsenic disulfide. See Arsenic sulfide, solid										
	Arsenic iodide, solid	Poison B	NA1557	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Arsenic pentoxide, solid	Poison B	UN1559	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Arsenic, solid	Poison B	UN1558	Poison	173.364	173.366	50 pounds	200 pounds	1,2	1,2	
	Arsenic sulfide and a chlorate, mixtures of	Forbidden									
	Arsenic sulfide, solid	Poison B	NA1557	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	Keep dry
	Arsenic trichloride, liquid	Poison B	UN1560	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsenic trioxide, solid	Poison B	UN1561	Poison	173.364	173.366 173.368	50 pounds	200 pounds	1,2	1,2	
	Arsenic trisulfide	Poison B	NA1557	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Arsenic, white, solid. See Arsenic trioxide, solid										
	Arsenious acid, solid. See Arsenic trioxide, solid										
	Arsenious and mercuric iodide solution	Poison B	NA2810	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Arsine	Poison A	UN2188	Poison gas and Flammable gas	None	173.328	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Asbestos	ORM-C		None	173.1090	173.1090	No limit	No limit	1,2	1,2	Stow and handle to avoid airborne particles
	Ascaridole (organic peroxide)	Forbidden									
W	Asphalt, at or above its flashpoint	ORM-C	NA1999	None	None	None	Forbidden	Forbidden	1	5	When applicable, no fire or residue thereof may be present in the furnace heating the substance while the vessel is on board a cargo vehicle
	Asphalt, cut back	Flammable liquid	NA1999	Flammable liquid	173.118	173.131	1 quart	10 gallons	1,2	1	
	Asphalt, cut back	Combustible liquid	NA1999	None	173.118a	None	No limit	No limit	1,2	1,2	
	Automobile, motorcycle, tractor or other self-propelled vehicle. See Motor vehicle										
	Automobile, motorcycle, tractor or other self-propelled vehicle, engine, or other mechanical apparatus, with charged electric storage battery wet. See Motor vehicle										
	Azaurolic acid (salt of), (dry)	Forbidden									
	Azidodithiocarbonic acid	Forbidden									
	Azidoethyl nitrate	Forbidden									
	Azido guanidine picrate (dry)	Forbidden									
	5-Azido-1-hydroxy tetrazole	Forbidden									
	Azido hydroxy tetrazole (mercury and other salts)	Forbidden									
	3-Azido-1,2-Propylene glycol dinitrate	Forbidden									
	Azinphos methyl	Poison B	NA2783	Poison	173.364	173.365	50 pounds	200 pounds	1,2	4	
	Azinphos methyl mixture, liquid	Poison B	NA2783	Poison	173.345	173.346	1/2 pint	1 quart	1,2	5	
	1-Aziridinyl phosphine oxide (tris). See Tris-(1-aziridinyl) phosphine oxide										
	Azotetrazole (dry)	Forbidden									

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Bags, burlap (used must be classed for the hazardous material previously contained in bag. See 173.28, 173.29										
	Barium azide, wet, 50% or more water	Flammable solid	UN1571	Flammable solid	None	173.739	Forbidden	1 pound	1,2	1,2	Stow away from fusing metals
	Barium chlorate	Oxidizer	UN1445	Oxidizer	173.153	173.183	25 pounds	100 pounds	1,2	1,2	Separate from ammonium compounds. Stow away from powdered metals
	Barium chlorate, wet	Oxidizer	NA1445	Oxidizer	173.153	173.183	25 pounds	200 pounds	1,2	1,2	Separate from ammonium compounds. Stow away from powdered metals
	Barium cyanide, solid	Poison B	UN1565	Poison	173.379	173.379	25 pounds	200 pounds	1,2	1,2	Stow away from acids
	Barium nitrate	Oxidizer	UN1446	Oxidizer	173.153	173.182	25 pounds	100 pounds	1,2	1,2	
A	Barium oxide	ORM B	UN1884	None	173.505	173.800	25 pounds	100 pounds			
	Barium perchlorate	Oxidizer	UN1447	Oxidizer	173.153	173.154	25 pounds	100 pounds	1,2	1,2	Stow away from powdered metals
	Barium permanganate	Oxidizer	UN1448	Oxidizer	173.153	172.154	25 pounds	100 pounds	1,2	1,2	Separate from ammonium compounds and hydrogen peroxide
	Barium peroxide	Oxidizer	UN1449	Oxidizer	173.153	173.158	25 pounds	100 pounds	1,2	1,2	Keep dry
	Barium styphnate, monohydrate. See initiating explosive										
	Barrel, empty. See Drum, empty										
	Battery, electric storage, dry (containing potassium hydroxide, dry, solid flake, bead, or granular)	Corrosive material	NA1813	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	Keep dry
	Battery, electric storage, wet, filled with acid	Corrosive material	UN2794	Corrosive	173.260	173.260	Forbidden	No limit	1,2	1,2	
	Battery, electric storage, wet, filled with acid, with automobile (or specifically named self-propelled vehicle or mechanical appliance)	Corrosive material	NA2794	Corrosive	173.260	173.260	No limit	No limit	1,2	1,2	Keep dry
	Battery, electric storage, wet, filled with alkali	Corrosive material	UN2795	Corrosive	173.260	173.260	Forbidden	No limit	1,2	1,2	
	Battery, electric storage, wet, filled with alkali, with automobile (or specifically named self-propelled vehicle or mechanical appliance)	Corrosive material	NA2795	Corrosive	173.260	173.260	No limit	No limit	1,2	1,2	Keep dry
	Battery, electric storage, wet, nonspillable. See 173.260(d)										
	Battery, electric storage, wet, with wheelchair	Corrosive material		Corrosive	173.260	173.260 175.10	No limit	No limit	1,2	1,2	Keep dry
	Battery fluid, acid	Corrosive material	UN2796	Corrosive	173.244	173.257	1 qt.[1]	5 gallons	1,2	1,2	
	Battery fluid, acid, with battery, electric storage, wet, empty or dry	Corrosive material	NA2796	Corrosive	None	173.258	Forbidden	5 pints	1,2	1,2	
	Battery fluid, acid, with electronic equipment or actuating device	Corrosive material	NA2796	Corrosive	None	173.258	Forbidden	5 pints	1,2	1,2	
	Battery fluid, alkali	Corrosive material	UN2797	Corrosive	173.244	173.257	1 qt.[1]	5 gallons	1,2	1,2	
	Battery fluid, alkali, with battery, electric storage, wet, empty or dry	Corrosive material	UN2797	Corrosive	None	173.258	Forbidden	5 pints	1,2	1,2	
	Battery fluid, alkali, with electronic equipment or actuating device	Corrosive material	NA2797	Corrosive	None	173.258	Forbidden	5 pints	1,2	1,2	
	Battery, lithium. See 173.206(f)										
W	Battery parts (plates, grids, etc. unfinished, unassembled)	ORM C		None	173.505	173.815			1,2	4	
	Benzaldehyde	Combustible liquid	NA1989	None	173.118a	None	No limit	No limit	1,2	1,2	
	Benzene (benzol)	Flammable liquid	UN1114	Flammable liquid	173.118	173.119	1 qt.[1]	10 gallons	1,2	1	
	Benzene diazonium chloride (dry)	Forbidden									
	Benzene diazonium nitrate (dry)	Forbidden									
	Benzene phosphorus dichloride	Corrosive material	UN2798	Corrosive	None	173.245a	Forbidden	5 pints	1	5	
	Benzene phosphorus thiodichloride	Corrosive material	UN2799	Corrosive	None	173.245a	Forbidden	5 pints	1	5	
	Benzenethiol. See Phenyl mercaptan										
	Benzene tricloride	Forbidden									
	Benzidine	Poison B	UN1885	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1	
	Benzine	Flammable liquid	UN1115	Flammable liquid	173.118	173.119	1 qt.[1]	10 gallons	1,2	1	
	Benzoic derivative pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2770	Flammable liquid	173.118	173.119	1 qt.[1]	10 gallons	1,2	1	
	Benzoic derivative pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2769	Poison	173.345	173.345	1 qt.[1]	55 gallons	1,2	1,2	
	Benzoic derivative pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2769	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Benzonitrile	Combustible liquid	UN2224	None	173.119b	None	No limit	No limit	12	12	
	Benzoquinone (dry)	Forbidden									
	Benzoyl azide	Forbidden									
	Benzoyl chloride	Corrosive material	UN1736	Corrosive	173.244	173.247	1 qt	1 qt	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Benzoyl peroxide	Organic peroxide	NA2085	Organic peroxide	None	173.157 173.158	Forbidden	25 pounds	12	1	
	Benzoyl peroxide, more than 77% but less than 95% with water. See Benzoyl peroxide		UN2069								
	Benzoyl peroxide, not less than 30% but not more than 52% with inert solid. See Organic peroxide, solid, n.o.s.		UN2089								
	Benzoyl peroxide, not more than 72% as a paste. See Organic peroxide, solid, n.o.s.		UN2087								
	Benzoyl peroxide, not more than 77% with water. See Benzoyl peroxide		UN2090								
	Benzoyl peroxide, technically pure or Benzoyl peroxide, more than 52% with inert solid. See Benzoyl peroxide.		UN2085								
	Benzyl bromide (bromotoluene, alpha)	Corrosive material	UN1737	Corrosive	None	173.251	Forbidden	5 pints	1	5	Keep dry
	Benzyl chloride	Corrosive material	UN1738	Corrosive	173.244	173.295	Forbidden	1 qt	1	1	Keep dry
	Benzyl chloroformate (benzyl chlorocarbonate)	Corrosive material	UN1739	Corrosive	None	173.258	Forbidden	5 pints	1	5	Keep dry
	Beryllium chloride	Poison B	NA1566	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Beryllium compound, n.o.s.	Poison B	UN1566	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Beryllium fluoride	Poison B	NA1566	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Beryllium nitrate	Oxidizer	UN2464	Oxidizer	173.153	173.152	25 pounds	100 pounds	12	12	
	Biphenyl hexamine	Forbidden									
	Bipyridilium pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2782	Flammable liquid	173.118	173.119	1 qt	10 gallons	12	1	
	Bipyridilium pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2781	Poison	173.345	173.345	1 qt	55 gallons	12	12	
	Bipyridilium pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2781	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	bis (Aminopropyl) piperazine	Corrosive material	NA1760	Corrosive	173.244	173.245	1 qt	10 gallons	12	12	
	Black powder	Class A explosive		Explosive A	None	173.50	Forbidden	Forbidden	6	5	
	Black powder igniter with empty cartridge bag	Class C explosive		Explosive C	None	173.100	50 pounds	150 pounds	13	13	
	Blasting agent, n.o.s.	Blasting agent		Blasting agent	None	173.114a	Forbidden	100 pounds	12	12	
	Blasting caps. See Detonators, Class A or Class C explosives										
	Blasting caps, electric. See Detonators, Class A or Class C explosives										
	Blasting caps, percussion activated. See Detonators, Class A or Class C explosives										
	Blasting caps with detonating cord. See Detonators, Class A or Class C explosives and Detonating primers, Class A or Class C explosives										
	Blasting caps with metal clad mild detonating fuse. See Detonators, Class A or Class C explosives										
	Blasting caps with safety fuse. See Detonators, Class A or Class C explosives										
	Blasting caps with shock tubes. See Detonators, Class A or Class C explosives										
	Blasting gelatin. See High explosive										
	Blasting powder. See Black powder										
W	Bleaching powder, containing 39% or less available chlorine	ORM C	UN2208	None	173.505	173.920			12	12	Keep dry. Store separate from flammable liquids and solids. (Store away from oils, grease, and similar organic materials)
	Bomb, explosive. See Explosive bomb										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
R / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Bomb, explosive with gas, smoke, or incendiary material. See Explosive bomb										
	Bomb, fireworks. See Fireworks, special										
	Bomb, gas, smoke, or incendiary nonexplosive. See Chemical ammunition, nonexplosive										
	Bomb, incendiary or smoke without bursting charge. See Fireworks, special										
	Bomb, practice, with electric primer or electric squib (non-explosive). See 173.55										
	Bomb, sand-loaded or empty (non-explosive). See 173.55										
	Boostec, explosive	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	6	5	
	Bordeaux arsenite, liquid	Poison B	NA2759	Poison	173.345	173.345	1 quart	55 gallons	1.2	1.2	
	Bordeaux arsenite, solid	Poison B	NA2759	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Boron tribromide	Corrosive material	UN2692	Corrosive	None	173.251	Forbidden	1 quart	1	5	
	Boron trichloride	Corrosive material	UN1741	Corrosive	None	173.251	Forbidden	1 quart	1.2	5	Stow in well ventilated space. Shade from radiant heat. Segregation same as for nonflammable gases
+	Boron trifluoride	Nonflammable gas	UN1008	Nonflammable gas and Poison	None	173.302	Forbidden	Forbidden	1	5	Stow away from living quarters and foodstuffs
	Boron trifluoride-acetic acid complex	Corrosive material	UN1742	Corrosive	173.244	173.247	1 quart	1 gallon	1.2	1.2	
	Bromine	Corrosive material	UN1744	Corrosive	None	173.252	Forbidden	1 quart	1	5	Keep cool
	Bromine azide	Forbidden									
	Bromine pentafluoride	Oxidizer	UN1745	Oxidizer	None	173.245	Forbidden	100 pounds	1	5	Shade from radiant heat. Segregation same as for corrosives
	Bromine trifluoride	Oxidizer	UN1746	Oxidizer and Poison	None	173.245	Forbidden	100 pounds	1	5	Shade from radiant heat. Segregation same as for corrosives
	Bromoacetic acid, solid	Corrosive material	UN1938	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Bromoacetic acid solution	Corrosive material	UN1938	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	Glass carboys in hampers not permitted under deck
	Bromoacetone, liquid	Poison A	UN1569	Poison gas	None	173.329	Forbidden	Forbidden	1	5	Segregation same as for flammable liquids
	Bromobenzene	Combustible liquid	UN2514	None	173.118a	None	No limit	No limit	1.2	1.2	
A	Bromochloromethane	ORM A	UN1887	None	173.505	173.505	10 gallons	55 gallons			
	4-Bromo-1,2-dinitrobenzene (unstable at 53 deg C.)	Forbidden									
	Bromosilane	Forbidden									
	Bromotoluene, alpha. See Benzyl bromide										
	Bromotrifluoromethane (R-1361 or H-1301)	Nonflammable gas	UN1009	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1.2	1.2	
	Brucine, solid (dimethoxy strychnine)	Poison B	UN1570	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Burnt cotton, not replicted	Flammable solid	NA1325	Flammable solid	None	173.159	Forbidden	Forbidden	1	5	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Burstec, explosive	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	6	5	
+	Butadiene, inhibited	Flammable gas	UN1010	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	1	Stow away from living quarters
	Butane or Liquefied petroleum gas. See Liquefied petroleum gas										
	1,2,4-Butanetriol trinitrate	Forbidden									
	tert-Butoxycarbonyl azide	Forbidden									
	Butyl acetate	Flammable liquid	UN1123	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	n-Butyl acid phosphate. See Acid butyl phosphate										
	Butyl alcohol	Flammable liquid	NA1120	Flammable liquid	173.118	173.125	1 quart	10 gallons	1.2	1	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
S / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Butylamine	Flammable liquid	UN1125	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Butyl bromide, normal	Flammable liquid	UN1126	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Butyl chloride	Flammable liquid	UN1127	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	tert-Butyl cumyl peroxide, technically pure or tert-Butyl cumene peroxide, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2091								
	n-Butyl-4,4-di (tert-butylperoxy)valerate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2143								
	n-Butyl-4,4-di (tert-butylperoxy)valerate, not more than 52% with inert solid. See Organic peroxide, solid, n.o.s.		UN2141								
	Butyl ether	Flammable liquid	UN1149	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Butyl formate	Flammable liquid	UN1128	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	tert-Butyl hydroperoxide, more than 72% but not more than 90% with water. See Organic peroxide, liquid or solution, n.o.s.		UN2094								
	tert-Butyl hydroperoxide, not more than 72% with water. See Organic peroxide, liquid or solution, n.o.s.		UN2093								
	tert-Butyl hydroperoxide, not more than 80% in di tert-butyl peroxide and solvent. See Organic peroxide, liquid or solution, n.o.s.		UN2092								
	tert-Butyl hydroperoxide, not more than 80% in di tert-butyl peroxide or solvent. See Organic peroxide, liquid or solution, n.o.s.		UN2092								
	tert-Butyl hydroperoxide, more than 90% with water	Forbidden									
	n-Butyl isocyanate	Flammable liquid	UN2485	Flammable liquid and Poison	None	173.119 173.3a	1 quart	10 gallons	1.2	1	
	tert-Butyl isopropyl benzene hydroperoxide	Organic peroxide	NA2091	Organic peroxide	173.153	173.224	1 quart	1 quart	1.2	4	
	Butyl mercaptan	Flammable liquid	UN2347	Flammable liquid	None	173.141	Forbidden	10 gallons	1.3	5	
	tert-Butyl peroxyacetate, not more than 76% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2095								
	tert-Butyl peroxyacetate, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2096								
	tert-Butyl peroxyacetate, more than 76% in solution	Forbidden									
	tert-Butyl peroxybenzoate, not more than 75% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2098								
	tert-Butyl peroxybenzoate, not more than 52% with inert inorganic solid. See Organic peroxide, solid, n.o.s.		UN2090								
	tert-Butyl peroxybenzoate, technically pure or tert-Butyl peroxybenzoate, more than 75% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2097								
	tert-Butyl peroxycrotonate, not more than 78% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2183								
	n-Butyl peroxydicarbonate, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2169								
	n-Butyl peroxydicarbonate, not more than 27% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2170								
	tert-Butyl peroxydiethylacetate, 33% with tert-Butyl peroxybenzoate, 33% and solvent. See Organic peroxide, liquid or solution, n.o.s.		UN2551								

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
** / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	tert-Butyl peroxydiethylacetate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2144								
	tert-Butyl peroxy-2-ethylhexanoate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2143								
	tert-Butyl peroxy-2-ethylhexanoate, not more than 30% with 2,2 Di (tert-butylperoxy)butane, not more than 35%, with not less than 35% phlegmatizer. See Organic peroxide liquid or solution, n.o.s.		UN3586								
	tert-Butyl peroxy-2-ethylhexanoate, not more than 6% with 2,2 Di (tert-butylperoxy)butane, not more than 14% with not less than 14% phlegmatizer and 80% inert inorganic solid. See Organic peroxide, solid, n.o.s.		UN3587								
	tert-Butyl peroxy-2-ethylhexanoate, not more than 52% with phlegmatizer. See Organic peroxide, liquid or solution, n.o.s.		UN3938								
	tert-Butyl peroxyisobutyrate, more than 52% but not more than 77% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2142								
	tert-Butyl peroxyisobutyrate, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2562								
	tert-Butyl peroxyisobutyrate, more than 77% in solution	Forbidden									
	tert-Butyl peroxyisopropyl carbonate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2103								
	tert-Butyl peroxymaleate, not more than 55% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2130								
	tert-Butyl peroxymaleate, not more than 55% as a paste. See Organic peroxide, solid, n.o.s.		UN2101								
	tert-Butyl peroxymaleate, technically pure. See Organic peroxide, solid, n.o.s.		UN2099								
	tert-Butyl peroxyneodecanoate, not more than 77% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2177								
	tert-Butyl peroxyneodecanoate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2554								
	3-tert-Butyl peroxy-3-phenylphthalide, technically pure. See Organic peroxide, solid, n.o.s.		UN2596								
	tert-Butyl peroxyphthalate, technically pure. See Organic peroxide, solid, n.o.s.		UN2105								
	tert-Butyl peroxypivalate, not more than 77% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2110								
	tert-Butyl peroxy-3,5,5-trimethylhexanoate or tert-Butyl peroxyisononanoate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2154								
	Butyl phosphoric acid. See Acid butyl phosphate										
	Butyl trichlorosilane	Corrosive material	UN1747	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Butyraldehyde	Flammable liquid	UN1129	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Butyric acid	Corrosive material	UN2820	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Cabande	Forbidden									
	Calcium arsenate, solid	Poison B	UN1573	Poison	173.364	173.367 173.368	50 pounds	200 pounds	1.2	1.2	
	Calcium arsenite, solid	Poison B	NA1574	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 AW	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Calcium bisulfite solution. See Calcium hydrogen sulfite solution										
	Calcium carbide	Flammable solid	UN1402	Flammable solid and Dangerous when wet	None	173.178	Forbidden	25 pounds	1.2	1.2	Keep dry. Store away from copper, its alloys, and salts
	Calcium chlorate	Oxidizer	UN1452	Oxidizer	173.153	173.163	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds. Store away from powdered metals and cyanide
	Calcium chlorite	Oxidizer	UN1453	Oxidizer	None	173.150	Forbidden	100 pounds	1.2	1.2	Separate from ammonium compounds, powdered materials, and cyanides
AW	Calcium cyanamide, Not hydrated (containing more than 0.1% calcium carbide)	ORM-C	UN1403	None	None	173.345	25 pounds	200 pounds	1.2	1.2	Segregation same as for flammable solids labeled Dangerous When Wet
	Calcium cyanide, solid or Calcium cyanide mixture, solid	Poison B	UN1575	Poison	173.370	173.370	25 pounds	200 pounds	1.2	1.2	Store away from corrosive liquids. Keep dry
	Calcium hydrogen sulfite solution	Corrosive material	NA2693	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	
	Calcium hypochlorite, hydrated (minimum 5.5% but not more than 10% water, and containing more than 39% available chlorine)	Oxidizer	UN2880	Oxidizer	173.153	173.217	50 pounds	100 pounds	1.2	1.2	
	Calcium hypochlorite mixture, dry (Containing more than 39% available chlorine)	Oxidizer	UN1748	Oxidizer	173.153	173.217	50 pounds	100 pounds	1.2	1.2	Keep cool and dry
	Calcium, metal	Flammable solid	UN1401	Flammable solid and Dangerous when wet	173.153	173.154	25 pounds	100 pounds	1.2	4	Keep cool and dry. Segregation same as for flammable solids labeled Dangerous When Wet
	Calcium, metal, crystalline	Flammable solid	NA1401	Flammable solid and Dangerous when wet	None	173.231	Forbidden	25 pounds	1.2	5	Keep cool and dry. Segregation same as for flammable solids labeled Dangerous When Wet
	Calcium nitrate (See 173.182(a) Note)	Oxidizer	UN1454	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
AW	Calcium oxide	ORM-B	UN1910	None	173.505	173.850	25 pounds	100 pounds	1.2	1.2	Keep dry. Store away from acid, wet, acids, combustible materials, and ammonium salts
	Calcium permanganate	Oxidizer	UN1456	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds and hydrogen peroxide
	Calcium peroxide	Oxidizer	UN1457	Oxidizer	173.153	173.156	25 pounds	100 pounds	1.2	1.2	Keep dry
	Calcium phosphide	Flammable solid	UN1360	Flammable solid and Dangerous when wet	None	173.161	Forbidden	25 pounds	1	5	Keep cool and dry. Segregation same as for flammable solids labeled Dangerous When Wet
	Calcium resinate	Flammable solid	UN1313	Flammable solid	None	173.156	Forbidden	125 pounds	1	5	
	Calcium resinate, fused	Flammable solid	UN1314	Flammable solid	None	173.156	Forbidden	125 pounds	1	5	
	Calcium silicon (powder)	Flammable solid	UN1406	Flammable solid and Dangerous when wet	173.153	173.178	Forbidden	25 pounds	1.2	4	Segregation same as for flammable solids labeled Dangerous When Wet
AW	Camphene	ORM-A	NA2811	None	173.505	173.810	No limit	No limit	1.3	1.3	Store away from foodstuffs and living quarters
	Camphor oil	Combustible liquid	UN1130	None	173.118a	None	No limit	No limit	1.2	1.2	
	Cannon primer	Class C explosive		None	None	173.107	50 pounds	150 pounds	1.3	5	
	Caprylyl peroxide solution	Organic peroxide	NA2129	Organic peroxide	173.153	173.221	1 quart	1 quart	1.2	4	Keep cool. Store separate from oxidizing, flammable materials, explosives, or acids
	Caps, blasting. See Detonators, Class A or Class C explosives										
	Caps, toy. See Toy caps										
	Carbamate pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2758	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Carbamate pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2757	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Carbamate pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2757	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
A	Carbaryl	ORM-A	NA2757	None	173.505	173.510	No limit	No limit	1.2	1.2	
	Carbofuran	Poison B	NA2757	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Carbofuran mixture, liquid	Poison B	NA2757	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
+	Carbolic acid. See Phenol										
	Carbolic acid, liquid (liquid tar acid containing over 50% phenol) See Phenol, liquid										

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1) 47 A W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(7) Water shipments (c) Other requirements
	Carbon bisulfide, or Carbon disulfide	Flammable liquid	UN1131	Flammable liquid	None	173.121	Forbidden	Forbidden	1	5	Keep cool. Not permitted on any vessel transporting explosives, except that quantities not exceeding 200 pounds may be transported on such vessels under conditions approved by the Captain of the Port
	Carbon dioxide	Nonflammable gas	UN1013	Nonflammable gas	173.306	173.302 173.304	150 pounds	300 pounds	1,2	1,2	
	Carbon dioxide nitrous oxide mixture	Nonflammable gas	UN1015	Nonflammable gas	173.306	173.304	150 pounds	300 pounds	1,2	1,2	
	Carbon dioxide-oxygen mixture	Nonflammable gas	UN1014	Nonflammable gas	173.306	173.304	150 pounds	300 pounds	1,2	1,2	
	Carbon dioxide, refrigerated liquid	Nonflammable gas	UN2187	Nonflammable gas	173.306	173.314 173.315	150 pounds	300 pounds	1,2	1,2	
AW	Carbon dioxide, solid, or Dry ice, or Carbonice	ORM A	UN1845	None	None	173.615	440 pounds	440 pounds	1	1	Stow away from open ventilators. Stow away from cyanides or cyanide mixtures, liquid or dry
9	Carbon monoxide	Flammable gas	UN1016	Flammable gas	173.306	173.302	Forbidden	150 pounds	1	4	
	Carbon monoxide, cryogenic liquid	Flammable gas	NA3202	Flammable gas	None	173.318	Forbidden	Forbidden	1	5	Stow away from living quarters
AW	Carbon tetrachloride	ORM A	UN1846	None	173.505	173.820	1 quart	55 gallons	1,2	1,2	Stow away from living quarters
	Carbonyl chloride. See Phosgene										
	Carboys, empty, must be classed for the hazardous material previously contained in carboy. See 173.29										
	Cartridge bags, empty, with black powder igniter	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1,3	1,3	
	Cartridge, practice ammunition	Class C explosive		Explosive C	None	173.101a	50 pounds	150 pounds	1,2	1,2	
	Case oil. See Gasoline or Naptha										
	Casinghead gasoline. See Gasoline										
W	Castor Beans	ORM C		None	173.505	173.952			1,2	1,2	Stow away from living quarters and foodstuffs. Bulk shipments permitted in tight vans or containers only on cargo vessels (Castor beans only)
W	Castor pomace. See Castor beans										
	Caustic, potash, dry, solid, flake, bead, or granular. See Potassium hydroxide, dry, etc										
	Caustic potash, liquid or solution. See Potassium hydroxide solution										
	Caustic soda, dry, solid, flake, bead, or granular. See Sodium hydroxide, dry, etc										
	Caustic soda, liquid or solution. See Sodium hydroxide solution										
W	Cellosolve. See Ethylene glycol monoethyl ether										
W	Cellosolve acetate. See Ethylene glycol monoethyl ether acetate										
	Cement	Combustible liquid	NA1133	None	173.118a	None	No limit	No limit	1,2	1,2	
	Cement	Flammable liquid	NA1133	Flammable liquid	173.118	173.132	1 quart	10 gallons	1,2	1	
	Cement, adhesive n.o.s. See Cement										
	Cement, container, linoleum, tile, or wallboard, liquid	Flammable liquid	NA1133	Flammable liquid	173.118	173.132	1 quart	15 gallons	1,2	1	
	Cement, leather	Flammable liquid	NA1133	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Cement, pyroxylin	Flammable liquid	NA1133	Flammable liquid	173.118	173.132	1 quart	15 gallons	1,2	1	
	Cement, roofing, liquid	Flammable liquid	NA1133	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Cement, rubber	Flammable liquid	NA1133	Flammable liquid	173.118	173.132	1 quart	15 gallons	1,2	1	
	Cesium metal	Flammable solid	UN1407	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1,2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Charcoal briquettes or briquets	Flammable solid	NA1361	Flammable solid	173.182	173.182	50 pounds	50 pounds	1,2	1,2	
	Charcoal screenings, made from "pinon" wood	Flammable solid	NA1361	Flammable solid	173.182	173.182	25 pounds	200 pounds	1,2	1,	
	Charcoal, shell	Flammable solid	NA1361	Flammable solid	173.182	173.182	25 pounds	200 pounds	1,2	1,2	

§ 172.101 Hazardous Materials Table—Continued

(1) S / A / W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(7) Water shipments (c) Other requirements
	Charcoal, wood, ground, crushed, granulated, or pulverized	Flammable solid	NA1361	Flammable solid	173.182	173.182	25 pounds	200 pounds	1,2	1,2	
	Charcoal, wood, lump	Flammable solid	NA1361	Flammable solid	173.182	173.182	50 pounds	50 pounds	1,2	1,2	
	Charcoal wood screenings, other than "pitwood" wood screenings	Flammable solid	NA1361	Flammable solid	None	173.182	Forbidden	Forbidden	1	1	
	Charged well casing jet perforating gun (total explosive content in guns 20 pounds or more per motor vehicle)	Class A explosive		Explosive A	None	173.53 173.80	Forbidden	Forbidden			Forbidden
	Charged well casing jet perforating gun (total explosive contents in guns not exceeding 20 pounds per motor vehicle or special offshore down hole tool pellet)	Class C explosive		Explosive C	None	173.53 173.115	Forbidden	Forbidden	1,2	5	
	Chemical ammunition, explosive. See Ammunition, chemical, explosive, with —										
	Chemical ammunition, nonexplosive (containing a *Poison B material*)	Poison B	UN2018	Poison	173.345	173.350	Forbidden	55 gallons			See correct shipping name of applicable Poison B material for stowage, special handling and special segregation requirements
	Chemical ammunition, nonexplosive (containing an *irritating material*)	Irritating material	UN2017	Irritant	None	173.383	Forbidden	20 pounds			See correct shipping name of applicable Irritant material for stowage, special handling and special segregation requirements
	Chemical ammunition, nonexplosive (containing a *Poison A material*)	Poison A	UN2016	Poison gas	None	173.300	Forbidden	Forbidden			See correct shipping name of applicable Poison A material for stowage, special handling and special segregation requirements
	Chemical kit	Corrosive material	NA1760	Corrosive	173.286		1 quart	1 quart	1,3	1,3	
	Chlorate and borate mixture (containing more than 28% chlorate)	Oxidizer	UN1458	Oxidizer	173.153	173.229	25 pounds	100 pounds	1,2	4	Stow away from ammonium compounds and away from powdered metals
	Chlorate and magnesium chloride mixture (containing more than 28% chlorate)	Oxidizer	UN1459	Oxidizer	173.153	173.229	25 pounds	100 pounds	1,2	4	Stow away from ammonium compounds and away from powdered metals
	Chlorate explosive, dry. See High explosive										
	Chlorate, n.o.s.	Oxidizer	UN1461	Oxidizer	173.153	173.153	25 pounds	100 pounds	1,2	4	Stow away from ammonium compounds and away from powdered metals
	Chlorate, n.o.s., wet	Oxidizer	NA1461	Oxidizer	173.153	173.153	25 pounds	200 pounds	1,2	4	Stow away from ammonium compounds and away from powdered metals
	Chlorate of potash. *See* Potassium chlorate										
	Chlorate of soda. *See* Sodium chlorate										
	Chlorate powder. *See* High explosive										
	Chlordane, liquid	Flammable liquid	NA2762	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Chlordane, liquid	Combustible liquid	NA2762	None	173.118a	None	No limit	No limit	1,2	1,2	
	Chloric acid	Oxidizer	NA2626	Oxidizer and Poison	None	173.237	Forbidden	Forbidden			Forbidden
	Chloride of phosphorus. *See* Phosphorus trichloride										
	Chloride of sulfur. *See* Sulfur chloride										
W	Chlorinated lime (chloride of lime) *See* Bleaching powder										
+	Chlorine	Nonflammable gas	UN1017	Nonflammable gas and Poison	None	173.304 173.314 173.315	Forbidden	Forbidden	1,2	5	Stow in a well ventilated space. Stow away from organic materials
	Chlorine acide	Forbidden									
	Chlorine dioxide hydrate, frozen	Oxidizer	NA9191	Oxidizer and Poison	None	173.237	Forbidden	Forbidden			Forbidden
	Chlorine dioxide (not hydrate)	Forbidden									
	Chlorine trifluoride	Oxidizer	UN1749	Oxidizer and Poison	None	173.245	Forbidden	100 pounds	1,3	5	Stow in well ventilated area away from organic material
	Chloroacetic acid, liquid or solution	Corrosive material	UN1750	Corrosive	173.244	173.294	1 quart	1 quart	1,2	1,2	Glass carboys in hampers not permitted under deck
	Chloroacetic acid, solid	Corrosive material	UN1751	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	Keep dry
	Chloroacetophenone, gas, liquid, or solid (CN)	Irritating material	UN1697	Irritant	None	173.382	Forbidden	75 pounds	1	5	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1) 87 A W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(7) Water shipments (c) Other requirements
	Chloroacetyl chloride	Corrosive material	UN1752	Corrosive	None	173.253	Forbidden	1 quart	1	5	Keep dry
	Chlorobenzene	Flammable liquid	UN1134	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Chlorobenzol. See Chlorobenzene										
	p-Chlorobenzoyl peroxide	Organic peroxide	UN2113	Organic peroxide	None	173.157 173.158	Forbidden	25 pounds	1	1	
	p-Chlorobenzoyl peroxide, not more than 75% with water. See p-Chlorobenzoyl peroxide		UN2113								
	p-Chlorobenzoyl peroxide, not more than 52% as a paste. See Organic peroxide, solid, n.o.s.		UN2114								
	p-Chlorobenzoyl peroxide, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2115								
*	Chlorodifluoroethane (R 142b) or (1-Chloro-1,1-difluoroethane)	Flammable gas	UN2517	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	1	
	1-Chloro-1,1-difluoroethane. See Chlorodifluoroethane (R 142b)										
	Chlorodifluoromethane (R 22)	Nonflammable gas	UN1018	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1.2	1	
	Chlorodifluoromethane and chloropentafluoroethane mixture (constant boiling mixture) (R 502). See Refrigerant gas, n.o.s.										
	Chlorodinitrobenzene. See Dinitrochlorobenzene										
AW	Chloroform	ORM A	UN1888	None	173.505	173.630	10 gallons	55 gallons	1.2	1.2	Stow away from living quarters and foodstuffs
	Chloropentafluoroethane (R 115)	Nonflammable gas	UN1020	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1.2	1.2	
	3-Chloroperoxybenzoic acid, not more than 86% with 3-chlorobenzoic acid. See Organic peroxide, solid, n.o.s.		UN2755								
	Chlorophenyltrichloroethane	Corrosive material	UN1753	Corrosive	None	173.290	Forbidden	10 gallons	1	1	Keep dry
	Chloropicrin, absorbed	Poison B	NA1583	Poison	None	173.357	Forbidden	Forbidden	1	5	Keep cool
*	Chloropicrin and methyl chloride mixture	Poison A	UN1582	Poison gas and Flammable gas	None	173.329	Forbidden	Forbidden	1	5	Keep cool. Segregation same as for flammable gases
*	Chloropicrin and nonflammable, nonliquefied compressed gas mixture	Poison A	NA1955	Poison gas and Nonflammable gas	None	173.329	Forbidden	Forbidden	1	5	Keep cool
*	Chloropicrin, liquid	Poison B	UN1580	Poison	None	173.357	Forbidden	Forbidden	1	5	Keep cool
*	Chloropicrin mixture (containing no compressed gas or Poison A liquid)	Poison B	UN1583	Poison	None	173.357	Forbidden	Forbidden	1	5	Keep cool
	Chloropicrin mixture, flammable (pressure not exceeding 14.7 psia flash point below 100 deg F)	Poison B	NA2929	Poison and Flammable liquid	None	173.357	Forbidden	Forbidden	1	5	Keep cool
A	Chloroplatinic acid, solid	ORM B	UN2507	None	173.505	173.800	25 pounds	100 pounds			
	Chloroprene, inhibited	Flammable liquid	UN1991	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Chloroprene, uninhibited	Forbidden									
	2-Chloropropene	Flammable liquid	UN2456	Flammable liquid	None	173.119	Forbidden	10 gallons	1.2	5	
	Chlorosulfonic acid	Corrosive material	UN1754	Corrosive	173.244	173.254	1 quart	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Chlorosulfonic acid-sulfur trioxide mixture	Corrosive material	UN1754	Corrosive	173.144	173.254	1 quart	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Chlorotetrafluoroethane (R 124)	Nonflammable gas	UN1021	Nonflammable gas	173.306	173.304 173.314	150 pounds	300 pounds	1.2	1.2	
*	4-Chloro-o-toluidine hydrochloride	Poison B	UN1579	Poison	None	173.362	Forbidden	1 quart	1.2	1.2	
	Chlorotrifluoromethane (R 13)	Nonflammable gas	UN1022	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1.2	1.2	
A	Chlorpyrifos	ORM A	NA2783	None	173.505	173.510	100 pounds	No limit	1.2	1.2	
	Chromic acid mixture, dry	Oxidizer	NA1463	Oxidizer	173.153	173.164	25 pounds	100 pounds	1.2	1.2	Stow away from foodstuffs
	Chromic acid, solid	Oxidizer	NA1463	Oxidizer	173.153	173.164	25 pounds	100 pounds	1.2	1.2	Stow away from foodstuffs. Stow separate from flammable liquids and solids

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipment		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Chromic acid solution	Corrosive material	UN1755	Corrosive	173.244	173.287	1 quart	1 gallon	1	1	
	Chromic anhydride. See Chromic acid, solid										
	Chromic fluoride, solid	Corrosive material	UN1756	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	
	Chromic fluoride solution	Corrosive material	UN1757	Corrosive	173.244	173.245	1 quart	1 gallon	1.2	1.2	
	Chromic trioxide. See Chromic acid, solid										
	Chromium oxychloride or Chromyl chloride	Corrosive material	UN1758	Corrosive	None	173.247	Forbidden	1 gallon	1	1	Keep dry. Glass (ampuls) not permitted on passenger vessels
	Cigarette lighter (or other similar ignition device)	Flammable gas	UN1057	Flammable gas	173.21	173.308	21 ounces	25 pounds	1	1	
	Cigarette lighter (or other similar ignition device)	Flammable liquid	UN1226	Flammable liquid	173.21 175.10	173.118	Forbidden	Forbidden	1	1	
	Cigarette load	Class C explosive		Explosive C	None	173.111	50 pounds	150 pounds	1.2	1.2	
	Cloud gas cylinder. See Chemical ammunition, nonexplosive										
	Coal briquettes, hot	Forbidden									
	Coal facings. See Coal ground bituminous, etc										
	Coal gas. See Hydrocarbon gas, nonliquefied										
	Coal, ground bituminous, sea coal, or coal facings	Flammable solid	NA1361	Flammable solid	173.165	173.185	Forbidden	Forbidden	1	1	Separate from flammable gases or liquids, oxidizing materials or organic peroxides
	Coal oil (export shipment only). See Kerosene										
	Coal tar distillate	Combustible liquid	UN1137	None	173.118a	None	No limit	No limit	1.2	1.2	
	Coal tar distillate	Flammable liquid	UN1136	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Coal tar dye, liquid (not otherwise specifically named in 172.101)	Corrosive material	NA2801	Corrosive	173.244	173.245a	1 quart	10 gallons	1.2	1.2	
	Coating solution	Flammable liquid	UN1139	Flammable liquid	173.118	173.132	1 quart	15 gallons	1.2	1	
	Cobalt resinate, precipitated	Flammable solid	UN1318	Flammable solid	None	173.166	Forbidden	125 pounds	1.2	1.2	
	Cocculus, solid (fishberry)	Poison B	UN1544	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
W	Coconut meal pellets containing at least 6% and not more than 13% moisture and not more than 10% residual fat content	ORM C		None	173.505	173.955			1.2	4	Keep dry
	Coke, hot	Forbidden									
	Collodion	Flammable liquid	NA2059	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Combination fuze	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1.3	1.3	
	Combination primer	Class C explosive		None	None	173.107	50 pounds	150 pounds	1.3	5	
	Combustible liquid, n.o.s.	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1.2	1.2	
	Commercial shaped charge. See High explosive										
	Common fireworks. See Fireworks, common										
	Compound, cleaning, liquid	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Compound, cleaning, liquid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Compound, cleaning, liquid	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1.2	1.2	
	Compound, cleaning, liquid (containing phosphoric acid, acetic acid, sodium hydroxide or potassium hydroxide)	Corrosive material	NA1760	Corrosive	173.244	173.243a	1 quart	1 quart	1.2	1.2	
	Compound, cleaning, liquid (containing hydrochloric (muriatic) acid)	Corrosive material	NA1789	Corrosive	173.244	173.263	1 quart	1 gallon	1	1	
	Compound, cleaning, liquid (containing hydrofluoric acid)	Corrosive material	NA1790	Corrosive	172.244	173.256	1 quart	1 gallon	1	4	
	Compound, polishing, liquid	Flammable liquid	NA1142	Flammable liquid	173.118	173.119	1 quart	55 gallons	1.2	1	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
					(a)	(b)	(a)	(b)	(a)	(b)	(c)
H / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	Exceptions	Specific requirements	Passenger-carrying aircraft or railcar	Cargo aircraft only	Cargo vessel	Passenger vessel	Other requirements
	Compound, rust preventing or Compound, rust removing	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 gallon	1.2	1.2	
	Compound, tree or weed killing, liquid	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1.2	1.2	
	Compound, tree or weed killing, liquid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Compound, tree or weed killing, liquid	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Compound, tree or weed killing, liquid	Poison B	NA2810	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Compound, tree or weed killing, solid	Oxidizer	NA1479	Oxidizer	173.153	173.154 173.229	25 pounds	100 pounds			
	Compound, vulcanizing, liquid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Compound, vulcanizing, liquid	Flammable liquid	NA1142	Flammable liquid	173.118	172.119	1 quart	10 gallons	1.2	1	
	Compressed gas, n.o.s.	Flammable gas	UN1954	Flammable gas	173.306	173.302 173.304 173.305	Forbidden	300 pounds	1	4	
	Compressed gas, n.o.s.	Nonflammable gas	UN1956	Nonflammable gas	173.306 173.307	173.302 173.304 173.305	150 pounds	300 pounds	1.2	1.2	
	Consumer commodity	ORM D		None	173.306(b)	173.510 173.1200	65 pounds gross	65 pounds gross			Not subject to requirements of Part 176
	Container, unused or empty, must be classed for the hazardous material previously contained. See 173.29, 173.29										
	Copper acetoarsenite, solid	Poison B	UN1585	Poison	173.364	173.367	50 pounds	200 pounds	1.2	1.2	
	Copper acetylide	Forbidden									
	Copper amine azide	Forbidden									
	Copper arsenite, solid	Poison B	UN1586	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Copper based pesticide, liquid, n.o.s. (*compounds and preparations*)	Flammable liquid	UN2776	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Copper based pesticide, liquid, n.o.s. (*compounds and preparations*)	Poison B	UN2775	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Copper based pesticide, solid, n.o.s. (*compounds and preparations*)	Poison B	UN2775	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
A	Copper chloride	ORM B	UN2802	None	173.505	173.800	25 pounds	100 pounds	1.2	1.2	
	Copper cyanide	Poison B	UN1587	Poison	173.379	173.379	25 pounds	200 pounds	1.2	1.2	Stow away from acids
	Copper tetramine nitrate	Forbidden									
W	Copra	ORM C	UN1363	None	173.505	173.960			1.2	1.2	Segregation same as for flammable solids. Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Copra pellets. See Coconut meal pellets										
	Cord, detonating flexible	Class A explosive		Explosive A	173.81	173.81	Forbidden	Forbidden	5	5	
	Cord, detonating flexible	Class C explosive		Explosive C	None	173.104	Forbidden	150 pounds	1.3	1.3	
	Corrosive liquid, n.o.s.	Corrosive material	UN1760	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1	4	For material that meets only the corrosion to skin criteria of 49 CFR 173.240(a)(1), "under deck" stowage is also authorized if the description includes the additional entry specified by 172.203(k)(2)
	Corrosive liquid, poisonous, n.o.s.	Corrosive material	UN2922	Corrosive and Poison	173.244	173.245	1 quart	1 quart	1	4	
	Corrosive solid, n.o.s.	Corrosive material	UN1759	Corrosive	173.244	173.245b	25 pounds	100 pounds	1	4	For material that meets only the corrosion to skin criteria of 49 CFR 173.240(a)(1), "under deck" stowage is also authorized if the description includes the additional entry specified by 172.203(k)(2)
	Cosmetics, liquid, n.o.s.	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Cosmetics, n.o.s.	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1.2	1.2	
	Cosmetics, n.o.s.	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Cosmetics, n.o.s.	Flammable solid	NA1325	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.2	1.2	
	Cosmetics, n.o.s.	Oxidizer	NA1479	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	
	Cosmetics, solid, n.o.s.	Corrosive material	NA1759	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Coumaphos	Poison B	NA2783	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Coumaphos mixture, liquid	Poison B	NA2783	Poison	173.345	173.346	1 pint	1 quart	1.2	5	
	Cresol	Corrosive material	UN2076	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Crotonaldehyde	Flammable liquid	UN1143	Flammable liquid and Poison	None	173.119 173.36	1 quart	1 gallon	1.2	1	
	Crotonic acid	Corrosive material	UN2823	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Crotonylene	Flammable liquid	UN1144	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Crude oil, petroleum	Combustible liquid	UN1267	None	173.115a	None	No limit	No limit	1.2	1.2	
	Crude oil, petroleum	Flammable liquid	UN1267	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Cumene hydroperoxide	Organic peroxide	UN2116	Organic peroxide	173.153	173.224	1 quart	1 quart	1.2	4	
	Cumene hydroperoxide, technically pure. See Cumene hydroperoxide.		UN2116								
	Cupric cyanide. See Copper cyanide										
	Cupric nitrate	Oxidizer	NA1479	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Cuprietylene-diamine solution	Corrosive material	UN1761	Corrosive	173.244	173.249	1 quart	1 gallon	1.2	1.2	
	Cyanide or cyanide mixture, dry	Poison B	UN1588	Poison	173.364	173.370	25 pounds	200 pounds	1.2	1.2	Keep dry. Store away from acids
	Cyanide solution, n.o.s.	Poison B	UN1935	Poison	173.345	173.352	1 quart	55 gallons	1.2	1.2	Store away from acids
	Cyanogen bromide	Poison B	UN1889	Poison	None	173.379	Forbidden	25 pounds	1	5	Shade from radiant heat. Segregation same as for corrosive materials
	Cyanogen chloride containing less than 0.9% water	Poison A	UN1589	Poison gas and Flammable gas	None	173.328	Forbidden	Forbidden	1	5	Shade from radiant heat
	Cyanogen gas	Poison A	UN1026	Poison gas and Flammable gas	None	173.328	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Cyanuric triazide	Forbidden									
	Cyclohexane	Flammable liquid	UN1145	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Cyclohexanone peroxide, 50 to 85% peroxide	Organic peroxide	UN2119	Organic peroxide	173.157	173.158	Forbidden	25 pounds	1	1	
	Cyclohexanone peroxide, as a paste with not more than 9% by weight active oxygen. See Cyclohexanone peroxide, 50 to 85% peroxide		UN2935								
	Cyclohexanone peroxide, in solution with not more than 9% by weight active oxygen. See Cyclohexanone peroxide, 50 to 85% peroxide		UN2118								
	Cyclohexanone peroxide, not over 50% peroxide	Organic peroxide	UN2936	Organic peroxide	173.153	173.154	2 pounds	25 pounds	1.2	1.2	
	Cyclohexanone peroxide and di-(1-hydroxy cyclohexyl) peroxide mixture. See appropriate cyclohexanone peroxide entry										
	Cyclohexenyl trichlorosilane	Corrosive material	UN1762	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Cyclohexylamine	Flammable liquid	UN2357	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Cyclohexyl trichlorosilane	Corrosive material	UN1763	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Cyclopentane	Flammable liquid	UN1145	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Cyclopentane, methyl	Flammable liquid	UN2298	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
+	Cyclopropane	Flammable gas	UN1027	Flammable gas	173.306	173.304	Forbidden	300 pounds	1.2	1	
	Cyclotetramethylene tetranitramine (dry) (HMX)	Forbidden									
	Cyclotetramethylene tetranitramine, wet with not less than 10% water. See High explosive										
	Cyclotrimethylene trinitramine desensitized. See High explosive										
	Cyclotrimethylene trinitramine, wet with not less than 10% water. See High explosive										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Cylinder, empty, including bin to it must be classed for the hazardous material previously contained in cylinder. See 173.29										
A	2,4-D. See 2,4-Dichlorophenoxyacetic acid										
A	DDT or Dichlorodiphenyltrichloroethane	ORM A	NA2761	None	173.505	173.510	No limit	No limit	12	12	
	Decaborane	Flammable solid	UN1868	Flammable solid and Poison	None	173.236	Forbidden	25 pounds	12	12	
	Decahydronaphthalene	Combustible liquid	UN1147	None	173.118a	None	No limit	No limit	12	12	
	Decalin. See Decahydronaphthalene										
	Decanoyl peroxide, technically pure See Organic peroxide, solid, n.o.s.		UN2120								
	Delay connectors. See Detonators, Class A or Class C explosives and Detonating primers, Class A or Class C explosives										
	Delay electric igniter	Class C explosive		Explosive C	None	173.108	50 pounds	150 pounds	13	13	
	Denatured alcohol	Flammable liquid	NA1986	Flammable liquid	173.118	173.125	1 quart	10 gallons	12	1	
	Depth bomb. See Explosive bomb										
	Detonating fuze, Class A, with or without radioactive components	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	6	5	
	Detonating fuze, Class C explosive	Class C explosive		Explosive C	None	173.113	50 pounds	150 pounds	13	13	
	Detonating primers, Class A explosives. See 173.53	Class A explosive		Explosive A	None	173.58	Forbidden	Forbidden	6	5	Do not stow detonating primers Class A explosives with any high explosives. Do not handle at the same time high explosives are being loaded
	Detonating primers, Class C explosives. See 173.100	Class C explosive		Explosive C	None	173.58	173.103(d)	150 pounds	12	12	The maximum net quantity in one package for this material shipped aboard passenger vessel is limited to 50 pounds. Must not be stowed in portable magazine or metal locker. Do not stow detonating primers Class C explosives with high explosives. Do not handle at the same time high explosives are being loaded
	Detonators, Class A explosives. See 173.53	Class A explosive		Explosive A	None	173.58	Forbidden	Forbidden	6	–	Do not stow detonators Class A with any high explosives. Do not handle at the same time high explosives are being loaded
	Detonators, Class C explosives. See 173.100	Class C explosive		Explosive C	None	173.56	173.103(d)	150 pounds	12	12	The maximum net quantity in one package for this material shipped aboard passenger vessel is limited to 50 pounds. Must be stowed in portable magazine or metal locker. Do not stow detonators Class C explosives with high explosives. Do not handle at the same time high explosives are being loaded
	Detonators, commercial. See Detonators, Class A or Class C explosives										
	Diacetone alcohol	Flammable liquid	UN1148	Flammable liquid	173.118	173.119	1 quart	10 gallons	12	1	
	Diacetone alcohol	Combustible liquid	UN1148	None	173.118a	None	No limit	No limit	12	12	
	Diacetone alcohol peroxide, not more than 57% in solution with not more than 9% hydrogen peroxide, not less than 26% diacetone alcohol and not less than 9% water, total active oxygen content not more than 9%. See Organic peroxide, liquid or solution, n.o.s.		UN2163								
	Diacetone alcohol peroxides, more than 57% in solution with more than 9% hydrogen peroxide, less than 26% diacetone alcohol and less than 9% water, total active oxygen content more than 9% by weight	Forbidden									
	Diacetyl	Flammable liquid	UN2346	Flammable liquid	173.118	173.119	1 quart	10 gallons	12	1	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
** A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	1,2-Dioxolane	Forbidden									
A	Dioxon	ORM A	NA2783	None	173.505	173.519	No limit	No limit	1,2	1,2	
	1,1'-Dioxamino-ethylene	Forbidden									
	Dioxammonium azide (dry)	Forbidden									
	Dioxodinitrophenol. See Initiating explosive										
	Dioxodinitrophenol (dry)	Forbidden									
	Dioxodiphenylmethane	Forbidden									
	Dioxonium nitrate (dry)	Forbidden									
	Dioxonium perchlorate (dry)	Forbidden									
	1,3-Dioxopropane	Forbidden									
	Dibenzyl peroxydicarbonate, not more than 87% with water. See Organic peroxide, solid, n.o.s.		UN2149								
	Dibenzyl peroxydicarbonate, more than 87% with water	Forbidden									
+	Diborane or diborane mixtures	Flammable gas	UN1911	Flammable gas and Poison	None	173.302	Forbidden	Forbidden	1	5	Separate from Oxidizing and materials bearing the oxidizer label
	Dibromoacetylene	Forbidden									
A	Dibromodifluoromethane	ORM A	UN1941	None	173.505	173.505	10 gallons	55 gallons			
AW	1,2-Dibromoethane. See Ethylene dibromide										
	Di-(4-tert-butylcyclohexyl)peroxydicarbonate, technically pure. See Organic peroxide, solid, n.o.s.		UN2154								
	Di-(4-tert-butylcyclohexyl)peroxydicarbonate, not more than 42%, stable dispersion, in water. See Organic peroxide, liquid or solution, n.o.s.		UN2894								
	Di-tert-butyl peroxide, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2102								
	2,3-Di-(tert-butylperoxy)butane, not more than 55% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2118								
	2,2-Di-(tert-butylperoxy) butane, more than 55% in solution	Forbidden									
	1,1-Di-(tert-butylperoxy)cyclohexane, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2179								
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 72% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2180								
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 42% with inert inorganic solid with not less than 13% phlegmatizer. See Organic peroxide, solid, n.o.s.		UN2585								
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 50% with phlegmatizer. See Organic peroxide, liquid or solution, n.o.s.		UN2897								
	1,2-Di-(tert-butylperoxy)cyclohexane, not more than 77% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2181								
	Di-sec-butyl peroxydicarbonate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2150								
	Di-sec-butyl peroxydicarbonate, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2151								
	1,4-Di-(2-tert-butylperoxyisopropyl) benzene, technically pure or more than 40% with inert solid. See Organic peroxide, solid, n.o.s.		UN2112								
	1,3-Di-(2-tert-butylperoxyisopropyl) benzene, technically pure or more than 40% with inert solid. See Organic peroxide, solid, n.o.s.		UN2112								

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
H / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	1,3-Di-(2-tert-butylperoxyisopropyl) benzene and 1,4-Di-(2-tert-butylperoxyisopropyl) benzene mixture, technically pure or more than 40% with inert solid. See Organic peroxide, solid, n.o.s.		UN2112								
	Di-(tert-butylperoxy)phthalate, technically pure. See Organic peroxide, solid, n.o.s.		UN2106								
	Di-(tert-butylperoxy)phthalate, not more than 55% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2107								
	Di-(tert-butylperoxy)phthalate, not more than 55% as a paste. See Organic peroxide, solid, n.o.s.		UN2108								
	Di-(tert-butylperoxy) phthalate more than 55% in solution	Forbidden									
	2,2-Di-(tert-butylperoxy)propane, not more than 52% with phlegmatizer. See Organic peroxide, liquid or solution, n.o.s.		UN2593								
	2,2-Di-(tert-butylperoxy)propane, not more than 42% with inert inorganic solid with not less than 13% phlegmatizer. See Organic peroxide, solid, n.o.s.		UN2864								
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, technically pure. See Organic peroxide, liquid or solution n.o.s.		UN2145								
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, not more than 57% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2146								
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, not more than 58% with inert solid. See Organic peroxide, solid, n.o.s.		UN2147								
	Diethyl peroxydicarbonate, not more than 42% stable dispersion in water. See Organic peroxide, liquid or solution, n.o.s.		UN2895								
	Diethyl peroxydicarbonate, technically pure. See Organic peroxide, solid, n.o.s.		UN2164								
	Dichloroacetic acid	Corrosive material	UN1764	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	Glass carboys in hampers not permitted under deck
	Dichloroacetyl chloride	Corrosive material	UN1765	Corrosive	173.244	173.247	1 quart	1 gallon	1	4	Keep dry
	Dichloroacetylene	Forbidden									
A	Dichlorobenzene, ortho, liquid	ORM A	UN1591	None	173.505	173.510	No limit	No limit	1.2	1.2	
A	Dichlorobenzene, para, solid	ORM A	UN1592	None	173.505	173.510	No limit	No limit	1.2	1.2	
	2,4-Dichlorobenzoyl peroxide, not more than 75% with water. See Organic peroxide, solid, n.o.s.		UN2137								
	2,4-Dichlorobenzoyl peroxide, not more than 52% as a paste. See Organic peroxide, solid, n.o.s.		UN2138								
	2,4-Dichlorobenzoyl peroxide, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2139								
	2,4-Dichlorobenzoyl peroxide more than 75% with water	Forbidden									
	1,1-Dichloro-2,2-bis(parachlorophenyl) ethane. See TDE										
	Dichlorobutene	Flammable liquid	NA2924	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Dichlorobutene	Corrosive material	NA2924	Corrosive	173.244	173.245 173.245a	1 quart	10 gallons	1	4	
A	Dichlorodifluoroethylene	ORM A	NA3018	None	173.505	173.505	10 gallons	55 gallons			
	Dichlorodifluoromethane (R 12)	Nonflammable gas	UN1028	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1.2	1.2	
	Dichlorodifluoromethane (R 12) and chlorodifluoromethane (R 22) mixture. See Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
§ / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Dichlorodifluoromethane (R-12) and dichlorotetrafluoroethane (R-114) mixture. *See* Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										
	Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R-500). *See* Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										
	Dichlorodifluoromethane (R-12) and trichlorofluoromethane (R-11) mixture. *See* Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										
	Dichlorodifluoromethane (R-12) and trichlorotrifluoroethane (R-113) mixture. *See* Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										
	Dichlorodifluoromethane (R-12), trichlorofluoromethane (R-11) and chlorodifluoromethane (R-22) mixture. *See* Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.										
A	Dichlorodiphenyltrichloroethane. *See* DDT										
	Dichloroethylene	Flammable liquid	UN1150	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Dichloroisopropyl ether	Corrosive material	UN2490	Corrosive	173.244	173.254	1 quart	10 gallons	1,2	1,2	
A	Dichloromethane or Methylene chloride	ORM A	UN1593	None	173.505	173.505	10 gallons	55 gallons			
	Dichloropentane	Flammable liquid	UN1152	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1,2	
A	2,4-Dichlorophenoxyacetic acid	ORM A	NA2765	None	173.505	173.510	50 pounds	No limit	1,2	1,2	
	Dichlorophenyltrichlorosilane	Corrosive material	UN1766	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Dichloropropane. *See* Propylene dichloride										
	Dichloropropene	Flammable liquid	UN2047	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Dichloropropene and propylene dichloride mixture	Flammable liquid	NA2047	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	2,2-Dichloropropionic acid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Dichlorvos	Poison B	NA2783	Poison	173.345	173.348	Forbidden	1 quart	1,2	1,2	
	Dichlorvos mixture, dry	Poison B	NA2783	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Dicumyl peroxide 52% solution	Organic peroxide	NA2121	Organic peroxide	173.153	173.224	1 quart	1 quart	1,2	4	
	Dicumyl peroxide, technically pure or Dicumyl peroxide, with inert solid. *See* Dicumyl peroxide, dry		UN2121								
	Dicumyl peroxide, dry	Organic peroxide	UN2121	Organic peroxide	173.153	173.154	2 pounds	25 pounds	1,2	1,2	
	Dicyclohexyl peroxydicarbonate, technically pure. *See* Organic peroxide, solid, n.o.s.		UN2152								
	Dicyclohexyl peroxydicarbonate, not more than 91% with water. *See* Organic peroxide, solid, n.o.s.		UN2153								
	2,2-Di-(4,4-di-tert-butylperoxycyclohexyl)propane, not more than 42% with inert solid. *See* Organic peroxide, solid, n.o.s.		UN2158								
	2,2-Di-(4,4-di-tert-butylperoxycyclohexyl) propane, more than 42% with inert solid	Forbidden									
A	Dieldrin	ORM A	NA2761	None	173.505	173.510	No limit	No limit	1,2	1,2	
	Diesel fuel. *See* Fuel oil										
	Diethanol nitrosamine dinitrate (dry)	Forbidden									
	Diethylamine	Flammable liquid	UN1154	Flammable liquid	173.118	173.119	Forbidden	5 pints	1,3	4	
	Diethyl cellosolve. *See* Ethylene glycol diethyl ether										
	Diethyl dichlorosilane	Flammable liquid	UN1767	Flammable liquid	None	173.135	Forbidden	10 gallons	1	1	Keep dry. Segregation same as for corrosives
	Diethylene glycol dinitrate. *See* 173.51	Forbidden									
	Diethylgold bromide	Forbidden									

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
¢/ A/ W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Di-(2-ethylhexyl) peroxydicarbonate, technically pure. *See* Organic peroxide, liquid or solution, n.o.s.		UN2122								
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 77% in solution. *See* Organic peroxide, liquid or solution, n.o.s.		UN2123								
	Di-(2-ethylhexyl) phosphoric acid	Corrosive material	NA1902	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Diethyl ketone	Flammable liquid	UN1156	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Diethyl peroxydicarbonate, not more than 27% in solution. *See* Organic peroxide, liquid or solution, n.o.s.		UN2175								
	Diethyl peroxydicarbonate, more than 27% in solution	Forbidden									
	Diethylzinc. *See* Pyrophoric liquid, n.o.s.										
	Difluoroethane (A-152a)	Flammable gas	UN1030	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	1,2	
	Difluorophosphoric acid, anhydrous	Corrosive material	UN1768	Corrosive	None	173.275	Forbidden	1 gallon	1,2	1,2	
	2,3-Dihydroperoxy propane, not more than 25% with inert organic solid. *See* Organic peroxide, solid, n.o.s.		UN2178								
	Dihydropyran	Flammable liquid	UN2376	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	4	
	Di-(1-hydroxycyclohexyl) peroxide, technically pure. *See* Organic peroxide, solid, n.o.s.		UN2149								
	1,8-Dihydroxy-2,4,5,7-tetranitroanthraquinone (chrysamminic acid)	Forbidden									
	Di-(1-hydroxytetrazole) (dry)	Forbidden									
	Diiodoacetylene	Forbidden									
	Diisobutyl ketone	Combustible liquid	UN1157	None	173.118a	None	No limit	No limit	1,2	1,2	
	Diisobutyryl peroxide, not more than 52% in solution. *See* Organic peroxide, liquid or solution, n.o.s.		UN2182								
	Diisooctyl acid phosphate	Corrosive material	UN1902	Corrosive	173.244	173.296	1 quart	1 quart	1,2	1,2	Glass carboys in hampers not permitted under deck
	Diisopropylamine	Flammable liquid	UN1158	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Diisopropylbenzene hydroperoxide, not more than 72% in solution. *See* Diisopropylbenzene hydroperoxide solution, not more than 72% peroxide		UN2171								
	Diisopropylbenzene hydroperoxide, more than 72% in solution	Forbidden									
	Diisopropylbenzene hydroperoxide solution, not over 72% peroxide	Organic peroxide	UN2171	Organic peroxide	173.153	173.224	1 quart	1 quart	1,2	4	
	Diisopropyl ether	Flammable liquid	UN1159	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,3	4	
	Diisobidecyl peroxydicarbonate, technically pure. *See* Organic peroxide, liquid or solution, n.o.s.		UN2683								
♦	Dimethylamine, anhydrous	Flammable gas	UN1032	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	4	
	Dimethylamine, aqueous solution	Flammable liquid	UN1160	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Di-(2-methylbenzoyl)peroxide, not more than 85% with water. *See* Organic peroxide, solid, n.o.s.		UN2593								
	2,3-Dimethylbutane	Flammable liquid	UN2457	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,3	4	
	Dimethyl carbonate	Flammable liquid	UN1161	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Dimethyl chlorothiophosphate	Corrosive material	NA2922	Corrosive	173.244	173.245	1 quart	1 quart	1,2	1,2	
	1,4-Dimethylcyclohexane	Flammable liquid	UN2263	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane, technically pure. *See* Organic peroxide, solid, n.o.s.		UN2172								

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(i) Passenger-carrying aircraft or railcar	(ii) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane, *not more than 82% with inert solid. See* Organic peroxide, solid, n.o.s.		UN2135								
	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane, technically pure *See* Organic peroxide, liquid or solution, n.o.s.		UN2156								
	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane, *not more than 52% with inert solid. See* Organic peroxide, solid, n.o.s.		UN2158								
	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3, technically pure *See* Organic peroxide, liquid or solution, n.o.s.		UN2159								
	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3, *not more than 52% with inert solid. See* Organic peroxide, solid, n.o.s.		UN2160								
	Dimethyldichlorosilane	Flammable liquid	UN1162	Flammable liquid	None	173.135	Forbidden	5 pints	1,2	1	
	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane, technically pure *See* Organic peroxide, liquid or solution, n.o.s.		UN2157								
	2,5-Dimethyl-2,5-dihydroperoxy hexane, *not more than 82% with water. See* Dimethylhexane dihydroperoxide, with 18% or more water.		UN2174								
	2,5-Dimethyl-2,5-dihydroperoxy hexane, more than 82% with water	Forbidden									
	Dimethyl ether	Flammable gas	UN1033	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	1	
	Dimethylhexane dihydroperoxide (dry)	Forbidden									
	Dimethylhexane dihydroperoxide, (with 18% or more water)	Organic peroxide	UN2174	Organic peroxide	None	173.157	Forbidden	25 pounds	1	1	
	Dimethylhydrazine, unsymmetrical (UDMH)	Flammable liquid	UN1163	Flammable liquid and Poison	None	173.145	Forbidden	5 pints	1,2	1	Keep dry. Segregate from corrosive and oxidizing materials and organic peroxides
	Dimethyl phosphorochloridothioate. *See* Dimethyl chlorothiophosphate										
	Dimethyl sulfate	Corrosive material	UN1595	Corrosive	None	173.255	Forbidden	1 quart	1	5	Keep cool
	Dimethyl sulfide	Flammable liquid	UN1164	Flammable liquid	None	173.119	Forbidden	10 gallons	1,2	5	
	Dimyristyl peroxydicarbonate, technically pure *See* Organic peroxide, solid, n.o.s.		UN2595								
	Dimyristyl peroxydicarbonate, *not more than 22% stable dispersion in water. See* Organic peroxide, liquid or solution, n.o.s.		UN2892								
	Di-(1-naphthyl)-peroxide	Forbidden									
	Dinitrobenzene, solid, or Dinitrobenzol, solid	Poison B	UN1597	Poison	173.364	173.371	50 pounds	200 pounds	1,2	1,2	
	Dinitrobenzene solution	Poison B	UN1597	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Dinitrochlorobenzene	Poison B	UN1577	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
A	Dinitrocyclohexylphenol	ORM A	NA3026	None	173.505	173.510	No limit	No limit			
	Dinitro-7,8-dimethylglycoluril (dry)	Forbidden									
	1,3-Dinitro-5,5-dimethyl hydantoin	Forbidden									
	1,3-Dinitro-4,5-dinitrosobenzene	Forbidden									
	1,2-Dinitroethane	Forbidden									
	1,1-Dinitroethane (dry)	Forbidden									
	Dinitroglycoluril	Forbidden									
	Dinitromethane	Forbidden									
	Dinitrophenol solution	Poison B	UN1599	Poison	173.345	173.362a	1 quart	65 pounds	1,2	1,2	Stow away from heavy metals and their compounds. If flash point is 141 deg F or less segregation same as for flammable liquids
	Dinitropropylene glycol	Forbidden									
	4,6-Dinitroresorcinol (heavy metal salts of) (dry)	Forbidden									
	2,4-Dinitroresorcinol (heavy metal salts of) (dry)	Forbidden									

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	3,5-Dinitrosalicylic acid (lead salt) (dry)	Forbidden									
	Dinitrosobenzylamine and salts of (dry)	Forbidden									
	2,2-Dinitrostilbene	Forbidden									
	2,4-Dinitro-1,2,4,4-tetramethylbutanetetranitrate (dry)	Forbidden									
	2,4-Dinitro-1,3,5-trimethylbenzene	Forbidden									
	Dinitrotetramethylammonium nitrate	Forbidden									
	2,2-Dinitro(nitroxy)methyl ether	Forbidden									
	1,9-Dinitroxy-pentamethylene-2,4,6,8-tetramine (dry)	Forbidden									
	Dioxane	Flammable liquid	UN1165	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Dioxolane	Flammable liquid	UN1166	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Diphenylaminechloroarsine (DM)	Irritating material	UN1698	Irritant	None	173.382	Forbidden	75 pounds	1	5	
	Diphenyl dichlorosilane	Corrosive material	UN1769	Corrosive	None	173.280	Forbidden	10 gallons	1	1	
	Diphenyl methyl bromide, solid	Corrosive material	UN1770	Corrosive	173.244	173.245b	25 pounds	100 pounds	1	4	
	Diphenyl methyl bromide solution	Corrosive material	UN1770	Corrosive	173.244	173.247	1 quart	1 gallon	1,2	1,2	
	Diphosgene See Phosgene										
	Di-n-propyl peroxydicarbonate, technically pure See Organic peroxide, liquid, n.o.s.		UN2176								
	Disinfectant, liquid	Corrosive material	UN1903	Corrosive	173.244	173.245	1 quart	10 gallons	1	4	
	Disinfectant, liquid	Poison B	UN1601	Poison	173.345	173.346	1 quart	55 gallons	1,2	1	
	Disinfectant, liquid, n.o.s.	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1,2	1,2	
	Disinfectant, solid	Poison B	UN1601	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1	
	Dispersant gas, n.o.s. See Refrigerant gas, n.o.s.										
	Distearyl peroxydicarbonate, not more than 85% with stearyl alcohol See Organic peroxide, solid, n.o.s.		UN2592								
	Disulfoton	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1,2	5	
	Disulfoton mixture, dry	Poison B	NA2783	Poison	173.377	173.377	Forbidden	200pounds	1,2	4	
	Disulfoton mixture, liquid	Poison B	NA2783	Poison	173.359	173.359	1 2 pint	1 quart	1,2	5	
	Dithiocarbamate pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2772	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Dithiocarbamate pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2771	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Dithiocarbamate pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2771	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Di-(3,5,5-trimethyl-1,2-dioxolanyl-3)peroxide, not more than 50% as a paste, with phlegmatizer See Organic peroxide, solid, n.o.s.		UN2597								
	Divinyl ether	Flammable liquid	UN1167	Flammable liquid	None	173.119	Forbidden	10 gallons	1,3	5	
	Dodecylbenzenesulfonic acid	Corrosive material	NA2584	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Dodecyl trichlorosilane	Corrosive material	UN1771	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Driers, paint or varnish, liquid, n.o.s.	Combustible liquid	UN1168	None	173.118a	None	No limit	No limit	1,2	1,2	
	Driers, paint or varnish, liquid, n.o.s.	Flammable liquid	UN1168	Flammable liquid	173.118 173.128	173.128	1 quart	55 gallons	1,2	1	
	Drill cartridge See 173.55										
	Drugs, liquid, n.o.s.	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 quart	1,2	1,2	
	Drugs, liquid, n.o.s.	Poison B	NA2810	Poison	173.345	173.345	1 quart	55 gallons	1,3	1	
	Drugs, n.o.s.	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1,2	1,2	
	Drugs, n.o.s.	Flammable solid	NA1325	Flammable solid	173.153	173.154	25 pounds	100 pounds	1,2	1,2	
	Drugs, n.o.s.	Oxidizer	NA1479	Oxidizer	173.153	173.154	25 pounds	100 pounds	1,2	1,2	
	Drugs, n.o.s.	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Drugs, solid, n.o.s.	Corrosive material	NA1759	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	Keep dry

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 CFR	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(c) Passenger-carrying aircraft or railcar	(d) Cargo aircraft only	(e) Cargo vessel	(f) Passenger vessel	(g) Other requirements
	Drugs, solid, n.o.s.	Poison B	NA2811	Poison	173.364	173.365	50 pounds	200 pounds	1.3	1.3	
	Drums, empty, must be closed for the hazardous material previously contained in drum. See 173.29										
	Dry ice. See Carbon dioxide, solid										
	Dye intermediate, liquid	Corrosive material	UN2801	Corrosive	173.244	173.243a	1 quart	10 gallons	1.2	1.2	Stow away from foodstuffs and living quarters
	Dynamite. See High explosive										
	Electric blasting caps. See Detonators, Class A or Class C explosives										
	Electric squib	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1.3	1.3	
	Electrolyte (acid) battery fluid (not over 47% acid) See Battery fluid, acid										
	Empty cartridge bag with black powder igniter	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1.3	1.3	
	Endosulfan	Poison B	NA2761	Poison	173.364	173.365	1 pound	10 pounds	1.2	1.2	If stowed under deck, must be stowed in a recoverable location
	Endosulfan mixture, liquid	Poison B	NA2761	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Endrin	Poison B	NA2761	Poison	173.364	173.365	1 pounds	10 pounds	1.2	1.2	If stowed under deck, must be stowed in a recoverable location
	Endrin mixture, liquid	Poison B	NA2761	Poison	173.345 173.120	173.346	1 quart	55 gallons	1.2	1.2	
	Engine, internal combustion										
	Engine starting fluid	Flammable gas	UN1960	Flammable gas	None	173.304	Forbidden	60 pounds	1.2	5	
	Epichlorohydrin	Flammable liquid	UN2023	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Escape or Evacuation slide, Inflatable. See Life rafts, Inflatable										
	Etching acid, liquid, n.o.s.	Corrosive material	NA1760	Corrosive	None	173.299	Forbidden	10 pounds	1	5	
	Ethane or Ethane, compressed	Flammable gas	UN1035	Flammable gas	173.306	173.304	Forbidden	300 pounds	1.2	4	Stow away from living quarters
	Ethane-Propane mixture, refrigerated liquid	Flammable gas	UN1961	Flammable gas	None	173.315	Forbidden	Forbidden	1	5	Stow away from living quarters
	Ethane, refrigerated liquid	Flammable gas	UN1961	Flammable gas	None	173.315	Forbidden	Forbidden	1	5	Stow away from living quarters
	Ethanol amine dinitrate	Forbidden									
	Ethanol. See Ethyl alcohol										
	Ethion	Poison B	NA2783	Poison	173.345	173.346	Forbidden	1 quart	1.2	1.2	
	Ethion mixture, dry	Poison B	NA2783	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Ethyl acetate	Flammable liquid	UN1173	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Ethyl acrylate, inhibited	Flammable liquid	UN1917	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Ethyl alcohol	Flammable liquid	UN1170	Flammable liquid	173.118	173.125	1 quart	10 gallons	1.2	1	
	Ethyl aldehyde. See Acetaldehyde										
	Ethyl benzene	Flammable liquid	UN1175	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Ethyl borate	Flammable liquid	UN1176	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	Keep dry
	Ethyl butyl acetate	Combustible liquid	UN1177	None	173.118a	None	No limit	No limit	1.2	1.2	
	Ethyl butyl ether	Flammable liquid	UN1179	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Ethyl butyraldehyde	Flammable liquid	UN1178	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Ethyl butyrate	Flammable liquid	UN1180	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Ethyl chloride	Flammable liquid	UN1037	Flammable liquid	None	173.123	Forbidden	See 173.123	1.2	1	Segregation same as for flammable gases
	Ethyl chloroacetate	Combustible liquid	UN1181	None	173.118a	None	No limit	No limit	1.2	1.2	
	Ethyl chloroformate (chlorocarbonate)	Flammable liquid	UN1182	Flammable liquid and Poison	None	173.258	Forbidden	5 pints	1.2	1	
	Ethyl chlorothioformate	Corrosive material	UN2826	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1.2	1	
	Ethyl crotonate	Flammable liquid	UN1862	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
¹/ A/ W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or rail car	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Ethyl 3,3-di-(tert-butylperoxy)butyrate, technically pure See Organic peroxide, liquid or solution, n.o.s.		UN2184								
	Ethyl 3,3-di-(tert-butylperoxy)butyrate, not more than 77% in solution See Organic peroxide, liquid or solution, n.o.s.		UN2185								
	Ethyl 3,3-di-(tert-butylperoxy)butyrate, not more than 50% with inert inorganic solid See Organic peroxide, solid, n.o.s.		UN2598								
	Ethyl dichloroarsine	Flammable liquid	UN1183	Flammable liquid	None	173.135	Forbidden	5 pints	1,2	1	
	Ethyl phosphonothioic dichloride, anhydrous	Corrosive material	NA1760	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1	4	
	Ethylene chlorohydrin	Poison B	UN1135	Poison	173.345	173.348 173.34	1 quart	55 gallons	1,2	1	Segregation same as for flammable liquids
	Ethylenediamine	Corrosive material	UN1604	Corrosive	173.244	173.245	1 quart	55 gallons	1,2	1,2	
	Ethylene diamine diperchlorate	Forbidden									
	Ethylene dibromide	Poison B	UN1605	Poison	173.345	173.348	1 quart	55 gallons	1,2	1,2	Stow away from living quarters
	Ethylene dichloride	Flammable liquid	UN1184	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Ethylene glycol diethyl ether (Diethyl Cellosolve)	Flammable liquid	UN1153	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1,2	
	Ethylene glycol dinitrate	Forbidden									
	Ethylene glycol monoethyl ether (Cellosolve)	Combustible liquid	UN1171	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethylene glycol monoethyl ether acetate (Cellosolve acetate)	Combustible liquid	UN1172	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethylene glycol monomethyl ether (methyl Cellosolve)	Combustible liquid	UN1188	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethylene glycol monomethyl ether acetate (methyl Cellosolveacetate)	Combustible liquid	UN1189	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethylene imine, inhibited	Flammable liquid	UN1185	Flammable liquid and Poison	None	173.139	Forbidden	5 pints	1,2	1	
+	Ethylene or Ethylene, compressed	Flammable gas	UN1962	Flammable gas	173.306	173.304	Forbidden	300 pounds	1,2	4	Stow away from living quarters
	Ethylene oxide	Flammable liquid	UN1040	Flammable liquid	None	173.124	Forbidden	See 173.124	1,2	1	Segregation same as for flammable gases
	Ethylene, refrigerated liquid (cryogenic liquid)	Flammable gas	UN1038	Flammable gas	None	173.318 173.319	Forbidden	Forbidden	1	5	Stow away from living quarters
	Ethyl ether	Flammable liquid	UN1155	Flammable liquid	None	173.119	Forbidden	10 gallons	1,3	5	
	Ethyl formate	Flammable liquid	UN1190	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,3	4	
	Ethylhexaldehyde	Combustible liquid	UN1191	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethyl hydroperoxide (explodes above 100 deg C)	Forbidden									
	Ethyl lactate	Combustible liquid	UN1192	None	173.118a	None	No limit	No limit	1,2	1,2	
	Ethyl mercaptan	Flammable liquid	UN2363	Flammable liquid	None	173.141	Forbidden	10 gallons	1,2	1	
	Ethyl methyl ether	Flammable liquid	UN1039	Flammable liquid	None	173.119	Forbidden	10 gallons	1,3	1	Segregation same as for flammable gases
	Ethyl methyl ketone	Flammable liquid	UN1193	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Ethyl nitrate (nitric ether)	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	Forbidden	Forbidden	1,2	1	
	Ethyl nitrite (nitrous ether)	Flammable liquid	UN1194	Flammable liquid	None	173.119	Forbidden	Forbidden	1,3	5	
	Ethyl perchlorate	Forbidden									
	Ethyl phenyl dichloroarsine	Corrosive material	UN2435	Corrosive	None	173.290	Forbidden	10 gallons	1	5	
	Ethyl phosphonothioic dichloride, anhydrous	Corrosive material	NA1760	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1	4	
	Ethyl phosphonous dichloride. See Pyrophoric liquid, n.o.s.										
	Ethyl phosphorodichloridate	Corrosive material	NA1760	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1	4	
	Ethyl propionate	Flammable liquid	UN1195	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	

§ 172.101 Hazardous Materials Table—Continued

(1) 47 AV W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(c) Other requirements
	Ethyl silicate (tetraethyl orthosilicate)	Combustible liquid	UN1292	None	173.118a	None	No limit	No limit	12	12	
	Ethyl trichloroacetate	Flammable liquid	UN1196	Flammable liquid	None	173.135	Forbidden	5 pints	12	1	
	Etiologic agent, A 6 8	Etiologic agent	NA2814	Etiologic agent	173.386	173.387	See 173.386	4 liters			Not permitted except under specific conditions approved by the Department
	Explosive auto alarm	Class C explosive		Explosive C	None	173.111	50 pounds	150 pounds	12	12	
	Explosive bomb	Class A explosive		Explosive A	None	173.56	Forbidden	Forbidden	12	5	Magazine stowage authorized. No other cargo may be stowed in the same hold with these items
	Explosive cable cutter	Class C explosive		Explosive C	None	173.102	50 pounds	150 pounds	13	13	
	Explosive, forbidden. See Sec. 173.51	Forbidden									
	Explosive mine	Class A explosive		Explosive A	None	173.56	Forbidden	Forbidden	12	5	Magazine stowage authorized. No other cargo may be stowed in the same hold with these items
	Explosive, new approval, and exemption. See 173.86										
	Explosive pest control devices	Class C explosive		Explosive C	None	173.100	50 pounds	150 pounds	13	13	
	Explosive power device, Class B	Class B explosive		Explosive B	None	173.94	Forbidden	150 pounds	12	5	
	Explosive power device, Class C	Class C explosive		Explosive C	None	173.102	50 pounds	150 pounds	13	13	
	Explosive projectile	Class A explosive		Explosive A	None	173.56	Forbidden	Forbidden	12	5	Magazine stowage authorized. No other cargo may be stowed in the same hold with this material
	Explosive release device	Class C explosive		Explosive C	None	173.102	50 pounds	150 pounds	13	13	
	Explosive rivet	Class C explosive		Explosive C	None	173.100	50 pounds	150 pounds	12	12	
	Explosive, sample for laboratory examination				173.86		Forbidden	See 173.86			
	Explosive torpedo	Class A explosive		Explosive A	None	173.56	Forbidden	Forbidden	12	5	Magazine stowage authorized. No other cargo may be stowed in the same hold with this material
	Extract, liquid, flavoring	Flammable liquid	UN1197	Flammable liquid	173.118	173.119	1 quart	10 gallons	12	1	
	Ferric arsenate, solid	Poison B	UN1606	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Ferric arsenite, solid	Poison B	UN1607	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
A	Ferric chloride, solid, anhydrous	ORM B	UN1773	None	173.505	173.510	25 pounds	100 pounds	12	12	
	Ferric chloride solution	Corrosive material	UN2582	Corrosive	173.244	173.245	1 quart	10 quarts	12	12	
	Ferric nitrate	Oxidizer	UN1466	Oxidizer	173.153	173.182	25 pounds	100 pounds	12	12	
W	Ferrochrome, exothermic	ORM-C		None	173.505	173.965			1	1	
W	Ferromanganese, exothermic. See Ferrochrome, exothermic										
W	Ferrophosphorus	ORM A		None	173.505	173.635			12	12	Keep dry. Stow away from living quarters
AW	Ferrosilicon, containing 30% or more but not more than 70% silicon	ORM A	UN1408	None	173.505	173.645	Forbidden	25 pounds	12	12	Keep dry. Stow away from living quarters. Segregation same as for flammable solids labeled Dangerous When Wet
	Ferrous arsenate, solid	Poison B	UN1608	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
A	Ferrous chloride, solid	ORM B	NA1759	None	173.505	173.510	No limit	No limit	12	12	
	Ferrous chloride, solution	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	5 gallons	12	12	
	Fertilizer ammoniating solution containing free ammonia (more than 25.3 psig)	Nonflammable gas	UN1043	Nonflammable gas	173.306	173.304 173.314	Forbidden	300 pounds	12	4	
W	Fibers (jute, hemp, flax, sisal, coir, kapok, and similar vegetable fibers)	ORM-C	NA1372	None	173.505	173.965			12	12	Stow away from animal or vegetable oils. Segregation same as for flammable solids
	Film (nitrocellulose)	Flammable solid	NA1324	Flammable solid	None	173.177	50 pounds	200 pounds	13	13	Stow away from all flammable cargo or substances
	Firecracker. See Fireworks, common or special										
	Firecracker salute. See Fireworks, common or special										
	Fire extinguisher	Nonflammable gas	UN1044	Nonflammable gas	173.306		150 pounds	300 pounds	12	12	
	Fire extinguisher charge containing not more than 50 grains of propellant explosive per unit. Not subject to requirements of this subchapter										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
+/A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Fire extinguisher charge containing sulfuric acid	Corrosive material	UN1774	Corrosive	173.261		1 quart	1 gallon	1,2	1,2	
	Fireworks, common	Class C explosive		Explosive C	None	173.100 173.108	50 pounds	200 pounds	1,3	1,3	Passenger vessels in metal lockers only
	Fireworks, exhibition display piece. See Fireworks, special										
	Fireworks, special	Class B explosive		Explosive B	None	173.88 173.91	Forbidden	200 pounds	3	3	Passenger vessels in metal lockers only. Toy torpedoes must not be packed with other special fireworks
W	Fish meal or fish scrap containing 6% to 12% water	ORM C	NA2216	None	173.505	173.995			1,2	1,2	Segregation same as for flammable solids. Separate from flammable gases or liquids, oxidizing materials, or organic peroxides. Use double strip stowage for cargo, 6-12 percent moisture containing not more than 12 percent fat. Use single strip stowage for cargo 6-12 percent moisture containing 12-15 percent fat
	Fish meal or fish scrap containing less than 6% or more than 12% water	Flammable solid	NA1374	Flammable solid	None	173.174	Forbidden	Forbidden	1,2	1,2	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Fissile radioactive material. See Radioactive material, fissile										
	Flame retardant compound liquid	Corrosive material	NA1760	Corrosive	173.244	173.291	1 quart	10 gallons	1,2	1,2	
	Flammable gas n.o.s. See Compressed gas, n.o.s.										
	Flammable liquid, corrosive, n.o.s.	Flammable liquid	UN2924	Flammable liquid and Corrosive	None	173.119	1 quart	1 quart	1,2	1	
	Flammable liquid, n.o.s.	Flammable liquid	UN1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Flammable liquid, poisonous, n.o.s.	Flammable liquid	UN1992	Flammable liquid and Poison	None	173.119	1 quart	10 gallons	1,2	1	
	Flammable solid, corrosive, n.o.s.	Flammable solid	UN2925	Flammable solid and Corrosive	173.153	173.154	25 pounds	25 pounds	1	4	
	Flammable solid, n.o.s.	Flammable solid	UN1325	Flammable solid	173.153	173.154	25 pounds	25 pounds	1,2	1,2	
	Flammable solid, poisonous, n.o.s.	Flammable solid	UN2926	Flammable solid and Poison	173.153	173.154	25 pounds	25 pounds	1,2	1	
	Flare. See Fireworks, common										
	Flare, airplane. See Fireworks, special										
	Flash cartridge. See Fireworks, special or Low explosives										
	Flash cracker. See Fireworks, common or special										
	Flash powder. See Fireworks, special or Low explosives										
	Flexible linear shaped charge, metal clad	Class C explosive		Explosive C	None	173.104	50 pounds	300 pounds	1,3	1,3	
	Flowers of sulfur. See Sulfur										
	Flue dust, poisonous	Poison B	NA2811	Poison	173.364	173.368	50 pounds	200 pounds	1,2	1,2	
	Fluoboric acid	Corrosive material	UN1775	Corrosive	173.244	173.283	1 quart	1 gallon	1,2	1,2	
	Fluoric acid. See Hydrofluoric acid										
	Fluorine	Nonflammable gas	UN1045	Poison and Oxidizer	None	173.302	Forbidden	Forbidden	1	5	Stow in well ventilated space away from organic materials
	Fluorophosphoric acid, anhydrous. See Monofluorophosphoric acid, anhydrous										
	Fluorosilicic acid. See Hydrofluorosilicic acid										
	Fluorosulfonic acid or Fluosulfonic acid	Corrosive material	UN1777	Corrosive	None	173.274	Forbidden	1 gallon	1	5	Keep dry
	Fluosilicic acid	Corrosive material	UN1778	Corrosive	None	173.265	1 quart	1 gallon	1,2	1,2	
	Forbidden explosives. See 173.51	Forbidden									
	Forbidden materials. See 173.21	Forbidden									
AW	Formaldehyde solution (*flash point more than 141 deg F, in containers of 110 gallons or less*)	ORM A	UN2209	None	173.505	173.510	10 gallons	55 gallons	1,2	4	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
49 A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Formaldehyde solution (flash point not more than 141 deg F, in containers over 110 gallons)	Combustible liquid	UN1198	None	173.118a	None	10 gallons	55 gallons	1,2	1,2	
A/W	Formaldehyde solution (flash point not more than 141 deg F, in containers of 110 gallons or less)	ORM A	UN1198	None	173.505	173.510	10 gallons	55 gallons	1,2	4	
	Formaldehyde solution (flash point more than 141 deg F, in containers over 110 gallons)	Combustible liquid	UN2209	None	173.118a	None	10 gallons	55 gallons	1,2	1,2	
	Formalin. See Formaldehyde solution										
	Formic acid	Corrosive material	UN1779	Corrosive	173.244	173.289	1 quart	5 gallons	1,2	1,2	Glass carboys in hampers not permitted under deck
	Formic acid solution	Corrosive material	UN1779	Corrosive	173.244	173.289	1 quart	5 gallons	1,2	1,2	
	Fuel, aviation, turbine engine	Flammable liquid	UN1863	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Fuel, aviation, turbine engine	Combustible liquid	UN1863	None	173.118a	None	No limit	No limit	1,2	1,2	
	Fuel oil	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1,2	1,2	
	Fuel oil, diesel. See Fuel oil										
	Fuel oil, No. 1, 2, 4, 5 or 6	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1,2	1,2	
	Fulminate of mercury (dry)	Forbidden									
	Fulminate of mercury wet. See Initiating explosive										
	Fulminating gold	Forbidden									
	Fulminating mercury	Forbidden									
	Fulminating platinum	Forbidden									
	Fulminating silver	Forbidden									
	Fulminic acid	Forbidden									
	Fumaryl chloride	Corrosive material	UN1780	Corrosive	173.244	173.245	1 quart	1 quart	1	1	Glass carboys not permitted
	Fumigant. See 173.153(a) Note 8										
	Furan	Flammable liquid	UN2389	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Furfural	Combustible liquid	UN1199	None	173.118a	None	No limit	No limit	1,2	1	
	Fuse (safety or highway)	Flammable solid	NA1325	Flammable solid	None	173.154a	50 pounds	200 pounds	1,3	1,3	
	Fuse igniter	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1,3	1,3	
	Fuse, instantaneous	Class C explosive		Explosive C	173.100		50 pounds	150 pounds	1,2	1,2	
	Fuse lighter	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1,3	1,3	
	Fuse oil	Combustible liquid	UN1201	None	173.118a	None	No limit	No limit	1,2	1,2	
	Fuse, mild detonating, metal clad	Class C explosive		Explosive C	None	173.104	50 pounds	300 pounds	1,2	1,2	
	Fuse, safety	Class C explosive		Explosive C	173.100	173.100	50 pounds	300 pounds	1,2	1,2	
	Fuze, combination	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Fuze, detonating	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	6	5	
	Fuze, detonating, Class C explosive	Class C explosive		Explosive C	None	173.113	50 pounds	150 pounds	1,3	1,3	
	Fuze, detonating, radioactive	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	6	5	
	Fuze, percussion	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Fuze, time	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Fuze, tracer	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Gelatinan trinitrate	Forbidden									
	Gallium metal, liquid	ORM-B	UN2803	None	None	173.861	Forbidden	Forbidden	1	5	None
	Gallium metal, solid	ORM-B	UN2803	None	None	173.862	40 pounds	40 pounds	1,3	1	Shade from radiant heat
	Gas cylinder, empty. See Cylinder, empty										
	Gas drips, hydrocarbon	Combustible liquid	UN1864	None	173.118a	None	No limit	No limit	1,2	1,2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Gas drips, hydrocarbon	Flammable liquid	UN1864	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Gas identification set	Poison A	NA3035	Poison gas	None	173.331	Forbidden	Forbidden	1	5	
	Gas identification set	Irritating material	NA3035	Irritant	None	173.331	Forbidden	Forbidden	1	5	
	Gas mine. See Explosive mine										
	Gasohol (gasoline mixed with ethyl alcohol containing 20% maximum alcohol). See Gasoline										
	Gasoline (including casing head and natural)	Flammable liquid	UN1203	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Gelatine Dynamite. See High explosive										
	Germane	Poison A	UN2192	Poison gas and Flammable gas	None	173.328	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Glyceryl 1,3-dinitrate	Forbidden									
	Glyceryl mononitrate trinitrate	Forbidden									
	Glyceryl nonitrate trinitrate	Forbidden									
	Grenade without bursting charge (With incendiary material)	Class B explosive		Explosive B	None	173.91	Forbidden	Forbidden	3	3	Passenger vessels on metal lockers only
	Grenade without bursting charge (With smoke charge) (Smoke grenade)	Class C explosive		Explosive C	None	173.108	50 pounds	150 pounds	1 3	1 3	
	Grenade without bursting charge (With Poison A gas charge)	Poison A	NA2016	Poison gas	None	173.330	Forbidden	Forbidden			See correct shipping name of applicable Poison A material for storage, special handling, and special segregation requirements
	Grenade without bursting charge (With Poison B charge)	Poison B	NA2016	Poison	None	173.350	Forbidden	Forbidden			See correct shipping name of applicable Poison B material for storage, special handling, and special segregation requirements
	Grenade, empty, primed	Class C explosive		None	None	173.107	50 pounds	150 pounds	1 3	1 3	
	Grenade, hand or rifle, explosive (with or without gas, smoke, or incendiary material)	Class A explosive		Explosive A	None	173.56	Forbidden	Forbidden	1 2	5	No other cargo may be stowed in the same hold with these items
	Grenade, tear gas	Irritating material	NA2017	Irritant	None	173.385	Forbidden	75 pounds	1 2	1	
	Guanidine nitrate	Oxidizer	UN1467	Oxidizer	173.153	173.182	25 pounds	100 pounds	1 2	1 2	Separate from nitro-compounds, chlorates, and acids
	Guanyl nitrosamino guanylidene hydrazine. See Initiating explosive										
	Guanyl nitrosamino guanylidene hydrazine (dry)	Forbidden									
	Guanyl nitrosamino guanyl tetrazene. See Initiating explosive										
	Guided missile, without warhead. See Rocket motor, Class A explosive or Rocket motor, Class B explosive										
	Guided missile with warhead. See Rocket ammunition with explosive, illuminating, gas, incendiary, or smoke projectile										
	Guncotton. See High explosive										
	Guthion. See Azinphos methyl										
	Guthion mixture, liquid. See Azinphos methyl mixture, liquid										
	Hafnium metal, dry (*See 173.214 Note 3*)	Flammable solid	UN2545	Flammable solid	None	173.214	Forbidden	75 pounds	1	5	
	Hafnium metal, wet	Flammable solid	UN1326	Flammable solid	None	173.214	Forbidden	150 pounds	1 2	5	
	Hand signal device	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1 2	1 2	
	Hazardous substance, liquid or solid, n.o.s. or ORM-E, liquid or solid, n.o.s.	ORM-E	NA9188	None	None	173.1300	No limit	No limit	1 2	1 2	
	Hazardous waste, liquid or solid, n.o.s.	ORM-E	NA9189	None	None	173.1300	Forbidden	550 pounds	1 2	1 2	
	Hazardous waste, meeting the definition of a hazard class other than ORM-E. See 172.101(c)(10)										
	Heater for refrigerator car, liquid fuel type (containing fuel)	Flammable liquid	NA1993	Flammable liquid	173.148		Forbidden	Forbidden	1 2	1	
	Helium or Helium, compressed	Nonflammable gas	UN1046	Nonflammable gas	173.306	173.302 173.314	150 pounds	300 pounds	1 2	1 2	
	Helium-oxygen mixture	Nonflammable gas	NA1980	Nonflammable gas	173.306	173.302	150 pounds	300 pounds	1 2	1 2	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Helium, refrigerated liquid (cryogenic liquid)	Nonflammable gas	UN1963	Nonflammable gas	173.320	173.318 173.318	100 pounds	1,100 pounds	1,3	1,3	
	Heptane	Flammable liquid	UN1206	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Hexachlorocyclopentadiene	Corrosive material	UN2646	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
W	Hexachloroethane	ORM A	NA9037	None	173.505	173.650			1,2	1,2	
	Hexadecyltrichlorosilane	Corrosive material	UN1781	Corrosive	None	173.290	Forbidden	10 gallons	1	1	Keep dry
	Hexadiene	Flammable liquid	UN2458	Flammable liquid	None	173.119	Forbidden	10 gallons	1,2	5	
	Hexaethyl tetraphosphate and compressed gas mixture	Poison A	UN1612	Poison gas	None	173.334	Forbidden	Forbidden	1	5	Shade from radiant heat
	Hexaethyl tetraphosphate, liquid	Poison B	UN1611	Poison	None	173.358	Forbidden	1 quart	1	1	
	Hexaethyl tetraphosphate mixture, dry (containing more than 2% hexaethyl tetraphosphate)	Poison B	NA2783	Poison	None	173.377	Forbidden	200 pounds	1,2	5	
	Hexaethyl tetraphosphate mixture, dry (containing not more than 2% hexaethyl tetraphosphate)	Poison B	NA2783	Poison	173.377	173.377	50 pounds	200 pounds	1,2	1	
	Hexaethyl tetraphosphate mixture, liquid (containing more than 25% hexaethyl tetraphosphate)	Poison B	NA2783	Poison	None	173.359	Forbidden	1 quart	1,2	5	
	Hexaethyl tetraphosphate mixture, liquid (containing not more than 25% hexaethyl tetraphosphate)	Poison B	UN2783	Poison	173.359	173.359	1 quart	1 quart	1,2	1	
	Hexafluorophosphoric acid	Corrosive material	UN1782	Corrosive	None	173.275	Forbidden	1 gallon	1,2	1,2	
	Hexafluoropropylene	Nonflammable gas	UN1858	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1	1	
	Hexafluoropropylene oxide	Nonflammable gas	NA1956	Nonflammable gas	173.306	173.304 173.314	150 pounds	300 pounds	1,2	1,2	
	Hexaldehyde	Flammable liquid	UN1207	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1,2	
	Hexamethylenediamine, solid	Corrosive material	UN2280	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	
	Hexamethylenediamine, solution	Corrosive material	UN1783	Corrosive	173.244	173.292	1 quart	10 gallons	1,2	1,2	
	Hexamethyleneimine	Flammable liquid	UN2493	Flammable liquid and corrosive	None	173.119	1 quart	1 gallon	1,2	1	
	Hexamethylene triperoxide diamine (dry)	Forbidden									
	Hexamethyl benzene hexanitrate	Forbidden									
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, technically pure. See Organic peroxide, solid, n.o.s.		UN2165								
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, not more than 52% with inert solid. See Organic peroxide, solid, n.o.s.		UN2166								
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2167								
	Hexane	Flammable liquid	UN1208	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,3	1	
	Hexanitroazoxy benzene	Forbidden									
	2,2',4,4',6,6'-Hexanitro-3,3'-dihydroxyazobenzene (dry)	Forbidden									
	2,2',4,4',6,6'-Hexanitrodiphenylamine	Forbidden									
	2,3',4,4',6,6'-Hexanitrodiphenylether	Forbidden									
	Hexanitrodiphenyl urea	Forbidden									
	Hexanitroethane	Forbidden									
	Hexanitrooxanilide	Forbidden									
	Hexanoic acid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Hexyltrichlorosilane	Corrosive material	UN1784	Corrosive	None	173.290	Forbidden	10 gallons	1	1	Keep dry
	High explosive	Class A explosive		Explosive A	173.55	173.61 to 173.87	Forbidden	Forbidden	6	5	
	High explosive, liquid	Class A explosive		Explosive A	None	173.62	Forbidden	Forbidden	6	5	

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
★ A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Hydraulic accumulator. See Accumulator, pressurized										
	Hydrazine, anhydrous	Flammable liquid	UN2029	Flammable liquid and Poison	None	173.276	Forbidden	5 pints	1	5	Segregation same as for corrosives
	Hydrazine, aqueous solution	Corrosive material	UN2030	Corrosive	None	173.276	Forbidden	5 pints	1	5	
	Hydrazine azide	Forbidden									
	Hydrazine chlorate	Forbidden									
	Hydrazine dicarbonic acid diazide	Forbidden									
	Hydrazine perchlorate	Forbidden									
	Hydrazine selenate	Forbidden									
	Hydriodic acid	Corrosive material	UN1787	Corrosive	173.244	173.245	1 quart	1 gallon	1	1	Glass carboys *not permitted* on passenger vessel
	Hydrobromic acid, more than 49% strength	Corrosive material	UN1788	Corrosive	None	173.262	Forbidden	Forbidden	1	1	Glass carboys *not permitted* on passenger vessel
	Hydrobromic acid, anhydrous. See Hydrogen bromide										
	Hydrobromic acid not more than 49% strength	Corrosive material	UN1788	Corrosive	173.244	173.262	1 quart	1 gallon	1	1	Glass carboys *not permitted* on passenger vessel
★	Hydrocarbon gas, liquefied	Flammable gas	UN1965	Flammable gas	173.306	173.304 173.314	Forbidden	300 pounds	1,2	1	
★	Hydrocarbon gas, nonliquefied	Flammable gas	UN1964	Flammable gas	173.306	173.302	Forbidden	300 pounds	1,2	1	
	Hydrochloric acid	Corrosive material	UN1789	Corrosive	173.244	173.263	1 quart	1 gallon	1	1	Glass carboys *not permitted* on passenger vessel
	Hydrochloric acid, anhydrous. See Hydrogen chloride										
	Hydrochloric acid mixture	Corrosive material	NA1789	Corrosive	173.244	173.263	1 quart	1 gallon	1	1	Glass carboys *not permitted* on passenger vessel
	Hydrochloric acid solution, inhibited	Corrosive material	UN1789	Corrosive	173.244	173.263	1 quart	1 gallon	1	1	Glass carboys *not permitted* on passenger vessel
	Hydrocyanic acid, liquefied	Poison A	NA1051	Poison gas and Flammable gas	None	173.332	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Hydrocyanic acid (prussic) unstabilized	Forbidden									
	Hydrocyanic acid solution (5% or more hydrocyanic acid)	Poison A	UN1613	Poison gas and Flammable gas	None	173.332	Forbidden	Forbidden	1	5	Shade from radiant heat. Aqueous solutions containing more than 20 percent hydrogen cyanide are not permitted in transportation by water. Segregation same as for flammable gases
★	Hydrocyanic acid solution, less than 5% hydrocyanic acid	Poison B	UN1613	Poison	None	173.351	Forbidden	25 pounds	1	5	Shade from radiant heat
	Hydrofluoric acid, anhydrous. See Hydrogen fluoride										
	Hydrofluoric acid solution	Corrosive material	UN1790	Corrosive	173.244	173.264	1 quart	1 gallon	1	4	
	Hydrofluoric and sulfuric acid mixture	Corrosive material	UN1786	Corrosive	None	173.290	Forbidden	1 gallon	1	5	
	Hydrofluoroboric acid. See Fluoboric acid										
	Hydrofluorosilicic acid or Hydrofluosilicic acid	Corrosive material	NA1778	Corrosive	None	173.265	1 quart	1 gallon	1,2	1,2	
	Hydrogen bromide	Nonflammable gas	UN1048	Nonflammable gas	173.306	173.304	Forbidden	300 pounds	1	4	
	Hydrogen chloride or Hydrogen chloride, anhydrous	Nonflammable gas	UN1050	Nonflammable gas	173.306	173.304	Forbidden	300 pounds	1	4	Stow away from foodstuff and living quarters
	Hydrogen chloride, refrigerated liquid	Nonflammable gas	UN2186	Nonflammable gas	None	173.314 173.315	Forbidden	300 pounds	1,2	4	Stow in well ventilated space
	Hydrogen fluoride	Corrosive material	UN1052	Corrosive	None	173.264	Forbidden	110 pounds	1	5	Segregation same as for nonflammable gases
	Hydrogen iodide solution. See Hydriodic acid										
★	Hydrogen or Hydrogen, compressed	Flammable gas	UN1049	Flammable gas	173.306	173.302 173.314	Forbidden	300 pounds	1,2	4	Stow away from living quarters
	Hydrogen peroxide solution (40% to 52% peroxide)	Oxidizer	UN2014	Oxidizer	173.244	173.256	Forbidden	Forbidden	1	4	Shade from radiant heat. Separate from permanganates. Keep away from powdered metals
	Hydrogen peroxide solution (8% to 40% peroxide)	Oxidizer	UN2014	Oxidizer	173.244	173.256	1 quart	1 gallon	1,2	1	Shade from radiant heat. Separate from permanganates. Keep away from powdered metals
	Hydrogen peroxide solution (over 52% peroxide)	Oxidizer	UN2015	Oxidizer and Corrosive	None	173.256	Forbidden	Forbidden	1	5	Shade from radiant heat. Separate from permanganates. Keep away from powdered metals. Concentrations greater than 86% hydrogen peroxide not permitted on any vessel except under conditions approved by the Department

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Hydrogen, refrigerated liquid (cryogenic liquid)	Flammable gas	UN1966	Flammable gas	None	173.316 173.318 173.319	Forbidden	Forbidden	5	5	
A	Hydrogen selenide	Flammable gas	UN2202	Flammable gas and Poison	None	173.329	Forbidden	Forbidden	1	5	
	Hydrogen sulfate. *See* Sulfuric acid										
A	Hydrogen sulfide	Flammable gas	UN1053	Flammable gas and Poison	None	173.304 173.314	Forbidden	300 pounds	1	5	
	Hydrofluorosilicic acid. *See* Hydrofluoric acid										
	Hydroxylamine iodide	Forbidden									
	Hypochlorite solution containing more than 7% available chlorine by weight	Corrosive material	UN1791	Corrosive	173.244	173.277	1 quart	6 gallons	1.2	1	Glass carboys in hampers not permitted under deck
A	Hypochlorite solution containing not more than 7% available chlorine by weight	ORM B	NA1791	None	173.505	173.510	No limit	No limit			
	Hyponitrous acid	Forbidden									
	Igniter	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1.3	1.3	
	Igniter cord	Class C explosive		Explosive C	None	173.100	50 pounds	150 pounds	1.3	1.3	
	Igniter fuse, metal clad	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1.3	1.3	
	Igniter, jet thrust (jato)	Class A explosive		Explosive A	None	173.79	Forbidden	Forbidden	6	5	
	Igniter, jet thrust (jato)	Class B explosive		Explosive B	None	173.92	Forbidden	550 pounds	1.3	5	
	Igniter, rocket motor	Class A explosive		Explosive A	None	173.79	Forbidden	Forbidden	6	5	
	Igniter, rocket motor	Class B explosive		Explosive B	None	173.92	Forbidden	550 pounds	1.3	5	
	Illuminating projectile. *See* Fireworks, special										
	Imidobispropylamine	Corrosive material	UN2269	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Infectious substance, human, n.o.s. *See* Etiologic agent, n.o.s.		UN2814								
	Initiating explosive (Azidodinitrophenol)	Class A explosive		Explosive A	None	173.70	Forbidden	Forbidden	6	5	
	Initiating explosive (Fulminate of mercury)	Class A explosive		Explosive A	None	173.71	Forbidden	Forbidden	6	5	
	Initiating explosive (guanyl nitrosamino guanyltetrene hydrazine)	Class A explosive		Explosive A	None	173.72	Forbidden	Forbidden	6	5	
	Initiating explosive (lead azide, dextrinated type only)	Class A explosive		Explosive A	None	173.73	Forbidden	Forbidden	6	5	
	Initiating explosive (lead mononitroresorcinate)	Class A explosive		Explosive A	None	173.79	Forbidden	Forbidden	6	5	
	Initiating explosive (lead styphnate, monohydrate, lead styphnate (lead trinitroresorcinate))	Class A explosive		Explosive A	None	173.74	Forbidden	Forbidden	6	5	
	Initiating explosive (mercury oxalate)	Class A explosive		Explosive A	None	173.75	Forbidden	Forbidden	6	5	
	Initiating explosive (nitroguanidine)	Class A explosive		Explosive A	None	173.76	Forbidden	Forbidden	6	5	
	Initiating explosive (pentaerythrite tetranitrate)	Class A explosive		Explosive A	None	173.77	Forbidden	Forbidden	6	5	
	Initiating explosive (tetrazene (guanyl nitrosamine guanyl tetrazene))	Class A explosive		Explosive A	None	173.78	Forbidden	Forbidden	6	5	
	Initiating explosives (dry)	Forbidden									
	Ink	Combustible liquid	UN1210	None	173.118a	None	No limit	No limit	1.2	1.2	
	Ink	Flammable liquid	UN1210	Flammable liquid	173.118	173.144	1 quart	10 gallons	1.2	1	
	Inositol hexanitrate (dry)	Forbidden									
	Insecticide, dry, n.o.s.	Poison B	NA2588	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Insecticide, liquefied gas (containing no Poison A or B material)	Nonflammable gas	NA1968	Nonflammable gas	173.306	173.304	150 pounds	300 pounds	1.3	1.3	
	Insecticide, liquefied gas, containing Poison A material or Poison B material	Poison A	NA1967	Poison gas	None	173.329 173.334	Forbidden	Forbidden	1	5	Shade from radiant heat
	Insecticide, liquid, n.o.s.	Combustible liquid	NA1993	None	173.118a	None	No limit	No limit	1.2	1.2	
	Insecticide, liquid, n.o.s.	Flammable liquid	NA1993	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
ATA/IATA	Hazardous materials descriptions and proper shipping names	Hazard class	Identification numbers	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Insecticide, liquid, n.o.s.	Poison B	NA2902	Poison	173.345	173.346	1 quart	55 gallons	1 2	1 2	
	Iodic anhydride (dry)	Forbidden									
	Iodine azide (dry)	Forbidden									
	Iodine monochloride	Corrosive material	UN1792	Corrosive	None	173.263	Forbidden	1 quart	1	5	Keep dry
	Iodine pentafluoride	Oxidizer	UN2495	Oxidizer and Poison	None	173.245	Forbidden	100 pounds	1	1	Keep dry
	Iodoxy compounds (dry)	Forbidden									
	Iridium nitratopentamine iridium nitrate	Forbidden									
	Iron chloride, solid. See Ferric chloride, solid										
	Iron mass or sponge, not properly oxidized	Flammable solid	NA1383	Flammable solid	None	173.174	Forbidden	Forbidden	1 2	5	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Iron mass or sponge, spent	Flammable solid	UN1376	Flammable solid	None	173.174	Forbidden	Forbidden	1 2	5	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Iron oxide, spent. See Iron mass or sponge, spent										
	Iron sesquichloride, solid. See Ferric chloride										
	Irritating agent, n.o.s.	Irritating material	NA1693	Irritant	None	173.382	Forbidden	75 pounds	1	1	Stow away from living quarters
	Isobutane or Liquefied petroleum gas. See Liquefied petroleum gas										
	Isobutyl acetate	Flammable liquid	UN1213	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Isobutylamine	Flammable liquid	UN1214	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Isobutylene or Liquefied petroleum gas. See Liquefied petroleum gas										
	Isobutyric acid	Corrosive material	UN2529	Corrosive	173.244	173.245	1 quart	10 gallons	1 2	1 2	
	Isobutyric anhydride	Corrosive material	UN2530	Corrosive	173.244	173.245	1 quart	10 gallons	1 2	1 2	
	Isononanyl peroxide, technically pure or Isononanyl peroxide, in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2128								
	Isooctane	Flammable liquid	UN1262	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Isooctene	Flammable liquid	UN1216	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 3	4	
	Isopentane	Flammable liquid	UN1265	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1 3	4	
	Isopentanoic acid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1 2	1 2	
	Isoprene	Flammable liquid	UN1218	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1 3	4	
	Isopropanol	Flammable liquid	UN1219	Flammable liquid	173.118	173.125	1 quart	10 gallons	1 2	1	
	Isopropyl acetate	Flammable liquid	UN1220	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Isopropyl acid phosphate, solid	Corrosive material	UN1793	Corrosive	173.244	173.245b	25 pounds	100 pounds	1 2	1 2	
	Isopropyl alcohol. See Isopropanol										
	Isopropylamine	Flammable liquid	UN1221	Flammable liquid	None	173.119	Forbidden	10 gallons	1 3	5	
	Isopropyl mercaptan	Flammable liquid	UN2703	Flammable liquid	None	173.141	Forbidden	10 gallons	1 3	5	
	Isopropyl nitrate	Flammable liquid	UN1222	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Isopropyl percarbonate, stabilized	Organic peroxide	NA2134	Organic peroxide	None	173.262	Forbidden	Forbidden	5	5	
	Isopropyl percarbonate, unstabilized	Organic peroxide	NA2133	Organic peroxide	None	173.218	Forbidden	Forbidden	5	5	
	Isopropyl peroxydicarbonate, technically pure. See Isopropyl percarbonate, unstabilized		UN2133								
	Isopropyl peroxydicarbonate, not more than 52% in solution. See Organic peroxide, liquid or solution, n.o.s.		UN2134								
	Isopropyl phosphoric acid, solid. See Isopropyl acid phosphate, solid										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging (a)	(5) Packaging (b)	(6) Maximum net quantity in one package (a)	(6) Maximum net quantity in one package (b)	(7) Water shipments (a)	(7) Water shipments (b)	(7) Water shipments (c)
+/ A/ W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	Exceptions	Specific requirements	Passenger-carrying aircraft or railcar	Cargo aircraft only	Cargo vessel	Passenger vessel	Other requirements
	Isothiocyanic acid (polymerization hazard)	Forbidden									
	Jet thrust igniter. See Igniter, jet thrust										
	Jet thrust unit (jato)	Class A explosive		Explosive A	None	173.79	Forbidden	Forbidden	6	5	
	Jet thrust unit (jato)	Class B explosive		Explosive B	None	173.92	Forbidden	550 pounds	1,3	5	
	Kerosene	Combustible liquid	UN1223	None	173.118a	None	No limit	No limit	1,2	1,2	
	Lacquer base or Lacquer chips, plastic (wet with alcohol or solvent)	Flammable liquid	UN1263	Flammable liquid	173.118	173.127	1 quart	25 pounds	1,2	1	
	Lacquer base, or Lacquer chips, dry	Flammable solid	NA2557	Flammable solid	173.153	173.175	25 pounds	100 pounds	1	1	
	Lauryl peroxide	Organic peroxide	UN2124	Organic peroxide	173.153	173.157 173.158	2 pounds	25 pounds	1,2	1	
	Lauryl peroxide, not more than 42%, stable dispersion, in water. See Organic peroxide, liquid or solution, n.o.s.		UN2893								
	Lauryl peroxide, technically pure. See Lauryl peroxide		UN2124								
	Lead arsenate, solid	Poison B	UN1617	Poison	173.364	173.367	50 pounds	200 pounds	1,2	1,2	
	Lead arsenite, solid	Poison B	UN1618	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Lead azide. See Initiating explosive										
	Lead azide (dry)	Forbidden									
A	Lead chloride	ORM-B	NA2291	None	173.505	173.500	25 pounds	100 pounds	1,2	1,2	
	Lead cyanide	Poison B	UN1620	Poison	173.370		25 pounds	No limit	1,2	1,2	Stow away from acids
W	Lead dross (containing 3% or more free acid)	ORM-C	NA1794	None	173.505	173.1010			1,2	1,2	Segregation same as for corrosive materials
A	Lead fluoborate	ORM-B	NA2291	None	173.505	173.510	25 pounds	100 pounds	1,2	1,2	
A	Lead fluoride	ORM-B	NA2811	None	173.505	173.510	25 pounds	100 pounds	1,2	1,2	
	Lead mononitroresorcinate. See Initiating explosive										
	Lead mononitroresorcinate (dry)	Forbidden									
	Lead nitrate	Oxidizer	UN1469	Oxidizer	173.153	173.182	25 pounds	100 pounds	1,2	1,2	Stow away from foodstuffs
	Lead peroxide	Oxidizer	UN1872	Oxidizer	173.153	173.154	25 pounds	100 pounds	1,2	1,2	Stow away from foodstuffs
	Lead picrate (dry)	Forbidden									
W	Lead scrap. See Lead dross										
	Lead styphnate (dry)	Forbidden									
	Lead styphnate (lead trinitroresorcinate). See Initiating explosive										
	Lead sulfate, solid (containing more than 3% free acid)	Corrosive material	UN1794	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	
	Liferaft, inflatable	ORM-C		None	None	173.906	1 per inaccessible cargo compartment	No limit	1,2	1,2	
	Lime-nitrogen. See Calcium cyanamide, not hydrated										
	Lime, unslaked. See Calcium oxide										
A	Lindane	ORM-A	NA2761	None	173.505	173.510	No limit	No limit	1,2	1,2	
+	Liquefied hydrocarbon gas. See Hydrocarbon gas, liquefied										
	Liquefied nonflammable gas (charged with nitrogen, carbon dioxide, or air)	Nonflammable gas	NA1058	Nonflammable gas	173.306	173.304	300 pounds	300 pounds	1,2	1,2	
+	Liquefied petroleum gas	Flammable gas	UN1075	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	1	
	Liquid other than one classed as flammable, corrosive, poison or irritant, charged with nitrogen, carbon dioxide, or air. See Compressed gas n.o.s.										
	Lithium acetylide-ethylene diamine complex	Flammable solid	NA2813	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1,2	5	Segregation same as for flammable solid labeled Dangerous When Wet
	Lithium aluminum hydride	Flammable solid	UN1410	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1,2	5	Segregation same as for flammable solid labeled Dangerous When Wet

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
49 CFR	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Lithium aluminum hydride, ethereal	Flammable liquid	UN1411	Flammable liquid	None	173.137	Forbidden	1 quart	1	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium amide, powdered	Flammable solid	UN1412	Flammable solid	173.153	173.168	25 pounds	100 pounds	1 2	4	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium batteries, for disposal (*Lithium battery. See 173.206(f)*)	ORM C		None	None	173.1015	Forbidden	Forbidden			
	Lithium borohydride	Flammable solid	UN1413	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium ferrosilicon	Flammable solid	UN2830	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium hydride	Flammable solid	UN1414	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium hydride in fused solid form	Flammable solid	UN2805	Flammable solid and Dangerous when wet	None	173.206	Forbidden	100 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium hypochlorite compound, dry (containing more than 39% available chlorine)	Oxidizer	UN1471	Oxidizer	173.153	173.217	50 pounds	100 pounds	1 2	1 2	
	Lithium metal	Flammable solid	UN1415	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium metal, in cartridges	Flammable solid	UN1415	Flammable solid and Dangerous when wet	173.206	173.206	1 pound	25 pounds	1 2	4	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium nitride	Flammable solid	UN2806	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Lithium peroxide	Oxidizer	UN1472	Oxidizer	173.153	173.154	25 pounds	100 pounds	1 2	1 2	Keep dry
	Lithium silicon	Flammable solid	UN1417	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	1 2	Segregation same as for flammable solids labeled Dangerous When Wet
	London purple, solid	Poison B	UN1621	Poison	173.364	173.365	50 pounds	200 pounds	1 2	1 2	
	Low blasting explosive. *See* Low explosive										
	Low explosive	Class A explosive		Explosive A	None	173.53	Forbidden	Forbidden	6	5	
	Lye. *See* Sodium hydroxide, solid										
	Magnesium aluminum phosphide	Flammable solid	UN1419	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1 2	1 2	Segregation same as for flammable solids labeled Dangerous When Wet
+	Magnesium arsenate, solid	Poison B	UN1622	Poison	173.364	173.367	50 pounds	200 pounds	1 2	1 2	
	Magnesium dross, wet or hot. *See 173.173*	Forbidden									
	Magnesium granules coated, particle size not less than *149* microns	Flammable solid	UN2950	Flammable solid and Dangerous when wet	173.153	173.178	25 pounds	100 pounds	1 2	1 2	Segregation same as for flammable solids labeled Dangerous When Wet
	Magnesium, metal (powdered, pellets, turnings, or ribbon) or Magnesium aluminum powder	Flammable solid	UN1869	Flammable solid and Dangerous when wet	173.153	173.220	25 pounds	100 pounds	1 2	1 2	Segregation same as for flammable solids labeled Dangerous When Wet
	Magnesium nitrate	Oxidizer	UN1474	Oxidizer	173.153	173.182	25 pounds	100 pounds	1 2	1 2	
	Magnesium perchlorate	Oxidizer	UN1475	Oxidizer	173.153	173.154	25 pounds	100 pounds	1 3	1 3	Stow away from powdered metals
	Magnesium peroxide, solid	Oxidizer	UN1476	Oxidizer	173.153	173.154	25 pounds	100 pounds	1 2	1 2	Keep dry
	Magnesium scrap (borings, clippings, shavings, sheet, turnings, or scalpings)	Flammable solid	NA1869	Flammable solid and Dangerous when wet	173.153	173.220	Forbidden	Forbidden	1 2	1 2	Segregation same as for flammable solids labeled Dangerous When Wet
A	Magnetized material. *See 173.21(f)*										
A	Malathion	ORM A	NA2783	None	173.505	173.510	No limit	No limit	1 2	1 2	
A	Maleic acid	ORM A	NA2215	None	173.505	173.510	50 pounds	200 pounds	1 2	1 2	Keep tightly closed
AW	Maleic anhydride	ORM A	UN2215	None	173.505	173.510	50 pounds	200 pounds	1 2	1 2	Stow away from foodstuffs
	Mannitan tetranitrate	Forbidden									

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipment		
49 CFR	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other shipping requirements
	Matches, block. See Matches, strike anywhere										
	Matches, safety, book, card or strike-on-box	Flammable solid	UN1944	None	173.170	None	50 pounds	50 pounds	1.2	1.2	
	Matches, strike anywhere	Flammable solid	UN1331	Flammable solid	None	173.170a	Forbidden	Forbidden	1.2	1	
	Matting acid. See Sulfuric acid										
	Medicines, liquid, n.o.s.	Corrosive material	UN1851	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Medicines, liquid, n.o.s.	Poison B	UN1851	Poison	173.345	173.346	1 quart	55 gallons	1.3	1	
	Medicines, n.o.s.	Combustible liquid	UN1851	None	173.118a	None	No limit	No limit	1.2	1.2	
	Medicines, n.o.s.	Flammable liquid	UN1851	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Medicines, n.o.s.	Flammable solid	UN1851	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.2	1.2	
	Medicines, n.o.s.	Oxidizer	UN1851	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	
	Medicines, solid, n.o.s.	Corrosive material	UN1851	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Medicines, solid, n.o.s.	Poison B	UN1851	Poison	173.364	173.365	50 pounds	200 pounds	1.3	1.3	
	p-Menthane hydroperoxide, technically pure. See Paramenthane hydroperoxide		UN2125								
	Mercaptan mixture, aliphatic	Flammable liquid	NA1228	Flammable liquid	None	173.141	Forbidden	10 gallons	1.3	5	
	Mercaptan mixture, aliphatic (in containers over 110 gallons)	Combustible liquid	NA1228	None	173.118a	None	Forbidden	10 gallons	1.2	1.2	
AW	Mercaptan mixture, aliphatic (in containers of 110 gallons or less) See 173.141(b)	ORM A	NA1228	None	173.505	173.510	Forbidden	10 gallons	1.3	5	Stow in well ventilated space away from living quarters
+	Mercuric acetate	Poison B	UN1629	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric ammonium chloride, solid	Poison B	UN1630	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric benzoate, solid	Poison B	UN1631	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric bromide, solid	Poison B	UN1634	Poison	173.364	173.365	Forbidden	25 pounds	1.2	1.2	
	Mercuric chloride, solid	Poison B	UN1624	Poison	173.364	173.372	Forbidden	25 pounds	1.2	1.2	
+	Mercuric cyanide, solid	Poison B	UN1636	Poison	173.370	173.370	25 pounds	200 pounds	1.2	1.2	Stow away from acids
	Mercuric iodide, solid	Poison B	UN1638	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercuric iodide, solution	Poison B	UN1638	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Mercuric nitrate	Oxidizer	UN1625	Oxidizer	173.153	173.152	25 pounds	100 pounds	1.2	1.2	If stowed under deck, must be stowed in recoverable container
+	Mercuric oleate, solid	Poison B	UN1640	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercuric oxide, solid	Poison B	UN1641	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric oxycyanide, solid (desensitized)	Poison B	UN1642	Poison	173.364	173.365	25 pounds	200 pounds	1.2	1.2	Stow away from acids
+	Mercuric potassium cyanide, solid	Poison B	UN1626	Poison	173.364	173.365 173.370	25 pounds	200 pounds	1.2	1.2	Stow away from acids
+	Mercuric potassium iodide, solid	Poison B	UN1643	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric salicylate, solid	Poison B	UN1644	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric subsulfate, solid	Poison B	NA2025	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric sulfate, solid	Poison B	UN1645	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercuric sulfocyanate, solid or Mercuric thiocyanate, solid	Poison B	UN1646	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercurol or Mercury nucleate, solid	Poison B	UN1639	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercurous acetate, solid	Poison B	UN1629	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercurous azide	Forbidden									
+	Mercurous bromide, solid	Poison B	UN1634	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercurous gluconate, solid	Poison B	UN1637	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercurous iodide, solid	Poison B	UN1638	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercurous nitrate, solid	Oxidizer	UN1627	Oxidizer	173.153	173.154	50 pounds	100 pounds	1.2	1.2	
+	Mercurous oxide, black, solid	Poison B	UN1641	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
+	Mercurous sulfate, solid	Poison B	UN1628	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercury acetylide	Forbidden									
	Mercury based pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2778	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Mercury based pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2777	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Mercury based pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2777	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercury compound, solid, n.o.s.	Poison B	UN2025	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mercury fulminate. See Initiating explosive										

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
A = Air W = Water	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Mercury iodide aqueous ammoniacal (iodide of Million's base)	Forbidden									
A	Mercury, metallic	ORM-B	NA2809	None	None	173.850	173.960	See 173.960			
	Mercury nitride	Forbidden									
	Mercury oxycyanide	Forbidden									
	Methyl azide	Flammable liquid	UN1229	Flammable liquid	None	173.119	1 qt	10 gallons	1.2	1.2	
	Metal alkyl, solution, n.o.s.	Flammable liquid	NA9195	Flammable liquid	173.118	173.119	1 qt	1 gallon	1.2	1	
W	Metal borings, shavings, turnings, or cuttings (ferrous metals only except stainless steel)	ORM-C	UN2793	None	173.505	173.1025			1.2	1.2	Keep dry; not permitted if temperature of material is at or above 130 deg F
	Metal salts of methyl nitramine (dry)	Forbidden									
•	Methane or Methane, compressed	Flammable gas	UN1971	Flammable gas	173.306	173.302	Forbidden	300 pounds	1.2	4	Stow away from living quarters
	Methane, refrigerated liquid (cryogenic liquid)	Flammable gas	UN1972	Flammable gas	None	173.318	Forbidden	Forbidden	1	5	Stow away from living quarters
	Methanol. *See* Methyl alcohol										
	Methanic acid	Forbidden									
	Methyl acetate	Flammable liquid	UN1231	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1	
	Methyl acetone	Flammable liquid	UN1232	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1	
•	Methylacetylene-propadiene, stabilized	Flammable gas	UN1060	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	1	
	Methyl acrylate, inhibited	Flammable liquid	UN1919	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1	
	Methylal	Flammable liquid	UN1234	Flammable liquid	None	173.119	Forbidden	10 gallons	1.3	5	
	Methyl alcohol	Flammable liquid	UN1230	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1	
•	Methylamine, anhydrous	Flammable gas	UN1061	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1	4	
	Methylamine, aqueous solution	Flammable liquid	UN1235	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.3	4	Stow away from mercury and its compounds
	Methylamine dinitramine and dry salts thereof	Forbidden									
	Methylamine nitrolate	Forbidden									
	Methylamine perchlorate (dry)	Forbidden									
	Methylamyl acetate	Flammable liquid	UN1233	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1.2	
	Methyl amyl ketone	Combustible liquid	UN1110	None	173.118a	None	No limit	No limit	1.2	1.2	
•	Methyl bromide and more than 2% chloropicrin mixture, liquid	Poison B	NA1581	Poison	None	173.353	Forbidden	Forbidden	1	5	Shade from radiant heat
•	Methyl bromide and nonflammable, nonliquefied compressed gas mixture, liquid (including up to 2% chloropicrin)	Poison B	NA1955	Poison	None	173.353a	Forbidden	300 pounds	1	5	Stow away from living quarters
•	Methyl bromide - ethylene dibromide mixture, liquid	Poison B	UN1647	Poison	None	173.353	Forbidden	55 gallons	1	1	
•	Methyl bromide, liquid (including up to 2% chloropicrin)	Poison B	UN1062	Poison	None	173.353	Forbidden	55 gallons	1	5	Stow away from living quarters. Segregation same as for nonflammable gas
	Methyl butene	Flammable liquid	UN2460	Flammable liquid	None	173.119	Forbidden	10 gallons	1.2	5	
	Methyl butyrate	Flammable liquid	UN1237	Flammable liquid	173.118	173.119	1 qt	10 gallons	1.2	1	
	Methyl cellosolve. See Ethylene glycol monomethyl ether										
	Methyl cellosolve acetate. See Ethylene glycol monomethyl ether acetate										
•	Methyl chloride	Flammable gas	UN1063	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	4	
•	Methyl chloride-methylene chloride mixture	Flammable gas	UN1912	Flammable gas	173.306	173.304 173.314	Forbidden	300 pounds	1.2	4	
	Methyl chlorocarbonate. *See* Methyl chloroformate										
A	Methyl chloroform. *See* 1,1,1-Trichloroethane										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
¶ / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Methyl chloroformate	Flammable liquid	UN1238	Flammable liquid and Poison	None	173.258	Forbidden	5 pints	1.2	1	
	Methyl cyanide	Flammable liquid	UN1648	Flammable liquid	173.118	173.119	1 quart	10 gallons	1	4	Shade from radiant heat
	Methylchloromethyl ether, anhydrous	Flammable liquid	UN1239	Flammable liquid and Poison	None	173.143	Forbidden	Forbidden	1	5	Shade from radiant heat
	Methylcyclohexane	Flammable liquid	UN2296	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methylcyclopentane	Flammable liquid	UN2298	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Methyl dichloroacetate	Corrosive material	UN2299	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Methyldichloroarsine	Poison A	NA1556	Poison gas	None	173.326	Forbidden	Forbidden	1	5	Shade from radiant heat
	Methyl dichlorosilane	Flammable liquid	UN1242	Flammable liquid	None	173.136	Forbidden	5 pints	1.2	1	
	Methylene chloride *See* Dichloromethane										
	Methylene glycol dinitrate	Forbidden									
	Methyl ethyl ether *See* Ethyl methyl ether										
	Methyl ethyl ketone	Flammable liquid	UN1193	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl ethyl ketone peroxide, in solution with not more than 9% by weight active oxygen *See* Organic peroxide, liquid, or solution, n.o.s.		UN2550								
	Methyl ethyl ketone peroxide, in solution with more than 9% by weight active oxygen	Forbidden									
	Methyl ethyl pyridine	Corrosive material	UN2300	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Methyl formate	Flammable liquid	UN1243	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1.3	4	
	Methylfuran	Flammable liquid	UN2301	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Methylhydrazine	Flammable liquid	UN1244	Flammable liquid and Poison	None	173.145	Forbidden	5 pints	1.2	1	Store separate from oxidizing material and corrosives
	Methyl isobutyl ketone peroxide, in solution with not more than 9% by weight active oxygen *See* Organic peroxide, liquid or solution, n.o.s.		UN2126								
	Methyl isobutyl ketone peroxide, in solution with more than 9% by weight active oxygen	Forbidden									
	Methyl isocyanate	Flammable liquid	UN2480	Flammable liquid and Poison	None	173.119 173.34	Forbidden	10 gallons	1	5	Keep cool. Store away from living quarters and sources of heat
	Methyl isopropenyl ketone, inhibited	Flammable liquid	UN1245	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl magnesium bromide in ethyl ether not over 40% concentration	Flammable liquid	UN1928	Flammable liquid	None	173.143	Forbidden	Forbidden	1	1	Segregation same as for flammable solids. Segregate from flammable gases or liquids, oxidizing materials or organic peroxides
✦	Methyl mercaptan	Flammable gas	UN1064	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	1	
	Methyl methacrylate monomer, inhibited	Flammable liquid	UN1247	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl methacrylate monomer, uninhibited (high purity if acceptable under 173.21 of this subchapter)	Flammable liquid	NA1247	Flammable liquid	173.118	173.119	Forbidden	Forbidden	1.2	1	
	Methyl nitrate	Forbidden									
	N-Methyl-N-nitro-N-nitrosoguanidine (not exceeding 25 grams in one outside packaging)	Flammable solid	NA1325	Flammable solid	None	173.179	Forbidden	Forbidden	1	5	
	Methyl parathion, liquid	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1.3	1.3	
	Methyl parathion mixture, dry	Poison B	NA2783	Poison	173.377	173.377	50 pounds	200 pounds	1.2	1.2	
	Methyl parathion mixture, liquid, (containing over 25% methyl parathion)	Poison B	NA2783	Poison	None	173.359	Forbidden	1 quart	1.2	1.2	
	Methyl parathion mixture, liquid, (containing 25% or less methyl parathion)	Poison B	NA2783	Poison	None	173.359	1 2 pint	1 quart	1.2	1.2	
	Methylpentadiene	Flammable liquid	UN2461	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Methyl pentane	Flammable liquid	UN2462	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl phosphonic dichloride	Corrosive material	NA9206	Corrosive and Poison	None	173.271	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Methyl phosphonothioic dichloride, anhydrous	Corrosive material	NA1760	Corrosive	173.244	173.245 173.245a	1 quart	1 quart	1	1	
	Methyl phosphonous dichloride. See Pyrophoric liquid, n.o.s.										
	Methyl picric acid (heavy metal salts of)	Forbidden									
	Methyl propionate	Flammable liquid	UN1248	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl propyl ketone	Flammable liquid	UN1249	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Methyl sulfate. See Dimethyl sulfate										
	Methyl sulfide. See Dimethyl sulfide										
	Methyltrichlorosilane	Flammable liquid	UN1250	Flammable liquid	None	173.135	Forbidden	10 gallons	1.2	1	
	Methyl trimethylol methane trinitrate	Forbidden									
	Methyl vinyl ketone, inhibited	Flammable liquid	UN1251	Flammable liquid	173.147	173.147	4 ounces	10 gallons	1.2	1	
	Mevinphos	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1.2	5	
	Mevinphos mixture, dry	Poison B	NA2783	Poison	173.377	173.377	Forbidden	200 pounds	1.2	4	
	Mevinphos mixture, liquid	Poison B	NA2783	Poison	173.359	173.359	1 pint	1 quart	1.2	5	
	Mexacarbate	Poison B	NA2757	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Mild detonating fuse, *metal clad*. See Fuse, mild detonating, metal clad										
	Mine, empty. See 173.55										
	Mine, explosive, with gaseous material See Explosive mine										
	Mine rescue equipment containing carbon dioxide	Nonflammable gas	NA1956	Nonflammable gas	173.306		150 pounds	300 pounds	1.2	1.2	
	Mining reagent, liquid (containing 20% or more cresylic acid)	Corrosive material	NA2022	Corrosive	173.244	173.243a	1 quart	10 gallons	1.2	1.2	
A	Mipafox	ORM A	UN2783	None	173.505	173.510	No limit	No limit			
	Mixed acid. See Nitrating acid										
	m-Nitrobenzene diazonium perchlorate	Forbidden									
	m-Nitrophenyldinitro methane	Forbidden									
A	Molybdenum pentachloride	ORM B	UN2508	None	173.505	173.800	25 pounds	100 pounds			
	Monochloroacetone, stabilized or inhibited	Irritating material	UN1695	Irritant	None	173.364	Forbidden	5 gallons	1	1	Stow away from living quarters
	Monochloroacetone (unstabilized)	Forbidden									
	Monochloroethylene. See Vinyl chloride										
	Monoethanolamine	Corrosive material	UN2491	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	
	Monoethylamine	Flammable liquid	UN1036	Flammable liquid	None	173.143	Forbidden	5 pints	1.2	5	Segregation same as for flammable gas
	Monofluorophosphoric acid, anhydrous	Corrosive material	UN1776	Corrosive	None	173.275	Forbidden	1 gallon	1.2	1.2	Keep dry
	(mono-(trichloro) hexa-(monopotassium dichloro)-penta-s-triazinetrione, dry (containing over 39% available chlorine)	Oxidizer	NA2468	Oxidizer	173.153	173.217	50 pounds	100 pounds	1.3	1.3	Keep dry
	Morpholine	Flammable liquid	UN2054	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Morpholine, aqueous, mixture	Flammable liquid	NA2054	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Morpholine, aqueous, mixture	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1	4	
	Moth balls. See Naphthalene										
	Motion picture film. See Film										
•	Motor fuel antiknock compound or Antiknock compound	Poison B	UN1649	Poison	None	173.354	Forbidden	55 gallons	1	5	If flashpoint less than 141 deg F, segregation same as for flammable liquids
	Motor, *internal combustion*				173.129						
	Motor vehicle, etc., including automobile, motorcycle, truck, tractor, and other self-propelled vehicle or equipment powered by internal combustion engine, when offered new or used for transportation and which contain fuel in the engine or fuel tank or the electric storage battery is connected to either terminal of the electrical system	ORM-C		None	173.129 173.250 173.257 173.306 175.305 176.905				1.2	1.2	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	m-Phenylene diaminedperchlorate (dry)	Forbidden									
	Muriatic acid. See Hydrochloric acid										
	Naphtha	Combustible liquid	UN2553	None	173.118a	None	No limit	No limit	1.2	1.2	
	Naphtha	Flammable liquid	UN2553	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
AW	Naphthalene or Naphthalin	ORM A	UN1334	None	173.505	173.655	25 pounds	300 pounds	1.2	1.2	Segregation same as for flammable solids
	Naphthalene dioxide	Forbidden									
	Naphtha petroleum. See Petroleum naphtha										
	Naphthyl amineperchlorate	Forbidden									
	Natural gasoline. See Gasoline										
	Natural gas, refrigerated liquid (with a high methane content) (cryogenic liquid)	Flammable gas	UN1972	Flammable gas	None	173.316	Forbidden	Forbidden	1	5	Stow away from living quarters
	n-Butyl peroxydicarbonate, more than 52% in solution	Forbidden									
	Neohexane	Flammable liquid	UN1208	Flammable liquid	173.119	173.119	1 quart	10 gallons	1.3	4	
	Neon or Neon, compressed	Nonflammable gas	UN1065	Nonflammable gas	173.306	173.302	150 pounds	300 pounds	1.2	1.2	
	Neon, refrigerated liquid (cryogenic liquid)	Nonflammable gas	UN1913	Nonflammable gas	173.320	173.316	100 pounds	1,100 pounds	1.3	1.3	
	New explosive or explosive device. See 173.51 and 173.86										
	Nickel carbonyl	Flammable liquid	UN1259	Flammable liquid and Poison	None	173.126	Forbidden	Forbidden	1	5	Shade from radiant heat. Segregation same as for flammable liquids. Not permitted on a vessel transporting explosives, except that quantities not exceeding 200 pounds may be transported on such vessels under conditions approved by the Captain of the Port
•	Nickel cyanide, solid	Poison B	UN1653	Poison	173.379		25 pounds	200 pounds	1.2	1.2	Stow away from acids
	Nickel nitrate	Oxidizer	UN2725	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Nickel picrate	Forbidden									
	Nicotine hydrochloride	Poison B	UN1656	Poison	173.345	173.345	1 quart	55 gallons	1.2	1.2	
	Nicotine, liquid	Poison B	UN1654	Poison	None	173.345	Forbidden	55 gallons	1.2	1.2	
	Nicotine salicylate	Poison B	UN1657	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
•	Nicotine sulfate, liquid	Poison B	UN1658	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
•	Nicotine sulfate, solid	Poison B	UN1658	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Nicotine tartrate	Poison B	UN1659	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Nitrated paper (unstable)	Forbidden									
	Nitrate, n.o.s.	Oxidizer	NA1477	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Nitrate of ammonia explosives. See High explosive										
	Nitrates of diazonium compounds	Forbidden									
	Nitrating acid, mixture (with more than 50% nitric acid)	Oxidizer	UN1796	Oxidizer and Corrosive	None	173.257	Forbidden	1 quart	1	5	Segregation same as for corrosive material. Stow away from fluorides
	Nitrating acid, mixture (with not more than 50% nitric acid)	Corrosive material	UN1796	Corrosive	None	173.257	Forbidden	1 quart	1	5	Stow away from fluorides
	Nitrating acid, spent	Corrosive material	NA1826	Corrosive	None	173.248	Forbidden	1 quart	1	5	
	Nitric acid (over 40%)	Oxidizer	UN2031	Oxidizer and Corrosive	None	173.258	Forbidden	5 pints	1	5	Segregation same as for corrosive materials. Stow away from hydrazine. Separate from diethylenetriamine
	Nitric acid, 40% or less	Corrosive material	NA1760	Corrosive	None	173.258	Forbidden	5 pints	1	5	Stow away from hydrazine. Separate from diethylenetriamine
	Nitric acid, fuming	Oxidizer	UN2032	Oxidizer and Poison	None	173.258	Forbidden	Forbidden	1	5	Segregation same as for corrosive materials. Stow away from hydrazine. Separate from diethylenetriamine
	Nitric ether. See Ethyl nitrate										
	Nitric oxide	Poison A	UN1660	Poison gas	None	173.337	Forbidden	Forbidden	1	5	
	p-Nitroaniline. See Nitroaniline										
	N-Nitrosaniline	Forbidden									
•	Nitroaniline	Poison B	UN1661	Poison	173.364	173.373	50 pounds	200 pounds	1.2	1.2	
	Nitrobenzene, liquid or Nitrobenzol, liquid (oil of mirbane)	Poison B	UN1662	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Nitro carbonitrate. See Blasting agent, n.o.s.										
	Nitrocellulose, colloided, granular or flake, wet with not less than 20% alcohol or solvent, or block, wet with not less than 25% alcohol	Flammable liquid	NA2059	Flammable liquid	173.118	173.127	1 quart	25 pounds	1.3	1	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
Symbols	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Nitrocellulose, colloided, granular or flake, wet with not less than 20% water	Flammable solid	NA2555	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.3	1	
	Nitrocellulose, *dry. See* High explosive										
	Nitrocellulose, wet with not less than 30% alcohol or solvent	Flammable liquid	NA2556	Flammable liquid	173.118	173.127	1 quart	25 pounds	1.3	1	
	Nitrocellulose, wet with not less than 20% water	Flammable solid	NA2555	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.3	1	
•	Nitrochlorobenzene, meta or para, solid	Poison B	UN1578	Poison	173.364	173.374	50 pounds	200 pounds	1.2	1.2	
•	Nitrochlorobenzene, ortho, liquid	Poison B	UN1578	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	6-Nitro-4-diazotoluene-3-sulfonic acid (dry)	Forbidden									
	Nitroethane	Flammable liquid	UN2842	Flammable liquid	173.118	173.119	15 gallon	55 gallons	1.2	1	
	Nitroethylene polymer	Forbidden									
	Nitroethyl nitrate	Forbidden									
	Nitrogen dioxide, liquid	Poison A	UN1067	Poison gas and Oxidizer	None	173.336	Forbidden	Forbidden	1	5	Segregation same as for nonflammable gases. Stow away from organic materials
	Nitrogen or Nitrogen, compressed	Nonflammable gas	UN1066	Nonflammable gas	173.306	173.302 173.314	150 pounds	300 pounds	1.2	1.2	
	Nitrogen peroxide, liquid	Poison A	NA1067	Poison gas and Oxidizer	None	173.336	Forbidden	Forbidden	1	5	Segregation same as for nonflammable gas. Stow away from organic materials
	Nitrogen, refrigerated liquid (cryogenic liquid)	Nonflammable gas	UN1977	Nonflammable gas	173.320	173.316 173.318	100 pounds	1,100 pounds	1.3	1.3	
	Nitrogen tetroxide, liquid	Poison A	NA1067	Poison gas and Oxidizer	None	173.335	Forbidden	Forbidden	1	5	Segregation same as for nonflammable gases. Stow away from organic materials
	Nitrogen trichloride	Forbidden									
	Nitrogen trifluoride	Nonflammable gas	UN2451	Nonflammable gas	None	173.302	Forbidden	300 pounds	1	5	Stow away from living quarters and organic materials
	Nitrogen triiodide	Forbidden									
	Nitrogen triiodide monoamine	Forbidden									
	Nitroglycerin, liquid, desensitized. *See* High explosive, liquid										
	Nitroglycerin, liquid, not desensitized. *See* 173.51	Forbidden									
	Nitroglycerin, spirits of. *See* Spirits of nitroglycerin										
	Nitroguanidine, *dry. See* High explosive										
	Nitroguanidine nitrate	Forbidden									
	Nitroguanidine, wet with not less than 20% water	Flammable solid	UN1336	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.2	4	
	1-Nitro hydantoin	Forbidden									
	Nitrohydrochloric acid	Corrosive material	UN1798	Corrosive	None	173.278	Forbidden	5 pints	1	5	
	Nitrohydrochloric acid, diluted	Corrosive material	UN1798	Corrosive	None	173.278	Forbidden	5 pints	1	5	
	Nitroisobutane trinitromethane	Forbidden									
	Nitromannite. *See* High explosive										
	Nitromannite (dry)	Forbidden									
	Nitromethane	Flammable liquid	UN1261	Flammable liquid	173.118	173.143a	1 quart	10 gallons	1.2	1.2	
	N-Nitro-N-methylglycolamide nitrate	Forbidden									
	2-Nitro-2-methylpropanol nitrate	Forbidden									
	Nitromuriatic acid. *See* Nitrohydrochloric acid										
	Nitrophenol pesticide, substituted, liquid or solid, n.o.s. (compounds and preparations). *See* Substituted nitrophenol pesticide, liquid or solid, n.o.s. (compounds and preparations)										
	Nitropropane	Flammable liquid	UN2608	Flammable liquid	173.118	173.119	15 gallon	55 gallons	1.2	1	
	Nitrosoguanidine. *See* Initiating explosive										
	Nitrostarch, *dry. See* High explosive										
	Nitrostarch, wet with not less than 30% alcohol or solvent	Flammable liquid	NA1337	Flammable liquid	173.118	173.127	1 quart	25 pounds	1.2	1	
	Nitrostarch, wet with not less than 20% water	Flammable solid	UN1337	Flammable solid	173.153	173.154	25 pounds	100 pounds	1	4	

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
H A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Nitrogen (dry)	Forbidden									
	Nitrosyl chloride	Nonflammable gas	UN1069	Nonflammable gas	173.306	173.304 173.314	Forbidden	300 pounds	1	4	
	Nitrous. See High explosive										
	Nitrous oxide or Nitrous oxide, compressed	Nonflammable gas	UN1070	Nonflammable gas	173.306	173.304	150 pounds	300 pounds	1.2	1.2	Under deck stowage must be in well ventilated space
	Nitrous oxide, refrigerated liquid	Nonflammable gas	UN2201	Nonflammable gas	173.306	173.315	Forbidden	Forbidden	1	1	Stow away from flammables. Do not overstow with other cargo
•	Nitroxyl	Poison B	NA1665	Poison	173.345	173.345	1 quart	55 gallons	1.2	1	
	N,N-Octabromodiethanediamine (salts of) (dry)	Forbidden									
	N,N-Pentanbisphenylethylene diamine (dry)	Forbidden									
	Nonflammable gas, n.o.s. See Compressed gas, n.o.s.										
•	Nonliquefied hydrocarbon gas. See Hydrocarbon gas, nonliquefied										
	Nonylchlorosilane	Corrosive material	UN1759	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Nordhausen acid. See Sulfuric acid										
	Octadecylchlorosilane	Corrosive material	UN1800	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	1,7-Octadiene-3,5-diyne-1,8-dinethoxy 9-octadecynoic acid	Forbidden									
	Octane	Flammable liquid	UN1262	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	n-Octanoyl peroxide, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2129								
	Octyltrichlorosilane	Corrosive material	UN1801	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Oil, described as oil, Oil, n.o.s., Petroleum oil, or Petroleum oil, n.o.s.	Combustible liquid	NA1270	None	173.118a	None	No limit	No limit	1.2	1.2	
	Oil, described as oil, Oil, n.o.s., Petroleum oil, or Petroleum oil, n.o.s.	Flammable liquid	NA1270	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Oil of mirbane. See Nitrobenzene, liquid										
	Oil of vitriol. See Sulfuric acid										
	Oil well cartridge	Class C explosive		Class C explosive	None	173.112	50 pounds	150 pounds	1.3	1.3	
	Oleum (fuming sulfuric acid)	Corrosive material	NA1831	Corrosive	None	173.272	Forbidden	5 pints	1.2	1	Under deck stowage must be in metal drums only. Keep dry
	Organic peroxide, liquid or solution, n.o.s.	Flammable liquid	NA1993	Flammable liquid and Organic peroxide	None	173.119	Forbidden	1 quart	1.2	5	Stow separate from combustible materials, explosives, or acids
	Organic peroxide, liquid or solution, n.o.s.	Organic peroxide	NA3103	Organic peroxide	173.153	173.221	Forbidden	1 quart	1.2	1.2	Stow separate from combustible materials, explosives, or acids
	Organic peroxide, mixture. See Organic peroxide, solid, n.o.s. or Organic peroxide, liquid or solution, n.o.s., as appropriate.		UN2756								
	Organic peroxide, sample, n.o.s. See Organic peroxide, solid, n.o.s. or Organic peroxide, liquid or solution, n.o.s., as appropriate.		UN2255								
	Organic peroxide, solid, n.o.s.	Organic peroxide	NA3107	Organic peroxide	173.153	173.154	Forbidden	25 pounds	1.2	1.2	Stow separate from combustible materials, explosives, or acids
	Organic peroxide, trial quantity, n.o.s. See Organic peroxide, solid, n.o.s. or Organic peroxide, liquid or solution, n.o.s., as appropriate.		UN2899								
	Organic phosphate mixture, Organic phosphate compound mixture, or Organic phosphorus compound mixture; liquid	Poison B	NA2783	Poison	173.359	173.359	1/2 pint	1 quart	1.2	5	
	Organic phosphate mixture, Organic phosphate compound mixture, or Organic phosphorus compound mixture; solid or dry	Poison B	NA2783	Poison	173.377	173.377	50 pounds	200 pounds	1.2	4	
	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound; mixed with compressed gas	Poison A	NA1955	Poison gas	None	173.334	Forbidden	Forbidden	1	5	Shade from radiant heat

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A-W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound, liquid	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1 2	5	
	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound, solid or dry	Poison B	NA2783	Poison	None	173.377	Forbidden	200 pounds	1 2	4	
	Organochlorine pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2762	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Organochlorine pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2761	Poison	173.345	173.345	1 quart	55 gallons	1 2	1 2	
	Organochlorine pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2761	Poison	173.364	173.365	50 pounds	200 pounds	1 2	1 2	
	Organophosphorus pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2784	Flammable liquid	None	173.119	Forbidden	1 quart	1 2	5	
	Organophosphorus pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2783	Poison	173.358	173.358	Forbidden	1 quart	1 2	5	
	Organophosphorus pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2783	Poison	173.377	173.377	Forbidden	200 pounds	1 2	4	
	Organotin pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2787	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Organotin pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2786	Poison	173.345	173.345	1 quart	55 gallons	1 2	1 2	
	Organotin pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2786	Poison	173.364	173.365	50 pounds	200 pounds	1 2	1 2	
A	ORM A, n.o.s.	ORM A	NA1693	None	173.505	173.513	No limit	No limit			
A	ORM B, n.o.s.	ORM B	NA1750	None	173.505	173.510	No limit	No limit			
	ORM C. See 173.500 and 176.900										
	ORM E, liquid or solid, n.o.s. See Hazardous substance, liquid or solid, n.o.s.										
	Orthonitroaniline. See Nitroaniline										
	Oxidizer, corrosive, liquid, n.o.s.	Oxidizer	NA3133	Oxidizer and Corrosive	None	173.245	Forbidden	1 quart	1	5	
	Oxidizer, corrosive, solid, n.o.s.	Oxidizer	NA3134	Oxidizer and Corrosive	173.153	173.154	25 pounds	25 pounds	1	4	
	Oxidizer material packed with other articles. *See 173.152*										
	Oxidizer, n.o.s. or Oxidizing material, n.o.s.	Oxidizer	UN1479	Oxidizer	173.153	173.154	25 pounds	25 pounds	1 2	1 2	
	Oxidizer, poisonous, liquid, n.o.s.	Oxidizer	NA3139	Oxidizer and Poison	None	173.154	Forbidden	1 quart	1	5	
	Oxidizer, poisonous, solid, n.o.s.	Oxidizer	NA3200	Oxidizer and Poison	173.153	173.154	25 pounds	25 pounds	1 2	4	
	Oxygen or Oxygen, compressed	Nonflammable gas	UN1072	Oxidizer	173.306	173.302 173.314	150 pounds	300 pounds	1 2	1 2	Under deck stowage must be in well ventilated space
	Oxygen, refrigerated liquid (cryogenic liquid)	Nonflammable gas	UN1073	Oxidizer	173.320	173.316 173.318	Forbidden	Forbidden	1	1	Stow separate from flammables Do not overstow with other cargo
	Paint	Combustible liquid	UN1263	None	173.118a	None	No limit	No limit	1 2	1 2	
	Paint	Flammable liquid	UN1263	Flammable liquid	173.118 173.128	173.128	1 quart	55 gallons	1 2	1	
	Paint or paint related material	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	1 gallon	1 2	1 2	
	Paint related material	Combustible liquid	NA1263	None	173.118a	None	No limit	No limit	1 2	1 2	
	Paint related material	Flammable liquid	NA1263	Flammable liquid	173.118 173.128	173.128	1 quart	55 gallons	1 2	1	
	Paper caps. *See* Toy caps										
AW	Paraformaldehyde	ORM A	UN2213	None	173.505	173.513	50 pounds	200 pounds	1 2	1 2	
	Paraldehyde	Flammable liquid	UN1264	Flammable liquid	173.118	173.119	1 quart	10 gallons	1 2	1	
	Paramenthane hydroperoxide	Organic peroxide	UN2125	Organic peroxide	173.153	173.224	1 quart	1 quart	1 2	4	
	Paranitroaniline, solid. *See* Nitroaniline										
	Parathion and compressed gas mixture	Poison A	NA1967	Poison gas	None	173.334	Forbidden	Forbidden	1 3	5	
	Parathion, liquid	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1 3	1 3	
	Parathion mixture, dry	Poison B	NA2783	Poison	173.377	173.377	50 pounds	200 pounds	1 3	1 3	
	Parathion mixture, liquid	Poison B	NA2783	Poison	None	173.359	Forbidden	1 quart	1 3	1 3	
	Paris green, solid. *See* Copper acetoarsenite, solid										
	p-Diazidobenzene	Forbidden									
	Pelargonyl peroxide, technically pure See Organic peroxide, solid, n.o.s.		UN2130								
	Pentaborane	Flammable liquid	UN1380	Flammable liquid and Poison	None	173.138	Forbidden	Forbidden	1	5	Segregation same as for flammable solids Separate from flammable gases or liquids, oxidizing materials, or organic peroxides

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Pentaerythrite tetranitrate. See Initiating explosive										
	Pentaerythrite tetranitrate, desensitized, wet. See High explosive										
	Pentaerythrite tetranitrate (dry)	Forbidden									
	Pentane	Flammable liquid	UN1265	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1.3	4	
	Pentanitroaniline (dry)	Forbidden									
	Pentolite, dry. See High explosive										
	Peracetic acid solution, not over 43% peracetic acid and not over 6% hydrogen peroxide	Organic peroxide	NA2131	Organic peroxide	173.223	173.223	1 pint	5 pints	1	4	Shade from radiant heat
	Perchlorate, n.o.s.	Oxidizer	NA1481	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.3	1.3	Stow away from powdered metals
	Perchloric acid, exceeding 50% but not exceeding 72% strength	Oxidizer	UN1873	Oxidizer	None	173.263	Forbidden	5 pints	1	5	Segregation same as for corrosive materials. Stow away from hydrazine
	Perchloric acid exceeding 72% strength	Forbidden									
	Perchloric acid, not over 50% acid	Oxidizer	UN1802	Oxidizer	173.244	173.263	Forbidden	5 pints	1	1	Segregation same as for corrosive materials. Stow away from hydrazine
	Perchloro-methyl-mercaptan	Poison B		Poison	173.345	173.360	Forbidden	10 pounds	1	4	
+	Perchloromethyl mercaptan	Poison B	UN1670	Poison	173.345	173.360	Forbidden	10 pounds	1	4	
	Percussion cap	Class C explosive		None	None	173.107	50 pounds	150 pounds	1.3	1.3	
	Percussion fuze	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1.3	1.3	
A	Perfluoro-2-butene	ORM A	NA2422	None	173.505	173.505	10 gallons	55 gallons			
	Permanganate, n.o.s.	Oxidizer	NA1482	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds, hydrogen peroxide, and acids
	Permanganate of potash. See Potassium permanganate										
	Peroxide, organic. See Organic Peroxide										
	Peroxyacetic acid, not more than 43% and with not more than 6% hydrogen peroxide. See Peracetic acid solution, not over 43% peracetic acid and not over 6% hydrogen peroxide		UN2131								
	Peroxyacetic acid, more than 43% and with more than 6% hydrogen peroxide	Forbidden									
W	Pesticide, water reactive, including but not limited to fungicides and herbicides, etc., which contain manganese ethylenebisdithiocarbamate	ORM C	NA2210	None	173.505	173.1043			2	2	Keep dry
W	Petroleum coke (uncalcined)	ORM C		None	173.505	173.1045			1.2	1.2	Not permitted if temperature of material is at or above 130 deg F
	Petroleum distillate	Combustible liquid	UN1268	None	173.118a	None	No limit	No limit	1.2	1.2	
	Petroleum distillate	Flammable liquid	UN1268	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Petroleum ether	Flammable liquid	UN1271	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.3	4	
	Petroleum gas, liquefied. See Liquefied petroleum gas										
	Petroleum naphtha	Combustible liquid	UN1255	None	173.118a	None	No limit	No limit	1.2	1.2	
	Petroleum naphtha	Flammable liquid	UN1255	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Petroleum oil, n.o.s. See Oil										
A	Phencaption	ORM A	NA2783	None	173.505	173.510	No limit	No limit			
+	Phenol	Poison B	UN1671	Poison	173.364	173.369	50 pounds	250 pounds	1.2	1.2	
	Phenol, liquid or solution (liquid tar acid containing over 50% phenol)	Poison B	NA2821	Poison	173.345	173.349	1 quart	55 gallons	1.2	1.2	
	Phenoxy pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2766	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Phenoxy pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2765	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Phenoxy pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2765	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Phenyldichloroarsine	Poison B	NA1556	Poison	None	173.355	Forbidden	30 gallons	1	5	
A	Phenylenediamine, meta or para, solid	ORM A	UN1673	None	173.505	173.510	No limit	No limit			
	Phenyl mercaptan	Poison B	UN2337	Poison	173.345	173.346	Forbidden	10 gallons	1.2	1	
	Phenyltrichlorosilane	Corrosive material	UN1804	Corrosive	None	173.280	Forbidden	10 gallons	1	1	Keep dry

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 / Air / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Phenylurea pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2768	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Phenylurea pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2767	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Phenylurea pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2767	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Phosgene (diphosgene)	Poison A	UN1076	Poison gas	None	173.333	Forbidden	Forbidden	1	5	
	Phosphine	Poison A	UN2199	Poison gas and Flammable gas	None	173.336	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Phosphoric acid	Corrosive material	UN1805	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	Glass carboys in hampers not permitted under deck
	Phosphoric acid triethylenelmine. See Tris (1-aziridyl) phosphine oxide										
	Phosphoric anhydride (phosphorus pentoxide)	Corrosive material	NA1807	Corrosive	None	173.188	Forbidden	100 pounds	1.2	1.2	Keep dry. Glass bottles not permitted under deck
	Phosphorus, amorphous, red	Flammable solid	UN1338	Flammable solid	None	173.189	Forbidden	11 pounds	1.2	1.2	
	Phosphorus bromide. See Phosphorus tribromide										
	Phosphorus chloride. See Phosphorus trichloride										
	Phosphorus heptasulfide	Flammable solid	UN1339	Flammable solid	None	173.225	Forbidden	10 pounds	1.2	1	Separate from oxidizing materials
	Phosphorus oxybromide	Corrosive material	UN1939	Corrosive	None	173.271	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Phosphorus oxychloride	Corrosive material	UN1810	Corrosive	None	173.271	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Phosphorus pentachloride, solid	Corrosive material	UN1806	Corrosive	None	173.191	Forbidden	5 pounds	1	1	Keep dry
	Phosphorus pentasulfide	Flammable solid	UN1340	Flammable solid and Dangerous when wet	None	173.225	Forbidden	11 pounds	1.2	1.2	Separate from oxidizing material
	Phosphorus sesquisulfide	Flammable solid	UN1341	Flammable solid and Dangerous when wet	None	173.225	Forbidden	11 pounds	1.2	1	Separate from oxidizing materials
	Phosphorus tribromide	Corrosive material	UN1808	Corrosive	None	173.270	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Phosphorus trichloride	Corrosive material	UN1809	Corrosive	None	173.271	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Phosphorus trisulfide	Flammable solid	UN1343	Flammable solid	None	173.225	Forbidden	10 pounds	1.2	1	Separate from oxidizing materials
	Phosphorus, white or yellow, dry	Flammable solid	UN1381	Flammable solid and Poison	None	173.130	Forbidden	Forbidden	1.2	5	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Phosphorus, white or yellow, in water	Flammable solid	UN1381	Flammable solid and Poison	None	173.130	Forbidden	25 pounds	1.2	5	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
	Phosphorus ferride or and a chloride, mixtures of	Forbidden									
	Phosphoryl chloride. See Phosphorus oxychloride										
	Photographic film. See Film										
	Photographic flash powder. See Fireworks, special or Low explosive										
	Phthalimide derivative pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2774	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Phthalimide derivative pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2773	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
	Phthalimide derivative pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2773	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Picrate, dry. See High explosive										
	Picrate of ammonia. See High explosive										
	Picric acid, dry. See High explosive										
	Picric acid, wet, with not less than 10% water	Flammable solid	NA1344	Flammable solid	173.192	173.193	1 pound	25 pounds	1	5	Under deck stowage permitted on cargo vessels if wet with more than 30% water. Stow away from heavy metals and their compounds

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
++ A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Picric acid, wet with not less than 10% water, over 25 pounds. See High explosive										
	Pinane hydroperoxide, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2162								
	Pinane hydroperoxide solution not over 45% peroxide.	Organic peroxide	UN2162	Organic peroxide	173.153	173.224	1 quart	1 quart	12	4	
	Pinene	Flammable liquid	UN2368	Flammable liquid	173.118	173.118	1 quart	10 gallons	12	1	
	Pine oil	Combustible liquid	UN1272	None	173.118a	None	No limit	No limit	12	12	
	Pinwheels. See Fireworks, common										
	Pivaloyl chloride. See Trimethylacetyl chloride										
	Poisonous liquid or gas, flammable, n.o.s.	Poison A	NA1953	Poison gas and Flammable gas	None	173.328	Forbidden	Forbidden	1	5	Segregation same as for flammable gases
	Poisonous liquid or gas, n.o.s.	Poison A	NA1955	Poison gas	None	173.328	Forbidden	Forbidden	1	5	
	Poisonous liquid, n.o.s. or Poison B, liquid, n.o.s.	Poison B	UN2810	Poison	173.345	173.345	1 quart	55 gallons	12	1	
	Poisonous solid, corrosive, n.o.s.	Poison B	UN2928	Poison and Corrosive	173.364	173.365	25 pounds	100 pounds	1	4	
	Poisonous solid, n.o.s. or Poison B, solid, n.o.s.	Poison B	UN2811	Poison	173.364	173.365	50 pounds	200 pounds	12	1	
	Polymerizable material. See 173.21										
	Potassium arsenate, solid	Poison B	UN1677	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Potassium arsenite, solid	Poison B	UN1678	Poison	173.364	173.365	50 pounds	200 pounds	12	12	
	Potassium bifluoride solution. See Potassium hydrogen fluoride solution										
	Potassium bromate	Oxidizer	UN1484	Oxidizer	173.153	173.154	25 pounds	100 pounds	12	12	Separate from ammonium compounds. Stow away from powdered metals
	Potassium carbonyl	Forbidden									
	Potassium chlorate (potash chlorate)	Oxidizer	UN1485	Oxidizer	173.153	173.153	25 pounds	100 pounds	12	12	Separate from ammonium compounds. Stow away from powdered metals
	Potassium cyanide, solid	Poison B	UN1680	Poison	173.370	173.370	25 pounds	200 pounds	12	12	Stow away from acids
	Potassium cyanide solution	Poison B	UN1680	Poison	173.345	173.352	1 quart	55 gallons	12	12	Stow away from acids
	Potassium dichloro isocyanurate. See Potassium dichloro-s-triazinetrione										
	Potassium dichloro-s-triazinetrione, *dry (containing more than 39% available chlorine)*	Oxidizer	NA2465	Oxidizer	173.153	173.217	50 pounds	100 pounds	12	12	
A	Potassium dichromate	ORM A	NA1479	None	173.505	173.510	No limit	No limit	12	12	
A	Potassium fluoride	ORM B	UN1812	None	173.505	173.510	No limit	No limit			
	Potassium fluoride solution	Corrosive material	UN1812	Corrosive	173.244	173.249	1 quart	5 gallons	12	12	
	Potassium hydrate. See Potassium hydroxide										
	Potassium hydrogen fluoride solution	Corrosive material	NA1811	Corrosive	173.244	173.249	1 quart	5 gallons	12	12	
A	Potassium hydrogen sulfate, solid	ORM B	UN2509	None	173.505	173.800	25 pounds	100 pounds			
	Potassium hydroxide, dry solid, flake, bead, or granular	Corrosive material	UN1813	Corrosive	173.244	173.245b	25 pounds	100 pounds	12	12	Keep dry. Do not stow with metals or alloys such as brass, copper, tin, zinc, aluminum, solder, or lead
	Potassium hydroxide, liquid or solution	Corrosive material	UN1814	Corrosive	173.244	173.249	1 quart	10 gallons	12	12	
	Potassium hypochlorite solution. See Hypochlorite solutions containing more than 7% available chlorine by weight										
A	Potassium metabisulfite	ORM B	NA2693	None	173.505	173.510	No limit	No limit			
	Potassium, metal or metallic	Flammable solid	UN2257	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	12	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Potassium, metal liquid alloy	Flammable solid	UN1420	Flammable solid and Dangerous when wet	None	173.202	Forbidden	1 pound	12	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Potassium nitrate	Oxidizer	UN1486	Oxidizer	173.153	173.152	25 pounds	100 pounds	12	12	
	Potassium nitrate mixed (fused) with sodium nitrite. See Sodium nitrite mixed (fused) with potassium nitrate										

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Potassium nitrite	Oxidizer	UN1488	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds and cyanides. Stow away from foodstuffs
	Potassium perchlorate	Oxidizer	UN1489	Oxidizer	173.153	173.219	25 pounds	100 pounds	1.3	1.3	Stow away from powdered metals
	Potassium permanganate	Oxidizer	UN1490	Oxidizer	173.153	173.154 173.194	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds and hydrogen peroxide
	Potassium peroxide	Oxidizer	UN1491	Oxidizer	None	173.187	Forbidden	100 pounds	1.2	1.2	Keep dry
	Potassium persulfate	Oxidizer	UN1492	Oxidizer	173.153	173.154	50 pounds	200 pounds	1.2	1.2	
	Potassium sulfide	Flammable solid	UN1382	Flammable solid	173.153	173.207	25 pounds	300 pounds	1.2	1.2	Separate from liquid acids, flammable gases or liquids, oxidizing materials or organic peroxides
	Potassium superoxide	Oxidizer	UN2466	Oxidizer	None	173.187	Forbidden	100 pounds	1.2	1	Keep dry. Stow away from powdered metals, permanganates and combustible packagings and cargo
	Pressurized product. See Compressed gas, n.o.s.										
	Primer. See Cannon primer, Combination primer, or Small arms primer										
	Primers, detonating. See Detonating primers, Class A or Class C explosives										
	Projectile, explosive. See Explosive projectile										
	Projectile, gas, nonexplosive. See Chemical ammunition, nonexplosive (containing a Poison A, Poison B or irritating material, as appropriate)										
	Projectile, gas, smoke, or incendiary, with burster or booster with or without detonating fuze. See Explosive projectile										
	Projectile, illuminating, incendiary or smoke, with expelling charge but without bursting charge. See Fireworks, special										
	Projectile, sand-loaded, empty or solid. See 173.55										
	Propane or Liquefied petroleum gas. *See* Liquefied petroleum gas										
	Propargyl alcohol	Flammable liquid	NA1986	Flammable liquid and Poison	None	173.119	Forbidden	1 quart	1.2	5	
	Propellant explosive	Class A explosive		Explosive A	None	173.84	Forbidden	Forbidden	1.1	5	
	Propellant explosive in water (smokeless powder)	Class B explosive		Explosive B	None	173.93	Forbidden	Forbidden	1.3	5	Magazine stowage authorized
	Propellant explosive in water, unstable, condemned, or deteriorated (smokeless powder)	Class B explosive		Explosive B	None	173.93	Forbidden	Forbidden	1.3	5	Magazine stowage authorized
	Propellant explosive, liquid	Class B explosive		Explosive B	None	173.93	Forbidden	10 pounds	1.2	5	Magazine stowage authorized
	Propellant explosive, solid	Class B explosive		Explosive B	None	173.93	Forbidden	10 pounds	1.3	5	Magazine stowage authorized
	Propionaldehyde	Flammable liquid	UN1275	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Propionic acid	Corrosive material	UN1848	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	Separated by a complete compartment or hold from organic peroxides
	Propionic acid, solution	Corrosive material	UN1848	Corrosive	173.244	173.245	1 quart	10 gallons	1.2	1.2	Separated by a complete compartment or hold from organic peroxides
	Propionic anhydride	Corrosive material	UN2496	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1	Keep dry
	Propionyl peroxide, not more than 28% in solution. *See* Organic peroxide, liquid or solution, n.o.s.		UN2132								
	Propionyl peroxide, more than 28% in solution	Forbidden									
	Propyl acetate	Flammable liquid	UN1276	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Propyl alcohol	Flammable liquid	UN1274	Flammable liquid	173.118	173.125	1 quart	10 gallons	1.2	1.2	
	Propylamine	Flammable liquid	UN1277	Flammable liquid	None	173.119	Forbidden	10 gallons	1.3	5	
	Propyl chloride	Flammable liquid	UN1278	Flammable liquid	None	173.119	Forbidden	10 gallons	1.3	5	

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 CFR/IATA	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Propylene or Liquefied petroleum gas. See Liquefied petroleum gas										
	Propyleneimine	Flammable liquid	UN2258	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Propylene dichloride	Flammable liquid	UN1279	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Propyleneimine, inhibited	Flammable liquid	UN1921	Flammable liquid	None	173.139	Forbidden	5 pints	1,2	1	
	Propylene oxide	Flammable liquid	UN1280	Flammable liquid	173.118	173.119	Forbidden	1 gallon	1,3	1	
	Propyl formate	Flammable liquid	UN1281	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Propyl mercaptan	Flammable liquid	UN2704	Flammable liquid	None	173.141	Forbidden	10 gallons	1,2	5	
	Propyl trichlorosilane	Corrosive material	UN1816	Corrosive	None	173.290	Forbidden	10 gallons	1	1	Keep dry
	Prussic acid. See Hydrocyanic acid, as appropriate										
	P.T.F.E. dioxide	Forbidden									
	Pyridine	Flammable liquid	UN1282	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Pyridine perchlorate	Forbidden									
	Pyrophoric liquid, n.o.s. or Pyroforic liquid, n.o.s.	Flammable liquid	UN2845	Flammable liquid	None	173.134	Forbidden	Forbidden	1	5	Shade from radiant heat. Separate from flammable gases or liquids, or oxidizing materials, or organic peroxides
	Pyrosulfuryl chloride	Corrosive material	UN1817	Corrosive	173.244	173.247	1 quart	1 quart *	1	4	Keep dry. Glass carboys not permitted on passenger vessels
	Pyroxylin plastic, rods, sheets, rolls, or tubes	Flammable solid	NA1325	Flammable solid	173.197	173.137	50 pounds	350 pounds	1,3	1	
	Pyroxylin plastic, scrap	Flammable solid	NA1325	Flammable solid	None	173.135	Forbidden	Forbidden	1	5	Shade from radiant heat
	Pyrrolidine	Flammable liquid	UN1922	Flammable liquid	173.118	173.119	Forbidden	10 gallons	1,2	1	
	Quebrachitol pentanitrate	Forbidden									
	Quicklime. See Calcium oxide										
	Radioactive material, articles, manufactured from natural or depleted uranium or natural thorium	Radioactive material	UN2909	None	173.421-1 173.424	173.421-1 173.424			1,2	1,2	
	Radioactive material, empty packages	Radioactive material	UN2908	Empty	173.421-1 173.427	173.421-1 173.427			1,2	1,2	
	Radioactive material, fissile, n.o.s.	Radioactive material	UN2918	Radioactive	173.453	173.417			1,2	1,2	
	Radioactive material, instruments and articles	Radioactive material	UN2911	None	173.421-1 173.422	173.421-1 173.422			1,2	1,2	
	Radioactive material, limited quantity, n.o.s.	Radioactive material	UN2910	None	173.421 173.421-3	173.421 173.421-3			1,2	1,2	
	Radioactive material, low specific activity or LSA, n.o.s.	Radioactive material	UN2912	Radioactive	173.421 173.422 173.424	173.425			1,2	1,2	
	Radioactive material, n.o.s.	Radioactive material	UN2982	Radioactive	173.421 173.422 173.424	173.415 173.416			1,2	1,2	
	Radioactive material, special form, n.o.s.	Radioactive material	UN2974	Radioactive	173.421 173.422	173.415 173.416			1,2	1,2	
	Railway Fusee. See Fusee										
	Railway torpedo. See Torpedo, railway										
	Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.	Nonflammable gas	UN1078	Nonflammable gas	173.306	173.304 173.314 173.315	150 pounds	300 pounds	1,2	1,2	
	Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.	Flammable gas	NA1954	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	1,2	
	Refrigerating machine	Nonflammable gas	UN2857	Nonflammable gas	173.306 173.307		No limit	No limit	1,3	1,3	
	Refrigerating machine	Flammable gas	NA1954	Flammable gas	173.306		No limit	No limit	1,3	1,3	
	Refrigerating machine	Flammable liquid	NA1993	Flammable liquid	173.130 173.306		No limit	No limit	1,2	1	
	Resin solution (resin compound liquid)	Flammable liquid	UN1866	Flammable liquid	173.118	173.119	1 quart	55 gallons	1,2	1	
	Rifle grenade. See Grenade, hand or rifle, explosive										
	Rifle powder. See Propellant explosive or Black powder										

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
** A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Road asphalt or tar, liquid. See Asphalt, cut back										
	Road asphalt or tar (when heated to or above its flash point). See Asphalt										
	Rocket ammunition with empty, inert, or solid loaded projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with empty projectile	Class B explosive		Explosive B	None	173.90	Forbidden	Forbidden	1.3	5	
	Rocket ammunition with explosive projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with gas projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with illuminating projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with incendiary projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with inert loaded projectile	Class B explosive		Explosive B	None	173.90	Forbidden	Forbidden	1.3	5	
	Rocket ammunition with smoke projectile	Class A explosive		Explosive A	None	173.57	Forbidden	Forbidden	6	5	
	Rocket ammunition with solid projectile	Class B explosive		Explosive B	None	173.90	Forbidden	Forbidden	1.3	5	
	Rocket body, with electric primer or electric squib. See 173.55										
	Rocket engine, liquid	Class B explosive		Explosive B	None	173.95	Forbidden	Forbidden	1.2	5	Magazine storage authorized
	Rocket fireworks. See Fireworks, common										
	Rocket head. See Explosive projectile										
	Rocket motor	Class A explosive		Explosive A	None	173.79	Forbidden	Forbidden	6	5	
	Rocket motor	Class B explosive		Explosive B	None	173.92	Forbidden	550 pounds	1.3	5	
	Roman candle. See Fireworks, common										
	Rubidium metal	Flammable solid	UN1423	Flammable solid and Dangerous when wet	None	173.206	Forbidden	225 pounds	1.2	5	Segregation same as for flammable solid labeled Dangerous When Wet
	Rubidium metal, in cartridges	Flammable solid	UN1423	Flammable solid and Dangerous when wet	173.206		1 pound	25 pounds	1.2	4	Segregation same as for flammable solid labeled Dangerous When Wet
	Safety fuse. See Fuse, safety										
	Safety squib	Class C explosive		Explosive C	None	173.106	50 pounds	150 pounds	1.3	1.3	
	Salute. See Fireworks common or special										
	Samples. See 172.101(c)(12)										
	Sand acid. See Hydrofluorosilicic acid										
	Selenic acid, liquid	Corrosive material	UN1905	Corrosive	None	173.245	Forbidden	5 pints	1.2	1.2	
	Selenium nitride	Forbidden									
	Selenium oxide	Poison B	NA2811	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Self-lighting cigarette	Flammable solid	UN1867	Flammable solid	173.21		Forbidden	Forbidden	1.2	1.2	Keep dry
	Self propelled vehicle. See Motor vehicle										
	Shaped charge, commercial. See High explosive (173.65(N))										
	Shaped charges (commercial) containing more than 8 ounces of explosives	Forbidden									
	Shell, fireworks. See Fireworks, common or special										
	Ship distress signal. See Fireworks, special										
	Signal flare	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1.2	1.2	
	Silicofluoric acid. See Hydrofluorosilicic acid										
	Silicon chloride or Silicon tetrachloride	Corrosive material	UN1818	Corrosive	173.244	173.247	1 quart	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Silicon chrome, exothermic. See Ferrochrome, exothermic										
◆	Silicon tetrafluoride	Nonflammable gas	UN1859	Nonflammable gas	173.306	173.302	Forbidden	300 pounds	1	4	Stow away from foodstuffs

§ 172.101 Hazardous Materials Table—*Continued*

(1) A W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required (if not excepted)	(5) Packaging (a) Exceptions	(5) Packaging (b) Specific requirements	(6) Maximum net quantity in one package (a) Passenger-carrying aircraft or railcar	(6) Maximum net quantity in one package (b) Cargo aircraft only	(7) Water shipments (a) Cargo vessel	(7) Water shipments (b) Passenger vessel	(7) Water shipments (c) Other requirements
	Silver acetylide (dry)	Forbidden									
	Silver azide (dry)	Forbidden									
	Silver chlorate (dry)	Forbidden									
•	Silver cyanide	Poison B	UN1684	Poison	173.370	173.370	25 pounds	200 pounds	1.2	1.2	Stow away from acids
	Silver fulminate (dry)	Forbidden									
	Silver nitrate	Oxidizer	UN1493	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	Stow away from foodstuffs
	Silver oxalate (dry)	Forbidden									
	Silver picrate (dry)	Forbidden									
	Small arms ammunition	ORM-D		None	173.101	173.1201	65 pounds gross	65 pounds gross			
	Small arms ammunition	Class C explosive		None	173.101		50 pounds	150 pounds	1.3	1.3	
	Small arms ammunition, irritating (tear gas) cartridge	Class C explosive		Irritant	None	173.101	Forbidden	150 pounds	1.3	1.3	
	Small arms primer	Class C explosive		None	None	173.107	50 pounds	150 pounds	1.3	1.3	
	Smoke candle	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1.3	1.3	
	Smoke generator. See Chemical ammunition, nonexplosive (containing a Poison A, Poison B, or irritating material, as appropriate)										
	Smoke grenade	Class C explosive		Explosive C	None	173.108	50 pounds	150 pounds	1.3	1.3	
	Smokeless powder for cannon or small arms. See Propellant explosive, Class A or B, as appropriate										
	Smokeless powder for small arms (100 pounds or less)	Flammable solid	NA1325	Flammable solid	173.88	173.197a	Forbidden	Forbidden	1.3	1.3	Segregation same as for explosives
	Smoke pot	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1.3	1.3	
	Smoke projectile with bursting charge. See Explosive projectile										
	Smoke projectile with expelling charge but without bursting charge. See Fireworks, special										
	Smoke signal	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1.3	1.3	
	Soda amide. See High explosive										
	Soda lime, solid	Corrosive material	UN1907	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Sodium acid sulfate, solid or solution. See appropriate Sodium hydrogen sulfate entry										
A	Sodium aluminate, solid	ORM-B	UN2812	None	173.505	173.800	25 pounds	100 pounds			
	Sodium aluminate solution	Corrosive material	UN1819	Corrosive	173.244	173.243	1 quart	5 gallons	1.2	1.2	
	Sodium aluminum hydride	Flammable solid	UN2835	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium amide	Flammable solid	UN1425	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium arsenate	Poison B	UN1685	Poison	173.364	173.365 173.368	50 pounds	200 pounds	1.2	1.2	
	Sodium arsenite, liquid (solution)	Poison B	UN1686	Poison	173.345	173.346	1 quart	55 gallons	1.2	1.2	
•	Sodium azide	Poison B	UN1687	Poison	173.364	173.375	50 pounds	100 pounds	1.2	1.2	Stow away from heavy metals, especially lead and its compounds. Stow separate from acids
	Sodium bifluoride, solid	Corrosive material	UN2439	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	
	Sodium bifluoride, solution	Corrosive material	UN2439	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	
	Sodium bisulfate, solid or solution. See Sodium hydrogen sulfate, solid or solution										
	Sodium bisulfite, solid or solution. See Sodium hydrogen sulfite, solid or solution										
	Sodium bromate	Oxidizer	UN1494	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds. Stow away from powdered metals
	Sodium chlorate (*soda chlorate*)	Oxidizer	UN1495	Oxidizer	173.153	173.183	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds. Stow away from powdered metals

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Sodium chlorite	Oxidizer	UN1496	Oxidizer	None	173.150	Forbidden	100 pounds	1.2	1.2	Stow separate from ammonium compounds. Stow away from powdered metals
	Sodium chlorite solution [not exceeding 42% sodium chlorite]	Corrosive material	UN1908	Corrosive	173.244	173.263	1 quart	4 gallons	1.2	1	Glass carboys in hampers not permitted under deck
	Sodium cyanide, solid	Poison B	UN1689	Poison	173.376	173.379	25 pounds	200 pounds	1.2	1.2	Stow away from acids
	Sodium cyanide solution	Poison B	UN1689	Poison	173.345	173.352	1 quart	55 gallons	1.2	1.2	Stow away from acids
	Sodium dichloroisocyanurate. See Sodium dichloro-s-triazinetrione										
	Sodium dichloro-s-triazinetrione [dry containing more than 39% available chlorine]	Oxidizer	UN2465	Oxidizer	173.153	173.217	50 pounds	100 pounds	1.2	1.2	
A	Sodium dichromate	ORM A	NA1479	None	173.505	173.510	No limit	No limit	1.2	1.2	
A	Sodium fluoride, solid	ORM B	UN1690	None	173.505	173.510	No limit	No limit	1.2	1.2	
	Sodium fluoride, solution	Corrosive material	UN1690	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	Stow away from acids
	Sodium hydrate. See Sodium hydroxide										
	Sodium hydride	Flammable solid	UN1427	Flammable solid and Dangerous when wet	None	173.198	Forbidden	25 pounds	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
A	Sodium hydrogen sulfate, solid	ORM B	UN1821	None	173.505	173.800	25 pounds	100 pounds			
	Sodium hydrogen sulfate solution	Corrosive material	UN2837	Corrosive	173.244	173.245	1 quart	1 gallon	1.2	1.2	
A	Sodium hydrogen sulfite, solid	ORM B	NA2693	None	173.505	173.800	25 pounds	100 pounds	1.2	1.2	
	Sodium hydrogen sulfite, solution	Corrosive material	NA2693	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	
	Sodium hydrosulfide, solid [with less than 25% water of crystallization]	Flammable solid	UN2318	Flammable solid	173.153	173.154	25 pounds	100 pounds	1.2	1.2	
	Sodium hydrosulfide, solid [with not less than 25% water of crystallization]	Corrosive material	NA2923	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	
	Sodium hydrosulfide, solution	Corrosive material	NA2922	Corrosive	173.244	173.245	1 quart	5 gallons	1.2	1.2	
	Sodium hydrosulfite [sodium dithionite]	Flammable solid	UN1384	Flammable solid	173.153	173.204	25 pounds	100 pounds	1.2	1.2	Keep dry. Below deck stowage in metal drums only. Separate from flammable gases, liquids, oxidizing materials, or organic peroxides
	Sodium hydroxide, dry solid, flake, bead, or granular	Corrosive material	UN1823	Corrosive	173.244	173.245b	25 pounds	200 pounds	1.2	1.2	Keep dry
	Sodium hydroxide, liquid or solution	Corrosive material	UN1824	Corrosive	173.244	173.243	1 quart	5 gallons	1.2	1.2	
	Sodium hypochlorite. See Hypochlorite solution or Hypochlorite solution containing not more than 7% available chlorine										
A	Sodium metabisulfite	ORM B	NA2693	None	173.505	173.510	No limit	No limit			
	Sodium, metal or metallic	Flammable solid	UN1428	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium, metal dispersion in organic solvent	Flammable solid	UN1429	Flammable solid and Dangerous when wet	None	173.230	Forbidden	10 pounds	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium, metal liquid alloy	Flammable solid	NA1421	Flammable solid and Dangerous when wet	None	173.202	Forbidden	1 pound	1.2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium methylate, alcohol mixture	Combustible liquid	NA1289	None	173.118a	None	No limit	No limit	1.2	1.2	
	Sodium methylate, alcohol mixture	Flammable liquid	NA1289	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Sodium methylate, alcohol mixture	Corrosive material	NA1289	Corrosive	173.244	173.245	1 quart	1 quart	1.2	1.2	
	Sodium methylate, dry	Flammable solid	UN1431	Flammable solid and Dangerous when wet	173.153	173.154	25 pounds	100 pounds	1.2	1	
	Sodium monoxide, solid	Corrosive material	UN1825	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Keep dry
	Sodium nitrate	Oxidizer	UN1498	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Sodium nitrate bags. See Bags, sodium nitrate, empty and unwashed										
	Sodium nitrite	Oxidizer	UN1500	Oxidizer	173.153	173.234	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds and cyanides. Bagged material not permitted on passenger vessels

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 CFR	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Sodium nitrite mixed (Used) with potassium nitrate	Oxidizer	UN1487	Oxidizer	173.153	173.183	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds and cyanides
	Sodium nitrite mixture (sodium nitrate, sodium nitrite, and potassium nitrate)	Oxidizer	NA1487	Oxidizer	173.153	173.234	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds and cyanides
A	Sodium pentachlorophenate	ORM A	UN2567	None	173.505	173.510	No limit	No limit			
	Sodium perchlorate	Oxidizer	UN1502	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.3	1.3	Stow away from powdered metals
	Sodium permanganate	Oxidizer	UN1503	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Separate from ammonium compounds and hydrogen peroxide
	Sodium peroxide	Oxidizer	UN1504	Oxidizer	None	173.187	Forbidden	100 pounds	1.2	1	Keep dry. Stow away from powdered metals, permanganates, combustible packing of other cargo, and combustible bookstuffs
	Sodium persulfate	Oxidizer	UN1505	Oxidizer	173.153	173.154	50 pounds	200 pounds	1.2	1.2	
	Sodium phenolate, solid	Corrosive material	UN2497	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	
	Sodium phosphide	Flammable solid	UN1432	Flammable solid and Dangerous when wet	None	173.154	Forbidden	25 pounds	1	5	
	Sodium picramate, wet (with at least 20% water)	Flammable solid	UN1349	Flammable solid	None	173.206	Forbidden	25 pounds	1.2	5	Stow away from heavy metals, especially lead, and its compounds
	Sodium picryl peroxide	Forbidden									
	Sodium potassium alloy, liquid	Flammable solid	UN1422	Flammable solid and Dangerous when wet	None	173.202	Forbidden	1 pound	1.2	5	Under deck stowage must be readily accessible. Segregation same as for flammable solid labeled Dangerous when wet
	Sodium potassium alloy, solid	Flammable solid	UN1422	Flammable solid and Dangerous when wet	None	173.206	Forbidden	25 pounds	1.2	5	Under deck stowage must be readily accessible. Segregation same as for flammable solids labeled Dangerous When Wet
	Sodium selenite	Poison B	UN2630	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Sodium sulfide, anhydrous or Sodium sulfide with less than 30% water of crystallization	Flammable solid	UN1385	Flammable solid	173.153	173.207	25 pounds	100 pounds	1.2	1.2	Stow separated from liquid acids
	Sodium sulfide, hydrated with not less than 30% water	Corrosive material	UN1849	Corrosive	173.244	173.245b	25 pounds	100 pounds	1.2	1.2	Stow away from acids
	Sodium superoxide	Oxidizer	UN2547	Oxidizer	None	173.187	Forbidden	100 pounds	1.2	5	Keep dry. Stow away from powdered metals, permanganates and combustible packagings and cargo
	Sodium tetrahide	Forbidden									
	Spatters. See Fireworks, common										
	Spent iron mass. See Iron mass, spent										
	Spent iron sponge. See Iron sponge, spent										
	Spent mixed acid. See Nitrating acid, spent										
	Spent sulfuric acid. See Sulfuric acid, spent										
	Spirits of nitroglycerin, (1 to 10%)	Flammable liquid	NA1204	Flammable liquid	None	173.133	Forbidden	6 quarts	1.2	5	Segregation same as for explosives
	Spirits of nitroglycerin, not exceeding 1% nitroglycerin by weight	Flammable liquid	NA1204	Flammable liquid	173.118	173.133	1 quart	6 quarts	1.2	1	
	Sporting powder. See Black powder or Propellant explosive, solid										
	Spray starting fluid. See Engine starting fluid										
	Spreader cartridge. See Fireworks, special										
	Squib, electric or safety. See Electric squib or Safety squib										
	Stannic phosphide	Flammable solid	UN1433	Flammable solid and Dangerous when wet	None	173.154	Forbidden	25 pounds	1	5	Segregation same as for flammable solid labeled Dangerous When Wet
A	Stannous chloride, solid	ORM B	NA1759	None	173.505	173.510	No limit	No limit			
	Starter cartridge	Class B explosive		Explosive B	None	173.92	Forbidden	200 pounds	1.3	5	
	Starter cartridge	Class C explosive		Explosive C	None	173.102	50 pounds	150 pounds	1.3	1.3	
	Storage battery, wet. See Battery, electric storage, wet										
	Straw. See Hay										
	Strontium arsenite, solid	Poison B	UN1691	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
R/A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Strontium chlorate	Oxidizer	UN1506	Oxidizer	173.153	173.183	25 pounds	100 pounds	1.2	1.2	Stow separate from ammonium compounds. Stow away from powdered metals
	Strontium chlorate, wet	Oxidizer	UN1506	Oxidizer	173.153	173.183	25 pounds	200 pounds	1.2	1.2	Stow separate from ammonium compounds. Stow away from powdered metals
	Strontium nitrate	Oxidizer	UN1507	Oxidizer	173.153	173.182	25 pounds	100 pounds	1.2	1.2	
	Strontium peroxide	Oxidizer	UN1509	Oxidizer	173.153	173.154	25 pounds	100 pounds	1.2	1.2	Keep dry
	Strychnine salt, solid	Poison B	UN1692	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Strychnine, solid	Poison B	UN1692	Poison	173.364	173.365	Forbidden	200 pounds	1.2	1.2	
	Styphnate of lead. See Initiating explosive										
	Styrene monomer, inhibited	Flammable liquid	UN2055	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1.2	
	Substituted nitrophenol pesticide, liquid, n.o.s. (compounds and preparations)	Flammable liquid	UN2780	Flammable liquid	173.118	173.119	1 quart	10 gallons	1.2	1	
	Substituted nitrophenol pesticide, liquid, n.o.s. (compounds and preparations)	Poison B	UN2779	Poison	173.345	173.348	1 quart	55 gallons	1.2	1.2	
	Substituted nitrophenol pesticide, solid, n.o.s. (compounds and preparations)	Poison B	UN2778	Poison	173.364	173.365	50 pounds	200 pounds	1.2	1.2	
	Succinic acid peroxide	Organic peroxide	UN2135	Organic peroxide	173.153	173.157 173.158	Forbidden	25 pounds	1	1	
	Succinic acid peroxide, technically pure. *See* Succinic acid peroxide.		UN2135								
	Sucrose octanitrate (dry)	Forbidden									
	Sulfur and chlorate, loose mixtures of	Forbidden									
	Sulfur chloride (*S*)	Corrosive material	UN1828	Corrosive	None	173.247	Forbidden	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Sulfur chloride (mono)	Corrosive material	UN1828	Corrosive	None	173.247	Forbidden	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Sulfur dioxide	Nonflammable gas	UN1079	Nonflammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1.2	1	Stow away from living quarters
	Sulfur flower. *See* Sulfur, solid										
	Sulfur hexafluoride	Nonflammable gas	UN1080	Nonflammable gas	173.306	173.304	150 pounds	300 pounds	1.2	1.2	
	Sulfuric acid (*For fuming sulfuric acid, see* Oleum)	Corrosive material	UN1830	Corrosive	173.244	173.272	1 quart	1 gallon	1	1	Keep dry. Under deck stowage is permitted on cargo vessels only in metal drums
	Sulfuric acid, spent	Corrosive material	UN1832	Corrosive	None	173.243	Forbidden	1 quart	1	1	Under deck stowage is permitted on cargo vessels only in metal drums
	Sulfuric anhydride. *See* Sulfur trioxide										
	Sulfurous acid	Corrosive material	UN1833	Corrosive	173.244	173.245	2 gallons	2 gallons	1.2	1	Glass carboys in hampers not permitted under deck
W	Sulfur, solid	ORM-C	UN1350	None	173.505	173.1060			1.2	1.2	Protect from sparks and open flame. Stow separate from oxidizing materials. Segregation same as for flammable solids
	Sulfur trioxide	Corrosive material	UN1829	Corrosive	173.244	173.273	Forbidden	1 gallon	1.2	1.2	Keep dry. Glass bottles not permitted under deck
	Sulfuryl chloride	Corrosive material	UN1834	Corrosive	173.244	173.247	1 quart	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Sulfuryl fluoride	Nonflammable gas	UN2191	Nonflammable gas	173.306	173.304 173.314	150 pounds	300 pounds	1.3	1	
	Sulphur. *See* Sulfur, solid										
	Supplementary charge (explosive)	Class A explosive		Explosive A	None	173.89	Forbidden	Forbidden	5	5	
A	2,4,5-T. *See* 2,4,5-Trichlorophenoxyacetic acid.										
	Tank car, containing residue of phosphorus and filled with water or inert gas. See 173.190										
	Tank car, empty (previously used for a hazardous material). See 173.29										
	Tank car, empty (previously used for a Poison A material). See 172.510 and 173.29										
	Tank, portable, empty (previously used for a hazardous material). See 172.510, 172.514 and 173.29										
	Tank truck, empty. See 172.510, 172.514 and 173.29										

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
S / A / W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
A	TDE (1,1-Dichloro-2,2-bis(p-chlorophenyl) ethane)	ORM A	NA2761	None	173.505	173.510	50 pounds	No limit	1,2	1,2	
	Tear gas ammunition. See Chemical ammunition, nonexplosive (containing an irritant material)										
	Tear gas candle	Irritating material	UN1700	Irritant	None	173.385	Forbidden	75 pounds	1	5	Stow away from living quarters
	Tear gas cartridge. See Small arms ammunition, irritating (tear gas) cartridge										
	Tear gas device	Irritating material	NA1693	Irritant	None	173.385	Forbidden	75 pounds	1	5	Stow away from living quarters
	Tear gas grenade. See Grenade, tear gas										
	Tertiary alcohol. See Alcohol, n.o.s.										
	Tetrazole benzene quinone	Forbidden									
AW	Tetrachloroethane	ORM A	UN1702	None	173.505	173.820	1 quart	10 gallons	1,2	1,2	
A	Tetrachloroethylene or Perchloroethylene	ORM A	UN1897	None	173.505	173.805	10 gallons	55 gallons			
	Tetraethylammonium perchlorate (dry)	Forbidden									
	Tetraethyl dithiopyrophosphate and compressed gas mixture	Poison A	UN1703	Poison gas	None	173.334	Forbidden	Forbidden	1	5	Shade from radiant heat. Stow away from living quarters. Segregation same as for nonflammable gases
	Tetraethyl dithiopyrophosphate, liquid	Poison B	UN1704	Poison	None	173.358	Forbidden	1 quart	1	5	
	Tetraethyl dithiopyrophosphate mixture, dry	Poison B	UN1704	Poison	None	173.377	Forbidden	200 pounds	1	5	
	Tetraethyl dithiopyrophosphate mixture, liquid	Poison B	UN1704	Poison	None	173.359	Forbidden	1 quart	1	5	
	Tetraethyl lead, liquid (including flash point for export shipment by water)	Poison B	NA1649	Poison	None	173.354	Forbidden	55 gallons	1	5	If flash point is 141 deg F or less segregation must be the same as for flammable liquids
	Tetraethyl pyrophosphate and compressed gas mixture	Poison A	UN1705	Poison gas	None	173.334	Forbidden	Forbidden	1	5	Shade from radiant heat. Stow away from living quarters. Segregation same as for nonflammable gases
	Tetraethyl pyrophosphate, liquid	Poison B	NA2783	Poison	None	173.358	Forbidden	1 quart	1,2	5	
	Tetraethyl pyrophosphate mixture, dry	Poison B	NA2783	Poison	None	173.377	Forbidden	200 pounds	1,2	5	
	Tetraethyl pyrophosphate mixture, liquid	Poison B	NA2783	Poison	None	173.359	Forbidden	1 quart	1,2	5	
+	Tetrafluoroethylene, inhibited	Flammable gas	UN1081	Flammable gas	173.306	173.304	Forbidden	300 pounds	1,2	1,2	Stow away from living quarters
	1,2,3,6-Tetrahydrobenzaldehyde	Corrosive material	UN2498	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Tetrahydrofuran	Flammable liquid	UN2056	Flammable liquid	None	173.118	Forbidden	10 gallons	1,3	5	
	Tetralin hydroperoxide, technically pure. See Organic peroxide, solid, n.o.s.		UN2136								
	Tetramethylammonium hydroxide, liquid	Corrosive material	UN1835	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	1,1,3,3-Tetramethylbutyl hydroperoxide, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2160								
	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate, technically pure. See Organic peroxide, liquid or solution, n.o.s.		UN2161								
	Tetramethylene diperoxide dicarbamide	Forbidden									
A	Tetramethylmethylenediamine	ORM A	NA3069	None	173.505	173.510	No limit	No limit			
	Tetranitro diglycerin	Forbidden									
	Tetranitromethane	Oxidizer	UN1510	Oxidizer	None	173.203	Forbidden	Forbidden	1	5	Shade from radiant heat. Stow away from foodstuffs
	2,3,4,6-Tetranitrophenol	Forbidden									
	2,3,4,6-Tetranitrophenyl methyl nitramine	Forbidden									
	2,3,4,6-Tetranitrophenylnitramine	Forbidden									
	Tetranitroresorcinol (dry)	Forbidden									
	2,3,5,6-Tetranitroso-1,4-dinitrobenzene	Forbidden									
	2,3,5,6-Tetranitroso nitrobenzene (dry)	Forbidden									
	Tetrazene (guanyl nitrosamino guanyltetrazene). See Initiating explosive										
	Tetrazine (dry)	Forbidden									

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Tetraethyl lead (dry)	Forbidden									
	Tetryl. See High explosive										
	Textile treating compound or mixture, liquid	Corrosive material	NA1760	Corrosive	173.244	173.243a	1 quart	10 gallons	1,2	1,2	
	Thallium salt, solid, n.o.s.	Poison B	NA1707	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Thallium sulfate, solid	Poison B	NA1707	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Thinner for rust preventive coating. *See Rust preventive coating*										
	Thiocarbonyl chloride. *See* Thiophosgene										
	Thioglycolic acid	Corrosive material	UN1940	Corrosive	173.244	173.245	1 quart	1 gallon	1,2	1,2	Glass carboys in hampers not permitted under deck
	Thionyl chloride	Corrosive material	UN1836	Corrosive	None	173.247	Forbidden	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Thiophenol. See Phenyl mercaptan										
*	Thiophosgene	Poison B	UN2474	Poison	None	173.356	Forbidden	1 gallon	1	5	Shade from radiant heat
	Thiophosphoryl chloride	Corrosive material	UN1837	Corrosive	None	173.271	Forbidden	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
A	Thiram	ORM A	NA2771	None	173.505	173.510	No limit	No limit			
	Thorium metal, pyrophoric	Radioactive material	UN2975	Radioactive and Flammable solid	None	173.418	Forbidden	Forbidden	1,2	1,2	
	Thorium nitrate	Radioactive material	UN2976	Radioactive and Oxidizer	None	173.418	Forbidden	25 pounds	1,2	1,2	Separate longitudinally by a complete hold or compartment from explosives
	Time fuze. See Fuze, time										
	Tin chloride, fuming. *See* Tin tetrachloride, anhydrous										
	Tin perchloride. *See* Tin tetrachloride, anhydrous										
	Tin tetrachloride, anhydrous	Corrosive material	UN1827	Corrosive	173.244	173.247	1 quart	1 quart	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Titanium metal powder, dry or wet with less than 25% water	Flammable solid	UN2546	Flammable solid	None	173.208	Forbidden	75 pounds	1,2	5	
	Titanium metal powder, wet with 25% or more water	Flammable solid	UN1352	Flammable solid	None	173.208	Forbidden	150 pounds	1,2	5	
	Titanium sulfate solution containing not more than 45% sulfuric acid	Corrosive material	NA1760	Corrosive	173.244	173.297	1 quart	1 gallon	1	4	Shade from radiant heat. Keep dry
	Titanium tetrachloride	Corrosive material	UN1838	Corrosive	173.244	173.247	1 quart	10 gallons	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Toluene (toluol)	Flammable liquid	UN1294	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
A	Toluenediamine	ORM A	NA1709	None	173.505	173.510	No limit	No limit			
*	Toluene diisocyanate	Poison B	UN2078	Poison	173.345	173.346	Forbidden	55 gallons	1,2	1,2	Shade from radiant heat
	Toluene sulfonic acid, liquid	Corrosive material	UN2584	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Torch. See Fireworks, common										
	Torpedo, railway	Class B explosive		Explosive B	None	173.91	Forbidden	200 pounds	1,2	1,2	Passenger vessels in metal bottoms only
A	Toxaphene	ORM A	NA2761	None	173.505	173.510	25 pounds	100 pounds	1,2	1,2	
	Toy caps	Class C explosive		Explosive C	None	173.100 173.109	50 pounds	150 pounds	1,3	1,3	
	Toy propellant device	Class C explosive		Explosive C	None	173.111	50 pounds	150 pounds	1,3	1,3	
	Toy smoke device	Class C explosive		Explosive C	None	173.111	50 pounds	150 pounds	1,3	1,3	
	Toy torpedo. See Fireworks, special										
	2,4,5-TP. *See* 2,4,5-Trichlorophenoxypropionic acid										
	Tracer	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Tracer fuze	Class C explosive		Explosive C	None	173.105	50 pounds	150 pounds	1,3	1,3	
	Tractor. See Motor vehicle										
	Trailer or truck body with refrigeration or heating equipment. *See* Motor vehicle										
	Triazine pesticide, liquid, n.o.s. (*compounds and preparations*)	Flammable liquid	UN2764	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
	Triazine pesticide, liquid, n.o.s. (*compounds and preparations*)	Poison B	UN2763	Poison	173.345	173.346	1 quart	55 gallons	1,2	1,2	
	Triazine pesticide, solid, n.o.s. (*compounds and preparations*)	Poison B	UN2763	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Tri-(b-nitroxyethyl)-ammonium nitrate	Forbidden									

§ 172.101 Hazardous Materials Table—*Continued*

(1)	(2)	(3)	(3A)	(4)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipments		
+/A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
A	Trichlorfon	ORM-A	NA2783	None	173.505	173.510	50 pounds	200 pounds	1,2	1,2	
	Trichloroacetic acid, solid	Corrosive material	UN1839	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1	
	Trichloroacetic acid solution	Corrosive material	UN2564	Corrosive	173.244	173.245	1 quart	1 quart	1,2	1,2	Glass carboys in hampers not permitted under deck
A	1,1,1-Trichloroethane	ORM-A	UN2831	None	173.505	173.605	10 gallons	55 gallons			
A	Trichloroethylene	ORM-A	UN1710	None	173.505	173.605	10 gallons	55 gallons	1,2	1,2	
	Trichloroisocyanuric acid, dry	Oxidizer	UN2468	Oxidizer	173.153	173.217	10 pounds	50 pounds	1,2	1,2	Shade from radiant heat. Keep dry. Stow separated from nitrogen compounds
	Trichloromethyl perchlorate	Forbidden									
A	Trichlorophenol	ORM-A	NA2020	None	173.505	173.510	100 pounds	No limit	1,2	1,2	
A	2,4,5-Trichlorophenoxyacetic acid	ORM-A	NA2765	None	173.505	173.510	50 pounds	No limit	1,2	1,2	
A	2,4,5-Trichlorophenoxypropionic acid	ORM-A	NA2765	None	173.505	173.510	50 pounds	No limit	1,2	1,2	
	Trichlorosilane	Flammable liquid	UN1295	Flammable liquid	None	173.136	Forbidden	10 gallons	1	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Trichloro-S-triazinetrione dry, containing over 39% available chlorine	Oxidizer	NA2468	Oxidizer	173.153	173.217	50 pounds	100 pounds	1,2	1,2	Shade from radiant heat. Keep dry. Stow separated from nitrogen compounds
	Trick matches	Class C explosive		Explosive C	None	173.111	Forbidden	Forbidden	1,3	1,3	
	Trick noise maker, explosive	Class C explosive		Explosive C	None	173.111	50 pounds	150 pounds	1,3	1,3	
	Triethylamine	Flammable liquid	UN1296	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
+	Trifluorochloroethylene	Flammable gas	UN1082	Flammable gas	173.306	173.304 173.314	Forbidden	10 gallons	1,2	1	
	Trifluoromethane and chlorotrifluoromethane mixture (constant boiling mixture) (R-503). *See* Refrigerant gas, n.o.s.										
	Triformoxime trinitrate	Forbidden									
	Trimethylacetyl chloride	Corrosive material	UN2438	Corrosive	173.244	173.247	1 quart	1 quart	1,2	1,2	
	Trimethylamine, anhydrous	Flammable gas	UN1083	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1	4	
	Trimethylamine, aqueous solution	Flammable liquid	UN1297	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	Stow away from mercury and mercury compounds
	Trimethylchlorosilane	Flammable liquid	UN1298	Flammable liquid	None	173.135	Forbidden	10 gallons	1,2	1	
	Trimethylene glycol diperchlorate	Forbidden									
	Trimethylol nitromethane trinitrate	Forbidden									
	1,3,5-Trimethyl-2,4,6-trinitrobenzene	Forbidden									
	Trinitroacetic acid	Forbidden									
	Trinitroacetonitrile	Forbidden									
	Trinitroamine cobalt	Forbidden									
	Trinitrobenzene, dry. See High explosive										
	Trinitrobenzene, wet containing at least 10% water	Flammable solid	UN1354	Flammable solid	173.212		1 pound	1 pound	1	4	Stow away from heavy metals and their compounds
	Trinitrobenzene, wet, containing at least 10% water, over 16 ounces in one outside packaging. See High explosive										
	Trinitrobenzoic acid, dry. See High explosive										
	Trinitrobenzoic acid, wet, containing at least 10% water	Flammable solid	UN1355	Flammable solid	173.132	173.133	1 pound	25 pounds	1	5	Stow away from heavy metals and their compounds
	Trinitrobenzoic acid, wet, containing at least 10% water, over 25 pounds in one outside packaging. See High explosive										
	2,4,6-Trinitro-1,3-diazobenzene	Forbidden									
	Trinitroethanol	Forbidden									
	Trinitroethylnitrate	Forbidden									
	Trinitromethane	Forbidden									
	1,3,5-Trinitronaphthalene	Forbidden									
	2,4,6-Trinitrophenyl guanidine (dry)	Forbidden									
	2,4,6-Trinitrophenyl nitramine	Forbidden									
	2,4,6-Trinitrophenyl trimethylol methyl nitramine trinitrate (dry)	Forbidden									

 For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 A W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Trinitroresorcinol. See High explosive										
	2,4,6 Trinitro-3-methyl nitraminoanisole	Forbidden									
	Trinitrotetramine cobalt nitrate	Forbidden									
	Trinitrotoluene, dry. See High explosive										
	Trinitrotoluene, wet containing at least 10% water	Flammable solid	UN1356	Flammable solid	173.212		1 pound	1 pound	1	4	Stow away from heavy metals and their compounds
	Trinitrotoluene, wet, containing at least 10% water, over 16 ounces in one outside packaging. See High explosive										
	2,4,6 Trinitro-1,3,5-trianilo benzene (dry)	Forbidden									
	Tris (1-aziridinyl) phosphine oxide	Corrosive material	UN2501	Corrosive	173.244	173.299a	1 quart	1 gallon	1	1	Keep dry. Glass carboys not permitted on passenger vessels
	Tris, bis difluoroamino diethoxy propane (TVOPA)	Forbidden									
	Tungsten hexafluoride	Corrosive material	UN2196	Corrosive	None	173.264	Forbidden	110 pounds	1	5	Segregation same as for nonflammable gases
	Turpentine	Combustible liquid	UN1299	None	173.118a	None	No limit	No limit	1,2	1,2	
	Turpentine	Flammable liquid	UN1299	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1,2	
	Uranium hexafluoride, fissile (containing more than 1% U-235)	Radioactive material	UN2977	Radioactive and Corrosive	173.453	173.417 173.420			1,2	1,2	
	Uranium hexafluoride, low specific activity	Radioactive material	UN2978	Radioactive and Corrosive	173.421-2	173.420 173.425			1,2	1,2	
	Uranium metal, pyrophoric	Radioactive material	UN2979	Radioactive and Flammable solid	None	173.418	Forbidden	Forbidden	1,2	1,2	
	Uranyl acetate	Radioactive material	NA3180	Radioactive	173.421 173.425	173.415 173.416			1,2	1,2	
	Uranyl nitrate hexahydrate solution	Radioactive material	UN2980	Radioactive and Corrosive	173.421 173.425	173.415 173.416 173.417			1,2	1,2	
	Uranyl nitrate, solid	Radioactive material	UN2981	Radioactive and Oxidizer	None	173.419	Forbidden	25 pounds	1,2	1,2	Separate longitudinally by an intervening hold or compartment from explosives
	Urea nitrate, dry. See High explosive										
	Urea nitrate, wet with 10% or more water	Flammable solid	UN1357	Flammable solid	173.182	173.183	1 pound	25 pounds	1,2	1,2	
	Urea nitrate, wet with 10% or more water, over 25 pounds in one outside packaging. See High explosive										
	Urea peroxide	Organic peroxide	NA1511	Organic peroxide	173.153	173.227	2 pounds	25 pounds	1	4	Keep dry. Shade from radiant heat
	Valeric acid	Corrosive material	NA1760	Corrosive	173.244	173.245	1 quart	10 gallons	1,2	1,2	
	Valeryl chloride	Corrosive material	UN2502	Corrosive	173.244	173.245	1 quart	1 gallon	1,2	1,2	
	Vanadium oxytrichloride	Corrosive material	UN2443	Corrosive	173.244	173.247a	Forbidden	1 quart	1	4	Shade from radiant heat
	Vanadium oxytrichloride and titanium tetrachloride mixture	Corrosive material	NA2443	Corrosive	None	173.245 173.245a	Forbidden	1 quart	1	4	Shade from radiant heat
	Vanadium tetrachloride	Corrosive material	UN2444	Corrosive	173.244	173.247a	Forbidden	1 quart	1	4	Shade from radiant heat
	Very signal cartridge	Class C explosive		Explosive C	None	173.108	50 pounds	200 pounds	1,3	1,3	
	Vinyl acetate	Flammable liquid	UN1301	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
+	Vinyl chloride	Flammable gas	UN1086	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1,2	4	Stow away from living quarters
	Vinyl ethyl ether, inhibited	Flammable liquid	UN1302	Flammable liquid	None	173.119	Forbidden	1 gallon	1,3	5	
	Vinyl fluoride, inhibited	Flammable gas	UN1860	Flammable gas	173.306	173.304 173.314 173.315	Forbidden	300 pounds	1	4	
	Vinylidene chloride, inhibited	Flammable liquid	UN1303	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,3	4	
	Vinyl isobutyl ether	Flammable liquid	UN1304	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
+	Vinyl methyl ether	Flammable gas	UN1087	Flammable gas	173.306	173.304 173.314	Forbidden	20 pounds	1,2	1	Stow away from living quarters

§ 172.101 Hazardous Materials Table—Continued

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
49 CFR	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific requirements	(a) Passenger-carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Vinyl nitrate polymer	Forbidden									
	Vinyl trichlorosilane	Flammable liquid	UN1305	Flammable liquid	None	173.135	Forbidden	10 gallons	1,2	1	
	Vitriol, oil of. See Sulfuric acid										
	War head. See Explosive projectile										
	Waste, hazardous. See Hazardous waste, liquid or solid, n.o.s.										
	Water pump system tank charged with compressed air or nitrogen	Nonflammable gas	NA1956	None	173.306		Forbidden	Forbidden	1,2	1,2	
	Water reactive solid, n.o.s.	Flammable solid	UN2813	Flammable solid and Dangerous when wet	173.153	173.154	Forbidden	25 pounds	1,2	4	Segregation same as for flammable solids labeled Dangerous When Wet
	Wheelchair, battery equipped. See Battery, electric storage, wet, with wheelchair										
	White acid (ammonium bifluoride and hydrofluoric acid mixture)	Corrosive material	NA1760	Corrosive	173.244	173.254	1 quart	1 gallon	1	1	
	Xenon	Nonflammable gas	UN2036	Nonflammable gas	173.306	173.302	150 pounds	300 pounds	1,2	1,2	
	X-ray film. See Film										
	Xylene (xylol)	Flammable liquid	UN1307	Flammable liquid	173.118	173.119	1 quart	10 gallons	1,2	1	
A	Xylenol	ORM A	UN2261	None	173.505	173.510	100 pounds	No limit	1,2	1,2	
	Xylyl bromide	Irritating material	UN1701	Irritant	None	173.382	Forbidden	75 pounds	1	5	Stow away from living quarters
	Zinc ammonium nitrite	Oxidizer	UN1512	Oxidizer	None	173.228	25 pounds	100 pounds	1,3	5	This material may be forbidden in water transportation by certain countries
	Zinc arsenate	Poison B	UN1712	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Zinc arsenite, solid	Poison B	UN1712	Poison	173.364	173.365	50 pounds	200 pounds	1,2	1,2	
	Zinc chlorate	Oxidizer	UN1513	Oxidizer	173.153	173.163	25 pounds	100 pounds	1,2	1,2	Stow separate from ammonium compounds and away from powdered metals
	Zinc chloride solution	Corrosive material	UN1840	Corrosive	173.244	173.245	1 quart	1 quart	1,2	1,2	
	Zinc cyanide	Poison B	UN1713	Poison	173.370	173.370	25 pounds	200 pounds	1,2	1,2	Stow away from acids
	Zinc ethyl. See Pyrophoric liquid, n.o.s.										
A	Zinc hydrosulfite	ORM A	UN1931	None	173.505	173.510	50 pounds	100 pounds	1,2	1,2	Keep dry. Stow away from acids and oxidizers
	Zinc muriate solution. See Zinc chloride solution										
	Zinc nitrate	Oxidizer	UN1514	Oxidizer	173.153	173.182	25 pounds	100 pounds	1,2	1,2	
	Zinc permanganate	Oxidizer	UN1515	Oxidizer	173.153	173.154	25 pounds	100 pounds	1,2	1,2	Separate from ammonium compounds and hydrogen peroxide
	Zinc peroxide	Oxidizer	UN1516	Oxidizer	173.153	173.154	25 pounds	100 pounds	1,2	1,2	Keep dry
	Zinc phosphide	Poison B	UN1714	Poison	173.364	173.365	25 pounds	100 pounds	1,2	1,2	Stow away from acids and oxidizers
	Zirconium hydride	Flammable solid	UN1437	Flammable solid and Dangerous when wet	None	173.256	Forbidden	150 pounds	1,2	5	Segregation same as for flammable solids labeled Dangerous When Wet
	Zirconium metal, dry, chemically produced, finer than 20 mesh particle size	Flammable solid	UN2008	Flammable solid	None	173.214	Forbidden	75 pounds	1	5	Separate from flammable gases or liquids, oxidizing materials or organic peroxides
	Zirconium metal, dry, mechanically produced, finer than 270 mesh particle size	Flammable solid	UN2008	Flammable solid	None	173.214	Forbidden	75 pounds	1	5	Separate from flammable gases or liquids, oxidizing materials or organic peroxides
	Zirconium, metal, liquid, suspensions	Flammable liquid	UN1308	Flammable liquid	None	173.140	Forbidden	5 gallons	1	5	
	Zirconium metal, wet, chemically produced, finer than 20 mesh particle size	Flammable solid	UN1358	Flammable solid	None	173.214	Forbidden	150 pounds	1,2	5	
	Zirconium metal, wet, mechanically produced, finer than 270 mesh particle size	Flammable solid	UN1358	Flammable solid	None	173.214	Forbidden	150 pounds	1,2	5	
	Zirconium nitrate	Oxidizer	UN2728	Oxidizer	173.153	173.182	25 pounds	100 pounds	1,2	1,2	
	Zirconium picramate, wet with at least 20% of water	Flammable solid	UN1517	Flammable solid	None	173.216	Forbidden	25 pounds	1	1	Stow away from heavy metals and their salts
	Zirconium scrap (borings, clippings, shavings, sheets, or turnings)	Flammable solid	UN1932	Flammable solid	173.153	173.220	Forbidden	Forbidden	1	4	Separate from flammable gases or liquids, oxidizing materials, or organic peroxides
A	Zirconium sulfate	ORM B	NA3163	None	None	173.510	100 pounds	No limit	1,2	1,2	
	Zirconium tetrachloride, solid	Corrosive material	UN2503	Corrosive	173.244	173.245b	25 pounds	100 pounds	1,2	1,2	

For explanation of abbreviations and reference marks, see last page of this tariff.

Appendix to § 172.101—List of Hazardous Substances and Reportable Quantities

1. This Appendix lists materials and their corresponding reportable quantities (RQs) which are listed or designated as "hazardous substances" under section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; Pub. L. 96–510). A material in this list is regulated as a hazardous material and a hazardous substance under this subchapter if it meets the definition of a hazardous substance in § 171.8 of this subchapter.

2. Column 1 of the list, entitled "Hazardous substances", contains the names of hazardous substances. Elements and compounds are listed first, in alphabetical sequence. Following the listing of elements and compounds is a listing of waste streams. These waste streams appear on the list in numerical sequence and are referenced by the appropriate "F" or "K" numbers. Column 2 of the list, entitled "Synonyms", contains the names of synonyms for certain elements and compounds listed in Column 1. No synonyms are listed for waste streams. Synonyms are useful in identifying hazardous substances and in identifying proper shipping names. Column 3 of the list, entitled "Reportable quantity (RQ)", contains the reportable quantity (RQ) in pounds and kilograms, for each hazardous substance listed in Column 1.

3. The procedure for selecting a proper shipping name for a hazardous substance is set forth in § 172.101(c)(9).

4. A series of notes is used throughout the list to provide additional information concerning certain hazardous substances. These notes are explained at the end of the list.

List of Hazardous Substances and Reportable Quantities

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Acenaphthene		100 (45.4)
Acenaphthylene		5000 (2270)
Acetaldehyde *	Ethanal	1000 (454)
Acetaldehyde, chloro-	Chloroacetaldehyde	1000 (454)
Acetaldehyde, trichloro-	Chloral	1 (0.454)
Acetamide, N-(aminothioxomethyl)-	1-Acetyl-2-thiourea	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	Phenacetin	1 (0.454)
Acetamide, N-9H-fluoren-2-yl-	2-Acetylaminofluorene	1 (0.454)
Acetamide, 2-fluoro-	Fluoracetamide	100 (45.4)
Acetic acid *		5000 (2270)
Acetic acid, ethyl ester	Ethyl acetate	5000 (2270)
Acetic acid, fluoro-, sodium salt	Fluoroacetic acid, sodium salt	10 (4.54)
Acetic acid, lead salt	Lead acetate	5000 (2270)
Acetic acid, thallium(I) salt	Thallium(I) acetate	100 (45.4)
Acetic anhydride *		5000 (2270)
Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-,methyl ester	Methomyl	100 (45.4)
Acetone *	2-Propanone	5000 (2270)
Acetone cyanohydrin *	Propanenitrile, 2-hydroxy-2-methyl- 2-Methyllactonitrile	10 (4.54)
Acetonitrile	Ethanenitrile	5000 (2270)
3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts	Warfarin	100 (45.4)
Acetophenone	Ethanone, 1-phenyl-	5000 (2270)
2-Acetylaminofluorene	Acetamide, N-9H-fluoren-2-yl-	1 (0.454)
Acetyl bromide *		5000 (2270)
Acetyl chloride *	Ethanoyl chloride	5000 (2270)
1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	1000 (454)
Acrolein *	2-Propenal	1 (0.454)
Acrylamide	2-Propenamide	5000 (2270)
Acrylic acid *	2-Propenoic acid	5000 (2270)
Acrylonitrile *	2-Propenenitrile	100 (45.4)
Adipic acid		5000 (2270)
Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl]-, L-	Melphalan	1 (0.454)
Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	1 (0.454)
Aldrin *	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,exo-dimethanonaphthalene	1 (0.454)
Allyl alcohol *	2-Propen-1-ol	100 (45.4)
Allyl chloride *		1000 (454)
Aluminum phosphide *		100 (45.4)
Aluminum sulfate *		5000 (2270)
2-Amino-1-methyl benzene	o-Toluidine	1 (0.454)
4-Amino-1-methyl benzene	p-Toluidine	1 (0.454)
5-(Aminomethyl)-3-isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	1000 (454)
4-Aminopyridine	4-Pyridinamine	1000 (454)
Amitrole	1H-1,2,4-Triazol-3-amine	1 (0.454)
Ammonia *		100 (45.4)
Ammonium acetate		5000 (2270)
Ammonium benzoate		5000 (2270)
Ammonium bicarbonate		5000 (2270)
Ammonium bichromate	Ammonium dichromate (6)	1000 (454)
Ammonium bifluoride *		100 (45.4)
Ammonium bisulfite *		5000 (2270)
Ammonium carbamate *		5000 (2270)
Ammonium carbonate *		5000 (2270)
Ammonium chloride		5000 (2270)
Ammonium chromate		1000 (454)
Ammonium citrate, dibasic		5000 (2270)
Ammonium dichromate (6)	Ammonium bichromate	1000 (454)
Ammonium fluoborate *		5000 (2270)
Ammonium fluoride *		100 (45.4)
Ammonium hydroxide *		1000 (454)
Ammonium oxalate *		5000 (2270)
Ammonium picrate *	Phenol, 2,4,6-trinitro-, ammonium salt	10 (4.54)
Ammonium silicofluoride *		1000 (454)
Ammonium sulfamate		5000 (2270)
Ammonium sulfide *		100 (45.4)
Ammonium sulfite		5000 (2270)
Ammonium tartrate		5000 (2270)
Ammonium thiocyanate		5000 (2270)
Ammonium thiosulfate		5000 (2270)
Ammonium vanadate	Vanadic acid, ammonium salt	1000 (454)
Amyl acetate *		5000 (2270)
iso-Amyl acetate		
sec-Amyl acetate		
tert-Amyl acetate		
Aniline *	Benzenamine	5000 (2270)
Anthracene		5000 (2270)
Antimony c		5000 (2270)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Antimony pentachloride *		1000 (454)
Antimony potassium tartrate *		100 (45.4)
Antimony tribromide *		1000 (454)
Antimony trichloride *		1000 (454)
Antimony trifluoride *		1000 (454)
Antimony trioxide		1000 (454)
Aroclor 1016	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1221	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1232	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1242	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1248	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1254	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1260	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Arsenic * §		1 (0.454)
Arsenic acid *		1 (0.454)
Arsenic disulfide *		5000 (2270)
Arsenic(III) oxide	Arsenic trioxide *	5000 (2270)
Arsenic(V) oxide	Arsenic pentoxide *	5000 (2270)
Arsenic pentoxide *	Arsenic(V) oxide	5000 (2270)
Arsenic trichloride *		5000 (2270)
Arsenic trioxide *	Arsenic(III) oxide	5000 (2270)
Arsenic trisulfide *		5000 (2270)
Arsine, diethyl-	Diethylarsine	1 (0.454)
Asbestos * ‡‡		1 (0.454)
Auramine	Benzenamine, 4,4-carbonimidoylbis [N,N-dimethyl-	1 (0.454)
Azaserine	L-Serine, diazoacetate (ester)	1 (0.454)
Aziridine	Ethylenimine	1 (0.454)
Azinphos-methyl @	Guthion *	1 (0.454)
Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a, 8b-hexahydro-8a-methoxy-5-methyl-,	Mitomycin C	1 (0.454)
Barium cyanide *		10 (4.54)
Benz[ace]anthrylene, 1,2-dihydro-3-methyl-	3-Methylcholanthrene	1 (0.454)
Benz[c]acridine	3,4-Benzacridine	1 (0.454)
3,4-Benzacridine	Benz[c]acridine	1 (0.454)
Benzal chloride	Benzene, dichloromethyl-	5000 (2270)
Benz[a]anthracene	Benzo[a]anthracene	1 (0.454)
	1,2-Benzanthracene	
1,2-Benzanthracene	Benz[a]anthracene	1 (0.454)
	Benzo[a]anthracene	
1,2-Benzanthracene, 7,12-dimethyl-	7,12-Dimethylbenz[a]anthracene	1 (0.454)
Benzenamine	Aniline *	5000 (2270)
Benzenamine, 4,4-carbonimidoylbis [N,N-dimethyl-	Auramine	1 (0.454)
Benzenamine, 4-chloro-	p-Chloroaniline	1000 (454)
Benzenamine, 4-chloro-2-methyl-, hydrochloride	4-Chloro-o-toluidine, hydrochloride	1 (0.454)
Benzenamine, N,N-dimethyl-4-phenylazo-	Dimethylaminoazobenzene	1 (0.454)
Benzenamine, 4,4-methylenebis(2-chloro-	4,4-Methylenebis(2-chloroaniline)	1 (0.454)
Benzenamine, 2-methyl-, hydrochloride	o-Toluidine hydrochloride	1 (0.454)
Benzenamine, 2-methyl-5-nitro-	5-Nitro-o-toluidine	1 (0.454)
Benzenamine, 4-nitro-	p-Nitroaniline	5000 (2270)
Benzene *		1000 (454)
Benzene, 1-bromo-4-phenoxy-	4-Bromophenyl phenyl ether	100 (45.4)
Benzene, chloro-	Chlorobenzene *	100 (45.4)
Benzene, chloromethyl-	Benzyl chloride *	100 (45.4)
Benzene, 1,2-dichloro-	o-Dichlorobenzene *	100 (45.4)
	1,2-Dichlorobenzene	
Benzene, 1,3-dichloro-	m-Dichlorobenzene	100 (45.4)
	1,3-Dichlorobenzene	
Benzene, 1,4-dichloro-	p-Dichlorobenzene *	100 (45.4)
	1,4-Dichlorobenzene	
Benzene, dichloromethyl-	Benzal chloride	5000 (2270)
Benzene, 2,4-diisocyanatomethyl-	Toluene diisocyanate *	100 (45.4)
Benzene, dimethyl-	Xylene * (mixed)	1000 (454)
m-	m-	
o-	o-	
p-	p-	
Benzene, hexachloro-	Hexachlorobenzene	1 (0.454)
Benzene, hexahydro-	Cyclohexane *	1000 (454)
Benzene, hydroxy-	Phenol *	1000 (454)
Benzene, methyl-	Toluene *	1000 (454)
Benzene, 1-methyl-2,4-dinitro-	2,4-Dinitrotoluene	1000 (454)
Benzene, 1-methyl-2,6-dinitro-	2,6-Dinitrotoluene	1000 (454)
Benzene, 1,2-methylenedioxy-4-allyl-	Safrole	1 (0.454)
Benzene, 1,2-methylenedioxy-4-propenyl-	Isosafrole	1 (0.454)
Benzene, 1,2-methylenedioxy-4-propyl-	Dihydrosafrole	1 (0.454)
Benzene, 1-methylethyl-	Cumene	5000 (2270)
Benzene, nitro-	Nitrobenzene *	1000 (454)
Benzene, pentachloro-	Pentachlorobenzene	10 (4.54)
Benzene, pentachloronitro-	Pentachloronitrobenzene	1 (0.454)
Benzene, 1,2,4,5-tetrachloro-	1,2,4,5-Tetrachlorobenzene	5000 (2270)
Benzene, trichloromethyl-	Benzotrichloride	1 (0.454)
Benzene, 1,3,5-trinitro-	s-Trinitrobenzene *	10 (4.54)
Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	Ethyl 4,4'-dichlorobenzilate	1 (0.454)
1,2-Benzenedicarboxylic acid anhydride	Phthalic anhydride	5000 (2270)
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	Bis(2-ethylhexyl)phthalate	1 (0.454)
1,2-Benzenedicarboxylic acid, dibutyl ester	Di-n-butyl phthalate	10 (4.54)
	Dibutyl phthalate	
	n-Butyl phthalate	
1,2-Benzenedicarboxylic acid, diethyl ester	Diethyl phthalate	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	Dimethyl phthalate	5000 (2270)
1,2-Benzenedicarboxylic acid, di-n-octyl ester	Di-n-octyl phthalate	5000 (2270)
1,3-Benzenediol	Resorcinol	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	Epinephrine	1000 (454)
Benzenesulfonic acid chloride	Benzenesulfonyl chloride	100 (45.4)
Benzenesulfonyl chloride	Benzenesulfonic acid chloride	100 (45.4)
Benzenethiol	Phenyl mercaptan ‡‡	100 (45.4)

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Benzidine *	Thiophenol	
1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	(1,1'-Biphenyl)-4,4-diamine	1 (0.454)
Benz[a]anthracene	Saccharin and salts	1 (0.454)
	Benz[a]anthracene	1 (0.454)
	1,2-Benzanthracene	
Benzo[b]fluoranthene		1 (0.454)
Benzo[j]fluoranthene		1 (0.454)
Benzo[k]fluorene	Fluoranthene	100 (45.4)
Benzoic acid		5000 (2270)
Benzonitrile *		5000 (2270)
Benzo[g,h,i]perylene		5000 (2270)
Benzo[a]pyrene	3,4-Benzopyrene	1 (0.454)
3,4-Benzopyrene	Benzo[a]pyrene	1 (0.454)
p-Benzoquinone	1,4-Cyclohexadienedione	10 (4.54)
Benzotrichloride	Benzene, trichloromethyl-	1 (0.454)
Benzoyl chloride *		1000 (454)
1,2-Benzphenanthrene	Chrysene	1 (0.454)
Benzyl chloride *	Benzene, chloromethyl-	100 (45.4)
Beryllium &	Beryllium dust &	1 (0.454)
Beryllium chloride *		5000 (2270)
Beryllium dust &	Beryllium &	1 (0.454)
Beryllium fluoride		5000 (2270)
Beryllium nitrate *		5000 (2270)
alpha - BHC		1 (0.454)
beta - BHC		1 (0.454)
delta - BHC		1 (0.454)
gamma - BHC	Hexachlorocyclohexane (gamma isomer)	1 (0.454)
	Lindane *	
2,2-Bioxirane	1,2,3,4-Diepoxybutane	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine	Benzidine *	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dichloro-	3,3'-Dichlorobenzidine	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy-	3,3'-Dimethoxybenzidine	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl-	3,3'-Dimethylbenzidine	1 (0.454)
Bis(2-chloroethoxy) methane	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-	1000 (454)
Bis(2-chloroethyl) ether	Dichloroethyl ether	1 (0.454)
	Ethane, 1,1'-oxybis[2-chloro-	
Bis(2-chloroisopropyl) ether	Propane, 2,2'-oxybis[2-chloro-	1000 (454)
Bis(chloromethyl) ether	Methane, oxybis[chloro-	1 (0.454)
Bis(dimethylthiocarbamoyl) disulfide	Thiram	10 (4.54)
Bis(2-ethylhexyl)phthalate	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester	1 (0.454)
Bromine cyanide	Cyanogen bromide *	1000 (454)
Bromoacetone *	2-Propanone, 1-bromo-	1000 (454)
Bromoform	Methane, tribromo-	100 (45.4)
4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-	100 (45.4)
Brucine	Strychnidin-10-one, 2,3-dimethoxy-	100 (45.4)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	Hexachlorobutadiene *	1 (0.454)
1-Butanamine, N-butyl-N-nitroso-	N-Nitroso-n-butylamine	1 (0.454)
Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-	Chlorambucil	1 (0.454)
1-Butanol	n-Butyl alcohol *	5000 (2270)
2-Butanone	Ethyl methyl ketone &	5000 (2270)
	Methyl ethyl ketone *	
2-Butanone peroxide	Methyl ethyl ketone peroxide *	10 (4.54)
2-Butenal	Crotonaldehyde *	100 (45.4)
2-Butene, 1,4-dichloro-	1,4-Dichloro-2-butene	1 (0.454)
Butyl acetate *		5000 (2270)
iso-Butyl acetate		
sec-Butyl acetate		
tert-Butyl acetate		
n-Butyl alcohol *	1-Butanol	5000 (2270)
Butylamine *		1000 (454)
iso-Butylamine		
sec-Butylamine		
tert-Butylamine		
Butyl benzyl phthalate		100 (45.4)
n-Butyl phthalate	Di-n-butyl phthalate	10 (4.54)
	Dibutyl phthalate	
	1,2-Benzenedicarboxylic acid, dibutyl ester	
Butyric acid *		5000 (2270)
iso-Butyric acid		
Cacodylic acid	Hydroxydimethylarsine oxide	1 (0.454)
Cadmium &		1 (0.454)
Cadmium acetate		100 (45.4)
Cadmium bromide		100 (45.4)
Cadmium chloride		100 (45.4)
Calcium arsenate *		1000 (454)
Calcium arsenite *		1000 (454)
Calcium carbide *		10 (4.54)
Calcium chromate	Chromic acid, calcium salt	1000 (454)
Calcium cyanide *		10 (4.54)
Calcium dodecylbenzene sulfonate		1000 (454)
Calcium hypochlorite *		10 (4.54)
Camphene, octachloro-	Toxaphene *	1 (0.454)
Captan		10 (4.54)
Carbamic acid, ethyl ester	Ethyl carbamate (Urethan)	1 (0.454)
Carbamic acid, methylnitroso-, ethyl ester	N-Nitroso-N-methylurethane	1 (0.454)
Carbamide, N-ethyl-N-nitroso-	N-Nitroso-N-ethylurea	1 (0.454)
Carbamide, N-methyl-N-nitroso-	N-Nitroso-N-methylurea	1 (0.454)
Carbamide, thio-	Thiourea	1 (0.454)
Carbanimidoselenoic acid	Selenourea	1000 (454)
Carbamoyl chloride, dimethyl-	Dimethylcarbamoyl chloride	1 (0.454)
Carbaryl *		100 (45.4)
Carbofuran *		10 (4.54)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Carbon bisulfide *	Carbon disulfide *	100 (45.4)
Carbon disulfide *	Carbon bisulfide *	100 (45.4)
Carbonic acid, dithallium (I) salt	Thallium(I) carbonate	100 (45.4)
Carbonochloridic acid, methyl ester	Methyl chlorocarbonate *	1000 (454)
	Methyl chloroformate (R	
Carbon oxyfluoride	Carbonyl fluoride	1000 (454)
Carbon tetrachloride *	Methane, tetrachloro-	5000 (2270)
Carbonyl chloride	Phosgene *	10 (4.54)
Carbonyl fluoride	Carbon oxyfluoride	1000 (454)
Chloral	Acetaldehyde, trichloro-	1 (0.454)
Chlorambucil	Butanoic acid, 4 [bis(2-chloroethyl)amino]benzene-	1 (0.454)
Chlordane *	Chlordane, technical *	1 (0.454)
Chlordane, technical *	4,7 Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-	1 (0.454)
	Chlordane *	
	4,7 Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a tetrahydro-	
Chlorine *		10 (4.54)
Chlorine cyanide	Cyanogen chloride *	10 (4.54)
Chlornaphazine	2-Naphthylamine, N,N-bis(2-chloroethyl)-	1 (0.454)
Chloroacetaldehyde	Acetaldehyde, chloro-	1000 (454)
p-Chloroaniline	Benzenamine, 4-chloro-	1000 (454)
Chlorobenzene *	Benzene, chloro-	100 (45.4)
4-Chloro-m-cresol	p-Chloro-m-cresol	5000 (2270)
	Phenol, 4-chloro-3-methyl-	
p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl-	5000 (2270)
	4-Chloro-m-cresol	
Chlorodibromomethane		100 (45.4)
1-Chloro-2,3 epoxypropane	Epichlorohydrin *	1000 (454)
	Oxirane, 2-(chloromethyl)-	
Chloroethane	Ethyl chloride (R	100 (45.4)
2-Chloroethyl vinyl ether	Ethene, 2-chloroethoxy-	1000 (454)
Chloroform *	Methane, trichloro-	5000 (2270)
Chloromethane	Methane, chloro-	1 (0.454)
	Methyl chloride *	
Chloromethyl methyl ether	Methane, chloromethoxy-	1 (0.454)
	Methylchloromethyl ether (R	
beta-Chloronaphthalene	Naphthalene, 2-chloro-	5000 (2270)
	2-Chloronaphthalene	
2-Chloronaphthalene	beta-Chloronaphthalene	5000 (2270)
	Naphthalene, 2-chloro-	
2-Chlorophenol	o-Chlorophenol	100 (45.4)
	Phenol, 2-chloro-	
o-Chlorophenol	Phenol, 2-chloro-	100 (45.4)
	2-Chlorophenol	
4-Chlorophenyl phenyl ether		5000 (2270)
1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-	100 (45.4)
3-Chloropropionitrile	Propanenitrile, 3-chloro-	1000 (454)
Chlorosulfonic acid *		1000 (454)
4-Chloro-o-toluidine, hydrochloride	Benzenamine, 4-chloro-2-methyl, hydrochloride	1 (0.454)
Chlorpyrifos *		1 (0.454)
Chromic acetate		1000 (454)
Chromic acid *		1000 (454)
Chromic acid, calcium salt *	Calcium chromate	1000 (454)
Chromic sulfate		1000 (454)
Chromium (I		1 (0.454)
Chromous chloride		1000 (454)
Chrysene	1,2-Benzphenanthrene	1 (0.454)
Cobaltous bromide		1000 (454)
Cobaltous formate		1000 (454)
Cobaltous sulfamate		1000 (454)
Coke Oven Emissions		1 (0.454)
Copper (I		5000 (2270)
Copper cyanide *		10 (4.54)
Coumaphos *		10 (4.54)
Creosote		1 (0.454)
Cresols *	Cresylic acid	1000 (454)
m-Cresols	m-Cresylic acid	
o-Cresols	o-Cresylic acid	
p-Cresols	p-Cresylic acid	
Cresylic acid	Cresols *	1000 (454)
m-Cresols	m-Cresylic acid	
o-Cresols	o-Cresylic acid	
p-Cresols	p-Cresylic acid	
Crotonaldehyde *	2-Butenal	100 (45.4)
Cumene	Benzene, 1-methylethyl-	5000 (2270)
Cupric acetate		100 (45.4)
Cupric acetoarsenite *		100 (45.4)
Cupric chloride *		10 (4.54)
Cupric nitrate *		100 (45.4)
Cupric oxalate		100 (45.4)
Cupric sulfate		10 (4.54)
Cupric sulfate ammoniated		100 (45.4)
Cupric tartrate		100 (45.4)
Cyanides (soluble cyanide salts), not otherwise specified *		10 (4.54)
Cyanogen *		100 (45.4)
Cyanogen bromide *	Bromine cyanide	1000 (454)
Cyanogen chloride *	Chlorine cyanide	10 (4.54)
1,4-Cyclohexadienedione	p-Benzoquinone	10 (4.54)
Cyclohexane *	Benzene, hexahydro-	1000 (454)
Cyclohexanone		5000 (2270)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	Hexachlorocyclopentadiene *	1 (0.454)
Cyclophosphamide	2H-1,3,2-Oxazaphosphorine 2-[bis(2-chloroethyl)amino] tetrahydro-2-oxide	1 (0.454)
2,4-D Acid	2,4-D *, salts and esters	100 (45.4)

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
	2,4-Dichlorophenoxyacetic acid *, salts and esters	
2,4-D Esters		100 (45.4)
2,4-D *, salts and esters	2,4-D Acid	100 (45.4)
	2,4-Dichlorophenoxyacetic acid *, salts and esters	
Daunomycin	5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-	1 (0.454)
DDD	Dichlorodiphenyl dichloroethane	1 (0.454)
	TDE *	
	4,4'-DDD	
4,4'-DDD	DDD	1 (0.454)
	Dichlorodiphenyl dichloroethane	
	TDE *	
DDE	4,4'-DDE	1 (0.454)
4,4'-DDE	DDE	1 (0.454)
DDT *	Dichlorodiphenyl trichloroethane *	1 (0.454)
	4,4'-DDT	
4,4'-DDT	DDT *	1 (0.454)
	Dichlorodiphenyl trichloroethane *	
Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]pentalen-2-one	Kepone *	1 (0.454)
Dalate	S-(2,3-Dichloroallyl) diisopropylthiocarbamate	1 (0.454)
Diamine	Hydrazine *	1 (0.454)
Diaminotoluene	Toluenediamine *	1 (0.454)
Diazinon *		1 (0.454)
Dibenz[a,h]anthracene	Dibenzo[a,h]anthracene	1 (0.454)
	1,2,5,6-Dibenzanthracene	
1,2,5,6-Dibenzanthracene	Dibenz[a,h]anthracene	1 (0.454)
	Dibenzo[a,h]anthracene	
Dibenzo[a,h]anthracene	Dibenz[a,h]anthracene	1 (0.454)
	1,2,5,6-Dibenzanthracene	
1,2,7,8-Dibenzopyrene	Dibenz[a,i]pyrene	1 (0.454)
Dibenz[a,i]pyrene	1,2,7,8-Dibenzopyrene	1 (0.454)
1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	1 (0.454)
Dibutyl phthalate	Di-n-butyl phthalate	10 (4.54)
	n-Butyl phthalate *	
	1,2-Benzenedicarboxylic acid dibutyl ester	
Di-n-butyl phthalate	Dibutyl phthalate	10 (4.54)
	n-Butyl phthalate *	
	1,2-Benzenedicarboxylic acid, dibutylester	
Dicamba		1000 (454)
Dichlobenil		100 (45.4)
Dichone		1 (0.454)
S-(2,3-Dichloroallyl) diisopropylthiocarbamate	Dalate	1 (0.454)
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	Pronamide	5000 (2270)
Dichlorobenzene (mixed)		100 (45.4)
1,2-Dichlorobenzene	Benzene, 1,2-dichloro-	100 (45.4)
	o-Dichlorobenzene *	
1,3-Dichlorobenzene	Benzene, 1,3-dichloro-	100 (45.4 lb)
	m-Dichlorobenzene	
1,4-Dichlorobenzene	Benzene, 1,4-dichloro-	100 (45.4)
	p-Dichlorobenzene *	
m-Dichlorobenzene	Benzene, 1,3-dichloro-	100 (45.4)
	1,3-Dichlorobenzene	
o-Dichlorobenzene *	Benzene, 1,2-dichloro-	100 (45.4)
	1,2-Dichlorobenzene	
p-Dichlorobenzene *	Benzene, 1,4-dichloro-	100 (45.4)
	1,4-Dichlorobenzene	
3,3'-Dichlorobenzidine	(1,1'-Biphenyl)-4,4'-diamine 3,3'-dichloro-	1 (0.454)
Dichlorobromomethane		5000 (2270)
1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	1 (0.454)
Dichlorodifluoromethane *	Methane dichlorodifluoro-	5000 (2270)
Dichlorodiphenyl dichloroethane	DDD	1 (0.454)
	TDE *	
	4,4'-DDD	
Dichlorodiphenyl trichloroethane *	DDT *	1 (0.454)
	4,4'-DDT	
1,1-Dichloroethane	Ethane, 1,1-dichloro-	1000 (454)
	Ethylidene dichloride	
1,2-Dichloroethane	Ethane, 1,2-dichloro-	5000 (2270)
	Ethylene dichloride *	
1,1-Dichloroethylene	Ethene, 1,1-dichloro-	5000 (2270)
	Vinylidene chloride *	
1,2-trans-Dichloroethylene	Ethene, trans-1,2-dichloro-	1000 (454)
Dichloroethyl ether	Bis (2-chloroethyl) ether	1 (0.454)
	Ethane, 1,1'-oxybis[2-chloro-	
2,4-Dichlorophenol	Phenol, 2,4-dichloro-	100 (45.4)
2,6-Dichlorophenol	Phenol, 2,6-dichloro-	100 (45.4)
2,4-Dichlorophenoxyacetic acid *, salts and esters	2,4-D Acid	100 (45.4)
	2,4-D *, salts and esters	
Dichlorophenylarsine	Phenyl dichlorarsine *	1 (0.454)
Dichloropropane *		1000 (454)
1,1-Dichloropropane		
1,3-Dichloropropane		
1,2-Dichloropropane	Propylene dichloride *	1000 (454)
Dichloropropene - Dichloropropene (mixture)		100 (45.4)
Dichloropropene(s) *		100 (45.4)
2,3-Dichloropropene (isomer)		
1,3-Dichloropropene	Propene, 1,3-dichloro-	100 (45.4)
2,2-Dichloropropionic acid *		5000 (2270)
Dichlorvos *		10 (4.54)
Deldrin *	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,exo-1,4,5,8-dimethanonaphthalene.	1 (0.454)
1,2,3,4-Diepoxybutane	2,2'-Bioxirane	1 (0.454)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Diethylamine *		100 (45.4)
Diethylarsine	Arsine, diethyl-	1 (0.454)
1,4 Diethylene dioxide	1,4 Dioxane	1 (0.454)
O,O Diethyl S [2 ethylthio)ethyl phosphorodithioate	Disulfoton *	1 (0.454)
N,N Diethylhydrazine	Hydrazine, 1,2-diethyl-	1 (0.454)
O,O Diethyl S methyl dithiophosphate	Phosphorodithioic acid, O-O diethyl S methyl ester	5000 (2270)
Diethyl p nitrophenyl phosphate	Phosphoric acid, diethyl p-nitrophenyl ester	100 (45.4)
Diethyl phthalate	1,2 Benzenedicarboxylic acid, diethyl ester	1000 (454)
O,O Diethyl O-pyrazinyl phosphorothioate	Phosphorothioic acid, O-O diethyl O-pyrazinyl ester	100 (45.4)
Diethylstilbestrol	4,4'-Stilbenediol, alpha,alpha'-diethyl-	1 (0.454)
1,2-Dihydro-3,6-pyridazinedione	Maleic hydrazide	5000 (2270)
Dihydrosafrole	Benzene, 1,2-methylenedioxy-4-propyl-	1 (0.454)
Diisopropyl fluorophosphate	Phosphorofluoridic acid, bis(1-methylethyl) ester	100 (45.4)
Dimethoate	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester	10 (4.54)
3,3'-Dimethoxybenzidine	(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy-	1 (0.454)
Dimethylamine *	Methanamine, N-methyl-	1000 (454)
Dimethylaminoazobenzene	Benzenamine, N,N-dimethyl-4-phenylazo-	1 (0.454)
7,12-Dimethylbenz[a]anthracene	1,2-Benzanthracene, 7,12-dimethyl-	1 (0.454)
3,3-Dimethylbenzidine	(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl-	1 (0.454)
alpha,alpha-Dimethylbenzylhydroperoxide	Hydroperoxide, 1-methyl-1-phenylethyl-	10 (4.54)
3,3-Dimethyl-1-(methylthio)-2-butanone, O-[methylamino]carbonyl] oxime	Thiofanox	100 (45.4)
Dimethylcarbamoyl chloride	Carbamoyl chloride, dimethyl-	1 (0.454)
Dimethylhydrazine, unsymmetrical (6	1,1-Dimethylhydrazine Hydrazine, 1,1-dimethyl-	1 (0.454)
1,1-Dimethylhydrazine	Dimethylhydrazine, unsymmetrical (6 Hydrazine, 1,1-dimethyl-	1 (0.454)
1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	1 (0.454)
O,O-Dimethyl O-p-nitrophenyl phosphorothioate	Methyl parathion *	100 (45.4)
Dimethylnitrosamine	N-Nitrosodimethylamine	1 (0.454)
alpha,alpha-Dimethylphenethylamine	Ethanamine, 1,1-dimethyl-2-phenyl-	5000 (2270)
2,4-Dimethylphenol	Phenol, 2,4-dimethyl-	100 (45.4)
Dimethyl phthalate	1,2 Benzenedicarboxylic acid, dimethyl ester	5000 (2270)
Dimethyl sulfate *	Sulfuric acid, dimethyl ester	1 (0.454)
Dinitrobenzene * (mixed) m-Dinitrobenzene o-Dinitrobenzene p-Dinitrobenzene		100 (45.4)
4,6-Dinitro-o-cresol and salts	Phenol, 2,4-dinitro-6-methyl-, and salts	10 (4.54)
4,6-Dinitro-o-cyclohexylphenol	Phenol, 2-cyclohexyl-4,6-dinitro-	100 (45.4)
Dinitrophenol 2,5-Dinitrophenol 2,6-Dinitrophenol		10 (4.54)
2,4 Dinitrophenol	Phenol, 2,4-dinitro-	10 (4.54)
Dinitrotoluene 3,4 Dinitrotoluene		1000 (454)
2,4 Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-	1000 (454)
2,6-Dinitrotoluene	Benzene, 1-methyl-2,6-dinitro-	1000 (454)
Dinoseb	Phenol, 2,4-dinitro-6-(1-methylpropyl)-	1000 (454)
Di-n-octyl phthalate	1,2 Benzenedicarboxylic acid, di-n-octyl ester	5000 (2270)
1,4 Dioxane	1,4 Diethylene dioxide	1 (0.454)
1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-	1 (0.454)
Diphosphoramide,octamethyl-	Octamethylpyrophosphoramide	100 (45.4)
Dipropylamine	1-Propanamine, N-propyl-	5000 (2270)
Di-n-propylnitrosamine	N-Nitroso-di-n-propylamine	1 (0.454)
Diquat		1000 (454)
Disulfoton *	O,O-Diethyl S-[2-(ethylthio)ethyl]phosphorodithioate	1 (0.454)
2,4 Dithiobiuret	Thioimidodicarbonic diamide	100 (45.4)
Dithiopyrophosphoric acid, tetraethyl ester	Tetraethyldithiopyrophosphate	100 (45.4)
Diuron		100 (45.4)
Dodecylbenzenesulfonic acid *		1000 (454)
Endosulfan *	5-Norbornene-2,3-dimethanol,1,4,5,6,7,7-hexachloro,cyclic sulfite	1 (0.454)
alpha - Endosulfan		1 (0.454)
beta - Endosulfan		1 (0.454)
Endosulfan sulfate		1 (0.454)
Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	1000 (454)
Endrin *	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4,5,8-dimethanonaphthalene	1 (0.454)
Endrin aldehyde		1 (0.454)
Epichlorohydrin *	1-Chloro-2,3-epoxypropane Oxirane, 2-(chloromethyl)-	1000 (454)
Epinephrine	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	1000 (454)
Ethanal	Acetaldehyde *	1000 (454)
Ethanamine, 1,1-dimethyl-2-phenyl-	alpha,alpha-Dimethylphenethylamine	5000 (2270)
Ethanamine, N-ethyl-N-nitroso-	N-Nitrosodiethylamine	1 (0.454)
Ethane, 1,2-dibromo-	Ethylene dibromide *	1000 (454)
Ethane, 1,1-dichloro-	Ethylidene dichloride 1,1-Dichloroethane	1000 (454)
Ethane, 1,2-dichloro-	Ethylene dichloride * 1,2-Dichloroethane	5000 (2270)
Ethane, 1,1,1,2,2,2-hexachloro-	Hexachloroethane *	1 (0.454)
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	Bis(2-chloroethoxy)methane	1000 (454)
Ethane, 1,1'-oxybis-	Ethyl ether *	100 (45.4)
Ethane, 1,1'-oxybis(2-chloro-	Bis (2-chloroethyl) ether Dichloroethyl ether	1 (0.454)
Ethane, pentachloro-	Pentachloroethane	1 (0.454)
Ethane, 1,1,1,2-tetrachloro-	1,1,1,2-Tetrachloroethane	1 (0.454)
Ethane, 1,1,2,2-tetrachloro-	1,1,2,2-Tetrachloroethane	1 (0.454)
Ethane, 1,1,2-trichloro-	1,1,2-Trichloroethane	1 (0.454)
Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	Methoxychlor	1 (0.454)
1,2-Ethanediylbiscarbamodithioic acid	Ethylenebis(dithiocarbamic acid)	5000 (2270)
Ethanenitrile	Acetonitrile *	5000 (2270)
Ethanethioamide	Thioacetamide	1 (0.454)
Ethanol, 2,2'-(nitrosoimino)bis-	N-Nitrosodiethanolamine	1 (0.454)
Ethanone, 1-phenyl-	Acetophenone	5000 (2270)

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Ethanoyl chloride	Acetyl chloride *	5000 (2270)
Ethanamine, N-methyl-N-nitroso-	N-Nitrosomethylvinylamine	1 (0.454)
Ethene, chloro-	Vinyl chloride *	1 (0.454)
Ethene, 2-chloroethoxy-	2-Chloroethyl vinyl ether	1000 (454)
Ethene, 1,1-dichloro-	Vinylidene chloride *	5000 (2270)
	1,1-Dichloroethylene	
Ethene, 1,1,2,2-tetrachloro-	Perchloroethylene	1 (0.454)
	Tetrachloroethene	
	Tetrachloroethylene	
Ethene, trans-1,2-dichloro-	1,2-trans-Dichloroethylene	1000 (454)
Ethion *		10 (4.54)
2-Ethoxyethanol	Ethylene glycol monoethyl ether *	1 (0.454)
Ethyl acetate	Acetic acid, ethyl ester	5000 (2270)
Ethyl acrylate *	2-Propenoic acid, ethyl ester	1000 (454)
Ethylbenzene *		1000 (454)
Ethyl carbamate (Urethan)	Carbamic acid, ethyl ester	1 (0.454)
Ethyl chloride #	Chloroethane	100 (45.4)
Ethyl cyanide	Propanenitrile	10 (4.54)
Ethyl 4,4-dichlorobenzilate	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	1 (0.454)
Ethylene dibromide *	Ethane, 1,2-dibromo-	1000 (454)
Ethylene dichloride *	1,2-Dichloroethane	5000 (2270)
	Ethane, 1,2-dichloro-	
Ethylene glycol monoethyl ether *	2-Ethoxyethanol	1 (0.454)
Ethylene oxide *	Oxirane	1 (0.454)
Ethylenebis(dithiocarbamic acid)	1,2-Ethanediylbiscarbamodithioicacid	5000 (2270)
Ethylenediamine *		5000 (2270)
Ethylenediamine tetraacetic acid (EDTA)		5000 (2270)
Ethylenethiourea	2-Imidazolidinethione	1 (0.454)
Ethylenimine	Aziridine	1 (0.454)
Ethyl ether *	Ethane, 1,1'-oxybis-	100 (45.4)
Ethylidene dichloride	Ethane, 1,1-dichloro-	1000 (454)
	1,1-Dichloroethane	
Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester	1000 (454)
Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester	1 (0.454)
Ethyl methyl ketone #	2-Butanone	5000 (2270)
	Methyl ethyl ketone *	
Famphur	Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino)-sulfonyl] phenyl] ester	1000 (454)
Ferric ammonium citrate		1000 (454)
Ferric ammonium oxalate		1000 (454)
Ferric chloride		1000 (454)
Ferric dextran	Iron dextran	5000 (2270)
Ferric fluoride		100 (45.4)
Ferric nitrate *		1000 (454)
Ferric sulfate		1000 (454)
Ferrous ammonium sulfate		1000 (454)
Ferrous chloride *		100 (45.4)
Ferrous sulfate		1000 (454)
Fluoranthene	Benz[j,k]fluorene	100 (45.4)
Fluorene		5000 (2270)
Fluorine *		10 (4.54)
Fluoroacetamide	Acetamide, 2-fluoro-	100 (45.4)
Fluoroacetic acid, sodium salt	Acetic acid, fluoro-, sodium salt	10 (4.54)
Formaldehyde *	Methylene oxide	1000 (454)
Formic acid *	Methanoic acid	5000 (2270)
Fulminic acid, mercury(II) salt	Mercury fulminate	10 (4.54)
Fumaric acid		5000 (2270)
Furan *	Furfuran	100 (45.4)
Furan, tetrahydro-	Tetrahydrofuran *	1000 (454)
2-Furancarboxaldehyde	Furfural *	5000 (2270)
2,5-Furandione	Maleic anhydride *	5000 (2270)
Furfural *	2-Furancarboxaldehyde	5000 (2270)
Furfuran	Furan *	100 (45.4)
D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	Streptozotocin	1 (0.454)
Glycidylaldehyde	1-Propanol, 2,3-epoxy-	1 (0.454)
Guanidine, N-nitroso-N-methyl-N'-nitro-	N-Methyl-N'-nitro-N-nitrosoguanidine	1 (0.454)
Guthion *	Azinphos methyl #	1 (0.454)
Heptachlor	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	1 (0.454)
Heptachlor epoxide		1 (0.454)
Hexachlorobenzene	Benzene, hexachloro-	1 (0.454)
Hexachlorobutadiene *	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	1 (0.454)
Hexachlorocyclohexane (gamma isomer)	gamma - BHC	1 (0.454)
	Lindane *	
Hexachlorocyclopentadiene *	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	1 (0.454)
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4,5,8-dimethanonaphthalene.	Endrin *	1 (0.454)
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,exo-1,4,5,8-dimethanonaphthalene.	Dieldrin *	1 (0.454)
Hexachloroethane *	Ethane, 1,1,1,2,2,2-hexachloro-	1 (0.454)
Hexachlorohexahydro-endo,endo-dimethanonaphthalene	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene.	1 (0.454)
1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene.	Hexachlorohexahydro-endo,endo-dimethanonaphthalene	1 (0.454)
1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,exo-dimethanonaphthalene.	Aldrin *	1 (0.454)
Hexachlorophene	2,2'-Methylenebis(3,4,6-trichlorophenol)	100 (45.4)
Hexachloropropene	1-Propene, 1,1,2,3,3,3-hexachloro-	1000 (454)
Hexaethyl tetraphosphate *	Tetraphosphoric acid, hexaethyl ester	100 (45.4)
Hydrazine *	Diamine	1 (0.454)
Hydrazine, 1,2-diethyl-	N,N'-Diethylhydrazine	1 (0.454)
Hydrazine, 1,1-dimethyl-	1,1-Dimethylhydrazine	1 (0.454)
	Dimethylhydrazine, unsymmetrical #	
Hydrazine, 1,2-dimethyl-	1,2-Dimethylhydrazine	1 (0.454)
Hydrazine, 1,2-diphenyl-	1,2-Diphenylhydrazine	1 (0.454)
Hydrazine, methyl-	Methyl hydrazine *	10 (4.54)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Hydrazinecarbothioamide	Thiosemicarbazide	100 (45.4)
Hydrochloric acid *		5000 (2270)
Hydrocyanic acid *	Hydrogen cyanide	10 (4.54)
Hydrofluoric acid *	Hydrogen fluoride *	100 (45.4)
Hydrogen cyanide	Hydrocyanic acid *	10 (4.54)
Hydrogen fluoride *	Hydrofluoric acid *	100 (45.4)
Hydrogen phosphide	Phosphine *	100 (45.4)
Hydrogen sulfide *	Hydrosulfuric acid	100 (45.4)
	Sulfur hydride	
Hydroperoxide, 1-methyl-1-phenylethyl-	Alpha,alpha-Dimethylbenzyl hydroperoxide	10 (4.54)
Hydrosulfuric acid	Hydrogen sulfide *	100 (45.4)
	Sulfur hydride	
Hydroxydimethylarsine oxide	Cacodylic acid	1 (0.454)
2-Imidazolidinethione	Ethylenethiourea	1 (0.454)
Indeno(1,2,3-cd)pyrene	1,10-(1,2-Phenylene)pyrene	1 (0.454)
Iron dextran	Ferric dextran	5000 (2270)
Isobutyl alcohol	1-Propanol, 2-methyl-	5000 (2270)
Isocyanic acid, methyl ester	Methyl isocyanate *	1 (0.454)
Isophorone		5000 (2270)
Isoprene *		100 (45.4)
Isopropanolamine dodecylbenzene sulfonate		1000 (454)
Isosafrole	Benzene, 1,2-methylenedioxy-4-propenyl-	1 (0.454)
3,2H)-Isoxazolone, 5-(aminomethyl)-	5-(Aminomethyl)-3-isoxazolol	1000 (454)
Kelthane		10 (4.54)
Kepone	Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one	1 (0.454)
Lasiocarpine		1 (0.454)
Lead *		1 (0.454)
Lead acetate	Acetic acid, lead salt	5000 (2270)
Lead arsenate *		5000 (2270)
Lead chloride *		100 (45.4)
Lead fluoborate *		100 (45.4)
Lead fluoride *		100 (45.4)
Lead iodide		100 (45.4)
Lead nitrate *		100 (45.4)
Lead phosphate	Phosphoric acid, lead salt	1 (0.454)
Lead stearate		5000 (2270)
Lead subacetate		1 (0.454)
Lead sulfate *		100 (45.4)
Lead sulfide		5000 (2270)
Lead thiocyanate		100 (45.4)
Lindane *	gamma - BHC	1 (0.454)
	Hexachlorocyclohexane (gamma isomer)	
Lithium chromate		1000 (454)
Malathion *		100 (45.4)
Maleic acid *		5000 (2270)
Maleic anhydride *	2,5-Furandione	5000 (2270)
Maleic hydrazide	1,2-Dihydro-3,6-pyridazinedione	5000 (2270)
Malononitrile	Propanedinitrile	1000 (454)
Melphalan	Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-, L-	1 (0.454)
Mercaptodimethur		10 (4.54)
Mercuric cyanide *		1 (0.454)
Mercuric nitrate *		10 (4.54)
Mercuric sulfate *		10 (4.54)
Mercuric thiocyanate		10 (4.54)
Mercurous nitrate *		10 (4.54)
Mercury *		1 (0.454)
Mercury fulminate	Fulminic acid, mercury(II) salt	10 (4.54)
Mercury, (acetato-O)phenyl-	Phenylmercuric acetate	100 (45.4)
Methacrylonitrile	2-Propenenitrile, 2-methyl-	1000 (454)
Methanamine, N-methyl-	Dimethylamine *	1000 (454)
Methane, bromo-	Methyl bromide *	1000 (454)
Methane, chloro-	Chloromethane	1 (0.454)
	Methyl chloride *	
Methane, chloromethoxy-	Chloromethyl methyl ether	1 (0.454)
	Methylchloromethyl ether ⊕	
Methane, dibromo-	Methylene bromide	1000 (454)
Methane, dichloro-	Methylene chloride *	1000 (454)
Methane, dichlorodifluoro-	Dichlorodifluoromethane *	5000 (2270)
Methane, iodo-	Methyl iodide	1 (0.454)
Methane, oxybis(chloro-	Bis(chloromethyl) ether	1 (0.454)
Methane, tetrachloro-	Carbon tetrachloride *	5000 (2270)
Methane, tetranitro-	Tetranitromethane *	10 (4.54)
Methane, tribromo-	Bromoform	100 (45.4)
Methane, trichloro-	Chloroform *	5000 (2270)
Methane, trichlorofluoro-	Trichloromonofluoromethane	5000 (2270)
Methanesulfenyl chloride, trichloro-	Perchloromethyl mercaptan ⊕	100 (45.4)
	Trichloromethanesulfenyl chloride	
Methanesulfonic acid, ethyl ester	Ethyl methanesulfonate	1 (0.454)
Methanethiol	Methyl mercaptan *	100 (45.4)
	Thiomethanol	
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	Heptachlor	1 (0.454)
Methanoic acid	Formic acid *	5000 (2270)
4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-	Chlordane *	1 (0.454)
	Chlordane, technical *	
Methanol *	Methyl alcohol *	5000 (2270)
Methapyrilene	Pyridine, 2-[(2-(dimethylamino)ethyl)-2-thenylamino]-	5000 (2270)
Methomyl	Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester	100 (45.4)
Methoxychlor	Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	1 (0.454)
Methyl alcohol *	Methanol *	5000 (2270)
Methylamine ⊕	Monomethylamine	100 (45.4)
2-Methylaziridine	1,2-Propylenimine	1 (0.454)
Methyl bromide *	Methane, bromo-	1000 (454)
1-Methylbutadiene	1,3-Pentadiene	100 (45.4)
Methyl chloride *	Chloromethane	1 (0.454)

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
	Methane, chloro-	
Methyl chlorocarbonate *	Carbonochloridic acid, methyl ester	1000 (454)
	Methyl chloroformate ‡	
Methyl chloroform *	1,1,1-Trichloroethane *	1000 (454)
Methyl chloroformate ‡	Carbonochloridic acid, methyl ester	1000 (454)
	Methyl chlorocarbonate	
Methyl chloromethyl ether ‡	Chloromethyl methyl ether	1 (0.454)
	Methane, chloromethoxy-	
3-Methylcholanthrene	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	1 (0.454)
4,4-Methylenebis(2-chloroaniline)	Benzenamine, 4,4'-methylenebis(2-chloro-	1 (0.454)
2,2'-Methylenebis(3,4,6-trichlorophenol)	Hexachlorophene	100 (45.4)
Methylene bromide	Methane, dibromo-	1000 (454)
Methylene chloride *	Methane, dichloro-	1000 (454)
Methylene oxide	Formaldehyde *	1000 (454)
Methyl ethyl ketone *	2-Butanone	5000 (2270)
	Ethyl methyl ketone ‡	
Methyl ethyl ketone peroxide *	2-Butanone peroxide	10 (4.54)
Methyl hydrazine *	Hydrazine, methyl-	10 (4.54)
Methyl iodide	Methane, iodo-	1 (0.454)
Methyl isobutyl ketone	4-Methyl-2-pentanone	5000 (2270)
Methyl isocyanate *	Isocyanic acid, methyl ester	1 (0.454)
2-Methyllactonitrile	Acetone cyanohydrin *	10 (4.54)
	Propanenitrile, 2-hydroxy-2-methyl-	
Methyl mercaptan *	Methanethiol	100 (45.4)
	Thiomethanol	
Methyl methacrylate *	2-Propenoic acid, 2-methyl-, methyl ester	1000 (454)
N-Methyl-N'-nitro-N-nitrosoguanidine	Guanidine, N-nitroso-N-methyl-N'-nitro-	1 (0.454)
Methyl parathion *	O,O-Dimethyl O-p-nitrophenyl phosphorothioate	100 (45.4)
4-Methyl-2-pentanone	Methyl isobutyl ketone	5000 (2270)
Methylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	1 (0.454)
Mevinphos *		10 (4.54)
Mexacarbate *		1000 (454)
Mitomycin C	Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-.	1 (0.454)
Monoethylamine *		100 (45.4)
Monomethylamine	Methylamine ‡	100 (45.4)
Naled		10 (4.54)
5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-.	Daunomycin	1 (0.454)
Naphthalene *		100 (45.4)
Naphthalene, 2-chloro-	beta-Chloronaphthalene	5000 (2270)
	2-Chloronaphthalene	
1,4-Naphthalenedione	1,4-Naphthoquinone	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	Trypan blue	1 (0.454)
Naphthenic acid		100 (45.4)
1,4-Naphthoquinone	1,4-Naphthalenedione	5000 (2270)
alpha-Naphthylamine	1-Naphthylamine	1 (0.454)
beta-Naphthylamine	2-Naphthylamine	1 (0.454)
1-Naphthylamine	alpha-Naphthylamine	1 (0.454)
2-Naphthylamine	beta-Naphthylamine	1 (0.454)
2-Naphthylamine, N,N-bis(2-chloroethyl)-	Chlornaphazine	1 (0.454)
alpha-Naphthylthiourea	Thiourea, 1-naphthalenyl-	100 (45.4)
Nickel ‡		1 (0.454)
Nickel ammonium sulfate		5000 (2270)
Nickel carbonyl *	Nickel tetracarbonyl	1 (0.454)
Nickel chloride		5000 (2270)
Nickel cyanide *	Nickel(II) cyanide	1 (0.454)
Nickel(II) cyanide	Nickel cyanide *	1 (0.454)
Nickel hydroxide		1000 (454)
Nickel nitrate *		5000 (2270)
Nickel sulfate		5000 (2270)
Nickel tetracarbonyl	Nickel carbonyl *	1 (0.454)
Nicotine * and salts *	Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	100 (45.4)
Nitric acid *		1000 (454)
Nitric oxide *	Nitrogen(II) oxide	10 (4.54)
p-Nitroaniline *	Benzenamine, 4-nitro-	5000 (2270)
Nitrobenzene *	Benzene, nitro-	1000 (454)
Nitrogen dioxide *	Nitrogen(IV) oxide	10 (4.54)
Nitrogen(II) oxide	Nitric oxide *	10 (4.54)
Nitrogen(IV) oxide	Nitrogen dioxide *	10 (4.54)
Nitroglycerine *	1,2,3-Propanetriol, trinitrate-	10 (4.54)
Nitrophenol [mixed]		100 (45.4)
m-	2-Nitrophenol	
o-	4-Nitrophenol	
p-	Phenol, 4-nitro-	
o-Nitrophenol	2-Nitrophenol	100 (45.4)
p-Nitrophenol	Phenol, 4-nitro-	100 (45.4)
	4-Nitrophenol	
2-Nitrophenol	o-Nitrophenol	100 (45.4)
4-Nitrophenol	p-Nitrophenol	100 (45.4)
	Phenol, 4-nitro-	
2-Nitropropane	Propane, 2-nitro-	1 (0.454)
N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-	1 (0.454)
N-Nitrosodiethanolamine	Ethanol, 2,2'-(nitrosoimino)bis-	1 (0.454)
N-Nitrosodiethylamine	Ethanamine, N-ethyl-N-nitroso-	1 (0.454)
N-Nitrosodimethylamine	Dimethylnitrosamine	1 (0.454)
N-Nitrosodiphenylamine		100 (45.4)
N-Nitrosodi-n-propylamine	Di-n-propylnitrosamine	1 (0.454)
N-Nitroso-N-ethylurea	Carbamide, N-ethyl-N-nitroso-	1 (0.454)
N-Nitroso-N-methylurea	Carbamide, N-methyl-N-nitroso-	1 (0.454)
N-Nitroso-N-methylurethane	Carbamic acid, methylnitroso-, ethyl ester	1 (0.454)
N-Nitrosomethylvinylamine	Ethenamine, N-methyl-N-nitroso-	1 (0.454)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
N-Nitrosopiperidine	Pyridine, hexahydro-N-nitroso-	1 (0.454)
N-Nitrosopyrrolidine	Pyrrole, tetrahydro-N-nitroso-	1 (0.454)
Nitrotoluene		1000 (454)
m-Nitrotoluene		
o-Nitrotoluene		
p-Nitrotoluene		
5-Nitro-o-toluidine	Benzenamine, 2-methyl-5-nitro-	1 (0.454)
5-Norbornene-2,3-dimethanol,1,4,5,8,7,7-hexachloro,cyclic sulfite	Endosulfan *	1 (0.454)
Octamethylpyrophosphoramide	Diphosphoramide, octamethyl-	100 (45.4)
Osmium oxide	Osmium tetroxide	1000 (454)
Osmium tetroxide	Osmium oxide	1000 (454)
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	Endothall	1000 (454)
1,2-Oxathiolane, 2,2-dioxide	1,3-Propane sultone	1 (0.454)
2H-1,3,2-Oxazaphosphorine,2-[bis(2-chloroethyl) amino] tetrahydro-2-oxide	Cyclophosphamide	1 (0.454)
Oxirane	Ethylene oxide *	1 (0.454)
Oxirane, 2-(chloromethyl)-	Epichlorohydrin *	1000 (454)
	1-Chloro-2,3-epoxypropane	
Paraformaldehyde *		1000 (454)
Paraldehyde *	1,3,5-Trioxane, 2,4,6-trimethyl-	1000 (454)
Parathion *	Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester	1 (0.454)
Pentachlorobenzene	Benzene, pentachloro-	10 (4.54)
Pentachloroethane	Ethane, pentachloro-	1 (0.454)
Pentachloronitrobenzene	Benzene, pentachloronitro-	1 (0.454)
Pentachlorophenol	Phenol, pentachloro-	10 (4.54)
1,3-Pentadiene	1-Methylbutadiene	100 (45.4)
Perchloroethylene *	Ethene, 1,1,2,2-tetrachloro-	1 (0.454)
	Tetrachloroethene	
	Tetrachloroethylene *	
Perchloromethyl mercaptan @	Methanesulfenyl chloride, trichloro-	100 (45.4)
	Trichloromethanesulfenyl chloride	
Phenacetin	Acetamide, N-(4-ethoxyphenyl)-	1 (0.454)
Phenanthrene		5000 (2270)
Phenol *	Benzene, hydroxy-	1000 (454)
Phenol, 2-chloro-	o-Chlorophenol	100 (45.4)
	2-Chlorophenol	
Phenol, 4-chloro-3-methyl-	p-Chloro-m-cresol	5000 (2270)
	4-Chloro-m-cresol	
Phenol, 2-cyclohexyl-4,6-dinitro-	4,6-Dinitro-o-cyclohexylphenol	100 (45.4)
Phenol, 2,4-dichloro-	2,4-Dichlorophenol	100 (45.4)
Phenol, 2,6-dichloro-	2,6-Dichlorophenol	100 (45.4)
Phenol, 2,4-dimethyl-	2,4-Dimethylphenol	100 (45.4)
Phenol, 2,4-dinitro-	2,4-Dinitrophenol	10 (4.54)
Phenol, 2,4-dinitro-6-(1-methylpropyl)-	Dinoseb	1000 (454)
Phenol, 2,4-dinitro-6-methyl-, and salts	4,6-Dinitro-o-cresol and salts	10 (4.54)
Phenol, 4-nitro-	p-Nitrophenol *	100 (45.4)
	4-Nitrophenol *	
Phenol, pentachloro-	Pentachlorophenol	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	2,3,4,6-Tetrachlorophenol	10 (4.54)
Phenol, 2,4,5-trichloro-	2,4,5-Trichlorophenol	10 (4.54)
Phenol, 2,4,6-trichloro-	2,4,6-Trichlorophenol	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	Ammonium picrate *	10 (4.54)
Phenyl dichloroarsine *	Dichlorophenylarsine	1 (0.454)
1,10-(1,2-Phenylene)pyrene	Indeno(1,2,3-cd)pyrene	1 (0.454)
Phenyl mercaptan @	Benzenethiol	100 (45.4)
	Thiophenol *	
Phenylmercuric acetate	Mercury, (acetato-O)phenyl-	100 (45.4)
N-Phenylthiourea	Thiourea, phenyl-	100 (45.4)
Phorate	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio) methyl]ester	10 (4.54)
Phosgene *	Carbonyl chloride	10 (4.54)
Phosphine *	Hydrogen phosphide	100 (45.4)
Phosphoric acid *		5000 (2270)
Phosphoric acid, diethyl p-nitrophenyl ester	Diethyl-p-nitrophenyl phosphate	100 (45.4)
Phosphoric acid, lead salt	Lead phosphate	1 (0.454)
Phosphorodithioic acid, O,O-diethyl S-[(ethylthio) methyl ester	Phorate	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methylester	O,O-Diethyl S-methyl dithiophosphate	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2 (methylamino)-2-oxoethyl] ester	Dimethoate	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	Diisopropyl fluorophosphate	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester	Parathion *	1 (0.454)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	O,O-Diethyl O-pyrazinyl phosphorothioate	100 (45.4)
Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino) sulfonyl] phenyl] ester	Famphur	1000 (454)
Phosphorus *		1 (0.454)
Phosphorus oxychloride *		1000 (454)
Phosphorus pentasulfide *	Phosphorus sulfide	100 (45.4)
	Sulfur phosphide	
Phosphorus sulfide	Phosphorus pentasulfide *	100 (45.4)
	Sulfur phosphide	
Phosphorus trichloride *		1000 (454)
Phthalic anhydride	1,2-Benzenedicarboxylic acid anhydride	5000 (2270)
2-Picoline	Pyridine, 2-methyl-	5000 (2270)
Plumbane, tetraethyl-	Tetraethyl lead *	10 (4.54)
POLYCHLORINATED BIPHENYLS (PCBs)	Aroclor 1016	10 (4.54)
	Aroclor 1221	
	Aroclor 1232	
	Aroclor 1242	
	Aroclor 1248	
	Aroclor 1254	
	Aroclor 1260	
Potassium arsenate *		1000 (454)
Potassium arsenite *		1000 (454)
Potassium bichromate	Potassium dichromate @	1000 (454)
Potassium chromate		1000 (454)
Potassium cyanide *		10 (4.54)
Potassium dichromate @	Potassium bichromate	1000 (454)
Potassium hydroxide *		1000 (454)

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Potassium permanganate *		100 (45.4)
Potassium silver cyanide		1 (0.454)
Pronamide	3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	5000 (2270)
1-Propanal, 2,3-epoxy-	Glycidylaldehyde	1 (0.454)
Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino)carbonyl]oxime	Aldicarb	1 (0.454)
1-Propanamine	n-Propylamine *	5000 (2270)
1-Propanamine, N-propyl-	Dipropylamine	5000 (2270)
Propane, 1,2-dibromo-3-chloro-	1,2-Dibromo-3-chloropropane	1 (0.454)
Propane, 2-nitro-	2-Nitropropane	1 (0.454)
Propane, 2,2'-oxybis[2-chloro-	Bis(2-chloroisopropyl) ether	1000 (454)
1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	1 (0.454)
Propanedinitrile	Malononitrile	1000 (454)
Propanenitrile	Ethyl cyanide	10 (4.54)
Propanenitrile, 3-chloro-	3-Chloropropionitrile	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	Acetone cyanohydrin *	10 (4.54)
	2-Methyllactonitrile	
1,2,3-Propanetriol, trinitrate-	Nitroglycerine *	10 (4.54)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	Tris(2,3-dibromopropyl)phosphate	1 (0.454)
1-Propanol, 2-methyl-	Isobutyl alcohol	5000 (2270)
2-Propanone	Acetone *	5000 (2270)
2-Propanone, 1-bromo-	Bromoacetone *	1000 (454)
Propargite		10 (4.54)
Propargyl alcohol *	2-Propyn-1-ol	1000 (454)
2-Propenal	Acrolein *	1 (0.454)
2-Propenamide	Acrylamide	5000 (2270)
Propene, 1,3-dichloro-	1,3-Dichloropropene	100 (45.4)
1-Propene, 1,1,2,3,3,3-hexachloro-	Hexachloropropene	1000 (454)
2-Propenenitrile	Acrylonitrile *	100 (45.4)
2-Propenenitrile, 2-methyl-	Methacrylonitrile	1000 (454)
2-Propenoic acid	Acrylic acid *	5000 (2270)
2-Propenoic acid, ethyl ester	Ethyl acrylate *	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	Ethyl methacrylate	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	Methyl methacrylate *	1000 (454)
2-Propen-1-ol	Allyl alcohol *	100 (45.4)
Propionic acid *		5000 (2270)
Propionic acid, 2-(2,4,5-trichlorophenoxy)-	Silvex	100 (45.4)
	2,4,5-TP (fr	
	2,4,5-TP acid	
Propionic anhydride		5000 (2270)
n-Propylamine *	1-Propanamine	5000 (2270)
Propylene dichloride *	1,2-Dichloropropane	1000 (454)
Propylene oxide *		100 (45.4)
1,2-Propylenimine *	2-Methylaziridine	1 (0.454)
2-Propyn-1-ol	Propargyl alcohol *	1000 (454)
Pyrene		5000 (2270)
Pyrethrins		1 (0.454)
4-Pyridinamine	4-Aminopyridine	1000 (454)
Pyridine *		1000 (454)
Pyridine, 2-[2-(dimethylamino)ethyl]-2-thenylamino]	Methapyrilene	5000 (2270)
Pyridine, hexahydro-N-nitroso-	N-Nitrosopiperidine	1 (0.454)
Pyridine, 2-methyl-	2-Picoline	5000 (2270)
Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	Nicotine * and salts *	100 (45.4)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	Methylthiouracil	1 (0.454)
Pyrophosphoric acid, tetraethyl ester	Tetraethyl pyrophosphate *	10 (4.54)
Pyrrole, tetrahydro-N-nitroso-	N-Nitrosopyrrolidine	1 (0.454)
Quinoline		5000 (2270)
RADIONUCLIDES		1 (0.454)
Reserpine	Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester,	5000 (2270)
Resorcinol	1,3-Benzenediol	5000 (2270)
Saccharin and salts	1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	1 (0.454)
Safrole	Benzene, 1,2-methylenedioxy-4-allyl-	1 (0.454)
Selenious acid		10 (4.54)
Selenium s		100 (45.4)
Selenium dioxide	Selenium oxide *	10 (4.54)
Selenium disulfide	Sulfur selenide	1 (0.454)
Selenium oxide *	Selenium dioxide	10 (4.54)
Selenourea	Carbamimidoselenoic acid	1000 (454)
L-Serine, diazoacetate (ester)	Azaserine	1 (0.454)
Silver s		1000 (454)
Silver cyanide *		1 (0.454)
Silver nitrate *		1 (0.454)
Silvex	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	2,4,5-TP (fr	
	2,4,5-TP acid	
Sodium *		10 (4.54)
Sodium arsenate *		1000 (454)
Sodium arsenite *		1000 (454)
Sodium azide *		1000 (454)
Sodium bichromate	Sodium dichromate (fr	1000 (454)
Sodium bifluoride *		100 (45.4)
Sodium bisulfite *		5000 (2270)
Sodium chromate		1000 (454)
Sodium cyanide *		10 (4.54)
Sodium dichromate (fr	Sodium bichromate	1000 (454)
Sodium dodecylbenzene sulfonate		1000 (454)
Sodium fluoride *		1000 (454)
Sodium hydrosulfide *		5000 (2270)
Sodium hydroxide *		1000 (454)
Sodium hypochlorite *		100 (45.4)
Sodium methylate *		1000 (454)
Sodium nitrite *		100 (45.4)
Sodium phosphate, dibasic		5000 (2270)
Sodium phosphate, tribasic		5000 (2270)

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
Sodium selenite *		100 (45.4)
Stilbestrol, alpha,alpha'-diethyl-	Diethylstilbestrol	1 (0.454)
Streptozotocin	D-Glucopyranose, 2-deoxy-2-[3-methyl-3-nitrosoureido]-	1 (0.454)
Strontium chromate		1000 (454)
Strontium sulfide		100 (45.4)
Strychnidin-10-one, and salts	Strychnine * and salts *	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	Brucine	100 (45.4)
Strychnine * and salts *	Strychnidin-10-one, and salts	10 (4.54)
Styrene		1000 (454)
Sulfur hydride	Hydrogen sulfide *	100 (45.4)
	Hydrosulfuric acid	
Sulfur monochloride		1000 (454)
Sulfur phosphide	Phosphorus pentasulfide *	100 (45.4)
	Phosphorus sulfide	
Sulfur selenide	Selenium disulfide	1 (0.454)
Sulfuric acid		1000 (454)
Sulfuric acid, dimethyl ester	Dimethyl sulfate *	1 (0.454)
Sulfuric acid, thallium(I) salt	Thallium(I) sulfate *	100 (45.4)
2,4,5-T *	2,4,5-T acid	1000 (454)
	2,4,5-Trichlorophenoxyacetic acid *	
2,4,5-T acid	2,4,5-T *	1000 (454)
	2,4,5-Trichlorophenoxyacetic acid *	
2,4,5-T amines		5000 (2270)
2,4,5-T esters		1000 (454)
2,4,5-T salts		1000 (454)
TDE *	DDD	1 (0.454)
	Dichlorodiphenyl dichloroethane	
	4,4-DDD	
1,2,4,5-Tetrachlorobenzene	Benzene, 1,2,4,5-tetrachloro-	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		1 (0.454)
1,1,1,2-Tetrachloroethane	Ethane, 1,1,1,2-tetrachloro-	1 (0.454)
1,1,2,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-	1 (0.454)
Tetrachloroethene	Ethene, 1,1,2,2-tetrachloro-	1 (0.454)
	Perchloroethylene *	
	Tetrachloroethylene *	
Tetrachloroethylene *	Ethene, 1,1,2,2-tetrachloro-	1 (0.454)
	Perchloroethylene *	
	Tetrachloroethene	
2,3,4,6-Tetrachlorophenol	Phenol, 2,3,4,6-tetrachloro-	10 (4.54)
Tetraethyl lead *	Plumbane, tetraethyl-	10 (4.54)
Tetraethyl pyrophosphate *	Pyrophosphoric acid, tetraethyl ester	10 (4.54)
Tetraethyldithiopyrophosphate	Dithiopyrophosphoric acid, tetraethyl ester	100 (45.4)
Tetrahydrofuran *	Furan, tetrahydro-	1000 (454)
Tetranitromethane *	Methane, tetranitro-	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	Hexaethyl tetraphosphate *	100 (45.4)
Thallic oxide	Thallium(III) oxide	100 (45.4)
Thallium I		1000 (454)
Thallium(I) acetate	Acetic acid, thallium(I) salt	100 (45.4)
Thallium(I) carbonate	Carbonic acid, dithallium (I) salt	100 (45.4)
Thallium(I) chloride		100 (45.4)
Thallium(I) nitrate		100 (45.4)
Thallium(III) oxide	Thallic oxide	100 (45.4)
Thallium(I) selenide		1000 (454)
Thallium(I) sulfate *	Sulfuric acid, thallium(I) salt	100 (45.4)
Thioacetamide	Ethanethioamide	1 (0.454)
Thiofanox	3,3-Dimethyl-1-(methylthio)-2-butanone,O-[(methylamino)carbonyl] oxime	100 (45.4)
Thioimidodicarbonic diamide	2,4-Dithiobiuret	100 (45.4)
Thiomethanol	Methanethiol	100 (45.4)
	Methyl mercaptan *	
Thiophenol *	Benzenethiol	100 (45.4)
	Phenyl mercaptan ‡	
Thiosemicarbazide	Hydrazinecarbothioamide	100 (45.4)
Thiourea	Carbamide, thio-	1 (0.454)
Thiourea, (2-chlorophenyl)-	1-(o-Chlorophenyl)thiourea	100 (45.4)
Thiourea, 1-naphthalenyl-	alpha-Naphthylthiourea	100 (45.4)
Thiourea, phenyl-	N-Phenylthiourea	100 (45.4)
Thiram	Bis(dimethylthiocarbamoyl) disulfide	10 (4.54)
Toluene *	Benzene, methyl-	1000 (454)
Toluenediamine *	Diaminotoluene	1 (0.454)
Toluene diisocyanate *	Benzene, 2,4-diisocyanatomethyl-	100 (45.4)
o-Tolidine hydrochloride	Benzeneamine, 2-methyl-, hydrochloride	1 (0.454)
o-Tolidine	2-Amino-1-methyl benzene	1 (0.454)
p-Tolidine	4-Amino-1-methyl benzene	1 (0.454)
Toxaphene *	Camphene, octachloro-	1 (0.454)
2,4,5-TP ‡	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	Silvex	
	2,4,5-TP acid	
2,4,5-TP acid esters		100 (45.4)
2,4,5-TP acid	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	Silvex	
	2,4,5-TP ‡	
1H-1,2,4-Triazol-3-amine	Amitrole	1 (0.454)
Trichlorfon		100 (45.4)
1,2,4-Trichlorobenzene		100 (45.4)
1,1,1-Trichloroethane *	Methyl chloroform *	1000 (454)
1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-	1 (0.454)
Trichloroethene	Trichloroethylene *	1000 (454)
Trichloroethylene *	Trichloroethene	1000 (454)
Trichloromethanesulfenyl chloride	Methanesulfenyl chloride, trichloro-	100 (45.4)
	Perchloromethyl mercaptan ‡	
Trichloromonofluoromethane	Methane, trichlorofluoro-	5000 (2270)
Trichlorophenol *		10 (4.54)
2,3,4-Trichlorophenol		
2,3,5-Trichlorophenol		

For explanation of abbreviations and reference marks, see last page of this tariff.

List of Hazardous Substances and Reportable Quantities—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
2,3,6-Trichlorophenol		
2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	
2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	
3,4,5-Trichlorophenol		
2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	10 (4.54)
2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	10 (4.54)
2,4,5-Trichlorophenoxyacetic acid *	2,4,5-T *	1000 (454)
	2,4,5-T acid	
Triethanolamine dodecylbenzene sulfonate		1000 (454)
Triethylamine		5000 (2270)
Trimethylamine *		100 (45.4)
1,3,5-Trinitrobenzene *	Benzene, 1,3,5-trinitro-	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	Paraldehyde	1000 (454)
Tris(2,3-dibromopropyl) phosphate	1-Propanol, 2,3-dibromo-, phosphate (3:1)	1 (0.454)
Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3-[(3,3'-dimethyl[1,1'-biphenyl]-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt	1 (0.454)
Unlisted Hazardous Wastes Characteristic of Corrosivity D002		100 (45.4)
Unlisted Hazardous Wastes Characteristic of EP Toxicity		
Arsenic D004		1 (0.454)
Barium D005		1000 (454)
Cadmium D006		1 (0.454)
Chromium D007		1 (0.454)
Lead D008		1 (0.454)
Mercury D009		1 (0.454)
Selenium D010		10 (4.54)
Silver D011		1 (0.454)
Endrin D012		1 (0.454)
Lindane D013		1 (0.454)
Methoxychlor D014		1 (0.454)
Toxaphene D015		1 (0.454)
2,4-D D016		100 (45.4)
2,4,5-TP D017		100 (45.4)
Unlisted Hazardous Wastes Characteristic of Ignitability D001		100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity D003		100 (45.4)
Uracil, 5-[bis(2-chloroethyl)amino]-	Uracil mustard	1 (0.454)
Uracil mustard	Uracil, 5-[bis(2-chloroethyl)amino]-	1 (0.454)
Uranyl acetate *		100 (45.4)
Uranyl nitrate *		100 (45.4)
Vanadic acid, ammonium salt	Ammonium vanadate	1000 (454)
Vanadium(V) oxide	Vanadium pentoxide	1000 (454)
Vanadium pentoxide	Vanadium(V) oxide	1000 (454)
Vanadyl sulfate		1000 (454)
Vinyl acetate *		5000 (2270)
Vinyl chloride *	Ethene, chloro-	1 (0.454)
Vinylidene chloride *	Ethene, 1,1-dichloro-	5000 (2270)
	1,1-Dichloroethylene	
Warfarin	3-(alpha Acetonylbenzyl)-4-hydroxycoumarin and salts	100 (45.4)
Xylene * (mixed)	Benzene, dimethyl-	1000 (454)
m-	m-	
o-	o-	
p-	p-	
Xylenol *		1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester	Reserpine	5000 (2270)
Zinc		1000 (454)
Zinc acetate		1000 (454)
Zinc ammonium chloride		1000 (454)
Zinc borate		1000 (454)
Zinc bromide		1000 (454)
Zinc carbonate		1000 (454)
Zinc chloride		1000 (454)
Zinc cyanide *		10 (4.54)
Zinc fluoride		1000 (454)
Zinc formate		1000 (454)
Zinc hydrosulfite *		1000 (454)
Zinc nitrate *		1000 (454)
Zinc phenolsulfonate		5000 (2270)
Zinc phosphide *		100 (45.4)
Zinc silicofluoride		5000 (2270)
Zinc sulfate		1000 (454)
Zirconium nitrate *		5000 (2270)
Zirconium potassium fluoride		1000 (454)
Zirconium sulfate *		5000 (2270)
Zirconium tetrachloride *		5000 (2270)
F001		1 (0.454)
The following spent halogenated solvents used in degreasing and sludges from the recovery of these solvents in degreasing operations:		
(a) Tetrachloroethylene		1 (0.454)
(b) Trichloroethylene		1000 (454)
(c) Methylene chloride		1000 (454)
(d) 1,1,1-Trichloroethane		1000 (454)
(e) Carbon tetrachloride		5000 (2270)
(f) Chlorinated fluorocarbons		5000 (2270)
F002		1 (0.454)
The following spent halogenated solvents and the still bottoms from the recovery of these solvents:		
(a) Tetrachloroethylene		1 (0.454)
(b) Methylene chloride		1000 (454)
(c) Trichloroethylene		1000 (454)
(d) 1,1,1-Trichloroethane		1000 (454)
(e) Chlorobenzene		100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane		5000 (2270)
(g) o-Dichlorobenzene		100 (45.4)
(h) Trichlorofluoromethane		5000 (2270)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
F003		100 (45.4)
The following spent non halogenated solvents and solvents:		
(a) Xylene		1000 (454)
(b) Acetone		5000 (2270)
(c) Ethyl acetate		5000 (2270)
(d) Ethylbenzene		1000 (454)
(e) Ethyl ether		100 (45.4)
(f) Methyl isobutyl ketone		5000 (2270)
(g) n Butyl alcohol		5000 (2270)
(h) Cyclohexanone		5000 (2270)
(i) Methanol		5000 (2270)
F004		1000 (454)
The following spent non halogenated solvents and the still bottoms from the recovery of these solvents:		
(a) Cresols/Cresylic acid		1000 (454)
(b) Nitrobenzene		1000 (454)
F005		100 (45.4)
The following spent non halogenated solvents and the still bottoms from the recovery of these solvents:		
(a) Toluene		1000 (454)
(b) Methyl ethyl ketone		5000 (2270)
(c) Carbon disulfide		100 (45.4)
(d) Isobutanol		5000 (2270)
(e) Pyridine		1000 (454)
F006		1 (0.454)
Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.		
F007		10 (4.54)
Spent cyanide plating bath solutions from electroplating operations		
F008		10 (4.54)
Plating bath sludges from the bottom of plating baths from electroplating operations where cyanides are used in the process (except for precious metals electroplating plating bath sludges).		
F009		10 (4.54)
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process (except for precious metals electroplating spent stripping and cleaning bath solutions).		
F010		10 (4.54)
Quenching bath sludge from oil baths from metal heat treating operations where cyanides are used in the process (except for precious metals heat treating quenching bath sludges).		
F011		10 (4.54)
Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations (except for precious metals heat treating spent cyanide solutions from salt bath pot cleaning).		
F012		10 (4.54)
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process (except for precious metals heat treating quenching wastewater treatment sludges).		
F019		1 (0.454)
Wastewater treatment sludges from the chemical conversion coating of aluminum		
F020		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.).		
F021		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives		
F022		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.		
F023		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.).		
F024		1 (0.454)
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desiccants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.32.).		
F026		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions		

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
F027		1 (0.454)
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5 trichlorophenol as the sole component.)		
F028		1 (0.454)
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.		
K001		1 (0.454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and or pentachlorophenol.		
K002		1 (0.454)
Wastewater treatment sludge from the production of chrome yellow and orange pigments.		
K003		1 (0.454)
Wastewater treatment sludge from the production of molybdate orange pigments		
K004		1 (0.454)
Wastewater treatment sludge from the production of zinc yellow pigments		1 (0.454)
K005		1 (0.454)
Wastewater treatment sludge from the production of chrome green pigments		1 (0.454)
K006		1 (0.454)
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).		
K007		1 (0.454)
Wastewater treatment sludge from the production of iron blue pigments		1 (0.454)
K008		1 (0.454)
Oven residue from the production of chrome oxide green pigments		1 (0.454)
K009		1 (0.454)
Distillation bottoms from the production of acetaldehyde from ethylene		1 (0.454)
K010		1 (0.454)
Distillation side cuts from the production of acetaldehyde from ethylene		1 (0.454)
K011		1 (0.454)
Bottom stream from the wastewater stripper in the production of acrylonitrile		1 (0.454)
K013		1 (0.454)
Bottom stream from the acetonitrile column in the production of acrylonitrile		5000 (2270)
K014		
Bottoms from the acetonitrile purification column in the production of acrylonitrile		
K015		1 (0.454)
Still bottoms from the distillation of benzyl chloride		1 (0.454)
K016		1 (0.454)
Heavy ends or distillation residues from the production of carbon tetrachloride		1 (0.454)
K017		
Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.		
K018		1 (0.454)
Heavy ends from the fractionation column in ethyl chloride production		1 (0.454)
K019		1 (0.454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.		
K020		1 (0.454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.		
K021		1 (0.454)
Aqueous spent antimony catalyst waste from fluoromethanes production		1 (0.454)
K022		1 (0.454)
Distillation bottom tars from the production of phenol acetone from cumene		5000 (2270)
K023		
Distillation light ends from the production of phthalic anhydride from naphthalene		5000 (2270)
K024		
Distillation bottoms from the production of phthalic anhydride from naphthalene		1 (0.454)
K025		
Distillation bottoms from the production of nitrobenzene by the nitration of benzene		1000 (454)
K026		
Stripping still tails from the production of methyl ethyl pyridines		1 (0.454)
K027		1 (0.454)
Centrifuge and distillation residues from toluene diisocyanate production		
K028		1 (0.454)
Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane		
K029		1 (0.454)
Waste from the product steam stripper in the production of 1,1,1-trichloroethane		
K030		1 (0.454)
Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene		
K031		1 (0.454)
By-product salts generated in the production of MSMA and cacodylic acid		1 (0.454)
K032		1 (0.454)
Wastewater treatment sludge from the production of chlordane		1 (0.454)
K033		1 (0.454)
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.		
K034		1 (0.454)
Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.		
K035		1 (0.454)
Wastewater treatment sludges generated in the production of creosote		1 (0.454)
K036		1 (0.454)
Still bottoms from toluene reclamation distillation in the production of disulfoton.		

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
K037		1 (0.454)
Wastewater treatment sludges from the production of disulfoton		
K038		1 (0.454)
Wastewater from the washing and stripping of phorate production		
K039		10 (4.54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.		
K040		1 (0.454)
Wastewater treatment sludge from the production of phorate		
K041		1 (0.454)
Wastewater treatment sludge from the production of toxaphene		
K042		1 (0.454)
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T		
K043		1 (0.454)
2,6-dichlorophenol waste from the production of 2,4-D		
K044		10 (4.54)
Wastewater treatment sludges from the manufacturing and processing of explosives		
K045		10 (4.54)
Spent carbon from the treatment of wastewater containing explosives		
K046		100 (45.4)
Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds		
K047		10 (4.54)
Pink/red water from TNT operations		
K048		1 (0.454)
Dissolved air flotation (DAF) float from the petroleum refining industry		
K049		1 (0.454)
Slop oil emulsion solids from the petroleum refining industry		
K050		1 (0.454)
Heat exchanger bundle cleaning sludge from the petroleum refining industry		
K051		1 (0.454)
API separator sludge from the petroleum refining industry		
K052		10 (4.54)
Tank bottoms (leaded) from the petroleum refining industry		
K060		1 (0.454)
Ammonia still lime sludge from coking operations		
K061		1 (0.454)
Emission control dust sludge from the primary production of steel in electric furnaces.		
K062		1 (0.454)
Spent pickle liquor from steel finishing operations		
K069		1 (0.454)
Emission control dust sludge from secondary lead smelting		
K071		1 (0.454)
Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.		
K073		1 (0.454)
Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.		
K083		100 (45.4)
Distillation bottoms from aniline extraction		
K084		1 (0.454)
Wastewater treatment sludges generated during the production of veterinary pharmaceutical's from arsenic or organo-arsenic compounds.		
K085		1 (0.454)
Distillation or fractionation column bottoms from the production of chlorobenzenes		
K086		1 (0.454)
Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead		
K087		100 (45.4)
Decanter tank tar sludge from coking operations		
K093		5000 (2270)
Distillation light ends from the production of phthalic anhydride from ortho-xylene		
K094		5000 (2270)
Distillation bottoms from the production of phthalic anhydride from ortho-xylene		
K095		1 (0.454)
Distillation bottoms from the production of 1,1,1-trichloroethane		
K096		1 (0.454)
Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.		
K097		1 (0.454)
Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.		
K098		1 (0.454)
Untreated process wastewater from the production of toxaphene		
K099		1 (0.454)
Untreated wastewater from the production of 2,4-D		
K1000		1 (0.454)
Waste leaching solution from acid leaching of emission control dust sludge from secondary lead smelting		
K101		1 (0.454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceutical's from arsenic or organo-arsenic compounds.		
K102		1 (0.454)
Residue from the use of activated carbon or decolorization in the production of veterinary pharmaceutical's from arsenic or organo-arsenic compounds.		
K103		100 (45.4)
Process residues from aniline extraction from the production of aniline		

For explanation of abbreviations and reference marks, see last page of this tariff.

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity Pounds (Kilograms)
K104 Combined wastewater streams generated from nitrobenzene/aniline chlorobenzenes		1 (0.454)
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes		1 (0.454)
K106 Wastewater treatment sludge from the mercury cell process in chlorine production		1 (0.454)
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene		1 (0.454)
K112 Reaction by product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.		1 (0.454)
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.		1 (0.454)
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.		1 (0.454)
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.		1 (0.454)
K116 Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine.		1 (0.454)
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.		1 (0.454)
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.		1 (0.454)
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.		1 (0.454)

Footnotes:
¢ - the RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 micrometers (0.004 inches)
¢¢ - the RQ for asbestos is limited to friable forms only
* - indicates that this material appears by name in the Hazarous Materials Table
@ - indicates that the name was added by RSPA because (1) the name is a synonym for a specific hazardous substance and (2) the name appears in the Hazardous Materials Table as a proper shipping name.

§ 172.102 Purpose and use of Optional Hazardous Materials Table for International Shipments. (a) The Optional Hazardous Materials Table (Optional Table) set forth in this section provides descriptions, classifications, labeling and vessel stowage requirements which may be used for international shipments as authorized by §171.12 of this subchapter. The Optional Table provides alternatives to corresponding requirements in §172.101 subject to conditions set forth in this section. The provisions of this section do not apply to materials designated as hazardous materials under this subchapter that are not subject to the requirements of the IMDG Code. This section does not designate materials as hazardous materials and it does not specify packaging requirements, exceptions or limitations. They are made only in §172.101. A number of materials listed in the Optional Table may not be subject to the requirements of this subchapter, but they are subject to regulation under widely applied international standards. They are listed in this section in the interest of providing consistency with those standards and to alert persons offering or accepting these materials for transportation that the materials may be subject to regulation in international transport.

(1) A shipping description and any associated entry which is listed in the current edition of the IMDG Code but is not listed in the Optional Table may be used as if it was listed in the Optional Table, if approved by the Director, OHMT.

(b) A material described, classed, and labeled, in accordance with this section must be in conformance with all additional defining or limiting conditions prescribed for the description in the appropriate schedule of the IMDG Code.

(c) When a material is transported by aircraft, motor vehicle, or rail transport vehicle under the description and IMO class or division provided in the Optional Table, the shipping paper required by §172.202(a) must include the class name from Part 173 of this subchapter which most closely corresponds to the IMO class indicated for the material in the Optional Table. For example, the IMO proper shipping name, class and identification number for Ethylene oxide are "Ethylene oxide, 2.1, UN1040". While *Ethylene oxide* would be classed as a Flammable liquid under §172.101, the class in Part 173 of this subchapter that most closely corresponds to the IMO class provided in the Optional Table is "Flammable gas". The proper shipping paper description would be "Ethylene oxide, 2.1, Flammable gas, UN1040".

(d) When appropriate, the entries "IMO" or "IMO Class" may be entered immediately before or immediately following the class entry in the basic description. For example: "Ethylene oxide, IMO Class 2.1, Flammable gas, UN1040."

(e) When an appropriate shipping name from the Optional Table is used to describe a hazardous material which is also a hazardous substance, the additional description requirements for hazardous substances in §§172.203(c) and 172.324 are applicable.

(f) Column 1 contains the letter "N" immediately adjacent to certain entries. The letter "N" means that the entry is not an acceptable alternative and the material must be transported under the appropriate entry in §172.101.

(g) Column 2 lists the optional proper shipping names for hazardous materials. Proper shipping names are limited to those shown in Roman type (not italics). In the selection of a proper shipping name to describe a particular material, if the correct technical name is not shown, or is not appropriate, selection must be made from the general description or "n.o.s." entries corresponding to the specific hazard class of the material being shipped. The name that most appropriately describes the material must be used; e.g., an alcohol not listed by name in the Optional Table must be shipped as an "Alcohol n.o.s." rather than "Flammable liquid n.o.s." unless the technical name of the alcohol is listed, e.g., Methanol. Some mixtures may be more appropriately described by their application, such as "Paint" or "Cleaning compound".

(1) Shipping names may be entered in either upper or lower case letters.

(2) The words in italics are not part of the proper shipping name but may be used in addition to the proper shipping name. The word "or" in italics indicates that any terms in the sequence may be used as the proper shipping name, as appropriate.

(3) When one entry references another entry by use of a "see" and both names are in Roman type, either name may be used as a proper shipping name (e.g., Methyl alcohol. See Methanol).

(4) If not included in the proper shipping name in the Optional Table, the proper shipping name for a hazardous material that is a hazardous waste must include the word "Waste" preceding the name of the material. For example: Waste turpentine.

(h) Column 3 contains the hazard class or division designated for the material in the IMDG Code. In the case of explosives, a letter designating the "compatibility group" of the substance or article is also included immediately following the division. Detailed definitions of the classes, divisions, and compatibility groups are provided in the IMDG Code. Basic definitions of the IMO classes and divisions (with corresponding DOT classes shown in italics) are as follows:

(1) Class 1—Explosives.
(i) Division 1.1—Substances and articles which have a mass explosion hazard. *Explosive A*
(ii) Division 1.2—Substances and articles which have a projection hazard but not a mass explosion hazard. *Explosive A or B*
(iii) Division 1.3—Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard. *Explosive B*
(iv) Division 1.4—Substances and articles which present no significant hazard. *Explosive C*
(v) Division 1.5—Very insensitive substances. *Blasting Agent*
(2) Class 2—Gases (compressed, liquefied or dissolved under pressure).
(i) Division 2.1—Flammable gases. *Flammable gas*
(ii) Division 2.2—Nonflammable gases. *Nonflammable gas*
(iii) Division 2.3—Poison gases. *Poison A*
(3) Class 3—Flammable liquids.
(i) Division 3.1—Low flash point group (liquids with flash points below 0°F). *Flammable liquid*
(ii) Division 3.2—Intermediate flash point group (liquids with flash points of 0°F or above but less than 73°F). *Flammable liquid*
(iii) Division 3.3—High flash point group (liquids with flash points of 73°F or above up to and including 141°F). *Flammable liquid or Combustible liquid*
(4) Class 4—Flammable solids or substances.
(i) Division 4.1—Flammable solids. *Flammable solid*
(ii) Division 4.2—Substances liable to spontaneous combustion. *Flammable solid or, for pyroforic liquids, Flammable liquid*
(iii) Division 4.3—Substances emitting flammable gases when wet. *Flammable solid*
(5) Class 5—Oxidizing substances.
(i) Division 5.1—Oxidizing substances or agents. *Oxidizer*
(ii) Division 5.2—Organic peroxides. *Organic peroxide*
(6) Class 6—Poisonous and infectious substances.
(i) Division 6.1—Poisonous substances. *Poison B*
(ii) Division 6.2—Infectious substances. *Etiologic agent*
(7) Class 7—Radioactive substances. *Radioactive material*
(8) Class 8—Corrosives. *Corrosive material*
(9) Class 9—Miscellaneous dangerous substances. *Other regulated material*

(i) Column 4 contains the United Nations number listed for the substance or article in the IMDG Code. A number of substances or articles have no UN number provided for them in the IMDG Code. For some of these entries, the UN number of the article or substance which most appropriately corresponds to that particular entry is shown in parentheses.

(j) Column 5 specifies the labels to be applied to each package. Specifications for labels for domestic and export shipments shall be either as provided in the subchapter or as provided in the IMDG Code, except that color shall be as prescribed in §172.407(d). The label referred to as the "St. Andrews Cross" label is the "Harmful—Stow Away From Foodstuffs" label provided by IMO for materials of Class 6.1 Packaging Group III.

(k) Column 6 provides the packaging group specified for the material in the IMDG Code.

(l) Column 7 specifies each of the authorized stowage locations on board cargo vessels and passenger vessels and certain additional requirements for shipments of listed hazardous materials. Section 176.63 of this subchapter sets forth the physical requirements for each of the authorized stowage locations listed in Column 7. The authorized stowage locations are defined as follows:

(1) "1" means the material must be stowed "on deck."
(2) "2" means the material must be stowed "under deck."
(3) "3" means the material must be stowed "under deck away from heat."
(4) "1,2" means the material may be stowed either "on deck" or "under deck"; however, "under deck" stowage should be used if available.
(5) "1,3" means the material may be stowed either "on deck" or "under deck away from heat"; however, "under deck away from heat" stowage should be used if it is available.
(6) "5" means the material is forbidden and may not be offered or accepted for transportation by vessel.
(7) "6" means the material is authorized to be transported in a magazine subject to the requirements of §§176.135 through 176.144 of this subchapter.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Acetal	3.1	UN1088	Flammable Liquid	II	1.3	5	Keep cool
	Acetaldehyde	3.1	UN1089	Flammable Liquid	I	1.3	5	Keep cool
	Acetaldehyde ammonia	9	UN1841	None	III	1.2	1.2	Stow "away from" foodstuffs
	Acetaldehyde oxime	3.3	UN2332	Flammable Liquid	II	1.2	1.2	
	Acetic acid, glacial or Acetic acid solution, more than 80% acid by weight	8	UN2789	Corrosive, Flammable Liquid	II	1.2	1.2	Segregation same as for flammable liquids. Glass carboys in hampers prohibited under deck
	Acetic acid solution, more than 25% but not more than 80% acid by weight	8	UN2790	Corrosive	II/III	1.2	1.2	Glass carboys in hampers prohibited under deck
	Acetic anhydride	8	UN1715	Corrosive, Flammable Liquid	II	1.2	1.2	Stow "separated longitudinally by an intervening complete compartment or hold from" explosives. Segregation same as for flammable liquids
	Acetone	3.1	UN1090	Flammable Liquid	II	1.3	5	
	Acetone cyanohydrin, stabilized	6.1	UN1541	Poison	I	1	5	Shade from radiant heat. Stow "away from" acids and alkalis
	Acetone oils	3.2	UN1091	Flammable Liquid	II	1.2	1	
	Acetonitrile. See Methyl cyanide							
	Acetyl acetone peroxide, maximum concentration 42% in solution	5.2	UN2080	Organic Peroxide	II	1	5	
	Acetyl benzoyl peroxide, maximum concentration 45% in solution	5.2	UN2081	Organic Peroxide	II	1	5	
	Acetyl bromide	8	UN1716	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Acetyl chloride	3.2	UN1717	Flammable Liquid, Corrosive	II	1.2	1	
	Acetyl cyclohexane sulphonyl peroxide, maximum concentration 82%, wetted with minimum 12% water	5.2	UN2082	Organic Peroxide	I	1	5	Control temperature -10 deg C. Emergency temperature 0 deg C
	Acetyl cyclohexane sulphonyl peroxide, maximum concentration 32% in solution	5.2	UN2083	Organic Peroxide	II	1	5	Control temperature -10 deg C. Emergency temperature 0 deg C
	Acetylene, dissolved	2.1	UN1001	Flammable Gas	–	1	1	Shade from radiant heat. Stow "separated from" chlorine
	Acetyl iodide	8	UN1898	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Acetyl methyl carbinol	3.3	UN2621	Flammable Liquid	III	1.2	1.2	
	Acetyl peroxide, maximum concentration 27% in solution	5.2	UN2084	Organic Peroxide	II	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	Acid mixtures, spent, nitrating	8	UN1826	Corrosive	I/II	1	5	Stow "away from" fluorides
	Acids, liquid, n.o.s. See Corrosive liquids, n.o.s.							
	Acridine	6.1	UN2713	Flammable Solid	III	1.2	1.2	
	Acrolein dimer, stabilized	3.3	UN2607	Flammable Liquid	II	1.2	1.2	
	Acrolein, inhibited	3.1	UN1092	Flammable Liquid, Poison	I	1.3	5	Keep cool
	Acrylamide	6.1	UN2074	St. Andrews Cross	III	1.2	1.2	Shade from radiant heat. Keep cool
	Acrylic acid, inhibited	8	UN2218	Corrosive, Flammable Liquid	II	1	1	Shade from radiant heat. Keep cool. Segregation same as for flammable liquids. Glass carboys prohibited on passenger vessels
	Acrylonitrile, inhibited	3.2	UN1093	Flammable Liquid, Poison	I	1.3	5	Keep cool
	Activated carbon. See Carbon, activated							
	Activated charcoal. See Carbon, activated							
	Adhesives, containing a flammable liquid	3.1	UN1133	Flammable Liquid	II	1.2	5	Keep cool
		3.2	UN1133	Flammable Liquid	II	1.2	1	
		3.3	UN1133	Flammable Liquid	II	1.2	1.2	
	Adiponitrile	6.1	UN2205	St. Andrews Cross	III	1.2	1.2	Shade from radiant heat
	Aerosol dispensers, with a capacity below 1400 cubic cm:							
	(1) more than 10% by weight of total contents consisting of flammable gas	2.1	UN1950	Flammable Gas	–	1.3	1.3	
	(2) internal pressure greater than 160 psig at 130 deg F	2.2	UN1950	Nonflammable Gas	–	1.3	1.3	
	(3) more than 45% by weight of total contents consisting of flammable liquid. This limit is reduced to 35% if there is any flammable gas present	3.1	UN1950	Flammable Liquid	–	1.3	1.3	
		3.2	UN1950	Flammable Liquid	–	1.3	1.3	
		3.3	UN1950	Flammable Liquid	–	1.3	1.3	
	(4) more than 10% by weight of toxic substances in the liquid concentrate	6.1	UN1950	Poison	I/II	1.3	1.3	
		6.1		St. Andrews Cross	III	1.3	1.3	
	(5) more than 5% by weight of corrosive substances in the liquid concentrate	8	UN1950	Corrosive	–	1.3	1.3	
	(6) as specified under Group 9 on page 9011 of IMDG Code	9	UN1950	None	–			
N	Aerosol dispensers, with a capacity of 1400 cubic cm or more	2	UN1950	–				
	Agents, blasting, Type B. See Explosives, blasting, Type B							
	Agents, blasting, Type E. See Explosives, blasting, Type E							
	Air, compressed	2.2	UN1002	Nonflammable Gas	–	1.2	1.2	
	Aircraft thrust device for assisted take-off	4.1	UN2751	Flammable Solid	II	1.2	5	
	Air, refrigerated liquid	2.2	UN1003	Nonflammable Gas, Oxidizer	–	1.3	1.3	Stow "separated from" acetylene. Do not overstow

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Alarm devices, explosive actuated	1.4 S	UN0001	None. Package to be marked "1.4 S"	-	1.3	1.3	
	Alcohols, n.o.s.	3.1	UN1987	Flammable Liquid	I,II	1.3	S	Keep cool
		3.2	UN1987	Flammable Liquid	II	1.2	1	
		3.3	UN1987	Flammable Liquid	II	1.2	1.2	
	Alcohols, toxic, n.o.s.	3.1	UN1986	Flammable Liquid, Poison	I,II	1.3	S	Keep cool
		3.2	UN1986	Flammable Liquid, Poison	II	1.2	1	
		3.3	UN1986	Flammable Liquid, Poison	II	1.2	1.2	
	Aldehydes, n.o.s.	3.1	UN1989	Flammable Liquid	I,II	1.3	S	Keep cool
		3.2	UN1989	Flammable Liquid	II	1.2	1	
		3.3	UN1989	Flammable Liquid	II	1.2	1.2	
	Aldehydes, toxic, n.o.s.	3.1	UN1988	Flammable Liquid, Poison	I,II	1.3	S	Keep cool
		3.2	UN1988	Flammable Liquid, Poison	II	1.2	1	
		3.3	UN1988	Flammable Liquid, Poison	II	1.2	1.2	
	Aldol	6.1	UN2839	Poison	II	1.3	1.3	Keep cool. Shade from radiant heat. Stow "away from" living quarters
	Alkali metal alloys, liquid	4.3	UN1421	Dangerous When Wet	I	1.2	S	
	Alkali metal amalgams, n.o.s.	4.3	UN1389	Dangerous When Wet	I	1.2	1.2	
	Alkali metal amides, n.o.s.	4.3	UN1390	Dangerous When Wet	II	1.2	S	
	Alkali metal dispersions, n.o.s. or Alkali earth metal dispersions, n.o.s.	4.3	UN1391	Dangerous When Wet	I	1.2	S	
	Alkaline caustic liquids, n.o.s. *See* Caustic alkali liquids, n.o.s.							
	Alkaline corrosive liquids, n.o.s. *See* Corrosive liquids, n.o.s.							
	Alkaline earth metal alloys, n.o.s.	4.3	UN1393	Dangerous When Wet	II	1.2	S	
	Alkaline earth metal amalgams, n.o.s.	4.3	UN1392	Dangerous When Wet	I	1.2	1.2	
	Alkaloids, n.o.s. or Alkaloid salts, n.o.s., poisonous	6.1	UN1544	Poison	I,II	1.2	1.2	
		6.1	UN1544	St. Andrews Cross	III	1.2	1.2	
	Alkylamines and polyamines, flashpoint below 23 deg C and boiling point above 35 deg C but not more than 200 deg C, n.o.s.	3.2	UN2733	Flammable Liquid, Corrosive	II	1.2	1	
	Alkylamines and polyamines, flashpoint 23 deg C or above boiling point above 35 deg C but not more than 200 deg C, n.o.s.	8	UN2734	Corrosive, Flammable Liquid (only if flashpoint 61 deg C or below)	II	1.2	1.2	If flashpoint 61 deg C or below, segregation same as for flammable liquids
	Alkylamines and polyamines, flashpoint of 23 deg C or above and boiling point above 200 deg C, n.o.s.	8	UN2735	Corrosive, Flammable Liquid (only if flashpoint 61 deg C or below)	III	1.2	1.2	If flashpoint 61 deg C or below, segregation same as for flammable liquids
	Alkyl, Aryl or Toluene sulphonic acid, liquid, containing more than 5% free sulphuric acid	8	UN2584	Corrosive	II	1.2	1	Glass carboys not permitted under deck
	Alkyl, Aryl or Toluene sulphonic acid, liquid, containing not more than 5% free sulphuric acid	8	UN2586	Corrosive	III	1.2	1	Glass carboys not permitted under deck
	Alkyl, Aryl or Toluene sulphonic acid, solid, containing more than 5% free sulphuric acid	8	UN2583	Corrosive	II	1.2	1.2	Keep dry
	Alkyl, Aryl or Toluene sulphonic acid, solid, containing not more than 5% free sulphuric acid	8	UN2585	Corrosive	III	1.2	1.2	Keep dry
	Alkyl phenols, n.o.s.	6.1	UN2430	St. Andrews Cross	III	1.2	1.2	
	Allyl acetate	3.2	UN2333	Flammable Liquid, Poison	II	1.3	S	Keep cool
	Allyl alcohol	3.2	UN1098	Flammable Liquid, Poison	I	1.2	1	
	Allylamine	3.1	UN2334	Flammable Liquid, Poison	I	1.3	S	Keep cool
	Allyl bromide	3.2	UN1099	Flammable Liquid, Poison	I	1.2	1	
	Allyl chloride	3.1	UN1100	Flammable Liquid, Poison	I	1.3	S	Keep cool
	Allyl chlorocarbonate. *See* Allyl chloroformate							
	Allyl chloroformate	8	UN1722	Corrosive, Flammable Liquid	I	1	S	Keep dry. Stow "separated longitudinally by an intervening complete compartment or hold from" explosives. Segregation same as for flammable liquids
	Allyl ethyl ether	3.2	UN2335	Flammable Liquid, Poison	II	1.3	S	Keep cool
	Allyl formate	3.2	UN2336	Flammable Liquid, Poison	I	1.3	S	Keep cool
	Allyl glycidyl ether	3.3	UN2219	Flammable Liquid	III	1.2	1.2	
	Allyl iodide	3.2	UN1723	Flammable Liquid, Corrosive	I	1.2	1	
	Allyl isothiocyanate, stabilized	6.1	UN1545	Poison, Flammable Liquid	II	1	S	Shade from radiant heat. Stow "away from" living quarters. Segregation same as for flammable liquids

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Allyl trichlorosilane, stabilized	8	UN1724	Corrosive, Flammable Liquid	II	1	1	Keep dry. Stow "separated longitudinally by an intervening complete compartment or hold from" explosives. Segregation same as for flammable liquids
	Aluminum alkyl halides, in solution	4.2	UN3220	Spontaneously Combustible	II	1	1	
	Aluminum alkyl halides, pure	4.2	UN3221	Spontaneously Combustible	I	1	5	
	Aluminum alkyls. See Metal alkyls, n.o.s.							
	Aluminum borohydride or Aluminum borohydride in devices	4.2	UN2870	Spontaneously Combustible Dangerous When Wet	I	1	5	
	Aluminum bromide, anhydrous	8	UN1725	Corrosive	II	1.2	1.2	Keep dry
	Aluminum bromide solution	8	UN2581	Corrosive	III	1.2	1.2	
	Aluminum carbide	4.3	UN1394	Dangerous When Wet	II	1.2	1.2	
	Aluminum chloride, anhydrous	8	UN1726	Corrosive	II	1.2	1.2	Keep dry
	Aluminum chloride solution	8	UN2581	Corrosive	III	1.2	1.2	
	Aluminum ferrosilicon, powder	4.3	UN1395	Dangerous When Wet	II	1.2	1.2	
	Aluminum hydride	4.2	UN2463	Spontaneously Combustible	I	1.2	5	
	Aluminum nitrate	5.1	UN1438	Oxidizer	III	1.2	1.2	
	Aluminum phosphide	4.3	UN1397	Dangerous When Wet Poison	I	1	1.2	
	Aluminum powder, coated	4.1	UN1309	Flammable Solid	III	1.2	1.2	Keep dry. Stow "away from" liquid halogenated hydrocarbons
	Aluminum, powder, pyrophoric. See Pyrophoric metals							
	Aluminum, powder, uncoated, non-pyrophoric	4.3	UN1396	Dangerous When Wet	II	1.2	1.2	Stow "away from" liquid halogenated hydrocarbons
	Aluminum resinate	4.1	UN2715	Flammable Solid	III	1.2	1.2	
	Aluminum silicon, powder, uncoated	4.3	UN1398	Dangerous When Wet	III	1.2	1.2	
	2-Amino-4-chlorophenol	6.1	UN2673	Poison	II	1.2	1.2	
	2-Amino-5-diethylaminopentane	6.1	UN2946	St. Andrews Cross	III	1.2	1.2	
	N-Aminoethylpiperazine	8	UN2815	Corrosive	III	1.3	1.3	Keep cool
	Aminophenols (o-, m-, p-)	6.1	UN2512	St. Andrews Cross	III	1.2	1.2	
	Aminopyridines (o-, m-, p-)	6.1	UN2671	Poison	II	1.3	1	Keep cool. Stow "away from" living quarters
	Ammonia, anhydrous, liquefied, or ammonia solutions, density (specific gravity) less than 0.880 at 15 degrees C in water, containing more than 50% ammonia	2.3	UN1005	Poison Gas	–	1.2	5	Stow "separated from" chlorine. Stow "away from" living quarters
	Ammonia solutions, density (specific gravity) between 0.880 and 0.957 at 15 deg C in water, with more than 10% and not more than 35% ammonia, by weight	8	UN2672	Corrosive	III	1.2	1.2	Stow "away from" living quarters
	Ammonia solutions, density (specific gravity) less than 0.880 at 15 degrees C in water, containing more than 35% and not more than 50% ammonia	2.2	UN2073	Nonflammable Gas	–	1.2	5	Stow "separated from" chlorine. Stow "away from" living quarters
	Ammonium arsenate	6.1	UN1546	Poison	II	1.2	1.2	Stow "away from" alkalis
	Ammonium bifluoride. See Ammonium hydrogen fluoride							
	Ammonium dichromate	5.1	UN1439	Oxidizer	II	1.2	1.2	Stow "away from" foodstuffs
	Ammonium dinitro-o-cresolate	6.1	UN1843	Poison	II	1.2	1	Stow "away from" heavy metals, "separated from" flammable substances and "separated longitudinally by an intervening complete compartment or hold from" explosives
	Ammonium fluoride	6.1	UN2505	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Ammonium hydrogen fluoride, solid	8	UN1727	Corrosive	II	1.2	1.2	Keep dry
	Ammonium hydrogen fluoride, solution	8	UN2817	Corrosive Poison	II	1.2	1	
	Ammonium hydrogen sulphate	8	UN2506	Corrosive	II	1.2	1.2	Stow "away from" strong alkalis
	Ammonium metavanadate	6.1	UN2859	Poison	II	1.2	1.2	Stow "away from" living quarters
	Ammonium nitrate fertilizers, n.o.s.	5.1	UN2072	Oxidizer	II	1.3	1.3	Stow "away from" sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders
	Ammonium nitrate fertilizers, of the same composition as defined in class 5.1 on pages 5015 and 5016 of the IMDG Code but containing greater amounts of organic and/or combustible material than specified in these entries	1.1 D	UN0223	Explosive (1.1D)	–	1.2	1.2	
	Ammonium nitrate fertilizers, type A							
	(1) Uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, containing not less than 90% of ammonium nitrate and not more than 0.2% of combustible material (including organic material calculated as carbon), or containing less than 90% but more than 70% of ammonium nitrate and not more than 0.4% of total combustible material	5.1	UN2067	Oxidizer	III	1.3	1.3	Stow "away from", sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders

§ 172.102 Optional Hazardous Materials Table—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7) Vessel Stowage Requirements		
Note and Symbols	Hazardous Materials Description and Proper Shipping Names	IMO Class	Identification Number	Label(s) required	Packaging Group	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	(2) Uniform non segregating mixtures of ammonium nitrate with calcium carbonate and or dolomite, containing more than 80% but less than 90% of ammonium nitrate and not more than 0.4% of total combustible material	5.1	UN2068	Oxidizer	III	1.3	1.3	Stow "away from" sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders
	(3) Uniform non segregating mixtures of ammonium nitrate ammonium sulphate, containing more than 45% but not more than 70% of ammonium nitrate and containing not more than 0.4% of total combustible material	5.1	UN2069	Oxidizer	III	1.3	1.3	Stow "away from" sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders
	(4) Uniform non segregating mixtures of nitrogen phosphate or nitrogen potash types or complete fertilizers of nitrogen phosphate potash type, containing more than 70% but less than 90% of ammonium nitrate and not more than 0.4% of total combustible material	5.1	UN2070	Oxidizer	III	1.3	1.3	Stow "away from" sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders
	Ammonium nitrate fertilizers, Type B. Uniform non segregating mixtures of nitrogen phosphate or nitrogen potash types or complete fertilizers of nitrogen phosphate type, containing not more than 70% of ammonium nitrate and not more than 0.4% of total added combustible material or containing not more than 45% of ammonium nitrate with unrestricted combustible material	9	UN2071	None	III	1.2	1.2	
	Ammonium nitrate, with more than 0.2% by weight of combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	1.1 D	UN0222	Explosive (1.1D)	–	1.2	1.2	
	Ammonium nitrate, with not more than 0.2% of combustible substance including any organic substance calculated as carbon, to the exclusion of any other add substance	5.1	UN1942	Oxidizer	III	1.3	1.3	Stow "away from" sources of heat and "separated from" combustible material, chlorates, hypochlorites, nitrites, permanganates, and metallic powders
	Ammonium perchlorate	5.1	UN1442	Oxidizer	II	1.2	5	Stow "away from" powdered metals
N	Ammonium perchlorate, average particle size less than 45 microns	1.1D	UN0432	Explosive (1.1D)	–	–	–	
	Ammonium persulphate	5.1	UN1444	Oxidizer	III	1.2	1.2	
N	Ammonium picrate, dry or wetted with less than 10% water, by weight	1.1D	UN0004	Explosive (1.1D)	–	–	–	
	Ammonium picrate, wetted, with not less than 10% water, by weight	4.1	UN1310	Flammable Solid	I	I	5	Stow "away from" heavy metals and their compounds
	Ammonium picrate, wetted, with not less than 33 1/3 % water, by weight	4.1	UN1310	Flammable Solid	I	1.2	5	Stow "away from" heavy metals and their compounds
	Ammonium polysulphide, solution	8	UN2818	Corrosive Poison	II	1.3	1	Keep cool. Stow "away from" acids
	Ammonium polyvanadate	6.1	UN2861	Poison	II	1.2	1.2	Stow "away from" living quarters
	Ammonium silicofluoride	6.1	UN2854	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Ammonium sulphide, solution	8	UN2683	Corrosive, Poison, Flammable Liquid (only if flashpoint below 61 deg C)	II	1.3	1	Keep cool. Stow "away from" all other corrosives. If flashpoint below 61 deg C segregation same as for flammable liquids
	Ammunition, illuminating, with or without burster, expelling charge or propelling charge	1.4 G	UN0297	Explosive (1.4G)	–	1.3	1.3	
N	Ammunition, illuminating, with or without burster, expelling charge or propelling charge	1.2G	UN0171	Explosive (1.2G)	–	–	–	
N	Ammunition, illuminating, with or without burster, expelling charge or propelling charge	1.3G	UN0254	Explosive (1.3G)	–	–	–	
N	Ammunition, incendiary, liquid or gel, with burster, expelling charge or propelling charge	1.3J	UN0247	Explosive (1.3J)	–	–	–	
	Ammunition, incendiary (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.4 G	UN0300	Explosive (1.4G)	–	1.3	1.3	
N	Ammunition, incendiary (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.2G	UN0009	Explosive (1.2G)	–	–	–	
N	Ammunition, incendiary (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.3G	UN0010	Explosive (1.3G)	–	–	–	
N	Ammunition, incendiary, white phosphorus, with burster, expelling charge or propelling charge	1.2H	UN0243	Explosive (1.2H)	–	–	–	
N	Ammunition, incendiary, white phosphorus, with burster, expelling charge or propelling charge	1.3H	UN0244	Explosive (1.3H)	–	–	–	
	Ammunition, practice	1.4G	UN0362	Explosive (1.4G)	–	1.3	1.3	
	Ammunition, proof	1.4G	UN0363	Explosive (1.4G)	–	1.3	1.3	
N	Ammunition, smoke (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.2G	UN0015	Explosive (1.2G); Corrosive	–	–	–	
N	Ammunition, smoke (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.3G	UN0016	Explosive (1.3G); Corrosive	–	–	–	
N	Ammunition, smoke (other than water activated ammunition) without white phosphorus or phosphides, with or without burster, expelling charge or propelling charge	1.4G	UN0303	Explosive (1.4G); Corrosive	–	–	–	
N	Ammunition, smoke, white phosphorus (other than water activated ammunition), with burster, expelling charge or propelling charge	1.2H	UN0245	Explosive (1.2H)	–	–	–	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Ammunition, smoke, white phosphorus (other than water activated ammunition) with bursting, expelling charge or propelling charge	1.3H	UN0248	Explosive (1.3H)	–	–	–	
	Ammunition, tear producing, non-explosive, with neither burster nor expelling charge, non-fuzed	6.1	UN2017	Poison, Corrosive	II	1.2	5	Keep dry. Stow "away from" living quarters. Segregation same as for corrosives
N	Ammunition, tear producing, with burster, expelling charge or propelling charge	1.2G	UN0018	Explosive (1.2G) Poison, Corrosive	–	–	–	
N	Ammunition, tear producing, with burster, expelling charge or propelling charge	1.3G	UN0019	Explosive (1.3G) Poison, Corrosive	–	–	–	
	Ammunition, tear producing, with burster, expelling charge or propelling charge	1.4G	UN0301	Explosive (1.4G) Poison, Corrosive	–	1.3	1.3	
	Ammunition, toxic non-explosive, with neither burster nor expelling charge, non-fuzed	6.1	UN2016	Poison	II	1.2	5	Keep dry
N	Ammunition, toxic (other than water activated ammunition) with burster, expelling charge or propelling charge	1.2K	UN0020	Explosive (1.2K) Poison	–	–	–	
N	Ammunition, toxic (other than water activated ammunition) with burster, expelling charge or propelling charge	1.3K	UN0021	Explosive (1.3K) Poison	–	–	–	
	Amyl acetates	3.2	UN1104	Flammable Liquid	II	1.2	1	
		3.3	UN1104	Flammable Liquid	II	1.2	1.2	
	Amyl acid phosphate	8	UN2819	Corrosive	III	1.2	1.2	
	Amyl alcohols	3.2	UN1105	Flammable Liquid	II	1.2	1	
		3.3	UN1105	Flammable Liquid	II	1.2	1.2	
	Amylamine	3.2	UN1106	Flammable Liquid	II	1.2	1	
	Amyl butyrates	3.3	UN2620	Flammable Liquid	III	1.2	1.2	
	Amyl chloride	3.2	UN1107	Flammable Liquid	II	1.2	1	
	a-Amylene	3.1	UN1108	Flammable Liquid	I	1.3	5	Keep cool
	Amyl formates	3.3	UN1109	Flammable Liquid	II	1.2	1.2	
	Amyl mercaptan	3.2	UN1111	Flammable Liquid	II	1.2	1	
	Amyl methyl ketone	3.3	UN1110	Flammable Liquid	III	1.2	1.2	
	Amyl nitrate	3.3	UN1112	Flammable Liquid	II	1.3	5	
	Amyl nitrite	3.1	UN1113	Flammable Liquid	II	1.3	5	Keep cool
	tert-Amyl peroxy-2-ethylhexanoate, technical pure	5.2	UN2658	Organic Peroxide	II	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	tert-Amyl peroxyneodecanoate with at least 25% phlegmatizer	5.2	UN2891	Organic Peroxide	II	1	5	Control temperature 0 deg C. Emergency temperature 10 deg C
	tert-Amyl peroxypivalate maximum concentration 77% in solution	5.2	UN2957	Organic Peroxide	II	1	5	Control temperature 10 deg C. Emergency temperature 15 deg C
	Amyl trichlorosilane	8	UN1728	Corrosive	II	1	1	Keep dry. Stow "separated longitudinally by an intervening complete compartment or hold from" explosives
	Aniline	6.1	UN1547	Poison	II	1.2	1.2	Stow "away from" acids and oxidizers
	Aniline hydrochloride	6.1	UN1548	St. Andrews Cross	III	1.2	1.2	Stow "away from" alkalis
	Aniline oil. *See* Aniline							
	o-Anisidine	6.1	UN2431	St. Andrews Cross	III	1.2	1.2	
	Anisole	3.3	UN2222	Flammable Liquid	III	1.2	1.2	
	Anisoyl chloride	8	UN1729	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Anti-freeze. *See* Flammable liquid preparations, n.o.s.							
	Antimony chloride. *See* Antimony trichloride, liquid or solid							
	Antimony compounds, inorganic, n.o.s.	6.1	UN1549	Poison	II	1.2	1.2	
		6.1	UN1549	St. Andrews Cross	III	1.2	1.2	
	Antimony lactate	6.1	UN1550	St. Andrews Cross	III	1.2	1.2	
	Antimony pentachloride, liquid	8	UN1730	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Antimony pentachloride, solutions	8	UN1731	Corrosive	II	1	1	Glass carboys prohibited on passenger vessels
	Antimony pentafluoride	8	UN1732	Corrosive Poison	II	1	5	Keep dry
	Antimony potassium tartrate	6.1	UN1551	St. Andrews Cross	III	1.2	1.2	
	Antimony powder	6.1	UN2871	St. Andrews Cross	III	1.2	1.2	
	Antimony trichloride, liquid	8	UN1733	Corrosive	II	1	1	Keep dry
	Antimony trichloride, solid	8	UN1733	Corrosive	II	1.2	1.2	Keep dry
	Argon, compressed	2.2	UN1006	Nonflammable Gas	–	1.3	1.3	
	Argon, refrigerated liquid	2.2	UN1951	Nonflammable Gas	–	1.3	1	
	Arsenic acid, liquid	6.1	UN1553	Poison	I	1.2	1.2	
	Arsenic acid, solid	6.1	UN1554	Poison	II	1.2	1.2	
	Arsenical dust	6.1	UN1562	Poison	II	1.2	1.2	
	Arsenical flue dust. *See* Arsenical dust							
	Arsenical pesticides, liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C		UN2760	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	II	1.2	1	

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Arsenical pesticides, liquid, toxic, flammable, n.o.s. *flashpoint between 23 deg C and 61 deg C*	6.1	UN2993	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2993	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN2993	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Arsenical pesticides, liquid, toxic, n.o.s.	6.1	UN2994	Poison	I	1	1	
		6.1	UN2994	Poison	II	1,2	1	
		6.1	UN2994	St. Andrews Cross,	III	1,2	1,2	
	Arsenical pesticides, solid, toxic, n.o.s.	6.1	UN2759	Poison	I	1,2	1,2	
		6.1	UN2759	St. Andrews Cross,	III	1,2	1,2	
	Arsenic bromide	6.1	UN1555	Poison	II	1,2	1,2	Keep cool. Store "away from" living quarters
	Arsenic chloride. *See* Arsenic trichloride							
	Arsenic compounds, liquid, n.o.s.	6.1	UN1556	Poison, Flammable Liquid (if flashpoint between 23 deg C and 61 deg C)	I	1,2	1	
		6.1	UN1556	St. Andrews Cross, Flammable Liquid (if flashpoint between 23 deg C and 61 deg C)	III	1,2	1	
	Arsenic compounds, solid, n.o.s.	6.1	UN1557	Poison	I	1,2	1	
		6.1	UN1557	Poison	II	1,2	1,2	
		6.1	UN1557	St. Andrews Cross	III	1,2	1,2	
	Arsenic, *metallic*	6.1	UN1558	Poison	II	1,2	1,2	
	Arsenic pentoxide	6.1	UN1559	Poison	II	1,2	1,2	
	Arsenic sulphides, solid, n.o.s. *See* Arsenic compounds, solid, n.o.s.							
	Arsenic trichloride	6.1	UN1560	Poison	I	1,2	1,2	
	Arsenic trioxide	6.1	UN1561	Poison	II	1,2	1,2	
	Arsine	2.3	UN2188	Poison Gas, Flammable Gas	–	1	5	Store "away from" living quarters
	Articles, explosive, n.o.s.	1.4S	UN0350	Explosive (1.4S)	–	1,3	1,3	
	Articles, explosive, n.o.s.	1.4C	UN0351	Explosive (1.4C)	–	1,3	1,3	
	Articles, explosive, n.o.s.	1.4D	UN0352	Explosive (1.4D)	–	1,3	1,3	
	Articles, explosive, n.o.s.	1.4G	UN0353	Explosive (1.4G)	–	1,3	1,3	
	Articles, explosive, n.o.s.	1.4S	UN0349	None. Package to be marked "1.4S"	–	1,3	1,3	
N	Articles, explosive, n.o.s.	1.1L	UN0354	Explosive (1.1L)	–	–	–	
N	Articles, explosive, n.o.s.	1.2L	UN0355	Explosive (1.2L)	–	–	–	
N	Articles, explosive, n.o.s.	1.3L	UN0356	Explosive (1.3L)	–	–	–	
N	Articles, pyrophoric	1.2L	UN0380	Explosive (1.2L)	–	–	–	
	Asbestos, blue	9	UN2212	None	II	1,2	1,2	
	Asbestos, white	9	UN2590	None	III	1,2	1,2	
	Asphalt cut-backs. *See* Cut-backs, asphalt or bitumen							
	2,2'-Azodi-(2,4-dimethyl-4-methoxyvaleronitrile)	4.1	UN2955	Flammable Solid	II	1	1	Control temperature -5 deg C Emergency temperature 5 deg C
	2,2'-Azodi-(2,4-dimethylvaleronitrile)	4.1	UN2953	Flammable Solid	II	1	1	Control temperature 10 deg C Emergency temperature 15 deg C
	Azodi-(1,1'-hexahydrobenzonitrile)	4.1	UN2954	Flammable Solid	II	1,2	1	Shade from radiant heat
	Azodiisobutyronitrile	4.1	UN2952	Flammable Solid	II	1	5	Control temperature 40 deg C Emergency temperature 45 deg C
	Bags, empty *and unwashed, having contained* Potassium nitrate or sodium nitrate	4.1	UN1309	Flammable Solid	III	1,2	5	
	Barium, alloys, *non-pyrophoric*	4.3	UN1399	Dangerous When Wet	II	1,2	5	
	Barium alloys, pyrophoric	4.2	UN1854	Spontaneously Combustible	II	1	5	
N	Barium azide, *dry or containing, by weight, less than 50% water*	1.1A	UN0224	Explosive (1.1A), Poison	–	–	–	
	Barium azide, *wetted with not less than 50% water, by weight*	4.1	UN1571	Flammable Solid, Poison	I	1	5	Store "away from" heavy metals
	Barium bromate	5.1	UN2719	Oxidizer, Poison	II	1,2	1,2	Store "separated from" ammonium compounds and "away from" finely powdered metals and foodstuffs
	Barium chlorate	5.1	UN1445	Oxidizer, Poison	II	1,2	1,2	Store "away from" powdered metals, "separated from" Ammonium compounds
	Barium compounds, n.o.s.	6.1	UN1564	Poison	III	1,2	1,2	
		6.1	UN1564	St. Andrews Cross	III	1,2	1,2	
	Barium cyanide	6.1	UN1565	Poison	I	1,2	1,2	Store "away from" acids
	Barium hypochlorite, *with more than 22% available chlorine*		UN2741	Oxidizer, Poison	II	1,2	1,2	Store "away from" foodstuffs
	Barium, *metal, non-pyrophoric*	4.3	UN1400	Dangerous When Wet	II	1,2	5	
	Barium nitrate	5.1	UN1446	Oxidizer, Poison	II	1,2	1,2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Barium oxide	6.1	UN1884	St. Andrews Cross	III	1,2	1,2	
	Barium perchlorate	5.1	UN1447	Oxidizer, Poison	II	1,2	1,2	Stow "away from" powdered metals
	Barium permanganate	5.1	UN1448	Oxidizer, Poison	II	1,2	1,2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Barium peroxide	5.1	UN1449	Oxidizer, Poison	II	1,2	1,2	Keep dry
	Batteries, wet, filled with acid, electric storage	8	UN2794	Corrosive	III	1,2	1,2	
	Batteries, wet, filled with alkali, electric storage	8	UN2795	Corrosive	III	1,2	1,2	
	Batteries, wet, non-spillable, electric storage	8	UN2800	None. Package to be marked "Class 8"	III	1,2	1,2	
	Battery fluid, acid	8	UN2796	Corrosive	II	1,2	1	Stow "away from" fluorides. Glass carboys in hampers prohibited under deck
	Battery fluid, alkali	8	UN2797	Corrosive	II	1,2	1,2	
	Benzene	3.2	UN1114	Flammable Liquid	II	1,2	1	
	Benzene sulphonyl chloride	8	UN2225	Corrosive	III	1,2	1,2	
	Benzidine	6.1	UN1885	Poison	II	1,2	1,2	
	Benzine	3.1	UN1115	Flammable Liquid	II	1,3	5	Keep cool
		3.2	UN1115	Flammable Liquid	II	1,2	1	
		3.3	UN1115	Flammable Liquid	II	1,2	1,2	
	Benzoic derivative pesticides, liquid, flammable, toxic, n.o.s. *flashpoint less than 23 deg C*	3.2	UN2779	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I,II	1,2	1	
	Benzoic derivative pesticides, liquid, toxic, flammable, n.o.s. *flashpoint between 23 deg C and 61 deg C*	6.1	UN3003	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3003	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN3003	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Benzoic derivative pesticides liquid, toxic, n.o.s.	6.1	UN3004	Poison	I	1	1	
		6.1	UN3004	Poison	II	1,2	1	
		6.1	UN3004	St. Andrews Cross	III	1,2	1,2	
	Benzoic derivative pesticides, solid, toxic, n.o.s.	6.1	UN2769	Poison	I,II	1,2	1,2	
		6.1	UN2769	St. Andrews Cross	III	1,2	1,2	
	Benzonitrile	6.1	UN2224	Poison	II	1,2	1,2	Stow "away from" acids
	Benzoquinone	6.1	UN2587	Poison	II	1,2	1,2	
	Benzotrichloride	8	UN2226	Corrosive	II	1,2	1,2	Stow "away from" living quarters
	Benzotrifluoride	3.2	UN2338	Flammable Liquid	II	1,2	1	
	Benzoyl chloride	8	UN1736	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Benzoyl peroxide, *in a concentration of more than 77% but less than 95% with water*	5.2	UN2668	Organic Peroxide	I	1	5	
	Benzoyl peroxide, *in a concentration of more than 72% but less than 95% as a paste*	5.2	UN2086	Organic Peroxide	I	1	5	
	Benzoyl peroxide, *in a concentration of not more than 72% as a paste*	5.2	UN2087	Organic Peroxide	II	1	5	
	Benzoyl peroxide, *in a concentration of not more than 77% with water*	5.2	UN2090	Organic Peroxide	II	1	5	
	Benzoyl peroxide, *in concentrations from 30% to maximum 52% with inert solid*	5.2	UN2083	Organic Peroxide	II	1	5	
	Benzoyl peroxide, *technical pure or in a concentration of more than 52% with inert solid*	5.2	UN2085	Organic Peroxide	I	1	5	
	Benzyl bromide	8	UN1737	Corrosive	II	1	5	Keep dry
	Benzyl chloride	6.1	UN1738	Poison, Corrosive	II	1	5	Keep dry. Segregation same as for corrosives
	Benzyl chloroformate	8	UN1739	Corrosive	I	1	5	Keep dry
	Benzyl dimethylamine	8	UN2619	Corrosive, Flammable Liquid	II	1,3	1,3	Segregation same as for flammable liquids. Stow "away from" sources of heat
	Benzylidene chloride	6.1	UN1886	Poison	II	1	5	
	Benzyl iodide	6.1	UN2653	Poison	II	1,3	1	Keep cool. Stow "away from" living quarters
	Beryllium compounds	6.1	UN1566	Poison	II	1,2	1,2	
	Beryllium, *metal powder*	6.1	UN1567	Poison, Flammable Solid	II	1,2	1,2	Segregation same as for flammable solids
	Beryllium nitrate	5.1	UN2464	Oxidizer, Poison	II	1,2	1,2	Keep cool. If packaged in a liner within a wooden barrel, fiber drum or plywood drum or in plastic bags within a fiberboard box, stow "away from" sources of heat
	Bhusa	6.1	UN1327	None	III	1,2	1,2	Stow "away from" animal or vegetable oils
	Bifluorides, n.o.s.	8	UN1740	Corrosive	II	1,2	1,2	Keep dry
	Bipyridilium pesticides, liquid, flammable, toxic, n.o.s., *flashpoint less than 23 deg C*	3.2	UN2782	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I,II	1,2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Bipyridilium pesticides, liquid, toxic, flammable, n.o.s., flash-point between 23 deg C and 61 deg C	6.1	UN3013	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3015	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3015	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Bipyridilium pesticides, liquid, toxic, n.o.s.	6.1	UN3016	Poison	I	1	1	
		6.1	UN3016	Poison	II	1.2	1	
		6.1	UN3016	St. Andrews Cross	III	1.2	1.2	
	Bipyridilium pesticides, solid, toxic, n.o.s.	6.1	UN2781	Poison	I	1.2	1.2	
		6.1	UN2781	Poison	II	1.2	1.2	
		6.1	UN2781	St. Andrews Cross	III	1.2	1.2	
	Bisulphites, inorganic, aqueous solution, n.o.s.	8	UN2693	Corrosive	III	1.2	1.2	Stow "away from" all other corrosive substances. Glass carboys prohibited on passenger vessels
N	Black powder, compressed	1.1D	UN0028	Explosive (1.1D)	–	–	–	
N	Black powder, granular or as meal	1.1D	UN0027	Explosive (1.1D)	–	–	–	
	Bleaching powder. See Calcium hypochlorite mixtures, dry, with more than 10% but not more than 39% available chlorine							
	Blue asbestos. See Asbestos, blue							
N	Bombs, containing flammable liquid, with bursting charge	1.1D	UN0399	Explosive (1.1J)	–	–	–	
N	Bombs, containing flammable liquid, with bursting charge	1.2D	UN0400	Explosive (1.2J)	–	–	–	
N	Bombs, photo-flash	1.1D	UN0037	Explosive (1.1D)	–	–	–	
N	Bombs, photo-flash	1.1F	UN0037	Explosive (1.1F)	–	–	–	
N	Bombs, photo-flash	1.2G	UN0039	Explosive (1.2G)	–	–	–	
N	Bombs, photo-flash	1.3G	UN0299	Explosive (1.3G)	–	–	–	
	Bombs, smoke, containing a corrosive liquid, non-explosive, without initiating device	8	UN2028	Corrosive	II	1.2	5	Keep dry. Stow "away from" living quarters
N	Bombs, with bursting charge	1.1D	UN0034	Explosive (1.1D)	–	–	–	
N	Bombs, with bursting charge	1.2D	UN0035	Explosive (1.2D)	–	–	–	
N	Bombs, with bursting charge	1.1F	UN0033	Explosive (1.1F)	–	–	–	
N	Bombs, with bursting charge	1.2F	UN0291	Explosive (1.2F)	–	–	–	
N	Boosters, with detonator	1.1B	UN0225	Explosive (1.1B)	–	–	–	
N	Boosters, with detonator	1.2B	UN0268	Explosive (1.2B)	–	–	–	
N	Boosters, without detonator	1.1D	UN0042	Explosive (1.1D)	–	–	–	
N	Boosters, without detonator	1.2D	UN0283	Explosive (1.2D)	–	–	–	
	Borate and chlorate, mixtures. See Chlorate and borate mixtures							
	Borneol	4.1	UN1312	None. Package to be marked "Class 4.1"	III	1.2	1.2	
	Boron tribromide	8	UN2692	Corrosive	I	1	1	Keep cool and dry. Stow "away from" foodstuffs
	Boron trichloride	2.2	UN1741	Nonflammable Gas Corrosive	–	1	5	Shade from radiant heat. Stow "away from" foodstuffs and living quarters
	Boron trifluoride	2.3	UN1008	Poison Gas	–	1	5	Stow "away from foodstuffs and living quarters
	Boron trifluoride acetic acid complex	8	UN1742	Corrosive	II	1.2	1.2	
	Boron trifluoride diethyletherate	4.3	UN2604	Dangerous When Wet, Flammable Liquid, Corrosive	II	1	5	
	Boron trifluoride dihydrate	8	UN2851	Corrosive	II	1.3	1	Keep cool
	Boron trifluoride dimethyl etherate	4.3	UN2965	Dangerous When Wet, Flammable Liquid, Corrosive	II	1	5	
	Boron trifluoride propionic acid complex	8	UN1743	Corrosive	II	1.2	1.2	
	Box ice guns. See Nitrocellulose							
	Brake fluid, hydraulic	3.2	UN1118	Flammable Liquid	II	1.2	1	
		3.3	UN1118	Flammable Liquid	II	1.2	1.2	
	Bromates, inorganic, n.o.s.	5.1	UN1450	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Bromine, (and solutions)	8	UN1744	Corrosive, Poison	I	1	5	Keep cool
	Bromine chloride	2.3	UN2901	Poison Gas, Oxidizer, Corrosive	–	1	5	Stow "away from" combustible materials
	Bromine pentafluoride	5.1	UN1745	Oxidizer, Poison Corrosive	I	1	5	Keep dry. Shade from radiant heat
	Bromine trifluoride	5.1	UN1746	Oxidizer, Poison Corrosive	I	1	5	Keep dry. Shade from radiant heat
	Bromoacetic acid, solid	8	UN1938	Corrosive	II	1.2	1.2	Keep dry
	Bromoacetic acid, solution	8	UN1938	Corrosive	II	1.2	1.2	Glass carboys in hampers not permitted under deck
	Bromoacetone	6.1	UN1569	Poison, Flammable Liquid	II	1	5	Segregation same as for flammable liquids. Stow "away from" living quarters

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Bromoacetyl bromide	8	UN2513	Corrosive	II	1	1	Glass carboys prohibited on passenger vessels
	Bromobenzene	3 3	UN2514	Flammable Liquid	III	1,2	1,2	
	Bromobenzyl cyanides	6 1	UN1694	Poison	I	1	5	Keep cool. Stow "away from" living quarters
	2-Bromobutane	3 2	UN2339	Flammable Liquid	II	1,2	1	
	Bromochloromethane	6 1	UN1887	St. Andrews Cross	III	1,2	1,2	
	2-Bromoethyl ethyl ether	3 2	UN2340	Flammable Liquid	II	1,2	1	
	Bromoform	6 1	UN2515	St. Andrews Cross	III	1,3	1,3	Keep cool
	1-Bromo-3-methylbutane	3 2	UN2341	Flammable Liquid	II	1,2	1	
	Bromomethylpropanes	3 2	UN2342	Flammable Liquid	II	1,2	1	
	Bromomethylpropanes	3 3	UN2342	Flammable Liquid	II	1,2	1,2	
	2-Bromopentane	3 2	UN2343	Flammable Liquid	II	1,2	1	
	Bromopropanes	3 2	UN2344	Flammable Liquid	II	1,2	1	
	Bromopropanes	3 3	UN2344	Flammable Liquid	II	1,2	1,2	
	3-Bromopropyne	3 2	UN2345	Flammable Liquid	II	1,2	1	
	Bromotrifluoroethylene	2 1	UN2419	Flammable Gas	–	1,2	5	
	Bromotrifluoromethane	2 2	UN1009	Nonflammable Gas	–	1,2	1,2	
	Brucine	6 1	UN1570	Poison	II	1,2	1,2	
N	Bursters, explosive	1.1D	UN0043	Explosive (1.1D)	–	–	–	
	Butadiene, inhibited	2 1	UN1010	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Butanediols	3 2	UN2346	Flammable Liquid	II	1,2	1	
	Butane or butane mixtures	2 1	UN1011	Flammable Gas	–	1,2	1	
	sec-Butanol	3 3	UN1120	Flammable Liquid	II	1,2	1,2	
	tert-Butanol	3 2	UN1120	Flammable Liquid	II	1,2	1	
	Butanol	3 3	UN1120	Flammable Liquid	II	1,2	1,2	
	Butene. *See* Butylene							
	Butenyl	3 3	UN2708	Flammable Liquid	III	1,2	1,2	
	Butyl acetates	3 2	UN1123	Flammable Liquid	II	1,2	1	
	Butyl acid phosphate	8	UN1718	Corrosive	III	1,2	1,2	Glass carboys in hampers prohibited under deck
	Butylacrylate, inhibited	3 3	UN2348	Flammable Liquid	II	1,2	1,2	
	Butyl alcohol. *See* Butanol							
	sec-Butyl alcohol. *See* sec-Butanol							
	tert-Butyl alcohol. *See* tert-Butanol							
	n-Butylamine	3 2	UN1125	Flammable Liquid	II	1,2	1	
	N-n-Butylaniline	6 1	UN2738	Poison	II	1,2	1,2	Stow "away from" living quarters
	Butyl benzenes	3 3	UN2709	Flammable Liquid	III	1,2	1,2	
	n-Butyl bromide	3 3	UN1126	Flammable Liquid	II	1,2	1,2	
	n-Butyl chloride. *See* Chlorobutanes							
	n-Butylchloroformate	6 1	UN2743	Poison, Corrosive, Flammable Liquid	II	1,3	1,3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters. Segregation same as for flammable liquids
	tert-Butyl cumene peroxide. *See* tert-Butyl cumyl peroxide							
	tert-Butyl cumyl peroxide, *technical pure*	5 2	UN2091	Organic Peroxide	II	1	5	
	tert-Butylcyclohexylchloroformate	6 1	UN2747	St. Andrews Cross	III	1,3	1,3	Keep cool and dry. Shade from radiant heat
	n-Butyl-4,4-di-(tert-butyl-peroxy) valerate, *maximum concentration 52% with inert solid*	5 2	UN2141	Organic Peroxide	II	1	5	
	n-Butyl-4,4-di-(tert-butyl-peroxy) valerate, *technical pure*	5 2	UN2140	Organic Peroxide	II	1	5	
	Butylene	2 1	UN1012	Flammable Gas	–	1,2	1	
	Butyl ether. *See* DiButyl ethers							
	n-Butyl formate	3 2	UN1128	Flammable Liquid	II	1,2	1	
	tert-Butyl hydroperoxide, *in a concentration over 72% to maximum 90% with water*	5 2	UN2094	Organic Peroxide	I	1	5	
	tert-Butyl hydroperoxide, *maximum concentration 80% in di-tert-butyl peroxide and/or solvent*	5 2	UN2092	Organic Peroxide, Flammable Liquid (only if flashpoint of solvent is 61 deg C or below)	I	1	5	
	tert-Butyl hydroperoxide, *maximum concentration 72% with water*	5 2	UN2093	Organic Peroxide	II	1	5	
	N-n-Butyl imidazole		UN2690	Poison	II	1,2	1,2	Stow "away from" living quarters
	tert-Butyl isocyanate	3 2	UN2484	Flammable Liquid, Poison	I	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	n-Butyl isocyanate	3 2	UN2485	Flammable Liquid, Poison	II	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	Butyl mercaptan	3 2	UN2347	Flammable Liquid	II	1,2	1	
	n-Butyl methacrylate	3 3	UN2227	Flammable Liquid	III	1,2	1,2	
	Butyl methyl ether	3 2	UN2350	Flammable Liquid	II	1,2	1	
	tert-Butyl monoperoxymaleate, *maximum concentration 55% as a paste*	5 2	UN2101	Organic Peroxide	II	1	5	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	tert-Butyl monoperoxymaleate, *maximum concentration 55% in solution*	5.2	UN2100	Organic Peroxide	II	1	5	
	tert-Butyl monoperoxymaleate, *technical pure*	5.2	UN2099	Organic Peroxide	II	1	5	
	tert-Butyl monoperoxyphthalate, *technical pure*	5.2	UN2105	Organic Peroxide	II	1	5	
	Butyl nitrite	3.2	UN2351	Flammable Liquid	II	1,2	1	
	tert-Butyl peroxide. See Di-tert-butyl peroxide				–	–	–	
	tert-Butyl peroxyacetate, *in a concentration of more than 52% to a maximum concentration of 76% in solution*	5.2	UN2095	Organic Peroxide	II	1	5	
	tert-Butyl peroxyacetate, *maximum concentration 52% in solution*	5.2	UN2096	Organic Peroxide	II	1	5	
	tert-Butyl peroxybenzoate, *maximum concentration 75% in solution*	5.2	UN2098	Organic Peroxide	II	1	5	
	tert-Butyl peroxybenzoate, *technical pure or in a concentration of more than 75% in solution*	5.2	UN2097	Organic Peroxide	II	1	5	
	tert-Butyl peroxybenzoate *with at least 50% inert inorganic solid*	5.2	UN2930	Organic Peroxide	II	1	5	
	tert-Butyl peroxycrotonate, *maximum concentration 78% in solution*	5.2	UN2183	Organic Peroxide	II	1	5	
	n-Butyl peroxydicarbonate, *in a concentration of more than 27% to a maximum concentration of 52% in solution*	5.2	UN2169	Organic Peroxide	II	1	5	Control temperature -15 deg C Emergency temperature -5 deg C
	n-Butyl peroxydicarbonate, *maximum concentration 27% in solution*	5.2	UN2179	Organic Peroxide	II	1	5	Control temperature 8 dec C Emergency temperature 10 deg C
	tert-Butyl peroxydiethylacetate, *(in a maximum concentration of 32%), with tert-butyl peroxybenzoate, (in a maximum concentration of 32%) and with solvent*	5.2	UN2551	Organic Peroxide	II	1	5	
	tert-Butyl peroxydiethylacetate, *technical pure*	5.2	UN2144	Organic Peroxide	II	1	5	Control temperature 20 deg C Emergency temperature 25 deg C
	tert-Butyl peroxy-2-ethylhexanoate, *maximum concentration 30% with 2,2-di-(tert-butyl peroxy) butane maximum concentration 35% and with at least 35% phlegmatizer*	5.2	UN2586	Organic Peroxide	II	1	5	Control temperature 35 deg C Emergency temperature 40 deg C
	tert-Butyl peroxy-2-ethylhexanoate *maximum concentration 12% with 2,2-di-(tert-butyl peroxy)butane maximum concentration 14% and with at least 14% phlegmatizer and 60% inert inorganic solid*	5.2	UN2587	Organic Peroxide	II	1	5	
	tert-Butyl peroxy-2-ethyl hexanoate, *technical pure*	5.2	UN2143	Organic Peroxide	II	1	5	Control temperature 20 deg C Emergency temperature 25 deg C
	tert-Butyl peroxy-2-ethylhexanoate, *with at least 50% phlegmatizer*		UN2588	Organic Peroxide	II	1	5	Control temperature 35 deg C Emergency temperature 40 deg C
	tert-Butyl peroxyisobutyrate, *in a concentration of more than 52% to a maximum concentration of 77% in solution*	5.2	UN2142	Organic Peroxide	II	1	5	Control temperature 15 deg C Emergency temperature 20 deg C
	tert-Butyl peroxyisobutyrate, *maximum concentration 52% in solution*	5.2	UN2562	Organic Peroxide	II	1	5	Emergency temperature 15 deg C Emergency temperature 20 deg C
	tert-Butyl peroxy isopropyl carbonate, *technical pure*	5.2	UN2103	Organic Peroxide	II	1	5	
	tert-Butyl peroxyneodecanoate, *maximum concentration 77% in solution*	5.2	UN2177	Organic Peroxide	II	1	5	Control temperature 8 deg C Emergency temperature 10 deg C
	tert-Butyl peroxyneodecanoate, *technical pure*	5.2	UN2594	Organic Peroxide	II	1	5	Control temperature -5 deg C Emergency temperature 5 deg C
	3-tert-Butylperoxy-3-phenyl phthalide, *technical pure*	5.2	UN2596	Organic Peroxide	II	1	5	
	tert-Butyl peroxyphtalate, *maximum concentration 77% in solution*	5.2	UN2110	Organic Peroxide	II	1	5	Control temperature 8 deg C Emergency temperature 10 deg C
	tert-Butyl peroxy-3,5,5-trimethyl hexanoate, *technical pure*	5.2	UN2104	Organic Peroxide	II	1	5	
	Butylphenols, liquid	6.1	UN2228	St. Andrews Cross	III	1,2	1,2	
	Butylphenols, solid	6.1	UN2229	St. Andrews Cross	III	1,2	1,2	
	Butyl phosphoric acid. See Butyl acid phosphate							
	Butyl propionate	3.3	UN1914	Flammable Liquid	II	1,2	1,2	
	Butyl toluenes	6.1	UN2667	Poison, Flammable Liquid (only if flashpoint below 61 deg C)	III	1,2	1,2	Shade from radiant heat. If flashpoint below 61 deg C segregation same as for flammable liquids
	Butyl trichlorosilane	8	UN1747	Corrosive, Flammable Liquid	II	1	1	Keep dry. Stow "separated longitudinally by an intervening complete compartment or hold from" explosives. Segregation same as for flammable liquids
	Butyl vinyl ether, inhibited	3.2	UN2352	Flammable Liquid	II	1,2	1	
	1,4-Butynediol	4.1	UN2716	Flammable Solid	III	1,2	1	Stow "separated from" mercury salts, strong acids, alkaline compounds and halides
	Butyraldehyde	3.2	UN1129	Flammable Liquid	II	1,2	1	
	Butyraldoxime	3.3	UN2840	Flammable Liquid	III	1,2	1,2	
	n-Butyric acid	8	UN2820	Corrosive	III	1,3	1,3	Keep cool. Glass carboys in hampers prohibited under deck
	Butyric anhydride	8	UN2739	Corrosive	III	1,2	1,2	
	Butyronitrile	3.2	UN2411	Flammable Liquid, Poison	II	1,3	5	Keep cool
	Butyryl chloride	3.2	UN2353	Flammable Liquid, Corrosive	II	1	1	Keep dry. Shade from radiant heat
	Cacodylic acid	6.1	UN1572	Poison	II	1,2	5	Stow "away from" acids

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Cadmium compounds	6.1	UN2570	Poison	I/II	1.2	1.2	Stow "away from" living quarters
		6.1	UN2570	St. Andrews Cross	III	1.2	1.2	Stow "away from" living quarters
	Caesium hydroxide, solid	8	UN2682	Corrosive	II	1.2	1.2	Keep dry
	Caesium hydroxide, solution	8	UN2681	Corrosive	II	1.2	1.2	
	Caesium, metal	4.3	UN1407	Dangerous When Wet	I	1.2	5	
	Caesium nitrate	5.1	UN1451	Oxidizer	III	1.2	1.2	
	Caesium, powdered *See Pyrophoric metals*							
	Calcium arsenate	6.1	UN1573	Poison	II	1.2	1.2	
	Calcium arsenate and arsenite, solid *mixtures*	6.1	UN1574	Poison	II	1.2	1.2	
	Calcium bisulphite, solution *See* Calcium hydrogen sulphite, solution							
	Calcium carbide	4.3	UN1402	Dangerous When Wet	II	1.2	1.2	Stow "away from" copper its alloys and its salts
	Calcium chlorate	5.1	UN1452	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Calcium chlorate, aqueous solution	5.1	UN2429	Oxidizer	II	1.2	1	Stow "away from" powdered metals and "separated from" ammonium compounds
	Calcium chlorite	5.1	UN1453	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals and cyanides, "separated from" ammonium compounds
	Calcium cyanamide, containing *more than 0.1% and not more than 0.5% of* calcium carbide	4.3	UN1403	Dangerous When Wet	III	1.2	1.2	
	Calcium cyanamide, containing *more than 0.5%* of calcium carbide	4.3	UN1403	Dangerous When Wet	III	1.2	1.2	
	Calcium cyanide	6.1	UN1575	Poison	I	1.2	1.2	
	Calcium hydride	4.3	UN1404	Dangerous When Wet	I	1.2	5	
	Calcium hydrosulphite	4.2	UN1923	Spontaneously Combustible	II	1.2	5	Keep dry
	Calcium hypochlorite, hydrated or Calcium hypochlorite, hydrated *mixtures with not less than 5.5% but not more than 10%* water	5.1	UN2880	Oxidizer	II	1.2	1.2	Stow "away from" sources of heat where temperatures in excess of 55 deg C for a period of 24 hours or more will be encountered
	Calcium hypochlorite, dry or Calcium hypochlorite *mixtures, with more than 39% available chlorine (8.8% available oxygen)*	5.1	UN1748	Oxidizer	II	1.2	5	Stow "separated from" ammonium compounds and "away from" sources of heat
	Calcium hypochlorite *mixtures, dry, with more than 10%, but not more than 39%, available chlorine*	5.1	UN2208	Oxidizer	III	1.2	1.2	
	Calcium manganese silicon	4.3	UN2844	Dangerous When Wet	III	1.2	1.2	
	Calcium, *metal and alloys, non-pyrophoric*	4.3	UN1401	Dangerous When Wet	II	1.2	5	
	Calcium nitrate	5.1	UN1454	Oxidizer	III	1.2	1.2	
	Calcium perchlorate	5.1	UN1455	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals
	Calcium permanganate	5.1	UN1456	Oxidizer	II	1.2	1.2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Calcium peroxide	5.1	UN1457	Oxidizer	II	1.2	1.2	Keep dry
	Calcium phosphide	4.3	UN1360	Dangerous When Wet	I	1.2	5	
	Calcium, pyrophoric or Calcium alloys, pyrophoric	4.2	UN1855	Spontaneously Combustible	II	1	5	
	Calcium resinate, fused	4.1	UN1314	Flammable Solid	III	1.2	1.2	
	Calcium resinate, *technical pure*	4.1	UN1313	Flammable Solid	III	1.2	1.2	
	Calcium silicide	4.3	UN1405	Dangerous When Wet	II	1.2	1.2	
	Calcium silicon	4.3	UN1406	Dangerous When Wet	III	1.2	1.2	
	Camphor, *natural or synthetic*	4.1	UN2717	Flammable Solid	III	1.2	1.2	
	Camphor oil	3.3	UN1130	Flammable Liquid	III	1.3	1.3	
	Caprylyl peroxide. *See* a-Octanoyl peroxide							
	Caps, blasting. *See* Blasting caps							
	Carbamate pesticides, liquid, flammable, toxic, n.o.s., flashpoint *less than 23 deg C*	3.2	UN2758	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I/II	1.2	1	
	Carbamate pesticides, liquid, toxic, flammable, n.o.s., flashpoint *between 23 deg C and 61 deg C*	6.1	UN2991	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2991	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN2991	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Carbamate pesticides, liquid, toxic, n.o.s.	6.1	UN2992	Poison	I	1	1	
		6.1	UN2992	Poison	II	1.2	1	
		6.1	UN2992	St. Andrews Cross	III	1.2	1.2	
	Carbamate pesticides, solid, toxic, n.o.s.	6.1	UN2757	Poison	I/II	1.2	1.2	
		6.1	UN2757	St. Andrews Cross	III	1.2	1.2	
	Carbolic acid. *See* Phenols, Phenol solutions or Phenol, molten							
	Carbon, activated	4.2	UN1362	Spontaneously Combustible	III	1.3	1.3	Keep cool. Stow "away from" oily matter
	Carbon, *animal or vegetable origin*	4.2	UN1361	Spontaneously Combustible	III	1.3	1.3	Keep cool. Stow "away from" oily matter

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Carbon bisulphide. See Carbon disulphide							
	Carbon dioxide	2.2	UN1013	Nonflammable Gas	–	1.2	1.2	
	Carbon dioxide and ethylene oxide mixtures with more than 6% ethylene oxide	2.3	UN1041	Poison Gas, Flammable Gas	–	1.2	1	
	Carbon dioxide and ethylene oxide mixtures with not more than 6% ethylene oxide	2.3	UN1952	Poison Gas	–	1.2	1	
	Carbon dioxide and nitrous oxide, mixtures	2.2	UN1015	Nonflammable Gas	–	1.2	1.2	
	Carbon dioxide and oxygen, mixtures	2.2	UN1014	Nonflammable Gas	–	1.2	1.2	
	Carbon dioxide, refrigerated liquid	2.2	UN2187	Nonflammable Gas	–	1.2	1	
	Carbon dioxide, solid	9	UN1845	None	III	1	1	Stow "away from" living quarters
	Carbon disulphide	3.1	UN1131	Flammable Liquid, Poison	I	1	5	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S). Keep cool
	Carbon monoxide	2.3	UN1016	Flammable Gas, Poison Gas	–	1	5	Stow "away from" living quarters
	Carbon monoxide and hydrogen mixture	2.3	UN2600	Poison Gas, Flammable Gas	–	1	5	
	Carbon paper. See Paper, treated with unsaturated oils, incompletely dried							
	Carbon remover, liquid	3.2	UN1132	Flammable Liquid	II	1.2	1	
	Carbon sulphide. See Carbon disulphide							
	Carbon tetrabromide	6.1	UN2516	St. Andrews Cross	III	1.2	1.2	Shade from radiant heat
	Carbon tetrachloride	6.1	UN1846	Poison	II	1.2	1.2	
	Carbonyl chloride. See Phosgene							
	Carbonyl fluoride	2.3	UN2417	Poison Gas	–	1	5	Stow "away from" living quarters
	Carbonyl sulfide	2.3	UN2204	Poison Gas, Flammable Gas	–	1	5	
	Cartridge cases. See Cases, cartridges							
N	Cartridges, flash	1.1G	UN0049	Explosive (1.1G)	–	–	–	
N	Cartridges, flash	1.3G	UN0050	Explosive (1.3G)	–	–	–	
	Cartridges for weapons, blank	1.4C	UN0338	Explosive (1.4C)	–	1.3	1.3	
N	Cartridges for weapons, blank	1.2C	UN0413	Explosive (1.2C)	–	–	–	
N	Cartridges for weapons, blank	1.1C	UN0326	Explosive (1.1C)	–	–	–	
N	Cartridges for weapons, blank	1.3C	UN0327	Explosive (1.3C)	–	–	–	
	Cartridges for weapons, blank or Cartridges, safety, blank	1.4S	UN0014	None. Package to be marked "1.4S"	–	1.3	1.3	
	Cartridges for weapons, other than blank	1.4S	UN0012	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Cartridges for weapons, with bursting charge	1.1E	UN0006	Explosive (1.1E)	–	–	–	
N	Cartridges for weapons, with bursting charge	1.2E	UN0321	Explosive (1.2E)	–	–	–	
N	Cartridges for weapons, with bursting charge	1.1F	UN0005	Explosive (1.1F)	–	–	–	
N	Cartridges for weapons, with bursting charge	1.2F	UN0007	Explosive (1.2F)	–	–	–	
	Cartridges for weapons, with bursting charge	1.4E	UN0412	Explosive (1.4E)	–	1.3	1.3	
N	Cartridges for weapons, with bursting charge	1.4F	UN0348	Explosive (1.4F)	–	–	–	
	Cartridges for weapons, with inert projectile	1.4C	UN0339	Explosive (1.4C)	–	1.3	1.3	
N	Cartridges for weapons, with inert projectile	1.2C	UN0328	Explosive (1.2C)	–	–	–	
N	Cartridges for weapons, with inert projectile	1.3C	UN0417	Explosive (1.3C)	–	–	–	
	Cartridges, oil well	1.4C	UN0278	Explosive (1.4C)	–	1.3	1.3	
N	Cartridges, oil well	1.3C	UN0277	Explosive (1.3C)	–	–	–	
	Cartridges, power device	1.4C	UN0276	Explosive (1.4C)	–	1.3	1.3	
	Cartridges, power device	1.4S	UN0323	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Cartridges, power device	1.2C	UN0381	Explosive (1.2C)	–	–	–	
N	Cartridges, power device	1.3C	UN0275	Explosive (1.3C)	–	–	–	
	Cartridges, safety. See Cartridges for weapons, other than blank (*UN0012*) or Cartridges for weapons, blank (*UN0014*)							
	Cartridges, signal	1.4G	UN0312	Explosive (1.4G)	–	1.3	1.3	
N	Cartridges, signal	1.3G	UN0054	Explosive (1.3G)	–	–	–	
	Cartridges, signal	1.4S	UN0405	None. Package to be marked "1.4S"	–	1.3	1.3	
	Cases, cartridge, empty, with primer	1.4C	UN0379	Explosive (1.4C)	–	1.3	1.3	
	Cases, cartridges, empty, with primer	1.4S	UN0055	None. Package to be marked "1.4S"	–	1.3	1.3	
	Casinghead gasoline	3.1	UN1257	Flammable Liquid	II	1.3	5	Keep cool
	Castor beans, Castor meal, Castor pomace or Castor flake	9	UN2969	None	II	1.2	5	Stow "away from" living quarters, foodstuffs, and oxidizing substances
	Caustic alkali liquids, n.o.s.	8	UN1719	Corrosive	II	1.2	1.2	
	Caustic potash. See Potassium hydroxide, solution							
	Caustic potash, solid. See Potassium hydroxide, solid							
	Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (scrap excluded)	4.1	UN2000	Flammable Solid	III	1.2	1.2	
	Celluloid, scrap	4.2	UN2002	Spontaneously Combustible	III	1	5	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Cement, liquid. See Adhesives, containing a flammable liquid							
	Cerium, crude, powder	4.1	UN1333	Flammable Solid	II	1,2	5	Stow "separated from" flammable substances and oxidizers
	Cerium, crude, slabs or ingots	4.1	UN1333	Flammable Solid	III	1,2	1,2	Stow "separated from" flammable substances and oxidizers
	Charcoal, activated. See Carbon, activated							
	Charcoal non-activated of animal or vegetable origin. See Carbon, of animal or vegetable origin							
N	Charges, demolition	1.1D	UN0048	Explosive (1.1D)	–	–	–	
N	Charges, depth	1.1D	UN0056	Explosive (1.1D)	–	–	–	
N	Charges, propelling, for cannon	1.1C	UN0279	Explosive (1.1C)	–	–	–	
N	Charges, propelling, for cannon	1.2C	UN0414	Explosive (1.2C)	–	–	–	
N	Charges, propelling, for cannon	1.3C	UN0242	Explosive (1.3C)	–	–	–	
N	Charges, propelling, for rocket motors	1.1C	UN0271	Explosive (1.1C)	–	–	–	
N	Charges, propelling, for rocket motors	1.2C	UN0415	Explosive (1.2C)	–	–	–	
N	Charges, propelling, for rocket motors	1.3C	UN0272	Explosive (1.3C)	–	–	–	
N	Charges, propelling, for rocket motors, composite mixture	1.1C	UN0273	Explosive (1.1C)	–	–	–	
N	Charges, propelling, for rocket motors, composite mixture	1.2C	UN0418	Explosive (1.2C)	–	–	–	
N	Charges, propelling, for rocket motors, composite mixture	1.3C	UN0274	Explosive (1.3C)	–	–	–	
N	Charges, shaped, commercial, without detonator	1.1D	UN0059	Explosive (1.1D)	–	–	–	
	Charges, shaped, flexible, linear, metal clad	1.4 D	UN0237	Explosive (1.4D)	–	1,3	1,3	
N	Charges, shaped, flexible, linear, metal clad	1.1D	UN0288	Explosive (1.1D)	–	–	–	
N	Charges, supplementary, explosive	1.1D	UN0060	Explosive (1.1D)	–	–	–	
	Chloral, anhydrous, inhibited	6.1	UN2075	Poison	II	1	5	
	Chlorate and borate, mixtures	5.1	UN1458	Oxidizer	II	1,2	1,2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Chlorate and magnesium chloride, mixture	5.1	UN1459	Oxidizer	II	1,2	1,2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Chlorates, inorganic, n.o.s.	5.1	UN1461	Oxidizer	II	1,2	1,2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Chloric acid solution with not more than 10% acid	5.1	UN2626	Oxidizer	II	1	5	Stow "separated from" ammonium compounds and "away from" finely powdered metals
	Chlorine	2.3	UN1017	Poison Gas	–	1	5	Stow "separated from" acetylene, ammonia, diborane and hydrogen
	Chlorine pentafluoride	2.3	UN2548	Poison Gas, Oxidizer, Corrosive	–	1	5	Stow "away from" combustible materials
	Chlorine trifluoride	2.3	UN1749	Poison Gas, Oxidizer, Corrosive	–	1,2	5	Stow "away from" food stuffs and living quarters
	Chlorites, inorganic, n.o.s.	5.1	UN1462	Oxidizer	II	1,2	1,2	Stow "away from" powdered metals and cyanides, "separated from" ammonium compounds
	Chloroacetaldehyde	6.1	UN2232	Poison	II	1	5	
	Chloroacetic acid, liquid	8	UN1750	Corrosive	II	1,2	1,2	Glass carboys in hampers not permitted under deck
	Chloroacetic acid, solid	8	UN1751	Corrosive	II	1,2	1,2	Keep dry
	Chloroacetone, stabilized	6.1	UN1695	Poison	II	1	5	Stow "away from" living quarters
	Chloroacetonitrile	6.1	UN2668	Poison, Flammable Liquid	II	1,3	1,3	Keep cool. Shade from radiant heat. Stow "away from" acids. Segregation same as for flammable liquids
	Chloroacetophenone	6.1	UN1697	Poison	II	1	5	Keep cool. Stow "away from" living quarters
	Chloroacetyl chloride	8	UN1752	Corrosive	II	1	5	Keep dry
	Chloroanilines, liquid	6.1	UN2019	Poison	II	1,2	1,2	
	Chloroanilines, solid	6.1	UN2018	Poison	II	1,2	1,2	
	p-Chloro-o-anisidine	6.1	UN2233	St. Andrews Cross	III	1,2	1,2	
	Chlorobenzene	3.3	UN1134	Flammable Liquid	II	1,3	1,3	
	Chlorobenzotrifluorides	3.3	UN2234	Flammable Liquid	III	1,2	1,2	
	p-Chlorobenzoyl peroxide. See Di-(4-chlorobenzoyl) peroxide				–	–	–	
	p-Chlorobenzyl chloride	6.1	UN2235	St. Andrews Cross	III	1,2	1,2	
	1-Chloro-3-bromopropane	6.1	UN2688	St. Andrews Cross	III	1,2	1,2	
	Chlorobutanes	3.2	UN1127	Flammable Liquid	II	1,2	1	
	Chlorocresols	6.1	UN2669	Poison	II	1,3	1,3	Keep cool. Stow "away from" living quarters
	Chlorodifluorobromomethane	2.2	UN1974	Nonflammable Gas	–	1,2	1,2	
	Chlorodifluoroethanes	2.1	UN2517	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Chlorodifluoromethane	2.2	UN1018	Nonflammable Gas	–	1,2	1,2	
	Chlorodifluoromethane and chloropentafluoroethane, mixture with a fixed boiling point containing about 45% of chlorodifluoromethane	2.2	UN1973	Nonflammable Gas	–	1,2	1,2	
	Chlorodinitrobenzene	6.1	UN1577	Poison	II	1,2	1,2	
	Chloroform	6.1	UN1888	Poison	II	1,2	1,2	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Hazard Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Chloroformates, n.o.s., with a flashpoint not less than 23 deg C	6.1	UN2742	Poison, Corrosive, Flammable Liquid (only if flashpoint below 61 deg C)	II	1.3	1.3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters. If flashpoint below 61, segregation same as for flammable liquids
	Chloromethylchloroformate	6.1	UN2745	Poison, Corrosive	II	1.3	1.3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters
	Chloromethyl ethyl ether	3.2	UN2354	Flammable Liquid, Poison	II	1.3	5	Keep cool
	3-Chloro-4-methylphenyl isocyanate	6.1	UN2236	Poison	II	1.2	1.2	Shade from radiant heat
	Chloronitroanilines	6.1	UN2237	St. Andrews Cross	III	1.2	1.2	
	Chloronitrobenzenes (o-, m-, p-)	6.1	UN1578	Poison	II	1.2	1.2	
	Chloro-o-nitrotoluene	6.1	UN2433	St. Andrews Cross	III	1.2	1.2	
	Chloropentafluoroethane	2.2	UN1020	Nonflammable Gas	–	1.2	1.2	
	3-Chloroperoxybenzoic acid, maximum concentration 86%	5.2	UN3755	Organic Peroxide	II	1	5	
	Chlorophenates, liquid	8	UN2904	Corrosive	III	1.2	1.2	
	Chlorophenates, solid	8	UN2905	Corrosive	III	1.2	1.2	
	Chlorophenols, liquid	6.1	UN2021	St. Andrews Cross	III	1.2	1.2	
	Chlorophenols, solid	6.1	UN2020	St. Andrews Cross	III	1.2	1.2	
	Chlorophenyl trichlorosilane	8	UN1753	Corrosive	II	1	1	Keep dry
	Chloroplatinic acid, solid	6.1	UN2507	Poison	II	1	5	Stow "away from" living quarters
	Chloropicrin	2.3	UN1581	Poison Gas	–	1	5	Shade from radiant heat. Stow "away from" living quarters
	Chloropicrin and methyl bromide, mixtures	2.3	UN1582	Poison Gas	–	1	5	Shade from radiant heat. Stow "away from" living quarters
	Chloropicrin and methyl chloride, mixtures	2.3	UN1583	Poison	I/II	1	1	Stow "away from" living quarters
	Chloropicrin mixtures, n.o.s.	6.1	UN1583	St. Andrews Cross	III	1	1	
	Chloroplatinic acid, solid	8	UN2507	Corrosive	III	1.2	1.2	
	Chloroprene, inhibited	3.2	UN1991	Flammable Liquid, Poison	I	1.2	1	
	3-Chloropropene	3.1	UN2356	Flammable Liquid	I	1.3	5	Keep cool
	3-Chloropropanol-1	6.1	UN2849	St. Andrews Cross	III	1.2	1.2	
	2-Chloropropene	3.1	UN2456	Flammable Liquid	I	1.3	5	Keep cool
	Chloropropionic acid	8	UN2511	Corrosive	III	1.2	1.2	Glass carboys prohibited on passenger vessels
	2-Chloropyridine	6.1	UN2822	Poison	II	1.2	1.2	Stow "away from" living quarters
	Chlorosulphonic acid, with or without sulphur trioxide	8	UN1754	Corrosive	I	1	1	Glass carboys prohibited on passenger vessels
	Chlorotetrafluoroethane	2.2	UN1021	Nonflammable Gas	–	1.2	1.2	
	Chlorotoluenes (o-, m-, p-)	3.3	UN2238	Flammable Liquid	III	1.2	1.2	
	4-Chloro-o-toluidine hydrochloride	6.1	UN1579	St. Andrews Cross	III	1.2	1.2	
	Chlorotoluidines	6.1	UN2239	St. Andrews Cross	III	1.2	1.2	
	Chlorotrifluoroethane	2.2	UN1983	Nonflammable Gas	–	1.2	1.2	
	Chlorotrifluoroethylene. See Trifluorochloroethylene							
	Chlorotrifluoromethane	2.2	UN1022	Nonflammable Gas	–	1.2	1.2	
	Chlorotrifluoromethane and trifluoromethane azeotropic mixture with approximately 60% chlorotrifluoromethane	2.2	UN2599	Nonflammable Gas	–	1.2	1.2	
	Chromic acid, solid. See Chromium trioxide, anhydrous							
	Chromic acid, solution	8	UN1755	Corrosive	II	1	1	
	Chromic anhydride. See Chromium trioxide, anhydrous							
	Chromic fluoride, solid	8	UN1756	Corrosive	II	1.2	1.2	
	Chromic fluoride, solution	8	UN1757	Corrosive	II	1.2	1.2	
	Chromium nitrate	5.1	UN2720	Oxidizer	III	1.2	1.2	
	Chromium oxychloride	8	UN1758	Corrosive	I	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Chromium trioxide, anhydrous	5.1	UN1463	Oxidizer, Corrosive	II	1.2	1.2	Stow "separated from" flammable substances and "away from" foodstuffs
	Chromosulphuric acid	8	UN2240	Corrosive	I	1.2	1	Carboys not permitted on passenger vessels and permitted only on deck on cargo vessels
	Chrysotile. See Asbestos, white							
	Cigarettes, self-lighting	4.1	UN1867	Flammable Solid	III	1.2	1.2	Keep dry
	Cleaning compound. See Flammable liquid preparations, n.o.s.							
	Coal gas	2.3	UN1023	Poison Gas, Flammable Gas	–	1	5	
	Coal tar distillate	3.2	UN1136	Flammable Liquid	II	1.2	1	
		3.3	UN1136	Flammable Liquid	III	1.2	1.2	
	Coal tar naphtha	3.2	UN2553	Flammable Liquid	II	1.2	1	
	Coal tar oil. See Coal tar distillate							
	Coating solution	3.2	UN1139	Flammable Liquid	II	1.2	1	
		3.3	UN1139	Flammable Liquid	III	1.2	1.2	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Cobalt naphthenates, *powder*	4.1	UN2001	Flammable Solid	III	1,2	1,2	
	Cobalt nitrate, *precipitated*	4.1	UN1318	Flammable Solid	III	1,2	1,2	
	Cocculus, *solid*	6.1	UN1584	Poison	II	1,2	1,2	
	Cologne spirits. *See* Ethanol							
	Columbian spirits. *See* Methanol							
	Components, explosive train, n.o.s.	1.4S	UN0383	Explosive (1.4S)	–	1,3	1,3	
	Components, explosive train, n.o.s.	1.4S	UN0384	None. Package to be marked "1.4S"	–	1,3	1,3	
N	Components, explosive train, n.o.s.	1.2B	UN0382	Explosive (1.2B)	–	–	–	
	Compressed or liquefied gases, flammable, non-toxic, n.o.s.	2.1	UN1954	Flammable Gas	–	1	5	Stow "away from" living quarters
	Compressed or liquefied gases, flammable, toxic, n.o.s.	2.1	UN1953	Flammable Gas. Poison Gas	–	1	5	Stow "away from" living quarters
	Compressed or liquefied gases, non-flammable, non-toxic, n.o.s.	2.2	UN1956	Nonflammable Gas	–	1,2	1,2	
	Compressed or liquefied gases, non-flammable, toxic, n.o.s.	2.3	UN1955	Poison Gas	–	1	5	Stow "away from" living quarters
N	Contrivances, water-activated, with bursting, expelling charge or propelling charge	1.2L	UN0248	Explosive (1.2L) Dangerous When Wet	–	–	–	
N	Contrivances, water-activated, with bursting, expelling charge or propelling charge	1.3L	UN0249	Explosive (1.3L) Dangerous When Wet	–	–	–	
	Copper acetoarsenite	6.1	UN1585	Poison	II	1,2	1,2	
	Copper arsenite	6.1	UN1586	Poison	II	1,2	1,2	
	Copper based pesticides, liquid, flammable, toxic, n.o.s. *flash-point less than 23 deg C*	3.2	UN2776	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I,II	1,2	1	
	Copper based pesticides, liquid, toxic, flammable, n.o.s., *flash-point between 23 deg C and 61 deg C*	6.1	UN3009	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3009	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN3009	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Copper based pesticides, liquid, toxic, n.o.s.	6.1	UN3010	Poison	I	1	1	
		6.1	UN3010	Poison	II	1,2	1	
		6.1	UN3010	St. Andrews Cross	III	1,2	1,2	
	Copper based pesticides, solid, toxic, n.o.s.	6.1	UN2775	Poison	I,II	1,2	1,2	
		6.1	UN2775	St. Andrews Cross	III	1,2	1,2	
	Copper chloride	5.1	UN2721	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and "away from" finely powdered metals
	Copper cyanide	6.1	UN1587	Poison	II	1,2	1,2	Stow "away from" acids
	Copra	4.2	UN1363	None. Package to be marked "Class 4.2"	III	1,2	1,2	Keep dry. Protect from sparks and open flame
	Cord, detonating, flexible	1.4D	UN0289	Explosive (1.4D)	–	1,3	1,3	
N	Cord, detonating, flexible	1.1D	UN0065	Explosive (1.1D)	–	–	–	
N	Cord, detonating, *metal clad*	1.1D	UN0290	Explosive (1.1D)	–	–	–	
N	Cord, detonating, *metal clad*	1.2D	UN0102	Explosive (1.2D)	–	–	–	
	Cord, detonating, *mild effect, metal clad*	1.4D	UN0104	Explosive (1.4D)	–	1,3	1,3	
	Cord, ignitar	1.4G	UN0066	Explosive (1.4G)	–	1,3	1,3	
	Corrosive liquids, flammable, n.o.s.	8	UN2920	Corrosive, Flammable Liquid	I,II	1	1	Segregation same as for flammable liquids. Keep cool. Shade from radiant heat
	Corrosive liquids, n.o.s.	8	UN1760	Corrosive	I,II	1,2	1	
		8	UN1760	Corrosive	III	1,2	1,2	
	Corrosive liquids, poisonous, n.o.s.	8	UN2922	Corrosive, Poison	I,II	1,2	1	Stow "away from" living quarters
	Corrosive solids, flammable, n.o.s.	8	UN2921	Corrosive, Flammable Solid	I,II	1,3	1	Keep cool. Shade from radiant heat
	Corrosive solids, n.o.s.	8	UN1759	Corrosive	I	1,2	1	
	Keep dry	8	UN1759	Corrosive	II,III	1,2	1,2	Keep dry
	Corrosive solids, poisonous, n.o.s.	8	UN2923	Corrosive, Poison	I,II	1,2	1	Keep dry. Stow "away from" living quarters
	Cosmetics. *See* Perfumery products							
	Cotton, dry. *See* Fibres, vegetable, dry							
	Cotton waste, oily *impregnated with less than 5% of animal or vegetable oil*	4.2	UN1364	Spontaneously Combustible	III	1,2	1,2	Stow "separated from" explosives
	Cotton waste, oily *impregnated with 5% or more of animal or vegetable oil*	4.2	UN1364	Spontaneously Combustible	III	1,2	1,2	Keep dry. Stow "separated from" explosives, animal oils or vegetable oils
	Cotton, *wet or contaminated*	4.2	UN1365	Spontaneously Combustible	III	1,2	1,2	Keep dry
	Cresols (*o-, m-, p-*)	6.1	UN2076	Poison	II	1,2	1,2	
	Cresylic acid	6.1	UN2022	Poison	II	1,2	1,2	
	Crocidolite. *See* Asbestos, blue							
	Crotonaldehyde, inhibited	3.2	UN1143	Flammable Liquid	II	1,2	1	
	Crotonic acid	8	UN2823	Corrosive	III	1,3	1,3	Keep cool
	Crotonylene	3.1	UN1144	Flammable Liquid	I	1,3	5	Keep cool

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Cumene hydroperoxide. *See* Cumyl hydroperoxide				–	–	–	
	Cumyl hydroperoxide, *technical pure*	5.2	UN2116	Organic Peroxide	II	1	5	
	Cumyl peroxyneodecanoate, *maximum concentration 77% in solution*	5.2	UN2963	Organic Peroxide	II	1	5	Control temperature -10 deg C Emergency temperature 0 deg C
	Cumyl peroxyphalate, *maximum concentration 77% in solution*	5.2	UN2964	Organic Peroxide	II	1	5	Control temperature 5 deg C Emergency temperature 5 deg C
	Cupric cyanide. *See* Copper cyanide							
	Cuprietylenediamine, solution	8	UN1761	Corrosive, Poison	II	1,2	1,2	
	Cut-backs, asphalt or bitumen	3.2	UN1999	Flammable Liquid	II	1,2	1	
		3.3	UN1999	Flammable Liquid	III	1,2	1,2	
	Cutters, cable, explosive	1.4 S	UN0070	None. Package to be marked "1.4 S"	–	1,3	1,3	
	Cyanide mixtures. *See* Cyanides, *inorganic, n.o.s.*							
	Cyanides, inorganic, n.o.s.	6.1	UN1588	Poison	II	1,2	1,2	Stow "away from" acids
		6.1	UN1588	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	Cyanide, solutions	6.1	UN1935	Poison	I	1,2	1,2	Stow "away from" living quarters and acids
	Cyanogen	2.3	UN1026	Poison Gas, Flammable Gas	–	1	5	Stow "away from" foodstuffs and living quarters
	Cyanogen bromide	6.1	UN1889	Poison, Corrosive	I	1	5	Shade from radiant heat. Segregation same as for corrosives
	Cyanogen chloride, *inhibited*	2.3	UN1589	Poison Gas	–	1	5	
	Cyanuric chloride	8	UN2670	Corrosive	III	1,3	1,3	Keep dry and cool
	Cyclobutane	2.1	UN2601	Flammable Gas	–	1,2	1	
	Cyclobutylchloroformate	6.1	UN2744	Poison, Corrosive, Flammable Liquid	II	1,3	1,3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters. Segregation same as for flammable liquids
	1,5,9-Cyclododecatriene	8	UN2518	Corrosive	II	1,2	5	Stow "away from" living quarters
	Cycloheptane	3.2	UN2241	Flammable Liquid	II	1,2	1	
	Cycloheptatriene	3.2	UN2603	Flammable Liquid, Poison	II	1,3	5	Keep cool
	Cycloheptene	3.2	UN2242	Flammable Liquid	II	1,2	1	
	Cyclohexane	3.1	UN1145	Flammable Liquid	II	1,3	5	Keep cool
	Cyclohexanone	3.3	UN1915	Flammable Liquid	III	1,2	1,2	
	Cyclohexanone peroxides, *in a concentration of more than 80% with less than 10% water*	5.2	UN2117	Organic Peroxide	I	1	5	
	Cyclohexanone peroxides, *maximum concentration 80%, with at least 10% water*	5.2	UN2119	Organic Peroxide	I	1	5	
	Cyclohexanone peroxides, *maximum concentration 72% and containing not more than 9% available oxygen, in solution*	5.2	UN2118	Organic Peroxide	I	1	5	
	Cyclohexanone peroxides, *maximum concentration 72% and containing not more than 9% available oxygen, as a paste*	5.2	UN2595	Organic Peroxide	II	1	5	
	Cyclohexene	3.1	UN2256	Flammable Liquid	II	1,3	5	Keep cool
	Cyclohexene	3.2	UN2256	Flammable Liquid	II	1,2	1	
	Cyclohexenyl trichlorosilane	8	UN1762	Corrosive	II	1	1	Keep dry
	Cyclohexyl acetate	3.3	UN2243	Flammable Liquid	III	1,2	1,2	
	Cyclohexylamine	3.2	UN2357	Flammable Liquid, Corrosive	II	1,2	1	
		3.3	UN2357	Flammable Liquid, Corrosive	II	1,2	1,2	
	Cyclohexyl isocyanate	6.1	UN2488	Poison, Flammable Liquid	II	1	5	Shade from radiant heat. Stow "away from" living quarters. Segregation same as for flammable liquids
	Cyclohexyl trichlorosilane	8	UN1763	Corrosive	II	1	1	Keep dry
	Cyclooctadienes	3.3	UN2520	Flammable Liquid	II	1,2	1,2	
	Cyclooctatetraene	3.2	UN2358	Flammable Liquid	II	1,2	1	
	Cyclopentane	3.1	UN1145	Flammable Liquid	II	1,3	5	Keep cool
	Cyclopentanol	3.3	UN2244	Flammable Liquid	III	1,2	1,2	
	Cyclopentanone	3.3	UN2245	Flammable Liquid	III	1,2	1,2	
	Cyclopentene	3.1	UN2246	Flammable Liquid	II	1,3	5	Keep cool
	Cyclopropane, liquefied	2.1	UN1027	Flammable Gas	–	1,2	1	
N	Cyclotetramethylenetetranitramine, *wetted with not less than 25% water, by weight, or desensitized with not less than 10% phlegmatizer, by weight*	1.1D	UN0226	Explosive (1.1D)	–	–	–	
N	Cyclotrimethylenetrinitramine and cyclotetramethylenetetranitramine, *mixtures, wetted with not less than 25% water, by weight, or desensitized with not less than 10% phlegmatizer, by weight*	1.1D	UN0391	Explosive (1.1D)	–	–	–	
N	Cyclotrimethylenetrinitramine, *wetted with not less than 25% water, by weight, or desensitized with not less than 10% phlegmatizer, by weight*	1.1D	UN0072	Explosive (1.1D), Corrosive	–	–	–	
	Cymenes	3.3	UN2046	Flammable Liquid	III	1,2	1,2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Decaborane	4.1	UN1868	Flammable Solid, Poison	II	1,2	1,2	
	Decahydronaphthalene	3.3	UN1147	Flammable Liquid	II	1,2	1,2	
	Decalin. See Decahydronaphthalene							
	n-Decane	3.3	UN2247	Flammable Liquid	III	1,2	1,2	
N	Deflagrating metal salts of aromatic nitro-derivatives, n.o.s.	1.3C	UN0132	Explosive (1.3C)	–	–	–	
	Detonator assemblies, non-electric, for blasting	1.4S	UN0361	Explosive (1.4S)	–	1.3	1.3	
N	Detonator assemblies, non-electric, for blasting	1.1B	UN0360	Explosive (1.1B)	–	–	–	
	Detonators, electric, for blasting	1.4B	UN0255	Explosive (1.4S)	–	1.2	5	
N	Detonators, electric, for blasting	1.1B	UN0030	Explosive (1.1B)	–	–	–	
	Detonators for ammunition	1.4S	UN0365	Explosive (1.4S)	–	1.3	1.3	
	Detonators for ammunition	1.4S	UN0366	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Detonators for ammunition	1.1B	UN0073	Explosive (1.1B)	–	–	–	
N	Detonators for ammunition	1.2B	UN0364	Explosive (1.2B)	–	–	–	
	Detonators, non-electric, for blasting	1.4B	UN0267	Explosive (1.4S)	–	1.2	5	
N	Detonators, non-electric, for blasting	1.1B	UN0029	Explosive (1.1B)	–	–	–	
	Deuterium	2.1	UN1957	Flammable Gas	–	1,2	5	
	Diacetone alcohol	3.2	UN1148	Flammable Liquid	II	1,2	1	
		3.3	UN1148	Flammable Liquid	II	1,2	1,2	
	Diacetone alcohol peroxides, maximum 57% in solution with maximum 9% hydrogen peroxide, minimum 26% diacetone alcohol and minimum 9% water, total active oxygen content maximum 10%	5.2	UN2163	Organic Peroxide	I	1	5	Control temperature 30 deg C. Emergency temperature 35 deg C
	Diallylamine	3.2	UN2359	Flammable Liquid	II	1,2	1	
	Diallylether	3.2	UN2360	Flammable Liquid, Poison	II	1,3	5	Keep cool
	4,4-Diaminodiphenyl methane	6.1	UN2651	St. Andrews Cross	III	1,2	1,2	
	Di-n-amylamine	6.1	UN2841	St. Andrews Cross, Flammable Liquid	III	1,3	1,3	Keep cool. Shade from radiant heat. Segregation same as for flammable liquids
N	Diazodinitrophenol, containing, by weight, at least 40% water or mixture of alcohol and water	1.1A	UN0074	Explosive (1.1A)	–	–	–	
	Dibenzyldichlorosilane	8	UN2434	Corrosive	II	1	1	Keep dry
	Dibenzyl peroxydicarbonate, maximum concentration 87% with water	5.2	UN2149	Organic Peroxide	I	1	5	Control temperature 25 deg C. Emergency temperature 30 deg C
	Diborane	2.1	UN1911	Flammable Gas, Poison Gas	–	1	5	Stow "separated from" chlorine and oxidizers
	Dibromobenzene	3.3	UN2711	Flammable Liquid	III	1,2	1,2	
	1,2-Dibromobutan-3-one	6.1	UN2648	Poison	II	1,2	1	
	1,2-Dibromo-3-chloropropane	6.1	UN2872	St. Andrews Cross	III	1,2	1,2	
	Dibromodifluoromethane	9	UN1941	None	III	1,2	1,2	Shade from radiant heat. Stow "away from" foodstuffs
	Dibromomethane	6.1	UN2664	St. Andrews Cross	III	1,2	1,2	
	Di-(n-butyl)amine	8	UN2248	Corrosive, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids
	N,N-Di-n-butylaminoethanol	6.1	UN2873	St. Andrews Cross	III	1,2	1,2	
	Di-(4-tert-butylcyclohexyl) peroxydicarbonate, maximum concentration 42%, stable dispersion in water	5.2	UN2958	Organic Peroxide	II	1	5	Control temperature 25 deg C. Emergency temperature 30 deg C
	Di-(4-tert-butylcyclohexyl) peroxydicarbonate, technical pure	5.2	UN2154	Organic Peroxide	II	1	5	Control temperature 30 deg C. Emergency temperature 35 deg C
	Dibutyl ethers	3.3	UN1149	Flammable Liquid	III	1,2	1,2	
	Di-tert-butyl peroxide, technical pure	5.2	UN2102	Organic Peroxide, Flammable Liquid	B	1	5	
	2,2-Di-(tert-butylperoxy) butane, maximum concentration 55% in solution	5.2	UN2131	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy) cyclohexane, maximum concentration 77% in solution	5.2	UN2160	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy) cyclohexane, technical pure	5.2	UN2179	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy) cyclohexane with at least 13% phlegmatizer and 47% inert inorganic solid	5.2	UN2565	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy) cyclohexane with at least 50% phlegmatizer	5.2	UN2897	Organic Peroxide	II	1	5	
	Di-sec-butyl peroxydicarbonate, maximum concentration 52% in solution	5.2	UN2151	Organic Peroxide	II	1	5	Control temperature -15 deg C. Emergency temperature -5 deg C
	Di-sec-butyl peroxydicarbonate, technical pure	5.2	UN2150	Organic Peroxide	I	1	5	Control temperature -20 deg C. Emergency temperature -10 deg C
	1,4-Di-(2-tert-butylperoxy isopropyl) benzene, or 1,3-di-(2-tert-butylperoxy isopropyl) benzene, or mixtures thereof, technical pure or in a concentration of more than 42% with inert solid	5.2	UN2112	Organic Peroxide	II	1	5	
	Di-(tert-butylperoxy)phthalate, maximum concentration 55% as a paste	5.2	UN2108	Organic Peroxide	II	1	5	
	Di-(tert-butylperoxy)phthalate, maximum concentration 55% in solution	5.2	UN2107	Organic Peroxide	II	1	5	
	Di-(tert-butylperoxy)phthalate, technical pure	5.2	UN2106	Organic Peroxide	II	1	5	
	2,2-Di-(tert-butylperoxy) propane, with at least 50% phlegmatizer	5.2	UN2883	Organic Peroxide	II	1	5	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	2,2-Di-(tert-butylperoxy) propane, with at least 13% phlegmatizer and 47% inert inorganic solid	5.2	UN2854	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, technical pure	5.2	UN2145	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, maximum concentration 57% in solvent	5.2	UN2146	Organic Peroxide	II	1	5	
	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane, maximum concentration 58% with inert solid	5.2	UN2147	Organic Peroxide	II	1	5	
	Diethyl peroxydicarbonate maximum concentration 42% stable dispersion in water	5.2	UN2205	Organic Peroxide	II	1	5	Control temperature 25 deg C Emergency temperature 30 deg C
	Diethyl peroxydicarbonate, technical pure	5.2	UN2154	Organic Peroxide	II	1	5	Control temperature 20 deg C Emergency temperature 25 deg C
	Dichloroacetic acid	8	UN1764	Corrosive	II	1.2	1.2	Glass carboy in hampers not permitted under deck
	1,3-Dichloroacetone	6.1	UN2649	Poison	II	1.3	1	Keep cool Stow "away from" living quarters
	Dichloroacetyl chloride	8	UN1765	Corrosive	II	1	5	Keep dry
	Dichloroanilines	6.1	UN1590	Poison	II	1.2	1.2	Stow "away from" acids
	o-Dichlorobenzene	6.1	UN1591	St. Andrews Cross	III	1.2	1.2	
	p-Dichlorobenzene	6.1	UN1592	St. Andrews Cross	III	1.2	1.2	
	Di-(4-chlorobenzoyl) peroxide, maximum concentration 52% as a paste	5.2	UN2114	Organic Peroxide	II	1	5	
	Di-(4-chlorobenzoyl) peroxide, maximum concentration 52% in solution	5.2	UN2115	Organic Peroxide	II	1	5	
	Di-(4-chlorobenzoyl) peroxide, maximum concentration 75% with water	5.2	UN2113	Organic Peroxide	II	1	5	
	Dichlorodifluoromethane	2.2	UN1028	Nonflammable Gas	–	1.2	1.2	
	Dichlorodifluoromethane and difluoroethane, azeotropic mixture, with approximately 74% dichlorodifluoromethane	2.2	UN2602	Nonflammable Gas	–	1.2	1.2	
	Dichlorodimethyl ether, symmetrical	6.1	UN2249	Poison Flammable, Liquid	I	1	5	Stow "away from" living quarters
	1,1-Dichloroethane	3.2	UN2362	Flammable Liquid	II	1.2	1	
	Dichloroethylene	3.2	UN1150	Flammable Liquid	II	1.2	1	
	Dichloroethyl ether	6.1	UN1916	Poison	II	1.2	1.2	
	Dichloroisocyanuric acid, dry or Dichloroisocyanuric acid salts	5.1	UN2465	Oxidizer	II	1.2	1.2	
	Dichloroisopropyl ether	6.1	UN2490	Poison	II	1.2	1	
	Dichloromethane	6.1	UN1593	St. Andrews Cross	III	1.2	1.2	Shade from radiant heat
	Dichloromonofluoromethane	2.2	UN1029	Nonflammable Gas	–	1.2	1.2	
	1,1-Dichloro-1-nitroethane	6.1	UN2650	Poison	II	1.3	1.3	Keep cool Stow "away from" living quarters
	Dichloropentanes	3.3	UN1152	Flammable Liquid	II	1.2	1.2	
	Dichlorophenyl isocyanates	6.1	UN2250	Poison	II	1.3	1.3	Shade from radiant heat Stow "away from" living quarters
	Dichlorophenyl trichlorosilane	8	UN1766	Corrosive	II	1	1	Keep dry
	1,3-Dichloropropanol-2	6.1	UN2750	Poison	II	1.3	1.3	Keep cool Stow "away from" living quarters
	Dichloropropene	3.3	UN2047	Flammable Liquid	II	1.2	1.2	
	Dichlorosilane	2.3	UN2189	Poison Gas Flammable Gas	–	1	5	Stow "away from" living quarters
	Dichlorotetrafluoroethane	2.2	UN1958	Nonflammable Gas	–	1.2	1.2	
	Dicumyl peroxide, technical pure or with inert solid	5.2	UN2121	Organic Peroxide	II	1	5	
	Dicyclohexylamine	8	UN2565	Corrosive	III	1	5	Keep dry
	Dicyclohexylammonium nitrite	6.1	UN2687	St. Andrews Cross	III	1.2	1.2	
	Dicyclohexyl peroxydicarbonate, maximum concentration 91% with water	5.2	UN2153	Organic Peroxide	I	1	5	Control temperature 5 deg C Emergency temperature 10 deg C
	Dicyclohexyl peroxydicarbonate, technical pure	5.2	UN2152	Organic Peroxide	I	1	5	Control temperature 5 deg C Emergency temperature 10 deg C
	Dicyclopentadiene	3.3	UN2048	Flammable Liquid	III	1.2	1.2	
	Didecanoyl peroxide, technical pure	5.2	UN2120	Organic Peroxide	II	1	5	Control temperature 15 deg C Emergency temperature 20 deg C
	2,2-Di-(4,4-di-tert-butylperoxy cyclohexyl) propane, maximum concentration 42% with inert solid	5.2	UN2158	Organic Peroxide	II	1	5	
	Di-2,4-dichlorobenzoyl peroxide, maximum concentration 75% with water	5.2	UN2137	Organic Peroxide	II	1	5	
	Di-2,4-dichlorobenzoyl peroxide, maximum concentration 52% as a paste	5.2	UN2138	Organic Peroxide	II	1	5	
	Di-2,4-dichlorobenzoyl peroxide, maximum concentration 52% in solution	5.2	UN2139	Organic Peroxide	II	1	5	
	1,2-Di-(dimethylamino)-ethane	3.2	UN2372	Flammable Liquid	II	1.2	1	
	Didymium nitrate	5.1	UN1465	Oxidizer	III	1.2	1.2	
	Diethoxymethane	3.1	UN2373	Flammable Liquid	II	1.3	5	Keep cool
	3,3-Diethoxypropene	3.2	UN2374	Flammable Liquid	II	1.2	1	
	Diethylaluminum chloride	4.2	UN1101	Spontaneously Combustible	I	1	1	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Diethylamine	3.1	UN1154	Flammable Liquid	II	1.3	S	Keep cool
	Diethylaminoethanol	3.3	UN2686	Flammable Liquid	III	1.2	1.2	
	3-(Diethylamino) propylamine	8	UN2684	Corrosive, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	N,N-Diethylaniline	6.1	UN2432	St. Andrews Cross	III	1.2	1.2	
	Diethylbenzene	3.3	UN2049	Flammable Liquid	II	1.2	1.2	
	Diethylcarbinol	3.3	UN2706	Flammable Liquid	II	1.2	1.2	
	Diethyl carbonate	3.3	UN2366	Flammable Liquid	II	1.2	1.2	
	Diethyl dichlorosilane	8	UN1767	Corrosive, Flammable Liquid	II	1	1	Keep dry. Separate longitudinally by an intervening compartment or hold from explosives. Segregation same as for flammable liquids
	N,N-Diethylethylene diamine	8	UN2685	Corrosive, Flammable Liquid	II	1.3	1.3	Keep cool. Segregation same as for flammable liquids
N	Diethyleneglycol dinitrate, desensitized with not less than 25% non-volatile water-insoluble phlegmatizer, by weight	1.1D	UN0075	Explosive (1.1D)	–	–	–	
	Diethylenetriamine	8	UN2079	Corrosive	II	1.2	1.2	Stow "away from" acids, copper and copper alloys, and living quarters. "Separated from" nitric acid
	Diethyl ether	3.1	UN1155	Flammable Liquid	I	1.3	S	Keep cool
	Di-(2-ethylhexyl) peroxydicarbonate, maximum concentration 77% in solution	5.2	UN2123	Organic Peroxide	II	1	S	Control temperature -15 deg C. Emergency temperature -5 deg C
	Di-(2-ethylhexyl) peroxydicarbonate, maximum concentration 32%, stable dispersion in water	5.2	UN2950	Organic Peroxide	II	1	S	Control temperature -10 deg C. Emergency temperature 0 deg C
	Di-(2-ethylhexyl) peroxydicarbonate, technical pure	5.2	UN2122	Organic Peroxide	II	1	S	Control temperature -20 deg C. Emergency temperature -10 deg C
	Diethyl ketone	3.2	UN1156	Flammable Liquid	II	1.2	1	
	Diethylmagnesium	4.2	UN1367	Spontaneously Combustible	I	1	S	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	Diethyl-p-nitrosoaniline	4.2	–	Spontaneously Combustible	–	1.2	S	Stow "away from" foodstuff
	Diethyl peroxydicarbonate, maximum concentration 27% in solution	5.2	UN2175	Organic Peroxide	II	1	S	Control temperature -10 deg C. Emergency temperature 0 deg C
	Diethyl sulfide	3.2	UN2375	Flammable Liquid, Poison	II	1.3	S	Keep cool and dry
	Diethyl sulphate	6.1	UN1594	Poison	II	1	1	
	Diethylthiophosphoryl chloride	8	UN2751	Corrosive, Flammable Liquid	II	1	S	Keep cool and dry. Segregation same as for flammable liquids
	Diethylzinc	4.2	UN1366	Spontaneously Combustible	I	1	S	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	1,1-Difluoroethane	2.1	UN1030	Flammable Gas	–	1.2	1	Stow "away from" living quarters
	1,1-Difluoroethylene	2.1	UN1959	Flammable Gas	–	1.2	S	Stow "away from" living quarters
	Difluoromonochloroethane. See Chlorodifluoroethanes							
	Difluorophosphoric acid, anhydrous	8	UN1768	Corrosive	II	1.2	1.2	
	2,2-Dihydroperoxy propane, maximum concentration 25% with inert inorganic solid	5.2	UN2178	Organic Peroxide	II	1	S	
	2,3-Dihydropyran	3.2	UN2376	Flammable Liquid	II	1.2	1	
	Di-(1-hydroxy cyclohexyl) peroxide, technical pure	5.2	UN2148	Organic Peroxide	II	1	S	
	Diisobutylamine	3.3	UN2361	Flammable Liquid	II	1.2	1.2	
	Diisobutylene, (isomeric compounds)	3.2	UN2050	Flammable Liquid	II	1.2	1	
	Diisobutyl ketone	3.3	UN1157	Flammable Liquid	III	1.2	1.2	
	Diisooctyl acid phosphate	8	UN1902	Corrosive	III	1.2	1.2	Glass carboys in hampers not permitted under deck
	Diisopropylamine	3.2	UN1158	Flammable Liquid	II	1.2	1	
	Diisopropylbenzene hydroperoxide, maximum concentration 72% in solution	5.2	UN2171	Organic Peroxide	II	1	S	
	N,N-Diisopropyl ethanolamine	8	UN2925	Corrosive	III	1.2	1.2	Stow "away from" caustic alkalis
	Diisopropyl ether	3.1	UN1159	Flammable Liquid	II	1.3	S	Keep cool
	Diisopropyl peroxydicarbonate, technical pure	5.2	UN2133	Organic Peroxide	II	1	S	Control temperature -15 deg C. Emergency temperature -5 deg C
	Diisopropyl peroxydicarbonate, maximum concentration 52% in solution	5.2	UN2134	Organic Peroxide	II	1	S	Control temperature -10 deg C. Emergency temperature 0 deg C
	Diisotridecyl peroxydicarbonate, technical pure	5.2	UN2969	Organic Peroxide	II	1	S	Control temperature -10 deg C. Emergency temperature 0 deg C
	Dilutene, inhibited	3.3	UN2521	Flammable Liquid	II	1.2	1.2	
	Dilauroyl peroxide, maximum concentration 42%, stable dispersion in water	5.2	UN2893	Organic Peroxide	II	1	S	
	Dilauroyl peroxide, technical pure	5.2	UN2124	Organic Peroxide	II	1	S	
	1,1-Dimethoxyethane	3.1	UN2377	Flammable Liquid	II	1.3	S	Keep cool
		3.2	UN2377	Flammable Liquid	II	1.2	1	
	1,2-Dimethoxyethane	3.2	UN2252	Flammable Liquid	II	1.2	1	

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Note and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Dimethylamine, anhydrous	2.1	UN1032	Flammable Gas	–	12	5	Stow "away from" living quarters
	Dimethylamine, solution	3.2	UN1160	Flammable Liquid	II	12	1	
	3-Dimethylaminoacetonitrile	3.3	UN2378	Flammable Liquid, Poison	II	12	12	
	Dimethylaminoethyl methacrylate	6.1	UN2522	Poison	II	12	1	
	N,N-Dimethylaniline	6.1	UN2253	Poison	II	13	13	Stow "away from" sources of heat
	Di-(2-methylbenzoyl)peroxide, *with at least 15% water*	5.2	UN2593	Organic Peroxide	I	1	5	Control temperature 30 deg C. Emergency temperature 35 deg C
	2,3-Dimethylbutane	3.1	UN2457	Flammable Liquid	II	13	5	Keep cool
	3,3-Dimethylbutylamine	3.2	UN2379	Flammable Liquid	II	12	1	
	N,N-Dimethylcarbamoyl chloride	8	UN2262	Corrosive	II	12	12	
	Dimethyl carbonate	3.2	UN1161	Flammable Liquid	II	12	1	
	Dimethylcyclohexanes	3.2	UN2263	Flammable Liquid	II	12	1	
	N,N-Dimethylcyclohexylamine	8	UN2264	Corrosive, Flammable Liquid	II	13	13	Keep cool. Segregation same as for Flammable liquids
	2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane, *maximum concentration 82% with water*	5.2	UN2969	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane, *maximum concentration 82% with inert solid*	5.2	UN2173	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane, *technical pure*	5.2	UN2172	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexane, *maximum concentration 52% with inert solid*	5.2	UN2156	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexane, *technical pure*	5.2	UN2155	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexyne-3, *maximum concentration 52% with inert solid*	5.2	UN2159	Organic Peroxide	II	1	5	
	2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexyne-3, *technical pure*	5.2	UN2158	Organic Peroxide	II	1	5	
	Dimethyldichlorosilane	3.2	UN1162	Flammable Liquid, Corrosive	II	12	1	
	Dimethyldiethoxysilane	3.2	UN2380	Flammable Liquid	II	12	1	
	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy) hexane, *technical pure*	5.2	UN2157	Organic Peroxide	II	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	2,5-Dimethyl-2,5-dihydroperoxy hexane, *maximum concentration 82% with water*	5.2	UN2174	Organic Peroxide	II	1	5	
	Dimethyldioxanes	3.2	UN2707	Flammable Liquid	II	12	1	
	Dimethyldioxanes	3.3	UN2707	Flammable Liquid	II	12	12	
	Dimethyl disulfide	3.2	UN2381	Flammable Liquid	II	12	1	
	Dimethylethanolamine	3.3	UN2051	Flammable Liquid	II	13	13	
	Dimethyl ether	2.1	UN1033	Flammable Gas	–	12	1	Stow "away from" living quarters
	N,N-Dimethylformamide	3.5	UN2265	Flammable Liquid	III	12	12	
	Dimethylhydrazine, *symmetrical*	3.2	UN2382	Flammable Liquid, Poison	I	13	5	Keep cool
	Dimethylhydrazine, *unsymmetrical*	3.2	UN1163	Flammable Liquid, Corrosive	I	12	1	Stow "separated from" corrosive liquids and oxidizers
	Dimethylmagnesium	4.2	UN1368	Spontaneously Combustible	I	1	5	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	Dimethyl-p-nitrosoaniline. *See* p-Nitrosodimethylaniline							
	2,2-Dimethylpropane *other than pentane and isopentane*	2.1	UN2044	Flammable Gas	–	12	1	
	Dimethyl-N-propylamine	3.2	UN2266	Flammable Liquid, Corrosive	II	12	1	
	Dimethyl sulphate	6.1	UN1595	Poison	I	1	5	Stow "away from" living quarters
	Dimethyl sulphide	3.1	UN1164	Flammable Liquid	I	13	5	Keep cool
	Dimethyl thiophosphoryl chloride	8	UN2267	Corrosive	III	12	1	Keep dry. Stable from radiant heat. Glass carboys prohibited on passenger vessels
	Dimethylzinc	4.2	UN1370	Spontaneously Combustible	I	1	5	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	Dimyristylperoxydicarbonate, *maximum concentration 22%, stable dispersion in water*	5.2	UN2892	Organic Peroxide	II	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	Dimyristylperoxydicarbonate, *technical pure*	5.2	UN2595	Organic Peroxide	II	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	Dinitroanilines	6.1	UN1596	Poison	II	12	12	
	Dinitrobenzenes *(o-, m-, p-)*	6.1	UN1597	Poison	II	12	12	
	Dinitro-o-cresol, *liquid*	6.1	UN1598	Poison	I	1	1	
		6.1	UN1598	Poison	II	12	1	
		6.1	UN1598	St. Andrews Cross	III	12	12	
	Dinitro-o-cresol, *solid*	6.1	UN1598	Poison	III	12	12	
		6.1	UN1598	St. Andrews Cross	III	12	12	
	Dinitrogen tetroxide. *See* Nitrogen dioxide							
N	Dinitrophenates *alkali metals, dry or wetted with less than 15% water, by weight*	1.3C	UN0077	Explosive (1.3C), Poison	–	–	–	
	Dinitrophenolates, *wetted with, by weight, at least 15% water*	4.1	UN1321	Flammable Solid, Poison	I	12	5	Stow "away from" heavy metals and their compounds

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Rules and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Dinitrophenol, *dry or wetted with less than 15% water, by weight*	1.1D	UN0076	Explosive (1.1D), Poison	–	–	–	
	Dinitrophenol, *solution in water or flammable liquid*	6.1	UN1599	Poison, Flammable Liquid (only if flashpoint between 23 deg C and 61 deg C)	II	1.2	5	Stow "away from" heavy metals and their compounds. Segregation same as for flammable liquids if flash point below 61 deg C
	Dinitrophenol, *wetted with, by weight, at least 15% water*	4.1	UN1320	Flammable Solid, Poison	I	1.2	5	Stow "away from" heavy metals and their compounds and sodium compounds
N	Dinitroresorcinol, *dry or wetted with less than 15% water*	1.1D	UN0078	Explosive (1.1D)	–	–	–	
	Dinitroresorcinol, *wetted with, by weight, at least 15% water*	4.1	UN1322	Flammable Solid	I	1.2	5	Stow "away from" heavy metals and their compounds
N	Dinitrosobenzene	1.3C	UN0406	Explosive (1.3C)	–	–	–	
	Dinitrotoluenes, *molten*	6.1	UN1600	Poison	II	1.2	1.2	
	Dinitrotoluenes, *solid*	6.1	UN1600	Poison	II	1.2	1.2	
	Di-n-nonanoyl peroxide, *technical pure*	5.2	UN2130	Organic Peroxide	II	1	5	Control temperature 0 deg C. Emergency temperature 10 deg C
	Di-n-octanoyl peroxide, *technical pure*	5.2	UN2129	Organic Peroxide	II	1	5	Control temperature 10 deg C. Emergency temperature 15 deg C
	Dioxane	3.2	UN1165	Flammable Liquid	II	1.2	1	
	Dioxolane	3.2	UN1166	Flammable Liquid	II	1.2	1	
	Dipentene	3.3	UN2052	Flammable Liquid	III	1.2	1.2	
	Diperoxyazelaic acid, *maximum concentration 27%, with not less than 13% azelaic acid and not less than 53% sodium sulphate*	5.2	UN2958	Organic Peroxide	II	1	5	Control temperature 35 deg C. Emergency temperature 40 deg C
	Diphenylaminechloroarsine	6.1	UN1698	Poison	I	1	5	
	Diphenylchloroarsine	6.1	UN1699	Poison	I	1	5	Stow "away from" living quarters
	Diphenyl dichlorosilane	8	UN1769	Corrosive	II	1	1	Keep dry
	Diphenylmethane-4,4'-diisocyanate	6.1	UN2489	St. Andrews Cross	III	1.2	1.2	Stow "away from" sources of heat
	Diphenylmethyl bromide	8	UN1770	Corrosive	II	1	5	
N	Dipicryl sulfide, *dry or wetted with less than 10% water, by weight*	1.1D	UN0401	Explosive (1.1D)	–	–	–	
	Dipicryl sulphide, *wetted with, by weight, at least 10% water*	4.1	UN2852	Flammable Solid	I	1	5	
	Dipropionyl peroxide, *maximum concentration 28% in solution*	5.2	UN2132	Organic Peroxide	II	1	5	Control temperature 15 deg C. Emergency temperature 20 deg C
	Dipropylamine	3.2	UN2383	Flammable Liquid	II	1.2	1	
	Dipropyl ether	3.1	UN2384	Flammable Liquid	II	1.3	5	Keep cool
	Dipropylketone	3.3	UN2710	Flammable Liquid	III	1.2	1.2	
	Di-n-propyl peroxydicarbonate, *technical pure*	5.2	UN2176	Organic Peroxide	I	1	5	Control temperature -25 deg C. Emergency temperature -15 deg C
	Disinfectants, *corrosive, liquid, n.o.s.*	8	UN1903	Corrosive	II	1.2	1.2	
	Disinfectants, *n.o.s., poisonous, liquid or solid*	6.1	UN1601	Poison	I	1.2	1	
		6.1	UN1601	Poison	II	1.2	1.2	
		6.1	UN1601	St. Andrews Cross	III	1.2	1.2	
	Distearylperoxydicarbonate, *with 15% stearyl alcohol*	5.2	UN2592	Organic Peroxide	II	1	5	
	Disuccinic acid peroxide, *maximum concentration 72%, wetted with water*	5.2	UN2962	Organic Peroxide	I	1	5	Control temperature 10 deg C. Emergency temperature 15 deg C
	Disuccinic acid peroxide, *technical pure*	5.2	UN2135	Organic Peroxide	I	1	5	
	Dithiocarbamate pesticides, *liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C*	3.2	UN2772	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I-II	1.2	1	
	Dithiocarbamate pesticides, *liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C*	6.1	UN3005	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3005	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3005	St. Andrews Cross Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Dithiocarbamate pesticides, *liquid, toxic, n.o.s.*	6.1	UN3006	Poison	I	1	1	
		6.1	UN3006	Poison	II	1.2	1	
		6.1	UN3006	St. Andrews Cross	III	1.2	1.2	
	Dithiocarbamate pesticides, *solid, toxic, n.o.s.*	6.1	UN2771	Poison	I-II	1.2	1.2	
		6.1	UN2771	St. Andrews Cross	III	1.2	1.2	
	Di-(3,5,5-trimethyl-1,2-dioxolanyl-3)peroxide, *as a paste with at least 50% phlegmatizer*	5.2	UN2597	Organic Peroxide	II	1	5	Control temperature 30 deg C. Emergency temperature 35 deg C
	Di-(3,5,5-trimethylhexanoyl)peroxide, *technical pure or in solution*	5.2	UN2128	Organic Peroxide	II	1	5	Control temperature 0 deg C. Emergency temperature 10 deg C
	Divinyl ether, *inhibited*	3.1	UN1167	Flammable Liquid	II	1.3	5	Keep cool
	Dodecyl trichlorosilane	8	UN1771	Corrosive	II	1	1	Keep dry
	Dressing, leather. *See* Flammable liquid preparations, *n.o.s.*							
	Driers, *paint or varnish, liquid, n.o.s.*	3.2	UN1168	Flammable Liquid	II	1.2	1	
		3.3	UN1168	Flammable Liquid	III	1.2	1.2	
	Driers, *paint or varnish, solid, n.o.s.*	4.1	UN1371	Flammable Solid	III	1.2	1.2	
	Dyes, *n.o.s. or Dye intermediates, n.o.s., liquid or solid, corrosive*	8	UN2801	Corrosive, Flammable Liquid (only if flashpoint between 23 and 61 deg C)	II-III	1.2	1.2	Segregation same as for flammable liquids, if flashpoint between 23 and 61 deg C

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Dyes, n.o.s. or Dye intermediates, n.o.s., liquid or solid, poisonous	6.1	UN1602	Poison	I	1,2	1	
		6.1	UN1602	Poison	II	1,2	1,2	
		6.1	UN1602	St. Andrews Cross	III	1,2	1,2	
	Enamels. See Paints, etc							
	Engine starting fluid, with flammable gas	2.1	UN1960	Flammable Gas	–	1,2	5	Stow "away from" living quarters
	Epibromohydrin	6.1	UN2558	Poison, Flammable Liquid	I	1	5	Stow "away from" living quarters. Segregation same as for flammable liquids. Shade from radiant heat
	Epichlorohydrin	6.1	UN2023	Poison, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids. Stow "away from" living quarters
	1,2-Epoxy-3-ethoxy propane	3.3	UN2752	Flammable Liquid	III	1,2	1,2	
	Eradicators, paint or grease, liquid. To be classified and labeled according to the principle hazardous constituent	–	UN1350		–	1,2	1	
	Essences. See Extracts, aromatic, liquid							
	Ethane, compressed	2.1	UN1035	Flammable Gas	–	1,2	5	
	Ethane, refrigerated liquid	2.1	UN1961	Flammable Gas	–	1	5	
	Ethanolamine or Ethanolamine solutions	8	UN2491	Corrosive	III	1,2	1,2	
	Ethanol or Ethanol solutions, including Alcoholic beverages	3.2	UN1170	Flammable Liquid	II	1,2	1	
		3.3	UN1170	Flammable Liquid	III	1,2	1,2	
	Ether. See Diethyl ether							
	Ethyl acetate	3.2	UN1173	Flammable Liquid	II	1,2	1	
	Ethyl acetylene, inhibited	2.1	UN2452	Flammable Gas	–	1	5	
	Ethyl acrylate, inhibited	3.2	UN1917	Flammable Liquid	II	1,2	1	
	Ethyl alcohol. See Ethanol							
	Ethyl aldehyde. See Acetaldehyde							
	Ethyl aluminum dichloride	4.2	UN1924	Spontaneously Combustible	I	1	1	
	Ethyl aluminum sesquichloride	4.2	UN1925	Spontaneously Combustible	I	1	1	
	Ethylamine	2.1	UN1036	Flammable Gas	–	1,2	5	
	Ethylamine solution in water, concentrations up to 70%	3.1	UN2270	Flammable Liquid	II	1,3	5	Keep cool
		3.2	UN2270	Flammable Liquid	II	1,2	1,2	
		3.3	UN2270	Flammable Liquid	III	1,2	1,2	
	Ethyl amyl ketone	3.3	UN2271	Flammable Liquid	III	1,2	1,2	
	N-Ethylaniline	6.1	UN2272	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	2-Ethylaniline	6.1	UN2273	St. Andrews Cross	III	1,2	1,2	
	Ethylbenzene	3.2	UN1175	Flammable Liquid	II	1,2	1,2	
	N-Ethyl-o-benzylaniline	6.1	UN2274	St. Andrews Cross	III	1,2	1,2	Stow "away from" living quarters
	N-ethylbenzyltoluidines	6.1	UN2753	St. Andrews Cross	III	1,3	1,3	Keep cool
	Ethyl borate	3.2	UN1176	Flammable Liquid	II	1,2	1	
	Ethyl bromide	6.1	UN1891	Poison	II	1,3	1	Stow "away from" sources of heat
	Ethyl bromoacetate	6.1	UN1603	Poison, Flammable Liquid	II	1	5	Stow "away from" living quarters. Segregation same as for flammable liquids
	2-Ethylbutanol	3.3	UN2275	Flammable Liquid	III	1,2	1,2	
	Ethylbutyl acetate	3.3	UN1177	Flammable Liquid	III	1,2	1,2	
	Ethyl butyl ether	3.2	UN1179	Flammable Liquid	II	1,2	1	
	2-Ethylbutyraldehyde	3.2	UN1178	Flammable Liquid	II	1,2	1	
	Ethyl butyrate	3.3	UN1180	Flammable Liquid	II	1,2	1,2	
	Ethyl chloride	2.1	UN1037	Flammable Gas	–	1,2	5	Stow "away from" living quarters
	Ethyl chloroacetate	6.1	UN1181	Poison, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids. Stow "away from" sources of heat and living quarters
	Ethyl chlorocarbonate. See Ethyl chloroformate							
	Ethyl chloroformate	3.2	UN1182	Flammable Liquid, Poison, Corrosive	I	1,2	1	
	Ethyl-2-chloropropionate	3.3	UN2935	Flammable Liquid	III	1,2	1,2	
	Ethyl chlorothioformate	8	UN2826	Corrosive, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids
	Ethyl crotonate	3.2	UN1862	Flammable Liquid	II	1,2	1	
	Ethyl cyanoacetate	6.1	UN2666	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	Ethyl-3,3-di-(tert-butylperoxy) butyrate, maximum concentration 77% in solution	5.2	UN2185	Organic Peroxide	II	1	5	
	Ethyl-3,3-di-(tert-butylperoxy) butyrate, technical pure	5.2	UN2184	Organic Peroxide, Explosive (May not be required under certain conditions. See IMDG Code)	II	1	5	
	Ethyl-3,3-di(tert-butylperoxy)butyrate, with at least 52% inert inorganic solid	5.2	UN2598	Organic Peroxide	II	1	5	
	Ethyl dichloroarsine	6.1	UN1892	Poison	I	1	5	Stow "away from" living quarters
	Ethyldichlorosilane	3.2	UN1183	Flammable Liquid, Corrosive	II	1,2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Ethylene chlorohydrin	6.1	UN1135	Poison, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids. Stow "away from" living quarters and sources of heat
	Ethylene, compressed	2.1	UN1962	Flammable Gas	–	1,2	5	Stow "away from" living quarters
	Ethylenediamine	8	UN1604	Corrosive, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids
	Ethylene dibromide	6.1	UN1605	Poison	II	1,2	1,2	Stow "away from" living quarters
	Ethylene dichloride	3.2	UN1184	Flammable Liquid, Poison	II	1,2	1	
	Ethylene glycol diethyl ether	3.3	UN1153	Flammable Liquid	III	1,2	1,2	
	Ethylene glycol monobutyl ether	6.1	UN2369	St. Andrews Cross, Flammable Liquid (only if flashpoint below 61 deg C)	III	1,3	1,3	Shade from radiant heat. Stow "away from" living quarters. If flashpoint below 61 deg C, segregation same as for flammable liquids
	Ethylene glycol monoethyl ether	3.3	UN1171	Flammable Liquid	III	1,2	1,2	
	Ethylene glycol monoethyl ether acetate	3.3	UN1172	Flammable Liquid	III	1,2	1,2	
	Ethylene glycol monomethyl ether	3.3	UN1188	Flammable Liquid	III	1,2	1,2	
	Ethylene glycol monomethyl ether acetate	3.3	UN1189	Flammable Liquid	III	1,2	1,2	
	Ethyleneimine, inhibited	3.2	UN1185	Flammable Liquid Poison	I	1,2	1	
	Ethylene oxide and carbon dioxide, mixtures. See Carbon dioxide and ethylene oxide mixtures							
	Ethylene oxide and propylene oxide mixtures, not more than 30% ethylene oxide	3.1	UN2983	Flammable Liquid, Poison	I	1,3	5	Keep cool
	Ethylene oxide, containing not more than 9.2% of nitrogen	2.1	UN1040	Flammable Gas, Poison Gas	–	1,2	1	Stow "away from" living quarters
	Ethylene, refrigerated liquid	2.1	UN1038	Flammable Gas	–	1	5	Stow "away from" living quarters
	Ethyl ether. See Diethyl ether							
	Ethyl fluid. See Motor fuel antiknock mixtures							
	Ethyl fluoride	2.1	UN2453	Flammable Gas	–	1,2	5	
	Ethyl formate	3.1	UN1190	Flammable Liquid	II	1,3	5	Keep cool
	Ethyl hexaldehyde	3.3	UN1191	Flammable Liquid	III	1,2	1,2	
	2-Ethylhexylamine	8	UN2276	Corrosive, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	2-Ethylhexylchloroformate	6.1	UN2748	Poison, Corrosive	II	1,3	1,3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters
	Ethylisobutyrate	3.2	UN2385	Flammable Liquid	II	1,2	1	
	Ethyl isocyanate	3.2	UN2481	Flammable Liquid, Poison	I	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	Ethyl lactate	3.3	UN1192	Flammable Liquid	III	1,2	1,2	
	Ethyl mercaptan	3.1	UN2363	Flammable Liquid, Poison	II	1,3	5	Keep cool and dry. Stow "separated from" foodstuffs and all odor absorbing cargo
	Ethyl methacrylate, inhibited	3.2	UN2277	Flammable Liquid	II	1,2	1	
	Ethyl methyl ether	2.1	UN1039	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Ethyl methyl ketone	3.2	UN1193	Flammable Liquid	II	1,2	1	
	Ethyl methyl ketone peroxide(s), maximum concentration 60%	5.2	UN2127	Organic Peroxide	I	1	5	
	Ethyl methyl ketone peroxide(s), maximum concentration 50%, containing not more than 10% available oxygen	5.2	UN2550	Organic Peroxide	I	1	5	
N	Ethyl methyl ketone peroxide(s), maximum concentration 50%, containing more than 10% available oxygen			–	–	–		
	Ethyl nitrite, solutions	3.1	UN1194	Flammable Liquid	I	1,3	5	Keep cool
	Ethyl orthoformate	3.3	UN2524	Flammable Liquid	II	1,2	1,2	
	Ethyl oxalate	6.1	UN2525	St. Andrews Cross	III	1,2	1,2	
	Ethylphenyldichlorosilane	8	UN2435	Corrosive	II	1	1	Keep dry
	1-Ethyl piperidine	3.2	UN2386	Flammable Liquid	II	1,2	1	
	Ethyl propionate	3.2	UN1195	Flammable Liquid	II	1,2	1	
	Ethyl propyl ether	3.1	UN2615	Flammable Liquid	II	1,3	5	Keep cool
	Ethyl silicate. See Tetraethyl silicate							
	Ethylsulphuric acid	8	UN2571	Corrosive	II	1,2	1	Keep dry. Metal drums only permitted under deck
	N-Ethyltoluidines (o m p)	6.1	UN2754	Poison, Flammable Liquid (only if flashpoint below 61 deg C)	II	1,3	1,3	Keep cool. Shade from radiant heat. Stow "away from" living quarters. If flashpoint below 61 deg C, segregation same as for flammable liquids
	Ethyltrichlorosilane	3.2	UN1196	Flammable Liquid, Corrosive	II	1,2	1	
N	Explosives, blasting, Type A	1.1D	UN0081	Explosive (1.1D)	–	–	–	
	Explosives, blasting, Type B	1.5D	UN0331	Explosive (1.5D)	–	6	5	
N	Explosives, blasting, Type B	1.1D	UN0082	Explosive (1.1D)	–	–	–	
N	Explosives, blasting, Type C	1.1D	UN0083	Explosive (1.1D)	–	–	–	
N	Explosives, blasting, Type D	1.1D	UN0084	Explosive (1.1D)	–	–	–	
	Explosives, blasting, Type E	1.5D	UN0332	Explosive (1.5D)	–	6	5	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Special Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Explosives, blasting, Type E	1.1D	UN0241	Explosive (1.1D)	–	–	–	
	Extracts, aromatic, liquid	3.2	UN1169	Flammable Liquid	II III	1.2	1	
		3.3	UN1169	Flammable Liquid	III	1.2	1.2	
	Extracts, flavouring, liquid	3.2	UN1197	Flammable Liquid	II III	1.2	1	
		3.3	UN1197	Flammable Liquid	III	1.2	1.2	
	Fabric, animal or vegetable. See Fibres, animal or vegetable							
	Ferric arsenate	6.1	UN1606	Poison	II	1.2	1.2	
	Ferric arsenite	6.1	UN1607	Poison	II	1.2	1.2	
	Ferric chloride, anhydrous	8	UN1773	Corrosive	III	1.2	1.2	
	Ferric chloride, solution	8	UN2582	Corrosive	III	1.2	1.2	
	Ferric nitrate	5.1	UN1466	Oxidizer	III	1.2	1.2	
	Ferrocerium	4.1	UN1323	Flammable Solid	II	1.2	1.2	
	Ferrosilicon, containing more than 30% but less than 90% silicon	4.3	UN1408	Dangerous When Wet Poison	III	1.2	1.2	Keep dry. When stowed under deck, stow in a mechanically ventilated space
	Ferrous arsenate	6.1	UN1608	Poison	II	1.2	1.2	
	Ferrous metal borings, shavings, turnings, or cuttings in a form liable to self heating	4.2	UN2793	Spontaneously Combustible	III	1.2	1.2	
	Fertilizer ammoniating solution, containing free ammonia in excess of 35% ammonia	2.2	UN1043	Nonflammable Gas	–	1.2	5	Stow "away from" living quarters
	Fibres, animal or vegetable, burnt, wet or damp	4.2	UN1372	Spontaneously Combustible	III	1.2	1.2	
	Fibres or Fabric, animal or vegetable, containing more than 5% of animal or vegetable oil	4.2	UN1373	Spontaneously Combustible	III	1.2	1.2	
	Fibres, vegetable, dry	4.1	–	None	–	1.2	1.2	Stow "away from" animal or vegetable oils
	Fillers, liquid. See Paints, etc.							
	Film, motion picture, nitrocellulose base, exposed and developed film, or unexposed or undeveloped film	4.1	UN1324	Flammable Solid	III	1.2	1.2	Stow "away from" flammable substances. Maximum 250 Kg. net on deck on passenger vessels
	Film, motion picture, nitrocellulose base, old film	4.1	UN1324	Flammable Solid	III	1	5	Stow "away from" flammable substances
	Fire extinguisher charges, corrosive liquid	8	UN1774	Corrosive	II	1.2	1.2	
	Fire extinguishers, containing compressed or liquefied gas	2.2	UN1044	Nonflammable Gas	–	1.2	1.2	
	Firelighters, solid, with a flammable liquid	4.1	UN2623	Flammable Solid	II III	1.2	1.2	
N	Fireworks, Type A	1.1G	UN0333	Explosive (1.1G)	–	–	–	
N	Fireworks, Type B	1.2G	UN0334	Explosive (1.2G)	–	–	–	
N	Fireworks, Type C	1.3G	UN0335	Explosive (1.3G)	–	–	–	
	Fireworks, Type D	1.4G	UN0336	Explosive (1.4G)	–	1.3	1.3	
	Fireworks, Type D	1.4S	UN0337	None. Package to be marked "1.4 S"	–	1.3	1.3	
	Fishmeal or fishscrap, antioxidant treated, moisture content greater than 5% but not exceeding 12% by weight, fat content not more than 15% by weight	9	UN2216	None	III	1.2	1.2	
	Fishmeal or fishscrap, high hazard, unrestricted moisture content, unrestricted fat content in excess of 12% by weight, unrestricted fat content in excess of 15% by weight, in the case of anti-oxidant treated fishmeal or fishscrap	4.2	UN1374	Spontaneously Combustible	II	1.2	1.2	
	Fishmeal or fishscrap, not antioxidant treated, moisture content greater than 5% but not exceeding 12% by weight, fat content not exceeding 12% by weight	4.2	UN1374	None. Package to be marked "Class 4.2"	III	1.2	1.2	Double strip stowage recommended. Provide good surface and through ventilation
	Flammable gas in lighters. See Lighters for cigars and cigarettes, etc. with flammable gas							
	Flammable liquid preparations, n.o.s.	3.2	UN1142	Flammable Liquid	II	1.2	1	
		3.3	UN1142	Flammable Liquid	II	1.2	1.2	
	Flammable liquids, corrosive, n.o.s.	3.1	UN2924	Flammable Liquid, Corrosive	I II	1.3	5	Keep cool. Stow "away from" foodstuffs
		3.2	UN2924	Flammable Liquid, Corrosive	I II	1.2	1	
	Flammable liquids, n.o.s.	3.1	UN1993	Flammable Liquid	I II	1.3	5	Keep cool
		3.2	UN1993	Flammable Liquid	II	1.2	1	
		3.3	UN1993	Flammable Liquid	II	1.2	1.2	
	Flammable liquids, poisonous, n.o.s.	3.1	UN1992	Flammable Liquid, Poison	I II	1.3	5	Keep cool
		3.2	UN1992	Flammable Liquid, Poison	II	1.2	1	
		3.3	UN1992	Flammable Liquid, Poison	II	1.2	1.2	
	Flammable solids, corrosive, n.o.s.	4.1	UN2925	Flammable Solid, Corrosive	I II III	1	5	Stow "separated from" oxidizing substances
	Flammable solids, n.o.s.	4.1	UN1325	Flammable Solid	I	1.2	5	
		4.1	UN1325	Flammable Solid	II III	1.2	1	
	Flammable solids, poisonous, n.o.s.	4.1	UN2926	Flammable Solid	I	1.2	5	
		4.1	UN2926	Flammable Solid	II	1.2	1	

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Flares, aerial	1.1G	UN0420	Explosive (1.1G)	–	–	–	
N	Flares, aerial	1.2G	UN0421	Explosive (1.2G)	–	–	–	
N	Flares, aerial	1.3G	UN0093	Explosive (1.3G)	–	–	–	
	Flares, aerial	1.4G	UN0403	Explosive (1.4G)	–	1.3	1.3	
	Flares, aerial	1.4S	UN0404	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Flares, surface (other than water activated flares)	1.1G	UN0418	Explosive (1.1G)	–	–	–	
N	Flares, surface (other than water-activated flares)	1.2G	UN0419	Explosive (1.2G)	–	–	–	
N	Flares, surface (other than water-activated flares)	1.3G	UN0092	Explosive (1.3G)	–	–	–	
	Flax, dry. See Fibres, vegetable, dry							
	Fluoboric acid	8	UN1775	Corrosive	II	1.2	1.2	
	Fluoric acid. See Hydrofluoric acid, solution							
	Fluorine, compressed	2.3	UN1045	Poison Gas, Oxidizer	–	1	5	Stow "away from" foodstuffs, organic materials, and living quarters
	Fluoroacetic acid	6.1	UN2642	Poison	I	1.3	1.3	Keep cool. Stow "away from" living quarters
	4-Fluoroaniline	6.1	UN2941	St. Andrews Cross	III	1.2	1.2	
	2-Fluoroaniline	6.1	UN2941	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Stable from radiant heat. Segregation same as for flammable liquids
	Fluorobenzene	3.2	UN2387	Flammable Liquid	II	1.2	1	
	Fluorophosphoric acid, anhydrous	8	UN1776	Corrosive	II	1.2	1.2	
	Fluorosulphonic acid	8	UN1777	Corrosive	I	1	5	Keep dry. Stow "away from" fluorides
	Fluorotoluenes	3.2	UN2388	Flammable Liquid	II	1.2	1	
		3.3	UN2388	Flammable Liquid	II	1.2	1.2	
	Fluosilicic acid	8	UN1778	Corrosive	II	1.2	1.2	
	Formaldehyde solutions	3.3	UN1198	Flammable Liquid	II	1.2	1.2	
	Formaldehyde, solutions with a flashpoint above 61 degrees C	9	UN2209	None	III	1.2	1.2	Stow "away from" foodstuffs
	Formalin. See Formaldehyde							
	Formic acid	8	UN1779	Corrosive	II	1.2	1.2	Glass carboy in hampers prohibited under deck
N	Fracturing devices, explosive, for oil wells	1.1D	UN0099	Explosive (1.1D)	–	–	–	
	Fuel, aviation, turbine engine	3.2	UN1863	Flammable Liquid	II	1.2	1	
	Fuel, pyrophoric, n.o.s.	4.2	UN1375	Spontaneously Combustible	I	1	5	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	Fumaryl chloride	8	UN1780	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Furan	3.1	UN2389	Flammable Liquid	I	1.3	5	Keep cool
	Furfural	3.3	UN1199	Flammable Liquid	II	1.2	1.2	
	Furfuryl alcohol	6.1	UN2874	St. Andrews Cross	III	1.2	1.2	Stow "separated from" oxidizing substances
	Furfurylamine	3.3	UN2526	Flammable Liquid	II	1.2	1.2	
	Fuse, igniter, tubular, metal clad	1.4G	UN0103	Explosive (1.4G)	–	1.3	1.3	
N	Fuse, instantaneous, non-detonating	1.3G	UN0101	Explosive (1.3G)	–	–	–	
	Fusel oil	3.2	UN1201	Flammable Liquid	II	1.2	1	
	Fuse, safety	1.4S	UN0105	None. Package to be marked "1.4S"	–	1.3	1.3	
	Fuzes, detonating	1.4S	UN0367	None. Package to be marked "1.4S"	–	1.3	1.3	
	Fuzes, detonating	1.4B	UN0257	Explosive (1.4B)	–	1.3	1.3	
N	Fuzes, detonating	1.1B	UN0106	Explosive (1.1B)	–	–	–	
N	Fuzes, detonating	1.2B	UN0107	Explosive (1.2B)	–	–	–	
N	Fuzes, detonating, with protective features	1.1D	UN0408	Explosive (1.1D)	–	–	–	
N	Fuzes, detonating, with protective features	1.2D	UN0409	Explosive (1.2D)	–	–	–	
N	Fuzes, detonating, with protective features	1.4D	UN0410	Explosive (1.4D)	–	–	–	
	Fuzes, igniting	1.4S	UN0368	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Fuzes, igniting	1.3G	UN0316	Explosive (1.3G)	–	–	–	
N	Fuzes, igniting	1.4G	UN0317	Explosive (1.4G)	–	–	–	
	Gallium, metal	8	UN2803	Corrosive	III	1.2	1	Stow "away from" sources of heat and acids
	Gas drips, hydrocarbon	3.2	UN1864	Flammable Liquid	II	1.2	1	
	Gas oil	3.3	UN1202	Flammable Liquid	II	1.2	1.2	
	Gasoline	3.1	UN1203	Flammable Liquid	II	1.3	5	Keep cool
	Germane	2.3	UN2192	Poison Gas, Flammable Gas	–	1	5	Stow "away from" living quarters
	Glycerol-alpha-monochlorohydrin	6.1	UN2689	St. Andrews Cross	III	1.2	1.2	
	Glycidaldehyde	3.3	UN2622	Flammable Liquid, Poison	II	1.2	1.2	
N	Grenades, hand or rifle, with bursting charge	1.1D	UN0284	Explosive (1.1D)	–	–	–	
N	Grenades, hand or rifle, with bursting charge	1.2D	UN0285	Explosive (1.2D)	–	–	–	

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Grenades, hand or rifle, with bursting charge	1.1F	UN0292	Explosive (1.1F)	–	–	–	
N	Grenades, hand or rifle, with bursting charge	1.2F	UN0293	Explosive (1.2F)	–	–	–	
	Grenades, practice, hand or rifle	1.4S	UN0110	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Grenades, practice, hand or rifle	1.2G	UN0372	Explosive (1.2G)	–	–	–	
N	Grenades, practice, hand or rifle	1.3G	UN0318	Explosive (1.3G)	–	–	–	
	Guanidine nitrate	5.1	UN1467	Oxidizer	III	1.2	1.2	Stow "separated from" nitro compounds and chlorates
N	Guanyl nitrosamino guanylidene hydrazine, containing by weight, at least 30% water	1.1A	UN0113	Explosive (1.1A)	–	–	–	
N	Guanyl nitrosamino guanyl tetrazene, containing by weight, at least 30% water or mixture of alcohol and water	1.1A	UN0114	Explosive (1.1A)	–	–	–	
	Gutta percha solution	3.2	UN1205	Flammable Liquid	II	1.2	1	
		3.3	UN1205	Flammable Liquid	II	1.2	1.2	
	Hafnium metal powder, dry	4.2	UN2545	Spontaneously Combustible	II	1	5	
	Hafnium metal powder, wetted, with not less than 25% water (a visible excess of water must be present) mechanically produced, particle size less than 53 microns, or chemically produced, particle size less than 840 microns	4.1	UN1326	Flammable Solid	II	1.2	5	
	Halogenated Irritating liquids, n.o.s.	6.1	UN1610	Poison, Flammable Liquid (only if flashpoint between 23 and 61 deg C)	I,II	1	5	Stow "away from" living quarters. If flash point below 61 deg C, segregation same as for flammable liquids
		6.1	UN1610	St. Andrews Cross, Flammable Liquid (only if flashpoint between 23 and 61 deg C.)	III	1	5	Stow "away from" living quarters. If flash point below 61 deg C, segregation same as for flammable liquids
	Hay	4.1	UN1327	None	III	1.2	1.2	Stow "away from" animal or vegetable oils
	Helium, compressed	2.2	UN1046	Nonflammable Gas	–	1.2	1.2	
	Helium, refrigerated liquid	2.2	UN1963	Nonflammable Gas	–	1.2	1	
	Hemp, dry. *See* Fibres, vegetable, dry							
	Heptane, and its isomers	3.2	UN1206	Flammable Liquid	II	1.2	1	
	n-Heptene	3.2	UN2278	Flammable Liquid	II	1.2	1	
	Hexachloroacetone	6.1	UN2661	Poison	II	1.3	1	Keep cool
	Hexachlorobenzene	6.1	UN2729	St. Andrews Cross	III	1.2	1.2	
	Hexachlorobutadiene	6.1	UN2279	St. Andrews Cross	III	1.2	1.2	Stow "away from" living quarters
	Hexachlorocyclopentadiene	6.1	UN2646	Poison	I	1	5	Stow "away from" living quarters
	Hexachlorophene	6.1	UN2875	St. Andrews Cross	III	1.2	1.2	
	Hexadecyl trichlorosilane	8	UN1781	Corrosive	II	1	1	Keep dry
	Hexaldehyde	3.1	UN2458	Flammable Liquid	II	1.3	5	Keep cool
	Hexaethyl tetraphosphate	6.1	UN1611	Poison	I,II	1.2	5	Stow "away from" living quarters
		6.1	UN1611	St. Andrews Cross	III	1.2	5	Stow "away from" living quarters
	Hexaethyl tetraphosphate and compressed gas mixture	2.3	UN1612	Poison Gas	–	1	5	Stow "away from" living quarters
	Hexafluoroacetone	2.3	UN2420	Poison Gas	–	1	5	Stow "away from" living quarters
	Hexafluoroacetone hydrate	6.1	UN2552	Poison	II	1.2	1	Stow "away from" living quarters
	Hexafluoroethane	2.2	UN2193	Nonflammable Gas	–	1.2	1.2	
	Hexafluorophosphoric acid	8	UN1782	Corrosive	II	1.2	1.2	
	Hexafluoropropylene	2.2	UN1858	Nonflammable Gas	–	1.2	1.2	
	Hexaldehyde	3.3	UN1207	Flammable Liquid	III	1.2	1.2	
	Hexamethylenediamine, solid	8	UN2280	Corrosive	III	1.3	1.3	Keep cool
	Hexamethylenediamine, solution	8	UN1783	Corrosive Poison	II	1.2	1.2	
	Hexamethylenediisocyanate	6.1	UN2281	Poison	II	1.2	1	Keep dry
	Hexamethylenimine	3.2	UN2493	Flammable Liquid, Corrosive	II	1.2	1	
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, maximum concentration 52% with inert solid	5.2	UN2166	Organic Peroxide	II	1	5	
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, maximum concentration 52% in solution	5.2	UN2167	Organic Peroxide	II	1	5	
	3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane, technical pure	5.2	UN2165	Organic Peroxide	I	1	5	
	Hexamine	4.1	UN1328	Flammable Solid	III	1.2	1.2	
	Hexane, and its isomers	3.1	UN1208	Flammable Liquid	II	1.3	5	Keep cool
N	Hexanitrodiphenylamine	1.1D	UN0079	Explosive (1.1D) Poison	–	–	–	
N	Hexanitrostilbene	1.1D	UN0392	Explosive (1.1D)	–	–	–	
	Hexanols	3.3	UN2282	Flammable Liquid	III	1.2	1.2	
N	Hexanoral, cast	1.1D	UN0393	Explosive (1.1D)	–	–	–	
	Hex-1-ene	3.1	UN2370	Flammable Liquid	II	1.3	5	Keep cool
	1-Hexene. *See* Hex-1-ene							
N	Hexolite, dry or wetted with less than 15% water, by weight	1.1D	UN0118	Explosive (1.1D)	–	–	–	
	Hexyl trichlorosilane	8	UN1784	Corrosive	II	1	1	Keep dry

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Hydrazine, anhydrous or Hydrazine aqueous solutions containing more than 64% by weight hydrazine	3 8	UN2029	Flammable Liquid, Poison, Corrosive	I	1	S	
	Hydrazine hydrate or Hydrazine aqueous solutions with not more than 64% by weight hydrazine	8	UN2030	Corrosive, Poison	II	1 2	S	Under deck permitted only if containing not more than 36% by weight hydrazine. Stow "away from" nitric acids and perchloric acids not exceeding 50% acid by weight
	Hydrides, metal, n.o.s.	4 3	UN1409	Dangerous When Wet	I	1 2	S	
	Hydriodic acid, solution	8	UN1787	Corrosive	II	1	1	Glass carboys prohibited on passenger vessels
	Hydrobromic acid, solution	8	UN1788	Corrosive	II	1	1	Glass carboys prohibited on passenger vessels. Stow "away from" fluorides
	Hydrocarbon gases, compressed, n.o.s. or Hydrocarbon gases, mixtures, compressed, n.o.s.	2 1	UN1964	Flammable Gas	–	1 2	1	
	Hydrocarbon gases, liquefied, n.o.s. or Hydrocarbon gases, mixtures, liquefied, n.o.s.	2 1	UN1965	Flammable Gas	–	1 2	1	
	Hydrochloric acid, solution	8	UN1789	Corrosive	II	1	1	Glass carboys prohibited on passenger vessels. Stow "away from" fluorides
	Hydrocyanic acid, anhydrous, stabilized. See Hydrogen cyanide, anhydrous, stabilized							
	Hydrocyanic acid, aqueous solutions, with not more than 20% hydrocyanic acid	6 1	UN1613	Poison	I	1	S	Stow "away from" living quarters
	Hydrofluoric acid and sulphuric acid mixtures	8	UN1786	Corrosive Poison	I	1	S	Stow "away from" fluorides
	Hydrofluoric acid, solution	8	UN1790	Corrosive Poison	I/II	1	S	Keep cool
	Hydrofluosilicic acid. See Fluosilicic acid							
	Hydrogen and methane mixtures, compressed	2 1	UN2034	Flammable Gas	–	1 2	S	
	Hydrogen bromide, anhydrous	2 3	UN1048	Poison Gas, Corrosive	–	1	S	
	Hydrogen chloride, anhydrous	2 2	UN1050	Nonflammable Gas, Corrosive	–	1	S	Stow "away from" foodstuffs and living quarters
	Hydrogen, compressed	2 1	UN1049	Flammable Gas	–	1 2	S	Stow "separated from" chlorine, "away from" living quarters
	Hydrogen cyanide, anhydrous, stabilized	6 1	UN1051	Poison, Flammable Liquid	I	1	S	Shade from radiant heat. Segregation same as for flammable liquids
	Hydrogen cyanide, anhydrous, stabilized, absorbed in a porous inert material	6 1	UN1614	Poison	I	1	S	Shade from radiant heat. Stow "away from" living quarters
	Hydrogen fluoride, anhydrous	2 3	UN1052	Poison Gas, Corrosive	–	1	S	
	Hydrogen iodide, anhydrous	2 2	UN2197	Nonflammable Gas, Corrosive	–	1	S	Stow "away from" living quarters
	Hydrogen iodide, solution. See Hydriodic acid solution							
	Hydrogen peroxide, aqueous solutions with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)	5 1	UN2984	Oxidizer	III	1 2	1	Shade from radiant heat. Stow "away from" powdered metals and "separated from" permanganates
	Hydrogen peroxide, aqueous solutions with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary)	5 1	UN2014	Oxidizer, Corrosive	II	1	S	Shade from radiant heat. Stow "away from" powdered metals and "separated from" permanganates
	Hydrogen peroxide, stabilized, or Hydrogen peroxide, aqueous solutions, stabilized, with more than 60% hydrogen peroxide	5 1	UN2015	Oxidizer, Corrosive	I	1	S	Shade from radiant heat. Stow "away from" powdered metals and "separated from" permanganates
	Hydrogen, refrigerated liquid	2 1	UN1966	Flammable Gas	–	S	S	
	Hydrogen selenide, anhydrous	2 3	UN2202	Poison Gas, Flammable Gas	–	1	S	Stow "away from" living quarters
	Hydrogen sulphide	2 1	UN1053	Flammable Gas, Poison Gas	–	1	S	Stow "away from" foodstuffs and living quarters
	Hydroquinone	6 1	UN2662	St. Andrews Cross	III	1 2	1 2	
	Hydrosilicofluoric acid. See Fluosilicic acid							
	Hydroxylamine sulphate	8	UN2865	Corrosive	III	1 2	1 2	Keep dry
	Hypochlorite, solutions with more than 5% available chlorine	8	UN1791	Corrosive	II/III	1 2	1	Glass carboys in hampers prohibited under deck
	Igniter for aircraft thrust device for assisted take-off	4 1	UN2792	Flammable Solid	II	1 2	S	
	Igniters	1 4 G	UN0325	Explosive (1.4G)	–	1.3	1.3	
N	Igniters	1 1G	UN0121	Explosive (1.1G)	–	–	–	
N	Igniters	1 2G	UN0314	Explosive (1.2G)	–	–	–	
N	Igniters	1 3G	UN0315	Explosive (1.3G)	–	–	–	
	3,3-Iminobispropylamine	8	UN2269	Corrosive	III	1 2	1 2	
	Inflammable gas in lighters. See Lighters, for cigars and cigarettes, etc. with flammable gas							
	Inflammable liquid preparations, n.o.s. See Flammable liquid preparations, n.o.s.							
	Inflammable liquids, corrosive, n.o.s. See Flammable liquids, corrosive, n.o.s.							
	Inflammable liquids, n.o.s. See Flammable liquids, n.o.s.							
	Inflammable liquids, poisonous, n.o.s. See Flammable liquids, poisonous, n.o.s.							
	Inflammable solids, corrosive, n.o.s. See Flammable solids, corrosive, n.o.s.							

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Inflammable solids, n.o.s. *See* Flammable solids, n.o.s.							
	Inflammable solids, poisonous, n.o.s. *See* Flammable solids, poisonous, n.o.s.							
	Ink, printers	3.2	UN1210	Flammable Liquid	II	1,2	1	
		3.3	UN1210	Flammable Liquid	III	1,2	1,2	
	Insecticide gases, non toxic, n.o.s.	2.1	UN1968	Flammable Gas	–	1,2	1	
		2.2	UN1968	Nonflammable Gas	–	1,3	1,3	
	Insecticide gases, toxic, n.o.s.	2.3	UN1967	Poison Gas	–	1	5	Shade from radiant heat
	Iodine monochloride	8	UN1792	Corrosive	II	1	5	Keep dry
	Iodine pentafluoride	5.1	UN2495	Oxidizer, Poison	I	1	5	Keep dry
	2-Iodobutane	3.2	UN2390	Flammable Liquid	II	1,2	1	
	Iodomethylpropanes	3.2	UN2391	Flammable Liquid	II	1,2	1	
	Iodopropanes	3.2	UN2392	Flammable Liquid	II	1,2	1	
		3.3	UN2392	Flammable Liquid	III	1,2	1,2	
	Iron carbonyl. *See* Iron pentacarbonyl							
	Iron chloride. *See* Ferric chloride, anhydrous							
	Iron oxide, spent	4.2	UN1376	Spontaneously Combustible	III	1,2	5	
	Iron pentacarbonyl	6.1	UN1994	Poison, Flammable Liquid	I	1	5	Segregation same as for flammable liquids. Shade from radiant heat
	Iron sesquichloride. *See* Ferric chloride							
	Iron sponge, spent. *See* Iron oxide, spent							
	Isobutane or isobutane mixtures	2.1	UN1969	Flammable Gas	–	1,2	1	
	Isobutanol	3.3	UN1212	Flammable Liquid	II	1,2	1,2	
	Isobutyl acetate	3.2	UN1213	Flammable Liquid	II	1,2	1	
	Isobutyl acrylate, inhibited	3.3	UN2527	Flammable Liquid	II	1,2	1,2	
	Isobutyl alcohol. *See* Isobutanol							
	Isobutyl aldehyde. *See* Isobutyraldehyde							
	Isobutylamine	3.2	UN1214	Flammable Liquid	II	1,2	1	
	Isobutylene	2.1	UN1055	Flammable Gas	–	1,2	1	
	Isobutyl formate	3.2	UN2393	Flammable Liquid	II	1,2	1	
	Isobutyl isobutyrate	3.3	UN2528	Flammable Liquid	III	1,2	1,2	
	Isobutyl isocyanate	3.2	UN2486	Flammable Liquid, Poison	II	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	Isobutyl methacrylate, inhibited	3.3	UN2283	Flammable Liquid	III	1,2	1,2	
	Isobutyl methyl ketone peroxide, maximum concentration 62% in solution	5.2	UN2126	Organic Peroxide	I	1	5	
	Isobutyl propionate	3.2	UN2394	Flammable Liquid	II	1,2	1	
	Isobutyraldehyde	3.1	UN2045	Flammable Liquid	II	1,3	5	Keep cool
	Isobutyric acid	3.3	UN2529	Flammable Liquid	III	1,2	1,2	
	Isobutyric anhydride	3.3	UN2530	Flammable Liquid	III	1,2	1,2	
	Isobutyronitrile	3.2	UN2284	Flammable Liquid, Poison	II	1,3	5	Keep cool
	Isobutyryl chloride	3.2	UN2395	Flammable Liquid, Poison	II	1	1	Keep dry. Shade from radiant heat
	Isobutyryl peroxide, maximum concentration 52% in solution	5.2	UN2182	Organic Peroxide	II	1	5	Control temperature -20 deg C. Emergency temperature -10 deg C
	Isocyanates, n.o.s. or Isocyanate solutions, n.o.s., boiling point not less than 300 deg C	6.1	UN2207	St. Andrews Cross	III	1,2	1,2	Stow "away from" sources of heat
	Isocyanates, n.o.s. or Isocyanate solutions, n.o.s., flashpoint not less than 23 deg C, boiling point less than 300 deg C	6.1	UN2206	Poison, Flammable Liquid (only if flashpoint is below 61 deg C)	II	1,3	1	Shade from radiant heat. Segregation same as for flammable liquids if flashpoint below 61 deg C
	Isocyanates, n.o.s. or Isocyanate solutions, n.o.s., flashpoint not less than -18 deg C but less than 23 deg C	3.2	UN2478	Flammable Liquid, Poison	II	1	5	
	Isocyanates, n.o.s. or Isocyanate solutions, n.o.s., flashpoint less than -18 deg C	3.1	UN2478	Flammable Liquid, Poison	II	1	5	Stow "away from" sources of heat. Keep cool
	Isocyanatobenzotrifluorides	6.1	UN2285	Poison	II	1,2	1	Shade from radiant heat. Stow "away from" living quarters
	Isoheptene	3.1	UN2287	Flammable Liquid	II	1,3	5	Keep cool
	Isohexene	3.1	UN2288	Flammable Liquid	II	1,3	5	Keep cool
	Isononanoyl peroxide. *See* Di-(3,3,5-trimethylhexanoyl) peroxide				–	–	–	
	Isooctene	3.2	UN1216	Flammable Liquid	II	1,2	1	
	Isopentane. *See* Pentanes							
	Isopentenes	3.1	UN2371	Flammable Liquid	I	1,3	5	Keep cool
	Isophoronediamine	8	UN2289	Corrosive	III	1,2	1,2	Glass carboys prohibited on passenger vessels
	Isophorone diisocyanate	6.1	UN2290	Poison	II	1,2	1	Stow "away from" living quarters
	Isoprene, inhibited	3.1	UN1218	Flammable Liquid	I	1,3	5	Keep cool
	Isopropanol	3.2	UN1219	Flammable Liquid	II	1,2	1	
	Isopropenyl acetate	3.2	UN2403	Flammable Liquid	II	1,2	1	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Isopropenylbenzene	3.3	UN2303	Flammable Liquid	II	1.2	1.2	
	Isopropyl acetate	3.2	UN1220	Flammable Liquid	II	1.2	1	
	Isopropyl acid phosphate	8	UN1793	Corrosive	III	1.2	1.2	Glass carboys in hampers prohibited under deck
	Isopropyl alcohol. See Isopropanol							
	Isopropylamine	3.1	UN1221	Flammable Liquid	I	1.3	5	Keep cool
	Isopropylbenzene	3.3	UN1918	Flammable Liquid	II	1.2	1.2	
	Isopropyl butyrate	3.3	UN2405	Flammable Liquid	II	1.2	1.2	
	Isopropyl chloroacetate	3.3	UN2947	Flammable Liquid	III	1.2	1.2	
	Isopropyl chloroformate	3.2	UN2407	Flammable Liquid, Corrosive	II	1.2	1	
	Isopropyl-2-chloropropionate	3.3	UN2934	Flammable Liquid	III	1.2	1.2	
	Isopropyl isobutyrate	3.2	UN2406	Flammable Liquid	II	1.2	1	
	Isopropyl isocyanate	3.2	UN2483	Flammable Liquid, Poison	I	1	5	Keep cool
	Isopropyl nitrate	3.2	UN1222	Flammable Liquid	II	1.2	1	
	Isopropyl propionate	3.2	UN2409	Flammable Liquid	II	1.2	1	
	Isosorbide dinitrate mixture with not less than 60% lactose, mannose, starch, or calcium hydrogen phosphate	4.1	UN2907	Flammable Solid	II	1.2	5	
N	Jet perforating guns, charged, oil well, without detonator	1.1D	UN0124	Explosive (1.1D)	–	–	–	
	Jute, dry. See Fibres, vegetable, dry							
	Kapok, dry. See Fibres, vegetable, dry							
	Kerosene	3.3	UN1223	Flammable Liquid	II	1.2	1.2	
	Ketones, liquid, n.o.s.	3.1	UN1224	Flammable Liquid	I/II	1.3	5	Keep cool
		3.2	UN1224	Flammable Liquid	II	1.2	1	
		3.3	UN1224	Flammable Liquid	II	1.2	1.2	
	Krypton, compressed	2.2	UN1056	Nonflammable Gas	–	1.2	1.2	
	Krypton, refrigerated liquid	2.2	UN1970	Nonflammable Gas	–	1.2	1	
	Lacquer base. See Paints, etc.							
	Lacquer chips. See Nitrocellulose, wetted with, by weight, more than 4% flammable liquid							
	Lacquers. See Paints, etc.							
	Lauroyl peroxide. See Dilauroyl peroxide				–	–	–	
	Lead acetate	6.1	UN1616	St. Andrews Cross	III	1.2	1.2	
	Lead arsenates	6.1	UN1617	Poison	II	1.2	1.2	
	Lead arsenites	6.1	UN1618	Poison	II	1.2	1.2	
N	Lead azide, containing, by weight, at least 20% water or mixture of alcohol and water	1.1A	UN0129	Explosive (1.1A)	–	–	–	
	Lead compounds, soluble, n.o.s.	6.1	UN2291	St. Andrews Cross	III	1.2	1.2	
	Lead cyanide	6.1	UN1620	Poison	II	1.2	1.2	Stow "away from" acids
	Lead dioxide	5.1	UN1872	Oxidizer	III	1.2	1.2	Stow "away from" foodstuffs
	Lead dross. See Lead sulphate, with more than 3% free acid							
	Lead nitrate	5.1	UN1469	Oxidizer, Poison	II	1.2	1.2	
	Lead perchlorate	5.1	UN1470	Oxidizer, Poison	II	1.2	1.2	Stow "away from" powdered metals
	Lead peroxide. See Lead dioxide							
	Lead phosphite dibasic	4.1	UN2989	Flammable Solid	II	1.2	1	Stow "away from" foodstuffs
N	Lead styphnate, containing, by weight, at least 20% water or mixture of alcohol and water	1.1A	UN0130	Explosive (1.1A)	–	–	–	
	Lead sulphate, with more than 3% free acid	8	UN1794	Corrosive	II	1.2	1.2	
	Life-rafts, inflatable	9	–	None	–	1.2	1.2	
	Lighter fuels, cigar and cigarette	3.2	UN1226	Flammable Liquid	II	1.2	1	
	Lighters for cigars and cigarettes, etc., with flammable gas	2.1	UN1057	Flammable Gas	–	1	1	
	Lighters for cigars and cigarettes, etc., with fuel	3.2	UN1226	Flammable Liquid	II	1.2	1	
	Lighters, fuse	1.4 S	UN0131	None. Package to be marked "1.4 S"	–	1.3	1.3	
	Liquefied gases, n.o.s. See Compressed or Liquefied gases, n.o.s.							
	Liquefied non-flammable gases charged with nitrogen, carbon dioxide or air	2.2	UN1058	Nonflammable Gas	–	1.2	1.2	
	Lithium alkyls	4.2	UN2445	Spontaneously Combustible	I	1	1	
	Lithium aluminium hydride	4.3	UN1410	Dangerous When Wet	I	1.2	5	
	Lithium aluminium hydride, ethereal	4.3	UN1411	Dangerous When Wet Flammable Liquid	I	1	5	
	Lithium amide	4.3	UN1412	Dangerous When Wet	II	1.2	5	
	Lithium borohydride	4.3	UN1413	Dangerous When Wet	I	1.2	5	
	Lithium ferrosilicon	4.3	UN2830	Dangerous When Wet	II	1.2	5	
	Lithium hydride	4.3	UN1414	Dangerous When Wet	I	1.2	5	
	Lithium hydride, fused solid	4.3	UN2805	Dangerous When Wet	II	1.2	5	
	Lithium hydroxide monohydrate	8	UN2680	Corrosive	II	1.2	1.2	Keep dry
	Lithium hydroxide, solution	8	UN2679	Corrosive	II	1.2	1.2	Glass carboys not permitted under deck on passenger vessels

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Lithium hypochlorite, dry or Lithium hypochlorite mixtures containing more than 39% available chlorine (9.8% available oxygen)	5.1	UN1471	Oxidizer	II	1.2	1.2	
	Lithium, metal	4.3	UN1415	Dangerous When Wet	II	1.2	5	
	Lithium nitrate	5.1	UN2722	Oxidizer	III	1.2	1.2	
	Lithium nitride	4.3	UN2806	Dangerous When Wet	I	1.2	5	
	Lithium peroxide	5.1	UN1472	Oxidizer	II	1.2	1.2	Keep dry
	Lithium silicon	4.3	UN1417	Dangerous When Wet	II	1.2	1.2	
	London purple	6.1	UN1621	Poison	II	1.2	1.2	
	Lye. See Sodium hydroxide							
	Magnesium aluminum phosphide	4.3	UN1419	Dangerous When Wet	I	1.2	5	When stowed under deck, stow in a mechanically ventilated space
	Magnesium arsenate	6.1	UN1622	Poison	II	1.2	1.2	
	Magnesium bromate	5.1	UN1473	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Magnesium chlorate	5.1	UN2723	Oxidizer	II	1.2	1.2	Stow "separated from" ammonium compounds and "away from" finely powdered metals
	Magnesium diamide	4.2	UN2004	Spontaneously Combustible	II	1	1	
	Magnesium diphenyl	4.2	UN2005	Spontaneously Combustible	I	1	1	
	Magnesium granules, coated containing more than 50% magnesium, particle size not less than 149 microns	4.3	UN2950	Dangerous When Wet	III	1.2	1.2	
	Magnesium hydride	4.3	UN2010	Dangerous When Wet	I	1.2	5	
	Magnesium nitrate	5.1	UN1474	Oxidizer	III	1.2	1.2	
	Magnesium or Magnesium alloys with more than 50% magnesium, in pellets, turnings or ribbon	4.1	UN1869	Flammable Solid	III	1.2	1.2	Stow "away from" liquid halogenated hydrocarbons
	Magnesium perchlorate	5.1	UN1475	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals
	Magnesium peroxide	5.1	UN1476	Oxidizer	II	1.2	1.2	Keep dry
	Magnesium phosphide	4.3	UN2011	Dangerous When Wet Poison	I	1.2	5	When stowed under deck, stow in a mechanically ventilated space
	Magnesium powder or Magnesium alloys, powder containing more than 50% magnesium, nonpyrophoric	4.3	UN1418	Dangerous When Wet	II	1.2	1.2	Stow "away from" liquid halogenated hydrocarbons
	Magnesium silicide	4.3	UN2624	Dangerous When Wet	II	1.2	1	
	Magnesium silicofluoride	6.1	UN2853	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Maleic anhydride, solid or molten	8	UN2215	None. Package to be marked "Class 8"	III	1.2	1.2	Stow "away from" foodstuffs
	Malononitrile	6.1	UN2647	Poison	II	1.3	1.3	Keep cool. Stow "away from" living quarters
	Maneb, or Maneb preparation(s), stabilized against self heating	4.3	UN2968	Dangerous When Wet	III	1.2	1.2	Stow "away from" acids, living quarters and foodstuffs
	Maneb, or maneb preparation(s) with not less than 60% maneb	4.2	UN2210	Spontaneously Combustible Dangerous When Wet	III	1.2	1.2	Stow "away from" acids, living quarters and foodstuffs. Keep cool and dry
	Manganese ethylene-bis-dithiocarbamate. See Maneb							
	Manganese nitrate	5.1	UN2724	Oxidizer	III	1.2	1.2	
	Manganese resinate	4.1	UN1330	Flammable Solid	III	1.2	1.2	
N	Mannitol hexanitrate, containing by weight, at least 40% water or mixture of alcohol and water	1.1D	UN0133	Explosive (1.1D)	–	–	–	
	Matches, fusee	4.1	UN2254	Flammable Solid	III	1.2	1.2	
	Matches, safety	4.1	UN1944	Flammable Solid	III	1.2	1.2	
	Matches, strike anywhere	4.1	UN1331	Flammable Solid	III	1.2	1	
	Matches, wax "vesta"	4.1	UN1945	Flammable Solid	III	1.2	1	
N	Medicines, n.o.s. to be classified and labeled according to the principle hazardous constituent	–	UN1851		–			
	MEKP See Ethyl methyl ketone peroxide							
	p-Menthane hydroperoxide, technical pure	5.2	UN2125	Organic Peroxide	I	1	5	
	Mercaptans, liquid, n.o.s. or Mercaptan mixtures, liquid, n.o.s.	3.1	UN1228	Flammable Liquid	II	1.3	5	Keep cool
		3.2	UN1228	Flammable Liquid	II	1.2	1	
		3.3	UN1228	Flammable Liquid	II	1.2	1.2	
	Mercuric acetate. See Mercury acetate							
	Mercuric arsenate	6.1	UN1623	Poison	II	1.2	1.2	
	Mercuric bromide. See Mercury bromides							
	Mercuric chloride	6.1	UN1624	Poison	II	1.2	1.2	
	Mercuric cyanide. See Mercury cyanide							
	Mercuric nitrate	6.1	UN1625	Poison	II	1.2	1.2	
	Mercuric oxycyanide. See Mercury oxycyanide							
	Mercuric potassium cyanide	6.1	UN1626	Poison	I	1.2	1.2	Stow "away from" acids
	Mercuric sulphate	6.1	UN1645	Poison	II	1.2	1.2	
	Mercurol. See Mercury nucleate							
	Mercurous acetate. See Mercury acetate							
	Mercurous bromide. See Mercury bromides							

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Mercurous nitrate	6.1	UN1627	Poison	II	1,2	1,2	
	Mercurous sulphate	6.1	UN1628	Poison	II	1,2	1,2	
	Mercury acetate	6.1	UN1629	Poison	II	1,2	1,2	
	Mercury ammonium chloride	6.1	UN1630	Poison	II	1,2	1,2	
	Mercury based pesticides, liquid, flammable, toxic, n.o.s., flash-point below 23 deg C	3.2	UN2778	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I,II	1,2	1	
	Mercury based pesticides, liquid, toxic, flammable, n.o.s., flash-point between 23 deg C and 61 deg C	6.1	UN3011	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3011	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN3011	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Mercury based pesticides, liquid, toxic, n.o.s.	6.1	UN3012	Poison	I	1	1	
		6.1	UN3012	Poison	II	1,2	1	
		6.1	UN3012	St. Andrews Cross	III	1,2	1,2	
	Mercury based pesticides, solid, toxic, n.o.s.	6.1	UN2777	Poison	I,II	1,2	1,2	
		6.1	UN2777	St. Andrews Cross	III	1,2	1,2	
	Mercury benzoate	6.1	UN1631	Poison	II	1,2	1,2	
	Mercury bisulphate	6.1	UN1633	Poison	II	1,2	1,2	
	Mercury bromides	6.1	UN1634	Poison	II	1,2	1,2	
	Mercury compounds, liquid, n.o.s.	6.1	UN2024	Poison	I,II	1,2	1	
		6.1	UN2024	St. Andrews Cross	III	1,2	1	
	Mercury compounds, solid, n.o.s.	6.1	UN2025	Poison	I,II	1,2	1,2	
		6.1	UN2025	St. Andrews Cross	III	1,2	1,2	
	Mercury cyanide	6.1	UN1636	Poison	II	1,2	1,2	Stow "away from" living quarters and acids
N	Mercury fulminate, containing by weight, at least 20% water or mixture of alcohol and water	1.1A	UN0135	Explosive (1.1A)	–	–	–	
	Mercury gluconate	6.1	UN1637	Poison	II	1,2	1,2	
	Mercury iodide	6.1	UN1638	Poison	II	1,2	1,2	
	Mercury, metal	8	UN2809	Corrosive	III	1,2	1	Stow "away from" living quarters and acids
	Mercury nucleate	6.1	UN1639	Poison	II	1,2	1,2	
	Mercury oleate	6.1	UN1640	Poison	II	1,2	1,2	
	Mercury oxide	6.1	UN1641	Poison	II	1,2	1,2	
	Mercury oxycyanide	6.1	UN1642	Poison	II	1,2	1,2	Stow "away from" acids
	Mercury potassium iodide	6.1	UN1643	Poison	II	1,2	1,2	
	Mercury salicylate	6.1	UN1644	Poison	II	1,2	1,2	
	Mercury thiocyanate	6.1	UN1646	Poison	II	1,2	1,2	
	Mesityl oxide	3.3	UN1229	Flammable Liquid	II	1,2	1,2	
	Metal alkyls, n.o.s.	4.2	UN2003	Spontaneously Combustible	I	1	5	
	Metaldehyde	4.1	UN1332	Flammable Solid	III	1,2	1,2	
	Methacraldehyde	3.2	UN2396	Flammable Liquid, Poison	II	1,3	5	Keep cool
	Methacrylic acid, inhibited	8	UN2531	Corrosive	III	1	1	Keep cool. Glass carboys prohibited on passenger vessels
	Methallyl alcohol	3.3	UN2614	Flammable Liquid	II	1,2	1,2	
	Methane or Natural gases with a high methane content, compressed	2.1	UN1971	Flammable Gas	–	1,2	5	Stow "away from" living quarters
	Methane or Natural gases with a high methane content, refrigerated liquid	2.1	UN1972	Flammable Gas	–	1	5	Stow "away from" living quarters
	Methanol	3.2	UN1230	Flammable Liquid, Poison	II	1,2	1	
	Methoxymethyl isocyanate	3.2	UN2605	Flammable Liquid, Poison	I	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	4-Methoxy-4-methylpentan-2-one	3.3	UN2293	Flammable Liquid	III	1,2	1,2	
	Methyl acetate	3.2	UN1231	Flammable Liquid	II	1,2	1	
	Methyl acetone	3.2	UN1232	Flammable Liquid	II	1,2	1	
	Methyl acetylene and propadiene mixture, stabilized	2.1	UN1060	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	beta-Methyl acrolein. See Crotonaldehyde, inhibited							
	Methyl acrylate, inhibited	3.2	UN1919	Flammable Liquid	II	1,2	1	
	Methylal	3.1	UN1234	Flammable Liquid	II	1,3	5	Keep cool
	Methyl alcohol. See Methanol							
	Methyl allyl chloride	3.1	UN2554	Flammable Liquid	II	1,3	5	Keep cool
	Methyl aluminum sesquibromide	4.2	UN1926	Spontaneously Combustible	I	1	1	
	Methyl aluminum sesquichloride	4.2	UN1927	Spontaneously Combustible	I	1	1	
	Methylamine, anhydrous	2.1	UN1061	Flammable Gas	–	1,2	5	Stow "away from" living quarters

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Methylamine, aqueous solution	3.1	UN1235	Flammable Liquid	II	1.3	5	Keep cool. Stow "away from" mercury and its compounds
	Methylamyl acetate	3.3	UN1233	Flammable Liquid	III	1.2	1.2	
	Methyl amyl ketone. See Amyl methyl ketone							
	N-Methylaniline	6.1	UN2294	St. Andrew's Cross	III	1.2	1.2	
	Methylbenzene	6.1	UN2938	St. Andrew's Cross	III	1.2	1.2	
	alpha-Methylbenzyl alcohol	6.1	UN2937	St. Andrew's Cross	III	1.2	1.2	
	Methyl bromide	2.3	UN1062	Poison Gas	–	1.2	5	Under deck stowage permitted only if an indicating substance such as chloropicrin has been added
	Methyl bromide and chloropicrin, mixtures. See Chloropicrin and methyl bromide, mixtures							
	Methyl bromide and ethylene dibromide mixtures, liquid	6.1	UN1647	Poison	I	1	1	Stow "away from" living quarters
	Methyl bromoacetate	6.1	UN2643	Poison	II	1	5	Keep cool. Stow "away from" living quarters
	2-Methyl-1,3-butadiene. See Isoprene							
	3-Methyl butan-2-one	3.2	UN2397	Flammable Liquid	II	1.2	1	
	3-Methyl-1-butene	3.2	UN2561	Flammable Liquid	II	1.2	1	
	2-Methyl-1-butene	3.1	UN2459	Flammable Liquid	I	1.3	5	Keep cool
	2-Methyl-2-butene	3.1	UN2460	Flammable Liquid	II	1.3	5	Keep cool
	N-Methylbutylamine	3.2	UN2945	Flammable Liquid	II	1.2	1	
	Methyl-tert-butyl ether	3.2	UN2398	Flammable Liquid	II	1.2	1	
	Methyl butyrate	3.2	UN1237	Flammable Liquid	II	1.2	1	
	Methyl chloride	2.3	UN1063	Poison Gas. Flammable Gas	–	1.2	5	
	Methyl chloride and chloropicrin, mixtures. See Chloropicrin and methyl chloride, mixtures							
	Methyl chloride and methylene chloride, mixtures	2.1	UN1912	Flammable Gas	–	1.2	5	
	Methyl chloroacetate	3.3	UN2295	Flammable Liquid	II	1.2	1.2	
	Methyl chlorocarbonate. See Methyl chloroformate							
	Methyl chloroformate	3.2	UN1238	Flammable Liquid, Poison, Corrosive	I	1.2	1	
	Methylchloromethyl ether	3.1	UN1239	Flammable Liquid	II	1	5	Keep cool
	Methyl-2-chloropropionate	3.3	UN2933	Flammable Liquid	III	1.2	1.2	
	Methyl chlorosilane	3.2	UN2534	Flammable Liquid, Corrosive	I	1.2	1	
	Methyl cyanide	3.2	UN1648	Flammable Liquid, Poison	II	1.2	1	
	Methyl cyclohexane	3.2	UN2296	Flammable Liquid	II	1.2	1	
	Methyl cyclohexanol	3.3	UN2617	Flammable Liquid	III	1.2	1.2	
	Methyl cyclohexanone	3.3	UN2297	Flammable Liquid	III	1.2	1.2	
	Methyl cyclopentane	3.1	UN2298	Flammable Liquid	II	1.2	1	
	Methyl dichloroacetate	6.1	UN2299	St. Andrew's Cross	III	1.2	1.2	Stow "away from" living quarters
	Methyldichlorosilane	3.2	UN1242	Flammable Liquid, Corrosive	I	1.2	1	
	Methylene chloride. See Dichloromethane							
	Methylene 4-phenylene isocyanate. See Diphenylmethane diisocyanate							
	Methyl ethyl ether. See Ethyl methyl ether							
	Methyl ethyl ketone peroxide(s). See Ethyl methyl ketone peroxide							
	Methyl ethyl ketone. See Ethyl methyl ketone							
	2-Methyl-5-ethylpyridine	6.1	UN2300	St. Andrew's Cross	III	1.2	1.2	Stow "away from" living quarters
	Methyl fluoride	2.1	UN2454	Flammable Gas	–	1.2	5	
	Methyl formate	3.1	UN1243	Flammable Liquid	I	1.3	5	Keep cool
	2-Methylfuran	3.1	UN2301	Flammable Liquid	II	1.3	5	Keep cool
	5-Methylhexan-2-one	3.3	UN2302	Flammable Liquid	III	1.2	1.2	
	Methylhydrazine	3.2	UN1244	Flammable Liquid, Corrosive	I	1.2	1	
	Methyl iodide	6.1	UN2644	Poison	II	1.3	1.3	Keep cool. Stow "away from" living quarters
	Methyl isobutyl carbinol	3.3	UN2053	Flammable Liquid	III	1.2	1.2	
	Methyl isobutyl ketone	3.2	UN1245	Flammable Liquid	II	1.2	1	
	Methyl isocyanate or Methyl isocyanate solutions	3.2	UN2480	Flammable Liquid, Poison	I	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	Methyl isopropenyl ketone, inhibited	3.2	UN1246	Flammable Liquid	II	1.2	1	
	Methyl isothiocyanate	3.2	UN2477	Flammable Liquid, Poison	II	1	5	Keep cool. Stow "away from" living quarters and sources of heat
	Methylisovalerate	3.2	UN2400	Flammable Liquid	II	1.2	1	
	Methyl magnesium bromide, in ethyl ether	4.2	UN1928	Spontaneously Combustible	I	1	5	
	Methylmercaptan	2.1	UN1064	Flammable Gas	–	1.2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Material's Description and Proper Shipping Name	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Methyl methacrylate, monomer, inhibited	3.2	UN1247	Flammable Liquid	II	1.2	1	
	Methylmorpholine		UN2535	Flammable Liquid Corrosive	II	1.2	1	
		3.3	UN2535	Flammable Liquid, Corrosive	II	1.2	1.2	
	Methyl nitrite - Carriage Forbidden							
	Methyl orthosilicate	3.2	UN2606	Flammable Liquid, Poison	II	1.3	5	Keep cool
	Methylpentadiene	3.1	UN2461	Flammable Liquid	II	1.3	5	Keep cool
	Methylpentanes	3.1	UN2462	Flammable Liquid	II	1.3	5	Keep cool
	2-Methylpentan-2-ol	3.3	UN2560	Flammable Liquid	III	1.2	1.2	
	Methylphenyldichlorosilane	3.3	UN2437	Flammable Liquid, Corrosive	II	1	1	
	1-Methylpiperidine	3.2	UN2399	Flammable Liquid	II	1.2	1	
	Methyl propionate	3.2	UN1248	Flammable Liquid	II	1.2	1	
	Methyl propyl ether	3.1	UN2612	Flammable Liquid	II	1.3	5	Keep cool
	Methyl propyl ketone	3.2	UN1249	Flammable Liquid	II	1.2	1	
	Methyl sulphide. See Dimethyl sulfide							
	Methyltetrahydrofuran	3.1	UN2536	Flammable Liquid	II	1.2	1	
	Methyl trichloroacetate	6.1	UN2533	St. Andrews Cross	III	1.2	1.2	
	Methyltrichlorosilane	3.2	UN1250	Flammable Liquid, Corrosive	II	1.2	1	
	alpha-Methyl valeraldehyde	3.3	UN2367	Flammable Liquid	III	1.2	1.2	
	Methyl vinyl ketone	3.2	UN1251	Flammable Liquid	II	1.2	1	
N	Mines, with bursting charge	1.1D	UNC137	Explosive (1.1D)	-	-	-	
N	Mines, with bursting charge	1.2D	UNC138	Explosive (1.2D)	-	-	-	
N	Mines, with bursting charge	1.1F	UNC136	Explosive (1.1F)	-	-	-	
N	Mines, with bursting charge	1.2F	UNC254	Explosive (1.2F)	-	-	-	
	Mixed acid, spent. See Acid mixtures, spent, nitrating							
	Molybdenum pentachloride	8	UN2508	Corrosive	III	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Monochlorodifluoromethane. See Chlorodifluoromethane							
	Monochloropentafluoroethane. See Chloropentafluoroethane							
	Monochlorotetrafluoroethane. See Chlorotetrafluoroethane							
	Monochlorotrifluoromethane. See Chlorotrifluoromethane							
	Monoethanolamine. See Ethanolamine and solutions thereof							
	Monoethylamine. See Ethylamine							
	Monomethylamine, anhydrous. See Methylamine, anhydrous							
	Monomethylamine, aqueous solution. See Methylamine, aqueous solution							
	Mononitrotoluidines	6.1	UN2660	St. Andrews Cross	III	1.2	1.2	
	Monopropylamine	3.1	UN1277	Flammable Liquid	II	1.2	5	
	Morpholine	3.3	UN2054	Flammable Liquid	II	1.2	1.2	
	Motor fuel anti-knock mixtures	6.1	UN1649	Poison, Flammable Liquid (only if flashpoint below 61 deg C)	I	1	5	If flashpoint below 61 deg C segregation same as for flammable liquids. Stow "away from" living quarters
	Motor fuel, n.o.s.	3.1	UN1203	Flammable Liquid	II	1.3	5	Keep cool
	Motor spirit. See Gasoline							
	Muriatic acid. See Hydrochloric acid							
	Naphthalene, crude or refined	4.1	UN1334	Flammable Solid	III	1.2	1.2	
	Naphtha, petroleum	3.2	UN1255	Flammable Liquid	II	1.2	1	
	Naphtha, solvent	3.2	UN1256	Flammable Liquid	II	1.2	1	
	Naphthylamine (alpha)	6.1	UN2077	St. Andrews Cross	III	1.2	1.2	
	Naphthylamine (beta)	6.1	UN1650	Poison	II	1.2	1.2	
	alpha-Naphthylthiourea	6.1	UN1651	Poison	II	1.2	1.2	
	Naphthylurea	6.1	UN1652	Poison	II	1.2	1.2	
	Naphthalene, molten	4.1	UN2304	Flammable Solid	III	1	1	
	Natural gases with a high methane content. See Methane or natural gases, etc							
	Natural gasoline. See Casinghead gasoline							
	Neohexane. See Dimethyl butane							
	Neon, compressed	2.2	UN1065	Nonflammable Gas	-	1.2	1.2	
	Neon, refrigerated liquid	2.2	UN1913	Nonflammable Gas	-	1.2	1	
	Nickel carbonyl	6.1	UN1259	Poison, Flammable Liquid	I	1	5	Keep cool. Prohibited on any ship carrying explosives except explosives in Division 1.4, Compatibility Group S. Shade from radiant heat. Segregation same as for flammable liquids
	Nickel catalyst, dry, precipitated on a carrier with a special activator	4.2	UN2881	Spontaneously Combustible	II	1.2	1	
	Nickel catalyst, wetted with not less than 40% water or other suitable liquid, by weight, finely divided, activated or spent	4.2	UN1378	Spontaneously Combustible	II	1.2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Nickel cyanide	6.1	UN1653	Poison	II	1.2	1.2	
	Nickel nitrate	5.1	UN2725	Oxidizer	III	1.2	1.2	
	Nickel nitrite	5.1	UN2726	Oxidizer	III	1.2	1.2	Stow "separated from" ammonium compounds and cyanides and "away from" foodstuffs
	Nicotine [and salts of], liquid	6.1	UN1654	Poison	I	1	1	
		6.1	UN1654	Poison	II	1.2	1	
		6.1	UN1654	St. Andrews Cross	III	1.2	1.2	
	Nicotine [and salts of], solid	6.1	UN1654	Poison	II	1.2	1.2	
		6.1	UN1654	St. Andrews Cross	III	1.2	1.2	
	Nicotine compounds, n.o.s. or Nicotine preparations, n.o.s.	6.1	UN1655	Poison	II	1.2	1.2	
		6.1	UN1655	St. Andrews Cross	III	1.2	1.2	
	Nicotine hydrochloride, or Nicotine hydrochloride solutions	6.1	UN1656	Poison	II	1.2	1.2	
	Nicotine salicylate	6.1	UN1657	Poison	II	1.2	1.2	
	Nicotine sulphate, solid or solution	6.1	UN1658	Poison	II	1.2	1.2	
	Nicotine tartrate	6.1	UN1659	Poison	II	1.2	1.2	
	Nitrate of soda and potash, mixture. See Sodium nitrate and potash, mixture							
	Nitrates, inorganic, n.o.s.	5.1	UN1477	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals
	Nitrating acid, mixtures	8	UN1796	Corrosive, Oxidizer [not required if nitric acid content not more than 50%]	II	1	5	Stow "away from" fluorides
	Nitric acid, other than red fuming, all concentrations	8	UN2031	Corrosive	II	1	5	Stow "separated from" diethylene triamine. Stow "away from" hydrazine, fluorides, and all other corrosives except sulphuric acid and sulphur trioxide
	Nitric acid, red fuming	8	UN2032	Corrosive, Oxidizer, Poison	I	1	5	Stow "separated from" diethylene triamine. Stow "away from" hydrazine, fluorides and all other corrosives except sulphuric acid and sulphur trioxide
	Nitric oxide	2.3	UN1660	Poison Gas	–	1	5	
	Nitric oxide and nitrogen tetroxide mixtures	2.3	UN1975	Poison Gas, Oxidizer	–	1	5	Stow "away from" organic materials
	Nitrites, inorganic, n.o.s.	5.1	UN2627	Oxidizer	II	1.2	1.2	Stow "separated from" ammonium compounds and cyanides and "away from" powdered metals and foodstuffs
	Nitroanilines (o-, m-, p-)	6.1	UN1661	Poison	II	1.2	1.2	
	Nitroanisoles	6.1	UN2730	St. Andrews Cross	III	1.3	1.3	Keep cool
	Nitrobenzene	6.1	UN1662	Poison	II	1.2	1.2	Stow "away from" living quarters
	Nitrobenzenesulphonic acid	8	UN2305	Corrosive	II	1.2	1.2	
	Nitrobenzol. See Nitrobenzene							
N	5-Nitrobenzotriazol	1.1D	UN0385	Explosive (1.1D)	–	–	–	
	Nitrobenzotrifluorides	6.1	UN2306	Poison	II	1.2	1.2	Stow "away from" living quarters
	Nitrobromobenzenes	6.1	UN2732	St. Andrews Cross	III	1.3	1.3	Keep cool
	Nitrocellulose, containing at least 25% alcohol, by weight, and not exceeding 12.6% nitrogen by dry weight	4.1	UN2556	Flammable Solid	I	1	5	Shade from radiant heat. Keep away from heat and open flame
	Nitrocellulose, containing at least 25% by weight, water	4.1	UN2555	Flammable Solid	II	1	5	Shade from radiant heat. Keep away from heat and open flame
	Nitrocellulose, containing at least 18% plasticizing substance, by weight, and not exceeding 12.6% nitrogen by dry weight	4.1	UN2557	Flammable Solid	I	1	1	Shade from radiant heat. Keep away from heat and open flame
N	Nitrocellulose dry or wetted with less than 25% alcohol, by weight	1.1D	UN0340	Explosive (1.1D)	–	–	–	
N	Nitrocellulose, dry or wetted with less than 25% water, by weight	1.1D	UN0340	Explosive (1.1D)	–	–	–	
	Nitrocellulose, in solution in flammable liquids	3.2	UN2059	Flammable Liquid	II	1.2	1	
		3.3	UN2059	Flammable Liquid	II	1.2	1.2	
N	Nitrocellulose, plasticized with not less than 18% plasticizing substance, by weight	1.3C	UN0343	Explosive (1.3C)	–	–	–	
N	Nitrocellulose unmodified or unplasticized with less than 18% plasticizing substance, by weight	1.1D	UN0341	Explosive (1.1D)	–	–	–	
	Nitrocellulose, wetted with, by weight, more than 40% flammable liquids	3.2	(UN2556)	Flammable Liquid	II	1.2	1	
		3.3	(UN2556)	Flammable Liquid	II	1.2	1.2	
N	Nitrocellulose, wetted with not less than 25% alcohol, by weight	1.3C	UN0342	Explosive (1.3C)	–	–	–	
	3-Nitro-4-chlorobenzotrifluoride	6.1	UN2307	Poison	II	1.2	1.2	Stow "away from" living quarters
	Nitrocresols	6.1	UN2446	St. Andrews Cross	III	1.2	1.2	Stow "away from" living quarters
	Nitroethane	3.3	UN2842	Flammable Liquid	III	1.2	1.2	
	Nitrogen, compressed	2.2	UN1066	Nonflammable Gas	–	1.2	1.2	
	Nitrogen dioxide, liquefied	2.3	UN1067	Poison Gas, Oxidizer	–	1	5	Stow "away from" foodstuffs, organic materials and living quarters
	Nitrogen, refrigerated liquid	2.2	UN1977	Nonflammable Gas	–	1.3	1.3	
	Nitrogen tetroxide. See Nitrogen dioxide							
	Nitrogen trifluoride	2.3	UN2451	Poison Gas	–	1	5	Stow "away from" living quarters and organic materials
	Nitrogen trioxide	2.3	UN2421	Poison Gas	–	1	5	Stow "away from" living quarters and readily combustible substances

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Nitroglycerine, desensitized, with not less than 40% non-volatile water insoluble phlegmatizer by weight	1.1D	UN0143	Explosive (1.1D), Poison	–	–	–	
N	Nitroglycerine, spirit of, with more than 1% but not more than 10% nitroglycerine in solution in alcohol	1.1D	UN0144	Explosive (1.1D)	–	–	–	
	Nitroglycerin solution, in alcohol with not more than 1% nitroglycerin	3.2	UN1204	Flammable Liquid	II	1.2	1	
N	Nitroguanidine, dry or containing by weight, less than 20% water	1.1D	UN0282	Explosive (1.1D)	–	–	–	
	Nitroguanidine, wetted, with, by weight, at least 20% water	4.1	UN1336	Flammable Solid	II	1.2	5	
	Nitrohydrochloric acid	8	UN1798	Corrosive	I	1	5	Stow "away from" fluorides
	Nitromethane	3.3	UN1261	Flammable Liquid	II	1.2	1.2	
	Nitromuriatic acid. See Nitrohydrochloric acid							
	Nitronaphthalene	4.1	UN2538	Flammable Solid	III	1.2	1.2	
	Nitrophenols (o-, m-, p-)	6.1	UN1663	St. Andrews Cross	III	1.2	1.2	
	Nitropropanes	3.3	UN2608	Flammable Liquid	III	1.2	1.2	
	p-Nitrosodimethylaniline	4.2	UN1369	Spontaneously Combustible	II	1.2	5	Stow "away from" foodstuffs
N	Nitrostarch, dry or containing by weight, less than 20% water	1.1D	UN0146	Explosive (1.1D)	–	–	–	
	Nitrostarch, wetted with, by weight, at least 20% water	4.1	UN1337	Flammable Solid	I	1	5	
	Nitrosyl chloride	2.3	UN1069	Poison Gas, Corrosive	–	1	5	Stow "away from" foodstuffs and living quarters
	Nitrosylsulphuric acid	8	UN2308	Corrosive	II	1	5	Stow "away from" organic materials
	Nitrotoluenes (o-, m-, p-)	6.1	UN1664	Poison	II	1.2	1.2	
N	Nitro urea	1.1D	UN0147	Explosive (1.1D)	–	–	–	
	Nitrous oxide, compressed	2.2	UN1070	Nonflammable Gas, Oxidizer	–	1.2	1.2	
	Nitrous oxide, refrigerated liquid	2.2	UN2201	Nonflammable Gas	–	1.2	5	
	Nitroxylenes (o-, m-, p-)	6.1	UN1665	Poison	II	1.2	1.2	
	Nonane, and its isomers	3.3	UN1920	Flammable Liquid	II	1.2	1.2	
	Nonyl trichlorosilane	8	UN1799	Corrosive	II	1	1	Keep dry
	Octadecyl trichlorosilane	8	UN1800	Corrosive	II	1	1	Keep dry
	Octadiene	3.2	UN2309	Flammable Liquid	III	1.2	1	
	Octafluorobut-2-ene	2.2	UN2422	Nonflammable Gas	–	1.2	1.2	
	Octafluorocyclobutane	2.2	UN1976	Nonflammable Gas	–	1.2	1.2	
	Octafluoropropane	2.2	UN2424	Nonflammable Gas	–	1.2	1.2	
	Octane and its isomers	3.2	UN1262	Flammable Liquid	II	1.2	1	
	n-Octanoyl peroxide. See Di-n-octanoyl peroxide				–	–	–	
N	Octolite, dry or wetted with less than 15% water by weight	1.1D	UN0266	Explosive (1.1D)	–	–	–	
	Octyl trichlorosilane	8	UN1801	Corrosive	II	1	1	Keep dry
	Oil gas	2.1	UN1071	Flammable Gas, Poison Gas	–	1	5	Stow "away from" living quarters
	Oleum. See Sulphuric acid, fuming							
	Organic peroxides, mixture (this description must be supplemented with the name of the primary constituent of the mixture)	5.2	UN2756	Organic Peroxide	I II	1	5	
	Organic peroxides, n.o.s., samples	5.2	UN2255	Organic Peroxide	I II	1	5	
	Organic peroxides, n.o.s., trial quantities	5.2	UN2899	Organic Peroxide	–	1	5	
	Organochlorine pesticides, liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C	3.2	UN2762	Flammable Liquid and Poison or St. Andrews Cross, (according to toxicity)	I II	1.2	1	
	Organochlorine pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN2995	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2995	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN2995	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Organochlorine pesticides, liquid, toxic, n.o.s.	6.1	UN2996	Poison	I	1	1	
		6.1	UN2996	Poison	II	1.2	1	
		6.1	UN2996	St. Andrews Cross	III	1.2	1.2	
	Organochlorine pesticides, solid, toxic, n.o.s.	6.1	UN2761	Poison	I II	1.2	1.2	
		6.1	UN2761	St. Andrews Cross	III	1.2	1.2	
	Organophosphorus pesticides, liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C	3.2	UN2784	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I II	1.2	1	
	Organophosphorus pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN3017	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3017	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3017	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Note and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Organophosphorus pesticides, liquid, toxic, n.o.s.	6.1	UN3018	Poison	I	1	1	
		6.1	UN3018	Poison	II	1.2	1	
		6.1	UN3018	St. Andrews Cross	III	1.2	1.2	
	Organophosphorus pesticides solid, toxic, n.o.s.	6.1	UN2783	Poison	I II	1.2	1.2	
		6.1	UN2783	St. Andrews Cross	III	1.2	1.2	
	Organotin compounds, n.o.s.	6.1	UN2788	Poison	I II	1.2	1	Stow "away from" living quarters
		6.1	UN2788	St. Andrews Cross	III	1.2	1	
	Organotin pesticides, liquid, flammable, toxic, n.o.s., flashpoint below 23 deg C	3.2	UN2787	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I II	1.2	1	
	Organotin pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN3019	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3019	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3019	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Organotin pesticides, liquid, toxic, n.o.s.	6.1	UN3020	Poison	I	1	1	
		6.1	UN3020	Poison	II	1.2	1	
		6.1	UN3020	St. Andrews Cross	III	1.2	1.2	
	Organotin pesticides, solid, toxic, n.o.s.	6.1	UN2786	Poison	I II	1.2	1.2	
		6.1	UN2786	St. Andrews Cross	III	1.2	1.2	
	Osmium tetroxide	6.1	UN2471	Poison	I	1.2	1	Stow "away from" living quarters
	Oxalates, water soluble	6.1	UN2449	St. Andrews Cross	III	1.2	1.2	
	Oxidizing substances, n.o.s.	5.1	UN1479	Oxidizer	I II III	1.2	1.2	Stow "separated from" ammonium compounds and "away from" powdered metals
	Oxygen and carbon dioxide, mixtures. See Carbon dioxide and oxygen mixtures							
	Oxygen, compressed	2.2	UN1072	Nonflammable Gas, Oxidizer	–	1.2	1.2	
	Oxygen difluoride	2.3	UN2190	Poison Gas	–	1	5	Keep dry Stow "away from" living quarters and readily combustible substances
	Oxygen, refrigerated liquid	2.2	UN1073	Nonflammable Gas, Oxidizer	–	1	5	Stow "separated from" acetylene Do not overstow
	Paints, enamels, lacquers, stains, shellac solutions, varnish, polishes, fillers liquid, lacquer base or thinners	3.2	UN1263	Flammable Liquid	II III	1.2	1	
		3.3	UN1263	Flammable Liquid	II III	1.2	1.2	
	Paper, unsaturated oil treated, *incompletely dried*	4.2	UN1379	Spontaneously Combustible	III	1.2	1.2	
	Paraformaldehyde	4.1	UN2213	None. Package to be marked "Class 4.1"	III	1.2	1.2	
	Paraldehyde	3.3	UN1264	Flammable Liquid	III	1.2	1.2	
	Pentaborane	4.2	UN1380	Spontaneously Combustible, Poison	I	1	5	
	Pentachloroethane	6.1	UN1669	Poison	II	1.2	1.2	
N	Pentaerythrite tetranitrate, wetted with *not less than 25% water by weight, or desensitized with not less than 15% phlegmatizer, by weight*	1.1D	UN0150	Explosive (1.1D)	–	–	–	
N	Pentaerythrite tetranitrate, *with not less than 7% wax, by weight*	1.1D	UN0411	Explosive (1.1D)	–	–	–	
	Pentamethylheptane	3.3	UN2286	Flammable Liquid	III	1.2	1.2	
	2,4-Pentanedione	3.3	UN2310	Flammable Liquid	III	1.2	1.2	
	Pentanes	3.1	UN1265	Flammable Liquid	I	1.3	5	Keep cool
	1-Pentol	8	UN2705	Corrosive	II	1.2	1	Stow "away from" all other corrosives
N	Pentolite, *dry or wetted with less than 15% water by weight*	1.1D	UN0151	Explosive (1.1D)	–	–	–	
	Perchlorates, inorganic, n.o.s.	5.1	UN1481	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Perchloric acid, *not exceeding 50% by weight, of acid*	8	UN1802	Corrosive, Oxidizer	II	1	1	Stow "away from" hydrazine
	Perchloric acid, *over 50% and not exceeding 72% of acid*	5.1	UN1873	Oxidizer, Corrosive	I	1	5	
	Perchloroethylene. *See* Tetrachloroethylene							
	Perchloromethyl mercaptan	6.1	UN1670	Poison	I	1	5	Stow "away from" living quarters
	Perfumery products, *with flammable solvents*	3.2	UN1266	Flammable Liquid	II	1.2	1	
		3.3	UN1266	Flammable Liquid	II	1.2	1.2	
	Permanganates, inorganic, n.o.s.	5.1	UN1482	Oxidizer	II	1.2	1.2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Peroxides, inorganic, n.o.s.	5.1	UN1483	Oxidizer	II	1.2	1	Stow "away from" powdered metals Keep dry
	Peroxyacetic acid, *maximum concentration 43% in acetic acid or in a mixture of acetic acid and water, with in either case not more than 6% hydrogen peroxide and not more than 1% sulphuric acid*	5.2	UN2131	Organic Peroxide, Corrosive	I	1	5	
	Pesticides, liquid, flammable, toxic, n.o.s. *Flashpoint below 23 deg C*	3.2	UN3021	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I II	1.2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Pesticides, liquid, toxic, flammable, n.o.s. flashpoint between 23 deg C and 61 deg C	6.1	UN2903	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2903	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN2903	St. Andrews Cross Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Pesticides, liquid, toxic, n.o.s.	6.1	UN2902	Poison	I	1	1	
		6.1	UN2902	Poison	II	1,2	1	
		6.1	UN2902	St. Andrews Cross	III	1,2	1,2	
	Pesticides, solid, toxic, n.o.s.	6.1	UN2588	Poison	I/II	1,2	1,2	
		6.1	UN2588	St. Andrews Cross	III	1,2	1,2	
	Petroleum crude oil	3.1	UN1267	Flammable Liquid	I	1,3	5	Keep cool
		3.2	UN1267	Flammable Liquid	II	1,2	1	
		3.3	UN1267	Flammable Liquid	III	1,2	1,2	
	Petroleum distillates, n.o.s.	3.1	UN1268	Flammable Liquid	I	1,3	5	Keep cool
		3.2	UN1268	Flammable Liquid	II	1,2	1	
		3.3	UN1268	Flammable Liquid	III	1,2	1,2	
	Petroleum ether. See Petroleum spirit							
	Petroleum gases, liquefied	2.1	UN1075	Flammable Gas	–	1,2	1	
	Petroleum oil	3.1	UN1270	Flammable Liquid	I	1,3	5	Keep cool
		3.2	UN1270	Flammable Liquid	II	1,2	1	
		3.3	UN1270	Flammable Liquid	III	1,2	1,2	
	Petroleum spirit	3.1	UN1271	Flammable Liquid	I	1,3	5	Keep cool
		3.2	UN1271	Flammable Liquid	II	1,2	1	
		3.3	UN1271	Flammable Liquid	III	1,2	1,2	
	Petrol. See Gasoline							
	Phenacyl bromide	6.1	UN2645	Poison	II	1,3	1	Keep cool. Stow "away from" living quarters
	Phenetidines (o-, p-)	6.1	UN2311	St. Andrews Cross	III	1,2	1,2	
	Phenol	6.1	UN1671	Poison	II	1,2	1,2	
	Phenol, molten	6.1	UN2312	Poison	II	1	1	
	Phenol solutions	6.1	UN2821	Poison	II	1,2	1,2	Stow "away from" living quarters
	Phenolsulphonic acid, liquid	8	UN1803	Corrosive	II	1,2	1	Metal drums only under deck
	Phenoxyl pesticides, solid, toxic, n.o.s.	6.1	UN2765	Poison	I/II	1,2	1,2	
		6.1	UN2765	St. Andrews Cross	III	1,2	1,2	
	Phenoxy pesticides, liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C	3.2	UN2758	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I/II	1,2	1	
	Phenoxy pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN2999	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2999	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN2999	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Phenoxy pesticides, liquid, toxic, n.o.s.	6.1	UN3000	Poison	I	1	1	
		6.1	UN3000	Poison	II	1,2	1	
		6.1	UN3000	St. Andrews Cross	III	1,2	1,2	
	Phenylacetonitrile, liquid	6.1	UN2470	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	Phenylacetyl chloride	8	UN2577	Corrosive	II	1	1	Keep dry
	Phenylcarbylamine chloride	6.1	UN1672	Poison	I	1	5	Stow "away from" living quarters
	Phenylchloroformate	6.1	UN2745	Poison, Corrosive	II	1,3	1,3	Keep cool and dry. Shade from radiant heat. Stow "away from" living quarters
	Phenylenediamines (o-, m-, p-)	6.1	UN1673	St. Andrews Cross	III	1,2	1,2	
	Phenylhydrazine	6.1	UN2572	Poison	II	1,2	1,2	Stow "away from" living quarters
	Phenyl isocyanate	6.1	UN2487	Poison, Flammable Liquid	II	1	5	Shade from radiant heat. Stow "away from" living quarters. Segregation same as for flammable liquids
	Phenyl mercaptan	6.1	UN2337	Poison, Flammable Liquid	I	1,2	1	Segregation same as for flammable liquids
	Phenylmercuric acetate	6.1	UN1674	Poison	II	1,2	1,2	
	Phenylmercuric compounds, n.o.s.	6.1	UN2026	Poison	I/II	1,2	1,2	
		6.1	UN2026	St. Andrews Cross	III	1,2	1,2	
	Phenylmercuric hydroxide	6.1	UN1894	Poison	II	1,2	1,2	
	Phenylmercuric nitrate	6.1	UN1895	Poison	II	1,2	1,2	
	Phenyl phosphorus dichloride	8	UN2798	Corrosive	II	1,2	1	
	Phenyl phosphorus thiodichloride	8	UN2799	Corrosive	II	1,2	1	
	Phenyl trichlorosilane	8	UN1804	Corrosive	II	1	1	Keep dry
	Phenyl urea pesticides, liquid, flammable, toxic, n.o.s., flashpoint less than 23 deg C	3.2	UN2758	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I/II	1,2	1	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Phenyl urea pesticides, liquid, toxic, flammable, n.o.s., flash-point between 23 deg C and 61 deg C	6.1	UN3001	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3001	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3001	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Phenyl urea pesticides, liquid, toxic, n.o.s.	6.1	UN3002	Poison	I	1	1	
		6.1	UN3002	Poison	II	1.2	1	
		6.1	UN3002	St. Andrews Cross	III	1.2	1.2	
	Phenyl urea pesticides, solid, toxic, n.o.s.	6.1	UN2767	Poison	I/II	1.2	1.2	
		6.1	UN2767	St. Andrews Cross	III	1.2	1.2	
	Phosgene	2.3	UN1076	Poison Gas, Corrosive	–	1	5	
	9-Phosphabicyclononanes	4.2	UN2940	Spontaneously Combustible	II	1.2	1.2	
	Phosphine	2.3	UN2199	Poison Gas, Flammable Gas	–	1	5	Stow "away from" living quarters
	Phosphoric acid, liquid	8	UN1805	Corrosive	III	1.2	1.2	Glass carboys in hampers prohibited under deck
	Phosphoric acid, solid	8	UN1805	Corrosive	III	1.2	1.2	
	Phosphoric anhydride. See Phosphorus pentoxide							
	Phosphorous acid, ortho	8	UN2834	Corrosive	III	1.3	1.3	Stow "away from" sources of heat. Keep dry
	Phosphorous bromide. See Phosphorus tribromide							
	Phosphorous chloride. See Phosphorus trichloride							
	Phosphorus, amorphous	4.1	UN1338	Flammable Solid	III	1.2	1.2	
	Phosphorus heptasulphide, free from yellow or white phosphorus	4.1	UN1339	Flammable Solid	II	1.2	1	Stow "separated from" oxidizing substances
	Phosphorus oxybromide, molten	8	UN2576	Corrosive	II	1	1	Keep dry
	Phosphorus oxybromide, solid	8	UN1939	Corrosive	II	1	1	Keep cool and dry
	Phosphorus oxychloride	8	UN1810	Corrosive	II	1	1	Keep dry
	Phosphorus pentabromide	8	UN2691	Corrosive	II	1.3	1	Keep cool and dry
	Phosphorus pentachloride	8	UN1806	Corrosive	II	1	1	Keep dry
	Phosphorus pentafluoride	2.3	UN2198	Poison Gas	–	1	5	Stow "away from" living quarters
	Phosphorus pentasulphide, free from yellow or white phosphorus	4.1	UN1340	Flammable Solid	II	1.2	1.2	Stow "separated from" oxidizing substances
	Phosphorus pentoxide	8	UN1807	Corrosive	II	1.2	1.2	Glass bottles prohibited under deck
	Phosphorus sesquisulphide, free from yellow or white phosphorus	4.1	UN1341	Flammable Solid	II	1.2	1	Stow "separated from" oxidizing substances
	Phosphorus tribromide	8	UN1808	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Phosphorus trichloride	8	UN1809	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Phosphorus trioxide	8	UN2578	Corrosive	III	1.3	1.3	Keep cool and dry
	Phosphorus trisulphide, free from yellow or white phosphorus	4.1	UN1343	Flammable Solid	II	1.2	1	Stow "separated from" oxidizing substances
	Phosphorus, white, molten	4.2	UN2447	Spontaneously Combustible, Poison	I	1	5	
	Phosphorus, white or yellow, dry	4.2	UN1381	Spontaneously Combustible	I	1.2	5	
	Phosphorus, white or yellow, in water	4.2	UN1381	Spontaneously Combustible	I	1.2	5	
N	Photo-flash powder in units	1.1G	UN0094	Explosive (1.1G)	–	–	–	
N	Photo-flash powder in units	1.2G	UN0095	Explosive (1.2G)	–	–	–	
N	Photo-flash powder in units	1.3G	UN0305	Explosive (1.3G)	–	–	–	
	Phthalic anhydride, solid or molten	8	UN2214	None. Package to be called "Class 8"	III	1.2	1.2	Stow "away from" foodstuffs
	Phthalimide derivative pesticides, liquid, flammable, toxic, n.o.s., flashpoint below 23 deg C	3.2	UN2774	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I/II	1.2	1	
	Phthalimide derivative pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN3007	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3007	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3007	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids
	Phthalimide derivative pesticides, liquid, toxic, n.o.s.	6.1	UN3008	Poison	I	1	1	
		6.1	UN3008	Poison	II	1.2	1	
		6.1	UN3008	St. Andrews Cross	III	1.2	1.2	
	Phthalimide derivative pesticides, solid, toxic, n.o.s.	6.1	UN2773	Poison	I/II	1.2	1.2	
		6.1	UN2773	St. Andrews Cross	III	1.2	1.2	
	Picolines	3.3	UN2313	Flammable Liquid	II	1.2	1.2	
	Picric acid, wetted. See Trinitrophenol, wetted							
	Pinanyl hydroperoxide technical pure	5.2	UN2162	Organic Peroxide	I	1	5	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Pindone (and salts of), liquid	6.1	UN2472	Poison	I	1	1	
		6.1	UN2472	Poison	II	1,2	1	
		6.1	UN2472	St. Andrews Cross	III	1,2	1,2	
	Pindone (and salts of), solid	6.1	UN2472	Poison	I,II	1,2	1,2	
		6.1	UN2472	St. Andrews Cross	III	1,2	1,2	
	alpha Pinene	3.3	UN2368	Flammable Liquid	III	1,2	1,2	
	Pine oil	3.3	UN1272	Flammable Liquid	III	1,2	1,2	
	Piperazine	8	UN2579	Corrosive	III	1,3	1,3	Keep cool and dry
	Piperidine	3.2	UN2401	Flammable Liquid	II	1,2	1	Keep dry
	Plastics moulding materials evolving flammable vapours	9	UN2211	None	III	1,2	1,2	
	Plastics, nitrocellulose-based, spontaneously combustible, n.o.s.	4.2	UN2006	Spontaneously Combustible	III	1	1	
	Poisonous liquids, corrosive, n.o.s.	6.1	UN2927	Poison, Corrosive	I,II	1,2	1	Segregation same as for corrosives
	Poisonous liquids, flammable, n.o.s.	6.1	UN2929	Poison, Flammable Liquid	I,II	1,2	1	Segregation same as for flammable liquids
	Poisonous liquids, n.o.s.	6.1	UN2810	Poison	I,II	1,2	1	
		6.1	UN2810	St. Andrews Cross	III	1,2	1	
	Poisonous solids, corrosive, n.o.s.	6.1	UN2928	Poison, Corrosive	I,II	1,2	1	Segregation same as for corrosives
	Poisonous solids, flammable, n.o.s.	6.1	UN2930	Poison, Flammable Solid	I,II	1,2	1	Segregation same as for flammable solids
	Poisonous solids, n.o.s.	6.1	UN2811	Poison	I,II	1,2	1	
		6.1	UN2811	St. Andrews Cross	III	1,2	1	
	Polishes. See Paints, etc							
	Polishing fluid. See Flammable liquid preparations, n.o.s.							
	Polychlorinated biphenyls	9	UN2315	None	II	1,2	1,2	Stow in a recoverable position. Stow "away from" foodstuffs
	Polystyrene beads, expandable, impregnated with flammable liquid See Plastics moulding materials evolving flammable vapours							
	Potassium arsenate	6.1	UN1677	Poison	II	1,2	1,2	
	Potassium arsenite	6.1	UN1678	Poison	II	1,2	1,2	
	Potassium bifluoride, solid	8	UN1811	Corrosive, Poison	II	1,2	1,2	
	Potassium bifluoride, solution	8	UN1811	Corrosive, Poison	II	1,2	1,2	
	Potassium borohydride	4.3	UN1870	Dangerous When Wet	I	1,2	5	
	Potassium bromate	5.1	UN1484	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and "away from" powdered metals
	Potassium chlorate	5.1	UN1485	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and "away from" powdered metals
	Potassium chlorate, aqueous solution	5.1	UN2427	Oxidizer	II	1,2	1	Stow "away from" powdered metals and "separated from" ammonium compounds
	Potassium cuprocyanide	6.1	UN1679	Poison	II	1,2	1,2	Stow "away from" acids
	Potassium cyanide	6.1	UN1680	Poison	I	1,2	1,2	Stow "away from" acids
	Potassium fluoride	6.1	UN1812	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	Potassium fluoroacetate	6.1	UN2628	Poison	I	1,2	5	Stow "away from" living quarters
	Potassium hydrogen fluoride. See Potassium bifluoride							
	Potassium hydrogen sulphate	8	UN2509	Corrosive	II	1,2	1,2	Stow "away from" strong alkalis
	Potassium hydrosulphite	4.2	UN1929	Spontaneously Combustible	II	1,2	5	Keep dry
	Potassium hydroxide, solid	8	UN1813	Corrosive	II	1,2	1,2	Keep dry
	Potassium hydroxide, solution	8	UN1814	Corrosive	II	1,2	1,2	
	Potassium hypochlorite, solution. See Hypochlorite, solutions, etc							
	Potassium metal	4.2	UN2257	Spontaneously Combustible	II	1,2	5	
	Potassium, metal alloys	4.3	UN1420	Dangerous When Wet	II	1,2	5	
	Potassium metavanadate	6.1	UN2864	Poison	II	1,2	1,2	Stow "away from" living quarters
	Potassium nitrate	5.1	UN1486	Oxidizer	III	1,2	1,2	
	Potassium nitrate and sodium nitrite, mixture	5.1	UN1487	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and cyanides, and "away from" foodstuffs
	Potassium nitrate bags, empty. See Bags, empty and unwashed, etc							
	Potassium nitrite	5.1	UN1488	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and cyanides, and "away from" foodstuffs
	Potassium oxide	8	UN2033	Corrosive	II	1,2	1,2	Keep dry
	Potassium perchlorate	5.1	UN1489	Oxidizer	II	1,2	1,2	Stow "away from powdered metals
	Potassium permanganate	5.1	UN1490	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Potassium peroxide	5.1	UN1491	Oxidizer	I	1,2	1,2	Keep dry
	Potassium persulphate	5.1	UN1492	Oxidizer	III	1,2	1,2	
	Potassium phosphide	4.3	UN2012	Dangerous When Wet Poison	I	1,2	5	When stowed under deck, stow in a mechanically ventilated space

§ 172.102 Optional Hazardous Materials Table—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7) Vessel Stowage Requirements		
Notes and Symbols	Hazardous Materials Description and Proper Shipping Names	IMO Class	Identification Number	Label(s) required	Packaging Group	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Potassium salts of nitro-aromatic derivatives, explosive	1.3C	UN0158	Explosive (1.3C)	–	–	–	
	Potassium silicofluoride	6.1	UN2655	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Potassium-sodium, alloy	4.3	UN1422	Dangerous When Wet	I	1.2	5	
	Potassium sulphide, anhydrous or Potassium sulphide with less than 30% water of crystallization	4.2	UN1382	Spontaneously Combustible	II	1.2	1.2	Stow "separated from" liquid acids
	Potassium sulphide, hydrated, with not less than 30% water of crystallization	8	UN1847	Corrosive	II	1.2	1.2	Stow "away from" acids
	Potassium superoxide	5.1	UN1456	Oxidizer	I	1.2	1	Keep dry. Stow "away from" combustible materials including packaging of other cargo
N	Powder cake, wetted with not less than 35% water by weight	1.3C	UN0159	Explosive (1.3C)	–	–	–	
N	Powder, smokeless	1.1C	UN0160	Explosive (1.1C)	–	–	–	
N	Powder, smokeless	1.3C	UN0161	Explosive (1.3C)	–	–	–	
	Primers, cap type	1.4B	UN0378	Explosive (1.4B)	–	1.3	1.3	
	Primers, cap type	1.4S	UN0044	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Primers, cap type	1.1B	UN0377	Explosive (1.1B)	–	–	–	
	Primers, tubular	1.4G	UN0320	Explosive (1.4G)	–	1.3	1.3	
	Primers, tubular	1.4S	UN0376	None. Package to be marked "1.4S"	–	1.3	1.3	
N	Primers, tubular	1.3G	UN0319	Explosive (1.3G)	–	–	–	
	Projectiles, inert, with tracer	1.4 S	UN0345	None. Package to be marked "1.4 S"	–	1.3	1.3	
N	Projectiles, inert, with tracer	1.3G	UN0424	Explosive (1.3G)	–	–	–	
	Projectiles, inert, with tracer	1.4G	UN0425	Explosive (1.4G)	–	1.3	1.3	
N	Projectiles, with burster or expelling charge	1.2D	UN0346	Explosive (1.2D)	–	–	–	
N	Projectiles, with burster or expelling charge	1.2F	UN0426	Explosive (1.2F)	–	–	–	
N	Projectiles, with burster or expelling charge	1.4F	UN0427	Explosive (1.4F)	–	–	–	
N	Projectiles, with burster or expelling charge	1.4D	UN0347	Explosive (1.4D)	–	–	–	
N	Projectiles, with bursting charge	1.1D	UN0158	Explosive (1.1D)	–	–	–	
N	Projectiles, with bursting charge	1.2D	UN0169	Explosive (1.2D)	–	–	–	
N	Projectiles, with bursting charge	1.4D	UN0344	Explosive (1.4D)	–	–	–	
N	Projectiles, with bursting charge	1.1F	UN0167	Explosive (1.1F)	–	–	–	
N	Projectiles, with bursting charge	1.2F	UN0324	Explosive (1.2F)	–	–	–	
	Propadiene, inhibited	2.1	UN2200	Flammable Gas	–	1	5	
	Propane	2.1	UN1978	Flammable Gas	–	1.2	1	
	Propanethiols	3.1	UN2402	Flammable Liquid	II	1.3	5	Keep cool and dry. Stow "away from" foodstuffs and all odor absorbing cargo
	Propanol	3.2	UN1274	Flammable Liquid	II	1.2	1	
	Propionaldehyde	3.1	UN1275	Flammable Liquid	II	1.3	5	
	Keep cool	3.2	UN1275	Flammable Liquid	II	1.2	1	
	Propionic acid, solution containing not less than 80% acid	8	UN1848	Corrosive, Flammable Liquid (only if flashpoint 61 deg C or below)	III	1.2	1.2	Stow "separated by a complete compartment or hold from" organic peroxides, and "separated longitudinally by a complete compartment or hold from" explosives. If flashpoint is 61 deg C or below, segregation same as for flammable liquids
	Propionic anhydride	8	UN2496	Corrosive	III	1.2	1.2	Keep dry. Glass carboys prohibited on passenger vessels
	Propionitrile	3.2	UN2404	Flammable Liquid. Poison	II	1.3	5	Keep cool
	Propionyl chloride	3.2	UN1815	Flammable Liquid. Corrosive	II	1.2	1	
	n-Propyl acetate	3.2	UN1276	Flammable Liquid	II	1.2	1	
	sec-Propyl alcohol. See Isopropanol							
	n-Propyl alcohol. See Propanol							
	Propylamine. See Monopropylamine							
	Propyl benzene	3.3	UN2364	Flammable Liquid	II	1.2	1.2	
	Propyl chloride	3.1	UN1278	Flammable Liquid	II	1.3	5	Keep cool
	n-Propyl chloroformate	3.3	UN2740	Flammable Liquid. Poison. Corrosive	II	1.2	1.2	
	Propylene	2.1	UN1077	Flammable Gas	–	1.2	1	
	Propylene chlorohydrin	6.1	UN2611	Poison. Flammable Liquid	II	1.3	1.3	Keep cool. Shade from radiant heat. Segregation same as for flammable liquids
	Propylenediamine	3.2	UN2258	Flammable Liquid. Corrosive	II	1.2	1.2	
		3.3	UN2258	Flammable Liquid. Corrosive	II	1.2	1.2	
	Propylene dichloride	3.2	UN1279	Flammable Liquid	II	1.2	1	
	Propyleneimine, inhibited	3.2	UN1921	Flammable Liquid	I	1.2	1	
	Propylene oxide	3.1	UN1280	Flammable Liquid	I	1.3	5	Keep cool
	Propyne tetramer	3.3	UN2850	Flammable Liquid	III	1.2	1.2	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Propyl formates	3.2	UN1281	Flammable Liquid	II	1,2	1	
	n-Propyl isocyanate	3.2	UN2482	Flammable Liquid, Poison	I	1	S	Keep cool. Stow "away from" living quarters and sources of heat
	n-Propyl nitrate	3.2	UN1865	Flammable Liquid	II	1,2	1	
	Propyl trichlorosilane	8	UN1816	Corrosive, Flammable Liquid	II	1	1	Keep dry. Stow "separated longitudinally by an intervening complete hold or hold from" explosives. Segregation same as for flammable liquids
	Pyridine	3.2	UN1282	Flammable Liquid, Poison	II	1,2	1	
	Pyrophoric fuel, n.o.s. See Fuel, pyrophoric, n.o.s.							
	Pyrophoric liquids, n.o.s.	4.2	UN2845	Spontaneously Combustible	I	1	S	Prohibited on any ship carrying explosives (except explosives in Division 1.4, Compatibility Group S)
	Pyrophoric metals, n.o.s. or Pyrophoric alloys, n.o.s.	4.2	UN1383	Spontaneously Combustible	II	1	S	
	Pyrophoric solids, n.o.s.	4.2	UN2846	Spontaneously Combustible	I II III	1	1	
	Pyrosulphuryl chloride	8	UN1817	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Pyroxylin. See Nitrocellulose							
	Pyrrolidine	3.2	UN1922	Flammable Liquid	II	1,2	1	
	Quinoline	6.1	UN2656	St. Andrews Cross, Flammable Liquid (only if flashpoint below 61 deg C)	III	1,3	1,3	Keep cool. Shade from radiant heat. If flashpoint below 61 deg C, segregation same as for flammable liquids
	Rags, oily	4.2	UN1856	Spontaneously Combustible	III	1,2	1,2	Keep dry
	Rare gases, mixtures	2.2	UN1979	Nonflammable Gas	–	1,2	1,2	
	Rare gases, mixtures with nitrogen	2.2	UN1981	Nonflammable Gas	–	1,2	1,2	
	Rare gases, mixtures with oxygen	2.2	UN1980	Nonflammable Gas	–	1,2	1,2	
	Receptacles, small, containing flammable compressed gas, not fitted with a dispersion device, not refillable	2.1	UN2037	Flammable Gas	–			
	Reducing liquid. See Flammable liquid preparation, n.o.s.							
N	Refrigerant gases, n.o.s.	2.1	UN1078	Flammable Gas	–	1	1	
	Refrigerant gases, n.o.s.	2.2	UN1078	Nonflammable Gas	–	1,2	1,2	
	Refrigerating machines containing non-flammable, non-toxic liquefied gases	2.2	UN2857	Nonflammable Gas	–	1,2	1,2	
	Release devices, explosive	1.4S	UN0173	None. Package to be marked "1.4 S"	–	1,3	1,3	
	Removing liquid. See Flammable liquid preparations, n.o.s.							
	Resin solution in flammable liquid	3.2	UN1866	Flammable Liquid	II	1,2	1	
		3.3	UN1866	Flammable Liquid	III	1,2	1,2	
	Resin solution, poisonous	6.1	UN1866	Poison, Flammable Liquid (only if flashpoint between 23 and 61 deg C)	II	1,2	1,2	If flashpoint between 23 and 61 deg C, segregation same as for flammable liquids
			UN1866	St. Andrews Cross, Flammable Liquid (only if flashpoint between 23 and and 61 deg C)	III	1,2	1,2	If flashpoint between 23 and 61 deg C, segregation same as for flammable liquids
	Resorcinol	6.1	UN2876	St. Andrews Cross	III	1,2	1,2	
	Rivets, explosive	1.4S	UN0174	None. Package to be marked "1.4 S"	–	1,3	1,3	
	Road asphalt, liquid tars or oil. See Cut-backs, asphalt or bitumen							
N	Rocket motors	1.1C	UN0280	Explosive (1.1C)	–	–	–	
N	Rocket motors	1.2C	UN0281	Explosive (1.2C)	–	–	–	
N	Rocket motors	1.3C	UN0186	Explosive (1.3C)	–	–	–	
N	Rocket motors, containing hypergolic liquids, with or without expelling charge	1.2L	UN0322	Explosive (1.2L)	–	–	–	
N	Rocket motors, containing hypergolic liquids, with or without expelling charge	1.3L	UN0250	Explosive (1.3L)	–	–	–	
N	Rocket motors, liquid fueled	1.2J	UN0395	Explosive (1.2J)	–	–	–	
N	Rocket motors, liquid fueled	1.3J	UN0396	Explosive (1.3J)	–	–	–	
N	Rockets, line throwing	1.2G	UN0238	Explosive (1.2G)	–	–	–	
N	Rockets, line throwing	1.3G	UN0240	Explosive (1.3G)	–	–	–	
N	Rockets, liquid fueled, with bursting charge	1.1J	UN0397	Explosive (1.1J)	–	–	–	
N	Rockets, liquid fueled, with bursting charge	1.2J	UN0398	Explosive (1.2J)	–	–	–	
N	Rockets, with bursting charge	1.1E	UN0181	Explosive (1.1E)	–	–	–	
N	Rockets, with bursting charge	1.2E	UN0182	Explosive (1.2E)	–	–	–	
N	Rockets, with bursting charge	1.1F	UN0180	Explosive (1.1F)	–	–	–	
N	Rockets, with bursting charge	1.2F	UN0295	Explosive (1.2F)	–	–	–	
N	Rockets, with inert head	1.3C	UN0183	Explosive (1.3C)	–	–	–	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Note and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Rodenticides, n.o.s., liquid	6.1	UN1587	Poison	I	1	1	
		6.1	UN1587	Poison	II	1.2	1	
		6.1	UN1587	St. Andrews Cross	III	1.2	1.2	
	Rodenticides, n.o.s., solid	6.1	UN1587	Poison	I	1.2	1.2	
		6.1	UN1587	St. Andrews Cross	III	1.2	1.2	
	Rosin oil	3.2	UN1286	Flammable Liquid	II	1.2	1	
		3.3	UN1286	Flammable Liquid	III	1.2	1.2	
	R 22. See Chlorodifluoromethane							
	R 12. See Dichlorodifluoromethane							
	Rubber scrap, powdered or granulated	4.1	UN1345	Flammable Solid	II	1.2	1.2	
	Rubber shoddy. See Rubber scrap							
	Rubber solution	3.2	UN1287	Flammable Liquid	II	1.2	1	
		3.3	UN1287	Flammable Liquid	III	1.2	1.2	
	Rubidium hydroxide, solid	8	UN2678	Corrosive	II	1.2	1.2	Keep dry
	Rubidium hydroxide, solution	8	UN2677	Corrosive	II	1.2	1.2	
	Rubidium, metal	4.3	UN1423	Dangerous When Wet	I	1.2	5	
N	Samples, explosive, other than initiating explosive	1	UN0190	As directed by the competent authority	–	–	–	
	Sand acid. See Fluosilicic acid							
	Seed cake, containing vegetable oil, mechanically expelled seeds, containing more than 10% of oil or more than 20% of oil and moisture combined	4.2	UN1386	None. Package to be marked "Class 4.2"	III	1.2	5	
	Seed cake, containing vegetable oil, solvent extractions and expelled seeds, containing not more than 10% of oil and, when the amount of moisture is higher than 10%, not more than 20% of oil and moisture combined	4.2	UN1386	None. Package to be marked "Class 4.2"	III	1.2	1.2	
	Seed cake, containing vegetable oil, solvent extractions containing not more than 1.5% of oil and 11% of moisture	4.2	UN2217	None. Package to be marked "Class 4.2"	III	1.2	1.2	
	Selenates, n.o.s. or Selenites, n.o.s.	6.1	UN2630	Poison	I	1.2	5	Stow "away from" living quarters
	Selenic acid	8	UN1905	Corrosive	I	1.2	1.2	Keep dry
	Selenium disulphide	6.1	UN2657	Poison	II	1.2	1.2	Stow "away from" living quarters
	Selenium hexafluoride	2.3	UN2194	Poison Gas	–	1	5	Stow "away from" living quarters
	Selenium metal powder, non-pyrophoric	6.1	UN2658	St. Andrews Cross	III	1.2	1.2	
	Selenium oxychloride	8	UN2879	Corrosive, Poison	I	1.2	5	Keep dry
	Shale oil	3.2	UN1288	Flammable Liquid	II	1.2	1	
		3.3	UN1288	Flammable Liquid	III	1.2	1.2	
	Shellac. See Paints, etc							
	Signal devices, hand	1.4S	UN0373	None. Package to be marked "1.4S"	–	1.3	1.3	
	Signal devices, hand	1.4G	UN0191	Explosive (1.4G)	–	1.3	1.3	
N	Signals, distress, ship (other than water activated)	1.1G	UN0194	Explosive (1.1G)	–	–	–	
N	Signals, distress, ship (other than water activated)	1.3G	UN0195	Explosive (1.3G)	–	–	–	
N	Signals, railway track, explosive	1.1G	UN0192	Explosive (1.1G)	–	–	–	
N	Signals, railway track, explosive	1.4S	UN0193	None. Package to be marked "1.4S"	–	–	–	
N	Signals, smoke, with explosive sound unit	1.1G	UN0196	Explosive (1.1G)	–	–	–	
N	Signals, smoke, with explosive sound unit	1.2G	UN0313	Explosive (1.2G)	–	–	–	
	Signals, smoke, without explosive sound unit	1.4G	UN0197	Explosive (1.4G)	–	1.3	1.3	
	Silane	2.1	UN2203	Flammable Gas	–	1	5	Shade from radiant heat. Stow "separated from" oxidizing substances such as bromine and chlorine
	Silicofluoric acid. See Fluosilicic acid							
	Silicofluorides, n.o.s.	6.1	UN2856	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Silicon chloride. See Silicon tetrachloride							
	Silicon powder, amorphous	4.1	UN1346	Flammable Solid	III	1.2	1.2	
	Silicon tetrachloride	8	UN1818	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Silicon tetrafluoride	2.3	UN1859	Poison Gas, Corrosive	–	1	5	
	Silver arsenite	6.1	UN1683	Poison	II	1.2	1.2	
	Silver cyanide	6.1	UN1684	Poison	II	1.2	1.2	Stow "away from" strong liquid acids
	Silver nitrate	5.1	UN1493	Oxidizer	II	1.2	1.2	Stow "away from" foodstuffs
	Silver picrate, wetted with, by weight, at least 30% water	4.1	UN1347	Flammable Solid	I	1	5	
	Sisal, dry. See Fibre, vegetable, dry							
	Sludge acid	8	UN1906	Corrosive	II	1.2	1	Stow "away from" fluorides. Metal drums only under deck
	Soda lime	8	UN1907	Corrosive	III	1.2	1.2	Keep dry
	Sodium aluminate, solution	8	UN1819	Corrosive	II	1.2	1.2	
	Sodium aluminium hydride	4.3	UN2835	Dangerous When Wet	II	1.2	5	
	Sodium amalgam	4.3	UN1424	Dangerous When Wet	I	1.2	1.2	
	Sodium amide	4.3	UN1425	Dangerous When Wet	II	1.2	5	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Sodium ammonium vanadate	6.1	UN2863	Poison	II	1.2	1.2	Stow "away from" living quarters
	Sodium arsanilate	6.1	UN2473	St. Andrews Cross	III	1.2	1.2	
	Sodium arsenate	6.1	UN1685	Poison	II	1.2	1.2	
	Sodium arsenite, aqueous solutions	6.1	UN1686	Poison	I/II	1.2	1.2	
		6.1	UN1686	St. Andrews Cross	III	1.2	1.2	
	Sodium arsenite, solid	6.1	UN2027	Poison	II	1.2	1.2	
	Sodium azide	6.1	UN1687	Poison	II	1.2	1.2	Stow "away from" heavy metals and their compounds. "separated from" acids
	Sodium bisulphate, solid. See Sodium hydrogen sulphate, solid							
	Sodium bisulphite, solution. See Sodium hydrogen sulphite, solution							
	Sodium borohydride	4.3	UN1426	Dangerous When Wet	I	1.2	5	
	Sodium bromate	5.1	UN1494	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Sodium cacodylate	6.1	UN1688	Poison	II	1.2	1.2	Stow "away from" acids
	Sodium chlorate	5.1	UN1495	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Sodium chlorite, aqueous solution	5.1	UN2428	Oxidizer	II	1.2	1	Stow "away from" powdered metals and "separated from" ammonium compounds
	Sodium chlorite	5.1	UN1496	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Sodium chlorite, solution with more than 5% available chlorine	8	UN1908	Corrosive	II	1.2	1	Glass carboys in hampers not permitted under deck
	Sodium chloroacetate	6.1	UN2659	St. Andrews Cross	III	1.3	1.3	Keep cool and dry
	Sodium cuprocyanide, solid	6.1	UN2316	Poison	I	1.2	1.2	Keep dry. Stow "separated from" acids
	Sodium cuprocyanide solution	6.1	UN2317	Poison	I	1.2	1	Stow "away from" living quarters and "separated from" acids
	Sodium cyanide	6.1	UN1689	Poison	I	1.2	1.2	Stow "away from" acids
N	Sodium dinitro-o-cresolate, dry or wetted with less than 15% water by weight	1.3C	UN0234	Explosive (1.3C)	–	–	–	
	Sodium dinitro-o-cresolate, wetted with, by weight, at least 15% water	4.1	UN1348	Flammable Solid Poison	II	1.2	5	Stow "away from" heavy metals and their compounds
	Sodium dinitro-o-cresolate, wetted with, by weight, at least 10% water	4.1	UN1349	Flammable Solid Poison	II	1	5	Stow "away from" heavy metals and their compounds
	Sodium dithionite	4.2	UN1384	Spontaneously Combustible	II	1.2	1.2	Keep dry. Only metal drums permitted on passenger vessels
	Sodium fluoride, solid	6.1	UN1690	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Sodium fluoride, solution	6.1	UN1690	St. Andrews Cross	III	1.2	1.2	
	Sodium fluoroacetate	6.1	UN2629	Poison	I	1.2	5	Stow "away from" living quarters
	Sodium hydrate. See Sodium hydroxide, solution							
	Sodium hydride	4.3	UN1427	Dangerous When Wet	I	1.2	5	
	Sodium hydrogen fluoride	8	UN2439	Corrosive	II	1.3	1.3	Keep cool and dry
	Sodium hydrogen sulphate, solid	8	UN1821	Corrosive	II	1.2	1.2	
	Sodium hydrogen sulphate, solution	8	UN2837	Corrosive	II	1.2	1.2	
	Sodium hydrogen sulphite, solution. See Bisulphites, inorganic, aqueous solutions, n.o.s.							
	Sodium hydrosulphide, with less than 25% water of crystallization	4.2	UN2318	Spontaneously Combustible	II	1.2	1.2	
	Sodium hydrosulphide, with not less than 25% water of crystallization	8	UN2949	Corrosive	II	1.2	1.2	Keep dry. Stow "away from" acids
	Sodium hydrosulphide, with not less than 25% water of crystallization	8	UN2949	Corrosive	II	1.2	1.2	
	Sodium hydrosulphite. See Sodium dithionite							
	Sodium hydroxide, solid	8	UN1823	Corrosive	II	1.2	1.2	Keep dry
	Sodium hydroxide, solution	8	UN1824	Corrosive	II	1.2	1.2	
	Sodium, metal	4.3	UN1428	Dangerous When Wet	II	1.2	5	
	Sodium metal, dispersion in organic liquids	4.3	UN1429	Dangerous When Wet	I	1.2	5	
	Sodium methylate	4.3	UN1431	Dangerous When Wet	I	1.2	1	
	Sodium methylate, solutions in alcohol	3.2	UN1289	Flammable Liquid	II	1.2	1	
		3.3	UN1289	Flammable Liquid	II	1.2	1.2	
	Sodium monoxide	8	UN1825	Corrosive	II	1.2	1.2	Keep dry
	Sodium nitrate	5.1	UN1498	Oxidizer	III	1.2	1.2	
	Sodium nitrate and potash, mixtures	5.1	UN1478	Oxidizer	II	1.2	1.2	
	Sodium nitrate and potassium nitrate, mixtures	5.1	UN1499	Oxidizer	III	1.2	1.2	
	Sodium nitrate bags, empty See Bags, empty and unwashed, etc							
	Sodium nitrite	5.1	UN1500	Oxidizer	III	1.2	1.2	Stow "separated from" ammonium compounds and cyanides and "away from" foodstuffs
	Sodium pentachlorophenate	6.1	UN2567	Poison	II	1.2	1.2	Stow "away from" living quarters
	Sodium perborate	5.1	UN2467	Oxidizer	III	1.2	1.2	Keep dry
	Sodium perchlorate	5.1	UN1502	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals

§ 172.102 Optional Hazardous Materials Table—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7) Vessel Stowage Requirements		
Notes and Symbols	Hazardous Materials Description & Proper Shipping Names	IMO Class	Identification Number	Label(s) required	Packaging Group	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Sodium permanganate	5.1	UN1503	Oxidizer	II	1.2	1.2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Sodium peroxide	5.1	UN1504	Oxidizer	I	1.2	1	Keep dry. Stow "away from" powdered metals permanganates and combustible packagings and cargo
	Sodium perchlorate	5.1	UN1505	Oxidizer	III	1.2	1.2	
	Sodium phenolate, solid	8	UN2497	Corrosive	III	1.2	1.2	
	Sodium phosphide	4.3	UN1432	Dangerous When Wet, Poison	I	1.2	5	When stowed under deck, stow in a mechanically ventilated space
N	Sodium picramate, dry or wetted with less than 20% water, by weight	1.3C	UN0235	Explosive (1.3C)	–	–	–	
	Sodium picramate, wetted with, by weight, at least 20% water	6.1	UN1349	Flammable Solid	I	1.2	5	Stow "away from" heavy metals and their compounds
	Sodium-potassium, alloy. See Potassium-sodium, alloy							
N	Sodium salts of nitro-aromatic derivatives, n.o.s., explosive	1.3C	UN0203	Explosive (1.3C)	–	–	–	
	Sodium silicofluoride	6.1	UN2674	St. Andrews Cross	III	1.2	1.2	Stow "away from" acids
	Sodium sulphide, anhydrous or Sodium sulphide with less than 30% water of crystallization	4.2	UN1385	Spontaneously Combustible	II	1.2	1.2	Stow "separated from" liquid acids
	Sodium sulphide, hydrated, with at least 30% water	8	UN1849	Corrosive	II	1.2	1.2	Stow "away from" acids
	Sodium superoxide	5.1	UN2547	Oxidizer	I	1.2	5	Keep dry. Stow "away from" powdered metals permanganates and combustible packaging and cargo
N	Sounding devices, explosive	1.1E	UN0374	Explosive (1.1E)	–	–	–	
N	Sounding devices, explosive	1.2E	UN0375	Explosive (1.2E)	–	–	–	
N	Sounding devices, explosive	1.1F	UN0296	Explosive (1.1F)	–	–	–	
N	Sounding devices, explosive	1.2F	UN0204	Explosive (1.2F)	–	–	–	
	Spent mixed acid. See Acid mixtures, spent							
	Spirits of salts. See Hydrochloric acid							
	Squibs	1.4S	UN0206	None. Package to be marked "1.4S"	–	1.3	1.3	
	Squibs	1.4B	UN0322	Explosive (1.4B)	–	1.3	5	
	Squibs	1.4G	UN0323	Explosive (1.4G)	–	1.3	5	
	Stains. See Paints, etc							
	Stannic chloride, anhydrous	8	UN1827	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Stannic chloride pentahydrate	8	UN2440	Corrosive	III	1.2	1.2	Keep dry
	Stannic phosphides	4.3	UN1433	Dangerous When Wet	I	1.2	5	When stowed under deck, stow in a mechanically ventilated space
	Stibine	2.3	UN2676	Poison Gas, Flammable Gas	–	1	5	Stow "away from" living quarters
	Stone	4.1	UN1327	None	III	1.2	1.2	Stow "away from" animal or vegetable oils
	Strike anywhere matches. See Matches, strike anywhere							
	Strontium, alloys, non-pyrophoric	4.3	UN1434	Dangerous When Wet	II	1.2	5	
	Strontium arsenite	6.1	UN1691	Poison	II	1.2	1.2	
	Strontium chlorate	5.1	UN1506	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Strontium nitrate	5.1	UN1507	Oxidizer	III	1.2	1.2	
	Strontium perchlorate	5.1	UN1508	Oxidizer	II	1.2	1.2	Stow "away from" powdered metals
	Strontium peroxide	5.1	UN1509	Oxidizer	II	1.2	1.2	Keep dry
	Strontium phosphide	4.3	UN2013	Dangerous When Wet Poison	I	1.2	5	When stowed under deck, stow in a mechanically ventilated space
	Strychnine (and salts of), liquid	6.1	UN1692	Poison	I	1		
		6.1	UN1692	Poison	II	1.2	1	
		6.1	UN1692	St. Andrews Cross	III	1.2	1.2	
	Strychnine (and salts of), solid	6.1	UN1692	Poison	I.1	1.2	1.2	
		6.1	UN1692	St. Andrews Cross	III	1.2	1.2	
	Styrene monomer, inhibited	3.3	UN2055	Flammable Liquid	II	1.2	1.2	
N	Substances, explosive, n.o.s.	1.1L	UN0357	Explosive (1.1L)	–	–	–	
N	Substances, explosive, n.o.s.	1.2L	UN0358	Explosive (1.2L)	–	–	–	
N	Substances, explosive, n.o.s.	1.3L	UN0359	Explosive (1.3L)	–	–	–	
	Substances which, in contact with water, emit flammable gases, n.o.s.	4.3	UN2813	Dangerous When Wet	I.1 III	1.2	5	
	Substituted nitrophenol pesticides, liquid, flammable, toxic, n.o.s., flashpoint below 23 deg C	3.2	UN2780	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	II	1.2	1	
	Substituted nitrophenol pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN3013	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN3013	Poison, Flammable Liquid	II	1.2	1	Segregation same as for flammable liquids
		6.1	UN3013	St. Andrews Cross, Flammable Liquid	III	1.2	1.2	Segregation same as for flammable liquids

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Substituted nitrophenol pesticides, liquid, toxic, n.o.s.	6.1	UN3014	Poison	I	1	1	
		6.1	UN3014	Poison	II	1,2	1	
		6.1	UN3014	St. Andrews Cross	III	1,2	1,2	
	Substituted nitrophenol pesticides, solid, toxic, n.o.s.	6.1	UN2779	Poison	I/II	1,2	1,2	
		6.1	UN2779	St. Andrews Cross	III	1,2	1,2	
	Succinic acid peroxide. See Disuccinic acid peroxide				–	–	–	
	Sulphamic acid	8	UN2967	Corrosive	III	1,2	1,2	
	Sulphur chlorides	8	UN1828	Corrosive	I	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Sulphur dichloride. See Sulphur chlorides							
	Sulphur dioxide, liquefied	2.3	UN1079	Poison Gas	–	1,2	5	Stow "away from" living quarters
	Sulphur hexafluoride	2.2	UN1080	Nonflammable Gas	–	1,2	1,2	
	Sulphuric acid, fuming	8	UN1831	Corrosive, Poison	I	1,2	1	Keep dry. Stow "away from" fluorides and all other corrosives except nitric acids and sulphur trioxide. Under deck stowage is permitted in metal drums only
	Sulphuric acid, spent	8	UN1832	Corrosive	II	1,2	1	Stow "away from" fluorides. For concentrations of more than 51% acid, stow "away from" all other corrosives except nitric acids and sulphur trioxide. Under deck stowage is permitted in metal drums only
	Sulphuric acid, with more than 51% acid	8	UN1830	Corrosive	II	1,2	1	Stow "away from" fluorides and all other corrosives except nitric acids and sulphur trioxide. Under deck stowage is permitted in metal drums only
	Sulphuric acid, with not more than 51% acid	8	UN2796	Corrosive	II	1,2	1	Stow "away from" fluorides. Glass carboys in hampers not permitted under deck
	Sulphuric and hydrofluoric acid mixtures. See Hydrofluoric acid and sulphuric acid mixtures							
	Sulphuric anhydride. See Sulphur trioxide, stabilized							
	Sulphur, lump and coarse grained powder, or fine grained powder	4.1	UN1350	Flammable Solid	III	1,2	1,2	Protect from sparks and open flame. Stow "separated from" oxidizing substances
	Sulphur, molten	4.1	UN2448	Flammable Solid	III	1	1	Stow "separated from" oxidizers, "away from" living quarters
	Sulphurous acid	8	UN1833	Corrosive	II	1,2	1	Glass carboys in hampers not permitted under deck
	Sulphur tetrafluoride	2.3	UN2418	Poison Gas	–	1	5	Stow "away from" living quarters
	Sulphur trioxide, stabilized	8	UN1829	Corrosive	I	1,2	1,2	Keep dry. Glass bottles not permitted under deck. Stow "away from" other corrosives except nitric and sulphuric acids
	Sulphuryl chloride	8	UN1834	Corrosive	I	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Sulphuryl fluoride	2.3	UN2191	Poison Gas	–	1,2	5	Stow "away from" living quarters
	Tars, liquid. See Cut-backs, asphalt or bitumen							
	Tear gas candles, non-explosive	6.1	UN1700	Poison, Flammable Solid	II	1	5	Segregation same as for flammable solids. Stow "away from" living quarters
	Tear gas grenades, non-explosive. See Tear gas candles							
	Tear gas, (irritating substances, liquid or solid), n.o.s.	6.1	UN1693	Poison	I/II	1	5	
		6.1	UN1693	St. Andrews Cross	III	1	5	
	Tellurium hexafluoride	2.3	UN2195	Poison Gas	–	1	5	Stow "away from" living quarters
	T.E.L. See Motor fuel anti-knock mixtures							
	Terpene hydrocarbons n.o.s.	3.3	UN2319	Flammable Liquid	III	1,2	1,2	
	Terpinolene	3.3	UN2541	Flammable Liquid	III	1,2	1,2	
	Tetrabromoethane	6.1	UN2504	St. Andrews Cross	III	1,2	1,2	
	1,1,2,2-Tetrachloroethane	6.1	UN1702	Poison	II	1,2	1,2	
	Tetrachloroethylene	6.1	UN1897	St. Andrews Cross	III	1,2	1,2	
	Tetraethyl dithiopyrophosphate, liquid or mixtures	6.1	UN1704	Poison	I/II	1	5	
		6.1	UN1704	St. Andrews Cross	III	1	5	
	Tetraethyl dithiopyrophosphate with gases, including solutions and mixtures thereof	2.3	UN1703	Poison Gas	–	1	5	Stow "away from" living quarters
	Tetraethylenepentamine	8	UN2320	Corrosive	III	1,2	1,2	Glass carboys prohibited on passenger vessels
	Tetraethyl lead. See Motor fuel anti-knock mixtures							
	Tetraethyl pyrophosphate and compressed gas, mixture	2.3	UN1705	Poison Gas	–	1	5	Stow "away from" living quarters
	Tetraethyl silicate	3.3	UN1292	Flammable Liquid	II	1,2	1,2	
	Tetrafluoroethylene, inhibited	2.1	UN1081	Nonflammable Gas	–	1,2	5	
	Tetrafluorohydrazine	2.3	[UN1955]	Poison Gas	–	1	5	Stow "away from" living quarters and readily combustible substances, "separated from" hydrogen
	Tetrafluoromethane	2.2	UN1982	Nonflammable Gas	–	1,2	1,2	
	1,2,3,6-Tetrahydrobenzaldehyde	3.3	UN2498	Flammable Liquid	III	1,2	1,2	
	Tetrahydrofuran	3.1	UN2056	Flammable Liquid	II	1,3	5	Keep cool
	Tetrahydrofurfurylamine	3.3	UN2943	Flammable Liquid	III	1,2	1,2	

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Tetrahydrophthalic anhydrides	8	UN2698	None. Package to be so marked "Class 8"	III	1,2	1,2	Keep dry
	1,2,3,6-Tetrahydropyridine	3.2	UN2410	Flammable Liquid	II	1,2	1	
	Tetrahydrothiophene	3.2	UN2412	Flammable Liquid	II	1,2	1	
	Tetralin hydroperoxide, technical pure	5.2	UN2136	Organic Peroxide	I	1	5	
	Tetramethylammonium hydroxide	8	UN1835	Corrosive	II	1,2	1,2	
	1,1,3,3-Tetramethyl butyl hydroperoxide, technical pure	5.2	UN2150	Organic Peroxide	II	1	5	
	1,1,3,3-Tetramethyl butyl peroxy-2-ethyl hexanoate, technical pure	5.2	UN2161	Organic Peroxide	I	1	5	Control temperature 20 deg C. Emergency temperature 25 deg C
	Tetramethylsilane	3.1	UN2749	Flammable Liquid	I	1	5	Keep cool. Shade from radiant heat
N	Tetranitro-aniline	1.1D	UN0207	Explosive (1.1D)	–	–	–	
	Tetranitromethane	5.1	UN1510	Oxidizer	I	1	5	
	Tetrapropylorthotitanate	3.3	UN2413	Flammable Liquid	II	1,2	1,2	
N	Tetrazol-1-acetic acid	1.4C	UN0407	Explosive (1.4C)	–	–	–	
	Textile waste, wet, n.o.s.	4.2	UN1857	Spontaneously Combustible	III	1,2	1,2	
	Thallium chlorate	5.1	UN2573	Oxidizer, Poison	II	1,2	1,2	Stow "separated from" ammonium compounds and foodstuffs and "away from" finely powdered metals
	Thallium compounds, n.o.s. liquid	6.1	UN1707	Poison	I	1		
		6.1	UN1707	Poison	II	1,2	1	
		6.1	UN1707	St. Andrews Cross	III	1,2	1,2	
	Thallium compounds, n.o.s. solid	6.1	UN1707	Poison	I	1,2	1,2	
		6.1	UN1707	St. Andrews Cross	III	1,2	1,2	
	Thallium nitrate	6.1	UN2727	Poison	II	1,2	1,2	Stow "away from" living quarters
	4-Thiapentanal	6.1	UN2785	St. Andrews Cross. Flammable Liquid (only if flashpoint below 61 deg C)	III	1	5	Segregation same as for flammable liquids if flashpoint below 61 deg C. Shade from radiant heat and sunlight. Stow "away from" living quarters, acids and bases
	Thinners. *See* Paints, etc.							
	Thinning liquid. *See* Flammable liquid preparations, n.o.s.							
	Thioacetic acid	3.2	UN2436	Flammable Liquid	II	1,2	1	
	Thiocarbonyl chloride. See Thiophosgene							
	Thioglycol	6.1	UN2966	Poison	II	1,2	1,2	
	Thioglycolic acid	8	UN1940	Corrosive	II	1,2	1,2	Glass carboys in hampers prohibited under deck
	Thiolactic acid	6.1	UN2936	Poison	II	1,2	1,2	
	Thionyl chloride	8	UN1836	Corrosive	I	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Thiophene	3.2	UN2414	Flammable Liquid	II	1,2	1	
	Thiophosgene	6.1	UN2474	Poison	II	1,2	1	Stow "away from" acids and living quarters
	Thiophosphoryl chloride	8	UN1837	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Thiourea	6.1	UN2877	St. Andrews Cross	III	1,2	1,2	
	Tin chloride, fuming. *See* Stannic chloride, anhydrous							
	Tinctures, medicinal	3.2	UN1293	Flammable Liquid	II	1,2	1	
		3.3	UN1293	Flammable Liquid	III	1,2	1,2	
	Tin tetrachloride. *See* Stannic chloride, anhydrous							
	Titanium hydride	4.1	UN1871	Flammable Solid	II	1,2	5	
	Titanium *metal powder, dry mechanically produced, particle size between 3 and 53 microns, or chemically produced, particle size less than 840 microns*	4.2	UN2545	Spontaneously Combustible	II	1	5	
	Titanium *metal powder, wetted with not less than 25% water (a visible excess of water must be present) mechanically produced, particle size between 3 and 53 microns, or chemically produced, particle size less than 840 microns*	4.1	UN1352	Flammable Solid	II	1,2	5	
	Titanium sponge granules or Titanium sponge powders	4.1	UN2878	Flammable Solid	III	1	5	
	Titanium tetrachloride	8	UN1838	Corrosive	II	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Titanium trichloride mixtures, *non-pyrophoric*	8	UN2869	Corrosive	II	1,2	1,2	Keep dry
	Titanium trichloride, *pyrophoric* or Titanium trichloride *mixtures, pyrophoric*	4.2	UN2441	Spontaneously Combustible. Corrosive	II	1,2	1,2	
	Toe puffs, *nitrocellulose base*	4.1	UN1353	Flammable Solid	III	1	5	
	Toluene	3.2	UN1294	Flammable Liquid	II	1,2	1	
	Toluene diisocyanate *(TDI)*	6.1	UN2078	Poison	II	1,2	1	Shade from radiant heat. Stow "away from" living quarters
	Toluidines *(o-, m-, p-)*	6.1	UN1708	Poison	II	1,2	1,2	Stow "away from" acids
	2,4-Tolylenediamine	6.1	UN1709	St. Andrews Cross	III	1,2	1,2	
N	Torpedoes, *with bursting charge*	1.1E	UN0329	Explosive (1.1E)	–	–	–	
N	Torpedoes, *with bursting charge*	1.1F	UN0330	Explosive (1.1F)	–	–	–	
N	Tracers for ammunition	1.4G	UN0306	Explosive (1.4G)	–	1,3	1,3	

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Tracers for ammunition	1.3G	UN0212	Explosive (1.3G)	–	–	–	
	Triallylamine	3.3	UN2610	Flammable Liquid	II	1,2	1,2	
	Triethyl borate	6.1	UN2609	St. Andrews Cross, Flammable Liquid (only if flashpoint below 61 deg C)	III	1,3	1,3	Keep cool and dry. Shade from radiant heat. If flashpoint below 61 deg C, segregation same as for flammable liquids
	Triazine pesticides, liquid, flammable, toxic, n.o.s., flashpoint below 23 deg C	3.2	UN2764	Flammable Liquid and Poison or St. Andrews Cross (according to toxicity)	I,II	1,2	1	
	Triazine pesticides, liquid, toxic, flammable, n.o.s., flashpoint between 23 deg C and 61 deg C	6.1	UN2997	Poison, Flammable Liquid	I	1	1	Segregation same as for flammable liquids
		6.1	UN2997	Poison, Flammable Liquid	II	1,2	1	Segregation same as for flammable liquids
		6.1	UN2997	St. Andrews Cross, Flammable Liquid	III	1,2	1,2	Segregation same as for flammable liquids
	Triazine pesticides, liquid, toxic, n.o.s.	6.1	UN2998	Poison	I	1	1	
		6.1	UN2998	Poison	II	1,2	1	
		6.1	UN2998	St. Andrews Cross	III	1,2	1,2	
	Triazine pesticides, solid, toxic, n.o.s.	6.1	UN2763	Poison	I,II	1,2	1,2	
		6.1	UN2763	St. Andrews Cross	III	1,2	1,2	
	Tributylamine	8	UN2542	Corrosive	III	1,2	1,2	
	Trichloroacetic acid, solid	8	UN1839	Corrosive	II	1,2	1,2	Keep dry
	Trichloroacetic acid, solutions	8	UN2564	Corrosive	II	1,2	1	Glass carboys in hampers prohibited under deck
	Trichloroacetyl chloride	8	UN2442	Corrosive	II	1	5	Keep dry
	Trichlorobenzenes, liquid	6.1	UN2321	St. Andrews Cross	III	1,2	1,2	Stow "away from" living quarters
	Trichlorobutene	6.1	UN2322	Poison	II	1,2	1,2	Shade from radiant heat. Stow "away from" living quarters
	1,1,2,-Trichloroethane	6.1	UN2831	St. Andrews Cross	III	1,2	1,2	
	Trichloroethylene	6.1	UN1710	St. Andrews Cross	III	1,2	1,2	
	Trichloroisocyanuric acid, dry	5.1	UN2468	Oxidizer	II	1,2	1,2	Shade from radiant heat. Keep dry. Stow "separated from" nitrogen compounds
	Trichlorosilane	4.3	UN1295	Dangerous When Wet, Flammable Liquid, Corrosive	I	1	5	
	Tricresylphosphate, with more than 3% ortho isomer	6.1	UN2574	Poison	II	1,2	1,2	
	Triethylaluminium	4.2	UN1102	Spontaneously Combustible	I	1	1	
	Triethylamine	3.2	UN1296	Flammable Liquid	II	1,2	1	
	Triethylenetetramine	8	UN2259	Corrosive	II	1,2	1	Stow "separated from" nitric acid, "away from" acids, copper and copper alloys and living quarters
	Triethyl phosphite	3.3	UN2323	Flammable Liquid	III	1,2	1,2	Stow "separated from" acids
	Trifluoroacetic acid	8	UN2699	Corrosive	I	1,3	1	Keep cool. Stow "away from" all other corrosives
	Trifluorobromomethane *See* Bromotrifluoromethane							
	Trifluorochloroethane *See* Chlorotrifluoroethane							
	Trifluorochloroethylene, inhibited	2.1	UN1082	Flammable Gas	–	1,2	1	
	Trifluorochloromethane *See* Chlorotrifluoromethane							
	Trifluoroethane	2.1	UN2035	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Trifluoromethane	2.2	UN1984	Nonflammable Gas	–	1,2	1,2	
	3-Trifluoromethyl aniline	6.1	UN2948	Poison	II	1,2	1,2	
	3-Trifluoromethyl aniline	6.1	UN2942	St. Andrews Cross	III	1,2	1,2	
	Triisobutyl aluminium	4.2	UN1930	Spontaneously Combustible	I	1	1	
	Triisobutylene	3.3	UN2324	Flammable Liquid	II	1,2	1,2	
	Triisocyanatoisocyanurate of isophoronediisocyanate, solution 70%, by weight	3.3	UN2906	Flammable Liquid	III	1,2	1,2	
	Triisopropyl borate	3.3	UN2616	Flammable Liquid	II	1,2	1,2	
	Trimethylacetyl chloride	8	UN2438	Corrosive, Flammable Liquid	II	1	5	Shade from radiant heat. Segregation same as for flammable liquids
	Trimethylaluminium	4.2	UN1103	Spontaneously Combustible	I	1	1	
	Trimethylamine, anhydrous	2.1	UN1083	Flammable Gas	–	1	5	
	Trimethylamine, aqueous solutions containing not more than 30% of trimethylamine	3.2	UN1297	Flammable Liquid	II	1,2	1	Stow "away from" mercury and its compounds
	1,3,5-Trimethylbenzene	3.3	UN2325	Flammable Liquid	III	1,2	1,2	
	Trimethyl borate	3.2	UN2416	Flammable Liquid	II	1,2	1	
		3.3	UN2416	Flammable Liquid	II	1,2	1,2	
	Trimethylchlorosilane	3.2	UN1298	Flammable Liquid, Corrosive	II	1,2	1	
	Trimethylcyclohexylamine	8	UN2326	Corrosive	III	1,2	1,2	Glass carboys prohibited on passenger vessels

§ 172.102 Optional Hazardous Materials Table—Continued

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Trimethylhexamethylene diamines	8	UN2327	Corrosive	III	1,2	1,2	Glass carboys prohibited on passenger vessels
	Trimethylhexamethylene diisocyanate	6.1	UN2328	Poison	II	1,2	1	
	2,4,4-Trimethylpentyl-2-peroxy phenoxy acetate, maximum concentration 37% in solution	5.2	UN2961	Organic Peroxide	II	1	5	Control temperature -10 deg C Emergency temperature 0 deg C
	Trimethyl phosphite	3.3	UN2329	Flammable Liquid	III	1,2	1,2	
N	Trinitroaniline	1.1D	UN0153	Explosive (1.1D)	–	–	–	
N	Trinitroanisole	1.1D	UN0213	Explosive (1.1D)	–	–	–	
N	Trinitrobenzene, dry or wetted with less than 30% water by weight	1.1D	UN0214	Explosive (1.1D)	–	–	–	
N	Trinitrobenzenesulfonic acid	1.1L	UN0386	Explosive (1.1L)	–	–	–	
	Trinitrobenzene, wetted with, by weight, at least 10% water	4.1	UN1354	Flammable Solid	I	1	5	Stow "away from" heavy metals and their compounds
	Trinitrobenzene, wetted with not less than 30% water by weight	4.1	UN1354	Flammable Solid	II	1,2	5	Stow "away from" heavy metals and their compounds
N	Trinitrobenzoic acid, dry or containing, by weight, less than 30% water	1.1D	UN0215	Explosive (1.1D)	–	–	–	
	Trinitrobenzoic acid, wetted with, by weight, at least 10% water	4.1	UN1355	Flammable Solid	I	1	5	Stow "away from" heavy metals and their compounds
	Trinitrobenzoic acid, wetted with not less than 30% water, by weight	4.1	UN1355	Flammable Solid	II	1,2	5	Stow "away from" heavy metals and their compounds
N	Trinitrochlorobenzene	1.1D	UN0155	Explosive (1.1D)	–	–	–	
N	Trinitrofluorenone	1.1D	UN0387	Explosive (1.1D)	–	–	–	
N	Trinitro-m-cresol	1.1D	UN0216	Explosive (1.1D)	–	–	–	
N	Trinitronaphthalene	1.1D	UN0217	Explosive (1.1D)	–	–	–	
N	Trinitrophenetole	1.1D	UN0218	Explosive (1.1D)	–	–	–	
N	Trinitrophenol, dry or wetted with less than 30% water, by weight	1.1D	UN0154	Explosive (1.1D)	–	–	–	
	Trinitrophenol, wetted, with not less than 30% water, by weight	4.1	UN1344	Flammable Solid	II	1,2	5	Stow "away from" heavy metals and their compounds
	Trinitrophenol, wetted with not less than 10% water, by weight	4.1	UN1344	Flammable Solid	I	1	5	Stow "away from" heavy metals and their compounds
N	Trinitrophenylmethylnitramine	1.1D	UN0208	Explosive (1.1D)	–	–	–	
N	Trinitroresorcinol, containing by weight, not less than 20% water or mixture of alcohol and water	1.1D	UN0394	Explosive (1.1D)	–	–	–	
N	Trinitroresorcinol, dry or wetted with less than 20% water by weight (or mixture of alcohol and water)	1.1D	UN0219	Explosive (1.1D)	–	–	–	
N	Trinitrotoluene and hexanitrostilbene mixtures or Trinitrotoluene and trinitrobenzene mixtures	1.1D	UN0388	Explosive (1.1D)	–	–	–	
N	Trinitrotoluene, dry or wetted with less than 30% water, by weight	1.1D	UN0209	Explosive (1.1D)	–	–	–	
N	Trinitrotoluene mixtures containing trinitrobenzene and hexanitrostilbene	1.1D	UN0389	Explosive (1.1D)	–	–	–	
	Trinitrotoluene, wetted with, by weight, at least 10% water	4.1	UN1356	Flammable Solid	I	1	5	Stow "away from" heavy metals and their compounds
	Trinitrotoluene, wetted with not less than 30% water by weight	4.1	UN1356	Flammable Solid	II	1,2	5	Stow "away from" heavy metals and their compounds
	Tripropylaluminum	4.2	UN2718	Spontaneously Combustible	I	1	5	
	Tripropylamine	3.3	UN2260	Flammable Liquid, Corrosive	II	1,2	1,2	
	Tripropylene	3.2	UN2057	Flammable Liquid	II	1,2	1	
		3.3	UN2057	Flammable Liquid	II	1,2	1,2	
	Tris-(1-aziridinyl)phosphine oxide, solution	6.1	UN2501	Poison	II	1,2	1,2	Stow "away from" living quarters
N	Tritonal	1.1D	UN0390	Explosive (1.1D)	–	–	–	
	Tungsten hexafluoride	2.3	UN2196	Poison Gas	–	1	5	
	Turpentine	3.3	UN1299	Flammable Liquid	III	1,2	1,2	
	Turpentine substitute	3.2	UN1300	Flammable Liquid	II	1,2	1	
		3.3	UN1300	Flammable Liquid	II	1,2	1,2	
	U D M H. See Dimethylhydrazine, unsymmetrical							
	Undecane	3.3	UN2330	Flammable Liquid	III	1,2	1,2	
	Urea hydrogen peroxide	5.1	UN1511	Oxidizer	III	1,2	1,2	Keep dry. Shade from radiant heat
N	Urea nitrate, dry or containing, by weight, less than 20% water	1.1D	UN0220	Explosive (1.1D)	–	–	–	
	Urea nitrate, wetted with not less than 10% water, by weight	4.1	UN1357	Flammable Solid	I	1,2	1,2	
	Urea nitrate, wetted with not less than 20% water, by weight	4.1	UN1357	Flammable Solid	II	1,2	1,2	
	Valeraldehyde	3.2	UN2058	Flammable Liquid	II	1,2	1	
	Valeryl chlorides	8	UN2502	Corrosive	II	1	1	Keep dry
	Vanadium oxytrichloride	8	UN2443	Corrosive	II	1	1	Keep dry. Stow "away from" organic compounds
	Vanadium pentoxide, non-fused form	6.1	UN2862	Poison	II	1,2	1,2	Stow "away from" living quarters
	Vanadium tetrachloride	8	UN2444	Corrosive	I	1	1	Keep dry. Glass carboys prohibited on passenger vessels
	Vanadium trichloride	8	UN2475	Corrosive	III	1,2	1,2	Keep dry
	Vanadium trioxide, non-fused form	6.1	UN2860	Poison	II	1,2	1,2	Stow "away from" living quarters
	Vanadyl sulphate	6.1	UN2931	Poison	II	1,2	1,2	Stow "away from" living quarters

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Materials Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Stowage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Varnish. See Paints, etc							
	Vinyl acetate, *inhibited*	3.2	UN1301	Flammable Liquid	II	1,2	5	
	Vinyl bromide, *inhibited*	2.1	UN1085	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Vinyl butyrate, *inhibited*	3.2	UN2838	Flammable Liquid	II	1,2	1	
	Vinyl chloride, *inhibited*	2.1	UN1086	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Vinyl chloroacetate	6.1	UN2589	Poison, Flammable Liquid	II	1,2	1,2	Segregation same as for flammable liquids
	Vinyl ethyl ether, *inhibited*	3.1	UN1302	Flammable Liquid	I	1,3	5	Keep cool
	Vinyl fluoride, *inhibited*	2.1	UN1860	Flammable Gas	–	1,2	1	Stow "away from" living quarters
	Vinylidene chloride, *inhibited*	3.1	UN1303	Flammable Liquid	I	1,2	5	Keep cool
	Vinyl isobutyl ether, *inhibited*	3.2	UN1304	Flammable Liquid	II	1,2	1	
	Vinyl methyl ether, *inhibited*	2.1	UN1087	Flammable Gas	–	1,2	1	
	Vinyl toluenes (*mixed isomers*), *inhibited*	3.3	UN2618	Flammable Liquid	III	1,2	1,2	
	Vinyl trichlorosilane, *inhibited*	3.2	UN1305	Flammable Liquid, Corrosive	I	1,2	1	
N	Warheads, rocket, with burster or expelling charge	1.4D	UN0370	Explosive (1.4D)	–	–	–	
N	Warheads, rocket, with burster or expelling charge	1.4F	UN0371	Explosive (1.4F)	–	–	–	
N	Warheads, rocket, with bursting charge	1.1D	UN0286	Explosive (1.1D)	–	–	–	
N	Warheads, rocket, with bursting charge	1.2D	UN0287	Explosive (1.2D)	–	–	–	
N	Warheads, rocket, with bursting charge	1.1F	UN0369	Explosive (1.1F)	–	–	–	
N	Warheads, torpedo, with bursting charge	1.1D	UN0221	Explosive (1.1D)	–	–	–	
	White asbestos. See Asbestos, white							
	White phosphorus, *dry*. See Phosphorus, white or yellow, dry							
	White phosphorus, *wet*. See Phosphorus, white or yellow, in water							
	Wood alcohol. See Methanol							
	Wool waste, *wet*	4.2	UN1387	Spontaneously Combustible	III	1,2	1,2	
	Xenon	2.2	UN2036	Nonflammable Gas	–	1,2	1,2	
	Xenon, *refrigerated liquid*	2.2	UN2591	Nonflammable Gas	–	1,2	1	
	Xylenes	3.2	UN1307	Flammable Liquid	II	1,2	1	
		3.3	UN1307	Flammable Liquid	II	1,2	1,2	
	Xylenols	6.1	UN2261	Poison	II	1,2	1,2	
	Xylidines	6.1	UN1711	Poison	II	1,2	1,2	Stow "away from" acids
	Xylols. See Xylenes							
	Xylyl bromide	6.1	UN1701	Poison	II	1	5	
	Yellow phosphorus, *dry*. See Phosphorus, white or yellow, dry							
	Yellow phosphorus, *wet*. See Phosphorus, white or yellow, in water							
	Zinc arsenate or Zinc arsenite, or mixtures thereof, *solid*	6.1	UN1712	Poison	II	1,2	1,2	
	Zinc ashes	4.3	UN1435	Dangerous When Wet	III	1,2	1,2	
	Zinc bromate	5.1	UN2469	Oxidizer	III	1,2	1,2	Stow "away from" powdered metals and "separated from" ammonium compounds
	Zinc chlorate	5.1	UN1513	Oxidizer	II	1,2	1,2	Stow "away from" powdered metals, "separated from" ammonium compounds
	Zinc chloride, *anhydrous*	8	UN2331	Corrosive	III	1,2	1,2	Keep dry
	Zinc chloride, *solution*	8	UN1840	Corrosive	III	1,2	1,2	
	Zinc cyanide	6.1	UN1713	Poison	I	1,2	1,2	Stow "away from" acids
	Zinc hydrosulfite	9	UN1931	None	III	1,2	1,2	Keep dry. Stow "away from" acids
	Zinc nitrate	5.1	UN1514	Oxidizer	II	1,2	1,2	
	Zinc permanganate	5.1	UN1515	Oxidizer	II	1,2	1,2	Stow "separated from" ammonium compounds and hydrogen peroxide
	Zinc peroxide	5.1	UN1516	Oxidizer	II	1,2	1,2	Keep dry
	Zinc phosphide	4.3	UN1714	Dangerous When Wet, Poison	I	1,2	5	When stowed under deck, stow in a mechanically ventilated space
	Zinc, powder or dust, pyrophoric. See Pyrophoric metals							
	Zinc powder or zinc dust, *non-pyrophoric*	4.3	UN1436	Dangerous When Wet	II	1,2	1,2	
	Zinc resinate	4.1	UN2714	Flammable Solid	III	1,2	1,2	
	Zinc silicofluoride	6.1	UN2855	St. Andrews Cross	III	1,2	1,2	Stow "away from" acids
	Zirconium hydride	4.1	UN1437	Flammable Solid	II	1,2	5	
	Zirconium, *metal, dry, finished metal sheets, strip or coiled wire (thinner than 18 microns)*	4.2	UN2009	Spontaneously Combustible	III	1	5	
	Zirconium, *metal, dry, finished sheets, strip or coiled wire (thinner than 254 microns but not thinner than 18 microns)*	4.1	UN2858	Flammable Solid	III	1,2	1,2	
	Zirconium *metal powder, dry mechanically produced, particle size between 9 and 53 microns, or chemically produced, particle size between 10 and 840 microns*	4.2	UN2008	Spontaneously Combustible	II	1	5	
	Zirconium *metal powder, wetted with not less than 25% water (a visible excess of water must be present), mechanically produced, having a particle size less than 53 microns, or chemically produced, having a particle size less than 840 microns*	4.1	UN1358	Flammable Solid	II	1,2	5	
	Zirconium nitrate	5.1	UN2728	Oxidizer	III	1,2	1,2	Shade from radiant heat

§ 172.102 Optional Hazardous Materials Table—*Continued*

(1) Notes and Symbols	(2) Hazardous Material's Description and Proper Shipping Names	(3) IMO Class	(4) Identification Number	(5) Label(s) required	(6) Packaging Group	(7) Vessel Storage Requirements (a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
N	Zirconium picramate, dry or wetted with less than 20% water, by weight	1.3C	UN0236	Explosive (1.3C)	–	–	–	
	Zirconium picramate, wetted with, by weight, at least 20% water	5.1	UN1517	Oxidizer	II	1	5	Store "away from" heavy metals and their salts
	Zirconium, scrap	4.2	UN1932	Spontaneously Combustible	III	1	5	
	Zirconium, suspended in flammable liquid	3.1	UN1308	Flammable Liquid	II	1	5	Keep cool
	Zirconium tetrachloride		UN2503	Corrosive	III	1,2	1,2	Keep dry

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 0001	102	Alarm devices, explosive
UN 0004	102	Ammonium picrate
UN 0005	102	Cartridges for weapons
UN 0006	102	Cartridges for weapons
UN 0007	102	Cartridges for weapons
UN 0009	102	Ammunition, incendiary
UN 0010	102	Ammunition, incendiary
UN 0012	102	Cartridges for weapons
UN 0014	102	Cartridges for weapons, blank or Cartridges, safety, blank
UN 0015	102	Ammunition, smoke
UN 0016	102	Ammunition, smoke
UN 0018	102	Ammunition, tear producing
UN 0019	102	Ammunition, tear producing
UN 0020	102	Ammunition, toxic
UN 0021	102	Ammunition, toxic
UN 0027	102	Black powder
UN 0028	102	Black powder, compressed
UN 0029	102	Detonators, non-electric
UN 0030	102	Detonators, electric
UN 0033	102	Bombs
UN 0034	102	Bombs
UN 0035	102	Bombs
UN 0037	102	Bombs, photo-flash
UN 0038	102	Bombs, photo-flash
UN 0039	102	Bombs, photo-flash
UN 0042	102	Boosters
UN 0043	102	Bursters
UN 0044	102	Primers, cap type
UN 0048	102	Charges, demolition
UN 0049	102	Cartridges, flash
UN 0050	102	Cartridges, flash
UN 0054	102	Cartridges, signal
UN 0055	102	Cases, cartridges, empty, with primer
UN 0056	102	Charges, depth
UN 0059	102	Charges, shaped, commercial
UN 0060	102	Charges, supplementary, explosive
UN 0065	102	Cord, detonating
UN 0066	102	Cord, igniter
UN 0070	102	Cutters, cable, explosive
UN 0072	102	Cyclotrimethylenetrinitramine, wetted
UN 0073	102	Detonators for ammunition
UN 0074	102	Diazodinitrophenol
UN 0075	102	Diethyleneglycol dinitrate, desensitized
UN 0076	102	Dinitrophenol
UN 0077	102	Dinitrophenolates
UN 0078	102	Dinitroresorcinol
UN 0079	102	Hexanitrodiphenylamine
UN 0081	102	Explosives, blasting, Type A
UN 0082	102	Explosives, blasting, Type B
UN 0083	102	Explosives, blasting, Type C
UN 0084	102	Explosives, blasting, Type D
UN 0092	102	Flares, surface
UN 0093	102	Flares, aerial
UN 0094	102	Photo-flash powder
UN 0096	102	Photo-flash powder
UN 0099	102	Fracturing devices, explosive
UN 0101	102	Fuse, instantaneous, non-detonating
UN 0102	102	Cord, detonating
UN 0103	102	Fuse, igniter
UN 0104	102	Cord, detonating, mild effect
UN 0105	102	Fuse, safety
UN 0106	102	Fuzes, detonating
UN 0107	102	Fuzes, detonating
UN 0110	102	Grenades, practice
UN 0113	102	Guanyl nitrosamino guanylidene hydrazine
UN 0114	102	Guanyl nitrosamino guanyl tetrazene
UN 0118	102	Hexolite
UN 0121	102	Igniters
UN 0124	102	Jet perforating guns, charged
UN 0129	102	Lead azide
UN 0130	102	Lead styphnate
UN 0131	102	Lighters, fuse
UN 0132	102	Deflagrating metal salts of aromatic nitro-derivatives, n.o.s.
UN 0133	102	Mannitol hexanitrate
UN 0135	102	Mercury fulminate
UN 0136	102	Mines
UN 0137	102	Mines
UN 0138	102	Mines
UN 0143	102	Nitroglycerine, desensitized
UN 0144	102	Nitroglycerine, spirit of
UN 0145	102	Nitrostarch
UN 0147	102	Nitro urea
UN 0150	102	Pentaerythrite tetranitrate, wetted
UN 0151	102	Pentolite
UN 0153	102	Trinitro aniline
UN 0154	102	Trinitrophenol
UN 0155	102	Trinitrochlorobenzene
UN 0158	102	Potassium salts of nitro-aromatic derivatives
UN 0159	102	Powder cake, wetted
UN 0160	102	Powder, smokeless
UN 0161	102	Powder, smokeless
UN 0167	102	Projectiles
UN 0168	102	Projectiles
UN 0169	102	Projectiles
UN 0171	102	Ammunition, illuminating
UN 0173	102	Release devices, explosive
UN 0174	102	Rivets, explosive
UN 0180	102	Rockets
UN 0181	102	Rockets
UN 0182	102	Rockets
UN 0183	102	Rockets
UN 0186	102	Rocket motors
UN 0190	102	Samples, explosive
UN 0191	102	Signal devices, hand
UN 0192	102	Signals, railway track, explosive
UN 0193	102	Signals, railway track, explosive
UN 0194	102	Signals, distress
UN 0195	102	Signals, distress
UN 0196	102	Signals, smoke
UN 0197	102	Signals, smoke
UN 0203	102	Sodium salts of nitro-aromatic derivatives, n.o.s.
UN 0204	102	Sounding devices, explosive
UN 0208	102	Squibs
UN 0207	102	Tetranitro-aniline
UN 0208	102	Trinitrophenylmethylnitramine
UN 0209	102	Trinitrotoluene
UN 0212	102	Tracers for ammunition
UN 0213	102	Trinitroanisole
UN 0214	102	Trinitrobenzene
UN 0215	102	Trinitrobenzoic acid
UN 0216	102	Trinitro-m-cresol
UN 0217	102	Trinitronaphthalene
UN 0218	102	Trinitrophenetole
UN 0219	102	Trinitroresorcinol
UN 0220	102	Urea nitrate
UN 0221	102	Warheads, torpedo
UN 0222	102	Ammonium nitrate
UN 0223	102	Ammonium nitrate fertilizers
UN 0224	102	Barium azide
UN 0225	102	Boosters, with detonator
UN 0226	102	Cyclotetramethylenetetranitramine, wetted
UN 0234	102	Sodium dinitro-o-cresolate
UN 0235	102	Sodium picramate
UN 0236	102	Zirconium picramate
UN 0237	102	Charges, shaped, flexible, linear
UN 0238	102	Rockets, line throwing
UN 0240	102	Rockets, line throwing
UN 0241	102	Explosives, blasting, Type E
UN 0242	102	Charges, propelling, for cannon
UN 0243	102	Ammunition, incendiary, white phosphorus
UN 0244	102	Ammunition, incendiary, white phosphorus
UN 0245	102	Ammunition, smoke, white phosphorus
UN 0245	102	Ammunition, smoke, white phosphorus
UN 0247	102	Ammunition, incendiary
UN 0248	102	Contrivances, water-activated
UN 0249	102	Contrivances, water-activated
UN 0250	102	Rocket motors
UN 0254	102	Ammunition, illuminating
UN 0255	102	Detonators, electric
UN 0257	102	Fuzes, detonating
UN 0266	102	Octolite
UN 0267	102	Detonators, non-electric
UN 0268	102	Boosters, with detonator
UN 0271	102	Charges, propelling, for rocket motors
UN 0272	102	Charges, propelling, for rocket motors
UN 0273	102	Charges, propelling, for rocket motors
UN 0274	102	Charges, propelling, for rocket motors
UN 0275	102	Cartridges, power device
UN 0276	102	Cartridges, power device
UN 0277	102	Cartridges, oil well
UN 0278	102	Cartridges, oil well
UN 0279	102	Charges, propelling, for cannon
UN 0280	102	Rocket motors
UN 0281	102	Rocket motors
UN 0282	102	Nitroguanidine
UN 0283	102	Boosters
UN 0284	102	Grenades
UN 0285	102	Grenades
UN 0286	102	Warheads, rocket
UN 0287	102	Warheads, rocket
UN 0288	102	Charges, shaped, flexible, linear
UN 0289	102	Cord, detonating
UN 0290	102	Cord, detonating
UN 0291	102	Bombs
UN 0292	102	Grenades
UN 0293	102	Grenades
UN 0294	102	Mines
UN 0295	102	Rockets
UN 0296	102	Sounding devices, explosive
UN 0297	102	Ammunition, illuminating
UN 0299	102	Bombs, photo-flash
UN 0300	102	Ammunition, incendiary
UN 0301	102	Ammunition, tear-producing
UN 0303	102	Ammunition, smoke
UN 0305	102	Photo-flash powder
UN 0306	102	Tracers for ammunition
UN 0312	102	Cartridges, signal
UN 0313	102	Signals, smoke
UN 0314	102	Igniters
UN 0315	102	Igniters
UN 0316	102	Fuzes, igniting
UN 0317	102	Fuzes, igniting
UN 0318	102	Grenades, practice
UN 0319	102	Primers, tubular
UN 0320	102	Primers, tubular
UN 0321	102	Cartridges for weapons
UN 0322	102	Rocket motors
UN 0323	102	Cartridges, power device
UN 0324	102	Projectiles
UN 0325	102	Igniters
UN 0326	102	Cartridges for weapons, blank
UN 0327	102	Cartridges for weapons, blank
UN 0328	102	Cartridges for weapons, with inert projectile
UN 0329	102	Torpedoes
UN 0330	102	Torpedoes
UN 0331	102	Explosives, blasting, Type B
UN 0332	102	Explosives, blasting, Type E
UN 0333	102	Fireworks, Type A
UN 0334	102	Fireworks, Type B
UN 0335	102	Fireworks, Type C
UN 0336	102	Fireworks, Type D
UN 0337	102	Fireworks, Type D
UN 0338	102	Cartridges for weapons, blank
UN 0339	102	Cartridges for weapons, with inert projectile
UN 0340	102	Nitrocellulose
UN 0341	102	Nitrocellulose
UN 0342	102	Nitrocellulose, wetted
UN 0343	102	Nitrocellulose, plasticized
UN 0344	102	Projectiles
UN 0345	102	Projectiles
UN 0346	102	Projectiles
UN 0347	102	Projectiles
UN 0348	102	Cartridges for weapons
UN 0349	102	Articles, explosive, n.o.s.
UN 0350	102	Articles, explosive, n.o.s.
UN 0351	102	Articles, explosive, n.o.s.
UN 0352	102	Articles, explosive, n.o.s.
UN 0353	102	Articles, explosive, n.o.s.
UN 0354	102	Articles, explosive, n.o.s.
UN 0355	102	Articles, explosive, n.o.s.
UN 0356	102	Articles, explosive, n.o.s.
UN 0357	102	Substances, explosive, n.o.s.
UN 0358	102	Substances, explosive, n.o.s.
UN 0359	102	Substances, explosive, n.o.s.
UN 0360	102	Detonator assemblies, non-electric
UN 0361	102	Detonator assemblies, non-electric
UN 0362	102	Ammunition, practice
UN 0363	102	Ammunition, proof
UN 0364	102	Detonators for ammunition
UN 0365	102	Detonators for ammunition
UN 0366	102	Detonators for ammunition
UN 0367	102	Fuzes, detonating
UN 0368	102	Fuzes, igniting
UN 0369	102	Warheads, rocket
UN 0370	102	Warheads, rocket
UN 0371	102	Warheads, rocket
UN 0372	102	Grenades, practice
UN 0373	102	Signal devices, hand

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 0074	102	Sounding devices, explosive
UN 0375	102	Sounding devices, explosive
UN 0376	102	Primers, tubular
UN 0377	102	Primers, cap type
UN 0378	102	Primers, cap type
UN 0379	102	Cases, cartridge, empty, with primer
UN 0380	102	Articles, pyrophoric
UN 0381	102	Cartridges, power device
UN 0382	102	Components, explosive train, n.o.s.
UN 0383	102	Components, explosive train, n.o.s.
UN 0384	102	Components, explosive train, n.o.s.
UN 0385	102	5-Nitrobenzotriazol
UN 0386	102	Trinitrobenzenesulfonic acid
UN 0387	102	Trinitrofluorenone
UN 0388	102	Trinitrotoluene and hexanitrostilbene mixtures or Trinitrotoluene and trinitrobenzene mixtures
UN 0389	102	Trinitrotoluene mixtures containing trinitrobenzene and hexanitrostilbene
UN 0390	102	Tritonal
UN 0391	102	Cyclotrimethylenetrinitramine and cyclotetramethylenetetranitramine, mixtures, wetted
UN 0392	102	Hexanitrostilbene
UN 0393	102	Hexotonal, cast
UN 0394	102	Trinitroresorcinol
UN 0395	102	Rocket motors, liquid fueled
UN 0396	102	Rocket motors, liquid fueled
UN 0397	102	Rockets, liquid fueled
UN 0398	102	Rockets, liquid fueled
UN 0399	102	Bombs, containing flammable liquid
UN 0400	102	Bombs, containing flammable liquid
UN 0401	102	Dipicryl sulfide
UN 0402	102	Ammonium perchlorate
UN 0403	102	Flares, aerial
UN 0404	102	Flares, aerial
UN 0405	102	Cartridges, signal
UN 0406	102	Dinitrosobenzene
UN 0407	102	Tetrazol-1-acetic acid
UN 0408	102	Fuzes, detonating
UN 0409	102	Fuzes, detonating
UN 0410	102	Fuzes, detonating
UN 0411	102	Pentaerythrite tetranitrate
UN 0412	102	Cartridges for weapons
UN 0413	102	Cartridges for weapons, blank
UN 0414	102	Charges, propelling, for cannon
UN 0415	102	Charges, propelling, for rocket motors
UN 0416	102	Charges, propelling, for rocket motors
UN 0417	102	Cartridges for weapons, with inert projectile
UN 0418	102	Flares, surface
UN 0419	102	Flares, surface
UN 0420	102	Flares, aerial
UN 0421	102	Flares, aerial
UN 0422	102	Squibs
UN 0423	102	Squibs
UN 0424	102	Projectiles
UN 0425	102	Projectiles
UN 0426	102	Projectiles
UN 0427	102	Projectiles
UN 1001	101	Acetylene
UN 1002	102	Air
UN 1002	101	Air, compressed
UN 1003	102	Air
UN 1005	102	Ammonia
UN 1005	101	Ammonia, anhydrous
UN 1006	102	Argon
UN 1006	101	Argon or Argon, compressed
UN 1008	101	Boron trifluoride
UN 1009	101	Bromotrifluoromethane
UN 1010	102	Butadiene
UN 1010	101	Butadiene, inhibited
UN 1011	102	Butane or butane mixtures
UN 1012	102	Butylene
UN 1013	101	Carbon dioxide
UN 1014	102	Carbon dioxide and oxygen
UN 1014	101	Carbon dioxide-oxygen mixture
UN 1015	102	Carbon dioxide and nitrous oxide
UN 1015	101	Carbon dioxide-nitrous oxide mixture
UN 1016	101	Carbon monoxide
UN 1017	101	Chlorine
UN 1018	101	Chlorodifluoromethane
UN 1020	101	Chloropentafluoroethane
UN 1021	101	Chlorotetrafluoroethane
UN 1022	101	Chlorotrifluoromethane
UN 1023	102	Coal gas

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1026	102	Cyanogen
UN 1026	101	Cyanogen gas
UN 1027	101	Cyclopropane
UN 1027	102	Cyclopropane, liquefied
UN 1028	101	Dichlorodifluoromethane
UN 1029	102	Dichloromonofluoromethane
UN 1030	102	1,1-Difluoroethane
UN 1030	101	Difluoroethane
UN 1032	102	Dimethylamine
UN 1032	101	Dimethylamine, anhydrous
UN 1033	101	Dimethyl ether
UN 1035	102	Ethane
UN 1035	101	Ethane or Ethane, compressed
UN 1036	102	Ethylamine
UN 1036	101	Monoethylamine
UN 1037	101	Ethyl chloride
UN 1038	102	Ethylene
UN 1038	101	Ethylene, refrigerated liquid
UN 1039	101	Ethyl methyl ether
UN 1040	101	Ethylene oxide
UN 1041	102	Carbon dioxide and ethylene oxide mixtures
NA 1043	101	Crude nitrogen fertilizer solution
UN 1043	101	Fertilizer ammoniating solution
NA 1043	101	Nitrogen fertilizer solution
UN 1044	101	Fire extinguisher
UN 1044	102	Fire extinguishers
UN 1045	101	Fluorine
UN 1046	102	Helium
UN 1046	101	Helium or Helium, compressed
UN 1048	101	Hydrogen bromide
UN 1048	102	Hydrogen bromide, anhydrous
UN 1049	102	Hydrogen
UN 1049	101	Hydrogen or Hydrogen, compressed
UN 1050	101	Hydrogen chloride, or Hydrogen chloride, anhydrous
UN 1050	102	Hydrogen chloride, anhydrous
NA 1051	101	Hydrocyanic acid, liquefied
UN 1051	102	Hydrogen cyanide, anhydrous, stabilized
UN 1052	101	Hydrogen fluoride
UN 1052	102	Hydrogen fluoride, anhydrous
UN 1053	101	Hydrogen sulfide
UN 1053	102	Hydrogen sulphide
UN 1055	102	Isobutylene
UN 1056	102	Krypton
UN 1057	101	Cigarette lighter
UN 1057	102	Lighters for cigars and cigarettes
NA 1058	101	Liquefied nonflammable gas
UN 1058	102	Liquefied non-flammable gases
UN 1060	102	Methyl acetylene and propadiene
UN 1060	101	Methylacetylene-propadiene, stabilized
UN 1061	102	Methylamine
UN 1061	101	Methylamine, anhydrous
UN 1062	102	Methyl bromide
UN 1062	101	Methyl bromide, liquid
UN 1063	101	Methyl chloride
UN 1064	101	Methyl mercaptan
UN 1064	102	Methylmercaptan
UN 1065	102	Neon
UN 1065	101	Neon or Neon, compressed
UN 1066	102	Nitrogen
UN 1066	101	Nitrogen or Nitrogen, compressed
UN 1067	102	Nitrogen dioxide
UN 1067	101	Nitrogen dioxide, liquid
NA 1067	101	Nitrogen peroxide, liquid
NA 1067	101	Nitrogen tetroxide, liquid
UN 1069	101	Nitrosyl chloride
UN 1070	102	Nitrous oxide
UN 1070	101	Nitrous oxide or Nitrous oxide, compressed
UN 1071	102	Oil gas
UN 1072	102	Oxygen
UN 1072	101	Oxygen or Oxygen, compressed
UN 1073	102	Oxygen
UN 1073	101	Oxygen, refrigerated liquid
UN 1075	101	Liquefied petroleum gas
UN 1075	102	Petroleum gases, liquefied
UN 1076	101	Phosgene
UN 1077	102	Propylene
UN 1078	102	Refrigerant gases, n.o.s.
UN 1078	101	Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.
UN 1079	101	Sulfur dioxide
UN 1079	102	Sulphur dioxide

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1080	101	Sulfur hexafluoride
UN 1080	102	Sulphur hexafluoride
UN 1081	101	Tetrafluoroethylene, inhibited
UN 1082	101	Trifluorochloroethylene
UN 1082	102	Trifluorochloroethylene, inhibited
UN 1083	101	Trimethylamine, anhydrous
UN 1085	102	Vinyl bromide
UN 1086	101	Vinyl chloride
UN 1087	101	Vinyl methyl ether
UN 1088	101	Acetal
UN 1089	101	Acetaldehyde
UN 1090	101	Acetone
UN 1091	101	Acetone oil
UN 1091	102	Acetone oils
UN 1092	101	Acrolein, inhibited
UN 1093	101	Acrylonitrile
UN 1093	102	Acrylonitrile, inhibited
UN 1098	101	Allyl alcohol
UN 1099	101	Allyl bromide
UN 1100	101	Allyl chloride
UN 1101	102	Diethylaluminum chloride
UN 1102	102	Triethylaluminum
UN 1103	102	Trimethylaluminum
UN 1104	101	Amyl acetate
UN 1104	102	Amyl acetates
UN 1105	102	Amyl alcohols
UN 1106	101	Amylamine
UN 1107	101	Amyl chloride
UN 1108	101	Amylene
UN 1108	102	n-Amylene
UN 1109	101	Amyl formate
UN 1109	102	Amyl formates
UN 1110	102	Amyl methyl ketone
UN 1110	101	Methyl amyl ketone
UN 1111	101	Amyl mercaptan
UN 1112	102	Amyl nitrate
UN 1113	101	Amyl nitrite
UN 1114	101	Benzene
UN 1115	101	Benzine
UN 1118	102	Brake fluid
UN 1120	102	Butanol
NA 1120	101	Butyl alcohol
UN 1120	102	sec-Butanol
UN 1120	102	tert-Butanol
UN 1123	101	Butyl acetate
UN 1123	102	Butyl acetates
UN 1125	101	Butylamine
UN 1125	102	n-Butylamine
UN 1126	101	Butyl bromide
UN 1126	102	n-Butyl bromide
UN 1127	101	Butyl chloride
UN 1127	102	Chlorobutanes
UN 1128	101	Butyl formate
UN 1128	102	n-Butyl formate
UN 1129	101	Butyraldehyde
UN 1130	101	Camphor oil
UN 1131	101	Carbon bisulfide, or Carbon disulfide
UN 1131	102	Carbon disulphide
UN 1132	102	Carbon remover
UN 1132	101	Carbon remover, liquid
UN 1133	101	Adhesive
UN 1133	102	Adhesives
NA 1133	101	Cement
NA 1133	101	Cement, contained, linoleum, tile, or wallboard, liquid
NA 1133	101	Cement, leather
NA 1133	101	Cement, pyroxylin
NA 1133	101	Cement, roofing, liquid
NA 1133	101	Cement, rubber
UN 1134	101	Chlorobenzene
UN 1135	101	Ethylene chlorohydrin
UN 1136	101	Coal tar distillate
UN 1136	101	Coal tar light oil
NA 1136	101	Coal tar oil
UN 1137	101	Coal tar distillate
NA 1137	101	Coal tar light oil
NA 1137	101	Coal tar oil
UN 1139	101	Coating solution
NA 1142	101	Antifreeze compound, liquid
NA 1142	101	Antifreeze preparation, liquid
NA 1142	101	Compound, polishing, liquid
NA 1142	101	Compound, vulcanizing, liquid
NA 1142	101	Dressing, leather
UN 1142	102	Flammable liquid preparations, n.o.s.
NA 1142	101	Leather bleach or dressing
NA 1142	101	Polish, metal, stove, furniture or wood, liquid

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 1142	101	Rust preventive coating
UN 1143	101	Crotonaldehyde
UN 1143	102	Crotonaldehyde, inhibited
UN 1144	101	Crotonylene
UN 1145	101	Cyclohexane
UN 1146	101	Cyclopentane
UN 1147	101	Decahydronaphthalene
UN 1148	102	Diacetone alcohol
UN 1148	101	Diacetone alcohol
UN 1149	101	Dibutyl ether
UN 1149	102	Dibutyl ethers
UN 1150	101	Dichloroethylene
UN 1152	101	Dichloropentane
UN 1152	102	Dichloropentanes
UN 1153	101	Ethylene glycol diethyl ether
UN 1154	101	Diethylamine
UN 1155	102	Diethyl ether
UN 1155	101	Ethyl ether
UN 1156	101	Diethyl ketone
UN 1157	101	Diisobutyl ketone
UN 1158	101	Diisopropylamine
UN 1159	101	Diisopropyl ether
UN 1160	101	Dimethylamine, aqueous solution
UN 1160	102	Dimethylamine, solution
UN 1161	101	Dimethyl carbonate
UN 1162	101	Dimethyldichlorosilane
UN 1163	101	Dimethylhydrazine, unsymmetrical
UN 1164	101	Dimethyl sulfide
UN 1164	102	Dimethyl sulphide
UN 1165	101	Dioxane
UN 1166	101	Dioxolane
UN 1167	101	Divinyl ether
UN 1167	102	Divinyl ether, inhibited
UN 1168	102	Driers
UN 1168	101	Driers, paint or varnish, liquid, n.o.s.
UN 1169	102	Extracts, aromatic, liquid
UN 1170	101	Alcoholic beverage
NA 1170	101	Cologne spirits
UN 1170	102	Ethanol or Ethanol solutions
UN 1170	101	Ethyl alcohol
UN 1171	101	Ethylene glycol monoethyl ether
UN 1172	101	Ethylene glycol monoethyl ether acetate
UN 1173	101	Ethyl acetate
UN 1175	101	Ethyl benzene
UN 1175	102	Ethylbenzene
UN 1176	101	Ethyl borate
UN 1177	102	Ethylbutyl acetate
UN 1177	101	Ethyl butyl acetate
UN 1178	102	2-Ethylbutyraldehyde
UN 1178	101	Ethyl butyraldehyde
UN 1179	101	Ethyl butyl ether
UN 1180	101	Ethyl butyrate
UN 1181	101	Ethyl chloroacetate
UN 1182	101	Ethyl chloroformate
UN 1183	101	Ethyl dichlorosilane
UN 1183	102	Ethyldichlorosilane
UN 1184	101	Ethylene dichloride
UN 1185	102	Ethyleneimine
UN 1185	101	Ethylene imine, inhibited
UN 1188	101	Ethylene glycol monomethyl ether
UN 1189	101	Ethylene glycol monomethyl ether acetate
UN 1190	101	Ethyl formate
UN 1191	102	Ethyl hexaldehyde
UN 1191	101	Ethylhexaldehyde
UN 1192	101	Ethyl lactate
UN 1193	101	Ethyl methyl ketone
UN 1193	101	Methyl ethyl ketone
UN 1194	101	Ethyl nitrite (nitrous ether)
UN 1194	102	Ethyl nitrite, solutions
UN 1195	101	Ethyl propionate
UN 1196	101	Ethyl trichlorosilane
UN 1196	102	Ethyltrichlorosilane
UN 1197	101	Extract, liquid, flavoring
UN 1197	102	Extracts, flavouring, liquid
UN 1198	101	Formaldehyde solution
UN 1198	102	Formaldehyde solutions
UN 1199	101	Furfural
UN 1201	101	Fusel oil
UN 1202	102	Gas oil
UN 1203	101	Gasoline
(UN 1203)	102	Motor fuel, n.o.s.
NA 1203	101	Motor fuel, n.o.s.
UN 1204	102	Nitroglycerin solution, in alcohol
NA 1204	101	Spirits of nitroglycerin

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 1204	101	Spirits of nitroglycerin, not exceeding 1% nitroglycerin by weight
UN 1205	102	Gutta percha solution
UN 1206	101	Heptane
UN 1207	101	Hexaldehyde
UN 1208	101	Hexane
UN 1208	101	Neohexane
UN 1210	101	Ink
UN 1210	102	Ink, printers
UN 1212	102	Isobutanol
UN 1213	101	Isobutyl acetate
UN 1214	101	Isobutylamine
UN 1216	101	Isooctene
UN 1218	101	Isoprene
UN 1218	102	Isoprene, inhibited
UN 1219	101	Isopropanol
UN 1220	101	Isopropyl acetate
UN 1221	101	Isopropylamine
UN 1222	101	Isopropyl nitrate
UN 1223	101	Kerosene
UN 1224	102	Ketones, liquid, n.o.s.
UN 1226	101	Cigarette lighter
UN 1226	101	Lighter fluid
UN 1226	102	Lighter fuels
UN 1226	102	Lighters
NA 1228	101	Mercaptan mixture, aliphatic
UN 1228	102	Mercaptans, liquid, n.o.s. or Mercaptan mixtures, liquid, n.o.s.
UN 1229	101	Mesityl oxide
NA 1230	101	Columban spirits
UN 1230	102	Methanol
UN 1230	101	Methyl alcohol
UN 1231	101	Methyl acetate
UN 1232	101	Methyl acetone
UN 1233	101	Methylamyl acetate
UN 1234	101	Methylal
UN 1235	101	Methylamine, aqueous solution
UN 1237	101	Methyl butyrate
UN 1238	101	Methyl chloroformate
UN 1239	102	Methylchloromethyl ether
UN 1239	101	Methylchloromethyl ether, anhydrous
UN 1242	101	Methyl dichlorosilane
UN 1242	102	Methyldichlorosilane
UN 1243	101	Methyl formate
UN 1244	101	Methylhydrazine
UN 1245	102	Methyl isobutyl ketone
UN 1246	102	Methyl isopropenyl ketone
UN 1246	101	Methyl isopropenyl ketone, inhibited
UN 1247	102	Methyl methacrylate
UN 1247	101	Methyl methacrylate monomer, inhibited
NA 1247	101	Methyl methacrylate monomer, uninhibited
UN 1248	101	Methyl propionate
UN 1249	101	Methyl propyl ketone
UN 1250	101	Methyltrichlorosilane
UN 1251	102	Methyl vinyl ketone
UN 1251	101	Methyl vinyl ketone, inhibited
UN 1255	102	Naphtha, petroleum
UN 1255	101	Petroleum naphtha
UN 1256	101	Naphtha, solvent
UN 1257	102	Casinghead gasoline
UN 1259	101	Nickel carbonyl
UN 1261	101	Nitromethane
UN 1262	101	Isooctane
UN 1262	101	Octane
UN 1263	101	Lacquer base or Lacquer chips, plastic
UN 1263	101	Paint
NA 1263	101	Paint related material
UN 1263	102	Paints, enamels, lacquers, stains, shellac
UN 1264	101	Paraldehyde
UN 1265	101	Isopentane
UN 1265	101	Pentane
UN 1265	102	Pentanes
UN 1266	102	Perfumery products
UN 1267	101	Crude oil, petroleum
UN 1267	102	Petroleum crude oil
NA 1268	101	Naphtha distillate
UN 1268	101	Petroleum distillate
UN 1268	102	Petroleum distillates, n.o.s.
NA 1268	101	Road oil
NA 1270	101	Oil
UN 1270	102	Petroleum oil
UN 1271	101	Petroleum ether
UN 1271	102	Petroleum spirit

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1272	101	Pine oil
UN 1274	102	Propanol
UN 1274	101	Propyl alcohol
UN 1275	101	Propionaldehyde
UN 1276	102	n-Propyl acetate
UN 1276	101	Propyl acetate
UN 1277	102	Monopropylamine
UN 1277	101	Propylamine
UN 1278	101	Propyl chloride
UN 1279	101	Propylene dichloride
UN 1280	101	Propylene oxide
UN 1281	101	Propyl formate
UN 1281	102	Propyl formates
UN 1282	101	Pyridine
UN 1286	102	Rosin oil
UN 1287	102	Rubber solution
UN 1288	102	Shale oil
NA 1289	101	Sodium methylate, alcohol mixture
UN 1289	102	Sodium methylate, solutions
UN 1292	101	Ethyl silicate
UN 1292	102	Tetraethyl silicate
UN 1293	102	Tinctures, medicinal
UN 1294	101	Toluene
UN 1295	101	Trichlorosilane
UN 1296	101	Triethylamine
UN 1297	102	Trimethylamine
UN 1297	101	Trimethylamine, aqueous solution
UN 1298	101	Trimethylchlorosilane
UN 1299	101	Turpentine
UN 1300	101	Turpentine substitute
UN 1301	101	Vinyl acetate
UN 1302	102	Vinyl ethyl ether
UN 1302	101	Vinyl ethyl ether, inhibited
UN 1303	102	Vinylidene chloride
UN 1303	101	Vinylidene chloride, inhibited
UN 1304	101	Vinyl isobutyl ether
UN 1305	101	Vinyl trichlorosilane
UN 1305	102	Vinyl trichlorosilane, inhibited
UN 1307	101	Xylene
UN 1307	102	Xylenes
UN 1308	102	Zirconium
UN 1308	101	Zirconium, metal, liquid, suspensions
UN 1309	102	Aluminium powder, coated
UN 1310	101	Ammonium picrate, wet
UN 1310	102	Ammonium picrate, wetted
UN 1312	102	Borneol
UN 1313	101	Calcium resinate
UN 1314	101	Calcium resinate, fused
UN 1318	102	Cobalt resinate
UN 1318	101	Cobalt resinate, precipitated
UN 1320	102	Dinitrophenol, wetted
UN 1321	102	Dinitrophenolates, wetted
UN 1322	102	Dinitroresorcinol, wetted
UN 1323	102	Ferrocerium
NA 1324	101	Film
UN 1324	102	Film, motion picture
NA 1325	101	Antimony sulfide, solid
NA 1325	101	Burnt cotton, not repicked
NA 1325	101	Cosmetics, n.o.s.
NA 1325	101	Drugs, n.o.s.
UN 1325	101	Flammable solid, n.o.s.
UN 1325	102	Flammable solids, n.o.s.
NA 1325	101	Fuse
NA 1325	101	Garbage tankage
NA 1325	101	N-Methyl-N'-nitro-N-nitrosoguanidine
NA 1325	101	Paper stock, wet
NA 1325	101	Pyroxylin plastic, rods, sheets, rolls, or tubes
NA 1325	101	Pyroxylin plastic, scrap
NA 1325	101	Rags, wet
NA 1325	101	Rough ammoniate tankage
NA 1325	101	Smokeless powder for small arms
NA 1325	101	Tankage fertilizer
NA 1325	101	Tankage, rough ammoniate
NA 1325	101	Waste paper, wet
UN 1326	102	Hafnium
UN 1326	101	Hafnium metal, wet
UN 1327	102	Ehusa
UN 1327	101	Hay
UN 1327	101	Hay or straw
UN 1327	102	Straw
UN 1328	102	Hexamine
UN 1330	102	Manganese resinate
UN 1331	102	Matches
UN 1331	101	Matches, strike anywhere
UN 1332	102	Metaldehyde

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1333	102	Cerium, crude
UN 1334	102	Naphthalene, crude or refined
UN 1334	101	Naphthalene or Naphthalin
UN 1336	102	Nitroguanidine, wetted
UN 1336	101	Nitroguanidine, wet with not less than 20% water
UN 1337	102	Nitrostarch, wetted
UN 1337	101	Nitrostarch, wet with not less than 20% water
NA 1337	101	Nitrostarch, wet with not less than 30% alcohol or solvent
UN 1338	102	Phosphorus, amorphous
UN 1338	101	Phosphorus, amorphous, red
UN 1339	101	Phosphorus heptasulfide
UN 1339	102	Phosphorus heptasulphide
UN 1340	101	Phosphorus pentasulfide
UN 1340	102	Phosphorus pentasulphide
UN 1341	101	Phosphorus sesquisulfide
UN 1341	102	Phosphorus sesquisulphide
UN 1343	101	Phosphorus trisulfide
UN 1343	102	Phosphorus trisulphide
NA 1344	101	Picric acid, wet, with not less than 10% water
UN 1344	102	Trinitrophenol, wetted
UN 1345	102	Rubber scrap
UN 1345	101	Rubber scrap or Rubber buffings
UN 1345	101	Rubber shoddy or Rubber, regenerated or Rubber, reclaimed
UN 1346	102	Silicon powder
UN 1347	102	Silver picrate, wetted
UN 1348	102	Sodium dinitro-o-cresolate, wetted
UN 1349	101	Sodium picramate, wet
UN 1349	102	Sodium picramate, wetted
UN 1350	101	Sulfur, solid
UN 1350	102	Sulphur
UN 1352	102	Titanium
UN 1352	101	Titanium metal powder, wet with 20% or more water
UN 1353	102	Tow puffs
UN 1354	101	Trinitrobenzene, wet
UN 1354	102	Trinitrobenzene, wetted
UN 1355	101	Trinitrobenzoic acid, wet
UN 1355	102	Trinitrobenzoic acid, wetted
UN 1356	101	Trinitrotoluene, wet
UN 1356	102	Trinitrotoluene, wetted
UN 1357	101	Urea nitrate, wet
UN 1357	102	Urea nitrate, wetted
UN 1358	102	Zirconium
UN 1358	101	Zirconium metal, wet
UN 1359	102	Bags
UN 1359	101	Bags, sodium nitrate, empty and unwashed
UN 1360	101	Calcium phosphide
UN 1361	102	Carbon
NA 1361	101	Charcoal briquettes or briquets
NA 1361	101	Charcoal screenings, made from 'pinon' wood
NA 1361	101	Charcoal, shell
NA 1361	101	Charcoal, wood, ground, crushed, granulated, or pulverized
NA 1361	101	Charcoal, wood, lump
NA 1361	101	Charcoal wood screenings, other than 'pinon' wood screenings
NA 1361	101	Coal, ground bituminous, sea coal, coal facings
UN 1362	102	Carbon, activated
UN 1362	101	Charcoal, activated
UN 1363	101	Copra
UN 1364	101	Cotton waste, oily
UN 1365	102	Cotton
UN 1366	102	Diethylzinc
UN 1367	102	Diethylmagnesium
UN 1368	102	Dimethylmagnesium
UN 1369	102	p-Nitrosodimethylaniline
UN 1370	102	Dimethylzinc
UN 1371	102	Driers
NA 1372	101	Burnt fiber
NA 1372	101	Fibers
NA 1372	101	Fibers, burnt
UN 1372	102	Fibres, animal or vegetable
NA 1372	101	Hair, wet
NA 1373	101	Fibers or fabric, containing more than 5% animal or vegetable oil
UN 1373	102	Fibres or Fabric, animal or vegetable
UN 1374	102	Fishmeal or fishscrap
NA 1374	101	Fish meal or fish scrap containing less than 6% or more than 12% water

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1375	102	Fuel, pyrophoric, n.o.s.
UN 1376	101	Iron mass or sponge, spent
UN 1376	102	Iron oxide
UN 1378	101	Nickel catalyst, wet
UN 1378	102	Nickel catalyst, wetted
UN 1379	102	Paper, unsaturated oil treated
UN 1380	101	Pentaborane
UN 1381	102	Phosphorus
UN 1381	101	Phosphorus, white or yellow, dry
UN 1381	101	Phosphorus, white or yellow, in water
UN 1382	101	Potassium sulfide
UN 1382	102	Potassium sulphide, anhydrous or Potassium sulphide
NA 1383	101	Iron mass or sponge
UN 1383	102	Pyrophoric metals, n.o.s. or Pyrophoric alloys, n.o.s.
UN 1384	102	Sodium dithionite
UN 1384	101	Sodium hydrosulfite
UN 1385	101	Sodium sulfide, anhydrous
UN 1385	102	Sodium sulphide, anhydrous or Sodium sulphide
UN 1386	102	Seed cake
UN 1387	101	Waste wool, wet
UN 1387	102	Wool waste
UN 1389	102	Alkali metal amalgams, n.o.s.
UN 1390	102	Alkali metal amides, n.o.s.
UN 1391	102	Alkali metal dispersions, n.o.s. or Alkali earth metal dispersions, n.o.s.
UN 1392	102	Alkaline earth metal amalgams, n.o.s.
UN 1393	102	Alkaline earth metal alloys, n.o.s.
UN 1394	102	Aluminium carbide
UN 1395	102	Aluminium ferrosilicon
UN 1396	102	Aluminium, powder, uncoated
UN 1396	101	Aluminum, metallic, powder
UN 1397	102	Aluminium phosphide
UN 1397	101	Aluminum phosphide
UN 1398	102	Aluminium silicon
UN 1399	102	Barium
UN 1400	102	Barium
UN 1401	102	Calcium
UN 1401	101	Calcium, metal
NA 1401	101	Calcium, metal, crystaline
UN 1402	101	Calcium carbide
UN 1403	102	Calcium cyanamide
UN 1403	101	Calcium cyanamide, not hydrated
UN 1404	102	Calcium hydride
UN 1405	102	Calcium silicide
UN 1406	101	Calcium silicon
UN 1407	102	Caesium
UN 1407	101	Cesium metal
UN 1408	101	Ferrosilicon
UN 1409	102	Hydrides
UN 1410	102	Lithium aluminium hydride
UN 1410	101	Lithium aluminum hydride
UN 1411	102	Lithium aluminium hydride, ethereal
UN 1411	101	Lithium aluminum hydride, ethereal
UN 1412	102	Lithium amide
UN 1412	101	Lithium amide, powdered
UN 1413	101	Lithium borohydride
UN 1414	101	Lithium hydride
UN 1415	102	Lithium
UN 1415	101	Lithium, metal
UN 1415	101	Lithium metal, in cartridges
UN 1417	101	Lithium silicon
UN 1418	102	Magnesium powder or Magnesium alloys, powder
UN 1419	102	Magnesium aluminium phosphide
UN 1419	101	Magnesium aluminum phosphide
UN 1420	102	Potassium, metal alloys
UN 1420	101	Potassium, metal liquid alloy
UN 1421	102	Alkali metal alloys, liquid
NA 1421	101	Sodium, metal liquid alloy
UN 1422	102	Potassium-sodium
UN 1422	101	Sodium potassium alloy, liquid
UN 1422	101	Sodium potassium alloy, solid
UN 1423	102	Rubidium
UN 1423	101	Rubidium metal
UN 1423	101	Rubidium metal, in cartridges
UN 1424	102	Sodium amalgam
UN 1425	101	Sodium amide
UN 1426	102	Sodium borohydride
UN 1427	101	Sodium hydride
UN 1428	102	Sodium
UN 1428	101	Sodium, metal or metallic
UN 1429	102	Sodium
UN 1429	101	Sodium, metal dispersion in organic solvent

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1431	102	Sodium methylate
UN 1431	101	Sodium methylate, dry
UN 1432	101	Sodium phosphide
UN 1433	101	Stannic phosphide
UN 1433	102	Stannic phosphides
UN 1434	102	Strontium
UN 1435	102	Zinc ashes
UN 1436	102	Zinc powder or zinc dust
UN 1437	101	Zirconium hydride
UN 1438	102	Aluminium nitrate
UN 1438	101	Aluminum nitrate
UN 1439	101	Ammonium dichromate
UN 1442	101	Ammonium perchlorate
UN 1444	102	Ammonium persulphate
UN 1445	101	Barium chlorate
NA 1445	101	Barium chlorate, wet
UN 1446	101	Barium nitrate
UN 1447	101	Barium perchlorate
UN 1448	101	Barium permanganate
UN 1449	102	Barium peroxide
UN 1449	101	Barium peroxide
UN 1450	102	Bromates, inorganic, n.o.s.
UN 1451	102	Caesium nitrate
UN 1452	101	Calcium chlorate
UN 1453	101	Calcium chlorite
UN 1454	101	Calcium nitrate
UN 1455	102	Calcium perchlorate
UN 1456	101	Calcium permanganate
UN 1457	101	Calcium peroxide
UN 1458	101	Chlorate and borate mixture
UN 1458	102	Chlorate and borate, mixtures
UN 1459	101	Chlorate and magnesium chloride mixture
UN 1459	102	Chlorate and magnesium chloride, mixture
UN 1461	101	Chlorate, n.o.s.
NA 1461	101	Chlorate, n.o.s., wet
UN 1461	102	Chlorates, inorganic, n.o.s.
UN 1462	102	Chlorites, inorganic, n.o.s.
NA 1463	101	Chromic acid mixture, dry
NA 1463	101	Chromic acid, solid
UN 1463	102	Chromium trioxide, anhydrous
UN 1465	102	Didymium nitrate
UN 1466	101	Ferric nitrate
UN 1467	101	Guanidine nitrate
UN 1469	101	Lead nitrate
UN 1470	102	Lead perchlorate
UN 1471	101	Lithium hypochlorite compound, dry
UN 1471	102	Lithium hypochlorite, dry or Lithium hypochlorite mixtures
UN 1472	101	Lithium peroxide
UN 1473	102	Magnesium bromate
UN 1474	101	Magnesium nitrate
UN 1475	101	Magnesium perchlorate
UN 1476	102	Magnesium peroxide
UN 1476	101	Magnesium peroxide, solid
NA 1477	101	Ammonium sulfate nitrate
NA 1477	101	Nitrate, n.o.s.
UN 1477	102	Nitrates, inorganic, n.o.s.
UN 1478	102	Sodium nitrate and potash, mixtures
NA 1479	101	Compound, tree or weed killing, solid
NA 1479	101	Cosmetics, n.o.s.
NA 1479	101	Cupric nitrate
NA 1479	101	Drugs, n.o.s.
UN 1479	101	Oxidizer, n.o.s. or Oxidizing material, n.o.s.
UN 1479	102	Oxidizing substances, n.o.s.
NA 1479	101	Potassium dichromate
NA 1479	101	Sodium dichromate
NA 1481	101	Perchlorate, n.o.s.
UN 1481	102	Perchlorates, inorganic, n.o.s.
NA 1482	101	Permanganate, n.o.s.
UN 1482	102	Permanganates, inorganic, n.o.s.
UN 1483	102	Peroxides, inorganic, n.o.s.
UN 1484	101	Potassium bromate
UN 1485	101	Potassium chlorate
UN 1486	101	Potassium nitrate
UN 1487	102	Potassium nitrate and sodium nitrite, mixture
UN 1487	101	Sodium nitrite mixed with potassium nitrate
NA 1487	101	Sodium nitrite mixture
UN 1488	101	Potassium nitrite
UN 1489	101	Potassium perchlorate
UN 1490	101	Potassium permanganate
UN 1491	101	Potassium peroxide

For explanation of abbreviations and reference marks, see last page of this tariff.

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1432	102	Potassium persulphate
UN 1433	101	Silver nitrate
UN 1434	101	Sodium bromate
UN 1435	101	Sodium chlorate
UN 1436	101	Sodium chlorite
UN 1438	101	Sodium nitrate
UN 1439	102	Sodium nitrate and potassium nitrate
UN 1500	101	Sodium nitrite
UN 1502	101	Sodium perchlorate
UN 1503	101	Sodium permanganate
UN 1504	101	Sodium peroxide
UN 1505	102	Sodium persulphate
UN 1506	101	Strontium chlorate
UN 1506	101	Strontium chlorate, wet
UN 1507	101	Strontium nitrate
UN 1508	102	Strontium perchlorate
UN 1509	101	Strontium peroxide
UN 1510	101	Tetranitromethane
UN 1511	102	Urea hydrogen peroxide
NA 1511	101	Urea peroxide
UN 1512	101	Zinc ammonium nitrite
UN 1513	101	Zinc chlorate
UN 1514	101	Zinc nitrate
UN 1515	101	Zinc permanganate
UN 1516	101	Zinc peroxide
UN 1517	101	Zirconium picramate, wet
UN 1517	102	Zirconium picramate, wetted
UN 1541	101	Acetone cyanohydrin
UN 1544	102	Alkaloids, n.o.s. or Alkaloid salts, n.o.s.
UN 1545	102	Allyl isothiocyanate
UN 1546	102	Ammonium arsenate
UN 1546	101	Ammonium arsenate, solid
UN 1547	102	Aniline
UN 1547	101	Aniline oil, liquid
UN 1548	102	Aniline hydrochloride
UN 1549	102	Antimony compounds, inorganic, n.o.s.
NA 1549	101	Antimony tribromide, solid
NA 1549	101	Antimony tribromide solution
NA 1549	101	Antimony trifluoride, solid
NA 1549	101	Antimony trifluoride solution
UN 1550	102	Antimony lactate
UN 1550	101	Antimony lactate, solid
UN 1551	102	Antimony potassium tartrate
UN 1551	101	Antimony potassium tartrate, solid
UN 1553	102	Arsenic acid, liquid
UN 1553	101	Arsenic acid solution
UN 1554	101	Arsenic acid, solid
UN 1555	102	Arsenic bromide
UN 1555	101	Arsenic bromide, solid
UN 1556	101	Arsenical compound, liquid, n.o.s., or Arsenical mixture, liquid, n.o.s.
UN 1556	102	Arsenic compounds, liquid, n.o.s.
NA 1556	101	Methyldichloroarsine
NA 1556	101	Phenyldichloroarsine
UN 1557	101	Arsenical compound, solid, n.o.s., or Arsenical mixture, solid, n.o.s.
NA 1557	101	Arsenical dip, liquid
UN 1557	102	Arsenic compounds, solid, n.o.s.
NA 1557	101	Arsenic iodide, solid
NA 1557	101	Arsenic sulfide, solid
NA 1557	101	Arsenic trisulfide
UN 1558	102	Arsenic
UN 1558	101	Arsenic, solid
UN 1559	102	Arsenic pentoxide
UN 1559	101	Arsenic pentoxide, solid
UN 1560	102	Arsenic trichloride
UN 1560	101	Arsenic trichloride, liquid
UN 1561	102	Arsenic trioxide
UN 1561	101	Arsenic trioxide, solid
UN 1562	101	Arsenical dust
UN 1564	102	Barium compounds, n.o.s.
UN 1565	102	Barium cyanide
UN 1565	101	Barium cyanide, solid
NA 1566	101	Beryllium chloride
UN 1566	101	Beryllium compound, n.o.s.
UN 1566	102	Beryllium compounds
NA 1566	101	Beryllium fluoride
UN 1567	102	Beryllium
UN 1569	102	Bromoacetone
UN 1569	101	Bromoacetone, liquid
UN 1570	102	Brucine
UN 1570	101	Brucine, solid
UN 1571	101	Barium azide, wet
UN 1571	102	Barium azide, wetted
UN 1572	102	Cacodylic acid
UN 1573	102	Calcium arsenate
UN 1573	101	Calcium arsenate, solid
UN 1574	102	Calcium arsenate and arsenite
NA 1574	101	Calcium arsenite, solid
UN 1575	102	Calcium cyanide
UN 1575	101	Calcium cyanide, solid or Calcium cyanide mixture, solid
UN 1577	102	Chlorodinitrobenzene
UN 1577	101	Dinitrochlorobenzene
UN 1578	102	Chloronitrobenzenes
UN 1578	101	Nitrochlorobenzene, meta or para, solid
UN 1578	101	Nitrochlorobenzene, ortho, liquid
UN 1579	101	4-Chloro-o-toluidine hydrochloride
UN 1580	102	Chloropicrin
UN 1580	101	Chloropicrin, liquid
UN 1581	102	Chloropicrin and methyl bromide
NA 1581	101	Methyl bromide and more than 2% chloropicrin mixture, liquid
UN 1582	102	Chloropicrin and methyl chloride
UN 1582	101	Chloropicrin and methyl chloride mixture
NA 1583	101	Chloropicrin, absorbed
UN 1583	101	Chloropicrin mixture
UN 1583	102	Chloropicrin mixtures, n.o.s.
UN 1584	102	Cocculus
UN 1584	101	Cocculus, solid
UN 1585	102	Copper acetoarsenite
UN 1585	101	Copper acetoarsenite, solid
UN 1586	102	Copper arsenite
UN 1586	101	Copper arsenite, solid
UN 1587	101	Copper cyanide
UN 1588	101	Cyanide or cyanide mixture, dry
UN 1588	102	Cyanides, inorganic, n.o.s.
UN 1589	101	Cyanogen chloride
UN 1590	102	Dichloroanilines
UN 1591	101	Dichlorobenzene, ortho, liquid
UN 1591	102	o-Dichlorobenzene
UN 1592	101	Dichlorobenzene, para, solid
UN 1592	102	p-Dichlorobenzene
UN 1593	102	Dichloromethane
UN 1593	101	Dichloromethane or Methylene chloride
UN 1594	102	Diethyl sulphate
UN 1595	101	Dimethyl sulfate
UN 1595	102	Dimethyl sulphate
UN 1596	102	Dinitroanilines
UN 1597	102	Dinitrobenzenes
UN 1597	101	Dinitrobenzene, solid, or Dinitrobenzol, solid
UN 1597	101	Dinitrobenzene solution
UN 1598	102	Dinitro-o-cresol
UN 1599	101	Dinitrophenol solution
UN 1599	102	Dinitrophenol, solution
UN 1600	101	Dinitrotoluene, liquid
UN 1600	102	Dinitrotoluenes, molten
UN 1601	101	Disinfectant, liquid
UN 1601	102	Disinfectants, n.o.s.
UN 1601	101	Disinfectant, solid
UN 1602	102	Dyes, n.o.s. or Dye intermediates, n.o.s.
UN 1603	102	Ethyl bromoacetate
UN 1604	101	Ethylenediamine
UN 1605	101	Ethylene dibromide
UN 1606	102	Ferric arsenate
UN 1606	101	Ferric arsenate, solid
UN 1607	102	Ferric arsenite
UN 1607	101	Ferric arsenite, solid
UN 1608	102	Ferrous arsenate
UN 1608	101	Ferrous arsenate, solid
UN 1610	102	Halogenated irritating liquids, n.o.s.
UN 1611	102	Hexaethyl tetraphosphate
UN 1611	101	Hexaethyl tetraphosphate, liquid
UN 1612	102	Hexaethyl tetraphosphate and compressed gas
UN 1612	101	Hexaethyl tetraphosphate and compressed gas mixture
UN 1613	102	Hydrocyanic acid, aqueous solutions
UN 1613	101	Hydrocyanic acid solution
UN 1613	101	Hydrocyanic acid solution, less than 5% hydrocyanic acid
UN 1614	102	Hydrogen cyanide, anhydrous, stabilized
UN 1616	101	Lead acetate
UN 1617	102	Lead arsenates
UN 1617	101	Lead arsenate, solid
UN 1618	102	Lead arsenites
UN 1618	101	Lead arsenite, solid
UN 1620	101	Lead cyanide
UN 1621	102	London purple
UN 1621	101	London purple, solid
UN 1622	102	Magnesium arsenate
UN 1622	101	Magnesium arsenate, solid
UN 1623	102	Mercuric arsenate
UN 1624	102	Mercuric chloride
UN 1624	101	Mercuric chloride, solid
UN 1625	101	Mercuric nitrate
UN 1626	102	Mercuric potassium cyanide
UN 1626	101	Mercuric potassium cyanide, solid
UN 1627	102	Mercurous nitrate
UN 1627	101	Mercurous nitrate, solid
UN 1628	101	Mercurous sulfate, solid
UN 1628	102	Mercurous sulphate
UN 1629	101	Mercuric acetate
UN 1629	101	Mercurous acetate, solid
UN 1629	102	Mercury acetate
UN 1630	101	Mercuric ammonium chloride, solid
UN 1630	102	Mercury ammonium chloride
UN 1631	101	Mercuric benzoate, solid
UN 1631	102	Mercury benzoate
UN 1633	102	Mercury bisulphate
UN 1634	101	Mercuric bromide, solid
UN 1634	101	Mercurous bromide, solid
UN 1634	102	Mercury bromides
UN 1636	101	Mercuric cyanide, solid
UN 1636	102	Mercury cyanide
UN 1637	101	Mercurous gluconate, solid
UN 1637	102	Mercury gluconate
UN 1638	101	Mercuric iodide, solid
UN 1638	101	Mercuric iodide, solution
UN 1638	101	Mercurous iodide, solid
UN 1638	102	Mercury iodide
UN 1639	101	Mercurol or Mercury nucleate, solid
UN 1639	102	Mercury nucleate
UN 1640	101	Mercuric oleate, solid
UN 1640	102	Mercury oleate
UN 1641	101	Mercuric oxide, solid
UN 1641	101	Mercurous oxide, black, solid
UN 1641	102	Mercury oxide
UN 1642	101	Mercuric oxycyanide, solid
UN 1642	102	Mercury oxycyanide
UN 1643	101	Mercuric potassium iodide, solid
UN 1643	102	Mercury potassium iodide
UN 1644	101	Mercuric salicylate solid
UN 1644	102	Mercury salicylate
UN 1645	101	Mercuric sulfate, solid
UN 1645	102	Mercuric sulphate
UN 1646	101	Mercuric sulfocyanate, solid or Mercuric thiocyanate, solid
UN 1646	102	Mercury thiocyanate
UN 1647	102	Methyl bromide and ethylene dibromide mixtures, liquid
UN 1647	101	Methyl bromide - ethylene dibromide mixture, liquid
NA 1648	101	Acetonitrile
UN 1648	102	Methyl cyanide
UN 1649	101	Motor fuel antiknock compound or Antiknock compound
UN 1649	102	Motor fuel anti knock mixtures
NA 1649	101	Tetraethyl lead, liquid
UN 1650	102	Naphthylamine
UN 1651	102	alpha Naphthylthiourea
UN 1652	102	Naphthylurea
UN 1653	102	Nickel cyanide
UN 1653	101	Nickel cyanide, solid
UN 1654	102	Nicotine
UN 1654	101	Nicotine, liquid
UN 1655	102	Nicotine compounds, n.o.s. or Nicotine preparations, n.o.s.
UN 1656	101	Nicotine hydrochloride
UN 1656	102	Nicotine hydrochloride, or Nicotine hydrochloride solutions
UN 1657	101	Nicotine salicylate
UN 1658	101	Nicotine sulfate, liquid
UN 1658	101	Nicotine sulfate, solid
UN 1658	102	Nicotine sulphate, solid or solution
UN 1659	101	Nicotine tartrate
UN 1660	101	Nitric oxide
UN 1661	101	Nitroaniline
UN 1661	102	Nitroanilines
UN 1662	102	Nitrobenzene
UN 1662	101	Nitrobenzene, liquid or Nitrobenzol, liquid

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1663	101	Nitrophenol
UN 1663	102	Nitrophenols
UN 1664	101	Nitrotoluene
UN 1664	102	Nitrotoluenes
UN 1665	102	Nitroxylenes
NA 1665	101	Nitroxylol
UN 1669	102	Pentachloroethane
UN 1670	101	Perchloromethyl mercaptan
UN 1671	101	Phenol
UN 1672	102	Phenylcarbylamine chloride
UN 1673	101	Phenylenediamine, meta or para, solid
UN 1673	102	Phenylenediamines
UN 1674	102	Phenylmercuric acetate
UN 1677	102	Potassium arsenate
UN 1677	101	Potassium arsenate, solid
UN 1678	102	Potassium arsenite
UN 1678	101	Potassium arsenite, solid
UN 1679	102	Potassium cuprocyanide
UN 1680	102	Potassium cyanide
UN 1680	101	Potassium cyanide, solid
UN 1680	101	Potassium cyanide solution
UN 1681	102	Rodenticides, n.o.s.
UN 1683	102	Silver arsenite
UN 1684	101	Silver cyanide
UN 1685	101	Sodium arsenate
UN 1686	102	Sodium arsenite, aqueous solutions
UN 1686	101	Sodium arsenite, liquid
UN 1687	101	Sodium azide
UN 1688	102	Sodium cacodylate
UN 1689	102	Sodium cyanide
UN 1689	101	Sodium cyanide, solid
UN 1689	101	Sodium cyanide solution
UN 1690	101	Sodium fluoride, solid
UN 1690	101	Sodium fluoride, solution
UN 1691	102	Strontium arsenite
UN 1691	101	Strontium arsenite, solid
UN 1692	102	Strychnine
UN 1692	101	Strychnine salt, solid
UN 1692	101	Strychnine, solid
NA 1693	101	Irritating agent, n.o.s.
NA 1693	101	OFM-A, n.o.s.
UN 1693	102	Tear gas
NA 1693	101	Tear gas device
UN 1694	102	Bromobenzyl cyanides
UN 1695	102	Chloroacetone
UN 1695	101	Monochloroacetone, stabilized or inhibited
UN 1697	102	Chloroacetophenone
UN 1697	101	Chloroacetophenone, gas, liquid, or solid
UN 1698	101	Diphenylaminechloroarsine
UN 1699	102	Diphenylchloroarsine
UN 1700	101	Tear gas candle
UN 1700	102	Tear gas candles
UN 1701	101	Xylyl bromide
UN 1702	102	1,1,2,2-Tetrachloroethane
UN 1702	101	Tetrachloroethane
UN 1703	101	Tetraethyl dithiopyrophosphate and compressed gas mixture
UN 1703	102	Tetraethyl dithiopyrophosphate with gases
UN 1704	101	Tetraethyl dithiopyrophosphate, liquid
UN 1704	102	Tetraethyl dithiopyrophosphate, liquid or mixtures
UN 1704	101	Tetraethyl dithiopyrophosphate mixture, dry
UN 1704	101	Tetraethyl dithiopyrophosphate mixture, liquid
UN 1705	102	Tetraethyl pyrophosphate and compressed gas
UN 1705	101	Tetraethyl pyrophosphate and compressed gas mixture
UN 1707	102	Thallium compounds, n.o.s.
NA 1707	101	Thallium salt, solid, n.o.s.
NA 1707	101	Thallium sulfate, solid
UN 1708	102	Toluidines
UN 1709	102	2,4-Toluylenediamine
NA 1709	101	Toluenediamine
UN 1710	101	Trichloroethylene
UN 1711	102	Xylidines
UN 1712	101	Zinc arsenate
UN 1712	102	Zinc arsenate or Zinc arsenite, or mixtures
UN 1712	101	Zinc arsenite, solid
UN 1713	101	Zinc cyanide
UN 1714	101	Zinc phosphide

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1715	101	Acetic anhydride
UN 1716	101	Acetyl bromide
UN 1717	101	Acetyl chloride
UN 1718	101	Acid butyl phosphate
UN 1718	102	Butyl acid phosphate
NA 1719	101	Alkaline liquid, n.o.s.
UN 1719	102	Caustic alkali liquids, n.o.s.
UN 1722	101	Allyl chloroacetate
UN 1722	102	Allyl chloroformate
UN 1723	102	Allyl iodide
UN 1724	101	Allyl trichlorosilane
UN 1725	102	Aluminium bromide, anhydrous
UN 1725	101	Aluminum bromide, anhydrous
UN 1726	102	Aluminium chloride, anhydrous
UN 1727	101	Ammonium hydrogen fluoride, solid
UN 1728	102	Amyl trichlorosilane
UN 1728	101	Amyl trichorosilane
UN 1729	101	Anisoyl chloride
UN 1730	101	Antimony pentachloride
UN 1731	102	Antimony pentachloride
UN 1731	101	Antimony pentachloride solution
UN 1732	101	Antimony pentafluoride
UN 1733	102	Antimony trichloride
UN 1733	101	Antimony trichloride, solid
UN 1733	101	Antimony trichloride solution
UN 1736	101	Benzoyl chloride
UN 1737	101	Benzyl bromide
UN 1738	101	Benzyl chloride
UN 1739	101	Benzyl chloroformate
UN 1740	102	Bifluorides, n.o.s.
UN 1741	101	Boron trichloride
UN 1742	102	Boron trifluoride acetic acid complex
UN 1742	101	Boron trifluoride acetic acid complex
UN 1743	102	Boron trifluoride propionic acid complex
UN 1744	101	Bromine
UN 1745	101	Bromine pentafluoride
UN 1746	101	Bromine trifluoride
UN 1747	101	Butyl trichlorosilane
UN 1748	102	Calcium hypochlorite, dry or Calcium hypochlorite mixtures
UN 1748	101	Calcium hypochlorite mixture
UN 1749	101	Chlorine trifluoride
UN 1750	102	Chloroacetic acid
UN 1750	101	Chloroacetic acid, liquid or solution
UN 1751	101	Chloroacetic acid, solid
UN 1752	101	Chloroacetyl chloride
UN 1753	102	Chlorophenyl trichlorosilane
UN 1753	101	Chlorophenyltrichlorosilane
UN 1754	101	Chlorosulfonic acid
UN 1754	101	Chlorosulfonic acid-sulfur trioxide mixture
UN 1754	102	Chlorosulphonic acid
UN 1755	102	Chromic acid
UN 1755	101	Chromic acid solution
UN 1756	101	Chromic fluoride, solid
UN 1757	101	Chromic fluoride solution
UN 1757	102	Chromic fluoride, solution
UN 1758	102	Chromium oxychloride
UN 1758	101	Chromium oxychloride or Chromyl chloride
UN 1759	101	Corrosive solid, n.o.s.
UN 1759	102	Corrosive solids, n.o.s.
NA 1759	101	Cosmetics, solid, n.o.s.
NA 1759	101	Drugs, solid, n.o.s.
NA 1759	101	Ferrous chloride, solid
NA 1759	101	Stannous chloride, solid
NA 1760	101	2-(2-Aminoethoxy) ethanol
NA 1760	101	2,2-Dichloropropionic acid
NA 1760	101	Acid, liquid, n.o.s.
NA 1760	101	Aluminum phosphate solution
NA 1760	101	Aluminum sulfate solution
NA 1760	101	Aminopropyldiethanolamine
NA 1760	101	bis (Aminopropyl) piperazine
NA 1760	101	Boiler compound, liquid
NA 1760	101	Chemical kit
NA 1760	101	Compound, cleaning, liquid
NA 1760	101	Compound, rust preventing or Compound, rust removing
NA 1760	101	Compound, tree or weed killing, liquid
NA 1760	101	Compound, vulcanizing, liquid
UN 1760	101	Corrosive liquid, n.o.s.
UN 1760	102	Corrosive liquids, n.o.s.
NA 1760	101	Cosmetics, liquid, n.o.s.
NA 1760	101	Drugs, liquid, n.o.s.
NA 1760	101	Ethyl phosphonothioic dichloride, anhydrous

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 1760	101	Ethyl phosphorodichloridate
NA 1760	101	Ferrous chloride, solution
NA 1760	101	Flame retardant compound liquid
NA 1760	101	Hexanoic acid
NA 1760	101	Isopentanoic acid
NA 1760	101	Memlehahydro phthalic anhydride
NA 1760	101	Methyl phosphonothioic dichloride, anhydrous
NA 1760	101	Morpholine, aqueous, mixture
NA 1760	101	N Aminopropylmorpholine
NA 1760	101	Nitric acid, 40% or less
NA 1760	101	OFM-B, n.o.s.
NA 1760	101	Paint or paint related material
NA 1760	101	Textile treating compound or mixture, liquid
NA 1760	101	Titanium sulfate solution
NA 1760	101	Valeric acid
NA 1760	101	Water treatment compounds, liquid
NA 1760	101	White acid
UN 1761	101	Cupriethylene diamine solution
UN 1761	102	Cupriethylenediamine, solution
UN 1762	101	Cyclohexenyl trichlorosilane
UN 1763	101	Cyclohexyl trichlorosilane
UN 1764	101	Dichloracetic acid
UN 1765	101	Dichloracetyl chloride
UN 1766	102	Dichlorophenyl trichlorosilane
UN 1766	101	Dichlorophenyltrichlorosilane
UN 1767	101	Diethyl dichlorosilane
UN 1768	102	Difluorophosphoric acid
UN 1768	101	Difluorophosphoric acid, anhydrous
UN 1769	101	Diphenyl dichlorosilane
UN 1770	102	Diphenylmethyl bromide
UN 1770	101	Diphenyl methyl bromide, solid
UN 1770	101	Diphenyl methyl bromide solution
UN 1771	101	Dodecyl trichlorosilane
UN 1773	102	Ferric chloride, anhydrous
UN 1773	101	Ferric chloride, solid
UN 1774	101	Fire extinguisher charge containing sulfuric acid
UN 1774	102	Fire extinguisher charges
UN 1775	101	Fluoboric acid
UN 1776	102	Fluorophosphoric acid
UN 1776	101	Monofluorophosphoric acid, anhydrous
UN 1777	101	Fluorosulfonic acid or Fluosulfonic acid
UN 1777	102	Fluorosulphonic acid
UN 1778	102	Fluosilicic acid
NA 1778	101	Hydrofluorosilicic acid
UN 1779	101	Formic acid
UN 1779	101	Formic acid solution
UN 1780	101	Fumaryl chloride
UN 1781	102	Hexadecyl trichlorosilane
UN 1781	101	Hexadecyltrichlorosilane
UN 1782	101	Hexafluorophosphoric acid
UN 1783	101	Hexamethylenediamine, solution
UN 1784	102	Hexyl trichlorosilane
UN 1784	101	Hexyltrichlorosilane
UN 1786	102	Hydrofluoric acid and sulphuric acid mixtures
UN 1786	101	Hydrofluoric and sulfuric acid mixture
UN 1787	101	Hydriodic acid
UN 1787	102	Hydriodic acid, solution
UN 1788	101	Hydrobromic acid
UN 1788	101	Hydrobromic acid not more than 49% strength
UN 1788	102	Hydrobromic acid, solution
NA 1789	101	Compound, cleaning, liquid (containing hydrochloric (muriatic) acid)
UN 1789	101	Hydrochloric acid
NA 1789	101	Hydrochloric acid mixture
UN 1789	102	Hydrochloric acid, solution
UN 1789	101	Hydrochloric acid solution, inhibited
NA 1790	101	Compound, cleaning, liquid (containing hydrofluoric acid)
NA 1790	101	Etching acid, liquid, n.o.s.
UN 1790	101	Hydrofluoric acid solution
UN 1790	102	Hydrofluoric acid, solution
UN 1791	101	Hypochlorite solution
NA 1791	101	Hypochlorite solution containing not more than 7% available chlorine
UN 1791	102	Hypochlorite, solutions
UN 1792	101	Iodine monochloride
UN 1793	101	Isopropyl acid phosphate, solid
UN 1793	102	Isopropyl acid phosphate
UN 1794	101	Lead dross
UN 1794	101	Lead sulfate, solid
UN 1794	102	Lead sulphate

For explanation of abbreviations and reference marks, see last page of this tariff.

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1796	102	Nitrating acid, mixtures
UN 1796	101	Nitrating acid, mixture (with more than 50% nitric acid)
UN 1796	101	Nitrating acid, mixture (with not more than 50% nitric acid)
UN 1798	101	Nitrohydrochloric acid
UN 1798	101	Nitrohydrochloric acid, diluted
UN 1799	102	Nonyl trichlorosilane
UN 1799	101	Nonyltrichlorosilane
UN 1800	102	Octadecyl trichlorosilane
UN 1800	101	Octadecyltrichlorosilane
UN 1801	102	Octyl trichlorosilane
UN 1801	101	Octyltrichlorosilane
UN 1802	102	Perchloric acid
UN 1802	101	Perchloric acid, not over 50% acid
UN 1803	102	Phenolsulphonic acid
UN 1804	102	Phenyl trichlorosilane
UN 1804	101	Phenyltrichlorosilane
UN 1805	101	Phosphoric acid
UN 1806	102	Phosphorus pentachloride
UN 1806	101	Phosphorus pentachloride, solid
NA 1807	101	Phosphoric anhydride
UN 1807	102	Phosphorus pentoxide
UN 1808	101	Phosphorus tribromide
UN 1809	101	Phosphorus trichloride
UN 1810	101	Phosphorus oxychloride
UN 1811	102	Potassium bifluoride
NA 1811	101	Potassium hydrogen fluoride solution
UN 1812	101	Potassium fluoride
UN 1812	101	Potassium fluoride solution
NA 1813	101	Battery
UN 1813	101	Potassium hydroxide, dry solid, flake, bead, or granular
UN 1813	102	Potassium hydroxide, solid
UN 1814	101	Potassium hydroxide, liquid or solution
UN 1814	102	Potassium hydroxide, solution
UN 1815	102	Propionyl chloride
UN 1816	101	Propyl trichlorosilane
UN 1817	101	Pyrosulfuryl chloride
UN 1817	102	Pyrosulphuryl chloride
UN 1818	101	Silicon chloride or Silicon tetrachloride
UN 1818	102	Silicon tetrachloride
UN 1819	101	Sodium aluminate solution
UN 1819	102	Sodium aluminate, solution
UN 1821	101	Sodium hydrogen sulfate, solid
UN 1821	102	Sodium hydrogen sulphate, solid
UN 1823	101	Sodium hydroxide, dry solid, flake, bead, or granular
UN 1823	102	Sodium hydroxide, solid
UN 1824	101	Sodium hydroxide, liquid or solution
UN 1824	102	Sodium hydroxide, solution
UN 1825	102	Sodium monoxide
UN 1825	101	Sodium monoxide, solid
UN 1826	102	Acid mixtures, spent, nitrating
NA 1826	101	Nitrating acid, spent
UN 1827	102	Stannic chloride, anhydrous
UN 1827	101	Tin tetrachloride, anhydrous
UN 1828	101	Sulfur chloride
UN 1828	102	Sulphur chlorides
UN 1829	101	Sulfur trioxide
UN 1829	102	Sulphur trioxide
UN 1830	101	Sulfuric acid
UN 1830	102	Sulphuric acid
NA 1831	101	Oleum
UN 1831	102	Sulphuric acid, fuming
UN 1832	101	Sulfuric acid, spent
UN 1832	102	Sulphuric acid, spent
UN 1833	101	Sulfurous acid
UN 1833	102	Sulphurous acid
UN 1834	101	Sulfuryl chloride
UN 1834	102	Sulphuryl chloride
UN 1835	102	Tetramethylammonium hydroxide
UN 1835	101	Tetramethylammonium hydroxide, liquid
UN 1836	101	Thionyl chloride
UN 1837	101	Thiophosphoryl chloride
UN 1838	101	Titanium tetrachloride
UN 1839	101	Trichloroacetic acid, solid
UN 1840	101	Zinc chloride solution
UN 1840	102	Zinc chloride, solution
UN 1841	101	Acetaldehyde ammonia
UN 1843	102	Ammonium dinitro-o-cresolate
UN 1845	102	Carbon dioxide, solid
UN 1845	101	Carbon dioxide, solid, or Dry ice, or Carbonice
UN 1846	101	Carbon tetrachloride

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1847	102	Potassium sulphide, hydrated
UN 1848	101	Propionic acid
UN 1848	101	Propionic acid, solution
UN 1849	102	Sodium sulphide, hydrated
UN 1850	101	Eradicator, paint or grease, liquid
UN 1850	102	Eradicators
UN 1851	101	Medicines, liquid, n.o.s.
UN 1851	101	Medicines, n.o.s.
UN 1851	101	Medicines, solid, n.o.s.
UN 1854	102	Barium alloys, pyrophoric
UN 1855	102	Calcium, pyrophoric or Calcium alloys, pyrophoric
UN 1856	102	Rags
UN 1856	101	Rags, oily
UN 1857	101	Textile waste, wet
UN 1857	102	Textile waste, wet, n.o.s.
UN 1857	101	Waste textile, wet
UN 1858	101	Hexafluoropropylene
UN 1859	101	Silicon tetrafluoride
UN 1860	102	Vinyl fluoride
UN 1860	101	Vinyl fluoride, inhibited
UN 1862	101	Ethyl crotonate
UN 1863	102	Fuel, aviation
UN 1863	101	Fuel, aviation, turbine engine
UN 1864	102	Gas drips
UN 1864	101	Gas drips, hydrocarbon
UN 1865	102	n-Propyl nitrate
UN 1866	101	Resin solution
UN 1867	102	Cigarettes
UN 1867	101	Self-lighting cigarette
UN 1868	101	Decaborane
UN 1869	101	Magnesium, metal
UN 1869	102	Magnesium or Magnesium alloys
NA 1869	101	Magnesium scrap
UN 1870	102	Potassium borohydride
UN 1871	102	Titanium hydride
UN 1872	102	Lead dioxide
UN 1872	101	Lead peroxide
UN 1873	101	Perchloric acid
UN 1884	101	Barium oxide
UN 1885	101	Benzidine
UN 1886	102	Benzylidene chloride
UN 1887	101	Bromochloromethane
UN 1888	101	Chloroform
UN 1889	101	Cyanogen bromide
UN 1891	102	Ethyl bromide
UN 1892	102	Ethyl dichloroarsine
UN 1894	102	Phenylmercuric hydroxide
UN 1895	102	Phenylmercuric nitrate
UN 1896	102	Resin solution, poisonous
UN 1897	102	Tetrachloroethylene
UN 1897	101	Tetrachloroethylene or Perchloroethylene
UN 1898	101	Acetyl iodide
NA 1902	101	Di-(2-ethylhexyl) phosphoric acid
UN 1902	101	Diisooctyl acid phosphate
UN 1903	101	Disinfectant, liquid
UN 1903	102	Disinfectants, corrosive, liquid, n.o.s.
UN 1905	102	Selenic acid
UN 1905	101	Selenic acid, liquid
UN 1906	101	Acid, sludge
UN 1906	102	Sludge acid
UN 1907	102	Soda lime
UN 1907	101	Soda lime, solid
UN 1908	101	Sodium chlorite solution
UN 1908	102	Sodium chlorite, solution
UN 1910	101	Calcium oxide
UN 1911	102	Diborane
UN 1911	101	Diborane or diborane mixtures
UN 1912	102	Methyl chloride and methylene chloride, mixtures
UN 1912	101	Methyl chloride-methylene chloride mixture
NA 1913	101	Neon, refrigerated liquid
UN 1913	102	Neon, refrigerated liquid
UN 1914	102	Butyl propionate
UN 1915	102	Cyclohexanone
UN 1916	102	Dichloroethyl ether
UN 1917	102	Ethyl acrylate
UN 1917	101	Ethyl acrylate, inhibited
UN 1918	102	Isopropylbenzene
UN 1919	102	Methyl acrylate
UN 1919	101	Methyl acrylate, inhibited
UN 1920	102	Nonane
UN 1921	102	Propyleneimine
UN 1921	101	Propyleneimine, inhibited

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1922	101	Pyrrolidine
UN 1923	102	Calcium hydrosulphite
UN 1924	102	Ethyl aluminium dichloride
UN 1925	102	Ethyl aluminium sesquichloride
UN 1926	102	Methyl aluminium sesquibromide
UN 1927	102	Methyl aluminium sesquichloride
UN 1928	101	Methyl magnesium bromide in ethyl ether
UN 1928	102	Methyl magnesium bromide, in ethyl ether
UN 1929	102	Potassium hydrosulphite
UN 1930	102	Triisobutyl aluminium
UN 1931	101	Zinc hydrosulfite
UN 1931	102	Zinc hydrosulphite
UN 1932	102	Zirconium
UN 1932	101	Zirconium scrap
UN 1935	101	Cyanide solution, n.o.s.
UN 1935	102	Cyanide, solutions
UN 1938	102	Bromoacetic acid
UN 1938	101	Bromoacetic acid, solid
UN 1938	101	Bromoacetic acid solution
UN 1939	101	Phosphorus oxybromide
UN 1939	102	Phosphorus oxybromide, solid
UN 1940	101	Thioglycolic acid
UN 1941	101	Dibromodifluoromethane
UN 1942	102	Ammonium nitrate
UN 1942	101	Ammonium nitrate (no organic coating)
NA 1942	101	Ammonium nitrate (organic coating)
UN 1944	101	Matches, safety
UN 1945	102	Matches
UN 1950	102	Aerosol dispensers
UN 1951	101	Argon, refrigerated liquid
UN 1951	102	Argon, refrigerated liquid
UN 1952	102	Carbon dioxide and ethylene oxide mixtures
UN 1953	102	Compressed or liquefied gases, flammable, toxic, n.o.s.
NA 1953	101	Poisonous liquid or gas, flammable, n.o.s.
UN 1954	101	Compressed gas, n.o.s.
UN 1954	102	Compressed or liquefied gases, flammable
NA 1954	101	Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.
NA 1954	101	Refrigerating machine
NA 1955	101	Chlorpicrin and nonflammable, nonliquefied compressed gas mixture
UN 1955	102	Compressed or liquefied gases
NA 1955	101	Methyl bromide and nonflammable, nonliquefied compressed gas mixture, liquid
NA 1955	101	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound, mixed with compressed gas
NA 1955	101	Poisonous liquid or gas, n.o.s.
(UN 1955)	102	Tetrafluorohydrazine
NA 1956	101	Accumulator, pressurized
UN 1956	101	Compressed gas, n.o.s.
UN 1956	102	Compressed or liquefied gases
NA 1956	101	Hexafluoropropylene oxide
NA 1956	101	Mine rescue equipment containing carbon dioxide
NA 1956	101	Water pump system
UN 1957	102	Deuterium
UN 1958	102	Dichlorotetrafluoroethane
UN 1959	102	1,1-Difluoroethylene
UN 1960	101	Engine starting fluid
UN 1961	102	Ethane
UN 1961	101	Ethane-Propane mixture, refrigerated liquid
NA 1961	101	Ethane, refrigerated liquid
UN 1962	102	Ethylene
UN 1962	101	Ethylene or Ethylene, compressed
UN 1963	101	Helium, refrigerated liquid
UN 1963	102	Helium, refrigerated liquid
UN 1964	102	Hydrocarbon gases, compressed, n.o.s. or Hydrocarbon gases, mixtures, compressed, n.o.s.
UN 1964	101	Hydrocarbon gas, nonliquefied
UN 1965	102	Hydrocarbon gases, liquefied, n.o.s. or Hydrocarbon gases, mixtures, liquefied, n.o.s.
UN 1965	101	Hydrocarbon gas, liquefied
UN 1966	102	Hydrogen
UN 1966	101	Hydrogen, refrigerated liquid

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 1967	102	Insecticide gases
NA 1967	101	Insecticide, liquefied gas, containing Poison A material or Poison B material
NA 1967	101	Parathion and compressed gas mixture
UN 1968	102	Insecticide gases
NA 1968	101	Insecticide, liquefied gas
UN 1969	102	Isobutane or Isobutane mixtures
UN 1970	102	Krypton, refrigerated liquid
UN 1971	101	Methane or Methane, compressed
UN 1971	102	Methane or Natural gases
UN 1972	102	Methane or Natural gases
UN 1972	101	Methane, refrigerated liquid
UN 1972	101	Natural gas, refrigerated liquid
UN 1973	102	Chlorodifluoromethane and chloropentafluoroethane
UN 1974	102	Chlorodifluorobromomethane
UN 1975	102	Nitric oxide and nitrogen tetroxide mixtures
UN 1976	102	Octafluorocyclobutane
UN 1977	101	Nitrogen, refrigerated liquid
UN 1977	102	Nitrogen, refrigerated liquid
UN 1978	102	Propane
UN 1979	102	Rare gases
NA 1980	101	Helium-oxygen mixture
UN 1980	102	Rare gases
UN 1981	102	Rare gases
UN 1982	102	Tetrafluoromethane
UN 1983	102	Chlorotrifluoroethane
UN 1984	102	Trifluoromethane
UN 1986	102	Alcohols, toxic, n.o.s.
NA 1986	101	Denatured alcohol
NA 1986	101	Propargyl alcohol
NA 1986	101	Rum, denatured
UN 1987	101	Alcohol, n.o.s.
UN 1987	102	Alcohols, n.o.s.
UN 1988	102	Aldehydes, toxic, n.o.s.
UN 1989	102	Aldehydes, n.o.s.
NA 1989	101	Benzaldehyde
UN 1991	101	Chloroprene, inhibited
UN 1992	101	Flammable liquid, poisonous, n.o.s.
UN 1992	102	Flammable liquids, poisonous, n.o.s.
NA 1993	101	Combustible liquid, n.o.s.
NA 1993	101	Compound, cleaning, liquid
NA 1993	101	Compound, tree or weed killing, liquid
NA 1993	101	Cosmetics, n.o.s.
NA 1993	101	Creosote, coal tar
NA 1993	101	Disinfectant, liquid, n.o.s.
NA 1993	101	Drugs, n.o.s.
NA 1993	101	Ethyl nitrate
UN 1993	101	Flammable liquid, n.o.s.
UN 1993	102	Flammable liquids, n.o.s.
NA 1993	101	Fuel oil
NA 1993	101	Fuel oil, No. 1, 2, 4, 5 or 6
NA 1993	101	Heater for refrigerator car, liquid fuel type
NA 1993	101	Insecticide, liquid, n.o.s.
NA 1993	101	Organic peroxide, liquid or solution, n.o.s.
NA 1993	101	Plastic solvent, n.o.s.
NA 1993	101	Refrigerating machine
NA 1993	101	Solvent, n.o.s.
NA 1993	101	Wax, liquid
UN 1994	102	Iron pentacarbonyl
NA 1999	101	Asphalt
NA 1999	101	Asphalt, cut back
UN 1999	102	Cut-backs
UN 1999	101	Tar, liquid
UN 2000	102	Celluloid
UN 2001	102	Cobalt naphthenates
UN 2002	102	Celluloid, scrap
UN 2003	102	Metal alkyls, n.o.s.
UN 2004	102	Magnesium diamide
UN 2005	102	Magnesium diphenyl
UN 2006	102	Plastics, nitrocellulose-based, spontaneously combustible, n.o.s.
UN 2008	102	Zirconium
UN 2008	101	Zirconium metal, dry
UN 2009	102	Zirconium
UN 2010	102	Magnesium hydride
UN 2011	102	Magnesium phosphide
UN 2012	102	Potassium phosphide
UN 2013	102	Strontium phosphide
UN 2014	102	Hydrogen peroxide, aqueous solutions
UN 2014	101	Hydrogen peroxide solution (8% to 40% peroxide)

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2014	101	Hydrogen peroxide solution (40% to 52% peroxide)
UN 2015	101	Hydrogen peroxide solution (over 52% peroxide)
UN 2015	102	Hydrogen peroxide, stabilized, or Hydrogen peroxide, aqueous solutions, stabilized
UN 2016	102	Ammunition
UN 2016	101	Chemical ammunition, nonexplosive
NA 2016	101	Grenade
UN 2017	102	Ammunition, tear producing, non-explosive
UN 2017	101	Chemical ammunition, nonexplosive
NA 2017	101	Grenade, tear gas
UN 2018	102	Chloroanilines
UN 2019	102	Chloroanilines
UN 2020	102	Chlorophenols, solid
NA 2020	101	Pentachlorophenol
NA 2020	101	Trichlorophenol
UN 2021	102	Chlorophenols, liquid
UN 2022	102	Cresylic acid
NA 2022	101	Mining reagent, liquid
UN 2023	101	Epichlorohydrin
UN 2024	102	Mercury compounds, liquid, n.o.s.
NA 2025	101	Mercuric subsulfate, solid
UN 2025	101	Mercury compound, solid, n.o.s.
UN 2025	102	Mercury compounds, solid, n.o.s.
UN 2026	102	Phenylmercuric compounds, n.o.s.
UN 2027	102	Sodium arsenite, solid
UN 2028	102	Bombs, smoke
UN 2029	101	Hydrazine, anhydrous
UN 2029	102	Hydrazine, anhydrous or Hydrazine aqueous solutions
UN 2030	101	Hydrazine, aqueous solution
UN 2030	102	Hydrazine hydrate or Hydrazine aqueous solutions
UN 2031	101	Nitric acid
UN 2032	101	Nitric acid, fuming
UN 2032	102	Nitric acid, red fuming
UN 2033	102	Potassium oxide
UN 2034	102	Hydrogen and methane mixtures, compressed
UN 2035	102	Trifluoroethane
UN 2036	101	Xenon
UN 2037	102	Receptacles
UN 2038	101	Dinitrotoluene, solid
UN 2038	102	Dinitrotoluenes, solid
UN 2044	102	2,2-Dimethylpropane
UN 2045	102	Isobutyraldehyde
UN 2046	102	Cymenes
UN 2047	101	Dichloropropene
NA 2047	101	Dichloropropene and propylene dichloride mixture
UN 2048	102	Dicyclopentadiene
UN 2049	102	Diethylbenzene
UN 2050	102	Diisobutylene
UN 2051	102	Dimethylethanolamine
UN 2052	102	Dipentene
UN 2053	102	Methyl isobutyl carbinol
UN 2054	101	Morpholine
NA 2054	101	Morpholine, aqueous, mixture
UN 2055	101	Styrene monomer, inhibited
UN 2056	101	Tetrahydrofuran
UN 2057	102	Tripropylene
UN 2058	102	Valeraldehyde
UN 2059	101	Box toe gun
NA 2059	101	Collodion
UN 2059	102	Nitrocellulose
NA 2059	101	Nitrocellulose, colloided, granular or flake, wet with not less than 20% alcohol or solvent, or block, wet with not less than 25% alcohol
NA 2059	101	Pyroxylin solution
NA 2059	101	Pyroxylin solvent, n.o.s.
UN 2060	101	Box toe gun
UN 2067	101	Ammonium nitrate fertilizer
UN 2067	102	Ammonium nitrate fertilizers
UN 2068	101	Ammonium nitrate-carbonate mixture
UN 2069	101	Ammonium nitrate mixed fertilizer
UN 2070	101	Ammonium nitrate-phosphate
UN 2071	102	Ammonium nitrate fertilizers
UN 2072	102	Ammonium nitrate fertilizers, n.o.s.
UN 2073	101	Ammonia solution
UN 2073	102	Ammonia solutions
UN 2074	102	Acrylamide
UN 2075	102	Chloral

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2076	101	Cresol
UN 2076	102	Cresols
UN 2077	102	Naphthylamine
UN 2078	101	Toluene diisocyanate
UN 2079	102	Diethylenetriamine
UN 2080	101	Acetyl acetone peroxide
UN 2081	101	Acetyl benzoyl peroxide
UN 2081	101	Acetyl benzoyl peroxide solution
UN 2082	101	Acetyl cyclohexanesulphonyl peroxide
UN 2082	102	Acetyl cyclohexane sulphonyl peroxide
UN 2083	101	Acetyl cyclohexanesulphonyl peroxide
UN 2083	102	Acetyl cyclohexane sulphonyl peroxide
UN 2084	101	Acetyl peroxide
UN 2084	101	Acetyl peroxide solution
NA 2085	101	Benzoyl peroxide
UN 2085	101	Benzoyl peroxide
UN 2086	102	Benzoyl peroxide
UN 2087	101	Benzoyl peroxide
UN 2088	101	Benzoyl peroxide
UN 2089	101	Benzoyl peroxide
UN 2090	101	Benzoyl peroxide
UN 2091	101	tert-Butyl cumyl peroxide
NA 2091	101	tert-Butyl isopropyl benzene hydroperoxide
UN 2092	101	tert-Butyl hydroperoxide
UN 2093	101	tert-Butyl hydroperoxide
UN 2094	101	tert-Butyl hydroperoxide
UN 2095	101	tert-Butyl peroxyacetate
UN 2096	101	tert-Butyl peroxyacetate
UN 2097	101	tert-Butyl peroxybenzoate
UN 2098	101	tert-Butyl peroxybenzoate
UN 2099	102	tert-Butyl monoperoxymaleate
UN 2099	101	tert-Butyl peroxymaleate
UN 2100	102	tert-Butyl monoperoxymaleate
UN 2100	101	tert-Butyl peroxymaleate
UN 2101	102	tert-Butyl monoperoxymaleate
UN 2101	101	tert-Butyl peroxymaleate
UN 2102	101	Di-tert-butyl peroxide
UN 2103	101	tert-Butyl peroxyisopropyl carbonate
UN 2103	102	tert-Butyl peroxy isopropyl carbonate
UN 2104	102	tert-Butyl peroxy-3,5,5 trimethylhexanoate
UN 2104	101	tert-Butyl peroxy-3,5,5-trimethylhexanoate or tert-Butyl peroxyisononanoate
UN 2105	102	tert-Butyl monoperoxyphthalate
UN 2105	101	tert-Butyl peroxyphthalate
UN 2106	101	Di-(tert-butylperoxy)phthalate
UN 2107	101	Di-(tert-butylperoxy)phthalate
UN 2108	101	Di-(tert-butylperoxy)phthalate
UN 2110	101	tert-Butyl peroxypivalate
UN 2111	101	2,2-Di-(tert-butylperoxy)butane
UN 2111	102	2,2-Di-(tert-butylperoxy) butane
UN 2112	101	1,3-Di-(2-tert-butylperoxyisopropyl) benzene
UN 2112	101	1,3-Di-(2-tert-butylperoxy isopropyl) benzene and 1,4-Di-(2-tert-butylperoxyisopropyl) benzene mixture
UN 2112	101	1,4-Di-(2-tert-butylperoxyisopropyl) benzene
UN 2112	102	1,4-Di-(2-tert-butylperoxy isopropyl) benzene, or 1,3-di-(2-tert-butylperoxy isopropyl) benzene, or mixtures
UN 2113	102	Di-(4-chlorobenzoyl) peroxide
UN 2113	101	p-Chlorobenzoyl peroxide
UN 2114	102	Di-(4-chlorobenzoyl) peroxide
UN 2114	101	p-Chlorobenzoyl peroxide
UN 2115	102	Di-(4-chlorobenzoyl) peroxide
UN 2115	101	p-Chlorobenzoyl peroxide
UN 2116	101	Cumene hydroperoxide
UN 2116	102	Cumyl hydroperoxide
UN 2117	102	Cyclohexanone peroxides
UN 2118	101	Cyclohexanone peroxide
UN 2118	102	Cyclohexanone peroxides
UN 2119	101	Cyclohexanone peroxide
UN 2119	102	Cyclohexanone peroxides
UN 2120	101	Decanoyl peroxide
UN 2120	102	Didecanoyl peroxide
NA 2121	101	Decumyl peroxide
UN 2121	101	Decumyl peroxide
UN 2121	101	Decumyl peroxide, dry
UN 2122	101	Di-(2-ethylhexyl) peroxydicarbonate
UN 2123	101	Di-(2-ethylhexyl) peroxydicarbonate
UN 2124	102	Dilauroyl peroxide

For explanation of abbreviations and reference marks, see last page of this tariff.

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2124	101	Lauroyl peroxide
UN 2125	101	Paramenthane hydroperoxide
UN 2125	101	p-Menthane hydroperoxide
UN 2126	102	Isobutyl methyl ketone peroxide
UN 2126	101	Methyl isobutyl ketone peroxide
UN 2127	102	Ethyl methyl ketone peroxide(s)
UN 2128	102	Di-(3,5,5 trimethylhexanoyl)peroxide
UN 2128	101	Isononanoyl peroxide
NA 2129	101	Caprylyl peroxide solution
UN 2129	102	Di-n-octanoyl peroxide
UN 2129	101	n-Octanoyl peroxide
UN 2130	102	Di-n-nonanoyl peroxide
UN 2130	101	Pelargonyl peroxide
NA 2131	101	Peracetic acid solution
UN 2131	101	Peroxyacetic acid
UN 2132	102	Dipropionyl peroxide
UN 2132	101	Propionyl peroxide
UN 2133	102	Diisopropyl peroxydicarbonate
NA 2133	101	Isopropyl percarbonate, unstabilized
UN 2133	101	Isopropyl peroxydicarbonate
UN 2134	102	Diisopropyl peroxydicarbonate
NA 2134	101	Isopropyl percarbonate, stabilized
UN 2134	101	Isopropyl peroxydicarbonate
UN 2135	102	Disuccinic acid peroxide
UN 2135	101	Succinic acid peroxide
UN 2136	101	Tetralin hydroperoxide
UN 2137	101	2,4-Dichlorobenzoyl peroxide
UN 2137	102	Di-2,4-dichlorobenzoyl peroxide
UN 2138	101	2,4-Dichlorobenzoyl peroxide
UN 2138	102	Di-2,4-dichlorobenzoyl peroxide
UN 2139	101	2,4-Dichlorobenzoyl peroxide
UN 2139	102	Di-2,4-dichlorobenzoyl peroxide
UN 2140	101	n-Butyl-4,4-di-(tert-butylperoxy)valerate
UN 2140	102	n-Butyl 4,4-di-(tert-butyl-peroxy) valerate
UN 2141	101	n-Butyl-4,4-di-(tert-butylperoxy)valerate
UN 2141	102	n-Butyl 4,4-di-(tert-butyl-peroxy) valerate
UN 2142	101	tert-Butyl peroxyisobutyrate
UN 2143	101	tert-Butyl peroxy-2-ethylhexanoate
UN 2143	102	tert-Butyl peroxy-2-ethyl hexanoate
UN 2144	101	tert-Butyl peroxyethylacetate
UN 2145	101	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane
UN 2145	101	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane
UN 2147	101	1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane
UN 2148	102	Di-(1-hydroxy cyclohexyl) peroxide
UN 2148	101	Di-(1-hydroxycyclohexyl) peroxide
UN 2149	101	Diisopropyl peroxydicarbonate
UN 2150	101	Di-sec-butyl peroxydicarbonate
UN 2151	101	Di-sec-butyl peroxydicarbonate
UN 2152	101	Dicyclohexyl peroxydicarbonate
UN 2153	101	Dicyclohexyl peroxydicarbonate
UN 2154	101	Di-(4-tert-butylcyclohexyl peroxydicarbonate
UN 2154	102	Di-(4-tert-butylcyclohexyl) peroxydicarbonate
UN 2155	101	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane
UN 2156	101	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane
UN 2157	102	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy) hexane
UN 2157	101	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane
UN 2158	101	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3
UN 2159	101	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3
UN 2160	101	1,1,3,3-Tetramethylbutyl hydroperoxide
UN 2160	102	1,1,3,3-Tetramethyl butyl hydroperoxide
UN 2161	102	1,1,3,3-Tetramethyl butyl peroxy-2-ethyl hexanoate
UN 2161	101	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate
UN 2162	101	Pinane hydroperoxide
UN 2162	101	Pinane hydroperoxide solution
UN 2162	102	Pinanyl hydroperoxide
UN 2163	101	Diacetone alcohol peroxide
UN 2163	102	Diacetone alcohol peroxides

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2164	101	Diallyl peroxydicarbonate
UN 2165	101	3,3,6,6,9,9 Hexamethyl-1,2,4,5-tetraoxacyclononane
UN 2166	101	3,3,6,6,9,9 Hexamethyl-1,2,4,5-tetraoxacyclononane
UN 2167	101	3,3,6,6,9,9 Hexamethyl-1,2,4,5-tetraoxacyclononane
UN 2168	101	2,2-Di-(4,4-di-tert-butylperoxycyclohexyl)propane
UN 2169	101	n-Butyl peroxydicarbonate
UN 2170	101	n-Butyl peroxydicarbonate
UN 2171	101	Dicopropoxybenzene hydroperoxide
UN 2171	101	Dicopropoxybenzene hydroperoxide solution
UN 2172	101	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane
UN 2173	101	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane
UN 2174	101	2,5-Dimethyl-2,5-dihydroperoxy hexane
UN 2174	101	Dimethylhexane dihydroperoxide, (with 18% or more water)
UN 2175	101	Diethyl peroxydicarbonate
UN 2176	101	Di-n-propyl peroxydicarbonate
UN 2177	101	tert-Butyl peroxyneodecanoate
UN 2178	101	2,2-Dihydroperoxy propane
UN 2179	101	1,1-Di-(tert-butylperoxy)cyclohexane
UN 2179	102	1,1-Di-(tert-butylperoxy) cyclohexane
UN 2180	101	1,1-Di-(tert-butylperoxy)cyclohexane
UN 2180	102	1,1-Di-(tert-butylperoxy) cyclohexane
UN 2181	101	1,2-Di-(tert-butylperoxy)cyclohexane
UN 2182	101	Diisobutyryl peroxide
UN 2182	102	Isobutyryl peroxide
UN 2183	101	tert-Butyl peroxyisobutyrate
UN 2184	101	Ethyl-3,3-di-(tert-butylperoxy)butyrate
UN 2184	102	Ethyl-3,3-di-(tert-butylperoxy) butyrate
UN 2185	101	Ethyl-3,3-di-(tert-butylperoxy)butyrate
UN 2185	102	Ethyl-3,3-di-(tert-butylperoxy) butyrate
UN 2186	101	Hydrogen chloride, refrigerated liquid
UN 2187	101	Carbon dioxide, refrigerated liquid
UN 2187	102	Carbon dioxide, refrigerated liquid
UN 2188	101	Arsine
UN 2189	102	Dichlorosilane
UN 2190	102	Oxygen difluoride
UN 2191	101	Sulfuryl fluoride
UN 2191	102	Sulphuryl fluoride
UN 2192	101	Germane
UN 2193	102	Hexafluoroethane
UN 2194	102	Selenium hexafluoride
UN 2195	102	Tellurium hexafluoride
UN 2196	101	Tungsten hexafluoride
UN 2197	102	Hydrogen iodide, anhydrous
UN 2198	102	Phosphorus pentafluoride
UN 2199	101	Phosphine
UN 2200	102	Propadiene, inhibited
UN 2201	101	Nitrous oxide, refrigerated liquid
UN 2201	102	Nitrous oxide, refrigerated liquid
UN 2202	101	Hydrogen selenide
UN 2203	102	Silane
UN 2204	102	Carbonyl sulfide
UN 2205	102	Adiponitrile
UN 2206	102	Isocyanates, n.o.s. or isocyanate solutions, n.o.s
UN 2207	102	Isocyanates, n.o.s. or isocyanate solutions, n.o.s
UN 2208	101	Bleaching powder
UN 2208	102	Calcium hypochlorite mixtures, dry
UN 2209	101	Formaldehyde solution
UN 2209	102	Formaldehyde, solutions
UN 2210	102	Maneb, or maneb preparation(s)
NA 2210	101	Pesticide, water reactive
UN 2211	102	Plastics moulding materials evolving flammable vapours
UN 2212	102	Asbestos, blue
UN 2213	101	Paraformaldehyde
UN 2214	102	Phthalic anhydride
NA 2215	101	Maleic acid
UN 2215	101	Maleic anhydride
UN 2216	102	Fishmeal or fishscrap
NA 2216	101	Fish meal or fish scrap containing 6% to 12% water
UN 2217	102	Seed cake
UN 2218	101	Acrylic acid
UN 2218	102	Acrylic acid, inhibited
UN 2219	102	Allyl glycidyl ether
UN 2220	102	Aluminium alkyl halides

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2221	102	Aluminium alkyl halides
UN 2222	102	Anisole
UN 2224	101	Benzonitrile
UN 2225	102	Benzene sulphonyl chloride
UN 2226	102	Benzotrichloride
UN 2227	102	n-Butyl methacrylate
UN 2228	102	Butylphenols, liquid
UN 2229	102	Butylphenols, solid
UN 2232	102	Chloroacetaldehyde
UN 2233	102	p-Chloro-o-anisidine
UN 2234	102	Chlorobenzotrifluorides
UN 2235	102	p-Chlorobenzyl chloride
UN 2236	102	3-Chloro-4 methylphenyl isocyanate
UN 2237	102	Chloronitroanilines
UN 2238	102	Chlorotoluenes
UN 2239	102	Chlorotoluidines
UN 2240	102	Chromosulphuric acid
UN 2241	102	Cycloheptane
UN 2242	102	Cycloheptene
UN 2243	102	Cyclohexyl acetate
UN 2244	102	Cyclopentanol
UN 2245	102	Cyclopentanone
UN 2246	102	Cyclopentene
UN 2247	102	n-Decane
UN 2248	102	Di-(n-butyl)amine
UN 2249	102	Dichlorodimethyl ether, symmetrical
UN 2250	102	Dichlorophenyl isocyanates
UN 2252	102	1,2-Dimethoxyethane
UN 2253	102	N,N-Dimethylaniline
UN 2254	102	Matches
UN 2255	101	Organic peroxide, sample, n.o.s.
UN 2255	102	Organic peroxides, n.o.s., samples
UN 2256	102	Cyclohexene
UN 2257	102	Potassium metal
UN 2257	101	Potassium, metal or metallic
UN 2258	101	Propylenediamine
UN 2259	102	Triethylenetetramine
UN 2260	102	Tripropylamine
UN 2261	101	Xylenol
UN 2261	102	Xylenols
UN 2262	102	N,N-Dimethylcarbamoyl chloride
UN 2263	101	1,4-Dimethylcyclohexane
UN 2263	102	Dimethylcyclohexanes
UN 2264	102	N,N-Dimethylcyclohexylamine
UN 2265	102	N,N-Dimethylformamide
UN 2266	102	Dimethyl-N-propylamine
UN 2267	102	Dimethyl thiophosphoryl chloride
UN 2269	102	3,3-Iminobispropylamine
UN 2269	101	Iminobispropylamine
UN 2270	102	Ethylamine solution
UN 2271	102	Ethyl amyl ketone
UN 2272	102	N-Ethylaniline
UN 2273	102	2-Ethylaniline
UN 2274	102	N-Ethyl-n-benzylaniline
UN 2275	102	2-Ethylbutanol
UN 2276	102	2-Ethylhexylamine
UN 2277	102	Ethyl methacrylate, inhibited
UN 2278	102	n-Heptene
UN 2279	102	Hexachlorobutadiene
UN 2280	101	Hexamethylenediamine, solid
UN 2281	102	Hexamethylenediisocyanate
UN 2282	102	Hexanols
UN 2283	102	Isobutyl methacrylate
UN 2284	102	Isobutyronitrile
UN 2285	102	Isocyanatobenzotrifluorides
UN 2286	102	Pentamethylheptane
UN 2287	102	Isoheptene
UN 2288	102	Isohexene
UN 2289	102	Isophoronediamine
UN 2290	102	Isophorone diisocyanate
NA 2291	101	Lead chloride
UN 2291	102	Lead compounds, soluble, n.o.s.
NA 2291	101	Lead fluoborate
NA 2291	101	Lead sulfate
NA 2291	101	Lead sulfide
NA 2291	101	Lead thiocyanate
UN 2293	102	4-Methoxy-4-methylpentan-2-one
UN 2294	102	N-Methylaniline
UN 2295	102	Methyl chloroacetate
UN 2296	102	Methyl cyclohexane
UN 2296	101	Methylcyclohexane
UN 2297	102	Methyl cyclohexanone
UN 2298	101	Cyclopentrine, methyl
UN 2298	102	Methyl cyclopentane
UN 2298	101	Methylcyclopentane
UN 2299	101	Methyl dichloroacetate

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2300	102	2-Methyl-5-ethylpyridine
UN 2300	101	Methyl ethyl pyridine
UN 2301	102	2-Methylfuran
UN 2301	101	Methylfuran
UN 2302	102	5-Methylhexan-2-one
UN 2303	102	Isopropenylbenzene
UN 2304	102	Naphthalene, molten
UN 2305	102	Nitrobenzenesulphonic acid
UN 2306	102	Nitrobenzotrifluorides
UN 2307	102	3-Nitro-4-chlorobenzotrifluoride
UN 2308	102	Nitrosylsulphuric acid
UN 2309	102	Octadiene
UN 2310	102	2,4-Pentanedione
UN 2311	102	Phenetidines
UN 2312	102	Phenol, molten
UN 2313	102	Picolines
UN 2315	101	Polychlorinated biphenyls
UN 2316	102	Sodium cuprocyanide
UN 2317	102	Sodium cuprocyanide solution
UN 2318	101	Sodium hydrosulfide, solid
UN 2318	102	Sodium hydrosulphide
UN 2319	102	Terpene hydrocarbons, n.o.s.
UN 2320	102	Tetraethylenepentamine
UN 2321	102	Trichlorobenzenes
UN 2322	102	Trichlorobutene
UN 2323	102	Triethyl phosphite
UN 2324	102	Triisobutylene
UN 2325	102	1,3,5-Trimethylbenzene
UN 2326	102	Trimethylcyclohexylamine
UN 2327	102	Trimethylhexamethylene diamines
UN 2328	102	Trimethylhexamethylene diisocyanate
UN 2329	102	Trimethyl phosphite
UN 2330	102	Undecane
UN 2331	102	Zinc chloride, anhydrous
UN 2331	101	Zinc chloride, solid
UN 2332	102	Acetaldehyde oxime
UN 2333	102	Allyl acetate
UN 2334	102	Allylamine
UN 2335	102	Allyl ethyl ether
UN 2336	102	Allyl formate
UN 2337	101	Phenyl mercaptan
UN 2338	102	Benzotrifluoride
UN 2339	102	2-Bromobutane
UN 2340	102	2-Bromoethyl ethyl ether
UN 2341	102	1-Bromo-3-methylbutane
UN 2342	102	Bromomethylpropanes
UN 2343	102	2-Bromopentane
UN 2344	102	Bromopropanes
UN 2345	102	3-Bromopropyne
UN 2346	102	Butanedione
UN 2345	101	Diacetyl
UN 2347	101	Butyl mercaptan
UN 2348	102	Butylacrylate, inhibited
UN 2350	102	Butyl methyl ether
UN 2351	102	Butyl nitrite
UN 2352	102	Butyl vinyl ether
UN 2353	102	Butyryl chloride
UN 2354	102	Chloromethyl ethyl ether
UN 2356	102	2-Chloropropane
UN 2357	101	Cyclohexylamine
UN 2358	102	Cyclooctatetraene
UN 2359	102	Diallylamine
UN 2360	102	Diallylether
UN 2361	102	Diisobutylamine
UN 2362	102	1,1-Dichloroethane
UN 2363	101	Ethyl mercaptan
UN 2364	102	Propyl benzene
UN 2366	102	Diethyl carbonate
UN 2367	102	alpha-Methyl valeraldehyde
UN 2368	102	alpha-Pinene
UN 2368	101	Pinene
UN 2369	102	Ethylene glycol monobutyl ether
UN 2370	102	Hex-1-ene
UN 2371	102	Isopentenes
UN 2372	102	1,2-Di-(dimethylamino) ethane
UN 2373	102	Diethoxymethane
UN 2374	102	3,3-Diethoxypropene
UN 2375	102	Diethyl sulfide
UN 2376	102	2,3-Dihydropyran
UN 2376	101	Dihydropyran
UN 2377	102	1,1-Dimethoxyethane
UN 2378	102	2-Dimethylaminoacetonitrile
UN 2379	102	1,3-Dimethylbutylamine
UN 2380	102	Dimethyldiethoxysilane
UN 2381	102	Dimethyl disulfide
UN 2382	102	Dimethylhydrazine

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2383	102	Dipropylamine
UN 2384	102	Dipropyl ether
UN 2385	102	Ethylisobutyrate
UN 2386	102	1-Ethylpiperidine
UN 2387	102	Fluorobenzene
UN 2388	102	Fluorotoluenes
UN 2389	101	Furan
UN 2390	102	2-Iodobutane
UN 2391	102	Iodomethylpropanes
UN 2392	102	Iodopropanes
UN 2393	102	Isobutyl formate
UN 2394	102	Isobutyl propionate
UN 2395	102	Isobutyryl chloride
UN 2396	102	Methacraldehyde
UN 2397	102	3-Methyl butan-2-one
UN 2398	102	Methyl tert-butyl ether
UN 2399	102	1-Methylpiperidine
UN 2400	102	Methylvalerate
UN 2401	102	Piperidine
UN 2402	102	Propanethiols
UN 2403	102	Isopropenyl acetate
UN 2404	102	Propionitrile
UN 2405	102	Isopropyl butyrate
UN 2406	102	Isopropyl isobutyrate
UN 2407	102	Isopropyl chloroformate
UN 2409	102	Isopropyl propionate
UN 2410	102	1,2,3,6-Tetrahydropyridine
UN 2411	102	Butyronitrile
UN 2412	102	Tetrahydrothiophene
UN 2413	102	Tetrapropyl orthotitanate
UN 2414	102	Thiophene
UN 2416	102	Trimethyl borate
UN 2417	102	Carbonyl fluoride
UN 2418	102	Sulphur tetrafluoride
UN 2419	102	Bromotrifluoroethylene
UN 2420	102	Hexafluoroacetone
UN 2421	102	Nitrogen trioxide
UN 2422	102	Octafluorobut-2-ene
NA 2422	101	Perfluoro-2-butene
UN 2424	102	Octafluoropropane
UN 2426	101	Ammonium nitrate, solution
UN 2427	102	Potassium chlorate
UN 2428	102	Sodium chlorate
UN 2429	102	Calcium chlorate
UN 2430	102	Alkyl phenols, n.o.s.
UN 2431	102	o-Anisidine
UN 2432	102	N,N-Diethylaniline
UN 2433	102	Chloro-o-nitrotoluene
UN 2434	102	Dibenzyldichlorosilane
UN 2435	101	Ethyl phenyl dichlorosilane
UN 2435	102	Ethylphenyldichlorosilane
UN 2436	102	Thioacetic acid
UN 2437	102	Methylphenyldichlorosilane
UN 2438	101	Trimethylacetyl chloride
UN 2439	101	Sodium bifluoride, solid
UN 2439	101	Sodium bifluoride, solution
UN 2439	102	Sodium hydrogen fluoride
UN 2440	102	Stannic chloride pentahydrate
UN 2441	102	Titanium trichloride, pyrophoric or Titanium trichloride mixtures, pyrophoric
UN 2442	102	Trichloroacetyl chloride
UN 2443	102	Vanadium oxytrichloride
UN 2443	101	Vanadium oxytrichloride
NA 2443	101	Vanadium oxytrichloride and titanium tetrachloride mixture
UN 2444	101	Vanadium tetrachloride
UN 2445	102	Lithium alkyls
UN 2446	102	Nitrocresols
UN 2447	102	Phosphorus, white, molten
UN 2448	102	Sulphur, molten
NA 2449	101	Ammonium oxalate
NA 2449	101	Cupric oxalate
UN 2449	102	Oxalates
UN 2451	101	Nitrogen trifluoride
UN 2452	102	Ethyl acetylene, inhibited
UN 2453	102	Ethyl fluoride
UN 2454	102	Methyl fluoride
UN 2456	101	2-Chloropropene
UN 2457	101	2,3-Dimethylbutane
UN 2458	101	Hexadiene
UN 2459	102	2-Methyl-1-butene
UN 2460	102	2-Methyl-2-butene
UN 2460	101	Methyl butene
UN 2461	101	Methylpentadiene
UN 2462	101	Methyl pentane

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2462	102	Methylpentanes
UN 2463	102	Aluminium hydride
UN 2463	101	Aluminum hydride
UN 2464	101	Beryllium nitrate
UN 2465	102	Dichloroisocyanuric acid, dry or Dichloroisocyanuric acid salts
NA 2465	101	Potassium dichloro-s-triazinetrione
UN 2465	101	Sodium dichloro-s-triazinetrione
UN 2466	101	Potassium superoxide
UN 2467	102	Sodium percarbonates
NA 2468	101	(mono-(Trichloro) tetra (monopotassium dichloro) penta-s-triazinetrione, dry
UN 2468	102	Trichloroisocyanuric acid, dry
UN 2468	101	Trichloro-s-triazinetrione
UN 2469	102	Zinc bromate
UN 2470	102	Phenylacetonitrile, liquid
UN 2471	102	Osmium tetroxide
UN 2472	102	Pindone
UN 2473	102	Sodium arsanilate
UN 2474	101	Thiophosgene
UN 2475	102	Vanadium trichloride
UN 2477	102	Methyl isothiocyanate
UN 2478	102	Isocyanates, n.o.s. or Isocyanate solutions, n.o.s.
UN 2480	101	Methyl isocyanate
UN 2480	102	Methyl isocyanate or Methyl isocyanate solutions
UN 2481	102	Ethyl isocyanate
UN 2482	102	n-Propyl isocyanate
UN 2483	102	Isopropyl isocyanate
UN 2484	102	tert-Butyl isocyanate
UN 2485	101	n-Butyl isocyanate
UN 2486	102	Isobutyl isocyanate
UN 2487	102	Phenyl isocyanate
UN 2488	102	Cyclohexyl isocyanate
UN 2489	102	Diphenylmethane-4,4-diisocyanate
UN 2490	101	Dichloroisopropyl ether
UN 2491	102	Ethanolamine or Ethanolamine solutions
UN 2491	101	Monoethanolamine
UN 2493	101	Hexamethylenediamine
UN 2495	101	Iodine pentafluoride
UN 2496	101	Propionic anhydride
UN 2497	101	Sodium phenolate, solid
UN 2498	101	1,2,3,6-Tetrahydrobenzaldehyde
UN 2501	101	Tris-(1-aziridinyl) phosphine oxide
UN 2501	102	Tris-(1-aziridinyl)phosphine oxide, solution
UN 2502	101	Valeryl chloride
UN 2502	102	Valeryl chlorides
UN 2503	102	Zirconium tetrachloride
UN 2503	101	Zirconium tetrachloride, solid
UN 2504	101	Acetylene tetrabromide
UN 2504	102	Tetrabromoethane
UN 2505	101	Ammonium fluoride
UN 2506	101	Ammonium hydrogen sulfate
UN 2506	102	Ammonium hydrogen sulphate
UN 2507	101	Chloroplatinic acid, solid
UN 2508	101	Molybdenum pentachloride
UN 2509	101	Potassium hydrogen sulfate, solid
UN 2509	102	Potassium hydrogen sulphate
UN 2511	102	Chloropropionic acid
UN 2512	102	Aminophenols
UN 2513	102	Bromoacetyl bromide
UN 2514	101	Bromobenzene
UN 2515	102	Bromoform
UN 2516	102	Carbon tetrabromide
UN 2517	101	Chlorodifluoroethane
UN 2517	102	Chlorodifluoroethanes
UN 2518	102	1,5,9-Cyclododecatriene
UN 2520	102	Cyclooctadienes
UN 2521	102	Diketene, inhibited
UN 2522	102	Dimethylaminoethyl methacrylate
UN 2524	102	Ethyl orthoformate
UN 2525	102	Ethyl oxalate
UN 2526	102	Furfurylamine
UN 2527	102	Isobutyl acrylate
UN 2528	102	Isobutyl isobutyrate
UN 2529	101	Isobutyric acid
UN 2530	101	Isobutyric anhydride
UN 2531	102	Methacrylic acid, inhibited
UN 2533	102	Methyl trichloroacetate
UN 2534	102	Methyl chlorosilane
UN 2535	102	Methylmorpholine
UN 2536	102	Methyltetrahydrofuran

For explanation of abbreviations and reference marks, see last page of this tariff.

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2538	102	Nitronaphthalene
UN 2541	102	Terpinolene
UN 2542	102	Tributylamine
UN 2545	102	Hafnium
UN 2545	101	Hafnium metal, dry
UN 2546	102	Titanium
UN 2546	101	Titanium metal powder, dry or wet
UN 2547	101	Sodium superoxide
UN 2548	102	Chlorine pentafluoride
UN 2550	102	Ethyl methyl ketone peroxide(s)
UN 2550	101	Methyl ethyl ketone peroxide
UN 2551	102	tert-Butyl peroxydiethylacetate
UN 2551	101	tert-Butyl peroxydiethylacetate, with tert-Butyl peroxybenzoate
UN 2552	102	Hexafluoroacetone hydrate
UN 2553	102	Coal tar naphtha
NA 2553	101	Coal tar naphtha
UN 2553	101	Naphtha
UN 2554	102	Methyl allyl chloride
UN 2555	102	Nitrocellulose
NA 2555	101	Nitrocellulose, colloided, granular or flake, wet with not less than 25% water
NA 2555	101	Nitrocellulose, wet with not less than 20% water
(UN 2556)	102	Nitrocellulose
UN 2556	102	Nitrocellulose
NA 2556	101	Nitrocellulose, wet with not less than 30% alcohol or solvent
NA 2557	101	Lacquer base, or Lacquer chips, dry
UN 2557	102	Nitrocellulose
UN 2558	102	Epibromohydrin
UN 2560	102	2-Methylpentan-2-ol
UN 2561	102	3-Methyl-1-butene
UN 2562	101	tert-Butyl peroxyisobutyrate
UN 2564	102	Trichloroacetic acid
UN 2564	101	Trichloroacetic acid solution
UN 2565	102	Dicyclohexylamine
UN 2567	101	Sodium pentachlorophenate
NA 2570	101	Cadmium acetate
NA 2570	101	Cadmium bromide
NA 2570	101	Cadmium chloride
UN 2570	102	Cadmium compounds
UN 2571	102	Ethylsulphuric acid
UN 2572	102	Phenylhydrazine
UN 2573	102	Thallium chlorate
UN 2574	102	Tricresylphosphate
UN 2576	102	Phosphorus oxybromide, molten
UN 2577	102	Phenylacetyl chloride
UN 2578	102	Phosphorus trioxide
UN 2579	102	Piperazine
UN 2580	102	Aluminium bromide solution
UN 2581	102	Aluminium chloride solution
UN 2582	101	Ferric chloride solution
UN 2582	102	Ferric chloride, solution
UN 2583	102	Alkyl, Aryl or Toluene sulphonic acid, solid
UN 2584	101	Alkanesulfonic acid
UN 2584	102	Alkyl, Aryl or Toluene sulphonic acid, liquid
NA 2584	101	Dodecylbenzenesulfonic acid
UN 2584	101	Toluene sulfonic acid, liquid
UN 2585	102	Alkyl, Aryl or Toluene sulphonic acid, solid
UN 2586	102	Alkyl, Aryl or Toluene sulphonic acid, liquid
UN 2587	102	Benzoquinone
NA 2588	101	Insecticide, dry, n.o.s.
UN 2588	102	Pesticides, solid, toxic, n.o.s.
UN 2589	102	Vinyl chloroacetate
UN 2590	102	Asbestos, white
UN 2591	102	Xenon, refrigerated liquid
UN 2592	101	Distearyl peroxydicarbonate
UN 2592	102	Distearylperoxydicarbonate
UN 2593	101	Di-(2-methylbenzoyl)peroxide
UN 2594	101	tert-Butyl peroxyneodecanoate
UN 2595	101	Dimyristyl peroxydicarbonate
UN 2595	102	Dimyristylperoxydicarbonate
UN 2596	101	3-tert-Butyl peroxy-3-phenylphthalide
UN 2596	102	3-tert-Butylperoxy-3-phenyl phthalide
UN 2597	101	Di-(3,5,5-trimethyl-1,2-dioxolanyl-3)peroxide
UN 2598	102	Ethyl-3,3-di(tert-butylperoxy)butyrate
UN 2598	101	Ethyl-3,3-di-(tert-butylperoxy)butyrate
UN 2599	102	Chlorotrifluoromethane and trifluoromethane azeotropic mixture
UN 2600	102	Carbon monoxide and hydrogen mixture
UN 2601	102	Cyclobutane
UN 2602	102	Dichlorodifluoromethane and difluoroethane, azeotropic mixture
UN 2603	102	Cycloheptatriene
UN 2604	102	Boron trifluoride diethyletherate
UN 2605	102	Methoxymethyl isocyanate
UN 2606	102	Methyl orthosilicate
UN 2607	102	Acrolein dimer
UN 2608	102	Nitropropanes
UN 2609	102	Triallyl borate
UN 2610	102	Triallylamine
UN 2611	102	Propylene chlorohydrin
UN 2612	102	Methyl propyl ether
UN 2614	102	Methallyl alcohol
UN 2615	102	Ethyl propyl ether
UN 2616	102	Triisopropyl borate
UN 2617	102	Methyl cyclohexanol
UN 2618	102	Vinyl toluenes
UN 2619	102	Benzyl dimethylamine
UN 2620	102	Amyl butyrates
UN 2621	102	Acetyl methyl carbinol
UN 2622	102	Glycidaldehyde
UN 2623	102	Firelighters
UN 2624	102	Magnesium silicide
NA 2626	101	Chloric acid
UN 2626	102	Chloric acid solution
UN 2627	102	Nitrites, inorganic, n.o.s.
UN 2628	102	Potassium fluoroacetate
UN 2629	102	Sodium fluoroacetate
UN 2630	102	Selenates, n.o.s. or Selenites, n.o.s.
UN 2630	101	Sodium selenite
UN 2642	102	Fluoroacetic acid
UN 2643	102	Methyl bromoacetate
UN 2644	102	Methyl iodide
UN 2645	102	Phenacyl bromide
UN 2646	101	Hexachlorocyclopentadiene
UN 2647	102	Malononitrile
UN 2648	102	1,2-Dibromobutan-3-one
UN 2649	102	1,3-Dichloroacetone
UN 2650	102	1,1-Dichloro-1-nitroethane
UN 2651	102	4,4-Diaminodiphenyl methane
UN 2653	102	Benzyl iodide
UN 2655	102	Potassium fluorosilicate
UN 2656	101	Quinoline
UN 2657	102	Selenium disulphide
UN 2658	102	Selenium
UN 2659	102	Sodium chloroacetate
UN 2660	102	Nitrotoluidines
UN 2661	102	Hexachloroacetone
UN 2662	102	Hydroquinone
UN 2664	102	Dibromomethane
UN 2666	102	Ethyl cyanoacetate
UN 2667	102	Butyl toluenes
UN 2668	102	Chloroacetonitrile
UN 2669	102	Chlorocresols
UN 2670	102	Cyanuric chloride
UN 2671	102	Aminopyridines
UN 2672	102	Ammonia solutions
NA 2672	101	Ammonium hydroxide
UN 2673	102	2-Amino-4-chlorophenol
UN 2674	102	Sodium fluorosilicate
UN 2676	102	Stibine
UN 2677	102	Rubidium hydroxide, solution
UN 2678	102	Rubidium hydroxide, solid
UN 2679	102	Lithium hydroxide, solution
UN 2680	102	Lithium hydroxide monohydrate
UN 2681	102	Caesium hydroxide, solution
UN 2682	102	Caesium hydroxide, solid
NA 2683	101	Ammonium hydrosulfide solution
UN 2683	101	Ammonium sulfide solution
UN 2683	102	Ammonium sulphide, solution
UN 2684	102	3-(Diethylamino) propylamine
UN 2685	102	N,N-Diethylethylene diamine
UN 2686	102	Diethylaminoethanol
UN 2687	102	Dicyclohexylammonium nitrite
UN 2688	102	1-Chloro-3-bromopropane
UN 2689	102	Glycerol-alpha-monochlorohydrin
UN 2690	102	N-n-Butyl imidazole
UN 2691	102	Phosphorus pentabromide
UN 2692	101	Boron tribromide
NA 2693	101	Ammonium bisulfite, solid
NA 2693	101	Ammonium bisulfite solution
UN 2693	102	Bisulphites, inorganic, aqueous solution, n.o.s.
NA 2693	101	Calcium hydrogen sulfite solution
NA 2693	101	Potassium metabisulfite
NA 2693	101	Sodium hydrogen sulfite, solid
NA 2693	101	Sodium hydrogen sulfite, solution
NA 2693	101	Sodium metabisulfite
UN 2698	102	Tetrahydrophthalic anhydrides
UN 2699	102	Trifluoroacetic acid
UN 2703	101	Isopropyl mercaptan
UN 2704	101	Propyl mercaptan
UN 2705	102	1-Pentol
UN 2706	102	Diethylcarbinol
UN 2707	102	Dimethyldioxanes
UN 2708	102	Butoxyl
UN 2709	102	Butyl benzenes
UN 2710	102	Dipropyl ketone
UN 2711	102	Dibromobenzene
UN 2713	102	Acridine
UN 2714	102	Zinc resinate
UN 2715	102	Aluminium resinate
UN 2716	102	1,4-Butynediol
UN 2717	102	Camphor
UN 2718	102	Tripropylaluminium
UN 2719	102	Barium bromate
UN 2720	102	Chromium nitrate
UN 2721	102	Copper chlorate
UN 2722	102	Lithium nitrate
UN 2723	102	Magnesium chlorate
UN 2724	102	Manganese nitrate
UN 2725	101	Nickel nitrate
UN 2726	102	Nickel nitrite
UN 2727	102	Thallium nitrate
UN 2728	101	Zirconium nitrate
UN 2729	102	Hexachlorobenzene
UN 2730	102	Nitroanisoles
UN 2732	102	Nitrobromobenzenes
UN 2733	102	Alkylamines and polyamines
UN 2734	102	Alkylamines and polyamines
UN 2735	102	Alkylamines and polyamines
UN 2738	102	N-n-Butylaniline
UN 2739	102	Butyric anhydride
UN 2740	102	n-Propyl chloroformate
UN 2741	102	Barium hypochlorite
UN 2742	102	Chloroformates, n.o.s.
UN 2743	102	n-Butylchloroformate
UN 2744	102	Cyclobutylchloroformate
UN 2745	102	Chloromethylchloroformate
UN 2746	102	Phenylchloroformate
UN 2747	102	tert-Butylcyclohexylchloroformate
UN 2748	102	2-Ethylhexylchloroformate
UN 2749	102	Tetramethylsilane
UN 2750	102	1,3-Dichloropropanol-2
UN 2751	102	Diethylthiophosphoryl chloride
UN 2752	102	1,2-Epoxy-3-ethoxy propane
UN 2753	102	N-ethylbenzyltoluidines
UN 2754	102	N-Ethyltoluidines
UN 2755	101	3-Chloroperoxybenzoic acid
UN 2756	101	Organic peroxide, mixture
UN 2756	102	Organic peroxides, mixture
UN 2757	101	Carbamate pesticide, liquid, n.o.s.
UN 2757	101	Carbamate pesticide, solid, n.o.s.
UN 2757	102	Carbamate pesticides, solid, toxic, n.o.s.
NA 2757	101	Carbaryl
NA 2757	101	Carbofuran
NA 2757	101	Carbofuran mixture, liquid
NA 2757	101	Mercaptodimethur
NA 2757	101	Mexacarbate
UN 2758	101	Carbamate pesticide, liquid, n.o.s.
UN 2758	102	Carbamate pesticides, liquid, flammable, toxic, n.o.s.
UN 2759	101	Arsenical pesticide, liquid, n.o.s.
UN 2759	101	Arsenical pesticide, solid, n.o.s.
UN 2759	102	Arsenical pesticides, solid, toxic, n.o.s.
NA 2759	101	Bordeaux arsenite, liquid
NA 2759	101	Bordeaux arsenite, solid
UN 2760	101	Arsenical pesticide, liquid, n.o.s.
UN 2760	102	Arsenical pesticides, liquid, flammable, toxic, n.o.s.
NA 2761	101	Aldrin
NA 2761	101	Aldrin, cast solid
NA 2761	101	Aldrin mixture, dry
NA 2761	101	Aldrin mixture, dry, with 65% or less aldrin
NA 2761	101	DDT or Dichlorodiphenyltrichloroethane
NA 2761	101	Dichlone

Appendix A—Identification Number Cross Reference to Proper Shipping Names In § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 2761	101	Dieldrin
NA 2761	101	Endosulfan
NA 2761	101	Endosulfan mixture, liquid
NA 2761	101	Endrin
NA 2761	101	Endrin mixture, liquid
NA 2761	101	Heptachlor
NA 2761	101	Kelthane
NA 2761	101	Kepone
NA 2761	101	Lindane
NA 2761	101	Methoxychlor
UN 2761	101	Organochlorine pesticide, liquid, n.o.s.
UN 2761	101	Organochlorine pesticide, solid, n.o.s.
UN 2761	102	Organochlorine pesticides, solid, toxic, n.o.s.
NA 2761	101	TDE
NA 2761	101	Toxaphene
NA 2762	101	Aldrin mixture, liquid
NA 2762	101	Aldrin mixture, liquid, with 60% or less aldrin
NA 2762	101	Chlordane, liquid
UN 2762	101	Organochlorine pesticide, liquid, n.o.s.
UN 2762	102	Organochlorine pesticides, liquid, flammable, toxic, n.o.s.
UN 2763	101	Triazine pesticide, liquid, n.o.s.
UN 2763	101	Triazine pesticide, solid, n.o.s.
UN 2763	102	Triazine pesticides, solid, toxic, n.o.s.
UN 2764	101	Triazine pesticide, liquid, n.o.s.
UN 2764	102	Triazine pesticides, liquid, flammable, toxic, n.o.s.
NA 2765	101	2,4,5-Trichlorophenoxyacetic acid
NA 2765	101	2,4,5-Trichlorophenoxyacetic acid amine, ester, or salt
NA 2765	101	2,4,5-Trichlorophenoxypropionic acid
NA 2765	101	2,4,5-Trichlorophenoxypropionic acid ester
NA 2765	101	2,4-Dichlorophenoxyacetic acid
NA 2765	101	2,4-Dichlorophenoxyacetic acid ester
UN 2765	102	Phenoxy pesticides, solid, toxic, n.o.s.
UN 2765	101	Phenoxy pesticide, liquid, n.o.s.
UN 2765	101	Phenoxy pesticide, solid, n.o.s.
NA 2765	101	Propargite
UN 2766	101	Phenoxy pesticide, liquid, n.o.s.
UN 2766	102	Phenoxy pesticides, liquid, flammable, toxic, n.o.s.
NA 2767	101	Diuron
UN 2767	101	Phenylurea pesticide, liquid, n.o.s.
UN 2767	101	Phenylurea pesticide, solid, n.o.s.
UN 2767	102	Phenyl urea pesticides, solid, toxic, n.o.s.
UN 2768	101	Phenylurea pesticide, liquid, n.o.s.
UN 2768	102	Phenyl urea pesticides, liquid, flammable, toxic, n.o.s.
UN 2769	101	Benzoic derivative pesticide, liquid, n.o.s.
UN 2769	101	Benzoic derivative pesticide, solid, n.o.s.
UN 2769	102	Benzoic derivative pesticides, solid, toxic, n.o.s.
NA 2769	101	Dicamba
NA 2769	101	Dichlobenil
UN 2770	101	Benzoic derivative pesticide, liquid, n.o.s.
UN 2770	102	Benzoic derivative pesticides, liquid, flammable, toxic, n.o.s.
UN 2771	101	Dithiocarbamate pesticide, liquid, n.o.s.
UN 2771	101	Dithiocarbamate pesticide, solid, n.o.s.
UN 2771	102	Dithiocarbamate pesticides, solid, toxic, n.o.s.
NA 2771	101	Thiram
UN 2772	101	Dithiocarbamate pesticide, liquid, n.o.s.
UN 2772	102	Dithiocarbamate pesticides, liquid, flammable, toxic, n.o.s.
UN 2773	101	Phthalimide derivative pesticide, liquid, n.o.s.
UN 2773	101	Phthalimide derivative pesticide, solid, n.o.s.
UN 2773	102	Phthalimide derivative pesticides, solid, toxic, n.o.s.
UN 2774	101	Phthalimide derivative pesticide, liquid, n.o.s.
UN 2774	102	Phthalimide derivative pesticides, liquid, flammable, toxic, n.o.s.
UN 2775	101	Copper based pesticide, liquid, n.o.s.
UN 2775	101	Copper based pesticide, solid, n.o.s.
UN 2775	102	Copper based pesticides, solid, toxic, n.o.s.
UN 2776	101	Copper based pesticide, liquid, n.o.s.
UN 2776	102	Copper based pesticides, liquid, flammable, toxic, n.o.s.
UN 2777	101	Mercury based pesticide, liquid, n.o.s.
UN 2777	101	Mercury based pesticide, solid, n.o.s.
UN 2777	102	Mercury based pesticides, solid, toxic, n.o.s.
UN 2778	101	Mercury based pesticide, liquid, n.o.s.
UN 2778	102	Mercury based pesticides, liquid, flammable, toxic, n.o.s.
UN 2779	101	Substituted nitrophenol pesticide, liquid, n.o.s.
UN 2779	101	Substituted nitrophenol pesticide, solid, n.o.s.
UN 2779	102	Substituted nitrophenol pesticides, solid, toxic, n.o.s.
UN 2780	101	Substituted nitrophenol pesticide, liquid, n.o.s.
UN 2780	102	Substituted nitrophenol pesticides, liquid, flammable, toxic, n.o.s.
UN 2781	101	Bipyridilium pesticide, liquid, n.o.s.
UN 2781	101	Bipyridilium pesticide, solid, n.o.s.
UN 2781	102	Bipyridilium pesticides, solid, toxic, n.o.s.
NA 2781	101	Diquat
UN 2782	101	Bipyridilium pesticide, liquid, n.o.s.
UN 2782	102	Bipyridilium pesticides, liquid, flammable, toxic, n.o.s.
NA 2783	101	Azinphos methyl
NA 2783	101	Azinphos methyl mixture, liquid
NA 2783	101	Chlorpyrifos
NA 2783	101	Coumaphos
NA 2783	101	Coumaphos mixture, liquid
NA 2783	101	Diazinon
NA 2783	101	Dichlorvos
NA 2783	101	Dichlorvos mixture, dry
NA 2783	101	Disulfoton
NA 2783	101	Disulfoton mixture, dry
NA 2783	101	Disulfoton mixture, liquid
NA 2783	101	Ethion
NA 2783	101	Ethion mixture, dry
NA 2783	101	Hexaethyl tetraphosphate mixture, dry
NA 2783	101	Hexaethyl tetraphosphate mixture, liquid
UN 2783	101	Hexaethyl tetraphosphate mixture, liquid
NA 2783	101	Malathion
NA 2783	101	Methyl parathion, liquid
NA 2783	101	Methyl parathion mixture, dry
NA 2783	101	Methyl parathion mixture, liquid
NA 2783	101	Methyl parathion mixture, liquid, (containing 25% or less methyl parathion)
NA 2783	101	Mevinphos
NA 2783	101	Mevinphos mixture, dry
NA 2783	101	Mevinphos mixture, liquid
UN 2783	101	Migafox
NA 2783	101	Naled
NA 2783	101	Organic phosphate mixture, Organic phosphate compound mixture, or Organic phosphorus compound mixture, liquid
NA 2783	101	Organic phosphate mixture, Organic phosphate compound mixture, or Organic phosphorus compound mixture, solid or dry
NA 2783	101	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound, liquid
NA 2783	101	Organic phosphate, Organic phosphate compound, or Organic phosphorus compound, solid or dry
UN 2783	101	Organophosphorus pesticide, liquid, n.o.s.
UN 2783	101	Organophosphorus pesticide, solid, n.o.s.
UN 2783	102	Organophosphorus pesticides solid, toxic, n.o.s.
NA 2783	101	Parathion, liquid
NA 2783	101	Parathion mixture, dry
NA 2783	101	Parathion mixture, liquid
NA 2783	101	Phencapton
NA 2783	101	Tetraethyl pyrophosphate, liquid
NA 2783	101	Tetraethyl pyrophosphate mixture, dry
NA 2783	101	Tetraethyl pyrophosphate mixture, liquid
NA 2783	101	Trichlorfon
UN 2784	101	Organophosphorus pesticide, liquid, n.o.s.
UN 2784	102	Organophosphorus pesticides, liquid, flammable, toxic, n.o.s.
UN 2785	102	4 Thiapentanal
UN 2786	101	Organotin pesticide, liquid, n.o.s.
UN 2786	101	Organotin pesticide, solid, n.o.s.
UN 2786	102	Organotin pesticides, solid, toxic, n.o.s.
UN 2787	101	Organotin pesticide, liquid, n.o.s.
UN 2787	102	Organotin pesticides, liquid, flammable, toxic, n.o.s.
UN 2788	102	Organotin compounds, n.o.s.
UN 2789	101	Acetic acid, glacial
UN 2789	102	Acetic acid, glacial or Acetic acid solution
UN 2790	101	Acetic acid
UN 2790	102	Acetic acid solution
NA 2791	101	Aircraft rocket engine
UN 2791	102	Aircraft thrust device
UN 2792	101	Aircraft rocket engine igniter
UN 2792	102	Igniter for aircraft thrust device
UN 2793	102	Ferrous metal borings, shavings, turnings, or cuttings
UN 2793	101	Metal borings, shavings, turnings, or cuttings
UN 2794	102	Batteries, wet, filled with acid
NA 2794	101	Battery
UN 2794	101	Battery
UN 2795	102	Batteries, wet, filled with alkali
NA 2795	101	Battery
UN 2795	101	Battery
UN 2796	101	Battery fluid, acid
NA 2796	101	Battery fluid, acid, with battery
NA 2796	101	Battery fluid, acid, with electronic equipment or actuating device
UN 2796	102	Sulphuric acid
UN 2797	101	Battery fluid, alkali
UN 2797	101	Battery fluid, alkali, with battery
NA 2797	101	Battery fluid, alkali, with electronic equipment or actuating device
UN 2798	101	Benzene phosphorus dichloride
UN 2798	102	Phenyl phosphorus dichloride
UN 2799	101	Benzene phosphorus thiodichloride
UN 2799	102	Phenyl phosphorus thiodichloride
UN 2800	102	Batteries, wet, non-spillable
NA 2801	101	Coal tar dye, liquid
UN 2801	101	Dye intermediate, liquid
UN 2801	102	Dyes, n.o.s. or Dye intermediates, n.o.s.
UN 2802	101	Copper chloride
UN 2803	102	Gallium
UN 2803	101	Gallium metal, liquid
UN 2803	101	Gallium metal, solid
UN 2805	102	Lithium hydride, fused solid
UN 2805	101	Lithium hydride in fused solid form
UN 2806	101	Lithium nitride
UN 2807	101	Magnetized material
UN 2809	102	Mercury
NA 2809	101	Mercury, metallic
NA 2810	101	Arsenious and mercuric iodide solution
NA 2810	101	Compound, tree or weed killing, liquid
NA 2810	101	Drugs, liquid, n.o.s.
UN 2810	101	Poisonous liquid, n.o.s. or Poison B, liquid, n.o.s.
UN 2810	102	Poisonous liquids, n.o.s.
NA 2811	101	Drugs, solid, n.o.s.
NA 2811	101	Flue dust, poisonous
NA 2811	101	Lead fluoride
NA 2811	101	Lead iodide
NA 2811	101	Lead stearate
UN 2811	101	Poisonous solid, n.o.s. or Poison B, solid, n.o.s.
UN 2811	102	Poisonous solids, n.o.s.
NA 2811	101	Selenium oxide
UN 2812	101	Sodium aluminate, solid
NA 2813	101	Lithium acetylide ethylene diamine complex
UN 2813	102	Substances which, in contact with water, emit flammable gases, n.o.s.
UN 2813	101	Water reactive solid, n.o.s.
NA 2814	101	Etiologic agent, n.o.s.
UN 2814	101	Infectious substance, human, n.o.s.
UN 2815	101	N Aminoethylpiperazine
UN 2817	101	Ammonium hydrogen fluoride solution
UN 2817	102	Ammonium hydrogen fluoride, solution

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2818	101	Ammonium polysulfide solution
UN 2818	102	Ammonium polysulphide, solution
UN 2819	101	Amyl acid phosphate
UN 2820	101	Butyric acid
UN 2820	102	n-Butyric acid
NA 2821	101	Phenol, liquid or solution
UN 2821	102	Phenol solutions
UN 2822	102	2-Chloropyridine
UN 2823	101	Crotonic acid
UN 2825	102	N,N-Diisopropyl ethanolamine
UN 2826	101	Ethyl chlorothioformate
UN 2830	101	Lithium ferrosilicon
UN 2831	101	1,1,1-Trichloroethane
UN 2831	102	1,1,1,-Trichloroethane
UN 2834	102	Phosphorous acid, ortho
UN 2835	102	Sodium aluminium hydride
UN 2835	101	Sodium aluminum hydride
UN 2837	101	Sodium hydrogen sulfate solution
UN 2837	102	Sodium hydrogen sulphate, solution
UN 2838	102	Vinyl butyrate, inhibited
UN 2839	102	Aldol
UN 2840	102	Butyraldoxime
UN 2841	102	Di-n-amylamine
UN 2842	102	Nitroethane
UN 2844	102	Calcium manganese silicon
UN 2845	101	Pyrophoric liquid, n.o.s. or Pyrophoric liquid, n.o.s.
UN 2845	102	Pyrophoric liquids, n.o.s.
UN 2846	102	Pyrophoric solids, n.o.s.
UN 2849	102	3-Chloropropanol-1
UN 2850	102	Propylene tetramer
UN 2851	102	Boron trifluoride dihydrate
UN 2852	102	Dipicryl sulphide, wetted
UN 2853	102	Magnesium silicofluoride
UN 2854	101	Ammonium silicofluoride
UN 2855	101	Zinc silicofluoride
UN 2856	102	Silicofluorides, n.o.s.
UN 2857	101	Refrigerating machine
UN 2857	102	Refrigerating machines
UN 2858	102	Zirconium
UN 2859	102	Ammonium metavanadate
UN 2860	102	Vanadium trioxide
UN 2861	102	Ammonium polyvanadate
UN 2862	101	Vanadium pentoxide
UN 2863	102	Sodium ammonium vanadate
UN 2864	102	Potassium metavanadate
UN 2865	102	Hydroxylamine sulphate
UN 2867	101	Ink
UN 2868	101	Resin solution
UN 2869	102	Titanium trichloride mixtures
UN 2870	102	Aluminium borohydride or Aluminium borohydride in devices
UN 2871	102	Antimony powder
UN 2872	102	1,2-Dibromo-3-chloropropane
UN 2873	102	N,N-Di-n-butylaminoethanol
UN 2874	102	Furfuryl alcohol
UN 2875	102	Hexachlorophene
UN 2876	101	Resorcinol
UN 2877	102	Thiourea
UN 2878	102	Titanium sponge granules or Titanium sponge powders
UN 2879	102	Selenium oxychloride
UN 2880	102	Calcium hypochlorite, hydrated or Calcium hypochlorite, hydrated mixtures
UN 2880	101	Calcium hypochlorite, hydrated
UN 2881	102	Nickel catalyst, dry
UN 2883	101	2,2-Di-(tert-butylperoxy)propane
UN 2883	102	2,2-Di-(tert-butylperoxy) propane
UN 2884	101	2,2-Di-(tert-butylperoxy)propane
UN 2884	102	2,2-Di-(tert-butylperoxy) propane
UN 2885	101	1,1-Di-(tert-butylperoxy)cyclohexane
UN 2885	102	1,1-Di-(tert-butylperoxy) cyclohexane
UN 2886	102	tert-Butyl peroxy-2-ethylhexanoate
UN 2886	101	tert-Butyl peroxy-2-ethylhexanoate, with 2,2-Di-(tert-butylperoxy)butane
UN 2887	101	tert-Butyl peroxy-2-ethylhexanoate
UN 2888	101	tert-Butyl peroxy-2-ethylhexanoate
UN 2889	102	Disotridecyl peroxydicarbonate
UN 2889	101	Disotridecyl peroxydicarbonate
UN 2890	101	tert-Butyl peroxybenzoate
UN 2891	102	tert-Amyl peroxyneodecanoate
UN 2891	101	tert- Amyl peroxyneodecanoate
UN 2892	101	Dimyristyl peroxydicarbonate
UN 2892	102	Dimyristylperoxydicarbonate
UN 2893	102	Diiauroyl peroxide
UN 2893	101	Lauroyl peroxide

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2894	101	Di-[4-tert-butylcyclohexyl]peroxydicarbonate
UN 2894	102	Di-(4 tert-butylcyclohexyl) peroxydicarbonate
UN 2895	101	Decanyl peroxydicarbonate
UN 2895	102	Decanyl peroxydicarbonate
UN 2896	101	Cyclohexanone peroxide
UN 2896	102	Cyclohexanone peroxides
UN 2897	101	1,1-Di-(tert-butylperoxy)cyclohexane
UN 2897	102	1,1-Di-(tert-butylperoxy) cyclohexane
UN 2898	101	tert Amyl peroxy-2-ethylhexanoate
UN 2899	102	Organic peroxides, n.o.s., trial quantities
UN 2899	101	Organic peroxide, trial quantity, n.o.s.
UN 2901	102	Bromine chloride
NA 2902	101	Aletrin
NA 2902	101	Insecticide, liquid, n.o.s.
UN 2902	102	Pesticides, liquid, toxic, n.o.s.
UN 2903	102	Pesticides, liquid, toxic, flammable, n.o.s.
UN 2904	102	Chlorophenates, liquid
UN 2905	102	Chlorophenates, solid
UN 2906	102	Trisisocyanatoisocyanurate of isophoronediisocyanate, solution
UN 2907	102	Isosorbide dinitrate mixture
UN 2908	101	Radioactive material, empty packages
UN 2909	101	Radioactive material, articles, manufactured from natural or depleted uranium or natural thorium
UN 2910	101	Radioactive material, limited quantity, n.o.s.
UN 2911	101	Radioactive material, instruments and articles
UN 2912	101	Radioactive material, low specific activity or LSA, n.o.s.
UN 2913	101	Radioactive material, fissile, n.o.s.
UN 2920	102	Corrosive liquids, flammable, n.o.s.
UN 2921	102	Corrosive solids, flammable, n.o.s.
UN 2922	101	Corrosive liquid, poisonous, n.o.s.
UN 2922	102	Corrosive liquids, poisonous, n.o.s.
NA 2922	101	Dimethyl chlorothiophosphate
NA 2922	101	Sodium hydrosulfide, solution
UN 2923	102	Corrosive solids, poisonous, n.o.s.
NA 2923	101	Sodium hydrosulfide, solid
NA 2924	101	Dichlorobutene
UN 2924	101	Flammable liquid, corrosive, n.o.s.
UN 2924	102	Flammable liquids, corrosive, n.o.s.
UN 2925	101	Flammable solid, corrosive, n.o.s.
UN 2925	102	Flammable solids, corrosive, n.o.s.
UN 2926	101	Flammable solid, poisonous, n.o.s.
UN 2926	102	Flammable solids, poisonous, n.o.s.
UN 2927	102	Poisonous liquids, corrosive, n.o.s.
UN 2928	101	Poisonous solid, corrosive, n.o.s.
UN 2928	102	Poisonous solids, corrosive, n.o.s.
NA 2929	101	Chloropicrin mixture, flammable
UN 2929	102	Poisonous liquids, flammable, n.o.s.
UN 2930	102	Poisonous solids, flammable, n.o.s.
UN 2931	102	Vanadyl sulfate
UN 2933	102	Methyl-2-chloropropionate
UN 2934	102	Isopropyl-2-chloropropionate
UN 2935	102	Ethyl-2-chloropropionate
UN 2936	102	Thiolactic acid
UN 2937	102	alpha Methylbenzyl alcohol
UN 2938	102	Methylbenzoate
UN 2940	102	9-Phosphabicyclononanes
UN 2941	102	2-Fluoroaniline
UN 2942	102	2-Trifluoromethyl aniline
UN 2943	102	Tetrahydrofurfurylamine
UN 2944	102	4 Fluoroaniline
UN 2945	102	N-Methylbutylamine
UN 2946	102	2-Amino-5-diethylaminopentane
UN 2947	102	Isopropyl chloroacetate
UN 2948	102	3-Trifluoromethyl aniline
UN 2949	102	Sodium hydrosulphide
UN 2950	101	Magnesium granules coated
UN 2950	102	Magnesium granules, coated
UN 2952	102	Azodiisobutyronitrile
UN 2953	102	2,2'-Azodi-(2,4-dimethylvaleronitrile)
UN 2954	102	Azodi-(1,1'-hexahydrobenzonitrile)
UN 2955	102	2,2'-Azodi-(2,4-dimethyl-4-methoxyvaleronitrile)
UN 2957	102	tert-Amyl peroxyphalate
UN 2958	102	Diperoxyazelaic acid
UN 2959	102	2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane
UN 2960	102	Di-(2-ethylhexyl) peroxydicarbonate

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
UN 2961	102	2,4,4-Trimethylpentyl-2-peroxy phenoxy acetate
UN 2962	102	Deuteric acid peroxide
UN 2963	102	Cumyl peroxyneodecanoate
UN 2964	102	Cumyl peroxyphalate
UN 2965	102	Boron trifluoride dimethyl etherate
UN 2966	102	Thioglycol
UN 2967	102	Sulphamic acid
UN 2968	102	Maneb, or Maneb preparation(s)
UN 2969	102	Castor beans, Castor meal, Castor pomace or Castor flake
UN 2974	101	Radioactive material, special form, n.o.s.
UN 2975	101	Thorium metal, pyrophoric
UN 2976	101	Thorium nitrate
UN 2977	101	Uranium hexafluoride, fissile
UN 2978	101	Uranium hexafluoride, low specific activity
UN 2979	101	Uranium metal, pyrophoric
UN 2980	101	Uranyl nitrate hexahydrate solution
UN 2981	101	Uranyl nitrate, solid
UN 2982	101	Radioactive material, n.o.s.
UN 2983	102	Ethylene oxide and propylene oxide mixtures
UN 2984	102	Hydrogen peroxide, aqueous solutions
UN 2989	102	Lead phosphite dibasic
UN 2991	102	Carbamate pesticides, liquid, toxic, flammable, n.o.s.
UN 2992	102	Carbamate pesticides, liquid, toxic, n.o.s.
UN 2993	102	Arsenical pesticides, liquid, toxic, flammable, n.o.s.
UN 2994	102	Arsenical pesticides, liquid, toxic, n.o.s.
UN 2995	102	Organochlorine pesticides, liquid, toxic, flammable, n.o.s.
UN 2996	102	Organochlorine pesticides, liquid, toxic, n.o.s.
UN 2997	102	Triazine pesticides, liquid, toxic, flammable, n.o.s.
UN 2998	102	Triazine pesticides, liquid, toxic, n.o.s.
UN 2999	102	Phenoxy pesticides, liquid, toxic, flammable, n.o.s.
UN 3000	102	Phenoxy pesticides, liquid, toxic, n.o.s.
UN 3001	102	Phenyl urea pesticides, liquid, toxic, flammable, n.o.s.
UN 3002	102	Phenyl urea pesticides, liquid, toxic, n.o.s.
UN 3003	102	Benzoic derivative pesticides, liquid, toxic, flammable, n.o.s.
UN 3004	102	Benzoic derivative pesticides liquid, toxic, n.o.s.
UN 3005	102	Dithiocarbamate pesticides, liquid, toxic, flammable, n.o.s.
UN 3006	102	Dithiocarbamate pesticides, liquid, toxic, n.o.s.
UN 3007	102	Phthalimide derivative pesticides, liquid, toxic, flammable, n.o.s.
UN 3008	102	Phthalimide derivative pesticides, liquid, toxic, n.o.s.
UN 3009	102	Copper based pesticides, liquid, toxic, flammable, n.o.s.
UN 3010	102	Copper based pesticides, liquid, toxic, n.o.s.
UN 3011	102	Mercury based pesticides, liquid, toxic, flammable, n.o.s.
UN 3012	102	Mercury based pesticides, liquid, toxic, n.o.s.
UN 3013	102	Substituted nitrophenol pesticides, liquid, toxic, flammable, n.o.s.
UN 3014	102	Substituted nitrophenol pesticides, liquid, toxic, n.o.s.
UN 3015	102	Bipyridilium pesticides, liquid, toxic, flammable, n.o.s.
UN 3016	102	Bipyridilium pesticides, liquid, toxic, n.o.s.
UN 3017	102	Organophosphorus pesticides, liquid, toxic, flammable, n.o.s.
UN 3018	102	Organophosphorus pesticides, liquid, toxic, n.o.s.
UN 3019	102	Organotin pesticides, liquid, toxic, flammable, n.o.s.
UN 3020	102	Organotin pesticides, liquid, toxic, n.o.s.
UN 3021	102	Pesticides, liquid, flammable, toxic, n.o.s.
NA 9011	101	Camphene
NA 9018	101	Dichlorodifluoroethylene

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 9028	101	Dinitrocyclohexylphenol
NA 9036	101	Gas identification set
NA 9037	101	Hexachloroethane
NA 9053	101	Oiled material
NA 9068	101	Tetramethylmethylenediamine
NA 9077	101	Adipic acid
NA 9078	101	Aluminum sulfate, solid
NA 9079	101	Ammonium acetate
NA 9080	101	Ammonium benzoate
NA 9081	101	Ammonium bicarbonate
NA 9083	101	Ammonium carbamate
NA 9084	101	Ammonium carbonate
NA 9085	101	Ammonium chloride
NA 9086	101	Ammonium chromate
NA 9087	101	Ammonium citrate, dibasic
NA 9088	101	Ammonium fluoborate
NA 9089	101	Ammonium sulfamate
NA 9090	101	Ammonium sulfite
NA 9091	101	Ammonium tartrate
NA 9092	101	Ammonium thiocyanate
NA 9093	101	Ammonium thiosulfate
NA 9094	101	Benzoic acid
NA 9095	101	n-Butyl phthalate
NA 9096	101	Calcium chromate
NA 9097	101	Calcium dodecylbenzenesulfonate
NA 9099	101	Captan
NA 1100	101	Chromic sulfate
NA 9101	101	Chromic acetate
NA 9102	101	Chromous chloride
NA 9103	101	Cobaltous bromide

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 9104	101	Cobaltous formate
NA 9105	101	Cobaltous sulfamate
NA 9106	101	Cupric acetate
NA 9109	101	Cupric sulfate
NA 9110	101	Cupric sulfate, ammoniated
NA 9111	101	Cupric tartrate
NA 9117	101	Ethylenediaminetetraacetic acid
NA 9118	101	Ferric ammonium citrate
NA 9119	101	Ferric ammonium oxalate
NA 9120	101	Ferric fluoride
NA 9121	101	Ferric sulfate
NA 9122	101	Ferrous ammonium sulfate
NA 9125	101	Ferrous sulfate
NA 9126	101	Fumaric acid
NA 9127	101	Isopropanolamine dodecylbenzenesulfonate
NA 9134	101	Lithium chromate
NA 9137	101	Naphthenic acid
NA 9138	101	Nickel ammonium sulfate
NA 9139	101	Nickel chloride
NA 9140	101	Nickel hydroxide
NA 9141	101	Nickel sulfate
NA 9142	101	Potassium chromate
NA 9145	101	Sodium chromate
NA 9146	101	Sodium dodecylbenzenesulfonate
NA 9147	101	Sodium phosphate, dibasic
NA 9148	101	Sodium phosphate, tribasic
NA 9149	101	Strontium chromate
NA 9151	101	Triethanolamine dodecylbenzenesulfonate

Appendix A—Identification Number Cross Reference to Proper Shipping Names in § 172.101 and § 172.102—Continued

This listing is provided for information purposes only

(1) Identification Number	(2) Source 172.***	(3) Description
NA 9152	101	Vanadyl sulfate
NA 9153	101	Zinc acetate
NA 9154	101	Zinc ammonium chloride
NA 9155	101	Zinc borate
NA 9156	101	Zinc bromide
NA 9157	101	Zinc carbonate
NA 9158	101	Zinc fluoride
NA 9159	101	Zinc formate
NA 9160	101	Zinc phenolsulfonate
NA 9161	101	Zinc sulfate
NA 9162	101	Zirconium potassium fluoride
NA 9163	101	Zirconium sulfate
NA 9180	101	Uranyl acetate
NA 9183	101	Organic peroxide, liquid or solution, n.o.s.
NA 9184	101	Pyrethrins
NA 9187	101	Organic peroxide, solid, n.o.s.
NA 9188	101	Hazardous substance, liquid or solid, n.o.s.
NA 9189	101	Hazardous waste, liquid or solid, n.o.s.
NA 9190	101	Ammonium permanganate
NA 9191	101	Chlorine dioxide hydrate, frozen
NA 9193	101	Oxidizer, corrosive, liquid, n.o.s.
NA 9194	101	Oxidizer, corrosive, solid, n.o.s.
NA 9195	101	Metal alkyl, solution, n.o.s.
NA 9199	101	Oxidizer, poisonous, liquid, n.o.s.
NA 9200	101	Oxidizer, poisonous, solid, n.o.s.
NA 9201	101	Antimony trioxide
NA 9202	101	Carbon monoxide, cryogenic liquid
NA 9206	101	Methyl phosphonic dichloride

For explanation of abbreviations and reference marks, see last page of this tariff.

SUBPART C

SHIPPING PAPERS

§ 172.200 Applicability. (a) **Description of hazardous materials required.** Except as otherwise provided in this subpart, each person who offers a hazardous material for transportation shall describe the hazardous material on the shipping paper in the manner required by this subpart.

(b) **Exceptions.** This subpart does not apply to any material, other than a hazardous waste or a hazardous substance, that is:

(1) An ORM-A, B, or C, unless it is offered or intended for transportation by air when it is subject to the regulations pertaining to transportation by air as specified in §172.101; or

(2) An ORM-A, B, or C, unless it is offered or intended for transportation by water when it is subject to the regulations pertaining to transportation by water as specified in §172.101; or

(3) An ORM-D unless it is offered or intended for transportation by air.

§ 172.201 General entries. (a) **Contents.** When a description of hazardous material is required to be included on a shipping paper, that description must conform to the following requirements:

(1) When a hazardous material and a material not subject to the requirements of this subchapter are described on the same shipping paper, the hazardous material description entries required by §172.202 and those additional entries that may be required by §172.203:

(i) Must be entered first, or

(ii) Must be entered in a color that clearly contrasts with any description on the shipping paper of a material not subject to the requirements of this subchapter, except that a description on a reproduction of a shipping paper may be highlighted, rather than printed, in a contrasting color (the provisions of this paragraph apply only to the basic description required by §§172.202(a)(1) and (2), or (3)), or

(iii) Must be identified by the entry of an "X" placed before the proper shipping name in a column captioned "HM". (The "X" may be replaced by "RQ," if appropriate.)

(2) The required shipping description on a shipping paper and all copies thereof used for transportation purposes, must be legible and printed (manually or mechanically) in English.

(3) Unless it is specifically authorized or required in this subpart, the required shipping description may not contain any code or abbreviation.

(4) A shipping paper may contain additional information concerning the material provided the information is not inconsistent with the required description. Unless otherwise permitted or required by this subpart, additional information must be placed after the basic description required by §172.202(a).

(i) When appropriate, the entries "IMO" or "IMO Class" may be entered immediately before or immediately following the class entry in the basic description.

(ii) For a material meeting the definition of more than one hazard class, the additional hazard class or classes may be entered after the hazard class in the basic description.

(b) **Name of shipper.** A shipping paper for a shipment by water must contain the name of the shipper.

(c) **Continuation page.** A shipping paper may consist of more than one page, if each page is consecutively numbered and the first page bears a notation specifying the total number of pages included in the shipping paper. For example, "Page 1 of 4 pages."

§ 172.202 Description of hazardous material on shipping papers. (a) The shipping description of a hazardous material on the shipping paper must include:

(1) The proper shipping name prescribed for the material in §172.101 or §172.102 (when authorized);

(2) The hazard class prescribed for the material in the same Section. Except for a proper shipping name that contains words describing more than one hazard class, inclusion of the hazard class is not required when the words of the proper shipping name contain the key word or words of the hazard class of the material, such as Flammable liquid; Poison B, liquid; Radioactive device; or Corrosive liquid;

(3) The identification number (preceded by "UN" or "NA" as appropriate) prescribed for the material in the same section; and

(4) Except for empty packagings, cylinders for compressed gases, and packagings of greater than 110 gallons capacity, the total quantity by weight (net or gross as appropriate) or volume, including the unit of measure, of the hazardous material covered by the description. For example: "800 lbs", "55 gal".

(b) Except as provided in this subpart, the basic description specified in paragraphs (a)(1), (2) and (3) of this section must be shown in sequence. For example: "Gasoline, Flammable liquid, UN 1203".

(c) The total quantity of the material covered by one description must appear before or after, or both before and after, the description required and authorized by this subpart.

(1) Abbreviations may be used to specify the type of packaging and unit of measurement for total quantity. For example: "10 ctns. Paint, Flammable liquid, UN1263, 500 lbs".

(2) The type of packaging and destination marks may be entered in any appropriate manner before or after the basic description.

(d) Technical and chemical group names may be entered in parentheses between the proper shipping name and hazard class.

(e) Except for those materials in the UN Recommendations, the ICAO Technical Instructions, or the IMDG Code, a material that is not a hazardous material according to this subchapter may not be offered for transportation or transported when its description on a shipping paper includes a hazard class or an identification number specified in §172.101.

§ 172.203 Additional description requirements. (a) **Exemptions.** Each shipping paper issued in connection with a shipment made under an exemption must bear the notation "DOT-E" followed by the exemption number assigned and so located that the notation is clearly associated with the description to which the exemption applies.

(b) **Limited quantities.** The description for a material offered for transportation as "limited quantity," as authorized by this subchapter, must include the words "Limited Quantity" or "Ltd Qty" following the basic description.

(c) **Hazardous substances.**

(1) If the proper shipping name for a material that is a hazardous substance does not identify the hazardous substance by name, one of the following descriptions shall be entered, in parentheses, in association with the basic description:

(i) The name of the hazardous substance as shown in the appendix to §172.101; or

(ii) For waste streams, the waste stream number; or

(iii) For wastes which exhibit an EPA characteristic of ignitability, corrosivity, reactivity or EP toxicity, the letters "EPA" followed by the word "ignitability", or "corrosivity", or "reactivity", or "EP toxicity", as appropriate or the corresponding "D" number, as appropriate.

(2) The letters "RQ" shall be entered on the shipping paper either before or after the basic description required by §172.202 for each hazardous substance. For example: "RQ, Cresol, Corrosive material, UN 2076; or "Hazardous substance, solid, n.o.s., ORM-E, NA 9188 (Adipic Acid), RQ".

(d) **Radioactive material.**

(1) The description for a shipment of radioactive material must include the following additional entries as appropriate:

(i) The name of each radionuclide in the radioactive material that is listed in §173.435 of this subchapter. Abbreviations, e.g., "^{99}Mo" are authorized.

(ii) A description of the physical and chemical form of the material, if the material is not in special form (generic chemical description is acceptable for chemical form).

(iii) The activity contained in each package of the shipment in terms of curies, millicuries, or microcuries. Abbreviations are authorized. For the shipment of a package containing a highway route controlled quantity of radioactive material's (see §173.403(l) of this subchapter), the words "Highway route controlled quantity" must be entered in association with the basic description.

(iv) The category of label applied to each package in the shipment. For example: "RADIOACTIVE WHITE—I."

(v) The transport index assigned to each package in the shipment bearing RADIOACTIVE YELLOW—II or RADIOACTIVE YELLOW—III labels.

(vi) For a shipment of fissile radioactive material's:

(A) The words "Fissile Exempt," if the package is exempt pursuant to §173.453 of this subchapter, or

(B) If not exempt, the fissile class of each package in the shipment, pursuant to §173.455 of this subchapter; and

(C) For a Fissile Class III shipment, the additional notation: "Warning—Fissile Class III Shipment. Do not Load More than * * * Packages per Vehicle." (Asterisks to be replaced by appropriate number.) "In loading and Storage Areas, Keep at Least 20 Feet (6 Meters) from Other Packages Bearing Radioactive Labels."

(D) If a Fissile Class III shipment is to be transported by water, the supplementary notation must also include the following statement: "For shipment by water, only one Fissile Class III shipment is permitted in each hold."

(vii) For a package approved by the U.S. Department of Energy (DOE) or U.S. Nuclear Regulatory Commission (USNRC), a notation of the package identification marking as prescribed in the applicable DOE or USNRC approval. (See §173.471 of the subchapter.)

(viii) For an export shipment or a shipment in a foreign made package, a notation of the package identification marking as prescribed in the applicable International Atomic Energy Agency (IAEA) Certificate of Competent Authority which has been issued for the package. (See §173.473 of the subchapter.)

(e) **Empty packagings.** (1) The description on the shipping paper for a packaging containing the residue of a hazardous material may include the words "RESIDUE: Last contained * * *" in association with the basic description of the hazardous material last contained in the packaging.

(2) For a tank car containing the residue (as defined in 171.8) of a hazardous material, the requirements of §174.25(c) and paragraph (e)(3) of this section apply.

(3) If a packaging, including a tank car, contains a residue that is a hazardous substance, the description on the shipping papers must be

prefaced with the phrase "RESIDUE: Last contained * * * *" and the letters "RQ" must be entered on the shipping paper either before or after the basic description.

(f) *Transportation by air.* When a package containing a hazardous material is offered for transportation by air and this subchapter prohibits its transportation aboard passenger-carrying aircraft, the words "Cargo aircraft only" must be entered after the basic description.

(g) *Transportation by rail.*

(1) The shipping paper for a rail car containing a hazardous material must contain the notation "Placarded" followed by the name of the placard required for the rail car.

(2) The shipping paper for each Class DOT-113 tank car containing a flammable gas must contain an appropriate notation, such as "DOT-113A," and the statement "Do Not Hump or Cut Off Car While in Motion."

(h) *Transportation by highway.* Following the basic description for a hazardous material in a Specification MC 330 or MC 331 cargo tank, there must be entered for—

(1) *Anhydrous ammonia.*

(i) The words "0.2 PERCENT WATER" to indicate the suitability for shipping anhydrous ammonia in a cargo tank made by quenched and tempered steel as authorized by §173.315(a)(1), Note 14 of this subchapter, or

(ii) The words "NOT FOR Q AND T TANKS" when the anhydrous ammonia does not contain 0.2 percent or more water by weight.

(2) *Liquefied petroleum gas.*

(i) The word NONCORROSIVE" or "NONCOR" to indicate the suitability for shiping "Noncorrosive" liquefied petroleum gas in a cargo tank made of quenched and tempered steel as authorized by §173.315(a)(1), Note 15 to this subchapter, or

(ii) The words "NOT FOR Q and T TANKS" for grades of liquefied petroleum gas other than "Noncorrosive".

(i) *Transportation by water.*

(1) Each shipment by water must have the following additional shipping paper entries:

(i) Identification of the type of packages such as barrels, drums, cylinders, and boxes,

(ii) The number of each type of package including those in a freight container or on a pallet, and

(iii) The gross weight of each type of package or the individual gross weight of each package.

(2) The shipping paper for a hazardous material offered for transportation by vessel to any country outside the United States must have in parentheses the technical name of the material immediately following the proper shipping name when the material is described by an n.o.s. entry in §172.101 or 172.102. For example: "Corrosive liquid, n.o.s. (caprylyl chloride), UN 1760." If the material is a mixture of two or more hazardous materials, the names of at least two components most predominately contributing to the hazard or hazards of the mixture shall be entered in parentheses. For example: "Flammable liquid, corrosive, n.o.s. (Methyl alcohol, Potassium hydroxide), UN 2924." The provisions of this paragraph do not apply:

(i) If the n.o.s. description for the material (other than a mixture of hazardous materials of different classes meeting the definition of more than one hazard class) contains the name of the chemical element or group which is primarily responsible for the material being included in the hazard class indicated. For example: "Mercury compound, solid, n.o.s., Poison B, UN 2025."

(ii) If the n.o.s. description for the material (which is a mixture of hazardous materials of different classes meeting the definition of more than one hazard class) contains the name of the chemical element or group responsible for the material meeting the definition of one of these classes. In such cases, only the technical name of the component that is not appropriately identified in the n.o.s. description shall be entered in parentheses. For example: "Carbamate pesticide, liquid, n.o.s. (contains Xylene), Flammable liquid, UN 2758, POISON."

(3) The entry "Skin corrosive only" must be included to also authorize "under deck" stowage for corrosive liquid, n.o.s. and corrosive solid, n.o.s. that meet only the corrosion to skin criteria of §173.240(a)(1).

(j) *Dangerous When Wet.* The words "Dangerous When Wet" shall be entered on the shipping paper in association with the basic description when a package covered by the basic description is required to be labeled with a DANGEROUS WHEN WET label.

(k) *Poisonous materials.* Notwithstanding the class to which a material is assigned:

(1) If the name of the compound or principal constituent that causes a material to meet the definition of a poison (according to this subchapter) is not included in the proper shipping name for the material, the name of that compound or constituent shall be entered on the shipping paper in association with the shipping description for the material. The name of the compound or principal constituent may be either a technical name or any name for the material that is listed in the NIOSH Registry. This subparagraph does not apply to:

(i) A material having a proper shipping name that includes the chemical element or group which causes the material to be a poison.

(ii) Limited Quantities.

(2) If a liquid or solid material in a package meets the definition of a poison according to this subchapter, and the fact that it is a poison is not disclosed by the shipping name or class entry, the word "Poison" shall be entered on the shipping paper in association with the shipping description.

(3) The provisions of paragraphs (k)(1) and (2) of this section do not apply—

(i) To consumer commodities, ORM-D, or

(ii) To compounds or principal constituents that would cause death by corrosive destruction to tissue rather than by systemic poisoning.

(4) If the inhalation toxicity of any material falls within the criteria specified in §173.3a(b)(2) (subject to definitions and implementation conditions of (c) and (d) of the same section), the words "Poison-Inhalation Hazard" shall be entered on the shipping paper in association with the shipping description. However, the word "Poison" need not be repeated if it is entered as part of the basic description or in conformance with paragraph (k)(2) of this section. This paragraph does not apply to packagings having primary containment units of one liter capacity or less.

(l) *IM portable tanks.* A hazardous material described by an "n.o.s." entry in §172.101 or §172.102 (when authorized) and offered for transportation in an IM portable tank must be described on shipping papers in accordance with the provisions of paragraph (i)(2) of this section.

§ 172.204 Shipper's certification. (a) *General.* Except as provided in paragraphs (b) and (c) of this section, each person who offers a hazardous material for transportation shall certify that the material is offered for transportation in accordance with this subchapter by printing (manually or mechanically) on the shipping paper containing the required shipping description the certification contained in paragraph (a)(1) of this section or the certification (declaration) containing the language contained in paragraph (a)(2) of this section.

(1) "This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation."

Note: In lieu of the certification the words "herein named" may be substituted for the words "above named."

(2) "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by [*] according to applicable international and national governmental regulations."

*Additional language indicating the modes of transportation to be used may be inserted at this point in the certification. All modes of transportation may be indicated provided that any mode not applicable to a specific shipment is deleted (lined out).

(b) *Exceptions.* (1) Except for a hazardous waste no certification is required for a hazardous material offered for transportation by motor vehicle and transported—

(i) In a cargo tank supplied by the carrier, or

(ii) By the shipper as a private carrier except for a hazardous material that is to be reshipped or transferred from one carrier to another.

(2) No certification is required for the return of any empty tank car which previously contained a hazardous material and which has not been cleaned or purged.

(c) *Transportation by air.*

(1) *General.* Certification containing the following language may be used in place of the certification required by paragraph (a) of this section:

I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and in proper condition for carriage by air according to applicable national governmental regulations.

(2) *Certificate in duplicate.* Each person who offers a hazardous material to an aircraft operator for transportation by air shall provide two copies of the certification required in this section. (See §175.30 of this subchapter.)

(3) *Passenger and cargo aircraft.* Each person who offers for transportation by air a hazardous material authorized for air transportation shall add to the certification required in this section the following statement:

This shipment is within the limitations prescribed for passenger aircraft/cargo aircraft only (delete nonapplicable).

(4) *Radioactive material.* Each person who offers any radioactive material for transportation aboard a passenger-carrying aircraft shall sign (mechanically or manually) a printed certificate stating that the shipment contains radioactive material intended for use in, or incident to, research, or medical diagnosis, or treatment.

(d) *Signature.* The certifications required by paragraphs (a) or (c) of this section:

(1) Must be legibly signed by a principal, officer, partner, or employee of the shipper or his agent; and

(2) May be legibly signed manually, by typewriter, or by other mechanical means.

§ 172.205 Hazardous waste manifest.

(a) No person may offer, transport, transfer, or deliver a hazardous waste (waste) unless an EPA Form 8700-22 and 8700-22A (when necessary) hazardous waste manifest (manifest) is prepared in accordance with 40 CFR 262.20 and is signed, carried, and given as required of that person by this section.

(b) The shipper (generator) shall prepare the manifest in accordance with 40 CFR Part 262.
(c) The original copy of the manifest must be dated by, and bear the handwritten signature of, the person representing:
(1) The shipper (generator) of the waste at the time it is offered for transportation, and
(2) The initial carrier accepting the waste for transportation.
(d) A copy of the manifest must be dated by, and bear the handwritten signature of the person representing:
(1) Each subsequent carrier accepting the waste for transportation, at the time of acceptance, and
(2) The designated facility receiving the waste, upon receipt.
(e) A copy of the manifest bearing all required dates and signatures must be:
(1) Given to a person representing each carrier accepting the waste for transportation,
(2) Carried during transportation in the same manner as required by this subchapter for shipping papers,
(3) Given to a person representing the designated facility receiving the waste,
(4) Returned to the shipper (generator) by the carrier that transported the waste from the United States to a foreign destination with a notation of the date of departure from the United States, and
(5) Retained by the shipper (generator) and by the initial and each subsequent carrier for three years from the date the waste was accepted by the initial carrier. Each retained copy must bear all required signatures and dates up to and including those entered by the next person who received the waste.
(f) The requirements of paragraphs (d) and (e) of this section do not apply to a rail carrier when waste is delivered to a designated facility by railroad if:
(1) All of the information required to be entered on the manifest (except generator and carrier identification numbers and the generator's certification) is entered on the shipping paper carried in accordance with § 174.26(c) of this subchapter;
(2) The delivering rail carrier obtains and retains a receipt for the waste that is dated by and bears the handwritten signature of the person representing the designated facility; and
(3) A copy of the shipping paper is retained for three years by each railroad transporting the waste.
(g) The person delivering a hazardous waste to an initial rail carrier shall send a copy of the manifest, dated and signed by a representative of the rail carrier, to the person representing the designated facility.
(h) A hazardous waste manifest required by 40 CFR Part 262, containing all of the information required by this subpart, may be used as the shipping paper required by this subpart.

SUBPART D

MARKING

§ 172.300 Applicability.
(a) Each person who offers a hazardous material for transportation shall mark each package, freight container, and transport vehicle containing the hazardous material in the manner required by this subpart.
(b) When assigned the function by this subpart, each carrier that transports a hazardous material shall mark each package, freight container, and transport vehicle containing the hazardous material in the manner required by this subpart.

§ 172.301 General marking requirements. (a) Except as provided by this subchapter, each person who offers for transportation a hazardous material in a packaging having a rated capacity of 110 gallons or less shall mark the package with the proper shipping name and identification number (preceded by "UN" or "NA" as appropriate) assigned to the material in § 172.101 or § 172.102 (when authorized). In addition, if the inhalation toxicity of any material in a package falls within the criteria specified in § 173.3a(b)(2), the package shall be marked "Inhalation Hazard" in association with the required label(s). This additional marking requirement does not apply to packaging having primary containment units of one liter capacity or less and to packagings of greater than 110 gallons capacity.
(1) The proper shipping name is not required to include the word "Waste" as specified by § 172.101(c)(10) if the package bears the EPA marking prescribed by 40 CFR 262.32.
(b) When it has been determined by the shipper that a package has been previously marked as required for the material it contains, it need not be remarked. (For empty packagings, see § 173.29 of this subchapter.)
(c) This section does not apply to:
(1) Display of identification numbers on packages containing Limited Quantities (see § 171.8 of this subchapter) or materials classed as ORM-D (see § 173.1200 of this subchapter) when packed with no other hazardous material.
(2) Display of identification numbers on packagings having a rated capacity of 110 gallons or less filled for shipment prior to July 1, 1983.
Note: EPA requires special markings for hazardous wastes. See 40 CFR 262.32.

§ 172.302 Export shipments by water. (a) Each package of hazardous material offered for export by water and described by a "n.o.s." entry in § 172.101 or § 172.102 (when authorized) must have the technical name or names of the material added in parentheses immediately following the proper shipping name (see § 172.203(i)(2)). For example: Corrosive liquid, n.o.s. (Caprylyl chloride).
(b) For a mixture of two or more hazardous materials, the technical name of at least two components most predominately contributing to the hazard or hazards of the mixture must be added in parentheses immediately following the proper shipping name.

§ 172.304 Marking requirements. (a) The marking required in this subpart—
(1) Must be durable, in English and printed on or affixed to the surface of a package or on a label, tag, or sign.
(2) Must be displayed on a background of sharply contrasting color;
(3) Must be unobscured by labels or attachments; and
(4) Must be located away from any other marking (such as advertising) that could substantially reduce its effectiveness.

§ 172.306 Consignee's or consignor's name and address. (a) Each package containing a hazardous material offered for transportation must be marked with the name and address of the consignee or consignor except when the package is:
(1) Transported by highway and will not be transferred from one motor carrier to another, or
(2) Part of a carload lot, truckload lot, or freight container load, and the entire contents of the rail car, truck or freight container are tendered from one consignor to one consignee, or
(3) A portable tank, cargo tank or tank car.

§ 172.308 Authorized abbreviations. (a) Abbreviations may not be used in a proper shipping name marking except in the following instances:
(1) For marking descriptions of ammunition, such as Ammunition for cannon without projectile, etc., the words "with" or "without" may be abbreviated as "W" or "W.O". For example: "Ammunition for cannon W/O projectile".
(2) The abbreviation "ORM" may be used in place of the words "Other Regulated Material."

§ 172.310 Radioactive materials. (a) In addition to any other markings required by this subpart, each package containing radioactive materials must be marked as follows:
(1) Each package of radioactive materials in excess of 110 pounds (50 kilograms) must have its gross weight plainly and durably marked on the outside of the package.
(2) Each package of radioactive materials which conforms to the requirements for Type A or Type B packaging (§ 173.403 of this subchapter) must be plainly and durably marked on the outside of the package in letters at least ½-inch (13 mm.) high, with the words "TYPE A" or "TYPE B" as appropriate. A packaging which is not in compliance with these requirements may not be so marked.
(3) Each package of radioactive material destined for export shipment must also be marked "USA" in conjunction with the specification marking, or other package certificate identification. (See §§ 173.471, 173.472, and 173.473 of this subchapter.)

§ 172.312 Liquid hazardous materials. (a) Except as provided in this section each package having an inside packaging containing liquid hazardous materials must be—
(1) Packed with closures upward, and
(2) Legibly marked "THIS SIDE UP" or "THIS END UP" as appropriate, to indicate the upward position of the inside packaging.
(b) Except as otherwise prescribed in Part 173 of this subchapter cylinders of liquefied compressed gas and specification containers 60, 37M, 37P, and 21P are not required to be marked "THIS SIDE UP" or "THIS END UP".
(c) Arrows for purposes other than indicating proper package orientation may not be displayed on a package containing a hazardous material that is a liquid.
(1) An arrow symbol indicating "This Way Up" as specified in ANSI MH6.1-1968 entitled "Pictorial Marking for Handling of Goods" should be used in addition to the marking required by this section and § 173.25 of this subchapter.
(d) Except when offered for transportation by air, packages containing flammable liquids in inside packagings of one quart or less prepared in accordance with §§ 173.118(a) or 173.1200(a)(1) of this subchapter are excepted from the requirements of paragraph (a) of this section.
(e) When offered for transportation by air, packages containing flammable liquids in inside packagings of one quart or less prepared in accordance with §§ 173.118(a) or 173.1200(a)(1) of this subchapter are excepted from the requirements of paragraph (a) of this section when

packed with sufficient absorption material between the inner and outer packagings to completely absorb the liquid contents.

§ 172.316 Packagings containing material classed as ORM.

(a) Each packaging having a rated capacity of 110 gallons or less and containing a material classed as ORM-A, B, C, D, or E must be plainly, durably, and legibly marked on at least one side or end with the appropriate ORM designation immediately following or below the proper shipping name of the material. The appropriate ORM designation must be placed within a rectangle that is approximately ¼ inch (6.3 mm.) larger on each side than the designation. The appropriate designation for each ORM must be:

(1) ORM-A for an ORM-A.

(2) ORM-B KEEP DRY for an ORM-B that is a solid and is corrosive only to aluminum when wet.

(3) ORM-B for an ORM-B other than that described in paragraph (a)(2) of this section.

(4) ORM-C for an ORM-C.

(5) ORM-D AIR for an ORM-D that is prepared for air shipment and packaged in accordance with the provisions of § 173.6 of this subchapter.

(6) ORM-D for an ORM-D other than that described in paragraph (a)(5) of this section.

(7) ORM-E for an ORM-E.

(b) When the ORM-D marking, including the proper shipping name, can not be affixed on the package surface, it may be on an attached tag.

(c) The marking ORM-A, B, C, D or E is the certification by the person offering the package for transportation that the material is properly described, classed, packaged, marked and labeled (when appropriate) and in proper condition for transportation according to the applicable regulations of this subchapter. This form of certification does not preclude the requirement for a certificate on a shipping paper when required by Subpart C of this Part.

§ 172.324 Hazardous substances.

For each package with a capacity of 110 gallons or less that contains a hazardous substance—

(a) If the proper shipping name does not identify the hazardous substance by name, one of the following descriptions shall be marked on the package, in parentheses, in association with the proper shipping name:

(1) The name of the hazardous substance as shown in the appendix to § 172.101; or

(2) For waste streams, the waste stream number; or

(3) For wastes which exhibit an EPA characteristic of ignitability, corrosivity, reactivity, or EP toxicity, the letters "EPA" followed by the word "ignitability", or "corrosivity", or "reactivity", or "EP toxicity", as appropriate or the corresponding "D" number, as appropriate.

(b) The letters "RQ" shall be marked on the package in association with the proper shipping name.

§ 172.326 Portable tanks. (a) No person may offer for transportation or transport a portable tank containing a hazardous material unless it is legibly marked with letters or numerals, as required, measuring no less than two inches (50.8 mm.) in height:

(1) On two opposing sides with the proper shipping name of the material, and

(2) As prescribed by § 172.332, with the identification number specified for the material in § 172.101 or § 172.102, (when authorized) and

(i) On each side and each end, if the tank has a capacity of 1,000 gallons or more, or

(ii) On two opposing sides in association with the proper shipping name, if the tank has a capacity of less than 1,000 gallons.

(b) A portable tank marked with the name or identification number of a hazardous material may not be used to transport any other material unless the marking is removed, or changed to identify the hazardous material in the portable tank, whichever is appropriate.

(c) The name of the owner, or when appropriate, of the lessee, must be legibly displayed on a portable tank that contains a hazardous material.

(d) If the marking required by paragraph (a)(2) of this section is not visible, a transport vehicle, or freight container used to transport a portable tank must be marked on each side and each end as required by § 172.332 with the identification number specified for the material in § 172.101 or § 172.102 (when authorized).

(1) Each person who offers a motor carrier a portable tank for transportation in a transport vehicle or freight container shall provide the motor carrier with the required identification numbers on placards, orange panels, or the white square-on-point configuration, as appropriate, for each side and each end of the transport vehicle or freight container from which identification numbers on the portable tank are not visible.

(e) Each portable tank marked as required by paragraph (a) of this section must remain marked unless it is:

(1) Filled with a material not subject to this subchapter; or

(2) Sufficiently cleaned of residue and purged of vapor to remove any potential hazard.

§ 172.328 Cargo tanks.

(a) Except as provided in this subpart, no person may offer for transportation or transport a hazardous material in a cargo tank unless the cargo tank is marked as required by § 172.332 on each side and each end with the identification number specified for the material in § 172.101 or § 172.102 (when authorized).

(1) A person who offers a motor carrier a hazardous material for transportation in a cargo tank shall provide the motor carrier the required identification numbers on placards or shall affix orange panels containing the required identification numbers, prior to or at the time the material is offered for transportation unless the cargo tank is already marked with the identification number required by this subpart in accordance with paragraph (f) of this section and § 173.29(c) of this subchapter.

(2) A person who offers a cargo tank containing a hazardous material for transportation shall affix the required identification numbers on panels or placards prior to or at the time the cargo tank is offered for transportation unless it is already marked with identification numbers as required by this subpart.

(b) When the name of a material is required by this subchapter to be marked on a cargo tank, it must be legibly displayed on each end and each side in lettering no less than two inches (50.8 mm.) in height.

(c) Required markings: Gases. Except for certain nurse tanks which must be marked as specified in § 173.315(m) of this subchapter, each cargo tank transporting flammable or nonflammable gas (including a cryogenic liquid) subject to this subchapter must be marked as specified in this part on each end and each side with—

(1) The proper shipping name of the gas, or

(2) An appropriate common name for the material such as "Refrigerant Gas."

(d) QT NQT marking for MC 330 and MC 331 cargo tanks. Each specification MC 330 and MC 331 cargo tank must be appropriately marked "QT" or "NQT" to indicate it is constructed of quenched and tempered steel (QT) or other than quenched and tempered steel (NQT). These markings must be placed near the specification identification plate letters no less than two inches (50.8 mm.) in height.

(e) A cargo tank marked with the name or identification number of a hazardous material may not be used to transport any other material unless that marking:

(1) Is removed,

(2) Is changed to identify the hazardous material in the cargo tank; or

(3) Conforms with § 172.336(c)(4) or (c)(5) of this part.

(f) A cargo tank that is required to be marked with the name or identification number of a hazardous material must remain marked when empty unless it is:

(1) Reloaded with a material not subject to this subchapter; or

(2) Sufficiently cleaned of residue and purged of vapor to remove any potential hazard.

§ 172.330 Tank cars and multi-unit tank car tanks.

(a) No person may offer for transportation or transport a hazardous material in a tank car (other than a multi-unit tank car tank) unless the tank car is:

(1) Marked on each side, when required by Part 173 or 179 of this subchapter, with the:

(i) Proper shipping name of the material, or

(ii) Common name authorized in this subchapter for the material such as "Refrigerant Gas."

(2) Marked on each side and each end, as required by § 172.332, with the identification number specified for the material in § 172.101 or § 172.102 (when authorized).

(b) The letters in the marking of a proper shipping name or common name must be 4 inches (101.6 mm.) or more in height with at least a ½ inch (15.9 mm.) stroke. The separation between each letter must be at least ¾ inch (19.0 mm.).

(c) No person may offer for transportation or transport a hazardous material in a multi-unit tank car tank unless it is marked on opposing sides, in letters and numerals no less than two inches high, with the:

(1) Proper shipping name specified for the material in § 172.101 or § 172.102 or common name authorized for the material in this subchapter, and

(2) Identification number specified for the material in § 172.101 or § 172.102 (when authorized).

(d) A tank car or a multi-unit tank car tank marked with the identification number or name of a hazardous material may not be used to transport any other material unless the marking is removed, or changed to identify the hazardous material that the tank car or multi-unit tank car tank contains, whichever is appropriate.

(e) A motor vehicle or rail car used to transport a multi-unit tank car tank must be marked on each side and each end, as required by § 172.332, with the identification number specified for the material in § 172.101 or § 172.102 (when authorized).

(f) If a multi-unit tank car tank contains chlorine, marking of the name "Chlorine" is not required when the CHLORINE label is used as provided in § 172.405(b).

(g) Each multi-unit tank car tank and each tank car (except when it contains a combustible liquid) must remain marked when empty unless:

(1) Reloaded with a material not subject to this subchapter, or

(2) Sufficiently cleaned of residue and purged of vapor to remove any potential hazard.

§ 172.331 Bulk packagings other than portable tanks, cargo tanks, tank cars and multi-unit tank car tanks.

(a) This section prescribes marking requirements for bulk packagings other than portable tanks (see § 172.326), cargo tanks (see § 172.328), tank cars and multi-unit tank car tanks (see § 172.330).

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) No person may offer for transportation or transport a bulk packaging unless the packaging is marked as prescribed in § 172.332 or § 172.336(b), as appropriate, with the identification number specified for the material in § 172.101 or § 172.102, when authorized—

(1) On two opposing sides, for a packaging of 1,000 gallons (3,785.4 liters or 133.7 cubic feet) or less capacity;

(2) On each side and each end, for a packaging of greater than 1,000 gallons (3,785.4 liters or 133.7 cubic feet) capacity.

(c) The provisions of paragraph (b) do not apply to cylinders permanently installed on a tube trailer motor vehicle if the identification numbers are displayed as prescribed on each side and each end of the motor vehicle.

(d) Each person who offers a motor carrier a hazardous material in a bulk packaging for transportation shall provide the motor carrier with the required identification numbers on placards of plain white square-on-point display configurations, as authorized, or shall affix orange panels containing the required identification numbers to the packaging prior to or at the time the material is offered for transportation, unless the packaging is already marked with the identification number as required by this subpart.

(e) Each person who offers a bulk packaging containing a hazardous material for transportation shall affix to the packaging the required identification numbers on orange panels, square-on-point configurations or placards, as appropriate, prior to, or at the time the packaging is offered for transportation unless it is already marked with identification numbers as required by this subchapter.

(f) No person may mark a bulk packaging with the name or identification number of a hazardous material that is not in the bulk packaging.

(g) A bulk packaging that is required to be marked with the name or identification number of a hazardous material must remain marked unless it is—

(1) Reloaded with a material that requires another marking or no marking; or

(2) Cleaned and purged of all residue.

§ 172.332 Identification number markings.

(a) **General.** When required by §§ 172.326, 172.328, 172.330, or 172.331 of this subpart, identification numbers shall be displayed on orange panels or placards as specified in this section or, when appropriate, on white square-on-point configurations as prescribed in § 172.336(b).

(b) **Orange panels.** Display of an identification number on an orange panel shall be in conformance with the following:

(1) The orange panel must be 6 ½ inches (16 cm.) high by 15 ¾ inches (40 cm.) wide with a ⅜ inch (15 mm.) black outer border. The identification number shall be displayed in 4-inch (10 cm.) black Helvetica Medium numerals on the orange panel. Measurements may vary from those specified plus or minus 0.2 of an inch (5 mm.).

(2) The orange panel may be made of any durable material prescribed for placards in § 172.519, and shall be of the orange color specified for labels or placards in Appendix A to this Part.

(3) The name and hazard class of a material represented by the identification number may be shown in the upper left border of the orange panel in letters not more than ¼ inch (18 points) high.

(4) Except for size and color, the orange panel and identification numbers shall be as illustrated for Liquefied petroleum gas:

(c) **Placards.** Display of an identification number on a hazard warning placard shall be in conformance with the following:

(1) The identification number shall be displayed across the center area of the placard in 3½ inch (89 mm.) black Alpine Gothic or Alternate Gothic No. 3 numerals on a white background 4 inches (10 cm.) high and approximately 8½ inches (21.5 cm.) wide and may be outlined with a solid or dotted line border.

(2) The top of the 4-inch (10 cm.) high white background shall be approximately 1¾ inches (40.0 mm.) above the placard horizontal center line.

(3) When an identification number is displayed on a placard the United Nations hazard class number for the material shall be displayed in the lower corner of each placard as specified in § 172.519(d).

(4) For a COMBUSTIBLE placard used to display an identification number, the entire background below the white background for the identification number must be white during transportation by rail and may be white during the transportation by highway.

(5) The name of the hazardous material and the hazard class may be shown in letters not more than ¼ inch (18 points) high immediately within the upper border of the space on the placard bearing the identification number of the material.

(6) If an identification number is placed over the word(s) on a placard, the word(s) should be substantially covered to maximize the effectiveness of the identification number.

(d) Except for size and color, the display of an identification number on a placard shall be as illustrated for Acetone.

§ 172.334 Identification numbers; prohibited display.

(a) No person may display an identification number on a POISON GAS, RADIOACTIVE, EXPLOSIVES A, EXPLOSIVES B, BLASTING AGENTS OR DANGEROUS placard.

(b) No person may display an identification number on a placard, orange panel or white square-on-point display configuration unless—

(1) The identification number is specified for the material in § 172.101 or § 172.102 (when authorized);

(2) The identification number is displayed on the placard, orange panel or white square-on-point configuration authorized by § 172.332 or § 172.336(b), as appropriate, and any placard used for display of the identification number corresponds to the hazard class of the material specified in § 172.504;

(3) Except as provided under § 172.336(c)(4) or (c)(5) the package, freight container, or transport vehicle on which the number is displayed contains the hazardous material associated with that identification number in § 172.101 or § 172.102.

(c) Except as required by § 172.332(c)(4) for a combustible liquid, the identification number of a material may be displayed only on the placards required by the tables in § 172.504.

(d) Except as provided in § 172.336, a placard bearing an identification number may not be used to meet the requirements of Subpart F of this Part unless it is the correct identification number for all hazardous materials of the same class in the transport vehicle or freight container on which it is displayed.

(e) Except as specified in § 172.338, an identification number may not be displayed on an orange panel on a cargo tank unless affixed to the cargo tank by the person offering the hazardous material for transportation in the cargo tank.

(f) If a placard is required by § 172.504, an identification number may not be displayed on an orange panel unless it is displayed in proximity to the placard.

(g) No person shall add any color, number, letter, symbol, or word other than as specified in this subchapter, to any identification number marking display which is required or authorized by this subchapter.

§ 172.336 Identification numbers; special provisions and exceptions.

(a) When not required or prohibited by this subpart, identification numbers may be displayed on a transport vehicle or a freight container in the manner prescribed by this subpart.

(b) For hazardous materials in hazard classes for which hazard warning placards are not specified (e.g., ORM-A, B, C, D, or E), identification numbers, when required, must be displayed on either orange panels (see § 172.332(b)) or on a plain white square-on-point display configuration having the same outside dimensions as a placard. In addition, for materials in hazard classes for which placards are specified and identification number displays are required, but for which identification numbers may not be displayed on the placards authorized for the material (see § 172.334(a)), identification numbers must be displayed on orange panels or on the plain white square-on-point display configuration in association with the required placards. An identification number displayed on a white square-on-point display configuration is not considered to be a placard.

(1) The 4-inch (10 cm.) by 8½ inch (21.5 cm.) area containing the identification number shall be located as prescribed by § 172.332(c)(1) and (c)(2) and may be outlined with a solid or dotted line border.

(c) Identification numbers are not required:

(1) On the ends of a portable tank, cargo tank or tank car having more than one compartment if hazardous materials having different identification numbers are being transported therein. In such a circumstance, the identification numbers on the sides of the tank shall be displayed in the same sequence as the compartments containing the materials they identify.

(2) On a cargo tank containing only gasoline, if the cargo tank is marked "Gasoline" on each side and rear in letters no less than 2 inches high, or is placarded in accordance with § 172.542(c).

(3) On a cargo tank containing only fuel oil, if the cargo tank is marked "Fuel Oil" on each side and rear in letters no less than 2 inches high, or is placarded in accordance with § 172.544(c).

(4) For each of the different liquid petroleum distillate fuels, including gasoline and gasahol in a compartmented cargo tank or tank car, if the identification number is displayed for the distillate fuel having the lowest flash point.

(5) For each of the different liquid petroleum distillate fuels, including gasoline and gasahol transported in a cargo tank, if the identification number is displayed for the liquid petroleum distillate fuel having the lowest flash point.

(6) On nurse tanks meeting the provisions of § 173.315(m) of this subchapter.

§ 172.338 Replacement of identification numbers.

If more than one of the identification number markings on placards, orange panels, or white square-on-point display configurations that are required to be displayed are lost, damaged or destroyed during transportation, the carrier shall replace all the missing or damaged identification numbers as soon as practicable. However, in such a case, the numbers may be entered by hand on the appropriate placard, orange panel or white square-on-point display configuration providing the correct identification numbers are entered legibly using an indelible marking material. When entered by hand, the identification numbers must be located in the white display area specified in § 172.332. This section does not preclude required compliance with the placarding requirements of Subpart F of this subchapter.

SUBPART E

LABELING

§ 172.400 General labeling requirements. (a) Except as otherwise provided in this subchapter, each person who offers a package, overpack, or freight container containing a hazardous material for transportation shall label it, when required, with labels prescribed for the material as specified in § 172.101 or § 172.102 (when authorized) and in accordance with this subpart.

(b) A label is not required on a:

(1) Package for which labeling is not required under the conditions set forth in this subchapter and in this section;

(2) Cylinder containing a compressed gas classed as flammable or nonflammable that is:

(i) Carried by a private or contract motor carrier;

(ii) Not overpacked; and

(iii) Durably and legibly marked in accordance with CGA Pamphlet C–7, Appendix A.

(3) Package or unit of military explosives (including ammunition) shipped by or on behalf of the DOD when in

(i) Freight containerload, carload or truckload shipments, if loaded and unloaded by the shipper or DOD or

(ii) unitized or palletized break bulk shipments by cargo vessel under charter to DOD if at least one required label is displayed on each unitized or palletized load.

(4) Package containing a hazardous material other than ammunition that is:

(i) Loaded and unloaded under the supervision of DOD personnel, and

(ii) Escorted by DOD personnel in a separate vehicle.

(5) Compressed gas cylinder permanently mounted in or on a transport vehicle;

(6) Portable tank which is placarded in accordance with § 172.514;

(7) Freight container having a volume of 640 cubic feet or more which is subject to § 172.512;

(8) Package containing a material classed as ORM–A, B, C, D, or E if that package does not contain any other material classed as a hazardous material that requires labeling.

(9) Package containing a combustible liquid; or

(10) Package of low specific activity radioactive material, when being transported in a conveyance assigned for exclusive use of the consignor under § 173.425(b) of this subchapter.

(11) Cargo tank or tank car other than a multi-unit tank car tank.

(c) Provisions of Paragraph B do not apply to the CARGO AIRCRAFT ONLY label.

(d) Except as provided in paragraph (b) of this section, when the proper shipping name marked on a package is a proper shipping name from § 172.102 that does not appear in § 172.101, the package must be labeled as provided in § 172.102.

§ 172.401 Prohibited labeling.

(a) Except as provided in paragraphs (c) and (d) of this section, no person may offer for transportation and no carrier may transport any package bearing a label specified in this subpart unless:

(1) The package contains a material that is a hazardous material, and

(2) The label represents a hazard of the hazardous material in the package.

(b) No person may offer for transportation and no carrier may transport a package bearing any marking or label which by its color, design, or shape could be confused with or conflict with a label prescribed by this part.

(c) The restrictions in paragraphs (a) and (b) of this section, do not apply to packages labeled in conformance with:

(1) Any United Nations recommendation, including the class number (see § 172.407), in the document entitled "*Transport of Dangerous Goods*";

(2) The International Maritime Organization (IMO) requirements, including the class number (see § 172.407), in the document entitled "International Maritime Dangerous Goods Code";

(3) The ICAO Technical Instructions; or

(4) The TDG Regulations

(d) A package containing a sample of a hazardous material, other than an explosive, must be labeled in accordance with § 172.402(h).

§ 172.402 Additional labeling requirements. (a) Multiple labeling. Each package containing a material meeting the definition of more than one hazard class must be labeled as follows:

(1) A material classed as an Explosive A, Poison A, or Radioactive material that also meets the definition of another hazard class, must be labeled as required for each class.

(2) A Poison B liquid that also meets the definition of a Flammable liquid must be labeled POISON and FLAMMABLE LIQUID.

(3) A material classed as Oxidizer, Flammable solid or Flammable liquid that also meets the definition of a Poison B must be labeled POISON in addition to the class label.

(4) A material classed as a Flammable solid that also meets the definition of a water restrictive material must have both the FLAMMABLE SOLID and DANGEROUS WHEN WET labels affixed.

(5) A material classed as a Corrosive material that also meets the definition of a Poison B shall be labeled with a POISON label in addition to the class label. This subparagraph does not apply to a material that would cause death due to corrosive destruction of tissue rather than by systemic poisoning.

(6) A material classed as a Poison B that also meets the definition of a corrosive material shall be labeled with a CORROSIVE label in addition to the class label.

(7) A material classed as a Flammable liquid that also meets the definition of a Corrosive material shall be labeled with a CORROSIVE label in addition to the class label.

(8) A material classed as a Flammable solid that also meets the definition of a Corrosive material shall be labeled with a CORROSIVE label in addition to the class label.

(9) A material classed as an Oxidizer that also meets the definition of a Corrosive material shall be labeled with a CORROSIVE label in addition to the class label.

(10) A material falling within the inhalation hazard criteria described in § 173.3a(b)(2) shall be labeled with a POISON label in addition to any other label(s) required by this section. Duplication of the POISON label is not required.

(b) **CARGO AIRCRAFT ONLY label.** Each person who offers for transportation by air a package containing a hazardous material authorized only on cargo aircraft shall affix to the package a CARGO AIRCRAFT ONLY label which is described in § 172.448.

(c) **DANGEROUS WHEN WET label.** Each person who offers for transportation a package containing a hazardous material must affix to the package a DANGEROUS WHEN WET label as described in § 172.423 when required by § 172.101.

(d) [Reserved]

(e) **BUNG label.** Each metal barrel or drum containing a flammable liquid having a vapor pressure between 16 and 40 p s i a. at 100° F must have affixed a BUNG label as specified in § 173.119(i) of this subchapter in addition to a FLAMMABLE LIQUID label described in § 172.419.

(f) **ETIOLOGIC AGENTS label.** See § 172.444 and § 173.388 of this subchapter for ETIOLOGIC AGENTS labeling requirements.

(g) **EMPTY label.** See § 173.29 of this subchapter for EMPTY labeling requirements.

(h) **Packages containing samples.** Except as provided in §§ 173.21 and 173.86 of this subchapter, a material for which a reasonable doubt exists as to its class and labeling requirements, and for which a sample must be transported for laboratory analysis may be labeled according to the shipper's tentative class assignment based upon:

(1) Defining criteria in this subchapter;

(2) The hazard precedence prescribed in § 173.2 of this subchapter; and

(3) The shipper's knowledge of the material.

(i) **Labels for DOT specification 106 and 110 tanks.** A DOT specification 106 or 110 tank must be labeled on each end as required by this subchapter for the hazardous material it contains.

§ 172.403 Radioactive material. (a) Unless excepted from labeling by §§ 173.421 through 173.425 of this subchapter, each package of radioactive material must be labeled as provided in this section.

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) The proper label to affix to a package of radioactive material is based on the radiation level at the surface of the package, the transport index (§ 173.403 of this subchapter) and, if appropriate, the fissile characteristics of the package. The proper category of label shall be determined in accordance with paragraph (c) of this section. The label to be applied shall be the highest category required for any of the three determining conditions for the package. Radioactive White-I is the lowest category and Radioactive Yellow-III is the highest. For example: a package with a transport index of 0.8 and a maximum surface radiation level of 60 millirem per hour which contains no fissile material must bear a Radioactive Yellow-III label.

(c) Category of Label to be Applied to Radioactive Materials Packages:

Transport index (TI)	Radiation level at package surface (RL)	Fissile criteria	Label category[1]
TI=0	RL≤0.5 millirem per hour (mrem/h)	Fissile class I only, no fissile class II or III.	White-I.
0<TI≤1.0	0.5 mrem/h<RL≤50 mrem/h	Fissile class I, fissile class II, with TI≤1.0, no fissile class III	Yellow-II.
1.0<TI	50 mrem/h<RL	Fissile Class II with 1.0<TI, fissile class III.	Yellow-III.

[1]Any package containing a "highway route controlled quantity" (§ 173.403 of this subchapter) must be labeled as Radioactive Yellow-III.

(d) [Reserved]

(e) Each package containing a radioactive material that also meets the definition of one or more additional hazards must be labeled as a radioactive material as required by this section and for each additional hazard. For example:

(1) Packages containing the solid nitrates of uranium or thorium must be labeled RADIOACTIVE and OXIDIZER.

(2) Packages containing nitric acid solutions of radioactive material must be labeled RADIOACTIVE and CORROSIVE.

(f) Each package required by this section to be labeled with a RADIOACTIVE label must have two of these labels, affixed to opposite sides of the package. (See § 172.406(e)(3) for freight container label requirements).

(g) The following applicable items of information must be entered in the blank spaces on the RADIOACTIVE label by legible printing (manual or mechanical), using a durable weather resistant means of marking:

(1) "Contents." The name of the radionuclides as taken from the listing of radionuclides in § 173.435, (symbols which conform to established radiation protection terminology are authorized, i.e., ^{99}Mo, ^{60}Co, etc.). For mixtures of radionuclides, the most restrictive radionuclides on the basis of radiotoxicity must be listed as space on the label allows.

(2) "Activity." Units shall be expressed in appropriate curie units, i.e., curies (Ci), millicuries (mCi) or microcuries (uCi) (abbreviations are authorized). For a fissile material, the weight in grams or kilograms of the fissile radioisotope also may be inserted.

(3) "Transportation index." (See § 173.403 of this subchapter.)

§ 172.404 Labels for mixed and consolidated packaging. (a) Mixed packaging. When hazardous materials having different hazard classes are packed within the same packaging, or within the same outside container or overpack as described in § 173.25 and authorized by § 173.21 of this subchapter, the packaging, outside container or overpack must be labeled as required for each class of hazardous material contained therein.

(b) Consolidated packaging. When two or more packages containing compatible hazardous material (see § 173.21 of this subchapter) are placed within the same outside container or overpack, the outside container or overpack must be labeled as required for each class of hazardous material contained therein.

§ 172.405 Authorized label modifications. (a) For a package containing Oxygen, the word "OXYGEN" may be used in the place of the word "OXIDIZER" on the OXIDIZER label provided the letter size and color for OXYGEN are the same as those required for OXIDIZER.

(b) For a package containing Chlorine, the word "CHLORINE" may be used in the place of the word "POISON" on the POISON label provided the letter size and color for CHLORINE are the same as those required for POISON;

(1) A CHLORINE label may be used in place of the NON-FLAMMABLE GAS and POISON labels required for Chlorine by § 172.101.

§ 172.406 Placement of labels. (a) General. Except as provided in paragraphs (b) and (e) of this section, each label required by this subpart must be printed on or affixed to the surface of the package near the marked proper shipping name required by Subpart D of this part.

(b) Exceptions. Labels may be printed on or placed on a securely affixed tag, or may be affixed by other suitable means to:

(1) A package that contains no radioactive material and which has dimensions less than those of the required label;

(2) A compressed gas cylinder; and

(3) A package which has such an irregular surface that a label cannot be satisfactorily affixed.

(c) Placement of multiple labels. When two or more different labels are required, they must be displayed or affixed next to each other.

(d) Label border. Each label must be affixed to a background of contrasting color, or must have a dotted or solid line outer border.

(e) Additional labeling. When labeling is required, the labels must be displayed on at least two sides or two ends (excluding the bottom) of:

(1) Each package containing a radioactive material;

(2) Each package having a volume of 64 cubic feet or more; and

(3) Each freight container having a volume of 64 cubic feet or more, but less than 640 cubic feet, except when placarded in accordance with § 172.512(b).

(i) Placarding may not be used instead of labeling on a package containing radioactive material.

(ii) When labeled, one of each of the appropriate labels must be displayed on or near the closure.

(4) Each portable tank having a rated capacity of less than 1,000 gallons, except when placarded in accordance with § 172.514(a).

(f) Obscured labels. A label must not be obscured by markings or attachments.

§ 172.407 Label specifications. (a) Each label, affixed to or printed on a package must be durable and weather resistant. Black and any color on a label must be able to withstand, without substantial change:

(1) A 72-hour fadeometer test (for a description of equipment designed for this purpose, see ASTM G 23–69 (1975), or ASTM G 26–70); and

(2) A 30-day exposure to conditions incident to transportation that reasonably could be expected to be encountered by the labeled package.

(b) Each diamond (square-on-point) label prescribed in this part must be at least four inches (101 mm.) on each side with each side having a black solid line border ¼ inch (6.3 mm.) from the edge.

(c) Except for size and color, the printing, inner border, and symbol on each label must be as shown for each label.

(d) A color on a label, upon visual examination, must fall within the color tolerances displayed on the appropriate Office of Hazardous Materials Label and Placard Color Tolerance Chart.

(1) A set of six charts, dated January 1973, for comparison with labels and placards surfaced with paint, lacquer, enamel, plastic or other opaque coatings, or ink, may be purchased from the Office of Hazardous Materials Regulation, U.S. Department of Transportation, Washington, D.C. 20590, for $5.50.

(2) A set of six charts, dated January 1974, for comparison with labels and placards surfaced with ink, may be similarly purchased for $12.50.

(3) Both sets of charts may be inspected in Room 8426, Nassif Building, 400 7th Street S.W., Washington, D.C. 20590, or any of the offices of the Federal Highway Administration listed at 49 CFR 390.40.

(4) The technical specifications for each chart are set forth in Appendix A to this Part.

(e) The specified label color must extend to the edge of the label in the area designated on each label except the CORROSIVE, MAGNETIZED MATERIAL, RADIOACTIVE YELLOW-II, and RADIOACTIVE YELLOW-III labels.

(f) A label may contain form identification information, including the name of its maker, provided that information is printed outside of the solid line inner border in no larger than 10-point type.

(g) A label may contain the UN and (IMO) hazard class number and, when appropriate, the division number. The number must be:

(1) Black, unless it is on a CORROSIVE label when it must be white, or unless other colors are authorized by this Part.

(2) Located in the lower corner of the label, and

(3) One-half inch (12.7 mm.) or less in height.

(h) For import shipments only, a label conforming to the requirements of IMO or the United Nations Recommendations affixed to a package in another country may contain inscriptions required by the country of origin.

(i) The dotted line border shown on each label is not part of the label specification, except when used as an alternative for the solid line outer border to meet the requirements of § 172.406(d).

(j) EXPLOSIVE A, EXPLOSIVE B, and EXPLOSIVE C labels may bear inscriptions in addition to those prescribed in this subpart, if required for import or export purposes.

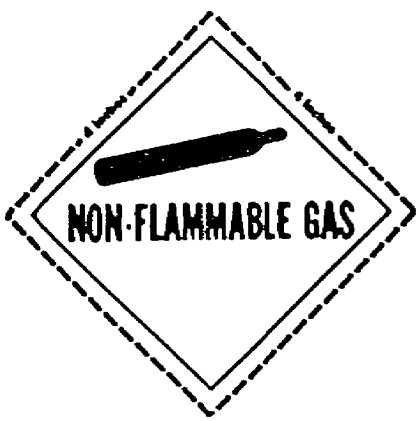
§ 172.411 EXPLOSIVE A, EXPLOSIVE B, EXPLOSIVE C, and BLASTING AGENTS labels. (a) Except for size and color, the EXPLOSIVE A, EXPLOSIVE B, and EXPLOSIVE C labels must be as follows:

(b) In addition to complying with §172.407, the **EXPLOSIVE A, EXPLOSIVE B,** and **EXPLOSIVE C** labels must be orange. The printing and symbol must be black.

(c) Except for size and color, the **BLASTING AGENT** label must be as follows:

(d) In addition to complying with §172.407, the **BLASTING AGENT** label must be orange. The printing must be black.

§ 172.415 NON-FLAMMABLE GAS label. (a) Except for size and color, the **NON-FLAMMABLE GAS** label must be as follows:

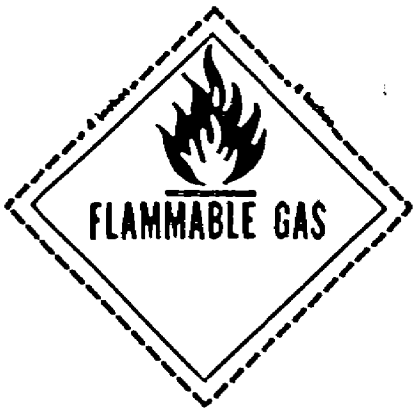


(b) In addition to the requirements specified in §172.407, the **NON-FLAMMABLE GAS** label must be green. The symbol and inscription must be black or white. The solid line border and, if used, the hazard class number must be the color of the symbol.

§ 172.416 POISON GAS label. (a) Except for size and color, the **POISON GAS** label must be as follows:

(b) In addition to complying with §172.407, the **POISON GAS** label must be white. The printing must be black, and the symbol must be black and white.

§ 172.417 FLAMMABLE GAS label. (a) Except for size and color, the **FLAMMABLE GAS** label must be as follows:



(b) In addition to complying with §172.407, the **FLAMMABLE GAS** label must be red. The symbol and inscription must be black or white. The solid line border and, if used, the hazard class number must be the color of the symbol.

§ 172.419 FLAMMABLE LIQUID label. (a) Except for size and color, the **FLAMMABLE LIQUID** label must be as follows:

(b) In addition to complying with §172.407, the **FLAMMABLE LIQUID** label must be red. The symbol and inscription must be black or white. The solid line border and, if used, the hazard class number must be the color of the symbol.

§ 172.420 FLAMMABLE SOLID label. (a) Except for size and color, the **FLAMMABLE SOLID** label must be as follows:

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) In addition to complying with §172.407, the **FLAMMABLE SOLID** label must be white with vertical red stripes equally spaced on each side of a red strip in the center of the label. The rectangle for the words "**FLAMMABLE SOLID**" must be white. The printing and symbol must be black with the symbol overprinted. The words "**FLAMMABLE SOLID**" must not contact any red stripe. The white stripes must be sufficiently wider than the red stripes to make them appear visually equal in width.

§ 172.422 SPONTANEOUSLY COMBUSTIBLE label. (a) Except for size and color, the **SPONTANEOUSLY COMBUSTIBLE** label must be as follows:

(b) In addition to complying with §172.407, the **SPONTANEOUSLY COMBUSTIBLE** label must be red in the lower half and white in the upper half. The symbol and printing must be black.

(c) If use of the **SPONTANEOUSLY COMBUSTIBLE** label is required by the regulations of another country, it may be used in addition to the labels required by §§172.400 and 172.402.

§ 172.423 DANGEROUS WHEN WET label. (a) Except for size and color, the **DANGEROUS WHEN WET** label must be as follows:

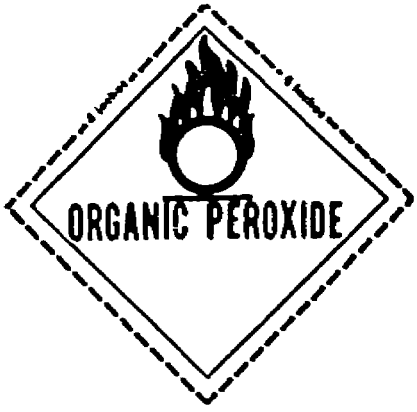
(b) In addition to complying with §172.407, the **DANGEROUS WHEN WET** LABEL must be blue. The symbol and inscription must be black or white. The solid line border and, if used, the hazardous class number must be the color of the symbol.

(c) If use of the **DANGEROUS WHEN WET** label is required by the regulations of another country, it may be used in addition to the labels required by §§172.400 and 172.402.

§ 172.426 OXIDIZER label. (a) Except for size and color, the **OXIDIZER** label must be as follows (see §172.405 for authorized label modification):

(b) In addition to complying with §172.407, the **OXIDIZER** label must be yellow. The printing and symbol must be black.

§ 172.427 ORGANIC PEROXIDE label. (a) Except for size and color, the **ORGANIC PEROXIDE** label must be as follows:

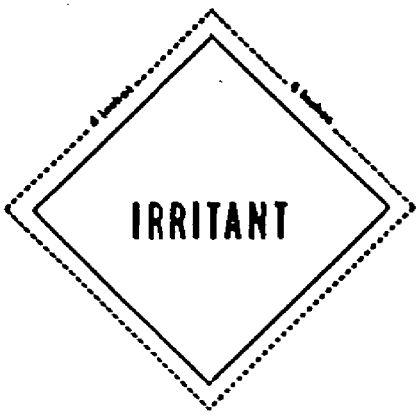


(b) In addition to complying with §172.407, the **ORGANIC PEROXIDE** label must be yellow. The printing and symbol must be black.

§ 172.430 POISON label. (a) Except for size and color, the **POISON** label must be as follows (see §172.405 for authorized label modification):

(b) In addition to complying with §172.407, the **POISON** label must be white. The printing and symbol must be black.

§ 172.432 IRRITANT label. (a) Except for size and color, the IRRITANT label must be as follows:



(b) In addition to complying with § 172.407, the IRRITANT label must be white. The word "IRRITANT" must be red.

(c) For export shipments, if use of the following label is required for irritants by the regulations of another country, it may be used in place of the label for irritants required by § 172.400 and described in § 172.432. In addition to complying with § 172.407, this label for irritant, except for size and color, must be as follows:

(d) The printing and symbol must be black on a white background.

§ 172.436 RADIOACTIVE WHITE-I label. (a) Except for size and color, the RADIOACTIVE WHITE-I label must be as follows:

(b) In addition to complying with § 172.407, the RADIOACTIVE WHITE-I label must be white. The printing and symbol must be black except for the "I" which must be red.

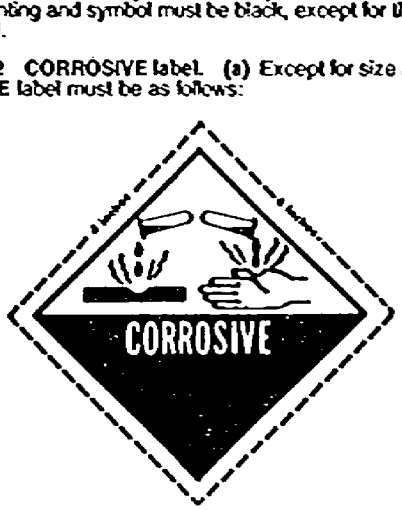
§ 172.438 RADIOACTIVE YELLOW-II label. (a) Except for size and color, the RADIOACTIVE YELLOW-II label must be as follows:

(b) In addition to complying with § 172.407, the RADIOACTIVE YELLOW-II label must be yellow in the top half and white in the lower half. The printing and symbol must be black, except for the "II" which must be red.

§ 172.440 RADIOACTIVE YELLOW-III label. (a) Except for the size and color, the RADIOACTIVE YELLOW-III label must be as follows:

(b) In addition to complying with § 172.407, the RADIOACTIVE YELLOW-III label must be yellow in the top half and white in the lower half. The printing and symbol must be black, except for the "III" which must be red.

§ 172.442 CORROSIVE label. (a) Except for size and color, the CORROSIVE label must be as follows:



(b) In addition to complying with § 172.407, the CORROSIVE label must be white in the top half and black in the lower half. The printing must be white and the symbol must be black and white.

§ 172.444 ETIOLOGIC AGENT label. (a) Each package containing an Etiologic agent subject to this subchapter must be labeled as specified in § 173.388 of this subchapter.

(b) For export shipments, if use of the following label is required by the regulations of another country, it may be used in addition to the label required in paragraph (a) of this section for Etiologic agents. In addition to complying with § 172.407, this additional label for Etiologic agents, except for size and color, must be as follows:

(c) The printing and symbol must be black on a white background.

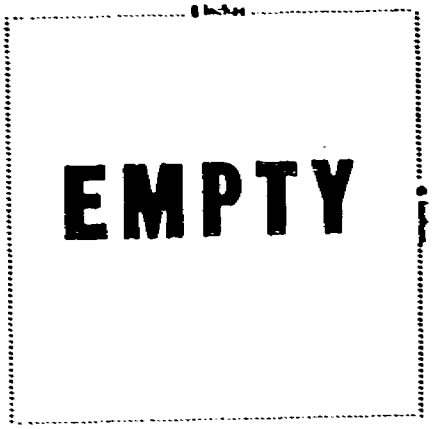
§ 172.448 [Reserved]

§ 172.448 CARGO AIRCRAFT ONLY label. (a) Except for size and color, the CARGO AIRCRAFT ONLY label must be as follows:

(b) The CARGO AIRCRAFT ONLY label must be a rectangle measuring 4 $\frac{5}{16}$ inches (110 mm.) high by 4 $\frac{3}{4}$ inches (120 mm.) wide. The printing must be black and the symbol must be black and orange.

(c) CARGO AIRCRAFT ONLY labels with the text "DANGER-PELIGRO" may continue to be used until stocks existing on January 1, 1983, are depleted.

§ 172.450 EMPTY label. (a) Each EMPTY label, except for size, must be as follows:



(1) Each side must be at least 6 inches (152 mm.) with each letter at least 1 inch (25.4 mm.) in height.

(2) The label must be white with black printing.

SUBPART F

PLACARDING

§ 172.500 Applicability of placarding requirements.

(a) Each person who offers for transportation or transports any hazardous material subject to this subchapter shall comply with the applicable placarding requirements of this subpart.

(b) This subpart does not apply to:

(1) Etiologic agents.

(2) Hazardous materials classed as ORM—A, B, C, D, or E, or

(3) Hazardous materials authorized by this subchapter to be offered

for transportation as Limited Quantities when identified as such on shipping papers in accordance with §172.203(b).

§ 172.502 Prohibited placarding. (a) Except as provided in paragraph (c) of this section, no person may affix or display on a transport vehicle, portable tank or freight container any placard described in this subpart unless:

(1) The material being offered or transported is a hazardous material, and

(2) The placard represents a hazard of the hazardous material being offered or transported.

(b) No person may affix or display any sign or other device on a transport vehicle, portable tank, or freight container, that by its color, design, shape, or content could be confused with any placard prescribed in this subpart.

(c) The restrictions in paragraphs (a) and (b) of this section do not apply to transport vehicles, portable tanks, or freight containers which—

(1) In addition to any placards required by this Part, may be placarded in conformance with the IMDG Code; or

(2) Are placarded in conformance with the TDG Regulations.

§ 172.503 Identification number display on placards.

For procedures and limitations pertaining to the display of identification numbers on placards, see §172.334.

§ 172.504 General placarding requirements. (a) Except as otherwise provided in this subchapter, each transport vehicle, and freight container containing any quantity of a hazardous material must be placarded on each end and each side with the type of placards specified in the following tables and other placarding requirements of this subpart, including the specifications for the placards named in the tables and described in detail in §§172.519 through 172.558.

TABLE 1

If the transport vehicle, or freight container contains a material classed (described) as—.	The transport vehicle or freight container must be placarded on each side and each end—
Class A explosives	EXPLOSIVES A.[1]
Class B explosives	EXPLOSIVES B.[2]
Poison A	POISON GAS.[4]
Flammable solid (DANGEROUS WHEN WET label only)	FLAMMABLE SOLID W.[3]
Radioactive material	RADIOACTIVE.[4,5]
Radioactive material:	
Uranium hexafluoride, fissile (containing more than 1.0 pct U^{235})	RADIOACTIVE[4] and CORROSIVE.[6]
Uranium hexafluoride, low specific activity (containing 1.0 pct or less U^{235})	RADIOACTIVE[4,5] and CORROSIVE.[6]

[1] See §172.510(a).

[2] EXPLOSIVES B placard not required if the transport vehicle or freight container contains class A explosives and is placarded EXPLOSIVES A as required.

[3] FLAMMABLE SOLID "W" placard is required only when the DANGEROUS WHEN WET label is specified in §172.101 for a material classed as a Flammable solid.

[4] Applies only to any quantity of packages bearing the RADIOACTIVE YELLOW III label. (See §172.403.)

[5] For exclusive use shipments [see §173.403] of low specific activity radioactive materials transported in accordance with §173.425(b) or (c).

[6] CORROSIVE placard not required for shipments of less than 1000 pounds gross weight.

TABLE 2

If the transport vehicle, or freight container contains a material classed (described) as—.	The transport vehicle or freight container must be placarded on each side and each end—
Class C explosives	DANGEROUS.[1,8]
Blasting agents	BLASTING AGENTS.[8,10]
Nonflammable gas	NONFLAMMABLE GAS.[8]
Nonflammable gas (chlorine)	CHLORINE.[7]
Nonflammable gas (fluorine)	POISON.
Nonflammable gas (oxygen, cryogenic liquid)	OXYGEN.
Flammable gas	FLAMMABLE GAS.[8]
Combustible liquid	COMBUSTIBLE.[3,4]
Flammable liquid	FLAMMABLE.
Flammable solid	FLAMMABLE SOLID.[3]
Oxidizer	OXIDIZER.[8,10]
Organic peroxide	ORGANIC PEROXIDE.
Poison B	POISON.
Corrosive material	CORROSIVE.[8]
Irritating material	DANGEROUS.

[1] Applies only to a class C explosive required to be labeled with an EXPLOSIVE C label.

[2] [Reserved]

[3] COMBUSTIBLE placard required only when a material classed as a combustible liquid is transported in a packaging having a rated capacity of more than 110 gallons, a cargo tank, or a tank car.

[4] A FLAMMABLE placard may be used on a cargo tank or portable tank during transportation by highway, rail or water, and on a compartmented tank car containing materials classed as flammable liquid and combustible liquid.

[5] Except when offered for transportation by water, a FLAMMABLE placard may be displayed in place of a FLAMMABLE SOLID placard except when a DANGEROUS WHEN WET label is specified for the material in sec. 172.101. (See table 1, this section.)

[6] See §173.245(b) of this subchapter for authorized exemptions.

[7] CHLORINE placard required only for a packaging having a rated capacity of more than 110 gallons, the NON FLAMMABLE GAS placard for packagings having a rated capacity of 110 gallons or less.

[8] A NON FLAMMABLE GAS placard is not required on a motor vehicle displaying a FLAMMABLE GAS placard or an OXYGEN placard.

[9] BLASTING AGENTS, OXIDIZER and DANGEROUS placards need not be displayed if a transport vehicle or freight container also contains Class A or Class B explosives and is placarded EXPLOSIVES A or EXPLOSIVES B as required.

[10] Except for shipments by water, OXIDIZER placards need not be displayed if a freight container, motor vehicle or rail car also contains blasting agents and is placarded BLASTING AGENT as required.

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) A transport vehicle or freight container containing two or more classes of materials requiring different placards specified in Table 2 may be placarded DANGEROUS in place of the separate placarding specified for each of those classes of material specified in Table 2. However, when 5,000 pounds or more of one class of material is loaded therein at one loading facility, the placard specified for that class in Table 2 must be applied. This paragraph does not apply to a portable tank, cargo tank, or tank car.

(c) When the gross weight of all hazardous materials covered by Table 2 is less than 1000 pounds, no placard is required on a transport vehicle, or freight container for the Table 2 materials. A Table 1 material must be placarded as specified in Table 1. This paragraph does not apply to portable tanks, cargo tanks, tank cars, transportation by air or water, or transport vehicles and freight containers subject to §172.505.

(d) Any packaging having a capacity of 110 gallons or less that contains only the residue of a hazardous material covered by Table 2 of this section need not be included in determining the applicability of the placarding requirements.

§ 172.505 Special placarding requirements for certain poisonous materials. Each transport vehicle and freight container that contains a material subject to the "Poison-Inhalation Hazard" shipping paper description of §172.203(k)(4) must be placarded POISON on each side and each end in addition to the placards required by §172.504. This requirement also applies to portable tanks. Duplication of POISON placards is not required nor display of UN class numbers at the bottom of additional placards required by this section.

§ 172.506 Providing and affixing placards: Highway. (a) Each person offering a motor carrier a hazardous material for transportation by highway shall provide to the motor carrier the required placards for the material being offered prior to or at the same time the material is offered for transportation, unless the carrier's motor vehicle is already placarded for the material as required by this subpart.

(1) No motor carrier may transport a hazardous material in a motor vehicle, unless the placards required for the hazardous material are affixed thereto as required by this subpart.

§ 172.507 Special placarding provisions: Highway. (a) Each motor vehicle used to transport a package of highway route controlled quantity radioactive materials (see §173.403(l) of this subchapter) must have the required RADIOACTIVE warning placard placed on a square background as described in §172.527.

(b) A nurse tank, meeting the provisions of §173.315(m) of this subchapter, is not required to be placarded on an end containing valves, fittings, regulators or gauges when those appurtenances prevent the markings and placard from being properly placed and visible.

§ 172.508 Placarding and affixing placards: rail. (a) Each person offering a hazardous material for transportation by rail shall affix to the rail car containing the material, the placards specified by this subpart for the material unless the placards already displayed on motor vehicles, transport containers, or portable tanks that are on the rail car comply with §§172.502 and 172.504 as these sections pertain to placarding the rail car.

(b) No rail carrier may accept a rail car containing a hazardous material for transportation unless the placards for the hazardous material are affixed thereto as required by this subpart.

§ 172.510 Special placarding provisions: Rail. (a) **Square background required.** Each EXPLOSIVE A placard, POISON GAS placard and POISON GAS—RESIDUE, placard affixed to a rail car must be placed on a square background as described in §172.527.

(b) **RESERVED.**

(c) **RESIDUE placard.** Each tank car containing the residue of a hazardous material must be placarded with the appropriate RESIDUE placards, as required in §172.525 and paragraph (a) of this section. The RESIDUE placard must correspond to the placard that was required for the material the tank car contained when loaded, unless the tank car—

(1) Is reloaded with a material requiring no placards or different placards; or

(2) Is sufficiently cleaned of residue and purged of vapor to remove any potential hazard.

(d) **FUMIGATION placard.** Each transport vehicle and freight container containing lading that has been fumigated or treated with poisonous liquid, solid, or gas, and that is offered for transportation by rail must have the placard specified in §173.9 of this subchapter affixed on or near each door.

(e) **Chemical ammunition.** Each rail car containing Class A explosive ammunition which has the additional hazard of Poison A must be placarded EXPLOSIVES A and POISON GAS.

§ 172.512 Freight containers and aircraft unit load devices. (a) **Capacity of 640 cubic feet or more.** Each person who offers for transportation, and each person who loads and transports, a hazardous material in a freight container or aircraft unit load device having a capacity of 640 cubic feet or more shall affix to the freight container or aircraft unit load device the placards specified for the material in accordance with §172.504. However:

(1) The placarding exception provided in §172.504(c) applies to motor vehicles transporting freight containers and aircraft unit load devices,

(2) The placarding exception provided in §172.504(c) applies to each freight container and aircraft unit load device being transported for delivery to a consignee immediately following an air or water shipment, and,

(3) Placarding is not required on a freight container or aircraft unit load device if it is only transported by air and is identified as containing a hazardous material in the manner provided in Part 5, Chapter 2, Section 2.7, of the ICAO Technical Instructions.

(b) **Capacity less than 640 cubic feet.** Each person who offers for transportation by air, and each person who loads and transports by air, a hazardous material in a freight container or aircraft unit load device having a capacity of less than 640 cubic feet shall affix one placard of the type specified by paragraph (a) of this section unless the freight container or aircraft load unit device:

(1) Is labeled in accordance with §172.406(e)(3);

(2) Contains radioactive materials requiring the Radioactive Yellow III label and is placarded with one Radioactive placard and is labeled in accordance with §172.406(e); or,

(3) Is identified as containing a hazardous material in the manner provided in Part 5, Chapter 2, Section 2.7, of the ICAO Technical Instructions. When hazardous materials are offered for transportation, not involving air transportation, in a freight container having a capacity of less than 640 cubic feet the freight container need not be placarded. However, if not placarded it must be labeled in accordance with Subpart E of this part.

(c) Notwithstanding paragraphs (a) and (b) of this section, packages containing hazardous materials, other than ORM-D, offered for transportation by air in freight containers are subject to the inspection requirements of §175.30 of this chapter.

§ 172.514 Cargo tanks and portable tanks. (a) Each person who offers for transportation a cargo tank or a portable tank containing a hazardous material shall affix the placards specified for the material in accordance with §172.504(a). However, if placarded instead of labeled as provided in §172.406(e)(4), a portable tank having a rated capacity of less than 1,000 gallons need be placarded on only two opposite sides.

(b) Each cargo tank and portable tank that is required to be placarded when it contains a hazardous material must remain placarded when it is emptied unless it is:

(1) Reloaded with a material not subject to this subchapter; or

(2) Sufficiently cleaned and purged of vapors to remove any potential hazard.

§ 172.516 Visibility and display of placards. (a) Each placard on a motor vehicle and each placard on a rail car must be readily visible from the direction it faces except from the direction of another motor vehicle or rail car to which the motor vehicle or rail car is coupled. This requirement may be met by the placards displayed on the freight containers or portable tanks loaded on a motor vehicle or rail car.

(b) The required placarding of the front of a motor vehicle may be on the front of a truck-tractor instead of or in addition to the placarding on the front of the cargo body to which a truck-tractor is attached.

(c) Each placard on a transport vehicle, portable tank or freight container must:

(1) Be securely attached or affixed thereto or placed in a holder thereon. (See Appendix C to this part.);

(2) Be located clear of appurtenances and devices such as ladders, pipes, doors, and tarpaulins;

(3) So far as practicable, be located so that dirt or water is not directed to it from the wheels of the transport vehicle;

(4) Be located away from any marking (such as advertising) that could substantially reduce its effectiveness, and in any case at least 3 inches (76.0 mm.) away from such marking;

(5) Have the words or identification number (when authorized) printed on it displayed horizontally, reading from left to right;

(6) Be maintained by the carrier in a condition so that the format, legibility, color, and visibility of the placard will not be substantially reduced due to damage, deterioration, or obscurement by dirt or other matter.

(d) Recommended specifications for a placard holder are set forth in Appendix C of this part. Except for a placard holder similar to that contained in Appendix C to this part, the means used to attach a placard may not obscure any part of its surface other than the borders.

(e) A placard or placard holder may be hinged provided the required format, color, and legibility of the placard are maintained.

§ 172.519 General specifications for placards. (a) A placard may be made of any plastic, metal, or other material that is equal to or better in strength and durability than the tagboard specified in paragraph (b) of this section. Also, reflective or retroreflective materials may be used on a placard providing the prescribed colors, strength and durability are maintained.

(b) A placard made of tagboard must be of material that has:

(1) A quality at least equal to that designated commercially as white tagboard,

(2) A weight of 175 pounds per ream of 24 by 36 inch sheets (waterproofing material included);

(3) The ability to pass a 60 p s i. Mullen test; and

(4) Been treated with plastic or other waterproofing material that will give it the ability to withstand open weather exposure (including rain) for 30 days without a substantial reduction in effectiveness.

(c) A placard may contain form identification information, including the name of its maker if that information is printed in the outer ½-inch (12.7 mm.) border in no larger than 10-point type.

(d) The hazard class and division number prescribed for dangerous goods in the UN Recommendations titled "Transport of Dangerous Goods" may be entered in the lower corner of the diamond on each placard. If a placard is used to display identification numbers as authorized by §172.332, the class number must be entered in a numeral approximately 1¾-inches (45 mm.) in height (numeral height may be between 1⅝ inches (41 mm.) and 1¾ inches (45 mm.)). It must be black on each placard except when on a **NON-FLAMMABLE GAS, FLAMMABLE GAS, FLAMMABLE, COMBUSTIBLE** or **CORROSIVE** placard. The class numbers on a **NON-FLAMMABLE GAS, FLAMMABLE GAS, FLAMMABLE** and **COMBUSTIBLE** placard may be white or black. The class number on a **CORROSIVE** placard must be white and on a **COMBUSTIBLE** placard with a white bottom as prescribed by §172.332(c)(4), the class number must be red or black.

(e) Surface pigmentation on a placard must meet the following requirements:

(1) Black and any color must be able to withstand, without substantial change:

(i) A 72-hour fadeometer test (for a description of equipment designed for this purpose, see ASTM G 23–69 (1975), or ASTM G 26–70); and

(ii) A 30-day exposure to open weather conditions.

(2) A color on a placard, upon visual examination, must fall within the color tolerances displayed on the appropriate Office of Hazardous Materials Label and Placard Color Tolerance Chart (see §172.407(d)).

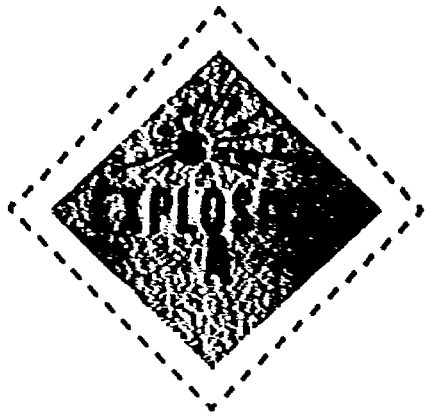
(f) Except as provided in §172.332, placards shall be as described in this section and as prescribed in Appendix B to this part.

(g) The dotted line at the outside of the ½ inch (12.7 mm.) white border on each placard is not part of the placard specification. However, a dotted or solid line outer border may be used when needed to indicate the full size of a placard that is part of a larger format or is on a background the color of which does not contrast with the placard color.

§ 172.521 DANGEROUS placard. (a) Except for size and color, the **DANGEROUS** placard must be as follows:

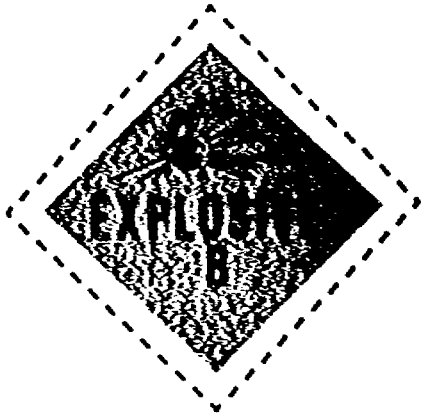
(b) In addition to meeting the requirements of §172.519, the Appendix B to this part, the **DANGEROUS** placard must have a red upper and lower triangle. The placard center area and ½ inch (12.7 mm.) border must be white. The inscription must be black with the ⅛ inch (3.2 mm.) border marker in the white area at each end of the inscription red.

§ 172.522 EXPLOSIVES A placard. (a) Except for size and color, the **EXPLOSIVES A** placard must be as follows:



(b) In addition to meeting the requirements of §172.519, and Appendix B to this part, the **EXPLOSIVES A** placard must be orange with a ½ inch (12.7 mm.) white outer border. The symbol and print must be black.

§ 172.523 EXPLOSIVES B placard. (a) Except for size and color, the **EXPLOSIVES B** placard must be as follows:



(b) In addition to meeting the requirements of §172.519 and Appendix B to this part, the **EXPLOSIVES B** placard must be orange with a ½ inch (12.7 mm.) white outer border. The symbol and print must be black.

§ 172.524 BLASTING AGENTS placard.

(a) Except for size and color, the **BLASTING AGENTS** placard must be as follows:

(b) In addition to meeting the requirements of this part, the **BLASTING AGENTS** placard must be orange with a ½-inch (12.7 mm) white outer border. The printing must be black.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 172.525 Standard requirements for the RESIDUE placard.

(a) Each RESIDUE placard must be as follows:

(1) Except as provided in paragraph (a)(3) of this section, the lower triangle of the RESIDUE placard must be black and the word "RESIDUE" must be in white letters approximately 1 inch (25 mm) high, made with approximately ¼ inch (6 mm) stroke. Use of RESIDUE placards displaying the word "RESIDUE" in 1½ inch lettering is authorized until July 1, 1987.

(2) Except for the POISON GAS, RADIOACTIVE, EXPLOSIVES, or subsidiary placard required by § 172.505, the RESIDUE placard may be used to display the appropriate identification number in accordance with the provisions of Subpart D of this part.

(3) For a combustible liquid residue, the lower triangle of the RESIDUE placard must be white and the word "RESIDUE" must be in black letters.

(4) Otherwise, the RESIDUE placard must be as specified in § 172.519 and Appendix B to this Part, and §§ 172.528, 172.530, 172.532, 172.536, 172.540, 172.542, 172.544, 172.546, 172.548, 172.550, 172.552, 172.554 and 172.558, as appropriate for the residue of the hazardous material being transported and required by this subchapter to be placarded. No other placard may be used as a RESIDUE placard.

(b) The lower part of each placard must be as specified in Appendix B to this Part and as illustrated on the FLAMMABLE—RESIDUE placard which, except for size and color, must be as follows:

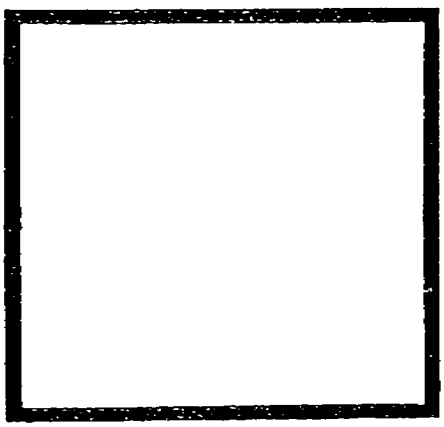
(c) The RESIDUE placard must be as shown in paragraph (b) of this section and may be—

(1) A separate placard;

(2) On the reverse side of a placard, or

(3) A composite made according to the specifications in this section, and paragraph (a)(10) of Appendix B to this Part. The lower triangle of the appropriate placard should have a black triangle bearing the word RESIDUE in white letters with the appropriate hazard class number in white.

§ 172.527 Background requirements for certain placards. (a) Except for size and color, the square background required by § 172.510(a) for certain placards on rail cars, and § 172.507 for placards on motor vehicles containing a package of highway route controlled quantity radioactive materials, must be as follows:

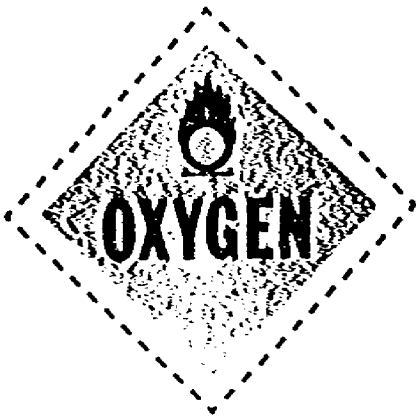


(b) In addition to meeting the requirements of § 172.519 for minimum durability and strength, the square background must consist of a white square measuring 14½ inches (362.0 mm.) on each side surrounded by a black border extending to 15¼ inches 387.0 mm.) on each side.

§ 172.528 NON-FLAMMABLE GAS placard. (a) Except for size and color, the NON-FLAMMABLE GAS placard must be as follows:

(b) In addition to meeting the requirement of § 172.519, and Appendix B to this part, the NON-FLAMMABLE GAS placard must be green with the symbol, inscription, and ½ inch (12.7 mm.) border white.

§ 172.530 OXYGEN placard. (a) Except for size and color, the OXYGEN placard must be as follows:



(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the OXYGEN placard must be yellow with ½ inch (12.7 mm) white border. The symbol and inscription must be black.

§ 172.532 FLAMMABLE GAS placard. (a) Except for size and color, the FLAMMABLE GAS placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the FLAMMABLE GAS placard must be red with the symbol, inscription, and ½ inch (12.7 mm.) border white.

§ 172.538 CHLORINE placard. (a) Except for size, the CHLORINE placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the CHLORINE placard must be a white 10¾ inches (273.0 mm.) square-on-point with a ⅛ inch (3.2 mm.) black solid line border ½ inch (12.7 mm.) in from each edge. The symbol and inscription must be black.

§ 172.540 POISON GAS placard. (a) Except for size, the POISON GAS placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the POISON GAS placard must be a white 10¾ inches (273.0 mm.) square-on-point with a ⅛ inch (3.2 mm.) black solid line border ½ inch (12.7 mm.) in from each edge. The symbol and inscription must be black.

§ 172.542 FLAMMABLE placard and modification. (a) Except for size and color, the FLAMMABLE placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part the FLAMMABLE placard must be red with white symbol, inscription, and ½-inch (12.7 mm.) border.

(c) The word "GASOLINE" may be used in place of the word "FLAMMABLE" on the placard that is displayed on a cargo tank or portable tank being used to transport gasoline by highway. The word "GASOLINE" must be in letters of the same size and color as those in the word "FLAMMABLE."

§ 172.544 COMBUSTIBLE placard and modification. (a) Except for size and color, the COMBUSTIBLE placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the COMBUSTIBLE placard must be red with white symbol, inscription, and ½ inch (12.7 mm.) border.

(c) The words "FUEL OIL" may be used in place of the word "COMBUSTIBLE" on the placard that is displayed on a cargo tank or portable tank being used to transport by highway fuel oil that is not classed as a flammable liquid. The words "FUEL OIL" must be in letters of the same size and color as those in the word "COMBUSTIBLE."

§ 172.548 FLAMMABLE SOLID placard. (a) Except for size and color, the FLAMMABLE SOLID placard must be as follows:

(b) In addition to complying with § 172.519 and Appendix B to this part, the FLAMMABLE SOLID placard must be white with seven vertical red stripes and a ½ inch (12.7 mm.) white border. The symbol and inscription must be black.

§ 172.548 FLAMMABLE SOLID W placard. (a) Except for size and color, the FLAMMABLE SOLID W placard must be as follows:

(b)

(1) The triangle at the top of the **FLAMMABLE SOLID W** placard must be blue with a white symbol, otherwise, the specifications for the **FLAMMABLE SOLID W** placard are the same as those for the **FLAMMABLE SOLID** placard.

(2) The **FLAMMABLE SOLID W** placard may be:

(i) A separate placard;

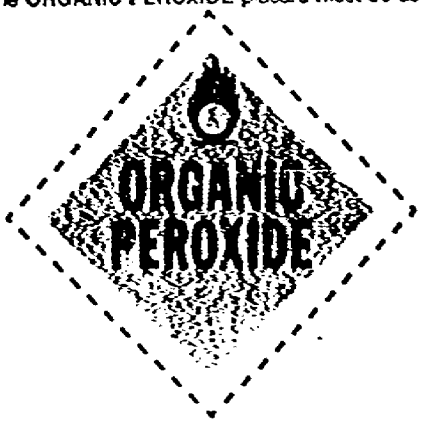
(ii) On the reverse side of a placard; or

(iii) A composite made by covering the top triangle of the **FLAMMABLE SOLID** placard with the blue triangle and white symbol as shown in paragraph (a) of this section.

§ 172.550 OXIDIZER placard. (a) Except for size and color, the **OXIDIZER** placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the **OXIDIZER** placard must be yellow with a ½ inch (12.7 mm.) white border. The symbol and inscription must be black.

§ 172.552 ORGANIC PEROXIDE placard. (a) Except for size and color, the **ORGANIC PEROXIDE** placard must be as follows:



(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part the **ORGANIC PEROXIDE** placard must be yellow with a ½ inch (12.7 mm.) white border. The symbol and inscription must be black.

§ 172.554 POISON placard. (a) Except for size, the **POISON** placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the **POISON** placard must be white with a ⅛ inch (3.2 mm.) black solid line border ½ inch (12.7 mm.) in from the edge. The symbol and inscription must be black.

§ 172.556 RADIOACTIVE placard. (a) Except for size and color, the **RADIOACTIVE** placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the **RADIOACTIVE** placard must have the top portion yellow with the symbol black. The lower portion must be white and the inscription black.

§ 172.558 CORROSIVE placard. (a) Except for size, the **CORROSIVE** placard must be as follows:

(b) In addition to meeting the requirements of § 172.519, and Appendix B to this part, the **CORROSIVE** placard must have the center and lower area black except for the letters in the word "**CORROSIVE**" which must be white. The symbol must be black and white.

Appendix A—Office of Hazardous Materials Regulation Color Tolerance Charts and Tables

The following are Munsell notations and Commission Internationale de L'Eclairage [CIE] coordinates which describe the Office of Hazardous Materials Transportation Label and Placard Color Tolerance Charts in Tables 1 and 2, and the CIE coordinates for the color tolerances specified in Table 3. Central colors and tolerances described in Table 2 approximate those described in Table 1 while allowing for differences in production methods and materials used to manufacture labels and placards surfaced with printing inks. Primarily, the color charts based on Table 1 are for label or placard colors applied as opaque coatings such as paint, enamel or plastic, whereas color charts based on Table 2 are intended for use with labels and placards surfaced only with inks.

For labels printed directly on packaging surfaces, Table 3 may be used, although compliance with either Table 1 or Table 2 is sufficient. However, if visual reference indicates that the colors of labels printed directly on package surfaces are outside the Table 1 or 2 tolerances, a spectrophotometer or other instrumentation may be required to insure compliance with Table 3.

TABLE 1.—Specifications for Color Tolerance Charts for Use with Labels and Placards Surfaced with Paint, Lacquer, Enamel, Plastic, Other Opaque Coatings, or Ink.[1]

Color	Munsell notation	CIE data for Source C		
		Y	x	y
Red:				
Central color	7.5R 4.0/14	12.00	.5959	.3269
Orange	8.5R 4.0/14	12.00	.6037	.3389
Purple and vivid	6.5R 4.0/14	12.00	.5869	.3154
Grayish	7.5R 4.0/12	12.00	.5603	.3321
Vivid	7.5R 4.0/16	12.00	.6260	.3132
Light	7.5R 4.5/14	15.57	.5775	.3320
Dark	7.5R 3.5/14	09.00	.6226	.3141
Orange:				
Central color	5.0YR 6.0/15	30.05	.5510	.4214
Yellow and grayish	6.25YR 6.0/15	30.05	.5452	.4329
Red and vivid	3.75YR 6.0/15	30.05	.5552	.4091
Grayish	5.0YR 6.0/13	30.05	.5311	.4154
Vivid	5.0YR 6.0/16	30.05	.5597	.4239
Light	5.0YR 6.5/15	36.20	.5427	.4206
Dark	5.0YR 5.5/15	24.58	.5606	.4218
Yellow:				
Central color	5.0Y 8.0/12	58.19	.4562	.4788
Green	8.5Y 8.0/12	58.19	.4438	.4565
Orange and vivid	3.5Y 8.0/12	58.19	.4532	.4568
Grayish	5.0Y 8.0/10	58.19	.4378	.4501
Vivid	5.0Y 8.0/14	58.19	.4599	.4320
Light	5.0Y 8.5/12	68.42	.4508	.4754
Dark	5.0Y 7.5/12	50.68	.4620	.4323
Green:				
Central color	7.5G 4.0/9	12.00	.2111	.4121
Bluish	8.5BG 4.0/9	12.00	.1974	.3839
Green yellow	5.0G 4.0/9	12.00	.2237	.4399
Grayish A	7.5G 4.0/7	12.00	.2350	.3922
Grayish B[2]	7.5G 4.0/6	12.00	.2467	.3622
Vivid	7.5G 4.0/11	12.00	.1843	.4319
Light	7.5G 4.5/9	15.57	.2204	.4060
Dark	7.5G 3.5/9	09.00	.2027	.4183
Blue:				
Central color	2.5PB 3.5/10	09.00	.1691	.1744
Purple	4.5PB 3.5/10	09.00	.1796	.1711
Green and vivid	10.0B 3.5/10	09.00	.1557	.1815
Grayish	2.5PB 3.5/8	09.00	.1858	.1964
Vivid	2.5PB 3.5/12	09.00	.1518	.1547
Light	2.5PB 4.0/10	12.00	.1805	.1838
Dark	2.5PB 3.0/10	06.55	.1576	.1500
Purple:				
Central color	10.0P 4.5/10	15.57	.3007	.2245
Reddish purple	2.5RP 4.5/10	15.57	.3584	.2377
Blue purple	7.5P 4.5/10	15.57	.3068	.2145
Reddish gray	10.0P 4.5/8	15.57	.3280	.2391
Gray[2]	10.0P 4.5/0.5	15.57	.3254	.2518
Vivid	10.0P 4.5/12	15.57	.3333	.2101
Light	10.0P 5.5/10	19.77	.3308	.2328
Dark	10.0P 4.0/10	12.00	.3306	.2182

[1] Maximum chroma is not limited.

[2] For the colors green and purple, the minimum saturation (chroma) limits for porcelain enamel on metal are lower than for most other surface coatings. Therefore, the minimum chroma limits of these 2 colors as displayed on the Charts for comparison to porcelain enamel on metal is low, as shown for green (grayish B) and purple (gray).

Note.—CIE-Commission Internationale de L'Eclairage

TABLE 2.—Specifications for Color Tolerance Charts for Use With Labels and Placards Surfaced With Ink.

Color	Munsell notation	CIE data for Source C		
		Y	x	y
Blue:				
Central series				
Central color	3.5PB 3.5/9.7	11.58	.1585	.1911
Green and Grayish A	2.0PB 4.3/8.7	14.41	.1962	.2099
Green and Grayish B	1.7PB 4.2/9.9	13.50	.1838	.2053
Vivid	2.9PB 3.8/19.7	10.78	.1818	.1852
Purple and vivid A	4.7PB 3.5/13.0.9	9.15	.1817	.1727
Purple and vivid B	5.0PB 3.7/19.9	10.20	.1838	.1798
Grayish	3.75PB 4.0/3.9.1	12.17	.1943	.1961
Light series				
Light and green A	1.7PB 4.3/2.9.2	14.22	.1904	.2056
Light and green B	1.5PB 4.1/1.9.6	12.72	.1815	.1971
Light and vivid	3.2PB 3.9/5.10.05	11.70	.1831	.1368
Dark series				
Dark and grayish	3.9PB 4.0/1.8.7	12.04	.1882	.1992
Dark and purple A	4.8PB 3.6/7.9.3	9.95	.1918	.1831
Dark and purple B	5.2PB 3.8/3.9.05	10.76	.1885	.1355
Purple:				
Central series				
Central color	9.5P 4.7/11.3	17.25	.3274	.2165
Red	1.0RP 5.3/1.0.8	22.70	.3424	.2354
Red and vivid A	1.4RP 5.0/0.11.9	19.78	.3500	.2274
Red and vivid B	0.2RP 4.3/9.12.5	14.70	.3365	.2059
Vivid	8.0P 4.0/4.12.8	12.23	.3098	.1316
Blue	7.0P 4.3/9.10.8	14.71	.3007	.2037
Grayish	8.8P 5.0/0.10.3	19.73	.3191	.2251
Light series				
Light and red A	0.8RP 5.5/6.11.1	25.18	.3387	.2356
Light and red B	1.1RP 5.2/7.12.3	22.27	.3450	.2276
Light and vivid	9.2P 4.9/4.11.95	19.24	.3247	.2163
Dark series				
Dark and grayish	9.6P 4.7/0.10.9	17.19	.3283	.2254
Dark and vivid	8.4P 4.0/5.11.6	12.35	.3144	.1970
Dark and blue	7.5P 4.3/2.10.5	14.19	.3059	.2078
Yellow:				
Central series				
Central color	4.3Y 7.8/7.10.3	56.81	.4445	.4589
Vivid A	4.5Y 7.8/2.10.8	55.92	.4503	.4658
Vivid B	3.3Y 7.7/2.11.35	54.24	.4512	.4624
Vivid and orange	3.2Y 7.7/2.10.8	54.25	.4576	.4572
Grayish A	4.1Y 7.9/5.9.7	58.18	.4380	.4516
Grayish B	5.1Y 8.0/6.9.05	60.12	.4272	.4508
Green yellow	5.2Y 7.9/7.9.9	58.53	.4356	.4505
Light series				
Light	5.4Y 8.5/8.10.5	70.19	.4351	.4528
Light and green yellow	5.4Y 8.5/6.11.2	69.59	.4414	.4632
Light and vivid	4.4Y 8.4/5.11.4	67.42	.4430	.4562
Dark series				
Dark and green yellow	4.4Y 7.5/7.9.7	51.82	.4423	.4562
Dark and orange A	3.4Y 7.3/9.10.4	48.86	.4564	.4590
Dark and orange B	3.5Y 7.4/1.10.9	49.20	.4517	.4544
Green:				
Central series				
Central color	9.75G 4.2/6.7.75	13.80	.2214	.3791
Grayish	10G 4.4/5.7.5	15.25	.2263	.3742
Blue A	1.43G 4.2/0.7.4	13.36	.2151	.3625
Blue B	1.08G 4.0/9.7.75	12.60	.2109	.3685
Vivid	8.4G 4.0/9.10.5	12.59	.2183	.3954
Vivid green yellow	7.0G 4.2/3.10	13.54	.2292	.4245
Green yellow	7.85G 4.4/6.7.7	15.29	.2513	.3914
Light series				
Light and vivid	9.5G 4.4/5.9.8	15.21	.2141	.3863
Light and blue	0.29G 4.3/1.8.8	14.12	.2069	.3614
Light and green yellow	8.3G 4.2/9.9.05	14.01	.2113	.4006
Dark series				
Dark and green yellow	7.1G 4.0/8.7.1	12.55	.2354	.3972
Dark and grayish	9.5G 4.1/1.6.9	12.70	.2282	.3764
Dark	8.5G 3.9/7.7.2	11.78	.2269	.3674
Red:				
Central series				
Central color	6.8R 4.4/7.12.8	15.34	.5510	.3296
Grayish	7.2R 4.7/2.12.2	17.37	.5368	.3348
Purple	6.4R 4.4/3.12.7	15.52	.5442	.3258
Purple and vivid	6.1R 4.3/3.13.1	14.25	.5529	.3209
Vivid	6.7R 4.2/9.13.2	13.99	.5617	.3253
Orange	7.3R 4.4/7.12.8	15.34	.5572	.3331
Orange and grayish	7.65R 4.7/0.12.4	17.20	.5438	.3382
Light series				
Light	7.0R 4.7/2.13.2	17.32	.5511	.3322
Light and orange	7.4R 4.9/6.12.6	19.38	.5365	.3382
Light and purple	6.6R 4.7/9.12.9	17.94	.5397	.3289
Dark series				
Dark A	6.7R 4.1/3.12.5	13.30	.5566	.3355
Dark B	7.0R 4.2/5.12.35	13.72	.5522	.3294
Dark and purple	7.5R 4.2/3.12.4	13.58	.5577	.3329
Orange:				
Central series				
Central color	5.0YR 6.1/0.12.5	31.27	.5133	.4117
Yellow and grayish A	5.8YR 6.2/2.11.7	32.69	.5114	.4155
Yellow and grayish B	6.1YR 6.2/6.11.85	33.20	.5109	.4130
Vivid	5.1YR 6.0/7.12.3	30.86	.5226	.4134
Red and vivid A	3.9YR 5.8/7.12.75	28.53	.5318	.4038
Red and vivid B	3.6YR 5.9/1.12.6	29.05	.5291	.4021
Grayish	4.9YR 6.1/0.11.9	31.22	.5170	.4089
Light series				
Light and vivid A	5.8YR 6.7/8.12.7	39.54	.5120	.4177
Light and yellow	6.6YR 6.8/0.12.8	40.29	.5135	.4198
Light and vivid B	4.9YR 6.5/0.12.9	37.47	.5218	.4125
Dark series				
Dark and yellow	5.8YR 5.9/8.11.8	29.87	.5052	.4132
Dark A	5.1YR 5.8/0.11.1	27.80	.5127	.4094
Dark B	5.6YR 5.8/0.11.8	27.67	.5109	.4068

TABLE 3.—Specification for colors for use with labels printed on packagings surfaces.

CIE data for Source C	Red	Orange	Yellow	Green	Blue	Purple
x	.424	.460	.417	.228	.200	.377
y	.306	.379	.392	.354	.175	.205
x	.571	.543	.490	.310	.255	.377
y	.306	.400	.442	.354	.250	.284
x	.424	.445	.390	.228	.177	.342
y	.350	.395	.430	.403	.194	.205
x	.571	.504	.440	.310	.230	.342
y	.350	.430	.432	.403	.267	.284
Y (high)	23.0	41.6	72.6	20.6	15.9	21.2
Y (low)	7.7	19.5	29.1	7.4	6.5	8.2

Appendix B—Dimensional Specification for Placards

1. Placard specifications.

(a) The print type on each placard must be Franklin Gothic Condensed.

(b) Each square-on-point placard must measure 10¾ inches (273.0 mm.) on each side, the outer ½ inch (12.7 mm.) of which must be white.

NOTE: The measurements in these specifications may be rounded to the nearest 1/32 of a inch and to the nearest whole millimeter.

(c) Specifications for each placard to augment those in paragraphs (1)(a) and (b) of this Appendix and those contained in Subpart F, Part 172 of this subchapter are as follows:

(1) DANGEROUS placard. The word "DANGEROUS" must be across the center of the placard and made with letters 2⅜ inches (56.4

mm.) high with a 3/8 inch (9.5 mm.) stroke. The white section of the placard must be centered across the placard and 5 inches (127 mm.) wide. The two ends of the white area must have an 1/8 inch (3.2 mm.) red solid line border to indicate the outer 1/2-inch (12.7 mm.) white placard border. The placard color must be red, white, and black.

(2) **EXPLOSIVES A** placard. The word "EXPLOSIVES" must be across the center area of the placard and made with letters 1 7/8 inches (47.6 mm) high with a 7/16 inch (7.9 mm.) stroke. The top of the letters in the word "EXPLOSIVES" must be 1 1/2 inches (38.1 mm.) above the placard horizontal center line. The top of the letter "A" must be 1/2 inch (12.7 mm.) below the horizontal center line. The letter "A" must be approximately 2 inches (50.8 mm.) high. The base of the symbol must be 2 1/16 inches (52.4 mm.) above the placard horizontal center line, and must be 4 1/2 inches (114.3 mm.) high when measured from a horizontal line touching the lowest extremity. The width of the symbol must be 7 7/8 inches (200.0 mm.) when measured between two lines perpendicular to the base line and touching the widest extremities on each side. The radius of the bomb must be 3/4 inch (19.1 mm.) The placard color must be orange, black and white.

(3) Except for the letter "B", the **EXPLOSIVES B** placard specifications are the same as those for the **EXPLOSIVES A** placard. The location, height, and stroke for the letter "B" are the same as those prescribed for the letter "A".

(4) The word "NON-FLAMMABLE" must be across the center area with the word "GAS" centered beneath the word "NON-FLAMMABLE." The letters in both words must be 1 9/16 inches (39.6 mm.) high and made with a 9/32 inch (7.1 mm.) stroke. The top of the letters in the words "NON-FLAMMABLE" must be 1 3/8 inches (35.9 mm.) above the placard horizontal center line, and the top of the letters in the word "GAS" must be 9/16 inch (14.3 mm.) below the placard horizontal center line. The base of the symbol must be 3 1/8 inches (79.3 mm.) above the horizontal centerline with the top 4 15/16 inches (125.4 mm.) above the placard horizontal center line. The lower portion of the cylinder (symbol) must be 11/32 inch (13.5 mm.) wide with the neck 1/4 inch (6.3 mm.) wide. The symbol must be 3 9/16 inches (90.4 mm.) long. The placard color must be green and white.

(5) The word "OXYGEN" must be centered on the placard horizontal center line in letters 2 1/2 inches (63.5 mm.) high and made with a 7/16 inch (11.1 mm.) stroke. The base of the bar in the symbol must be 2 1/16 inches (52.4 mm.) above the placard horizontal center line. The overall height of the symbol must be 4 5/16 (109.5 mm.) with the bar measuring 1/8 inch (3.2 mm.) wide and, 2 3/16 inches (55.5 mm.) long.

The symbol must be 2 3/8 inches (60.3 mm.) across the widest part.

The outer 1/2-inch (12.7 mm.) of the 10 3/4 inches (273.0 mm.) square on-point placard must be white. The placard color must be yellow, black, and white.

(6) **FLAMMABLE GAS** placard. The word "FLAMMABLE" must be across the placard center area with the word "GAS" centered beneath the word "FLAMMABLE". The letters in both words must be 2 inches (50.8 mm.) high and made with a 3/8-inch (9.5 mm.) stroke. The top of the letters in the word "FLAMMABLE" must be 1 5/8 inches (41.3 mm.) above the placard horizontal center line and the top of the word "GAS" must be 5/8-inch (15.9 mm.) below the placard horizontal center line. The base of the symbol bar must be 2 1/4 inches (57.1 mm.) above the placard horizontal center line, and must be 4 17/32 inches (115.1 mm.) high and 3 5/16 inches (84.1 mm.) wide. The bar must be 5/32-inch (4.0 mm.) wide and 3 5/16 inches (84.1 mm.) long. The outer 1/2 (12.7 mm.) of the 10 3/4 inches (273.0 mm.) square-on-point placard must be white. The placard color must be red and white.

(7) **CHLORINE** placard. The specifications for the **CHLORINE** placard are the same as those for the **POISON GAS** placard except for the word "CHLORINE" and the symbol. The word "CHLORINE" must be centered on the placard horizontal center line in letters 2 1/2 inches (6.35 mm.) high and made with a 7/16-inch (11.1 mm.) stroke. The lowest part of the symbol must be 1 3/4 inches (44.5 mm.) above the placard horizontal center line. The symbol must be 3 11/16 inches (93.6 mm.) high and 5 1/8 inches (130.2 mm.) across the widest extremities.

(8) **POISON GAS** placard. The word "POISON" must be across the center area of the placard with the word "GAS" centered beneath the word "POISON." The letters in both words must be 2 3/16 inches (55.5 mm.) high and made with a 13/32-inch (10.3 mm.) stroke. The top of the letters in the word "POISON" must be 2 1/4 inches (57.1 mm.) above the horizontal center line. The lowest part of the symbol must be 2 3/4 inches (69.8 mm.) above the horizontal center line and must be 3 1/4 inches (82.5 mm.) high and 4 5/16 inches (109.5 mm.) across the widest extremities. The 1/8-inch (3.2 mm.) black border must be 1/2 inch (12.7 mm.) in from the placard edge. The placard color must be black and white.

(9) **FLAMMABLE** placard. The word "FLAMMABLE" must be centered on the placard horizontal center line. The letters in the word "FLAMMABLE" must be 2 inches (50.8 mm.) high and made with an 11/32-inch (8.7 mm.) stroke. The base of the symbol bar must be 2 1/4 inches (57.1 mm.) above the placard horizontal center line. The symbol must be 4 1/16 inches (115.9 mm.) high and 3 5/16 inches (84.1 mm.) wide. The bar must be 1/8-inch (3.2 mm.) wide and 3 5/16 inches (84.1 mm.) long. The outer 1/2-inch (12.7 mm.) of the 10 3/4 inches (273.0 mm.) square-on-point placard must be white.

(10) **RESIDUE** placard. The specifications for the **FLAMMABLE-RESIDUE** placard are the same as the specifications for the following **RESIDUE** placards: NON-FLAMMABLE GAS; POISON GAS; CHLORINE; OXYGEN; FLAMMABLE GAS; FLAMMABLE; FLAMMABLE SOLID; FLAMMABLE SOLID W; OXIDIZER; ORGANIC PEROXIDE; POISON; and CORROSIVE. The lower triangle of each **RESIDUE** placard must be black. This triangle must be 2 1/2 inches (50 mm) below the horizontal center line of the placard or adjacent to the lower edge of the white block for the identification number. The letters in the word *RESIDUE* must be approximately 1 inch (25 mm) high, made with approximately 1/4 inch (6 mm) stroke. The letters must be located in the lower black triangle and parallel to the horizontal center line of the placard. The hazard class number must be approximately 1 1/2 inches (40 mm) high and centered below the word *RESIDUE*. The *RESIDUE* placard may be made in any of the three ways cited in § 172.525(c), Subpart F of Part 172.

(11) **COMBUSTIBLE** placard. The specification for the **COMBUSTIBLE** placard are the same as those prescribed for the **FLAMMABLE** placard except the letters in the word "COMBUSTIBLE" must be 1 7/8 inches (47.6 mm.) high and made with an 11/32-inch (8.7 mm.) stroke.

(12) **FLAMMABLE SOLID** placard. The word "FLAMMABLE" must be across the center of the placard with the word "SOLID" centered beneath the word "FLAMMABLE." The letters in the word "FLAMMABLE" must be 2 inches (50.8 mm.) high and made with a 3/8-inch (9.5 mm.) stroke. The letters in the word "SOLID" must be 1 1/2 inches (38.1 mm.) high and made with a 1/4-inch (6.3 mm.) stroke. The top of the letters in the word "FLAMMABLE" must be 1 3/16 inches (30.1 mm.) above the placard horizontal center line, and the top of the word "SOLID" must be 1-inch (25.5 mm.) below the placard horizontal center line. The base of the symbol bar must be 2 1/4 inches (57.1 mm.) above the placard horizontal center line. The symbol must be 4 1/16 inches (115.9 mm.) high and 3 5/16 inches (84.1 mm.) wide. The outer 1/2-inch (12.7 mm.) of the 10 3/4 inches (273.0 mm.) square-on-point placard must be white. Each red and white stripe must be approximately 1 inch (25.4 mm.) wide. The placard must have seven red stripes and six white stripes. One red stripe must be approximately centered on the vertical center line of the placard. The placard color must be black, white, and red.

(13) **FLAMMABLE SOLID W** placard. The specifications for the **FLAMMABLE SOLID W** are the same as the specifications for the **FLAMMABLE SOLID** placard except for the top triangle. The base of the blue triangle must be 2 inches (50.8 mm.) above the placard horizontal center line with the base of the symbol 2 1/8 inches (60.3 mm.) above the placard horizontal center line. The symbol must be 2 1/4 inches (57.1 mm.) high; 2 3/4 inches (69.8 mm.) across the top 1 3/4 inches (44.4 mm.) across the base, and made with a 5/16 inch (7.9 mm.) stroke. The white stripe in the symbol must be 7/32 inch (5.5 mm.) wide and 3 1/2 inches (88.9 mm.) long. The white stripe must slant upward from right to left at an angle of approximately 21 degrees from the horizontal line. This placard may be made in any of the three ways cited in § 172.543, subpart F of Part 172.

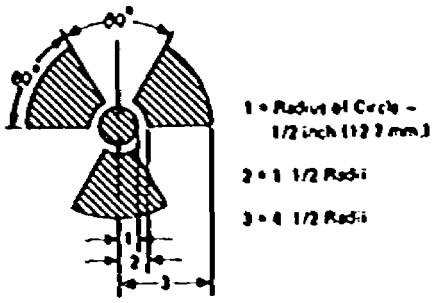
(14) **OXIDIZER** placard. The word "OXIDIZER" must be centered on the placard horizontal center line in letters 2 1/2 inches (63.5 mm.) high with a 15/32-inch (11.9 mm.) stroke. The base of the bar of the symbol must be 2 1/16 inches (52.4 mm.) above the placard horizontal center line. The overall height of the symbol must be 4 5/16 inches (109.5 mm.) with the bar measuring 1/8-inch (3.2 mm.) wide and 2 3/16 inches (55.6 mm.) long. The symbol must be 2 3/8 inches (60.3 mm.) across the widest part. The outer 1/2-inch (12.7 mm.) of the 10 3/4 inches (273.0 mm.) placard must be white. The placard color must be yellow, black, and white.

(15) **ORGANIC PEROXIDE** placard. The word "ORGANIC" must be across the center line of the placard with the word "PEROXIDE" centered beneath the word "ORGANIC." The letters in both words must be 2 inches (50.8 mm.) high and made with an 11/32-inch (8.7 mm.) stroke. The top of the letters in the word "ORGANIC" must be 2 1/8 inches (54.0 mm.) above the placard horizontal center line, and the top of the letters in the words "PEROXIDE" must be 5/16-inch (7.9 mm.) below the placard horizontal center line. The base of the symbol bar must be 2 7/8 inches (73.0 mm.) above the horizontal center line. The symbol must be 3 11/16 inch (93.6 mm.) high and 2 1/16 inches (52.3 mm.) wide with the bar 3/16-inch (4.8 mm.) wide and 1 7/8 inches (47.6 mm.) long. The outer 1/2-inch (12.7 mm.) of the 10 3/4 inches (273.0 mm.) square-on-point placard must be white. The placard color must be yellow, black, and white.

(16) **POISON** placard. The word "POISON" must be centered on the placard horizontal center line in letters 3 1/16 inches (77.8 mm.) high and made with a 9/16-inch (14.3 mm.) stroke. The lowest point on the symbol must be 2 1/8 inches (54.0 mm.) above the placard horizontal center line. The symbol must be 3 11/16 inches (93.6 mm.) high and 4 15/16 inches (125.4 mm.) across the widest extremities. The 1/8-inch (3.2 mm.) black border must be 1/2-inch (12.7 mm.) in from the placard edge. The placard color must be black and white.

(17) **RADIOACTIVE** placard. The word "RADIOACTIVE" must be centered on the placard horizontal center line in letters 2 inches (50.8 mm.) with an 11/32-inch (8.7 mm.) stroke. The lower edge of the yellow triangle must be 1 1/4 inches (28.6 mm.) above the placard horizontal center line. The lower edge of the symbol must be 1 1/4 inches (31.7 mm.)

above the placard horizontal center line. The symbol must be made as shown with the following dimensions.

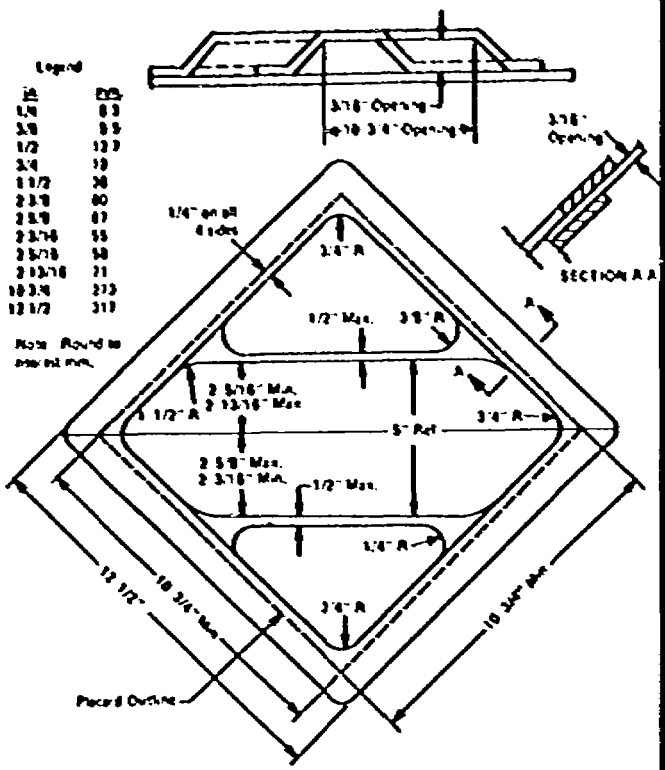


The lower white area must have a ⅛-inch (3.2 mm.) black solid line border extended from the edge of the yellow area to indicate the outer ½-inch (12.7 mm.) white placard border. The placard color must be yellow, black, and white.

(18) CORROSIVE placard. The word "CORROSIVE" must be across the center of the placard and made with letters 2 ⁱ⁄₁₆ inches (52.4 mm.) high with a ⁱ⁄₃₂-inch (8.7 mm.) stroke. The base of the top white triangle must be 1½ inches (38.1 mm.) above the placard horizontal center line. The lowest part of the symbol must be 1⅝ inches (41.3 mm.) above the placard horizontal center line. The height of the symbol measured from a horizontal line extended from the lowest part of the symbol must be 3¼ inches (82.5 mm.) and the width across the widest part must be 7⅜ inches (187.3 mm.). The upper white area must have a ⅛-inch (3.2 mm.) black solid border as an extension from the edge of the black area to indicate the outer ½-inch (12.7 mm.) white placard border. The placard color must be black and white.

(19) BLASTING AGENTS placard. The words **BLASTING AGENTS** must be across the center area of the placard and made with letters 1⅞ inches (47.6 mm) high with a ⁱ⁄₁₆-inch (7.9 mm) stroke.

Appendix C—Dimensional Specifications for Recommended Placard Holder



For explanation of abbreviations and reference marks, see last page of this tariff.

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

SUBPART A

GENERAL

§ 173.1 Purpose and scope. (a) This part includes:
(1) Definitions of hazardous materials for transportation purposes;
(2) Requirements to be observed in preparing hazardous materials for shipment by air, highway, rail, or water, or any combination thereof; and
(3) Inspection, testing, and retesting responsibilities for persons who retest, recondition, maintain, repair and rebuild containers used or intended for use in the transportation of hazardous materials.
(b) A shipment that is not prepared for shipment in accordance with this subchapter may not be offered for transportation by air, highway, rail, or water. It is the duty of each person who offers hazardous materials for transportation to instruct each of his officers, agents, and employees having any responsibility for preparing hazardous materials for shipment as to applicable regulations in this subchapter.
(c) When a person other than the person preparing a hazardous material for shipment performs a function required by this part, that person shall perform the function in accordance with this part.

§ 173.2 Classification of a material having more than one hazard as defined in this part. *(a) Classification of material having more than one hazard as defined in this part.* Except as provided in paragraph (b) of this section, a hazardous material, having more than one hazard as defined in this part, must be classed according to the following order of hazards:
(1) Radioactive material (except a limited quantity).
(2) Poison A.
(3) Flammable gas.
(4) Non-flammable gas.
(5) Flammable liquid.
(6) Oxidizer.
(7) Flammable solid.
(8) Corrosive material (liquid).
(9) Poison B.
(10) Corrosive material (solid).
(11) Irritating materials.
(12) Combustible liquid (in containers having capacities exceeding 110 gallons).
(13) ORM–B.
(14) ORM–A.
(15) Combustible liquid (in containers having capacities of 110 gallons or less).
(16) ORM–E.
(b) **Exceptions.** Paragraph (a) of this section does not apply to—
(1) a material specifically identified in §172.101 of this subchapter;
(2) An explosive required to be classed and approved under §173.86, or a blasting agent required to be classed and approved under §173.114a.
(3) An etiologic agent identified in §173.386 as those materials listed in 42 CFR 72.3; or
(4) An organic peroxide. (See §172.101 and §173.151a of this subchapter.)
(5) A limited quantity radioactive material that also meets the definition of another hazard class (see §173.421–2).

§ 173.3 Packaging and exceptions. (a) The packaging of hazardous materials for transportation by air, highway, rail, or water must be as specified in this part. Methods of manufacture, packing, and storage of hazardous materials, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or a representative of the Department. Methods of manufacture and related functions necessary for completion of a DOT specification packaging must be open to inspection by a representative of the Department.
(b) The regulations setting forth packaging requirements for a specific material apply to all modes of transportation unless otherwise stated, or unless exceptions from packaging requirements are authorized. For example, the restriction in §173.249(b) applicable to cargo aircraft only applies only to quantities in excess of those allowable under §173.244. Quantities covered under §173.244 may also be shipped by cargo aircraft only.
(c) Packages of hazardous materials that are damaged or found leaking and hazardous materials that have been spilled or leaked may be placed in a metal removable head salvage drum that is compatible with the lading and shipped for repackaging or disposal under the following conditions.
(1) The drum utilized may be either a DOT specification or a non-DOT specification drum as long as the drum has equal or greater structural integrity than a package that is authorized for the respective material in this subchapter. Maximum capacity shall not exceed 110 gallons.
(2) Each drum must be provided with adequate closure and, when necessary, provided with sufficient cushioning and absorption material to prevent excessive movement of the damaged package and to absorb all free liquid. All cushioning and absorbent material used in the drum must be compatible with the hazardous material.
(3) Each drum must be marked with the proper shipping name of the material inside the defective packaging and the name and address of the consignee. In addition, the drum must be marked "salvage drum".
(4) Each drum must be labeled as prescribed for the respective material.
(5) The shipper shall prepare shipping papers in accordance with Subpart C of Part 172 of this subchapter.
(6) The overpack requirements of §173.25, and the reuse provisions of §173.28(h) and §173.28(m) do not apply to drums used in accordance with this paragraph.

§ 173.3a Packaging; special requirements for certain poisonous materials. (a) Notwithstanding the packaging requirements and authorizations referred to in paragraph (b)(1) of this section (including exemptions referring thereto), no person may offer for transportation a material addressed by those sections that also meets the criteria of paragraph (b)(2) of this section except in a packaging—
(1) Specified in Subpart H of this part for any Poison A material if the packaging is made of materials that are chemically compatible with the hazardous materials;
(2) The basic containment unit of which has a rated capacity of one liter or less and that is otherwise offered for transportation in conformance with this Chapter; or
(3) Approved by the Associate Director for HMR based on a determination that the packaging provides a level of safety equivalent to a packaging authorized in this Chapter for Poison A materials, or to packagings authorized for a hazardous material having similar hazards addressed by a specific packaging regulation of this part.
(b) This section applies to any liquid material other than a liquefied compressed gas—
(1) Addressed by the Table in §172.101 (Column 5b) of this subchapter to a packaging requirement prescribed in §§173.119, 173.125, 173.134, 173.154, 173.221, 173.245, 173.249, 173.346, or 173.352, or which is addressed by an exemption, issued under Subpart B of Part 107 of this chapter, that refers to one or more of those sections for the purpose of packaging authorization; and
(2) Having a saturated vapor concentration at 20°C (68°F) equal to or greater than ten times its LC_{50} (vapor) value if the LC_{50} value is 1000 parts per million (ppm) or less.
(c) For the purposes of this section—
(1) LC_{50} means the concentration of vapor that, when administered by continuous inhalation of both male and female young albino rats for one hour, is most likely to cause death within 14 days to one half of the animals tested. The result is expressed in milliliters per cubic meter of air (ppm). Wherever practicable, the test should be conducted in accordance with the procedure described in the Organization for Economic Cooperation and Development (OECD) for Acute Inhalation Toxicity except that the periods of exposure shall be one hour instead of four hours.
(2) Saturated vapor concentration (SVC) means the concentration of vapor at equilibrium with the liquid phase at 20°C (68°F) and standard atmospheric pressure expressed in milliliters per cubic meter (expressed in ppm). This concentration may be calculated from the vapor pressure (VP) of the liquid at 20°C (68°F). The general formula is the vapor pressure divided by the standard atmospheric pressure and multiplied by a million. If the vapor pressure is expressed in millimeters (mm) of mercury the calculation would be

$$\frac{\text{VP (in mm Hg)}}{760} \times 10^6 = \text{SVC (in ppm)}$$

(3) If LC_{50} data are available based on other than a one hour exposure, a factor may be used to determine an acceptable one hour value for the purposes of this section. If the only value available is for a 4 hour exposure, that value is multiplied by 2. This method of estimating a LC_{50} value may not be used when a material causes death by direct pulmonary effect, i.e., by destruction of lung tissue as opposed to systemic poisoning. For these corrosive poisons, the exposure period must be one hour.
(4) LC_{50} data published in scientific and technical handbooks, journals and texts may be used in place of new tests using animals to determine compliance with this section. Where different values for the LC_{50} of a material are found, the most credible value must be used. The Registry of Toxic Effects of Chemical Substances (RTECS) published by NIOSH is a recommended source of these data.
(5) *Limit test.* As an alternative to determine a LC_{50} value, the following procedure may be used to determine whether a material is subject to this section: The saturated vapor concentration at 20°C (68°F) is determined as in

paragraph (c)(2) of this section. This then is divided by 10 and the resulting concentration used to test 10 animals in accordance with the OECD procedure noted in paragraph (c)(1) of this section, with a one hour exposure period. If 5 or more animals die during a 14 day observation period, the material is subject to this section. For example: If a liquid has a saturated vapor concentration of 500 ppm at 20°C, the concentration used in the test outlined in this paragraph would be 50 ppm.

(d) The requirements of this section, and other requirements of this subchapter referring to this section for application, are effective as follows:

(1) Transportation in packagings having capacities greater than 110 gallons after April 30, 1986.

(2) Transportation in packaging having capacities of 110 gallons or less after September 30, 1986.

(3) Until January 1, 1988, LC_{50} or limit test data based on a 48 hour observation period may be used in place of a 14 day observation period.

§ 173.4 Exceptions for small quantities. (a) Small quantities of Flammable liquids, Flammable solids, Oxidizers, Organic peroxides, Corrosive materials, Poison B, and ORM A, B, C, and Radioactive materials that also meet the definition of one or more of these hazard classes are not subject to any other requirements of this subchapter if:

(1) The maximum quantity of material per inner receptacle is limited to:

(i) Thirty (30) milliliters for authorized liquids, other than poisons;

(ii) Thirty (30) grams for authorized solids, other than poisons;

(iii) One (1) gram for authorized materials classed as Poison B; or subject to the "Poison-Inhalation Hazard" shipping paper description requirements of §172.203(k)(4); and

(iv) An activity level not exceeding that specified in §§173.421, 173.422, or 173.424, as appropriate, for a package containing a radioactive material;

(2) With the exception of temperature sensing devices, each inner receptacle:

(i) Is not liquid-full at 130°F; and

(ii) Is constructed of plastic having a minimum thickness of no less than 0.008-inch (0.2 millimeters), or earthenware, glass, or metal;

(3) Each inner receptacle with a removable closure has its closure held securely in place with wire, tape, or another positive means;

(4) Unless equivalent cushioning and absorbent material surrounds the inside packaging, each inner receptacle is securely packed in an inside packaging with cushioning and absorbent material that:

(i) Will not react chemically with the material, and

(ii) Is capable of absorbing the entire content (if a liquid) of the receptacle;

(5) The inside packaging is securely packed in a strong outside packaging;

(6) The completed package, as demonstrated by prototype testing, is capable of sustaining:

(i) Each of the following free drops made from a height of 6-feet direct onto a solid unyielding surface without breakage or leakage from any inner receptacle and without a substantial reduction in the effectiveness of the package:

(A) One drop flat on bottom;

(B) One drop flat on top;

(C) One drop flat on the long side;

(D) One drop flat on the short side; and

(E) One drop on a corner at the junction of three intersecting edges; and

(ii) A compressive load in pounds determined by multiplying by two the maximum horizontal cross section of the package (in square inches) in the position in which it would normally be transported without a substantial reduction in effectiveness; the load shall be applied continuously during a period of 24 hours, uniformly against the top and bottom of the package which is in the position in which it is intended to be normally transported.

Note: Each of the above tests may be performed on a different, but identical package (i.e., all tests need not be performed on the same package.

(7) Placement of the material, or packing it with different materials, in the package does not result in a violation of §173.21;

(8) The gross weight of the completed package does not exceed 65 pounds;

(9) The shipper certifies conformance with this section by marking the outside of the package with the statement: "This package conforms to conditions and limitations specified in 49 CFR 173.4";

(10) The package is not opened or otherwise altered until it is no longer in commerce; and

(11) The package, unless approved by the Director, OHMT, does not contain a material assigned any of the following identification numbers associated with the hazardous materials description in §§172.101 or 172.102 of this subchapter:

1092	1419	1504	2031	2845
1131	1422	1749	2032	2924
1259	1432	1798	2495	2925
1380	1433	1831	2626	9191
1397	1491	1873	2813	9193

(b) A package containing a radioactive material also must conform with the requirements of §173.421(a) through (e) or §173.422(a) through (f). After May 2, 1989, a package containing a radioactive material may not be offered for transportation aboard a passenger-carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

§ 173.5 Agricultural operations. (a) Formulated agricultural chemicals which are offered for transportation in less-than-case-lot quantities, or when repackaged, are not subject to Subpart D of Part 172 of this subchapter and the outside specification packaging requirements of Part 173 of this subchapter if all of the following conditions are met:

(1) Inside packagings are enclosed in strong outside packagings. Inside liquid packagings are cushioned, if necessary, to prevent breakage and leakage;

(2) Each inside packaging does not exceed 1-gallon capacity for liquids nor 25 pounds for dry materials;

(3) Gross weight of less-than-case or repackaged lots is not over 100 pounds in each vehicle;

(4) Transportation is authorized only by private motor vehicle between a final distribution point and the ultimate point of application, if that distance does not exceed one hundred miles.

(b) Formulated liquid agricultural chemicals in specification packagings of 55 gallons capacity, or less, with closures manifolded to a closed mixing system and equipped with positive dry disconnect devices may be transported by a private motor carrier between a final distribution point and an ultimate point of application or loading aboard an aircraft for aerial application.

(c) See §173.315(m) pertaining to nurse tanks.

§ 173.5a Oilfield service vehicles. Notwithstanding §173.29 of this subchapter, a cargo tank mounted on a transport vehicle used in oilfield servicing operations is not subject to the specification requirements of this subchapter if—

(a) The cargo tank and equipment contains only residual amounts (i.e., it is emptied so far as practicable) of a flammable liquid alone or in combination with water.

(b) No flame producing device is operated during transportation, and

(c) The proper shipping name is preceded by "Residual" on the shipping paper for each movement on a public highway.

§ 173.6 Shipments by air. (a) **General shipping requirements.** When the regulations indicate a hazardous material is forbidden aboard cargo-aircraft only, the material is also forbidden aboard passenger-carrying aircraft.

(b) **General packaging requirements.** (1) In addition to the requirements of this part and Parts 175 and 178 of this subchapter, for air shipments each packaging must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during air transportation.

(2) Inner containers that are breakable (such as earthenware, glass, or brittle plastic), must be packaged to prevent breakage and leakage under conditions normally incident to transportation. These completed packagings must be capable of withstanding a 4-foot drop on solid concrete in the position most likely to cause damage. Cushioning and absorbent materials must not be capable of reacting dangerously with the contents. Where any plastic packaging is specified in this part, a plastic bag or pouch is not permitted unless specifically authorized.

(3) For any packaging with a capacity of 110 gallons or less containing liquid, sufficient outage (ullage) must be provided to prevent liquid contents from completely filling the packaging at 130°F. The primary packaging (which may include composite packaging), for which retention of the liquid is the basic function, must be capable of withstanding, without leakage, an internal absolute pressure of no less than 26 lbs./sq. inch or no less than the sum of the absolute vapor pressure of the contents at 130°F. (55°C.) and the atmospheric pressure at sea level, whichever is greater.

(4) Stoppers, corks, or other such friction-type closures must be held securely, tightly, and effectively in place with wire, tape, or other positive means. Each screw-type closure on any inside plastic packaging must be secured to prevent the closure from loosening due to vibration or substantial changes in temperature.

(5) Bags permitted by regulations as outside packaging for transportation aboard aircraft must be water resistant.

(6) For any cylinder containing hazardous materials incorporating valves, sufficient protection must be provided to prevent operation and damage to such valves during transportation, by one of the following methods:

(i) By equipping each cylinder with securely attached valve caps or protective headrings, or

(ii) By boxing or crating of the cylinder.

(7) Tank cars and cargo tanks containing hazardous materials may not be transported aboard aircraft.

(c) **Special labeling requirements.** See "Magnetized materials" in §§172.101 and 173.1020 of this subchapter and see §172.101 for cargo-only aircraft labeling requirements.

(d) No person may offer for transportation aboard aircraft an overpack containing hazardous materials which require segregation under the provisions of §175.78 of this subchapter.

§ 173.7 U.S. Government material. (a) Hazardous materials offered for transportation by, for, or to the Department of Defense (DOD) of the U.S. Government, including commercial shipments pursuant to a DOD contract, must be packaged in accordance with the regulations in this sub-

chapter or in packagings of equal or greater strength and efficiency as certified by DOD pursuant to the "Policies and Procedures for Hazardous Materials Packaging Certification, AFLCR 800-29/AFSCR 800-29/ OARDOM-R 700-103/NAVMATINST 4030.11/DLAR 4145.37." Hazardous materials offered for transportation by DOD under this provision may be reshipped by any shipper to any consignee provided the original packaging has not been damaged or altered in any manner.

(i) Hazardous materials sold by the DOD in packagings that are not marked in accordance with the requirements of this subchapter may be shipped from DOD installations if the DOD certifies in writing that the packagings are equal to or greater in strength and efficiency than the packaging prescribed in this subchapter. The shipper shall obtain such a certification in duplicate for each shipment. He shall give one copy to the originating carrier and retain the other for no less than 1 year.

(b) Shipments of radioactive materials, made by or under the direction or supervision of the U.S. Department of Energy or the Department of Defense, and which are escorted by personnel specifically designated by or under the authority of those agencies, for the purpose of national security, are not subject to the regulations in Parts 170–189 of this subchapter.

(c) Shipments of explosive samples, not exceeding one gram net weight, offered by and consigned to the Bureau of Alcohol, Tobacco and Firearms (ATF) of the Department of the Treasury are not otherwise subject to the regulations in Parts 110–189 of this subchapter when placed in a specifically designed multi-unit assembly packed in a strong outside packaging. The packaging must be of a type accepted by ATF as capable of precluding a propagation of any explosion outside the packaging. The second component from the outside of the packaging must be marked or tagged to indicate the presence of an explosive.

(d) Notwithstanding the requirements of §§ 173.416 and 173.417 of this subchapter, packagings made by or under the direction of the U.S. Department of Energy may be used for the transportation of radioactive materials when evaluated, approved, and certified by the Department of Energy against packaging standards equivalent to those specified in 10 CFR Part 71. Packages shipped in accordance with this paragraph shall be marked and otherwise prepared for shipment in a manner equivalent to that required by this subchapter for packagings approved by the Nuclear Regulatory Commission.

§ 173.8 [Reserved]

§ 173.9 Cars, truck bodies or trailers containing lading which has been fumigated or treated with flammable liquids, flammable gases, poisonous liquids or solids, or poisonous gases. (a) Delivery of rail cars, freight container, or trailers containing lading, fumigated or treated with flammable liquid or flammable gas for transportation by rail carrier is prohibited until 48 hours have elapsed after such fumigation or treatment, or until cars, truck bodies or trailers have been ventilated so as to remove danger of fire or explosion due to the presence of flammable vapors.

(b) Rail cars, truck bodies or trailers containing lading which has been fumigated or treated with poisonous liquid, solid, or gas, such as carbolic acid, liquid or solid, chlorpicrin, hydrocyanic acid, methyl bromide, etc., must be placarded on each door or near thereto with placard as described below (for cleaning cars see § 174.615 of this subchapter):

(Reduced size)

(Red lettering on white cardboard)

DANGER

The lading of this car has been
FUMIGATED or
TREATED
with

(Name of poisonous liquid, solid, or gas)

BEFORE UNLOADING, open both doors and DO NOT ENTER until car is free of gas. REMOVE ALL POISONOUS MATERIAL before release of empty car.

§ 173.10 Tank car shipments. (a) Tank cars containing any flammable gas (including a cryogenic liquid) or flammable liquid, except liquid road asphalt or tar, may not be offered for transportation unless originally consigned or subsequently reconsigned to parties having private-siding (see Note 1 of this section) or to parties using railroad siding facilities which have been equipped for piping the liquid from tank cars to permanent storage tanks of sufficient capacity to receive contents of car.

(b) A tank car containing any compressed gas must not be offered for transportation unless the car is consigned for delivery (see paragraph (c) of this section), and unloading on a private track (see Note 1 of this section), except that where no private track is available, delivery and unloading on carrier tracks is permitted provided the following conditions are complied with:

(1) Any tank car of DOT-106A or 110A type (see §§ 179.300 and 179.301 of this subchapter) may be offered for transportation and the loaded unit tanks may be removed from car frame on carrier tracks, provided the shipper has obtained from the delivering carrier and filed with originating carrier, written permission (see Note 2 of this section) for such removal. The consignee must furnish adequately safe mechanical hoist, obtained from the carrier if desirable, by which the tanks shall be lifted from the car and deposited directly upon vehicles furnished by the consignee for immediate removal from carrier property or tanks must be lifted by adequately safe mechanical hoist from car directly to vessels for further transportation.

(c) Any tank car of other than DOT-106A or 110A type (see §§ 179.300 and 179.301 of this subchapter), containing anhydrous ammonia, liquefied hydrocarbon or liquefied petroleum gas, and having interior pipes of liquid and gas discharge valves equipped with check valves, may be consigned for delivery and unloading on carrier tracks, if the lading is piped directly from the car to permanent storage tanks of sufficient capacity to receive the entire contents of the car. Such cars may also be consigned for storage on a private track or on a carrier track when designated by the carrier for such storage.

(d) For cars of the DOT-106A or 110A type (see §§ 179.300 and 179.301 of this subchapter), the tanks must be placed in position and attached to the car structure by the shipper.

(e) Flammable liquids and flammable gases (including a cryogenic liquid) may not be loaded into tank cars on carrier property from tank trucks or drums.

Note 1. For this purpose, a private track is a track outside of carrier's right of way, yard, and terminals, and of which the carrier does not own either the rails, ties, roadbed or right of way; or a track or portion of a track which is devoted to the purpose of its use, either by lease or written agreement, in which case the lease or written agreement will be considered as equivalent to ownership.

Note 2. Carriers should give permission for the unloading of these containers on carrier tracks only where no private siding is available within reasonable trucking distance of final destination. The danger involved is the release of compressed gases due to accidental injury to container in handling. The exposure to this danger decreases directly with the isolation of the unloading point.

§ 173.11 Shipper's registration statement; flammable cryogenic liquids. (a) No person may offer a flammable cryogenic liquid for transportation in a portable tank, cargo tank or a tank car unless he has filed a registration statement by certified mail, return receipt requested, with the Director, OHMT, RSPA, in accordance with paragraphs (b), (c) and (d) of this section.

(b) The registration statement must contain the following information:

(1) The shipper's name and principal place of business;

(2) Location where flammable cryogenic liquids are offered for transportation, including transportation by private carriage;

(3) The name and principle place of business of each initial carrier used to transport flammable cryogenic liquids and the name of each flammable cryogenic liquid the carrier is offered for transportation; and

(4) The type of packaging and the serial number or vehicle identification number of each portable tank and cargo tank, and the reporting mark and number of each tank car, owned, leased, or otherwise controlled by the shipper and used to offer a flammable cryogenic liquid for transportation.

(c) The registration statement must be filed:

(1) Initially between January 1 and February 28, 1985 (this initial statement is only required to contain information regarding operations that took place during the 90 days prior to the date of the statement); and

(2) Subsequently, between July 1 and August 31 of each odd numbered year after 1985.

(d) For operations begun between the two-year filing intervals specified in paragraph (c) of this section, the information must be provided on the registration statement filed during the next required filing period.

§ 173.12 Exceptions for shipment of waste material.

(a) **General.** Waste material meeting the hazard class definition of a flammable liquid, flammable solid, oxidizer, corrosive material, Posion B or ORM-A, B, C, and E are excepted from the specification packaging requirements of this subchapter if packaged in combination packagings in accordance with this section and transported for disposal or recovery by private or contract motor carrier by highway only. In addition, a generic proper shipping name from § 172.101 may be used in place of specific chemical names, when two or more waste materials in the same hazard class are packaged in the same outside packaging, provided the waste materials are chemically compatible.

(b) **Outside packaging.** The outside packaging must be a DOT specification metal or fiber drum. It may also be a polyethylene drum capable of withstanding:

(1) The vibration and compression tests specified in § 178.19-7(c)(1) and (2), and

(2) A four-foot drop test as specified in § 178.224-2(b).

(c) **Inside packagings.** The inside packagings must be either glass packagings not exceeding 1-gallon rated capacity, or metal or plastic packagings not exceeding a rated capacity of 5 gallons.

(d) **Additional packaging requirements.** The following additional requirements are applicable:

(1) Each outside packaging may only contain one hazard class and the materials must be chemically compatible;

(2) Inside packagings of liquid must be surrounded by a compatible absorbent material capable of absorbing the total liquid contents; and

(3) Gross weight may not exceed 450 pounds or the rated capacity of the drum; whichever is less.

(e) **Prohibited materials.** The following materials are not authorized under the provisions of this section: acrolein; bromine pentafluoride; bromine trifluoride; chloric acid, chlorine trifluoride, nitric acid, fuming; pyroforic liquids; and sulfuric acid, fuming.

SUBPART B

PREPARATION OF HAZARDOUS MATERIALS FOR TRANSPORTATION

§ 173.21 Forbidden materials and packages.

Unless otherwise provided in this subchapter, the offering for transportation of the following is forbidden:

(a) A hazardous material in the same packaging, freight container, or overpack with another hazardous material, the mixing of which would be liable to cause a dangerous evolution of heat or gas, or produce corrosive materials, except as provided in §§ 173.152(a) and 173.242(a) and (b).

(b) A package containing a material which is liable to decompose or polymerize at a temperature of 130°F. (54.4°C.) or less with an evolution of a dangerous quantity of heat or gas unless stabilized or inhibited in a manner that will preclude such evolution.

(1) The determination of whether a material is forbidden under this paragraph may be made by one of the following methods: Standard Method of Test for Constant Temperature Stability of Chemical Materials (ASTM E-487-74) or the Self Accelerating Decomposition Temperature (SADT) Test published by the Organic Peroxide Producers' Safety Division (OPPSD).

(2) Refrigeration may be used as a means of stabilization only when approved by the Director, Office of Hazardous Materials Transportation, RSPA. (For status of approvals issued by the Bureau of Explosives, see § 171.19 of this subchapter.)

(3) For organic peroxides, the decomposition temperature of 130°F. (54.4°C.) does not apply if the controlled temperature requirements specified in Chapter 11 of the UN Recommendations are applied to determine when refrigeration is required.

(c) Packages which evolve a dangerous quantity of flammable gas or vapor released from a material which would not otherwise be subject to this subchapter, i.e., the release of flammable vapor or gas in such quantities that a flammable mixture with air would be created within a transport vehicle.

(d) Packages containing materials (other than those classed as explosives) which will detonate in a fire. For the purposes of this paragraph, a detonation is a type of explosion in which a shock wave travels through the material at a speed greater than the speed of sound in the undecomposed material. When tests are required to evaluate a package under the provisions of this paragraph, the testing must be done or approved by one of the agencies specified in § 173.86.

(e) Any package containing a cigarette lighter or other similar device with fuel and equipped with an ignition element, unless the design of the device and its packaging insofar as they affect safety in transportation have been examined by the Bureau of Explosives (B of E) and approved by the Director, Office of Hazardous Materials Transportation, RSPA. (An approval which was issued by the B of E remains valid to the same extent as if it had been issued by RSPA.) For lighters containing gases, also see § 173.308.

(f) For carriage by aircraft, any material which when packaged has a measurable magnetic field of more than 0.00525 gauss when measured from any surface of the package at a distance of 15 feet.

§ 173.22 Shipper's responsibility. (a) Except as otherwise provided in this part, a person may offer a hazardous material for transportation in a packaging or container required by this part only in accordance with the following:

(1) The person shall class and describe the hazardous material in accordance with Parts 172 and 173 of this subchapter, and

(2) The person shall determine that the packaging or container has been manufactured, assembled, and marked in accordance with—

(i) Section 173.7(a) and Parts 173, 178, or 179 of this subchapter;

(ii) A specification of the Department in effect at the date of manufacture of the packaging or container;

(iii) An approval issued under this subchapter; or

(iv) An exemption issued under Subchapter B of this chapter.

(3) In making the determination under paragraph (a)(2) of this section, the person may accept:

(i) The manufacturer's certification, specification, approval, or exemption marking (see §§ 178.0-2 and 179.1 of this subchapter); or

(ii) With respect to cargo tanks provided by a carrier, the manufacturer's identification plate or a written certification of specification or exemption provided by the carrier.

(b) When a person performs a function covered by or having an effect on a specification prescribed in Part 178 or 179 of this subchapter, an approval issued under this subchapter, or an exemption issued under Subchapter B of this chapter, that person must perform the function in accordance with that specification, approval, or exemption, as appropriate.

(c) Prior to each shipment of fissile radioactive materials, and Type B or highway route controlled quantity packages of radioactive materials (see § 173.403), the shipper shall notify the consignee of the dates of shipment and expected arrival. The shipper shall also notify each consignee of any special loading/unloading instructions prior to his first shipment. For any shipment of irradiated reactor fuel, the shipper shall provide physical protection in compliance with a plan established under:

(1) Requirements prescribed by the U.S. Nuclear Regulatory Commission, or

(2) Equivalent requirements approved by the Director, Office of Hazardous Materials Transportation, RSPA.

(d) Within 90 days following acceptance by a carrier of any package containing a highway route controlled quantity of radioactive material (see § 173.403(l)) for transportation by public highway, the shipper shall file the following information with the Director, Office of Hazardous Materials Transportation, RSPA (this paragraph does not apply to packages shipped in compliance with physical security requirements of the U.S. Nuclear Regulatory Commission in 10 CFR Part 73):

(1) The route plan required under § 177.825(c) of this subchapter (any supplement to the route plan prepared in accordance with § 177.825(c) of this subchapter shall be filed within 90 days of receipt from the carrier);

(2) A statement identifying the name and address of the shipper, carrier and consignee; and

(3) A copy of the shipping paper or the description of the radioactive material required by §§ 172.202 and 172.203 of this subchapter.

§ 173.22a Use of packagings authorized under exemptions. (a) Except as provided in paragraph (b) of this section, no person may offer a hazardous material for transportation in a packaging the use of which is dependent upon an exemption issued under Subpart B of Part 107 of this title, unless that person is the holder of or a party to the exemption.

(b) If an exemption authorizes the use of a packaging for the shipment or transportation of a hazardous material by any person or class of persons other than or in addition to the holder of the exemption, that person or a member of that class of persons may use the packaging for the purposes authorized in the exemption subject to the terms specified therein. However, no person may use a packaging under the authority of this paragraph unless he maintains a copy of the exemption at each facility where the packaging is being used in connection with the shipment or transportation of the hazardous material concerned. Copies of exemptions may be obtained from the Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590, Attention: Docket Section.

§ 173.23 Previously authorized packaging. (a) Where the regulations specify Specification 34 polyethylene drums, a polyethylene drum manufactured and marked in accordance with a DOT exemption may be used if the polyethylene drum conforms to Specification 34 except for the specification marking required by § 178.19-6(a)(2) of this subchapter and the drum is legibly marked "DOT-34" in characters at least one half inch in height in a location near the exemption marking.

(b) [Reserved]

(c) After July 2, 1982, a seamless aluminum cylinder manufactured in conformance with and for use under DOT exemption E 6498, E 8107, E 7042, E 8364, or E 8422, may be continued in use if marked before or at the time of the next retest with the specification identification "3AL" immediately above the exemption number, or the DOT mark (i.e., DOT 3AL 1800) is added in proximity to the exemption marking.

(d) Cylinders (spheres) manufactured and marked DOT-E 6616 prior to January 1, 1983, may be continued in use if marked before or at the time of the next retest with the specification identification "4BA" near the exemption marking.

(e) After October 1, 1984, cylinders manufactured for use under exemptions DOT E-6668 or E-8404 may be continued in use, and must be marked "DOT-4L XXXYY" (XXX to be replaced by the service pressure, YY to be replaced by the letters "AL," if applicable), in compliance with Specification 4L (§ 178.57 of this subchapter) on or before January 1, 1986. The "DOT-4L XXXYY" must appear in proximity to other required specification markings.

§ 173.24 Standard requirements for all packages. (a) Each package used for shipping hazardous materials under this subchapter shall be so designed and constructed, and its contents so limited, that under conditions normally incident to transportation:

(1) There will be no significant release of the hazardous materials to the environment;

(2) The effectiveness of the packaging will not be substantially reduced; and

(3) There will be no mixture of gases or vapors in the package which could, through any credible spontaneous increase of heat or pressure, or through an explosion, significantly reduce the effectiveness of the packaging.

(b) Materials for which detailed specifications for packaging are not set forth in this part must be securely packaged in strong, tight packages meeting the requirements of this section.

(c) Packaging used for the shipment of hazardous materials under this subchapter shall, unless otherwise specified or exempted therein, meet all of the following design and construction criteria:

(1) Each specification container must be marked as follows:

(i) In an unobstructed area with letters and numerals identifying the container specification (e.g., DOT-1A, DOT-17E-304HT, DOT-23G40). See § 178.0-2 of this subchapter.

(ii) The name and address or symbol of person making the mark specified in paragraph (c)(1)(i) of this section. Symbol letters, if used, must be registered with the Director, OHMT. Duplicate symbols are not authorized.

(iii) The markings must be stamped, embossed, burned, printed, or otherwise marked on the packaging to provide adequate accessibility, permanency, and contrast so as to be readily apparent and understood.

(iv) Unless otherwise specified, letters and numerals must be at least ½ inch high.

(v) Packaging which does not comply with the applicable specification listed in Parts 178 and 179 of this subchapter must not be marked to indicate such compliance (see § 178.0-2 and § 179.1 of this subchapter).

(2) Steel used shall be low-carbon, commercial quality steel. Stainless, open hearth, electric, basic oxygen, or other similar quality steels are acceptable. Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness (inches)	Minimum thickness (inches)
12	0.1046	0.0946
13	0.0897	0.0817
14	0.0747	0.0677
15	0.0673	0.0603
16	0.0598	0.0533
17	0.0538	0.0478
18	0.0478	0.0428
19	0.0418	0.0378
20	0.0359	0.0324
22	0.0299	0.0269
23	0.0269	0.0239
24	0.0239	0.0209
26	0.0179	0.0159
28	0.0149	0.0129
30	0.0120	0.0110

(3) Lumber used shall be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

(4) Welding and brazing shall be performed in a workmanlike manner using suitable and appropriate techniques, materials, and equipment.

(5) Packaging materials and contents shall be such that there will be no significant chemical or galvanic reaction among any of the materials in the package.

(6) Closures shall be adequate to prevent inadvertent leakage of the contents under normal conditions incident to transportation. Gasketed closures shall be fitted with gaskets of efficient material which will not be deteriorated by the contents of the container.

(7) Nails, staples, and other metallic devices shall not protrude into the interior of the outer packaging in such a manner as to be likely to cause failures.

(8) The nature and thickness of the packaging shall be such that friction during transport does not generate any heating likely to decrease the chemical stability of the contents.

(d) **Polyethylene packagings and receptacles.** (1) Polyethylene used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition occurs during transportation, handling or refilling.

(2) Each polyethylene packaging or receptacle which is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in Appendix B of this Part ("Procedure for Testing Chemical Compatibility and Rate of Permeation in Polyethylene Packagings and Receptacles") and the maximum rate of permeation of hazardous lading through or into the polyethylene packaging or receptacles may not exceed the following rates:

(i) 0.5 percent for materials meeting the definition of a poison according to this subchapter and 2.0 percent for other hazardous materials, when subjected to temperatures no lower than 18°C. (64°F) for 180 days in accordance with Test Method 1;

(ii) 0.5 percent for materials meeting the definition of a poison according to this subchapter and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than 50°C. (122°F) for 28 days in accordance with Test Method 2; or

(iii) 0.5 percent for materials meeting the definition of a poison according to this subchapter and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than 60°C. (140°F) for 14 days in accordance with Test Method 3.

(3) Alternative procedures or rates of permeation are permitted if they yield a level of safety equivalent to or greater than that provided by paragraph (d)(2) of this section and are approved by the Director, OHMT.

(4) Each polyethylene packaging used as an outside packaging for materials meeting the definition of a poison according to this subchapter shall be permanently marked, by embossment or other durable means, with the word "POISON" in letters of at least ½ inch in height. Additional text or symbols may be included in the marking. The marking shall be located within six inches of the packaging's closure. The requirements of this subparagraph do not apply prior to September 1, 1985.

(e) For specification containers, compliance with the applicable specifications in Parts 178 and 179 of this subchapter shall be required in all details, except as otherwise provided in this subchapter.

§ 173.25 Authorized packages and overpacks. (a) Except as provided in paragraph (b) of this section, authorized packages containing hazardous materials may be offered for transportation when tightly packed in a strong overpack, if all of the following conditions are met:

(1) The package meets the requirements of §§ 173.21 and 173.24 of this subchapter.

(2) The overpack is marked with the proper shipping name and identification number, and labeled as required by this subchapter for each hazardous material contained therein unless markings and labels representative of each hazardous material in the overpack are visible.

(3) Each package subject to the orientation marking requirements of § 172.312 of this subchapter is packed in the overpack with its filling holes up and the overpack is marked "THIS END UP" or "THIS SIDE UP" (as appropriate) to indicate the upward position of closures.

(4) The overpack is marked with a statement indicating that the inside (inner) packages comply with prescribed specifications when specification packagings are required, unless specification markings on the inside packages are visible.

(b) In addition to the requirements of paragraph (a) of this section, authorized packages containing corrosive liquids must meet the following conditions:

(1) Packages containing nitric acid (over 40% concentration), perchloric acid, hydrogen peroxide solution (over 52% strength by weight), nitrohydrochloric or nitrohydrochloric acid diluted are not overpacked; and

(2) Other corrosive liquids are not to be overpacked with any other hazardous material, except as follows:

(i) As provided in §§ 173.242, 173.257, 173.258, 173.259, 173.260, 173.261, and 173.286 of this subchapter; and

(ii) Acid or alkaline battery fluid in packages prescribed by §§ 173.257 and 173.258 of this subchapter may be included in overpacks with storage batteries when packed to prevent movement within the overpack.

(c) Hazardous materials which are required to be labeled Poison, may be transported in the same motor vehicle with material that is marked or known to be foodstuffs, feed or any edible material intended for consumption by humans or animals provided the Poison B material is marked, labeled, and packaged in accordance with this subchapter, conforms to the requirements of paragraph (a) of this section and is overpacked as specified in § 177.841(e) or is in an overpack meeting the following requirements:

(1) The overpack conforms to Specification 5C (§ 178.83 of this subchapter), or

(2) The overpack is a salvage drum as prescribed in § 173.3(c) of this subchapter, and—

(i) Has a maximum rated capacity of 85 gallons;

(ii) Is constructed of steel with a minimum thickness of 16 gauge; and

(iii) It meets the requirements of Specification 17C (§ 178.115 of this subchapter) except for size and marking.

§ 173.26 Quantity limitations and metric measurements. (a) When quantity limitations are specified in this subchapter only by United States liquid measure for 110 gallons or less, or only by avoirdupois weight for 1,000 pounds or less quantities measured in metric units may be substituted on an equivalent basis and up to and including 1 liter per quart and 500 grams per pound. When metric measurements are used, specification packagings must be marked to indicate their use and must be tested accordingly. Symbols for metric markings are L for liter, mL for milliliter, kg for kilogram, and g for gram.

(b) When quantity limitations do not appear in the packaging requirements of this subchapter, the permitted gross weight or capacity authorized for a container to be offered for transportation is as shown in the container specification. (See also § 173.27.)

§ 173.27 Aircraft quantity limitations. (a) The maximum quantity of hazardous material that may be offered for transportation by air in a package that is required for the material by this subchapter may not exceed that quantity prescribed in § 172.101 of this subchapter.

(b) When offered for transportation by air, the combined quantity of any one class of materials may not exceed the lowest maximum quantity prescribed in § 172.101 of this subchapter for any one of the materials in that class contained in the same package that meets the minimum requirements for the material contained therein.

§ 173.28 Reuse of packagings (containers). (a) Containers used more than once (refilled and reshipped after having been previously emptied) must be in such condition, including closure devices and cushioning materials, that they comply in all respects with the prescribed requirements for those containers. Repairs must be made in an efficient manner in accordance with requirements for materials and construction as prescribed in Parts 178 and 179 of this subchapter for new containers, or as otherwise prescribed. Parts that are weak, broken, or otherwise deteriorated must be replaced.

(1) Retest of carboy packages must have been made by or for shippers, or their authorized agents, as required by applicable provisions of the specifications in Part 178 of this subchapter before carboys which are to be offered for transportation are filled.

Note 1: Tests not required by shipper who fills and ships or who reships filled carboys for one shipment only carboy packages which have been properly tested by another shipper or a duly authorized agency.

(b) Markings applied as prescribed by the specifications must be maintained in a legible condition.

(c) If, on account of painting or any other reason, the markings as prescribed for any container cannot be kept plain and legible, a metal plate, brazed or soldered, or otherwise securely fastened to the container, with a reproduction of the prescribed markings plainly stamped thereon, will be permitted.

(d) Packagings previously used for any hazardous material must have the old markings (other than markings which are required by this subchapter to be permanent) and labels, if any, thoroughly removed or obliterated before being used for other materials.

(e) Boxes previously used for high explosives containing a liquid explosive ingredient not contained in an inside metal container must not be again used for shipments of any character.

(f) Boxes that have been contaminated by liquid explosive compositions must not again be used for shipments of any character.

(g) Kegs previously used for any chlorate must not be again used for shipments of any character.

(h) Metal kegs previously used for black powder not contained in an interior package must not be again used for shipment of any explosive.

Note 1: Until further order of the Department, metal kegs previously used for the shipment of black powder not contained in an interior package, may be used provided the kegs are in good physical condition and are not liable to permit escape of contents during transportation. Empty kegs previously used for shipment of black powder must be entirely free of black powder on the inside and outside before being offered for transportation.

(h) Except as provided in paragraphs (m) (n) and (p) of this section, single-trip containers (marked STC) and nonreusable containers (marked NRC) subject to the specification requirement of Part 178 of this subchapter, from which contents have been removed following use for transportation of any material, may not be used thereafter for the transportation of hazardous materials.

(i) Polyethylene packagings previously used for poisonous materials should not be reused for any materials other than poisonous materials or hazardous wastes.

(j) [Reserved]

(k) Containers used for shipments of etching acid liquid, n.o.s. must not be reused for shipment of any commodity.

(l) Cylinders used in anhydrous hydrofluoric acid service must comply with the requirements of § 173.264(b)(1) and must not be used in any other service.

(m) Specifications 17C, 17E, and 17H steel drums (§§ 178.115, 178.116, 178.118 of this subchapter) from which contents have been removed, may be reused as prescribed in this Part as packagings for shipment of flammable liquids, flammable solids, organic peroxides, oxidizers, poisons covered by § 173.370, Radioactive materials and corrosive liquids covered by §§ 173.249 and 173.249a, only if the following requirements, in addition to the other requirements of this section, are complied with prior to each reuse:

(1) Each drum must be thoroughly cleaned to remove all residues and foreign matter, inspected for deterioration or defects, and returned to its original shape and contour. All closure devices and parts must be removed (if removable), inspected for defects, and replaced as necessary. Each open head cover gasket must be replaced. Any drum which shows evidence of deterioration (e.g., visible pitting; creases; significant reduction in parent metal thickness from rust, corrosion, or cleaning processes; metal fatigue; or other material defects) or which cannot be returned to its original shape and contour does not qualify for reuse.

(2) The entire surface of each closed-head drum (and after December 31, 1971, each open-head drum, except for its removable head and adjacent chime area) must be tested for leakage by constant internal air pressure. The leakage test must be conducted by submersion under water, by completely covering the surface with soap suds or oil, or by some other method that will be equally sensitive. The air pressure must be maintained for a period of time sufficient to permit a complete inspection for leaks. The minimum air pressure for the test must be as follows:

Specification No.	Capacity	Minimum test pressure p.s.i.
17C	All	15
	Over 12 gallons	7
17E	12 gallons or less	5
	Over 12 gallons	7
17H	12 gallons or less	5

If leaking, the drum does not qualify for reuse.

(3) Marking:

(i) All previous test markings, commodity identification markings, and labels must be removed.

(ii) The outside of each drum qualifying for reuse under this section must be marked on the body within 10 inches of the top head with the following information: "Tested" (or "Inspected" as appropriate), the month and year of the test (or inspection, if an open-head drum), and the DOT registration number of the reconditioner. For example:

TESTED 2/70
DOT R1001

The registration number required for this marking must be obtained from the Office of Hazardous Materials Transportation, Department of Transportation, Washington, D.C. 20590.

(iii) Markings must be in at least ¼-inch figures and letters on a contrasting background.

(iv) The printed marking of the month and year of test is not required if each is clearly indicated by other means, such as perforations on a decal.

(n) A packaging marked as STC or NRC according to the specification requirements of Part 178 of this subchapter may be reused for the shipment of any corrosive solid, ORM-A, ORM-B, ORM-C, ORM-E, or any material not required by this subchapter to be shipped in a DOT specification packaging. Paragraph (m) of this section does not apply to these materials.

(o) Any drum meeting one specification which has been altered to meet another specification must be capable of meeting the new specification in all respects.

(1) Each drum so altered must be inspected, tested, and marked in accordance with paragraph (m) of this section. In addition, the drum must:

(i) Bear the specification markings required by the specification under which it was originally manufactured, and

(ii) Bear both the old and the new specification identification in conjunction with the markings required by paragraph (m) of this section with the specification to which the drum is converted shown last, e.g., "17E/17H". For example:

17E/17H
TESTED 2/70
DOT R1001

(p) A packaging marked NRC or STC according to the specification requirements of Part 178 of this subchapter may be reused for the shipment of hazardous waste to designated facilities subject to the following conditions:

(1) Except as authorized by this paragraph, the waste must be packaged in accordance with this part and offered for transportation in accordance with the requirements of this subchapter.

(2) Transportation is performed by highway only.

(3) A package is not offered for transportation less than 24 hours after it is finally closed for transportation, and each package is inspected for leakage immediately prior to being offered for transportation.

(4) Each package is loaded by the shipper and unloaded by the consignee, unless the motor carrier is a private or contract carrier.

(5) The packaging may be used only once under this paragraph and may not be used again for shipment of hazardous materials except in accordance with paragraph (m) or (n) of this section.

§ 173.29 Empty packagings. (a) Except as otherwise provided in this section, a packaging having a capacity of 110 gallons or less that previously contained a hazardous material may not be offered for transportation unless offered in the same manner as required when it previously contained a greater quantity of hazardous material.

(1) This paragraph does not apply to:

(i) A packaging that has been cleaned and purged of all residue, or

(ii) A packaging filled with a material that is not subject to this subchapter.

(2) The word "waste" does not have to be displayed as part of the marking required by § 172.300 of this subchapter on a packaging having a capacity of 110 gallons or less that contains only the residue of a hazardous material.

(3) Any packaging having a capacity of 110 gallons or less that contains only the residue of a hazardous material covered by Table 2 of § 172.504 of this subchapter:

(i) Does not have to be included in determining the applicability of the placarding requirements of that section, and

(ii) Is not subject to the shipping paper requirements of this subchapter when collected and transported by a contract or private carrier for reconditioning or reuse.

(4) Notwithstanding the stowage requirements in Columns 7(a) and (b) of the Table in § 172.101 or of the Optional Table in § 172.102 of this subchapter, for transportation by water, empty drums or empty cylinders not meeting the exception in paragraph (a)(1) of this section may be stowed on deck or under deck. Also, these packagings are not subject to Subparts D through O of Part 176 of this subchapter.

(b) [Reserved]

(c) An empty portable tank, cargo tank, tank car or multi-unit tank car tank may not be offered for transportation unless—

(1) Each opening is tightly closed except heater coil inlet and outlet pipes of empty tank cars; and

(2) Except as otherwise specified in this subchapter it is offered for transportation in the same manner as when it previously contained a greater quantity of a hazardous material. This requirement, as well as other provisions in this subchapter, does not apply to any tank that has been cleaned or purged of all hazardous material's residue or when it is reloaded with a material not subject to this subchapter.

(d) An empty packaging bearing a label or marking that is described in this subchapter and that pertains to the identification of a hazardous material may not be offered for transportation, unless the packaging contains some of the hazardous material that previously required display of the label or marking. This prohibition does not apply to transportation in a transport vehicle or freight container if such a packaging is not

For explanation of abbreviations and reference marks, see last page of this tariff.

visible during transportation and the packaging is loaded by the shipper and unloaded by the shipper or consignee.

(e) No person may offer for transportation, and no carrier may accept or transport, an empty packaging containing the residue of a hazardous material unless each opening is securely closed and free from leaks.

§ 173.30 Loading and unloading of transport vehicles. A person who loads or unloads hazardous materials into or from a transport vehicle or vessel shall comply with the applicable loading and unloading requirements of Parts 174, 175, 176, and 177 of this subchapter.

§ 173.31 Qualification, maintenance, and use of tank cars. (a) **General qualifications for use.** (1) Except as otherwise provided in paragraph (a)(2) of this section, every tank car used for the transportation of dangerous articles shall meet the requirements of the applicable specification and regulations for the transportation of the particular commodity. See paragraph (a)(3) of this section.

(2) Tanks prescribed in the following table are authorized for service provided they conform to all applicable safety requirements of this subchapter:

Specifications prescribed in current regulations	Other specifications permitted (subject to the notes)	Notes
105A200-W	105A100-W	1
105A200AL-W	105A100AL-W	1
105A300-W	ICC-105, 105A300	
105A400-W	105A400	
105A500-W	105A500	
105A600-W	105A500	
106A500-X	ICC-27, BE-27, 106A500	
106A800-X	106A800	
107A****		2

Note 1.—Tanks built as Spec. DOT-105A100-W or 105A100AL-W may be altered and reclassified as Spec. DOT 105A200W or 105A200ALW, respectively, by installing safety relief valves, retesting and stenciling in accordance with the applicable specification.

Note 2.—The test pressures of tanks built in the United States prior to January 1, 1956, may be increased to conform with current Spec. DOT-107A except that tanks built prior to 1941 are not authorized. Original and revised test pressure must be indicated and may be shown on a plate attached to the bulkhead of the car.

(3) Unless otherwise specifically provided in this Part:

(i) When class DOT-105A, 105-AL, 106A, 109A-AL, 110A, 111A, 112A, 112S, 112T, 112J, 114A, 114S, 114T or 114J tank car tanks are prescribed, the same class tanks having higher marked test pressures than those prescribed may also be used.

(ii) When class DOT-111AW1 tank car tanks are prescribed, class 111AW3 tank car tanks may also be used.

(iii) When class DOT-112A tank car tanks are prescribed, classes DOT-112S, 112T, and 112J tanks having equal or higher marked test pressures than those prescribed may also be used.

(iv) When class DOT-112S tank car tanks are prescribed, classes DOT-112T and 112J tanks having equal or higher marked test pressures than those prescribed may also be used.

(v) When class DOT-114A tank car tanks are prescribed, classes DOT-114S, 114T, and 114J tanks having equal or higher marked test pressures than those prescribed may also be used.

(vi) When class DOT-114S tank car tanks are prescribed, classes DOT-114T, and 114J tanks having equal or higher marked test pressures than those prescribed may also be used.

(vii) When a class DOT-105A tank car is prescribed, class DOT-105S and DOT-105J tank cars having equal or higher marked test pressures than those prescribed may also be used.

(viii) When class DOT-105S tank car tanks are prescribed, class DOT-105J tank cars having equal or higher marked test pressures than those prescribed may also be used.

(4) Tank cars and appurtenances may be used for the transportation of any commodity for which they are authorized. Tank cars proposed for a commodity service other than authorized, must be approved for such service by the Association of American Railroads' Committee on Tank Cars. Transfer of a tank car from one authorized service to another may be made only by the owner or owner's authorization. Classes DOT-105A-W, 109A-W, 111A-100-W-4, 112A-W, 114A-W tank cars may be used for any commodity for which they are approved by the Committee on Tank Cars and may be stenciled accordingly. When a tank car is stenciled to indicate that it is authorized for one commodity only, it must not be used for any other service.

Note 1: For additional requirements for tank cars for compressed gases, see § 173.314.

(5) After December 31, 1978, each Specification 112 and 114 tank car must be equipped with shelf couplers in accordance with § 179.105-6 of this subchapter.

(6) After February 28, 1982, each Specification 105 tank car shall be equipped with a coupler vertical restraint system in accordance with § 179.105-6 of this subchapter.

(7) After February 28, 1985, no person may load a DOT Specification tank car unless it is equipped with a coupler vertical restraint system in accordance with § 179.105-6 of this subchapter.

(8) For each tank car conforming to and used under an exemption issued before October 1, 1984, which authorized the transportation of a cryogenic liquid in a tank car, the owner or operator, if not the owner, shall remove the exemption number stenciled on the car and stamp the tank car with the appropriate Class DOT-113 Specification followed by the applicable exemption number, for example, "DOT-113D60W-E****". (Asterisks to be replaced by the exemption number.) The owner or operator, if not the owner, of a tank car that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the tank car is in service. No modification of a tank car remarked under this paragraph is authorized unless made in conformance with an applicable requirement or provision of this subchapter.

(9) Specification DOT-113A175W, DOT-113C60W, DOT-113D60W, and DOT-113D120W tank cars may continue in use, but new construction is not authorized.

(10) Class DOT-105A and 105S tank cars, constructed of ASTM A212B steel to ASTM A300 low temperature requirements, that were authorized under DOT E-3992 may continue in service but new construction is not authorized.

(b) **Loading and shipping.** (1) **Examination before shipping.** When tanks are loaded and prior to shipping, the shipper must determine to the extent practicable, that the tank, safety appurtenances and fittings are in proper condition for the safe transportation of the lading. Tanks with bottom discharge outlets must have their outlet caps off, or outlet cap plugs open, during the entire time tanks are being loaded. After loading, tanks with bottom outlet valves which permit more than a dropping of the liquid with the outlet caps off, or the outlet cap plugs open, must not be offered for transportation until proper repairs have been made. Tanks which show any dropping or leaking of liquid contents at seams or rivets, must not be offered for transportation until proper repairs have been made.

(2) **Loading requirements for tanks with interior heater coils.** Tank cars equipped with interior heater coils, except when coils are rendered inoperative by blocking off the inlet and outlet, must be loaded with heater coil inlet and outlet caps off during entire time tanks are being loaded and show no leakage with caps off.

(3) **Securing closures.** All closures of openings in tank cars and of their protective housings must be properly secured in place by the use of a bar, wrench, or other suitable tool. A wrench having a handle at least 36 inches long must be used to apply the outlet valve cap. Manway covers and outlet valve caps must be made tight against leakage of vapor and liquid, by use of gaskets of suitable materials, before cars are tendered to carrier for transportation. Lubricating materials must not be used in outlet cap or on threads of bottom outlet. All closures of openings in tank cars must be inspected to the extent practical for corrosion of or damage to the gasket seating surface and for serviceability of packing, gaskets, and hold-down bolts. All defective packing, gaskets, bolting or threaded elements must be replaced.

(4) [Reserved]

(5) A tank car is authorized for shipment of a hazardous material by water when in conformance with the requirements of Part 176 of this subchapter and the following limitations:

(i) On carfloats or trainships if the material is permitted aboard a cargo vessel by § 172.101 of this subchapter, or

(ii) On railroad car ferry vessels if the material is permitted aboard a passenger vessel by § 172.101 of this subchapter.

(c) **Periodic retest and reinspection of single-unit tank car tanks.** (1) Tanks, interior heater systems, and safety relief valves must be retested periodically as specified in Retest Table 1 of this section. Retests may be made at any time during the calendar year the retest falls due except as provided in the notes. Periodic retest of exterior heater systems is not a specification requirement.

(2) Each tank must be retested by completely filling the tank and manway nozzle or expansion dome with water or other liquid of similar viscosity except as otherwise provided for in Note (d) to Retest Table 1 and applying the specified pressure for 10 minutes if the tank is not insulated, or 20 minutes if the tank is insulated. There shall be no leakage or evidence of distress. The tank insulation and jacket need not be removed unless leakage is indicated by a drop in pressure. The liquid temperature must not exceed 100° F. during the test. Caulking of welded joints to stop leaks developed during retests is prohibited.

(3) Unless longer retest interval is authorized, tanks in service 10 years or over must be internally inspected and interior heater systems inspected for defects which would make leakage or failure probable during transit.

(4) Anchor rivet housings, if used, must not be removed during retest. They shall be retested by applying an air pressure of 100 psi through openings in the tank shell and must show no leakage.

(5) Interior heater systems must be retested hydrostatically at 200 psi and must show no leakage.

(6) Safety relief valves must be retested with air or gas and must start to discharge at the pressure prescribed within plus or minus 3 percent except that if the start-to-discharge pressure is under 100 psi, the valve must start to discharge at the pressure prescribed within plus or minus 3 psi. Valves must be vapor tight at the prescribed pressure.

(7) A DOT tank car built to one specification and authorized to be stenciled to another specification must be retested in accordance with the higher specification and the test pressure stenciled accordingly on the tank or jacket. An existing pressure tank car tank which is permanently converted to a lower pressure specification must have the new specification and conversion date permanently stamped in letters and figures at least ¾-inch high on the outside of the manway nozzle or the edge of the manway nozzle flange on the left side of the car. Each car

must be tested as designated in Retests Table 1 for the new specification. On a Class DOT-111A tank car, the class numeral of the specification number may be omitted from the stamping.

(8) Retests of tanks and safety relief devices must be reported by party making tests to car owner. Reports must show initials and numbers of cars, pressure to which tested, date and place of test, and by whom tested. Reports of latest retest must be retained by owner until the next retest has been accomplished and recorded.

(9) After repairs requiring welding, riveting, caulking of rivets, or hot or cold forming to restore tank contour, tanks must be retested at the pressure specified in Retest Table 1 of this paragraph before being returned to service. Glass, lead, rubber, elastomeric or polyvinyl chloride lined tanks must be retested before lining is renewed or after lining is removed. Interior heater systems must be retested before the tank is returned to service after repairs or renewals of any part of the system.

(10) The year of a pressure test, the pressure to which it was tested, and tests due dates for the tank, pressure relief valve and interior heating system must be stenciled on the tank (or on the tank jacket if the tank is insulated). If a retest is required during a particular calendar month, the month and the year must be stenciled. On existing cars, the test due date stencil must be applied at the next test date or tank painting whichever comes first. Any pressure relief valve from a stock which has been tested within six months of installation may be considered as having been tested or retested in the month in which installed, providing the valve has been protected from deterioration during this period.

(11) Any glass, rubber, or lead-lined tank need not be periodically retested, but the interior heater systems and safety valves must be retested at the prescribed interval. See also paragraph (c)(9) of this section.

(12) Any tank lined with an elastomeric polyvinyl chloride at least ¼-inch thick or an elastomeric polyurethane at least ⅜-inch thick need not be periodically retested, but the heater system and safety relief valves must be retested at the prescribed intervals. The tank must be retested before lining is renewed.

(13) Special requirements for Class DOT-113 tank cars.

(i) A Class DOT-113 tank care need not be periodically pressure tested; however, each shipment must be monitored to determine the average daily pressure rise in the tank car. If the average daily pressure rise during any shipment exceeds 3 psi per day, the tank car must be retested for thermal integrity prior to any subsequent shipment.

(ii) Thermal integrity retest. Either of the following alternative thermal integrity retests may be used:

(A) Pressure rise retest: The pressure rise in the tank may not exceed 5 psi in 24 hours. When the pressure rise retest is performed, the absolute pressure in the annular space of the loaded tank car may not exceed 75 microns of mercury at the beginning of the retest, and may not increase more than 25 microns during the 24 hour period, or

(B) Calculated heat transfer rate retest: The insulation system must be performance tested as prescribed in §179.400-4 of this subchapter. When the calculated heat transfer rate retest is performed, the absolute pressure in the annular space of the loaded tank car may not exceed 75 microns of mercury at the beginning of the retest, and may not increase more than 25 microns during the 24 hour period. The calculated heat transfer rate in 24 hours may not exceed:

(1) 120 percent of the appropriate standard heat transfer rate specified in §179.401-1 of this subchapter, for DOT-113A60W and DOT-113C120W tank cars;

(2) .1164 Btu/day/lb. of inner tank water capacity, for DOT-113A175W tank cars;

(3) .3272 Btu/day/lb. of inner tank water capacity, for DOT-113C60W and 113D60W tank cars; or

(4) .4740 Btu/day/lb. of inner tank water capacity, for DOT-113D120W tank cars.

(iii) If the car fails either of the retests prescribed in paragraph (c)(13)(ii) of this section, the car must be removed from service and may not be placed back in service until one of the applicable retests in paragraph (c)(13)(ii) of this section is successfully completed.

(iv) Each frangible disc must be replaced every 12 months and the replacement date stenciled on the car near the pressure relief valve information.

(v) An alternate pressure relief valve must be retested at the same time interval prescribed for the required pressure relief valve. The start-to-discharge pressure and vapor tight pressure requirements for the alternate pressure relief valve must be as specified in §179.401-1 of this subchapter. The alternate pressure relief valve values specified in §179.401-1 of this subchapter for the DOT-113C120W tank car apply to the DOT-113D120W tank car.

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RETEST-TABLE 1

Specification	Retest interval years [1]				Retest pressure—p.s.i.		
	Tank and interior heater systems			Safety relief valve	Tank	Safety relief valve	
	Up to 10 years old	Over 10 to 22 years old	Over 22 years old			Start to discharge	Vapor tight
DOT-103	.....	10	10	10	60	[2] 35	28
DOT-103AL	.....	5	5	5	60	35	28
DOT-103W	.....	[3] 20	10	10	60	[2] 35	28
DOT-103ALW	10	10	10	10	60	35	28
DOT-103A	.....	3	1	2	60	35	28
DOT-103AW [4]	[5] 5	3	1	2	60	35	28
DOT-103A-ALW [6]	[5] 5	3	1	[7]	60	[8] 35	28
DOT-103ANW	[5] 5	3	1	2	60	35	28
DOT-103B	.....	[9] 3	[9] 1	None	60	.....	.....
DOT-103BW	[5] 5	[9] 3	[9] 1	None	60	.....	.....
DOT-103C	.....	3	1	[7]	60	35	28
DOT-103CW	[5] 5	3	1	[7]	60	[8] 35	28
DOT-103DW	[5] 5	3	1	[7]	60	35	28
DOT-103EW	[5] 5	3	1	[7]	60	35	28
DOT-104	.....	10	10	10	60	[2] 35	28
DOT-104A	.....	10	10	5	100	75	.....
DOT-104W	.....	[3] 20	10	10	60	[2] 35	28
DOT-105	.....	.....	[10] 10	[11] 5	500	[12] 225	180
DOT-105A100 [13]	.....	10	10	5	100	75	60
DOT-105A100W	10	10	10	5	100	75	60
DOT-105A200ALW	10	10	10	5	200	150	120
DOT-105A200F	10	10	10	5	200	150	120
DOT-105A200W	10	10	10	5	200	150	120
DOT-105A200W	10	10	10	5	200	150	120
DOT-105A300 [14]	.....	[15] 10	[15] 10	[16] 5	300	[12] 225	180
DOT-105A300ALW	10	10	10	5	300	225	180
DOT-105A300W [13]	10	10	10	5	300	225	180
DOT-105A400 [14]	.....	[15] 10	[15] 10	[16] 5	400	[17] 300	240
DOT-105A400W	[15] 10	[15] 10	[15] 10	[16] 5	400	[17] 300	240
DOT-105A500 [14]	.....	[15] 10	[15] 10	[16] 5	500	[18] 375	300
DOT-105A500W	[15] [19] 10	[15] [19] 10	[15] [19] 10	[16] [19] 5	500	[18] 375	300
DOT-105A500 [14]	.....	[15] 10	[15] 10	[16] 5	600	450	360
DOT-105A500W	[15] 10	[15] 10	[15] 10	[16] 5	600	[17] 450	360
DOT-109A100ALW	10	10	10	5	100	75	60
DOT-109A200ALW	10	10	10	5	200	150	120
DOT-109A300ALW	10	10	10	5	300	225	180
DOT-109A300W	10	10	10	5	300	225	180

[1] Tanks and safety relief valves in chlorine service must be retested every 2 years at any time during the calendar month the retest falls due. See § 173.314(c) Note 12.

[2] Specifications 103CW and 103A-ALW cars built prior to Aug. 31, 1956, equipped with safety relief valves set to discharge at 45 p.s.i., may be continued in service. Such valves may be set to discharge at 35 p.s.i. by installing a spring suitable for the lower pressure. Specifications 103A-ALW and 103CW tank cars used to transport anhydrous hydrazine or hydrazine solutions may have a safety relief valve having a start to discharge pressure of 45 p.s.i. with a tolerance of plus or minus 3 p.s.i. and a vapor tight pressure of 36 p.s.i.

[3] Class 103 and 104 tank cars built before January 1, 1959 and equipped with 25 psi pressure relief valves may remain in service with start-to-discharge retested at 25 psi, vapor tight at 20 psig.

[4] A commodity for which a tank is approved may be used for filling tank and dome when retesting tanks in service not over 10 years.

[5] Safety relief valve retest period is same as tank retest period.

[6] Nickel clad tanks in bromine service and any glass, rubber, lead, or elastomeric lined tank need not be periodically retested, but the interior heater systems and pressure relief valves must be retested at the prescribed interval. For testing requirements for glass, rubber or other lined tanks see paragraphs (c)(9), (c)(11), and (c)(12) of this section.

[7] If safety relief valves are used in combination with breaking pins designed to break at 225 psi, the safety relief valves must be retested and must start to discharge at 213 psi plus or minus 3 percent.

[8] If safety relief valves are used in combination with breaking pins designed to break at 375 psi, the safety relief valves must be retested and must start to discharge at 360 psi plus or minus 3 percent.

[9] Tanks and safety relief devices in hydrocyanic acid service must be retested and inspected by a written procedure filed with and approved by the Associate Director for HMR.

[10] When the retest interval changes due to the age of the tank, the new retest interval must be measured from the last retest date but in no case shall the time between retests exceed the interval specified in Table 1 for the age of the tank. The retest of a tank because of repairs may alter the normal retest schedule specified in the table.

[11] Safety relief valves in bromine service must be retested every 2 years.

[12] [Reserved]

[13] When a safety relief valve is used in combination with a breaking pin device, the breaking pin device shall be designed to fail at a pressure of 75 percent of the tank test pressure and safety relief valve shall be set for a start-to-discharge pressure of 71 percent of the tank pressure.

[14] If the alternate safety relief valve start-to-discharge pressure setting is used, the retest pressures of the safety relief valves must be in accordance with the provisions of § 179.102-11 of this chapter.

[15] [Reserved]

[16] Retest period for interior heater systems on cars so equipped is 10 years.

[17] Tanks must be retested at the time they are converted from existing pressure type tanks to a non-pressure specification. When tanks are converted to DOT 103A-ALW from DOT 103ALW or AAR 201A70W, the tank must be retested at the time of conversion if welding on the tank is performed. For future retests of converted tanks, the retest interval must be selected from the table based on the age of the tank computed from the date converted instead of the date built. The conversion date must be stenciled on the tank below the built date.

[18] When tanks are converted to DOT-103AW from existing DOT-103W or 103W tanks, the tank must be retested at time of conversion if welding on the tank is performed. Lined tanks must be retested before the lining is renewed or after the lining is removed. For future retests, the retest interval must be selected from the Table as though the tank were 10 years old at time of conversion. The conversion date must be stenciled on the tank below the built date.

[19] See paragraph (c)(13) of this section for additional requirements for Class DOT-113 cars.

[20] Tanks in sodium metal service may be visually inspected at least once every 10 years instead of being retested hydrostatically. Date of the visual inspection must be stenciled on the tank near the other required markings.

[21] Tank cars stenciled 105S, 105J, 112S, 112T, 112J, 114S, 114T or 114J have the same retest requirements as 105A, 112A, or 114A, respectively.

[22] Pressure tank cars authorized for corrosive material service must have tank and pressure relief valve retested when removed from the service and prior to return to compressed gas service.

[23] Tank cars stenciled 105S or 105J have the same retest requirements as 105A.

RETEST TABLE 2

Specification	Retest interval—years		Retest pressure—psi		Safety valve pressure—psi	
	Tank	Safety relief devices[1]	Tank hydrostatic expansion[2]	Tank air test	Start-to-discharge	Vapor tight
DOT 27	5	2	500	100	375	300
106A500	5	2	500	100	375	300
106A500X	5	2	500	100	375	300
106A800	5	2	800	100	600	480
106A800X	5	2	800	100	600	480
106A800NCI	[4] 5	[4] 2	800	100	600	480
107A****	5	2	[3]	None	None	None
110A500-W	5	2	500	100	375	300
110A500-W	5	2	600	100	450	360
110A800-W	5	2	800	100	600	480
110A1000-W	5	2	1,000	100	750	600
BE-27	5	2	500	100	375	300

[1] If DOT 107A**** tanks are used for transportation of flammable gases, one frangible disc from each car must be burst at the interval prescribed. The sample disc must burst at a pressure not exceeding the marked test pressure of the tank and not less than 7/10 of the marked test pressure. If the sample disc does not burst within the prescribed limits all discs on the car must be replaced.

[2] The hydrostatic expansion test pressure must at least equal the marked test pressure.

[3] [Reserved]

[4] See § 173.31(d)(9).

[5] Safety relief valves of the spring loaded type on tanks used exclusively for fluorinated hydrocarbons and mixtures thereof which are free from corroding components may be retested every 5 years.

(d) Periodic retest and reinspection of tanks other than single-unit tank car tanks. (1) Tanks designed to be removed from cars for filling and emptying and tanks to spec. DOT 107A**** and their safety relief devices must be retested periodically as specified in Retest Table 2 of this paragraph. Retests may be made at any time during the calendar year the retest falls due.

(2) Each tank, except as provided in paragraph (d)(9) of this section, must be subjected to the specified hydrostatic pressure and its permanent expansion determined. Pressure must be maintained for 30 seconds and as much longer as may be necessary to secure complete expansion of the tank. Pressure gauge must permit reading to an accuracy of 1 percent. Expansion gauge must permit reading of total expansion to an accuracy of 1 percent. Expansion must be recorded in cubic centimeters. Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure and tank must not leak or show evidence of distress.

(3) Each tank, except tanks to Spec. DOT 107A, must also be subjected to interior air pressure test of at least 100 psi under conditions favorable to detection of any leakage. No leaks shall appear.

(4) Safety relief valves must be retested by air or gas, must start to discharge at or below the prescribed pressure and must be vaportight at or above the prescribed pressure.

(5) Frangible discs or fusible plugs must be removed from the tank and visually inspected.

(6) Tanks must be retested as specified in Retest Table 2 of this paragraph before return to service after repairs involving welding or heat treatment.

(7) The month and year of test, followed by a "V" if visually inspected as described in paragraph (d)(9) of this section, must be plainly and permanently stamped into the metal of one head or chime of each tank passing test; for example, 1–60 for January 1960. On DOT 107A**** tanks, the date must be stamped into the metal of the marked end; except that if all tanks mounted on a car have been tested, the date may be stamped into the metal of a plate permanently applied to the bulkhead on the "A" end of the car. Date of previous tests and all prescribed markings must be kept legible.

(8) Retests of tanks and safety relief devices must be reported by party making tests to owner of tank. Reports must show registered identifying mark and serial number, pressure to which tested, date and place of test, and by whom tested. Reports of latest retest must be retained by owner until the next retest has been accomplished and recorded.

(9) Tanks of DOT 106A and DOT 110A–W (§§ 179.300, 179.301, 179.302 of this subchapter) specifications used exclusively for transporting fluorinated hydrocarbons and mixtures thereof which are free from corroding components may be given a periodic complete internal and external visual inspection in lieu of the periodic hydrostatic retest. Visual inspections shall be made only by competent persons. Acceptance or rejection of tanks must be based upon the methods used for cylinders in CGA Pamphlet C–6, and the results must be recorded on a suitable data sheet, the completed copies of which must be kept by the owner as a permanent record. The points to be recorded and checked on these data sheets are: Date of inspection (month and year followed by a "V" to indicate visual inspection); DOT specification number; tank identification (registered symbol and serial number, date of manufacture and ownership symbol); type of protective coating (painted, etc., and statement as to need of refinishing or recoating); conditions checked (leakage, corrosion, gouges, dents or digs, broken or damaged chime or protective ring, fire, fire damage, internal condition); disposition of tank (returned to service, returned to manufacturer for repair, or scrapped).

(e) Tank car tanks subjected to the action of fire. (1) Tank car tanks of other than classes DOT 106A, 107A or 110A bearing evidence of damage to the metal by fire must be withdrawn from transportation service except that if the damage to the tank is local only or confined to not more than 25 percent of the tank surface, the damaged material may be replaced. See paragraph (f)(1) of this section for the procedure for handling tank car tanks with more than 25 percent of the tank surface damaged.

(2) Tank car tanks of classes DOT 106A, 107A or 110A bearing evidence of damage to the metal by fire must be withdrawn from transportation service until they have been inspected inside and outside to determine that no reduction in wall thickness has resulted, and have been heat-treated and retested. These operations must be carried out, supervised and reported as prescribed by the specifications for original heat treatment and test.

(f) Repairs or alterations. (1) For procedure to be followed in making repairs or alterations to all tank car tanks and securing approval thereof, see Appendix R, Association of American Railroads Specifications for Tank Cars.

(2) After alterations of tank cars or equipment therefor from original design, a certificate of compliance with the respective specification must be furnished to the car owner, to the Bureau of Explosives, and to the Secretary, Mechanical Division, Association of American Railroads.

§ 173.32 Qualification, maintenance, and use of portable tanks other than Specification IM portable tanks. (a) Except as otherwise provided in this section, each portable tank container used for the transportation of hazardous materials must conform to the requirements of the specification and regulations for the transportation of the particular commodity. Except for Specification 56 and 57 portable tanks, a manufacturer's data report of the portable tank must be procured and retained in the files of the owner during the time that such portable tank is used for such service.

(1) When a portable tank container is used as a cargo tank container, it shall comply with all the requirements prescribed for cargo tank containers. (See § 173.33.)

(2) [Reserved]

(3) Each uninsulated portable tank used for the transportation of compressed gases, as defined in § 173.300, must have an exterior surface finish complying with § 178.245–1(c) of this subchapter.

(4) No portable tank or specification 106A or 110A tank containing a hazardous material may be offered for transportation aboard a passenger vessel unless:

(i) The vessel is operating under a change to its character of vessel certification as defined in § 171.8 of this subchapter; and

(ii) The material is permitted to be transported aboard a passenger vessel in § 172.101 of this subchapter.

(5) Where IM–101 and IM–102 portable tanks are prescribed, Specification 51 portable tanks otherwise conforming to the special commodity requirements of the IM Tank Table may be used.

(b) Any portable tank container constructed prior to May 15, 1950, complying with the requirements of either the A. S. M. E. Code for Unfired Pressure Vessels, 1946 Edition, or the A. P. I.–A. S. M. E. Code for Unfired Pressure Vessels, 1943 Edition, may be used for the transportation of liquefied compressed gas, provided it fulfills all the requirements of this part and specifications for the particular gas or gases to be transported therein and shall be marked "ICC Specification 51X" on the plate required by the specification, except as modified by any or all of the following:

(1) Tanks designed and constructed in accordance with Pars. U–68, U–69, or U–201 of the A. S. M. E. Code may be used. Tanks designed and constructed in accordance with Pars. U–68 or U–69 may be re-rated at a working pressure 25 percent in excess of the design pressure for which the tank was originally constructed. If advantage is taken of the increased rating, the re-rated pressure shall be marked on the plate as follows:

Re rated working pressure - psig

Note 1. For purposes of setting safety relief valves, pressure control valves and establishing retest pressure, and for purposes of establishing maximum and minimum design pressures, the re rated working pressure shall be considered as the equivalent of the design pressure as defined in the specification.

(2) Loading and unloading accessories, valves, piping, fittings, safety and gauging devices, do not have to comply with the requirements for the particular location on the tank.

(3) Specification requirements as to stress-relieving and radiographing are waived.

(c) Any portable tank container of IOC Specification 50[1] fulfilling the requirements of that specification may be continued in service for transportation of a liquefied petroleum gas if it is retested every five years in accordance with the requirements of paragraph (e)(3), (4), and (5) of this section: *Provided*, That it is in and can be maintained in safe operating condition for the transportation of that gas. In this case the container may retain its original markings.

(d) **Use of specification 52 and 53 tanks.** Continued use of an existing portable tank constructed to specification 52 or 53 is authorized only for a tank constructed before June 1, 1972.

(e) **Retest.** Each portable tank used for the transportation of a hazardous material must be successfully retested before further use in accordance with the following:

(1) Schedule. Each tank must be retested as prescribed in paragraph (e)(2) of this section, in accordance with the following schedule:

(i) Specification 51 (§ 178 245 of this subchapter): at least once every 5 years.

(ii) Specifications 52, 53, 56, and 57 (§§ 178 251, 178 252, 178 253 of this subchapter): at least once every 2 years.

(iii) Specification 60 (§ 178 255 of this subchapter): at the end of the first 4-year period after the original test; at least once every 2 years thereafter up to a total of 12 years of service; and at least once annually thereafter. Retesting is not required on a rubber-lined tank except before each relining.

(iv) Any other portable tank authorized by this part for transportation of compressed gases (including liquefied compressed gases): at least once every 5 years.

(2) Test procedures. Unless otherwise specified, each tank must be retested in accordance with the following test procedures:

(i) Pressure. Each Specification 60 tank must be retested in accordance with § 178 255-12 of this subchapter. A Specification 57 tank must be retested in accordance with § 178 253-5(b) of this subchapter. Any other tank must be tested by a minimum pressure (air or hydrostatic) of at least 2 pounds per square inch gage or at least one and one-half times the design pressure (maximum allowable working pressure, or re-rated pressure) of the tank, whichever is greater. During each air pressure test, the entire surface of all joints under pressure must be coated with or immersed in a solution of soap and water, heavy oil, or other material suitable for the purpose of detecting leaks. The pressure must be held for a period of time sufficiently long to assure detection of leaks. During the air or hydrostatic test, relief devices may be removed, but all the closure fittings must be in place and the relief device openings plugged. Lagging need not be removed from a lagged tank if it is possible to maintain the required test pressure at constant temperature with the tank disconnected from the source of pressure.

(ii) Visual. While under the test pressure, the tank must be visually inspected for leakage, defective fittings and welds, defective closures, significant dents, and other defects or abnormalities which indicate a potential or actual weakness that could render the tank unsafe for the transportation of a hazardous material.

(iii) Rejection criteria. A tank fails to meet the requirements of the pressure test if, during the test, there is permanent distortion of the tank exceeding that permitted by the applicable specification, if there is any leakage, or if any deficiencies described in paragraph (e)(ii) of this section are found. Any tank that fails must be rejected and may not be used again for the transportation of a hazardous material unless the tank is adequately repaired and thereafter a successful test is conducted in accordance with the requirements of this paragraph.

(3) Marking. The date of the most recent periodic retest must be marked on the tank, on or near the metal certification plate. Marking must be in accordance with § 173 24.

(4) Records. The owner of the tank or his authorized agent must retain a written record indicating the date and results of all required tests and the name and address of the tester, until the next retest has been satisfactorily completed and recorded.

(f) **Special tanks.** Each portable tank authorized by this part including each exemption tank (other than a tank covered by paragraph (e)(1)(iv) of this section) which is not in compliance with one of the specifications listed in paragraph (e) of this section, must be tested in accordance with the procedures prescribed in paragraph (e) of this section for the type of portable tank most nearly equivalent in design and usage. A tank constructed in accordance with paragraph U-68 or U-69 of previous editions of the ASME Code, and which has not been re-rated, must be hydrostatically retested at twice the design pressure instead of the one and one-half times prescribed in paragraph (e)(2)(i) of this section.

(g) **Deteriorated tanks.** Without regard to any other retest requirements, any tank that shows evidence at any time of bad dents, corroded areas, leakage, or other conditions that indicate weakness which could render the tank unsafe for the transportation of a hazardous material, must be retested as prescribed in paragraph (e)(2) of this section.

(h) **Damaged tanks.** Any tank that has been in an accident and that has been damaged to an extent that may adversely affect its product retention capability, must be retested as prescribed in paragraph (e)(2) of this section.

(i) **Unused tanks.** Any tank that has not been used to transport a hazardous material for a period of 1 year or more may not be returned to hazardous material's service until it has been tested successfully in accordance with the requirements of paragraph (e)(2) of this section.

(j) The Department may require the testing under prescribed conditions of any tank when probable cause appears for suspecting that such tank is in unsafe operating condition.

(k) The repair of tanks is authorized, provided such repairs are made under requirements prescribed in the "Code" for the original design and construction.

(l) In addition to any other provisions of the specification, no tank shall be repaired, or remodeled, as to cause leakage or cracks or likelihood of leakage or cracks, by areas of stress concentration due to shrinkage of cooling metal in welding operations, sharp fillets, reversal of stresses, or otherwise.

(2) No field welding shall be done except to non-pressure parts.

(m) The bursting strength of any piping and fittings shall be not less than four times the design pressure of the tank, and not less than four times that pressure to which, in any instance, it may be subjected in service, by the action of a pump or other device (not including safety relief valves) the action of which may be to subject certain portions of the tank piping to pressures greater than the design pressure of the tank.

(1) Pipe joints shall be threaded, welded or flanged. If threaded pipe is used, the pipe and pipe fittings must not be lighter than (Schedule 80) weight. Nonmalleable metals must not be used in the construction of valves or fittings. Where copper tubing is permitted, joints must be brazed or be of equally strong metal union type. The melting point of brazing material may not be lower then 1000° F. The method of joining tubing must not decrease the strength of the tubing such as by the cutting of threads.

(2) Fittings shall be extra heavy. Non-malleable metals shall not be employed in the construction of valves or fittings.

(3) Suitable provision shall be made in every case to allow for expansion, contraction, jarring and vibration of all pipe. Slip joints shall not be used for this purpose.

(4) Piping and fittings shall be grouped in the smallest practicable space and shall be protected from damage as required by the specification.

(5) All piping, valves and fittings on every tank shall be leakage tested with gas or air after installation and proved tight at not less than the design pressure of the tank on which they are used. In the event of replacement, all such piping, valves, or fittings so replaced shall be tested in accordance with the requirements of this section before the tank is returned to transportation service. The requirements of this section shall apply with equal force to all hose used on such tanks, except that such hose may be so tested either before or after installation on the tank.

(n) All materials of construction used in portable tank containers and their appurtenances shall not be subject to destructive attack by the contents of the tank.

(o) All parts of tanks and appurtenances for anhydrous ammonia shall be steel. No copper, silver, zinc, nor their alloys shall be permitted. Brazed joints shall not be permitted.

(p) Each outlet of portable tanks used for the transportation of liquefied compressed gases, except carbon dioxide, shall be provided with a suitable automatic excess-flow valve. These valves shall be located inside the tank or at a point outside the tank where the line enters or leaves the tank. The valve seat shall be located inside the tank or shall be located within a welded flange or its companion flange, or within a nozzle or within a coupling. The installation shall be made in such a manner as reasonably to assure that any undue strain which causes failure requiring functioning of the valve shall cause failure in such a manner that it will not impair the operation of the valve.

Exception. Safety device connections and liquid level gauging devices which are so constructed that the outward flow of tank contents shall not exceed that passed by a No. 54 drill size opening are not required to be equipped with excess-flow valves.

(q) Excess-flow valves shall close automatically at the rated flows of gas or liquid as specified by the valve manufacturer. The connections or lines on each side of the excess-flow valve, including valves, fittings, etc., shall have a greater capacity than the rated flow of the excess-flow valve.

[1] Use of existing portable tanks authorized, but new construction not authorized.

(2) Excess-flow valves may be designed with a by-pass, not to exceed a No. 60 drill size opening, to allow equalization of pressures.

(3) Filling and discharge lines shall be provided with manually operated shut-off valves located as close to the tank as is practicable. The use of so-called "Stop-Check" valves to satisfy with one valve the requirements of this subparagraph and of paragraph (n) of this section, is forbidden.

(o) Each tank for carbon dioxide and nitrous oxide shall be lagged with a suitable insulation material of such thickness that the overall thermal conductance is not more than 0.08 Btu per square foot per degree F. differential in temperature per hour. The conductance shall be determined at 60° F. Insulation material used on tanks for nitrous oxide shall be noncombustible.

(p) A refrigerating and or heating coil or coils may be installed in tanks for carbon dioxide and nitrous oxide. Such coils must be tested externally to at least the same pressure as the test pressure of the tank. The coils must also be tested internally to at least twice the working pressure of the heating or refrigerating system to be used but in no case less than the test pressure of the tank. Such coils shall be securely anchored. The refrigerant or heating medium to be circulated through the coil or coils must be such as to cause no adverse chemical reaction with the tank or tank contents in case of leakage.

§ 173.32a Approval of Specification IM portable tanks. (a) **Application for approval.**

(1) An owner or manufacturer of an IM portable tank (§§ 178.270 through 178.272 of this subchapter) shall apply for approval to any approval agency designated to approve that tank in accordance with the procedures in Subpart E, Part 107 of this chapter.

(2) Each application for approval must contain the following information:

(i) Three complete copies of all engineering drawings, calculations, and test data necessary to insure that the design complies with the relevant specification.

(ii) The manufacturer's serial number that will be assigned to each portable tank.

(iii) A statement as to whether the design type has been examined by any approval agency previously and judged unacceptable. Affirmative statements must be documented with the name of the approving agency, reason for nonacceptance, and the nature of modifications made to the design type.

(b) **Action by approval agency.** The approval agency shall:

(1) Review the application for approval to determine whether it is complete and conforms with the requirements of paragraph (a) of this section. If an application is incomplete, it will be returned to the applicant and the applicant will be informed in what respects the application is incomplete.

(2) Review all drawings and calculations to ensure that the design is in compliance with all requirements of the relevant specification. If the application is approved, one set of the approved drawings, calculations, and test data shall be returned to the applicant. The second and third (inspector's copy) sets of approved drawings, calculations, and test data shall be retained by the approval agency.

(3) Witness all tests required in § 178.270–13 of this subchapter.

(4) Ensure, through appropriate inspection that each IM portable tank is fabricated in all respects in conformance with the approved drawings, calculations, and test data; and

(5) Upon successful completion of all requirements of this subpart, the approval agency shall:

(i) Apply its name, identifying mark or identifying number, and the date upon which the approval was issued, to the metal identification plate required by § 178.270–14 of this subchapter.

(ii) Issue an approval certificate for each IM portable tank or, in the case of a series of identical tanks manufactured to a single design, for the series of IM portable tanks. The approval certificate must include all the information required to be displayed on the required metal identification plate.

(c) **Disposition of approval certificates.** A copy of each approval certificate shall be retained by the approval agency and by the owner of each IM portable tank, and a copy shall be forwarded by the approval agency to the Director, OHMT.

(d) **Denial of application for approval.** If an approval agency finds that an IM portable tank cannot be approved for any reason, it shall so notify the applicant in writing and shall provide the applicant with the reasons for which the approval is denied. An applicant aggrieved by a decision of an approval agency may appeal the decision in writing within 90 days of receipt to the Director, OHMT.

(e) [Reserved]

(f) **Approval of other existing IM portable tanks.** Portable tanks constructed on or before May 1, 1991, that have not operated under a DOT exemption must be approved in accordance with the provisions of paragraph (b) of this section.

(g) Modifications to approved portable tanks.

(1) Prior to modification of any approved portable tank which may affect conformance to § 178.271 or § 178.272 of this subchapter, the owner or manufacturer desiring to make such modification shall inform the approval agency that issued the initial approval of the portable tank (or if unavailable another approval agency) of the nature of the modification and request approval of the modification. The owner or manufacturer shall supply the approval agency with three sets of all revised drawings, calculations, and test data relative to the intended modification.

(2) A statement as to whether the intended modification has been examined by any approval agency previously and judged unacceptable. An affirmative statement must be documented with the name of the approving agency, the reason for nonacceptance, and the nature of changes made to the modification since its original rejection.

(3) The approval agency shall review the request for modification, and if it is determined that the proposed modification is in full compliance with the relevant DOT specification the request shall be approved and the approval agency shall:

(i) Return one set of the approved revised drawings, calculations, and test data to the applicant. The second and third sets of the approved revised drawings, calculations, and test data shall be retained by the approval agency as required in § 107.404(a)(3) of this chapter.

(ii) Ensure through appropriate inspection, that all modifications conform to the revised drawings, calculations, and test data.

(iii) Determine the extent to which retesting of the modified tank is necessary based on the nature of the proposed modification, and ensure that all required retests are performed in accordance with § 178.270–13 of this subchapter.

(iv) If modification to an approved tank alters any information on the approval certificate, issue a new approval certificate for the modified tank and ensure that any necessary changes are made to the metal identification plate. A copy of each newly issued approval certificate shall be retained by the approval agency and by the owner of each portable tank.

(4) If it determined that the proposed modification is not in compliance with the relevant DOT specification, the request shall be denied. The procedures of paragraph (d) of this section apply to such denial.

(h) **Termination of Approval Certificate.**

(1) The Director, OHMT may terminate an approval issued under this section if he determines that:

(i) Information upon which the approval was based is fraudulent or substantially erroneous; or

(ii) Termination of the approval is necessary to adequately protect against risks to life and property.

(iii) The approval was not issued by the approval agency in good faith.

(2) Before an approval is withdrawn, the Director, OHMT gives the owner or manufacturer and the approval agency:

(i) Written notice of the facts or conduct believed to warrant the withdrawal;

(ii) Opportunity to submit oral and written evidence, and

(iii) Opportunity to demonstrate or achieve compliance with the application requirement.

(3) If the Director, OHMT determines that a certificate of approval must be withdrawn to preclude a significant and imminent adverse affect on public safety, he shall withdraw the certificate of approval issued by a designated approval agency. In such circumstances, the procedures of paragraphs (h)(2) (ii) and (iii) of this section need not be provided prior to withdrawal of the approval, but shall be provided as soon as practicable thereafter.

§ 173.32b Periodic testing and inspection of Specification IM portable tanks. (a) **Periodic testing**—(1) **Hydrostatic test.** Each Specification IM portable tank (§§ 178.270, 178.271 and 178.272 of this subchapter) and all piping, valves and accessories, except pressure-relief devices, shall be hydrostatically tested with water, or other liquid of similar density and viscosity, to a pressure not less than 150 percent of its maximum allowable working pressure. Testing shall be at intervals of not more than five years. While under pressure the tank shall be inspected, for leakage, distortion, or any other condition which might render the tank unsafe for service. The hydrostatic test shall be witnessed by an approval agency. Any damage or deficiency which might render the portable tank unsafe for service shall be repaired to the satisfaction of the witnessing approval agency and the tank hydrostatically retested. Upon successful completion of the hydrostatic test, the witnessing approval agency shall apply its name, identifying mark or identifying number and the date of the test on the tank as described in paragraph (d) of this section.

(2) **Pressure relief valves.** Spring loaded pressure relief valves must be removed from the tank and tested at intervals of not more than two and one-half years.

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) Visual inspection. Each portable tank and all piping, valves and accessories shall be visually inspected at intervals not exceeding two and one half years. The inspection shall be conducted by an owner or his agent or by an approval agency, except that it must be conducted by an approval agency coincident with each hydrostatic test required by paragraph (a) of this section. In the case of insulated tanks, insulation need not be removed if, in the opinion of the person performing the visual inspection, external corrosion is likely to be negligible. If evidence of any unsafe condition is discovered, the portable tank may not be returned to service until such condition has been corrected to the satisfaction of the person performing the inspection. The inspection shall include the following:

(1) The tank shall be carefully inspected internally for corroded areas, dents, distortions, defects in welds, and other conditions that might render the tank unsafe for service;

(2) The piping, valves, and gaskets shall be carefully inspected for corroded areas, defects in welds, and other conditions, including leakage, that might render the tank unsafe for service;

(3) Devices for tightening manhole covers must be operative and there must be no leakage at manhole covers or gaskets.

(4) Missing or loose bolts or nuts on any flanged connection or blank flange must be replaced or tightened.

(5) All emergency devices and valves must be free from corrosion, distortion and any damage or defect that could prevent their normal operation.

(6) Required markings on the tank must be legible.

(7) Upon successful completion of the visual reinspection, the inspector shall mark the date of the visual reinspection on the tank as described in paragraph (d) of this section.

(c) International shipments. A portable tank that meets the definition of "container" in § 450.3(a)(3) of this title may not be offered for international transport unless the frame work, tank supports and lifting attachments fully comply with all applicable requirements of Parts 450–453 of this title.

(d) Test date marking. The month and year of the last hydrostatic test, the identification markings of the approval agency witnessing the test, and the date of the last visual inspection must be durably and legibly marked on or near the metal identification plate in letters not less than 3 mm (0.118 inches) high when on the metal identification plate and 32 mm (1.25 inches) high when on the tank.

(e) Damaged or deteriorated portable tanks. Without regard to any other test requirement, any tank that shows evidence at any time of damaged or corroded areas, leakage, or other deterioration that indicates a weakness that could render the tank unsafe for service, must be inspected and tested in accordance with the requirements of paragraphs (a) and (b) of this section prior to reuse. Pressure relief devices need not be tested or replaced unless there is reason to believe the relief devices have been affected by the damage or deterioration.

(f) Record retention. The owner of each portable tank or his authorized agent shall retain a written record of the date and results of all required tests, (including visual inspections), and the name and address of the person performing the test, until the next retest has been satisfactorily completed and recorded.

§ 173.32c Use of specification IM portable tanks. (a) No person may offer a hazardous material for transportation in an IM portable tank except as authorized by this subchapter and under conditions approved by the Director, OHMT in the IM Tank Table.

(b) Except as otherwise provided in this subpart, an IM portable tank may not be used for the transportation of a hazardous material unless it meets the requirements of this subchapter and the conditions and limitations specified in the IM Tank Table for the hazardous material.

(c) An IM portable tank for which the prescribed periodic retest or reinspection under § 173.32b of this subchapter has become due may not be filled and offered for shipment until the retest or reinspection has been successfully completed. This paragraph does not apply to any tank filled prior to the test due date.

(d) Prior to filling, each IM portable tank shall be given a complete external inspection. Any unsafe condition must be corrected prior to its use. The external inspection shall include:

(1) A visual inspection of:

(i) The shell, piping, valves and other appurtenances for corroded areas, dents, defects in welds and other defects such as missing, damaged, or leaking gaskets;

(ii) All flanged connections or blank flanges for missing or loose nuts and bolts;

(iii) All emergency devices for corrosion, distortion, or any damage or defect that could prevent their normal operation; and

(iv) All required markings on the tank for legibility.

(2) An inspection to determine that any device for tightening manhole covers is operative and adequate to prevent leakage at the manhole cover.

(e) A hazardous material may not be loaded in an IM portable tank if the part of the tank or any of its appurtenances having contact with the material during transportation would be subject to destructive attack by or a dangerous reaction with the material.

(f) A hazardous material may not be loaded in an IM portable tank unless it has pressure relief devices providing total relieving capacity meeting the requirements of § 178.270-11(d) of this subchapter.

(g) A hazardous material may not be loaded in an IM portable tank with filling or discharge connections located below the normal liquid level of the tank unless:

(1) Each filling or discharge connection located below the normal liquid level of the tank has at least two serially-mounted closures consisting of an internal discharge valve and a bolted blank flange or other suitable, liquid-tight closure on each filling or discharge connection; or

(2) When required for a hazardous material by the IM Tank Table, each filling or discharge connection located below the normal liquid level of the tank, or compartment thereof, has three serially-mounted closures consisting of an internal discharge valve capable of being closed from a location remote from the valve itself, an external valve, and a bolted blank flange or other suitable, liquid-tight closure on the outlet side of the external valve.

(h) Except during a hydrostatic test, an IM portable tank may not be subjected to a pressure greater than its maximum allowable working pressure.

(i) An IM portable tank may not be loaded to a gross weight greater than the maximum allowable gross weight specified on its identification plate.

(j) An IM portable tank or compartment thereof having a volume greater than 5,000 liters (1,900 gallons) may not be loaded to a filling density less than 80 percent by volume.

(k) The outage for an IM portable tank may not be less than 2 percent at a temperature of 122 F (50°C).

(l) Each tell-tale indicator for the space between a frangible disc and a safety relief valve mounted in series must be checked after the tank is filled and prior to transportation to ensure that the frangible disc is leak free. Any leakage through the frangible disc must be corrected prior to offering the tank for transportation. The tell-tale device must be designed to prevent the loss of any hazardous material through the device itself while the tank is in transportation.

(m) An IM portable tank containing a hazardous material may not be loaded on a highway or rail transport vehicle unless loaded entirely within the horizontal outline thereof, without overhang or projection of any part of the tank assembly.

(n) Specifications IM 101 and IM 102 portable tanks used for the transportation of flammable liquids via rail may not be fitted with non-reclosing pressure relief devices except in series with spring loaded pressure relief valves.

(o) An IM 101 tank may be used whenever an IM 102 tank is authorized provided it meets the requirements of columns (5), (6), (7) and (8) of the IM Tank Table for the material to be transported.

§ 173.32d Additions, modifications and removals of entries in the IM Tank Table. The following requirements and conditions apply to listing of hazardous materials in the IM Tank Table (the Table):

(a) A hazardous material that is not listed or authorized in the Table may be added to the Table by the Director, OHMT.

(b) Any person may request the Director, OHMT to add a material to the Table, or to delete or modify an entry in the Table. A request should contain the information specified in the preface to the Table.

(c) The decision of the Director, OHMT to add a material to the Table, deny addition of a material to the Table, or to delete or modify an entry in the Table, will be based on a technical analysis of available data concerning the material and analogical comparison with existing entries in the Table.

(d) Each addition of a material to the Table by the Director, OHMT has interim status until completion of his review of comments following publication in the *Federal Register* of proposed permanent addition of the material to the Table. Following consideration of all comments in response to the publication, the Associate Director will add the material to the Table, or terminate its interim status, based on the information received.

(e) If the Director, OHMT determines that it may be necessary to remove an authorization for a material from the Table, or to modify the conditions for transportation of a material in an IM portable tank, he shall take action after subjecting the issue to public comment by publication in the *Federal Register* unless he determines that public safety requires immediate action.

(f) If the Director, OHMT denies a request for addition of a material to the Table or terminates an addition of a material under paragraphs (c) and (d) of this section, an appeal of the denial or termination may be submitted to the Administrator, Research and Special Programs Administration, within 60 days of receipt of the denial or termination. The decision of the Administrator concerning the appeal is final.

§ 173.33 Qualification, maintenance, and use of cargo tanks. (a) General: Unless otherwise provided in this part, every cargo tank (or compartment) used for the transportation of hazardous materials must be an authorized packaging. Such authorized packaging shall comply with requirements as set forth in this section, in addition to those regulations applicable for the transportation of the particular material. For the purposes of this part, whenever reference is made to a Specification MC-338 insulated cargo tank, the definitions in § 178.338-1(a) and (b) of this subchapter apply.

(i) A cargo tank is authorized for shipment of a hazardous material by vessel when in conformance with the requirements of Part 176 of this subchapter and the following limitations:

(i) On carfloats or trainerships if the material is permitted aboard a cargo vessel by §172.101 of this subchapter, or

(ii) On passenger ferry vessels or railroad car ferry vessels if the material is permitted aboard a passenger vessel by §172.101 of this subchapter.

(2) [Reserved]

(b) Cargo tank qualification as an authorized packaging requires compliance with the applicable Specification MC-300, MC-301, MC-302, MC-303, MC-304, MC-305, MC-306, MC-307, MC-310, MC-311, MC-312, MC-330, MC-331, or MC-338 (§178.340, §178.341, §178.342, §178.343, §178.337 or §178.338 of this subchapter), this section, and the inspection, retest and marking requirements of §177.824 of this subchapter. Any Specification MC-304 cargo tank on which construction began before September 2, 1967, may have the vents and outlets modified to comply with Specification MC-307 cargo tanks (See §§178.342–4 and 178.342–5).

(1) A cargo tank of the specification listed in Column 1 may be used when authorized in this part, provided the tank construction began before the date in Column 2:

Column 1	Column 2
MC-300	Sept. 2, 1967.
MC-301	June 12, 1961
MC-302, MC-303, MC-304, MC-305, MC-310, MC-311	Sept. 2, 1967
MC-330	May 15, 1967.

(2) For each cargo tank conforming to and used under an exemption issued before October 1, 1984, which authorized the transportation of a cryogenic liquid in a cargo tank, the owner or operator, if not the owner, shall remove the exemption number stenciled on the cargo tank and stamp the specification plate (or a plate placed adjacent to the specification plate) "DOT MC-338" followed by the applicable exemption number, for example, "DOT MC-338–E* * * *". (Asterisks to be replaced by the exemption number.) The owner or operator, if not the owner, of a cargo tank that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the cargo tank is in service. No modification of a cargo tank remarked under this paragraph is authorized unless made in conformance with an applicable requirement or provision of this subchapter. No new construction of such cargo tanks may be initiated after September 30, 1984.

(i) The holding time must be determined, as required in §178.338–9 of this subchapter, on each cargo tank or on at least one cargo tank of each design. Any subsequent cargo tank manufactured to the same design, if not individually tested, must have the optional test regimen performed during the first shipment (see §178.338–9 (b) and (c) of this subchapter). For the purpose of performing the holding time test, same design means cargo tanks having the same manufacturer, same drawings, same dimensions (of length, diameter, and volume), same material's of construction, and the same insulation system.

(ii) The holding time determined by test for one authorized cryogenic liquid may be used as the basis for establishing the holding time for other authorized cryogenic liquids.

(3) For each MC-331 cargo tank (§178.337 of this subchapter) conforming to and used under an exemption issued before October 1, 1984, which authorizes the transportation of ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid, or hydrogen chloride, refrigerated liquid, the owner or operator, if not the owner, shall remove the exemption number stenciled on the cargo tank and stamp the exemption number on the specification plate immediately after the DOT Specification, for example, "DOT MC-331–E* * * *". (Asterisks to be replaced by the exemption number.) If there is not adequate room on the specification plate, the exemption number must be stamped on a plate placed adjacent to the specification plate. The owner or operator, if not the owner, of a cargo tank that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the cargo tank is in service.

(c) Multipurpose cargo tanks. Multipurpose cargo tanks which have more than one compartment, each of which meets the requirements qualifying them as different container types, are authorized for use for applicable commodities.

(1) Multipurpose tanks which can be physically altered to qualify as containers to accommodate various commodities subject to the regulations in this part or commodities not subject to the regulation in this part are authorized if:

(i) All applicable provisions of the regulations in this part which are required to qualify the container as acceptable for the commodity being transported are met.

(ii) The required physical alterations to convert from one container type to another are clearly indicated on or near the certification plate.

(d) A Specification MC-330, MC-331 or MC-338 (§178.337 or §178.338 of the subchapter) cargo tank may not be used unless it meets the following requirements, as applicable:

(1) Each cargo tank must be tested and inspected at least once every 5 years in accordance with paragraphs (d)(2), (3), (4), (10), (11) and (12) of this section.

(i) The tank, and each pressure relief valve, of any cargo tank used for the transportation of chlorine must be tested at least once every 2 years. Tanks used only in sodium metal service may have a complete internal visual inspection at least once every 5 years instead of a hydrostatic or pneumatic test.

(ii) Each cargo tank used to transport a flammable cryogenic liquid must be examined after each shipment to determine its actual holding time. The record required by §177.840(h) of this subchapter may be used for this determination. If the examination indicates that the actual holding time of the cargo tank, after adjustment to reflect an average ambient temperature of 85°F, is less than 90 percent of the marked rated holding time (MRHT) for the cryogenic liquid marked on the specification plate or adjacent thereto (§178.338–18(b) of this subchapter), the tank may not be refilled with any flammable cryogenic liquid until it is restored to its marked rated holding time value or it is re-marked with the actual marked rated holding time determined by this examination. If the name of the flammable cryogenic liquid that was transported and its marked rated holding time is not displayed on or adjacent to the specification plate, this requirement may be met by deriving the MRHT of the cargo tank for that flammable cryogenic liquid and comparing that derived MRHT with the actual holding time after adjustment.

(2) Each tank (less fittings) must be subjected to a minimum internal pressure as shown below:

Specification	Ratio[1]
MC-330, MC-331	1½
MC-338	1¼

[1] Ratio of test pressure to the design pressure (maximum allowable working pressure or rated pressure) of the tank.

The internal pressure may be hydraulically or pneumatically generated. If a pneumatic test is used, a suitable method must be used for detecting the existence of leaks at all joints under pressure. This method must consist either of coating the entire surface of all joints under pressure with a solution of soap and water, or using another equally sensitive method. When a pneumatic test is performed, suitable safeguards should be provided to protect employees and other persons should a failure occur.

(3) The tank shall be inspected for corroded areas, bad dents, or other conditions, including leakage under test pressure, which indicate weakness that might render the tank unsafe for transportation service, and shall be rejected if evidence of any such unsafe condition is discovered.

(4) When testing cargo tanks, the insulation and jacketing need not be removed unless it is otherwise impossible to reach test pressure and maintain a condition of pressure equilibrium after test pressure is reached, or the vacuum integrity cannot be maintained in the insulation space.

(5) [Reserved]

(6) Without regard to any other retest requirement, any tank that shows evidence at any time of bad dents, corroded areas, leakage, or other conditions that indicate weakness which might render the tank unsafe for transportation service, shall be retested as prescribed by paragraphs (d)(2), (3), and (4) of this section.

(7) Any tank which has been in an accident and which has been damaged to an extent likely to cause it to be in unsafe condition or to an extent where such a condition is suspected, shall be tested as prescribed by paragraphs (d)(2), (3), and (4) of this section.

(8) Any tank which has been out of transportation service for a period of 1 year or more shall not be returned to or placed in such service until it shall have successfully fulfilled the testing requirements prescribed by paragraphs (d)(2), (3), and (4) of this section.

(9) The Department may require the testing under prescribed conditions of any tank when probable cause appears for suspecting that such tank is in unsafe condition.

(10) Ammonia tanks. Each MC 330 and MC 331 cargo tank used for anhydrous ammonia which is constructed of quenched and tempered steel or constructed of other than quenched and tempered steel but without post-weld heat treatment, must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of any hydrostatic retest prescribed in this section. The wet fluorescent magnetic particle inspection must be in accordance with Section V of the ASME Code and CGA Technical Bulletin TB–2 titled, "Guidelines for Inspection and Repair of MC 330 and MC 331 Cargo Tanks," 1975 edition. This paragraph does not apply to cargo tanks that do not have manholes.

(11) Repairs. All cracks and other defects found must be repaired in accordance with the repair procedures described in CGA Technical Bulletin TB–2, titled "Guidelines for Inspection and Repair of MC 330 and MC 331 Cargo Tanks," 1975 edition and section VIII of the edition of the ASME Code under which the tank was built. Each tank having cracks and defects requiring welded repairs must meet all of the requirements of §178.337–16 of this subchapter except that post-weld heat treatment

For explanation of abbreviations and reference marks, see last page of this tariff.

after minor weld repairs is not required. When any repairs are made, including those by grinding, the tank must again be examined by the wet fluorescent magnetic particle method after hydrotest to assure that all defects have been removed.

(12) Reports required. Each motor carrier operating an MC 330 or MC 331 cargo tank subject to paragraph (d)(10) of this section must make a written report concerning the cargo tank following the required inspection or test. This reporting requirement does not apply to a motor carrier leasing a cargo tank for less than 30 days if the lessor has submitted the reports required by this section. The report for each cargo tank must contain the following:

(i) Carrier's name, address of principal office, and telephone number;

(ii) Complete name plate data required by specification MC 330 or MC 331, including data required by ASME Code;

(iii) Carrier's equipment number, which shall be the same as reported in accordance with §177.824(f)(1)(iii) of this subchapter;

(iv) A statement indicating whether or not the tank was stress relieved after fabrication;

(v) Name and address of the person performing the test and date of test;

(vi) A statement of the nature and severity of defects found, if any. In particular, information must be furnished to indicate the location of defects detected, such as in a weld, a heat-affected zone, the liquid phase, the vapor phase, or the head-to-shell seam. If no defect or damage was discovered, that fact must be reported;

(vii) A statement indicating the methods employed to make repairs, who made the repairs, and the date they were completed. Also, a statement of whether or not the tank was stress relieved after repairs and, if so, whether full or local stress relieving was performed;

(viii) A statement of the disposition of cargo tank, such as "tank scrapped," or "returned to service;" and

(ix) A statement of whether or not the cargo tank is used for transportation of anhydrous ammonia, liquefied petroleum gas or any other commodity which shall be identified. Also, if the cargo tank was used for anhydrous ammonia, a statement indicating whether each shipment of ammonia was certified by its shipper as containing 0.2 percent water by weight.

(13) Report retention. A copy of the report required by this section must be retained by the carrier at its principal place of business during the period the tank is in the carrier's service and for 1 year thereafter. However, upon a written request to, and with the approval of the Regional Director of Motor Carrier Safety, for the region in which a motor carrier has its principal place of business, the carrier may maintain the reports at a regional or terminal office.

(14) Supplying reports. Each carrier offering a MC 330 or MC 331 cargo tank for sale or lease must make available for inspection a copy of any reports made under this paragraph to each prospective purchaser or lessee. Copies of such reports must be provided for the purchaser or lessee if the cargo tank is leased for more than 30 days.

(15) Record of inspections. Each carrier shall prepare a record of inspections required by paragraphs (d)(10), (d)(11), and (d)(12) of this section. The inspection record shall be signed by the person conducting the inspections, and retained with the carrier's file copy of the report submitted under paragraph (d)(12) of this section. The inspection record must identify by cargo tank manufacturer's serial number each cargo tank inspected and also indicate the name of the inspecting agency and person, the nature of any defect or damage discovered, and must state by what method the defect or damage was discovered. If no defect or damage was discovered upon inspection this fact must also be reported.

(i) The reports required of a carrier by paragraphs (d)(12) and (13) of this section may be combined in a single report.

(e) The repair of tanks is authorized, provided such repairs are made under requirements prescribed in the "Code" for its original design and construction.

(1) In addition to any other provisions of the specification, no tank shall be repaired, or remodeled, as to cause leakage or cracks or likelihood of leakage or cracks, by areas of stress concentration due to shrinkage of cooling metal in welding operations, sharp fillets, reversal of stresses, or otherwise.

(2) No field welding shall be done except to nonpressure parts.

(f) On any tank used for a compressed gas except chlorine, the bursting pressure of all piping, pipe fittings, hose and other pressure parts except pump seals and safety relief devices must be at least 4 times the design pressure of the tank. In addition, the bursting pressure may not be less than 4 times any higher pressure to which each pipe, pipe fitting, hose and other pressure part may be subjected in service by the action of a pump or other device. For tanks used in transporting chlorine, see paragraphs (f)(8) through (10) of this section.

(1) Pipe joints shall be threaded, welded or flanged. If threaded pipe is used, the pipe and pipe fittings must not be lighter than Schedule 80 weight. Nonmalleable metals must not be used in the construction of valves or fittings. Where copper tubing is permitted, joints must be brazed or be of equally strong metal union type. The melting point of brazing material must not be lower than 1000 F. The method of joining tubing must not decrease the strength of the tubing such as by the cutting of threads.

(2) Each hose coupling must be designed for a pressure at least 20 percent in excess of the hose design pressure and so there will be no leakage when connected.

(3) Provision must be made to prevent damage to piping due to thermal expansion and contraction, jarring, and vibration. Slip joints may not be used for this purpose.

(4) Piping and fittings must be grouped in the smallest practicable space and be protected from damage as required by the specification.

(5) All piping, valves, and fittings on every cargo tank shall be proved free from leaks at not less than the design pressure for the tank. This condition will be considered to have been met when such piping, valves, and fittings have been tested for leakage with gas or air after installation and proved tight at not less than the design pressure marked on the cargo tank with which they are used. In the event of replacement, all such piping, valves, or fittings so replaced shall be tested in accordance with the requirements of this section before the tank is returned to transportation service. The requirements of this section shall apply with equal force to all hose used on such tanks, except that such hose may be so tested either before or after installation on the tank.

(6) Liquid pumps or gas compressors, wherever used, must be of suitable design, adequately protected against breakage by collisions, and kept in good condition. They may be driven by motor vehicle power takeoff or other mechanical, electrical, or hydraulic means. Unless they are of the centrifugal type, they shall be equipped with suitable pressure actuated by-pass valves permitting flow from discharge to suction or to the tank.

(7) Each tank used for the shipment of carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid shall be provided with a suitable pressure gauge. A shutoff valve must be installed between the pressure gauge and the tank. This gauge need be used only during the filling operation.

(8) Chlorine cargo tanks. No piping, hose, or other means of loading or unloading may be attached to any valve of a cargo tank containing chlorine except at the time of loading or unloading. No hose, piping, or tubing used for loading or unloading may be mounted or carried on the motor vehicle. Except at the time of loading or unloading, the pipe connection of each angle valve must be closed with a screw plug which is chained or otherwise fastened to prevent misplacement.

(9) Chlorine cargo tank angle valves must be tested before installation to be leak free at not less than 225 p.s.i.g. using dry air or inert gas. The angle valves must also be tested as above once every five loadings or once a week whichever occurs first. At each loading, tanks must be inspected and the angle valves and gasketed joints must be examined and tested at a pressure of not less than 50 p.s.i.g. to determine that they are not leaking and are in proper condition for transportation. Leaks which are detected must be corrected before the cargo tank motor vehicle is shipped.

(10) Liquid chlorine pumps shall not be installed on cargo tank motor vehicles used for the shipment of chlorine.

(g) All materials of construction used in cargo tanks and their appurtenances shall not be subject to destructive attack by the contents of the tank.

(1) All parts of tanks and appurtenances for anhydrous ammonia shall be steel. No copper, silver, zinc, nor their alloys shall be permitted. Brazed joints shall not be permitted.

(h) Each outlet of cargo tanks used for the transportation of liquefied compressed gases, except carbon dioxide, refrigerated liquid shall be provided with an approved suitable automatic excess-flow valve or in lieu thereof may be fitted with an approved automatic quick-closing internal valve. These valves shall be located inside the tank or at a point outside the tank where the line enters or leaves the tank. The valve seat shall be located inside the tank or shall be located within a welded flange or its companion flange, or within a nozzle, or within a coupling. The installation shall be made in such a manner as reasonably to assure that any undue strain which causes failure requiring functioning of the valve shall cause failure in such a manner that it will not impair the operation of the valve.

Exception. Any liquid level gauging device which is constructed so that the outward flow of tank contents does not exceed that passed by a 0.060-inch diameter opening, or any safety device connection, is not required to be equipped with an excess flow valve.

(1) Each excess-flow valve must close automatically at the rated flow of gas or liquid as specified by the valve manufacturer. The flow rating of the piping, fittings, valves, and hose on each side of the excess-flow valve must be greater than that of the excess-flow valve. If branching or any other restriction is incorporated in the system so that the flow rating is less than that of the excess-flow valve at the tank, additional excess-flow valves must be located where the flow rates are reduced.

(2) An excess-flow valve may be designed with a bypass, not to exceed 0.040-inch diameter opening, to allow equalization of pressures.

(3) Each filling and discharge line must be provided with a manual shut-off valve located as close to the tank as practicable. However, when an internal shut-off valve that closes automatically is used, a manual shut-off valve must be located in the line ahead of the hose connection.

The use of a so-called "slop-check" or excess flow valve to satisfy the requirements of this rule and of paragraph (i) of this section with one valve is prohibited except as provided in §178.337-11(c) of this subchapter.

(4) Angle valves and excess-flow valves on chlorine tank motor vehicles manufactured on or before December 31, 1974, must conform to the standards of The Chlorine Institute, Inc., as follows:

(i) An angle valve must conform to either DWG. 104-4 dated May 5, 1958, or DWG. 104-5, dated September 1, 1972.

(ii) An excess-flow valve conforming to either DWG. 101-4 dated May 16, 1969, or DWG. 101-6, dated September 1, 1973, must be installed under each liquid angle valve. An excess-flow valve conforming to either DWG. 106-3, dated May 16, 1969, or DWG. 106-5, dated September 1, 1973, must be installed under each gas angle valve.

(5) Angle valves and excess-flow valves on chlorine tank motor vehicles manufactured on or after January 1, 1975, must conform to the standards of The Chlorine Institute, Inc., as follows:

(i) An angle valve must conform to DWG. 104-5, dated September 1, 1972.

(ii) An excess-flow valve conforming with DWG. 101-6, dated September 1, 1973, must be installed under each liquid angle valve. An excess-flow valve conforming to DWG. 106-5, dated September 1, 1973, must be installed under each gas angle valve.

(j) Each tank for chlorine, carbon dioxide, refrigerated liquid and nitrous oxide, refrigerated liquid must be insulated with a suitable insulation material of such thickness that the overall thermal conductance is not more than 0.08 B.t.u. per square foot per degree F. differential in temperature per hour. The conductance must be determined at 60° F. Insulation material used on tanks for nitrous oxide, must be noncombustible. Insulation material used on tanks for chlorine must be corkboard or self-extinguishing polyurethane foam with minimum thickness of 4 inches.

(j) A refrigerating and/or heating coil or coils may be installed in tanks for carbon dioxide, refrigerated liquid and nitrous oxide, refrigerated liquid. Such coils must be tested externally to at least the same pressure as the test pressure of the tank. The coils must also be tested internally to at least twice the working pressure of the heating or refrigerating system to be used but in no case less than the test pressure of the tank. Such coils shall be securely anchored. The refrigerant or heating medium to be circulated through the coil or coils must be such as to cause no adverse chemical reaction with the tank or tank contents in case of leakage. If desired, the unit furnishing refrigeration may be mounted on the motor vehicle.

(k) Each MC 330 cargo tank used for flammable compressed gas or anhydrous ammonia must be equipped with liquid discharge controls that conform to the requirements of §178.337-11(c) of this subchapter at each liquid discharge opening. The controls required by this paragraph must be installed not later than the date the tests prescribed by paragraph (d) of this section are required.

§ 173.34 Qualification, maintenance and use of cylinders. (a) **General qualification for use of cylinders.** (See §§173.1 through 173.30 for requirements applying to all shipments.)

(1) No person may charge or fill a cylinder unless it is as specified in this part and Part 178 of this subchapter. A cylinder that leaks, is bulged, has defective valves or safety devices, bears evidence of physical abuse, fire or heat damage, or detrimental rusting or corrosion, must not be used unless it is properly repaired and requalified as prescribed in these regulations.

(2) When cylinders with a marked pressure limit are prescribed, other cylinders made under the same specification but with a higher marked service pressure limit are authorized. For example, cylinders marked DOT-4B500 may be used where DOT-4B300 is specified.

(b) **Grandfather clause.** A cylinder in domestic use previous to the date upon which the specification therefor was first made effective in these regulations may be used if the cylinder has been properly tested and otherwise complies with the requirements applicable for the gas with which it is charged.

(c) **Cylinder marking.** Each required marking on a cylinder must be maintained so that it is legible. Retest markings and original markings which are becoming illegible may be reproduced by stamping on a metal plate which must be permanently secured to the cylinder.

(1) Additional information not affecting the markings prescribed in the applicable cylinder specification may be placed on the cylinder. No indentation may be made in the sidewall of the cylinder unless specifically permitted in the applicable specification.

(2) When the space originally provided for dates of subsequent retests becomes filled, the stamping of additional test dates into the external surface of the footring of a cylinder is authorized.

(3) Except for marked service pressure, markings required on cylinders may not be altered or removed. The marked service pressure may be changed only upon application to the Director, Office of Hazardous Materials Transportation and receipt of written instructions as to the procedure to be followed. A service pressure change is not authorized for a cylinder which fails to pass the prescribed periodic hydrostatic retest, unless it is reheat treated and requalified in accordance with this section.

(d) **Pressure relief device systems.** No person may offer a cylinder charged with a compressed gas for transportation unless the cylinder is equipped with one or more pressure relief devices sized and selected as to type, location, and quantity and tested in accordance with CGA Pamphlet S-1.1. The pressure relief device system must be capable of preventing rupture of the normally charged cylinder when subjected to a fire test conducted in accordance with CGA Pamphlet C-14 or in the case of an acetylene cylinder, CGA Pamphlet C-12. Cylinders shall not be shipped with leaking safety relief devices. Safety relief devices must be tested for leaks before the charged cylinder is shipped from the cylinder filling plant; it is expressly forbidden to repair leaking fuse plug devices, where leak is through the fusible metal or between the fusible metal and the opening in the plug body, (except by removal of the device and replacement of the fusible metal). Exceptions are as follows:

(1) Except as provided in Notes 1, 2, and 3, safety relief devices are not required on cylinders 12 inches or less in length, exclusive of neck, and 4½ inches or less in outside diameter.

Note 1: Safety relief devices are required on specifications 9, 40, 41, and 39 (§178.65 of this subchapter) cylinders. Metal safety relief valves are required on specification 39 cylinders used for liquefied flammable gases. Fusible safety relief devices are not authorized on specification 39 cylinders containing liquefied compressed gases.

Note 2: Safety relief devices are required on cylinders charged with a liquefied gas for which the part requires a service pressure of 1,800 psi or higher.

Note 3: Safety relief devices are required on cylinders charged with non-liquefied gases to a pressure of 1,800 psi or higher at 70° F.

(2) Except for specification 39 cylinders and cylinders for acetylene in solution, safety relief devices are not required on cylinders charged with non-liquefied gas under pressure of 300 p.s.i. or less at 70° F.

(3) Safety relief devices are prohibited on cylinders charged with Poison A gas or liquid.

(4) Safety relief devices are prohibited on cylinders charged with fluorine.

(5) Safety relief devices are not required on cylinders charged with methyl mercaptan; with mono-, di-, or trimethylamine, anhydrous; with not over 10 pounds of nitrosyl chloride; or with less than 165 pounds of anhydrous ammonia.

(6) [Reserved]

(7) Safety relief devices, if used, must be in the vapor space of cylinders containing pyrolonic liquids, n.o.s., covered by §173.134.

(e) **Periodic retesting, reinspection and marking of cylinders.** Each cylinder that becomes due for periodic retest as specified in the following table and exceptions, must be retested and marked in conformance with the applicable requirements of this paragraph.

Specification under which cylinder was made	Minimum retest pressure (p.s.i.)	Retest period (years)
DOT-3	3,000 p.s.i.	5
DOT-3A, 3AA, 3AL	5/3 times service pressure, except non-corrosive service (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(11), (e)(14), and (e)(15).)
DOT-3AX, 3AAX	5/3 times service pressure	5.
3B, 3BN	2 times service pressure (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(14).)
3C	Retest not required	
3D	5/3 times service pressure	5.
3E	Retest not required	
3HT	5/3 times service pressure	3 (see §173.34(e)(13).)
3T	5/3 times service pressure	5.
4	700 p.s.i.	10.
4A	5/3 times service pressure (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(14).)
4AA480	2 times service pressure (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(11).)
4B, 4BA, 4BW, 4B-240ET	2 times service pressure, except non-corrosive service (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(9) and (e)(14).)
4C	Retest not required	
4D, 4DA, 4DS	2 times service pressure	5.
DOT-4E	2 times service pressure, except non-corrosive service (see §173.34(e)(10).)	5.
4L	Retest not required	
8, 8AL	Retest not required	
DOT-9	450 p.s.i. (maximum 600 p.s.i.)	5.
25	500 p.s.i.	5.
26 for filling at over 450 p.s.i.	5/3 times service pressure	5.
26 for filling at 450 p.s.i. and below	2 times service pressure, except non-corrosive service (see §173.34(e)(10).)	5 or 10 (see §173.34(e)(9).)
33	800 p.s.i.	5.
38	500 p.s.i.	5.
Any cylinder with marked test pressure	Retest at marked test pressure	5.
Foreign cylinder charged for export	As marked on the cylinder, but not less than 5/3 of any service or working pressure marking	See §173.301(j).

Note 1: For cylinders not marked with a service pressure, see §173.301(e)(1).

For explanation of abbreviations and reference marks, see last page of this tariff.

(f) The periodic retest must be performed by an authorized retester and must include a visual internal and external examination in accordance with CGA Pamphlet C-6, and a test by interior hydrostatic pressure in a water jacket or other apparatus suitable for determination of the expansion of the cylinder. The internal inspection may be omitted for cylinders of the type and in the service described under paragraphs (e)(9) and (10) of this section.

(i) No person may represent that he has retested a DOT specification cylinder under this section, by marking the cylinder with a test date or by any other means unless that person holds a current retester's identification number issued by the RSPA.

(ii) The marking of a test date on a DOT specification cylinder is the certification by the person affixing the date that all applicable requirements of this section have been met with respect to that cylinder.

(iii) No cylinder required to be retested in accordance with this paragraph, or paragraphs (e)(9) or (10) of this section, may be used for the transportation of a hazardous material unless it has been retested successfully under this section, and the retester has marked the cylinder by stamping the cylinder retester identification number and date of retest plainly and permanently into the metal of the cylinder or on a metal plate which must be permanently secured to the cylinder.

(iv) RSPA may issue a retester's identification number based on an application and an inspection report of the applicant's facility and qualifications performed by an independent inspection agency approved pursuant to §173.300a, and any other information available to RSPA. A retester's identification number is valid for five years from the date of issuance and may be renewed upon application to RSPA. Applications for renewal must be submitted at least 50 days prior to expiration of the number. An initial or renewal application may be obtained from the Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590.

(v) Authority to perform retesting under this section, as reflected by assignment of a current retester identification number, remains valid as long as the level of personnel qualifications, and equipment used, is maintained at least equivalent to the level observed at the time of inspection by the independent inspection agency.

(2) Cylinders of DOT 4 series, without regard to date of previous test, that show bad dents or other evidence of rough usage, or that are corroded locally to such extent as to indicate possible weakness, or that have lost as much as 5 percent of their official tare weight, must be retested before being again charged and shipped. After any retest, the actual tare weight for those cylinders passing the test may be recorded as their new official tare weight.

(3) In hydrostatic retesting of a cylinder the pressure must be maintained for at least 30 seconds and as much longer as may be necessary to secure complete expansion of the cylinder. The gauge indicating the total expansion of the cylinder must be such that the total expansion can be read with an accuracy of 1 percent, except that a reading to 0.1 cubic centimeter shall be acceptable. The gauge indicating the pressure must be capable of being read to within 1 percent of the test pressure. Any internal pressure applied previous to the test pressure shall not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psi, whichever is the lower value.

(4) A cylinder must be condemned when it leaks, or when internal or external corrosion, denting, bulging, or evidence of rough usage exists to the extent that the cylinder is likely to be weakened appreciably, or when the permanent expansion exceeds 10 percent of the total expansion, except that for DOT 4E aluminum cylinders, when the permanent expansion exceeds 12 percent of the total expansion. Except for DOT 3AL and DOT 4E aluminum cylinders, a cylinder condemned for excessive permanent expansion may be reheat-treated. (See paragraph (g) of this section.) DOT 4 series cylinders, condemned for other than excessive permanent expansion, may be repaired and rebuilt as otherwise provided in this section.

(5) Records showing the result of reinspection and retest must be kept by the owner or his authorized agent until either expiration of the retest period, or until the cylinder is again reinspected or retested, whichever occurs first.

(6) Each cylinder passing retest must be marked with the cylinder retester's identification number set in a square pattern, between the month and year of the retest date, in characters not less than ⅛-inch high with the first character occupying the upper left corner of the square pattern. The second character must be in the upper right, the third in the lower right, and the fourth in the lower left. Example: A cylinder retested in May, 1984, and approved by a retester who has been issued identification number A123 would be stamped:

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      A  1
5           84
      3  2
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Variations from the marking requirements may be permitted upon written request to, and approval issued by, the Director, OHMT. Stamping must be in accordance with the location requirements of the cylinder specification. Date of previous tests must not be obliterated. Cylinders which are subject to the requirements under subparagraphs (8), (9) (modified hydrostatic test only), (10), and (12) are not required to be marked with a retester's identification number.

(7) Cylinders in chlorine or sulfur dioxide service made before April 20, 1915, must be retested at 500 psi.

(8) For cylinders of not over twelve pounds water capacity which are authorized for service pressures not over 300 psi, the hydrostatic testing portion of the retest procedure may consist of application of the prescribed internal hydrostatic test pressure without the use of special apparatus and without the determination of total and permanent expansions. In this test the cylinders shall be examined while under pressure and must show no leak or other harmful defect as enumerated in paragraph (e)(4) of this section.

(9) Cylinders made in compliance with specifications DOT 4B, DOT 4BA, DOT 4BW, DOT 4E, and ICC-26-300[1] (§§178.50, 178.51, 178.61, 178.68 of this subchapter) which are used exclusively for anhydrous dimethylamine; anhydrous monomethylamine; anhydrous trimethylamine; methyl chloride; liquefied petroleum gas; methylacetylene-propadiene stabilized; or dichlorodifluoromethane, difluoroethane, difluoromonochloroethane, monochlorodifluoromethane, monochlorotetrafluoroethane, monochlorotrifluoroethylene, or mixture thereof, or mixtures of one or more with trichlorofluoromethane; and which are commercially free from corroding components and protected externally by suitable corrosion resisting coatings (such as galvanizing, painting, etc.) may be retested decennially (see Note 2) instead of quinquennially, or, as an alternative such cylinders may be subjected to an internal hydrostatic pressure equal to at least two times the marked service pressure without determination of expansions (see Note 1), but this latter type of test must be repeated quinquennially after expiration of the first 10-year period (see Note 2). When subjected to this latter test, cylinders must be carefully examined under the test pressure and removed from service if leaks or other harmful defects exist.

Note 1 — Cylinders requalified by the modified hydrostatic test method or external inspection shall be marked after each retest or reinspection by stamping the date of retest or reinspection on the cylinders followed by the symbol E (external inspection) or S (modified hydrostatic test method) as appropriate.

Note 2: Until further order of the Department, the decennial retest period may be extended to a 12 year period, and the quinquennial retest period may be extended to a 7 year period after expiration of the first 12 year period.

(10) Cylinders made in compliance with the specifications listed in the table below and used exclusively in the service indicated may, in lieu of the periodic hydrostatic retest, be given a complete external visual inspection at the time such periodic retest becomes due. External visual inspection as described in CGA Pamphlet C-6 will, in addition to the following requirements prescribed herein, meet the requirements for visual inspection.

When this inspection is used in lieu of hydrostatic retesting, subsequent inspections are required 5 years after the first such inspection and periodically at 5-year intervals thereafter. Inspections shall be made only by competent persons and the results shall be recorded on a suitable data sheet, the completed copies which shall be kept in accordance with the requirements of paragraph (e)(5) of this section. The points to be recorded and checked on these data sheets are: Date of inspection (month and year); DOT specification number; cylinders identification (registered symbol and serial number, date of manufacture, and ownership symbol (if needed for adequate identification)); type cylinder protective coating (painted, etc., and statement as to need of refinishing or recoating); conditions checked (leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footring or protective ring or fire damage); disposition of cylinders (returned to service, to cylinder manufacturer for repairs or scrapped); a cylinder which passes the inspection prescribed shall have the date recorded in the manner presently prescribed for the recording of the retest date, except that an "E" is to follow the date (month and year) indicating requalification by the external inspection method.

Cylinders made in compliance with—	Used exclusively for—
DOT 4, DOT-3A, DOT-3AA, DOT-3A480X, DOT 4A, DOT 4AA480	Anhydrous ammonia of at least 99.95% purity
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT-4B, DOT-4BA, DOT-4BW, ICC-26 240[1] ICC-26-300[1]	Butadiene, inhibited, which is commercially free from corroding components
DOT-3A, DOT-3A480X, DOT-3AA, DOT-3B, DOT-4A, DOT-4AA480, DOT-4B, DOT-4BA, DOT-4BW	Cyclopropane which is commercially free from corroding components
DOT-3A, DOT-3AA, DOT-3A480X, DOT 4B, DOT 4BA, DOT4BW, DOT 4E	Fluorinated hydrocarbons and mixtures thereof which are commercially free from corroding components
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT-4B, DOT 4BA, DOT 4BW, DOT 4E, ICC-26 240[1] ICC-26-300[1]	Liquefied hydrocarbon gas which is commercially free from corroding components
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E, ICC-26 240[1] ICC-26-300[1]	Liquefied petroleum gas which is commercially free from corroding components
DOT-3A, DOT-3AA, DOT-3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Methylacetylene-propadiene, stabilized, which is commercially free from corroding components
DOT-3A, DOT-3AA, DOT-3B, DOT 4B, DOT 4BA, DOT 4BW	Anhydrous mono, di, trimethylamines which are commercially free from corroding components
DOT 4B240, DOT 4BW240	Ethylene imine, inhibited

[1] Use of existing cylinders authorized, but new construction not authorized.

(11) A cylinder made in compliance with specification DOT-3A, DOT-3AA480X, or DOT-4AA480 used exclusively for anhydrous ammonia, commercially free from corroding components, and protected externally by suitable corrosion resisting coatings (such as painting, etc.) may be retested every 10 years instead of every 5 years.

(12) All cylinders not exceeding 2 inches outside diameter and length less than 2 feet are exempted from hydrostatic retest.

(13) In addition to the requirements of this paragraph (e), cylinders marked DOT-3HT must be requalified in accordance with CGA Pamphlet C-8 and must comply with the following:

(i) Cylinder shall be subjected, at least once in three years, to a test by hydrostatic pressure in a water jacket, for the determination of the expansion of the cylinder. A cylinder must be condemned if the elastic expansion exceeds the marked rejection elastic expansion.

(ii) A cylinder must be condemned if there is evidence of any denting or bulging.

(iii) A cylinder must be condemned at the termination of a 24-year period following the date of the original test or after 4,380 pressurizations, whichever occurs first. If a cylinder is recharged more than an average of once every other day, an accurate record of the number of rechargings must be maintained by its owner, or his agent.

(iv) Retest dates shall be applied by low stress type steel stamping to a depth no greater than that of the original marking at the time of manufacture. Stamping on sidewall not authorized.

(v) A cylinder made before January 17, 1978 and not yet marked with a rejection elastic expansion (REE) in cubic centimeters near the marked original elastic expansion prior to the next retest date. The REE for a cylinder is 1.05 times its original elastic expansion.

(14) Cylinders made in compliance with specifications DOT-3A, DOT-3AA, DOT-3B, DOT-4A, DOT-4BA, and DOT-4BW (§§ 178.36, 178.37, 178.38, 178.49, 178.51, 178.61 of this chapter) having service pressures up to and including 300 p.s.i. which are used exclusively for methyl bromide, liquid; mixtures of methyl bromide and ethylene dibromide, liquid; mixtures of methyl bromide and chlorpicrin, liquid; mixtures of methyl bromide and petroleum solvents, liquid; or methyl bromide and nonflammable, nonliquefied compressed gas mixtures, liquid; which are commercially free from corroding components, and which are protected externally by suitable corrosion resisting coatings (such as galvanizing, painting, etc.) and internally by a suitable corrosion resisting lining (galvanized, etc.) may be tested decennially instead of quinquennially. All tests must be supplemented by a visual internal and external examination of the cylinder quinquennially. Examination must be as required by CGA Pamphlet C-6. All tests must be supplemented by a very careful examination of the cylinder at each filling, and the cylinder must be rejected if evidence is found of bad dents, corroded areas, a leak, or other conditions that indicate possible weakness which would render the cylinder unfit for service.

(15) A cylinder made in compliance with specification DOT-3A or 3AA, not exceeding 125 pounds water capacity and removed from any cluster, bank, group, rack, or vehicle each time it is filled, may be retested every 10 years instead of every 5 years, provided the cylinder complies with all of the following:

(i) The cylinder is not over 35 years old when it is retested.

(ii) The cylinder is used exclusively for: Air, argon, cyclopropane, ethylene, helium, hydrogen, krypton, neon, nitrogen, nitrous oxide, oxygen, sulfur hexafluoride, xenon, and permitted mixtures thereof (see § 173.301(a)) and permitted mixtures of these gases with up to 30 percent by volume of carbon dioxide. These commodities must have a dewpoint at or below minus 52° F. at 1 atmosphere.

(iii) Prior to each refill, the cylinder is subjected to, and passes the hammer test specified in CGA Pamphlet C-6.

(iv) A cylinder currently in compliance with paragraphs (e)(15)(i), (ii), and (iii) of this section but which has not been confined to the exclusive use service specified since the last required hydrostatic retest is retested and examined in accordance with the requirements of § 173.302(c)(2), (3), and (4) before the periodic retest interval is extended to 10 years.

(v) Each cylinder less than 35 years old is stamped with a five pointed star at least one-fourth of an inch high following the test date. If at any time a cylinder marked with the star is used other than as specified in this paragraph, the star following the most recent test date is obliterated and subsequent tests are made every 5 years.

(vi) The cylinder is dried immediately following hydrostatic testing to remove all traces of free water.

(vii) The cylinder is not used for underwater breathing.

(16) A cylinder that previously contained a commodity classified as a "corrosive material" must not be used for the transportation of any compressed gas unless the following requirements are complied with before the subsequent initial filling with the compressed gas.

(i) The cylinder must be visually inspected, internally and externally, in accordance with the CGA Pamphlet C-6.

(ii) Regardless of the previous test or retest date, the cylinder must be tested by interior hydrostatic pressure and must meet the acceptance criteria as specified in paragraphs (e)(1), (2), (3), and (4) of this section.

(iii) In addition to the record prescribed in paragraph (e)(5) of this section, the record of the inspection and test shall include the date (month and year) of the inspection and test; the cylinder identification (including ICC or DOT specification number, registered symbol, serial number, date of manufacture, and ownership symbol); the conditions checked (leakage, corrosion, gouges, dents, or digs in shell or heads, broken or damaged footrings, or fire damage) and the disposition of the cylinder (returned to service, returned to the manufacturer for repairs, or scrapped).

(iv) A cylinder requalified for compressed gas service in accordance with this paragraph may have its next retest and inspection scheduled from the date of the inspection and retest prescribed herein.

(v) A cylinder that contained any corrosive liquid, for which decontamination methods cannot remove all significant residue or impregnation by the former corrosive content must not be used for the transportation of any compressed gas.

(f) **Cylinders subjected to the action of fire.** A cylinder which has been subjected to the action of fire must not again be placed in service until it has been properly reconditioned as follows:

(1) A cylinder made of plain carbon steel with not over 0.25 percent carbon nor over 0.90 manganese need not be reheat-treated but must pass the periodic retest requirements as specified in paragraph (e) of this section.

(2) DOT-8 cylinders made of plain carbon steel with not over 0.25 percent carbon nor over 0.90 percent manganese must be reinspected to determine the condition of the cylinder and the porous filling. If the cylinder is undamaged and the filler is unchanged and intact, the cylinder may be returned to service without reheat treatment or test.

(3) The inner cylinders made under specification DOT-4L (§ 178.57 of this chapter) may be used after again passing the original hydrostatic test.

(4) DOT 3AL and DOT 4E aluminum cylinders may not be reheat-treated and must be removed from service.

(5) Other cylinders must be reheat-treated and reconditioned as specified in paragraph (g) of this section.

(g) **Reheat treatment.** (1) Previous to the reheat treatment procedure hereinafter prescribed, each cylinder must be subjected to a careful internal and external inspection.

(2) Cylinders must be segregated for reheat treatment in lots of 100 or less cylinders of the same general size having practically the same chemical composition.

(3) The reheat treatment operation must be carried out, supervised, and reported as prescribed for the heat treatment in the specification covering the manufacture of the cylinder in question. Data from the original reports of manufacture of the cylinders must be available.

(4) The reheat treatment must be followed by hydrostatic retest, such retest to be carried out, supervised, and reported as prescribed for the hydrostatic tests in the specification covering the manufacture of the cylinder in question. The results of the retest must meet either of the following conditions:

(i) The permanent expansion shall be from zero to 10 percent of the total expansion in the hydrostatic retest and one cylinder from each lot shall pass the requirements of the flattening and physical tests prescribed. Failure to pass the flattening or physical tests will reject the lot or;

(ii) The permanent expansion shall not be less than 3 percent nor more than 10 percent of the total expansion in the hydrostatic retest, in which case the flattening and physical tests are not required. For this alternative method the hydrostatic retest pressure may not exceed 115 percent of the minimum prescribed test pressure.

(h) **Repair by welding or brazing of specifications DOT-3A, 3AA, 3B, 3C cylinders.** Repair of specifications DOT-3A, 3AA, 3B or 3C (§§ 178.36, 178.37, 178.38, or 178.40 of this subchapter) cylinders by welding or brazing authorized, but only for the removal and replacement of neckrings and footrings attached to cylinders originally manufactured to conform to §§ 178.36-9(a), 178.37-9(a), 178.38-9(a), and 178.40-9(a) of this subchapter. Removal and replacement must be done by a regular manufacturer of this type of cylinder. After removal and before replacement of such parts, cylinders must be inspected, and defective ones rejected. Cylinders, neckrings, footrings, and method of replacement must conform to § 178.36-9(a), § 178.37-9(a), § 178.38-9(a), or § 178.40-9(a) of this subchapter whichever applies. Replacement must be followed by reheat treating, testing, inspection, and supervised and reported as prescribed by the specification covering their original manufacture. Inspector's reports must conform with that required by the specification covering original manufacture with the

For explanation of abbreviations and reference marks, see last page of this tariff.

word "repaired" substituted for "manufactured." Show original markings and the new additional markings added, and statement: "Cylinders were carefully inspected for defects after removal of neckrings and footrings and after replacement, which replacement was made by process of .....

(Welding brazing)."

(l) **Repair by welding or brazing of DOT–4 series, and DOT–8, welded or brazed cylinders.** Repairs on DOT–4 series and DOT–8 series welded or brazed cylinders are authorized to be made by welding or brazing. Such repairs must be made by a manufacturer of these types of DOT cylinders or by a repair facility approved by the Director, OHMT and by a process similar to that used in its manufacture and under the following specific requirements:

(1) Cylinders with injurious defects in welded joints in or on pressure parts must be repaired by completely removing the defect prior to rewelding.

(2) Cylinders with injurious defects in brazed joints in or on pressure parts must be repaired by rebrazing.

(3) Cylinders during welding must be free of materials in contact with the welded joint that may impair the serviceability of the metal in or adjacent to the weld. (Precautions must be taken to prevent acetylene cylinder steels from picking up carbon during repair.)

(4) Neckrings, footrings, or other nonpressure attachments authorized by the specification may be replaced or repaired. Repair or replacement of footrings, neckrings, or other nonpressure attachments authorized by the specification for DOT–4BA and 8AL (§§ 178.51 and 178.60 of this subchapter) cylinders may be made without conforming to the requirements of paragraph (i)(6) of this section provided the following requirements are met:

(i) Must be done by a manufacturer of these types of DOT cylinders or by a repair facility approved by the Director, OHMT.

(ii) The welder shall have available to him information as to the procedure, equipment, and rod used during manufacture and shall use a similar method for repair.

(iii) Repairs must be by metal arc welding only. Welds shall be 3 inches maximum length and spaced at least 3 inches apart.

(iv) Welds shall not be made on or near a brazed joint (to prevent the possibility of copper penetration).

(v) After repair the welds are to be inspected visually for weld quality.

(vi) After repair the weld area is to be leak tested at the service pressure of the cylinder.

(5) After removal, and before replacement of attachments, cylinders must be inspected and defective ones rejected, repaired or rebuilt.

(6) After repair, cylinders must be reheat-treated, tested, inspected and reported when and as prescribed by the specification covering their original manufacture when welding or brazing seams in a pressure part of a cylinder; or when welding or brazing on pressure parts of cylinders of plain carbon steels with carbon over 0.25 percent or manganese over 1.00 percent or of alloy steels except as provided in § 173.34(l)(7).

Note 1: Heat treatment is not required after welding or brazing weldable low carbon parts to attachments of similar material which has been previously welded or brazed to the top or bottom of cylinders and properly heat treated, provided such subsequent welding or brazing does not produce a temperature in excess of 400° F. in any part of the top or bottom material.

(7) Repair of cylinders must be followed by a proof pressure leakage test at prescribed test pressure and visual examination for weld quality when welding on pressure parts of cylinders of plain carbon 0.25 percent or less and manganese 1.00 percent or less, or when repairing steel types 1315, NAX and GLX by the following procedure:

(i) Leakage through the welding metal may be repaired without subsequent reheat treatment of the cylinder.

(ii) Repair permitted only by either the metal arc or tungsten inert gas shielded arc process. E7015, 7016, or 7018 electrodes not larger than ⅛ inch diameter shall be used for the metal arc process.

(iii) Weld defects must be removed by grinding or chipping before repair by the metal arc process. The tungsten inert gas shielded arc process may be used for repair only when such repair can be made by pudding. Repair weld shall not exceed 1 inch in length nor be closer than 3 inches to the next repair area.

(iv) Repair of weld defects which have any cracking is not permitted.

(j) **Repair of non-pressure attachments.** Repair of non-pressure attachments by welding or brazing without affecting a pressure part of the cylinder must be followed by visual examination for weld quality.

(k) **Prohibited repairs.** Walls, heads or bottoms of cylinders with injurious defects or leaks in base metal shall not be repaired, but may be replaced as provided for in paragraph (l) of this section.

(l) **Rebuilding of DOT 4 series and DOT 8, welded or brazed cylinders.** Rebuilding of DOT–4 series and DOT–8 series, welded or brazed cylinders is authorized. Such rebuilding must be done by a manufacturer of these types of DOT cylinders or by a repair facility approved by the Director, OHMT and by a process similar to that used in its original manufacture and under the following specific requirements:

(1) The replacement of a pressure part such as wall, heads, or bottoms of cylinders or the replacement of the porous filling material, shall be considered as rebuilding.

(2) Rebuilt cylinders shall be considered as new cylinders and shall conform to all the requirements of the specifications applying, including verification of material, examination, inspection, etc., and the rendering of the proper reports to the purchaser, cylinder rebuilder, and Director, OHMT. Report must show that cylinders were rebuilt.

(3) Information in sufficient detail regarding previous serial numbers and identification symbols must be filed with Director, OHMT.

SUBPART C

EXPLOSIVES AND BLASTING AGENTS; DEFINITIONS AND PREPARATION

§ 173.50 An explosive. (a) For the purpose of Parts 170–189 of this subchapter an explosive is defined as any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified in Parts 170–189 of this subchapter.

§ 173.51 Forbidden explosives. Unless otherwise provided in this subchapter, the transportation of the following explosives is forbidden.

(a) Explosive compounds, mixtures or devices which ignite spontaneously or undergo marked decomposition when subjected to a temperature of 167°F. (75°C.) for 48 consecutive hours.

(b) New explosive compounds, mixtures or devices except as provided for in § 173.86.

(c) Explosive mixtures or devices containing an ammonium salt and a chlorate.

(d) Explosive mixtures or devices containing an acidic metal salt and a chlorate.

(e) Leaking or damaged packages of explosives.

(f) Nitroglycerin, diethylene glycol dinitrate or other liquid explosives not authorized by § 173.53(e) or (h). (For shipment by motor vehicle other than by common carrier, see § 177.822(b) of this subchapter.)

(g) Loaded firearms (except as provided in 14 CFR 108.11).

(h) Fireworks that combine an explosive and a detonator or blasting cap.

(i) Fireworks containing yellow or white phosphorous.

(j) Toy torpedoes, the maximum outside dimension of which exceeds ¾-inch, or toy torpedoes containing a mixture of potassium chlorate, black antimony, and sulfur with an average weight of explosive composition in each torpedo exceeding four grains.

§ 173.52 Acceptable explosives. (a) For the purposes of this subchapter, acceptable explosives are divided into three classes as follows (acceptable military explosives must be transported on board vessels in accordance with 46 CFR 146.29):

(1) Class A explosives; detonating or otherwise of maximum hazard.

(2) Class B explosives; flammable hazard.

(3) Class C explosives; minimum hazard.

CLASS A EXPLOSIVES; DEFINITIONS

§ 173.53 Definition of Class A explosives. (a) **Type 1.** Solid explosives which can be caused to deflagrate by contact with sparks or flame such as produced by safety fuse or an electric squib, but cannot be detonated (see Note 1) by means of a No. 8 test blasting cap (see Note 2). Example: Black powder and low explosives.

(b) **Type 2.** Solid explosives which contain a liquid explosive ingredient, and which, when unconfined (see Note 3), can be detonated by means of a No. 8 test blasting cap (see Note 2); or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Example: High explosives, commercial dynamite containing a liquid explosive ingredient.

(c) **Type 3.** Solid explosives which contain no liquid explosive ingredient and which can be detonated, when unconfined (see Note 3), by means of a No. 8 test blasting cap (see Note 2); or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Example: High explosives, commercial dynamite containing no liquid explosive ingredient, trinitrotoluene, amatol, tetryl, picric acid, urea nitrate, pentolite, and commercial boosters.

(d) **Type 4.** Solid explosives which can be caused to detonate when unconfined (see Note 3), by contact with sparks or flame such as produced by safety fuse or an electric squib, or which can be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4), in more than 50 percent of the trials under a drop of less than 4 inches. Example: Initiating and priming explosives, lead azide, fulminate of mercury, etc., and high explosives.

(e) **Type 5.** Desensitized liquid explosives are explosives which may be detonated separately or when absorbed in sterile absorbent cotton, by a No. 8 test blasting cap (see Note 2); but which cannot be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4), by a drop of less than 10 inches. The desensitizer must not be significantly more volatile than nitroglycerine and the desensitized explosive must not freeze at temperatures above minus 10° F. Example: High explosives, desensitized nitroglycerine.

(f) **Type 6.** Liquid explosives that can be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of less than 10 inches. Example: Nitroglycerin. (See § 173.51(a)(3))

(g) **Type 7.** An initiating device is a metal or plastic casing containing initiating or priming explosives, Class A-Type 4, either with or without other explosives. It is activated by any one of several means, including an electrical pulse, a flame, a shock or detonation wave, mechanical impact (percussion), pressurized gas, or high intensity light beam. It produces an explosive output that may be used to initiate another explosive or to perform work. A time delay may be incorporated in the means of applying the stimulus, or in the initiating device itself.

(1) A detonator (see Note 5) is an initiating device (other than one properly described as a detonating fuze) which contains no more than 10 grams of total explosives weight, excluding ignition and delay charges per unit. There are different kinds of detonators including the following:

(i) Blasting caps which are activated by safety fuse.

(ii) Blasting caps which are percussion activated.

(iii) Blasting caps which are activated by flexible detonating cord, including:

(A) Delay connectors in plastic sheaths which consist of a plastic sleeve that contains a suitable delay system with receptor and donor explosive charges in the center portion. Each end of the sleeve is made so that flexible detonating cord can be inserted into and locked to the connector;

(B) Delay connectors in metal tubes which consist of a system with a receptor and donor charge positioned between two detonators with the entire assembly placed in a metal tube having both ends open for the insertion of flexible detonating cord;

(C) Delay connectors with detonating cord pigtails which consist of delay connectors as described in paragraph (g)(1)(iii)(B) of this section that have short lengths of detonating cord inserted into both ends and crimped in place; and

(D) Nonelectric instantaneous and delay caps which consist of blasting caps to which is assembled a length of detonating cord that may have a transfer explosive charge at the opposite end.

(iv) Blasting caps which are activated by gas pressurization or reaction.

(v) Blasting caps which are activated by a shock tube.

(vi) Electric blasting caps which are activated by an electric current.

(2) A detonating primer (see Note 6) is an initiation device for commercial use which contains more than 10 grams of total explosives weight, excluding ignition and delay charges per unit.

(3) Detonating fuzes, class A, are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In addition to a powerful detonator, they may contain several ounces of a high explosive, such as tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component. Those that are so made and packed that they will not cause functioning of other fuzes, explosives, or explosive devices in the same or adjacent containers are classed as class C explosives.

(h) **Type 8.** Any device or solid or liquid compound or mixture which is not specifically included in any of the above types, and which under special conditions may be so designated and examined by the Bureau of Explosives or the Bureau of Mines, U.S. Department of the Interior and approved by the Director, OHMT. Example: Shaped charges, commercial.

(i) A shaped charge, commercial, consists of a plastic, paper, or other suitable container comprising a charge of not to exceed 8 ounces of a high explosive containing no liquid explosive ingredient and with a hollowed-out portion (cavity) lined with a rigid material. Detonators or other initiating elements may not be assembled in the device unless examined by the Bureau of Explosives and approved by the Director, OHMT.

(i) **Ammunition for cannon.** Ammunition for cannon is fixed, semi-fixed or separate loading ammunition which is fired from a cannon, mortar, gun, howitzer or recoilless rifle.

(j) **Ammunition for cannon with projectiles.** Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, or shell is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer, and the projectiles, or shell, fuzed or unfuzed. Detonating fuzes, tracer fuzes, explosive or ignition devices, or fuze parts with explosives contained therein may not be assembled in ammunition or included in the same outside package unless shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(k) **Explosive projectiles.** Explosive projectiles are shells, projectiles, warheads, or rocket heads, loaded with explosives or bursting charges, with or without other materials, for use in cannons, guns, tubes, mortars or other firing or launching devices.

(l) **Grenades.** Grenades, hand or rifle, are small metal or other containers designed to be thrown by hand or projected from a rifle. They are filled with an explosive or a liquid, gas, or solid material such as a toxic or tear gas or an incendiary or smoke producing material and a bursting charge. When shipped without explosives or bursting charges, see §§ 173.100(y), 173.330, 173.350, and 173.385.

(m) **Explosive bombs.** Explosive bombs are metal or other containers filled with explosives. They are used in warfare and include aeroplane bombs and depth bombs.

(n) **Explosive mines.** Explosive mines are metal or composition containers filled with a high explosive.

(o) **Explosive torpedoes.** Explosive torpedoes, such as are used in warfare, are metal devices containing a means of propulsion and a quantity of high explosives.

(p) **Rocket ammunition.** Rocket ammunition (including guided missiles) is ammunition designed for launching from a tube, launcher, rails, trough, or other launching device, in which the propellant material is a solid propellant explosive. It consists of an igniter, rocket motor, and projectile (warhead) either fuzed or unfuzed, containing high explosives or chemicals. Rocket ammunition may be shipped completely assembled or may be shipped unassembled in one outside container.

(q) **Ammunition for small arms with explosive projectiles or incendiary projectiles.** Ammunition for small arms with explosive projectiles and ammunition for small arms with incendiary projectiles is fixed ammunition of caliber 20 millimeters to be used in machine guns or cannons, and consists of a metallic cartridge case, the primer and the propelling charge, with explosive projectile or incendiary projectile with or without detonating fuze; the component parts necessary for one firing being all in one assembly. Detonating fuzes, tracer fuzes, explosive or ignition devices or fuze parts with explosives contained therein must not be assembled in ammunition or included in the same outside package unless shipped by, for, or to the Departments of the Army, Navy, and Air Force of the U.S. Government or unless of a type approved by the Department.

(r) **Chemical ammunition.** Chemical ammunition used in warfare is all kinds of explosive chemical projectiles, shells, bombs, grenades, etc., loaded with toxic, tear, or other gas, smoke or incendiary agent, also such miscellaneous apparatus as cloud-gas cylinders, smoke generators, etc., that may be utilized to project chemicals.

For explanation of abbreviations and reference marks, see last page of this tariff.

(s) **Boosters, bursters, and supplementary charges.** Boosters and supplementary charges consist of a casing containing a high explosive and are used to increase the intensity of explosion of the detonator of a detonating fuze. Bursters consist of a casing containing a high explosive and are used to rupture a projectile or bomb to permit release of its contents.

(t) **Jet thrust units (jato), class A explosives; rocket motors, class A explosives; igniters, jet thrust (jato), class A explosives; and igniters, rocket motor, class A explosives:**

(1) Jet thrust units (jato), class A explosives, are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Under certain conditions the chemical fuel with which the unit is loaded may explode. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist aeroplanes to take off.

(2) Rocket motor, class A explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s) closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. (The rocket motor carries its own solid oxidizer-fuel combination.) The propelling charge consists of a mixture of chemicals and or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will sustain a detonation. Rocket motors, class A explosives, should be nonpropulsive in shipment (see paragraphs (t)(2)(i) and (ii) of this section). Rocket motors, class A explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers, or other similar devices must be proven adequate by test prior to authorization for use.

(ii) Rocket motors, class A explosives may be shipped in a propulsive state only under conditions approved by the Department of Defense.

(3) Igniters, jet thrust (jato), class A explosives, and igniters, rocket motor, class A explosives, are devices consisting of an electrically operated or remotely controlled ignition element and a charge of fast-burning composition meeting the definition prescribed for Type 1 class A explosives (see paragraph (a) of this section), assembled in a unit for use in igniting the propelling charge of jet thrust units or rocket motors.

(u) **Charged well casing jet perforating guns.** Charged well casing jet perforating guns are steel tubes or metallic strips into which are inserted shaped charges connected in series by primacord. Shaped charges must be of a type described in paragraph (h)(1) of this section, except that each shaped charge installed in the steel tube or metallic strip shall contain not over 4 ounces of high explosive. Charged well casing jet perforating guns must not be transported with blasting caps, electric blasting caps, or other firing devices affixed to or installed in the guns.

(v) **Type 9.** Propellant explosives, class A, are solid chemicals or solid chemical mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, class A, include some types of smokeless powder and some types of solid propellant explosives for jet thrust units, rockets, or other devices. Any propellant explosive is class A which detonates in any one out of five trials when tested in the packages in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidences of detonation.

(w) Detonating cord is a device consisting of a core of pentaerythrite tetranitrate, cyclotrimethylene-trinitramine or similar explosive overspun with tapes, yarns and plastics or waterproofing compounds without wire countering.

Note 1: The detonation test is performed by placing the sample in an open-end fiber tube which is set on the end of a lead block approximately 4½ inches in diameter and 4 inches high which, in turn, is placed on a solid base. A steel plate may be placed between the fiber tube and the lead block.

Note 2: A No. 8 test blasting cap is one containing two grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate, or a cap of equivalent strength.

Note 3: "Unconfined" as used in this section does not exclude the use of a paper or soft fiber tube wrapping to facilitate tests.

Note 4: The Bureau of Explosives Impact Apparatus is a testing device designed so that a guided 8 pound weight may be dropped from predetermined heights so as to impact specific quantities of liquid or solid materials under fixed conditions. Detailed prints may be obtained from the Bureau of Explosives, 50 F Street, N.W., Washington, D.C. 20001.

Note 5.—See § 173.100(gg) for criteria that determine whether a particular type of detonator can be classed as a Class C explosive.

Note 6.—See § 173.100(hh) for criteria that determine whether a particular type of detonating primer can be classed as a Class C explosive.

§ 173.54 Ammunition for cannon. (a) Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, or tear gas projectiles must be packed and properly secured in strong wooden or metal containers, or in plastic containers of approved military specifications complying with § 173.7(a).

(b) Each outside package must be plainly marked **"AMMUNITION FOR CANNON WITH EXPLOSIVE PROJECTILES," "AMMUNITION FOR CANNON WITH GAS PROJECTILES," "AMMUNITION FOR CANNON WITH SMOKE PROJECTILES," "AMMUNITION FOR CANNON WITH INCENDIARY PROJECTILES," "AMMUNITION FOR CANNON WITH ILLUMINATING PROJECTILES,"** or **"AMMUNITION FOR CANNON WITH TEAR GAS PROJECTILES, CLASS A EXPLOSIVES,"** as appropriate.

§ 173.55 Ammunition, nonexplosive. (a) Nonexplosive ammunition is defined as a device which contains no explosives or other hazardous materials, such as cartridge cases, dummy or drill cartridges; empty, sand loaded or solid projectiles with or without tracers (containing not in excess of one ounce of tracer composition), empty mines, empty bombs, solid projectiles, empty torpedoes, or practice bombs. It also includes devices containing no explosives, or other hazardous materials, except installed electric squibs, primers, propellants or thermal batteries required for the activation of the device, provided that it has been proven by test that when initiated the full energy release is contained within the outside shipping container. Such ammunition is exempt from Parts 170–189 of this chapter. Rotating bands should be protected against deformation by method of packing or loading.

§ 173.56 Ammunition, projectiles, grenades, bombs, mines, gas mines, and torpedoes. (a) Detonating fuzes, tracer fuzes, explosive or ignition devices, bouchons, or fuze parts with explosives contained therein, must not be assembled in explosive projectiles, grenades, explosive bombs, explosive mines, or explosive torpedoes, or included in the same outside package with them unless shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(b) Explosive projectiles, explosive torpedoes, explosive mines, explosive bombs, or explosive grenades except as provided in paragraph (c) of this section, must be packed and properly secured in strong wooden or metal boxes.

(c) The following explosives may be shipped without being boxed when shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD:

(1) Explosive projectiles, explosive torpedoes, explosive mines, or explosive bombs, exceeding 90 pounds in weight, and explosive projectiles of not less than 4½ inches when palletized.

(2) Explosive projectiles less than 4½ inches when palletized.

(d) Gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, gas bombs, smoke bombs, incendiary bombs, gas grenades, smoke grenades, incendiary grenades, and gas mines, explosive, containing a bursting charge must be packed and properly secured in strong wooden boxes. Detonating fuzes, boosters or bursters, bouchons or ignition elements may not be assembled in these articles or included in the same package with them unless shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(e) The gross weight of a box containing more than one projectile, mine, grenade, or bomb must not exceed 250 pounds.

(f) Explosive bombs packed more than one in shipping containers having gross weights not in excess of 1,400 pounds may be shipped by, for or to the Departments of the Army, Navy, and Air Force of the U.S. Government.

(g) Each exterior package or projectile, bomb, or mine must be plainly marked "Explosive Projectile," "Explosive Torpedo," "Explosive Mine," "Explosive Bomb," "Hand Grenades," or "Rifle Grenades," as the case may be, except that each device need not be so marked when palletized and the palletized units are plainly marked and shipped as carload or truckload shipments.

(g) Bombs, projectiles, grenades, ammunition for cannon with gas projectiles, or other packagings loaded with Poison A, and an explosive charge, either boxed or unboxed (see paragraph (c) of this section) must bear the **POISON GAS** label in addition to the **EXPLOSIVE** label.

(h) For regulations for shipping ammunition containing chemicals but no explosives or bursting charges, see chemical ammunition, §§ 173.330, 173.350, and 173.383.

§ 173.57 Rocket ammunition. (a) Rocket ammunition with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, or illuminating projectiles must be well packed and properly secured in strong wooden, metal, preformed fiber glass resin impregnated container, or other packagings or approved military specifications which comply with § 173.7(a).

(b) [Reserved]

§ 173.58 Ammunition for small arms. (a) Ammunition for small arms with explosive projectiles or incendiary projectiles must be well packed and properly secured in strong metal or wooden containers. The gross weight of the outside package must not exceed 175 pounds.

(b) [Reserved]

§ 173.59 Chemical ammunition, explosive. (a) When chemical elements of ammunition are shipped assembled with their detonating fuzes or bursting charges, they must be shipped in conformity with the regulations prescribed for explosive articles, class A, see §173.56. For shipment of these articles not containing ignition elements, bursting charges, detonating fuzes, or other explosive components, see §173.330, §173.350, and §173.383. For shipment of these articles assembled with their ignition elements or expelling charges but without any detonating or bursting charge see §173.68(d).

§ 173.60 Black powder and low explosives. (a) Black powder and low explosives must be packed in containers complying with the following specifications:

(1) Specification 13 (§178.140 of this subchapter). Metal kegs not less than 7 inches long. Net weight not less than 6¼ pounds nor more than 150 pounds.

(2) [Reserved]

(3) [Reserved]

(4) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes with inside fiber or metal containers not over 1½ pounds capacity each, or cotton bags of at least 4 ounce cotton duck not over 25 pounds capacity each. The gross weight of Specification 14 boxes may not exceed 140 pounds and the gross weight of Specification 15A or 16A boxes may not exceed 200 pounds.

(5) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes with inside cylindrical fiber cartridges not over 5 inches diameter nor over 18 inches long with fiber at least 0.05 inch thick paraffined on outer surface with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Boxes must be completely lined with strong paraffined paper or other suitable waterproofed material without joints or other openings at the bottom or sides. Authorized gross weight not to exceed 75 pounds.

(6) Spec. 12H, 23F, or 23H (§§178.209, 178.214, or 178.219 of this subchapter). Fiberboard boxes with inside cylindrical fiber cartridges not over 5 inches diameter nor over 18 inches long with fiber at least 0.05 inch thick paraffined on outer surface with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Authorized gross weight not to exceed 65 pounds.

(b) Black powder (not low explosives) in addition to containers specified in paragraph (a) of this section, must be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes with inside containers which must be cloth or paper bags of capacity not exceeding 25 pounds net weight, provided the completed shipping package shall be capable of standing a drop of 4 feet without rupture of inner or outer containers. The completed package must not exceed 50 pounds, net weight of black powder.

(2) Spec. 12H, 23F, or 23H (§178.209, 178.214, or 178.219 of this subchapter). Fiberboard boxes with inside containers which must be cloth, paper, or securely closed polyethylene bags constructed of material not less than 0.004 inch thick of capacity not exceeding 25 pounds net weight for cloth or paper bags and not exceeding 50 pounds net weight for polyethylene bags, or inside fiber or metal containers having not over 1 pound capacity each, provided the completed shipping package shall be capable of withstanding a drop of 4 feet without rupture of inner or outer containers. The tubes of the box may be eliminated and a single tube as specified in spec. 23F (§178.214 of this subchapter) may be substituted. The completed package shall not contain more than 50 pounds net weight of black powder.

(3) Spec. 17E (§178.116 of this subchapter). Metal drums (single trip), not over 5 gallons capacity each, without opening except bunghole not exceeding 2.3 inches in diameter. Authorized for carload or truckload shipments only.

(c) Black pellet powder primed with an electric squib secured inside the coaxial hole of the pellet powder with loose ends of the wires of the squib effectively short-circuited may be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes with inside cartridges which must be strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Boxes must be lined as prescribed for cylindrical fiber cartridges. Gross weight not to exceed 65 pounds.

(d) Low explosives (not black powder) may in addition to the containers specified in paragraph (a) of this section, be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes with inside containers which must be strong paper bags of capacity not exceeding 25 pounds. Gross weight of spec. 14 box must not exceed 140 pounds. Gross weight of spec. 15A or 16A box must not exceed 200 pounds.

(2) Spec. 12H, 23F, or 23H (§178.209, §178.214 or §178.219 of this subchapter). Fiberboard boxes with inside containers which must be strong paper bags of capacity not exceeding 25 pounds. Gross weight must not exceed 65 pounds.

(3) Spec. 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes, lined, spec. 2L (§178.30 of this subchapter). Authorized only for low explosives in the form of hard nonplastic rods or cylinders not less than ⅝-inch diameter.

(e) Each outside package must be plainly marked, stamped, or stenciled "BLACK POWDER" or "LOW EXPLOSIVES," and may also show "BLASTING," "RIFLE," etc., as "BLACK BLASTING POWDER," "BLACK RIFLE POWDER," "LOW BLASTING EXPLOSIVE" or "BLACK PELLET POWDER," as the case may be.

(f) Inside containers of over 1½ pounds capacity each in boxes, must be packed with filling holes up, and the boxes must be marked on top "THIS SIDE UP."

§ 173.61 High explosives. (a) High explosives (dynamite), except gelatin dynamite, when offered for transportation by rail freight or highway must not contain in excess of 60 percent of liquid explosive ingredient and when offered for transportation by carrier by water must not contain in excess of 75 percent of liquid explosive ingredient. Maximum limit of liquid explosive ingredient specified for transportation by carrier by water applies only for such explosives as consist principally of wood pulp or other satisfactory absorbent and liquid explosive, which are comparable with good commercial dynamite under tests as to leakage of liquid ingredient and sensitiveness to the shocks of transportation, and for shipments that are otherwise in compliance with the regulations in Parts 170–189 of this subchapter, for the transportation of high explosives.

(b) High explosives consisting of a liquid mixed with an absorbent material must have the absorbent (wood pulp or similar material) in sufficient quantity and of satisfactory quality, properly dried at the time of mixing; nitrate of soda must be dried at the time of mixing to less than 1 percent of moisture; and the ingredients must be uniformly mixed so that the liquid will remain thoroughly absorbed under the most unfavorable conditions incident to transportation.

(c) High explosives containing nitroglycerin or other liquid explosive ingredients must have uniformly mixed with an absorbent material a satisfactory antacid, which must be in quantity sufficient to have the acid neutralizing power of an amount of magnesium carbonate equal to 1 percent of the nitroglycerin or other liquid explosive ingredient.

(d) Cartridges shall consist of a column of explosives completely inclosed in a shell made of strong paper or polyethylene or a combination of paper and polyethylene, so treated that it will not absorb the liquid ingredient of the explosive.

(e) Bags shall be made of strong paper or equally efficient material so treated or of such nature that it will not absorb the liquid ingredient of the explosive.

(f) All boxes in which high explosives are packed must be lined with strong paraffined paper or other suitable material, except as provided in paragraph (j) of this section, §173.64(a)(5), and §173.65(a)(5). Lining must be without joints or other openings or with cemented joints at the bottom, ends or sides of boxes, and for explosives with liquid ingredients must be impervious to such ingredient and also to water. Covers of boxes must be protected from contact with explosives by lining paper or other suitable material. (See spec. 2L (§178.30 of this subchapter), for authorized lining material.)

(g) Before cartridges or bags of gelatin explosives are packed in boxes, lined in accordance with paragraph (f) of this section, dry fine wood pulp or sawdust at least ¼ inch in depth must be spread over the bottom of box or bottom of box may have a full area pad formed of absorptive cellulose sheet having nitroglycerin absorptive value equivalent to sawdust as specified; similar materials are required in boxes for packing all non-gelatinous types of explosives containing 30 percent or more liquid explosive ingredient.

For explanation of abbreviations and reference marks, see last page of this tariff.

(h) Except for cartridges containing gelatin dynamite, all cartridges of high explosives exceeding 4 inches in length and containing more than 10 percent of a liquid explosive ingredient must be placed horizontally in boxes. Bags must be packed with their filling holes up.

(i) Movement of cartridges and bags of high explosives within the boxes shall be prevented by sufficiently tight packing.

(j) High explosives (dynamite), except gelatin dynamite, packed in bags or in cartridges in excess of 2 inches in diameter and containing not more than 30 percent liquid explosive ingredients may be packed in outside containers without sawdust and without lining paper provided either each inside or outside container is sift-proof and is so treated as to prevent penetration by the commodity with which the container is filled for shipping.

§ 173.62 High explosives, liquid. (a) Liquid explosives as defined in §173.53(e) must be packed in specification containers as follows:

(1) Spec. 15L (§178.176 of this subchapter). Wooden boxes which must be plainly marked on top and on one side or end "HIGH EXPLOSIVES—DANGEROUS" in letters not less than ¾ inch in height. The tops of boxes must be marked "THIS SIDE UP".

(2) Spec. 15M (§178.177 of this subchapter.) Wooden boxes. Metal inside containers shall contain not more than 10 quarts liquid explosives each. Boxes must be plainly marked on top and on one side or end "HIGH EXPLOSIVES—DANGEROUS" in letters not less than ¾ inch in height. The tops of boxes must be marked "THIS SIDE UP".

(3) Spec. MC–200 (§178.315 of this subchapter). Motor vehicle container.

§ 173.63 High explosive with liquid explosive ingredient. (a) High explosives (dynamite) containing not more than 30 percent liquid explosive ingredients must be prepared as prescribed in §173.61, except as otherwise specified, and packed in containers complying with the following specifications:

(1) Spec. 23G (§178.218 of this subchapter.) Fiberboard boxes. Not more than one cartridge in each box. High explosives packed in boxes consisting of more than one tube joined circumferentially are exempt from the requirements of §173.61(f) and (g). High explosives packed in boxes consisting of one tube closed at the ends are exempt from the requirements of §173.61(d), (f), and (g). Gross weight of boxes not to exceed 65 pounds.

(2) Spec. 14, 15A, 16A, or 19B (§178.165, §178.168, §178.185, or §178.191 of this subchapter). Wooden boxes, or spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter) fiberboard boxes, with inside containers which must be cartridges not exceeding 12 inches in diameter or 50 pounds in weight with length not to exceed 36 inches, or bags not exceeding 50 pounds each securely closed so as to prevent leakage therefrom. Gross weight of wooden boxes not to exceed 75 pounds and gross weight of fiberboard boxes not to exceed 65 pounds.

(3) Spec. 23F or 23H (§178.214 or §178.219 of this subchapter). Fiberboard boxes having one inside 26-gauge metal container, measuring not over 8 inches in diameter and 31 inches long, containing high explosives (ammonium dynamite core) surrounded by a material classed as a blasting agent. Authorized gross weight not to exceed 65 pounds.

(b) High explosives (dynamite) containing 10 percent or less of a liquid explosive ingredient in cartridges or bags as prescribed in §173.61(d) and (e) may be packed in wooden boxes, Spec. 14, 15A, 16A, or 19B (§178.165, §178.168, §178.185, or §178.191 of this subchapter), gross weight not to exceed 140 pounds, or fiberboard boxes, Spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter), gross weight not to exceed 65 pounds.

(1) High explosives (dynamite) containing 10 percent or less of a liquid explosive ingredient may be packed in fiberboard boxes, spec. 23G (§178.218 of this subchapter). Not more than one cartridge in each box. High explosives packed in boxes consisting of more than one tube joined circumferentially are exempt from the requirements of §173.61(f) and (g). High explosives packed in boxes consisting of one tube closed at the ends are exempt from the requirements of §173.61(d), (f), and (g). Gross weight of boxes not to exceed 65 pounds.

(c) High explosives (dynamite) containing more than 30 percent liquid explosive ingredients must be prepared as prescribed in §173.61(a) to (i), inclusive, except as otherwise specified, and in containers complying with the following specifications:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter) wooden boxes or spec. 12H, 23F, or 23H (§§178.209, 178.214, or 178.219 of this subchapter) fiberboard boxes. Inside containers must consist of:

(i) Cartridges not exceeding 4 inches in diameter and not exceeding 8 inches in length.

(ii) Cartridges exceeding 4 inches in diameter and not exceeding 5 inches in diameter and between 8 inches and not exceeding 10 inches in length must be redipped in melted paraffin or equivalent material.

(iii) Two or more cartridges that must be redipped because of their size may be enclosed in another strong paper shell to form a completed cartridge not exceeding 30 inches in length. The resulting cartridge must be dipped in melted paraffin or equivalent material.

(iv) Gross weight of wooden boxes not to exceed 75 pounds and gross weight of fiberboard boxes not to exceed 65 pounds.

(2) Spec. 14, 15A, 16A, or 19B (§178.165, §178.168, §178.185, or §178.191 of this subchapter) wooden boxes, or spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter), fiberboard boxes, with inside containers which must be paraffined two-ply paper bags not exceeding 12½ pounds capacity, securely closed by folding the tops and securing the fold by tape, with not more than two such bags inserted into another two-ply paper bag which must be securely closed and dipped in paraffin after closing, or with not more than two inside containers which must be securely closed polyethylene bags not less than 0.004 inch in thickness of not more than 12½ pounds capacity each packed in a securely closed polyethylene or paper bag and packed in polyethylene lined outside fiberboard boxes. Gross weight of wooden boxes not to exceed 75 pounds and gross weight of fiberboard boxes not to exceed 65 pounds.

(d) High explosives (gelatin dynamite and blasting gelatin) must be prepared as prescribed in §173.61(a) to (i) inclusive, except as otherwise specified, and in containers complying with the following specifications:

(1) Spec. 23G (§178.218 of this subchapter). Fiberboard boxes. Not more than one cartridge in each box. High explosives packed in boxes consisting of more than one tube joined circumferentially are exempt from the requirements of §173.61(f) and (g) or when packed in boxes consisting of one tube closed at the ends are exempt from the requirements of §173.61(d) to (g), inclusive. Gross weight of boxes not to exceed 65 pounds.

(2) Spec. 14, 15A, 16A, or 19B (§178.165, §178.168, §178.185, or §178.191 of this subchapter). Wooden boxes, or spec. 12H, 23F, or 23H (§178.209, §176.214, or §178.219 of this subchapter), fiberboard boxes, with inside containers which must be cartridges not exceeding 12 inches in diameter or 50 pounds in weight with length not to exceed 36 inches, or bags not exceeding 12½ pounds each. Bags if not completely sealed against leakage by method of closure must be packed with filling holes up. Gross weight of wooden boxes not to exceed 75 pounds and gross weight of fiberboard boxes not to exceed 65 pounds.

(3) High explosives (gelatin dynamite or blasting gelatin) may be shipped in a package consisting of not more than 6 cartridges of such explosives, each not exceeding 32 inches in length or 5 inches in diameter, cartridged with heavy paper in such manner as to have the approximate strength of a spec. 23G (§178.218 of this subchapter) container, which cartridges shall in turn be placed in a 10-ply paper tube not exceeding 11 feet in length. The outer paper tube must be equipped with a metal cone or equally efficient device on one end which shall serve to close that end of the tube and to the metal cone shall be affixed a wire threaded through fiber tubes running through the center of each of the 6 cartridges; or as an alternative to the single wire running through the cartridges in the outer tube at the center, two wires may be applied, one on each side of the cartridges and between the outside of the cartridges and the inside of the outer tube. In either event, cartridges and the outer tube shall be securely closed so as to prevent spilling of any loose explosive under any conditions normally incident to transportation and cartridges shall be so loaded and stayed within the car or motor vehicle as to prevent damage to individual containers. The total gross weight of each completed package shall not exceed 125 pounds. Shipments are authorized in carload or truckload lots only without transfer of packages other than such transfers as may be necessary in the event of mechanical failure of the car or vehicle in which originally loaded.

(e) High explosives (straight gelatin dynamites of 80 percent strength and over and blasting gelatin) must be packed in cartridges or in bulk in outside boxes. When packed in bulk in boxes double lining paper throughout must be used. Containers must comply with the following specifications:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes.

(2) Specification 12H, 23F, 23G, or 23H (§§178.209, 178.214, 178.218, 178.219 of this subchapter). Fiberboard boxes. Specification 23G must be packed in an outer container consisting of at least 7-ply heavy kraft paper (see §173.25 for additional required marking). Two 3-mil polyethylene bags (one within the other) may be used in place of the double lining paper when Specification 12H is the outside container. Not more than one such double bag may be packed in the Specification 12H fiberboard box.

(3) Gross weight of wooden boxes not to exceed 75 pounds. Gross weight of fiberboard boxes not to exceed 65 pounds.

(f) Boxes containing high explosives must be plainly marked on top and on one side or end, except those made in compliance with spec. 23G which must be marked on the side or end, and kegs, drums, or barrels containing high explosives must be marked on both ends "HIGH EXPLOSIVES—DANGEROUS" in letters not less than ⅞ inch in height. The tops of boxes except those made in compliance with spec. 23G, must be marked "THIS SIDE UP".

§ 173.64 High explosives with no liquid explosive ingredient and propellant explosives, Class A. (a) High explosives containing no liquid explosive ingredients if their sensitiveness to percussion is not greater than that measured by the blow delivered by an 8-pound weight dropping from a distance of 7 inches on a compressed pellet of the explosive three-hundredths of an inch thick and two-tenths of an inch in diameter, confined rigidly between hard steel surfaces as in the standard Impact Testing Apparatus of the Bureau of Explosives, must be packed in cartridges or in bags in outside boxes. They must be packed in cartridges when their sensitiveness is greater than the limit prescribed herein. Such explosives when dry may be packed in strong sift-proof cloth or paper bags of capacity not exceeding 25 pounds. These explosives must be packed in outside containers complying with the following specifications:

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, or 178.191 of this subchapter). Wooden boxes.

(2) Spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter). Fiberboard boxes.

(3) [Reserved]

(4) Gross weight of wooden boxes not to exceed 140 pounds. Gross weight of fiberboard boxes not to exceed 65 pounds.

(5) When such explosives contain over 5 percent moisture, box must have an inside polyethylene bag having a minimum thickness of 6 mils; or the box must be lined with strong paraffined paper or other authorized material, spec. 2L (§178.30 of this subchapter). Box handholes are not authorized.

(6) When such explosives are in combination cartridges, consisting of column of explosives with core of dynamite, they may be shipped when packed in outside boxes with 65 pounds as the maximum gross weight. The column of explosives must be completely inclosed in waterproofed cloth or strong waterproofed paper and must not exceed 6 inches in diameter, 20 inches in length, or gross weight of 25 pounds.

(7) Spec. 23G (§178.218 of this subchapter). Fiberboard boxes. Such explosives when packed in boxes consisting of more than one tube joined circumferentially are exempt from requirements of §173.61(f) and (g) or when packed in boxes consisting of one tube closed at the ends are exempt from requirements of §173.61(d) to (g) inclusive. The gross weight of boxes not to exceed 65 pounds.

(b) Boxes containing high explosives must be plainly marked on top and on one side or end, except those made in compliance with spec. 23G which must be marked on the side or end, and kegs, drums, or barrels containing high explosives must be marked on both ends "HIGH EXPLOSIVES—DANGEROUS" in letters not less than ¾ inch in height.

(c) [Reserved]

(d) Propellant explosives, class A must be packed in containers as prescribed in §173.93. Each outside container must be plainly marked "PROPELLANT EXPLOSIVES, CLASS A".

§ 173.65 High explosives with no liquid explosive ingredient nor any chlorate. (a) High explosives containing no liquid explosive ingredient nor any chlorate if their sensitiveness to percussion is not greater than that measured by the blow delivered by an 8-pound weight dropping from a distance of 7 inches on a compressed pellet of the explosive three-hundredths of an inch thick and two-tenths of an inch in diameter, confined rigidly between hard steel surfaces as in the standard Impact Testing Apparatus of the Bureau of Explosives, must be packed in cartridges, or in bags or metal containers in outside boxes, except that the requirement of packaging in cartridges, bags or metal containers does not apply to plastic-bonded explosives, but they must be packed and cushioned so as to prevent movement of individual pieces within the outside shipping container. They must be packed in cartridges when their sensitiveness is greater than the limit prescribed in this section. Such explosives when dry may be packed in strong sift-proof bags securely closed so as to prevent leakage therefrom or metal containers of capacity not exceeding 60 pounds. These explosives must be packed in outside containers complying with the following specifications:

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes.

Note 1: Wooden boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1½ inches from top edge of end of box.

(2) Spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter). Fiberboard boxes.

(3) Specification 17H or 37A (§§178.118 and 178.131 of this subchapter). Metal drums (single-trip) having a minimum 0.003-inch thick polyethylene liner. Authorized only for ammonium perchlorate with particle size of 5 to 15 microns. Maximum capacity is 30 gallons.

(4) Gross weight of wooden boxes not to exceed 140 pounds. Gross weight of fiberboard boxes not to exceed 65 pounds.

(5) When these explosives contain over 5 percent moisture, each box must have inside securely closed polyethylene bags having a minimum wall thickness of 0.006-inch, or must incorporate a specification 2L (§178.30 of this subchapter) lining. Polyethylene is authorized only for materials that will not, react with, or cause decomposition of the plastic.

(6) When such explosives are in combination cartridges, consisting of column of explosives with core of dynamite, they may be shipped when packed in outside boxes with 65 pounds as the maximum gross weight. The column of explosives must be completely inclosed in waterproofed cloth or strong waterproofed paper and must not exceed 6 inches in diameter, 20 inches in length, or gross weight of 25 pounds.

(7) Spec. 23G (§178.218 of this subchapter). Fiberboard boxes. Such explosives when packed in boxes consisting of more than one tube joined circumferentially are exempt from requirements of §173.61(f) and (g) or when packed in boxes consisting of one tube closed at the ends are exempt from requirements of §173.61(d) to (g) inclusive. The gross weight of boxes not to exceed 65 pounds.

(b) Amatol consisting of 80 percent ammonium nitrate and 20 percent trinitrotoluene, ammonium picrate, nitroguanidine, nitrourea, urea nitrate, picric acid, tetryl, trinitroresorcinol, trinitrotoluene, pentolite, cyclotrimethylenetrinitramine (desensitized), and soda amatol, in dry condition, in addition to containers prescribed in paragraphs (a)(1) to (5) and (7) of this section, may be shipped in containers complying with the following specifications:

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes with inside strong paper or cloth bags not over 50 pounds capacity each, packed with filling holes up.

(2) Specification 21C (§178.224 of this subchapter). Fiber drums. Net weight not to exceed 200 pounds.

(c) Trinitrotoluene and pentolite, in dry condition, in addition to containers prescribed in paragraphs (a)(1) to (5) and (b)(1) and (2) of this section, may be shipped in specification containers as follows:

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes with inside strong paper or cloth bags not over 100 pounds capacity each, packed with filling holes up.

(2) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes with strong sift-proof liners. Specification 2L (§178.30 of this subchapter).

(d) The following materials may be shipped dry as drugs, n.o.s., or medicines, n.o.s., without any other requirements by rail freight or highway if the amount in one outside package does not exceed 4 ounces, and the materials are packed in securely closed bottles or jars that are cushioned to prevent breakage:

(1) Ammonium picrate.
(2) Dipicrylamine.
(3) Dipicryl sulfide.
(4) Dinitrophenylhydrazine.
(5) Nitroguanidine.
(6) Picramide.
(7) Picric acid.
(8) Picryl chloride.
(9) Trinitroanisole.
(10) Trinitrobenzene.
(11) Trinitrobenzoic acid.
(12) Trinitro-m-cresol.
(13) Trinitronaphthalene.
(14) Trinitroresorcinol.
(15) Trinitrotoluene.
(16) Urea nitrate.
(17) Triaminotrinitrobenzene
(18) Trichlortrinitrobenzene
(19) Hexanitrostilbene

(e) Ammonium picrate, cyclo-tetramethylenetetranitramine, cyclotrimethylenetrinitramine, pentaerythrite tetranitrate (desensitized), picric acid, trinitrobenzene, trinitrobenzoic acid, trinitroresorcinol, trinitrotoluene, or urea nitrate, when wet with not less than 10 pounds of water to each 90 pounds of dry material must be shipped in packagings as follows:

(1) [Reserved]

(2) (See §173.192 for shipments of wet ammonium picrate, wet picric acid, wet trinitrobenzoic acid, and wet urea nitrate not in excess of 16 ounces and §173.193 for shipments of wet picric acid, wet trinitrobenzoic acid, and wet urea nitrate not in excess of 25 pounds.) (See §173.212 for shipments of wet trinitrobenzene and wet trinitrotoluene not in excess of 16 ounces.)

(3) Specification 5B (§178.82 of this subchapter) Metal barrels or drums or Spec. 21C (§178.224 of this subchapter) fiber drums. Authorized only for cyclotetramethylenetetranitramine, or cyclotrimethylenetrinitramine, each wet with not less than 10 pounds of water to each 90 pounds of dry material in inside containers which must be bags made of at least 10-ounce cotton duck, plastic bags not less than 4 mils thick, rubber, or rubberized cloth and securely closed. The dry weight of cyclotrimethylenetrinitramine or cyclotetramethylenetetranitramine in one metal barrel or drum must not exceed 300 pounds and not more than 225 pounds in fiber drums. These bags containing the cyclotrimethylenetrinitramine or cyclotetramethylenetrinitramine must then be placed in a rubber bag, rubberized cloth bag or bag made of suitable water-tight material which must be securely closed and then placed in the drum. If shipment of cyclotrimethylenetetranitramine is to take place at a time freezing weather is to be anticipated, it must be wet with a mixture of denatured ethyl alcohol or other suitable anti-freeze and water of such proportions that freezing will not occur in transit.

For explanation of abbreviations and reference marks, see last page of this tariff.

(4) Specification 21C (§178.224 of this subchapter). Fiber drum with an inside polyethylene bag having 0.004 inch minimum thickness and liquid tight closure. Net weight not to exceed 200 pounds. Authorized only for wet desensitized pentaerythrite tetranitrate.

(f) Amatol when cast or pressed in a block or column, in addition to the containers prescribed in paragraphs (a)(1) to (5) and (7) of this section, may be shipped in specification containers as follows:

(1) Spec. 13A (§178.141 of this subchapter). Metal drums not exceeding 90 pounds gross weight.

(g) Nitrocellulose must be packed in wooden boxes complying with Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter), with inside packages which must be:

(1) Inside packages containing not more than 1 pound each of dry, uncompressed nitrocellulose, wrapped in strong paraffined paper or suitable, sparkproof material. Completed outside package not to contain more than 10 pounds dry nitrocellulose.

(2) Inside packages containing compressed sticks or blocks of dry nitrocellulose wrapped in strong paraffined paper. Gross weight not to exceed 75 pounds.

(h) Shaped charges, commercial, having exposed lined conical cavities must have such cavities effectively filled. Those having conical cavities that are covered shall be paired together with the cavities facing each other and with one or more pairs in a fiber tube, or so arranged that the conical cavities of the shaped charges at the ends of the column face toward the center of the tube. The shaped charges in the fiber tubes must fit snugly with no excess space and the fiber tubes containing the shaped charges must be packed snugly with no excess space in the outside containers. Other methods of packaging for devices of which shaped charges are a component part may be employed when examined by the Bureau of Explosives and approved by the Director, OHMT. Shaped charges, commercial, must be packed in specification containers as follows:

(1) Spec. 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 140 pounds.

(2) Spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes which must be manufactured of at least 275-pound strength (Mullen or Cady test) double-wall corrugated fiberboard and shall be provided with double-faced corrugated lining board (see §178.205-15 of this subchapter) having minimum strength (Mullen or Cady test) of 200 pounds. Individual charges of explosives shall be packed in inside securely closed, waterproof plastic containers, or in securely closed waterproof fiberboard containers having metal ends. Gross weight not to exceed 65 pounds. Inside individual containers shall be separated by means of double-faced corrugated fiberboard partitions of material not less than 175-pound Mullen or Cady test.

(i) Cyclotrimethylenetrinitramine (desensitized) in pellet form, dry, in addition to provisions of paragraphs (a) and (b) of this section may be packed in specification containers as follows:

(1) Spec. 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes. For pellets ¼ inch or less in diameter; pellets must be packed in a side-type fiber carton with perforated fillers. All openings of the fiber carton shall be securely closed with pressure-sensitive tape. Inside containers shall be cushioned with at least 2 inches of sawdust between inner containers and outside box. No inside container shall contain more than one-half pound net weight of explosive composition and not more than 10 pounds net weight of explosive composition shall be packed in one outside box.

(2) Spec. 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes. For pellets exceeding ¼ inch in diameter; pellets must be packed in a fiber tube with positive closures at both ends, which shall be packed in a fiber carton having not more than one-half pound net weight of explosive composition. Fiber carton shall be cushioned with not less than 2 inches of sawdust in the outside box. Not more than 10 pounds net weight of explosive composition shall be packed in one outside box.

(j) Boxes containing high explosives must be plainly marked on top and on the side or end, except those made in compliance with spec. 23G (§178.218 of this subchapter) which must be marked on the side or end, and kegs, drums, or barrels containing high explosives must be marked on both ends "HIGH EXPLOSIVES—DANGEROUS" in letters not less than ¾ inch in height. When space will not permit such marking on ends of kegs or drums, it may be applied to the side of the container. The tops of boxes, except those referred to in paragraph (a)(1) to (7) of this section, must be marked "THIS SIDE UP".

§ 173.66 Detonators. (a) Unless otherwise specified in this section, detonators must be packed in accordance with the following:

(1) They must be snugly packed in strong inside packagings.

(2) Inside packagings must be snugly packed in an outside packaging specified in paragraph (e) of this section.

(3) For devices containing no more than 10 grams of explosive (excluding ignition and delay charges):

(i) No more than 50 devices may be packed in one inside packaging;

(ii) No more than 500 devices may be packed in one outside packaging; and

(iii) The gross weight of the completed package may not exceed 150 pounds or the gross weight permitted by the specification for the outside packaging used, whichever is less.

(b) Detonators that are blasting caps (including percussion activated) or delay connectors in metal tubes, must be packed as specified in paragraph (a) of this section. In addition:

(1) They must be packed in inside packagings with the open ends of any device covered with an appropriate cushioning material;

(2) Inside packagings must be snugly packed in intermediate packagings consisting of cartons, or wrappings made of paper, plastic, or pasteboard;

(3) Intermediate packagings must be separated from the outside packaging by at least 1 inch of cushioning material; and

(4) For devices containing no more than 3 grams of explosive (excluding ignition and delay charges):

(i) No more than 100 devices may be packed in one inside packaging; and

(ii) No more than 5,000 devices may be packed in one outside packaging.

(c) Detonators that are electric blasting caps, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing, must be packed as specified in paragraph (a) of this section, except that:

(1) Devices containing no more than 3 grams of explosive (excluding ignition and delay charges) may be packed as follows:

(i) No more than 100 devices may be packed in one inside packaging; and

(ii) No more than 1,000 devices may be packed in one outside packaging.

(2) Devices that are electric blasting caps with leg wires 4 feet long or longer, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing 12 feet long or longer, and contain no more than 1 gram of explosive (excluding ignition and delay charges) may be offered for transportation and transported in an IME Standard 22 container or compartment without the outside packaging specified in paragraph (e)(1) or (e)(2) of this section if:

(i) The devices are packed as specified in paragraph (a)(1) and (a)(3)(i) of this section;

(ii) There are no more than 1000 detonators in the IME Standard 22 container or compartment; and

(iii) No material is loaded on top of the IME Standard 22 container, or no material is loaded against the outside of the door of the IME Standard 22 compartment.

(3) Inside packaging is not required for electric blasting caps when packed in inside pasteboard tubes, or when their leg wires are wound on spools with the caps either placed inside the spool or securely taped to the wire on the spool, so as to restrict freedom of movement of the caps and to protect them from impact forces.

(d) Detonators that are blasting caps with safety fuse, blasting caps with metal clad mild detonating cord, blasting caps with detonating cord, or blasting caps with shock tubes, must be packed in accordance with the requirements of paragraph (a) of this section, except that:

(1) The blasting caps are not required to be attached to the safety fuse, metal clad mild detonating cord, detonating cord, or shock tube; and

(2) Inside packagings are not required if the packing configuration restricts freedom of movement of the caps and protects them from impact forces.

(e) Detonators with or without inside packaging as provided for in paragraphs (a) through (d) of this section, must be packed in the following outside packagings.

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes.

(2) DOT Specification 12H, 23F, or 23H (§§178.209, 178.214, 178.219 of this subchapter) fiberboard box.

(3) IME Standard 22 container or compartment when the detonators conform with conditions and limitations specified in paragraph (c)(2) of this section.

(f) Each outside packaging containing detonators must be plainly marked "DETONATORS—HANDLE CAREFULLY" and bear the appropriate explosives label specified in §172.411 of this subchapter.

(g) Devices subject to this section and approved by an agency listed in §173.86(b) before January 1, 1980, may be transported subject to conditions of the approval and in accordance with regulations in effect on October 31, 1979, until December 31, 1985. Applicability of this paragraph is further limited to detonators packaged for transportation prior to January 1, 1985.

§ 173.68 Detonating primers. (a) Detonating primers that are blasting caps with detonating cord, and delay connectors with detonating cord pigtails, must be packed in accordance with the following:

(1) They must be snugly packed in inside packagings;

(2) Inside packagings must be snugly packed in an outside packaging specified in paragraph (d) of this section;

(3) No more than 50 devices may be packed in one inside packaging;

(4) No more than 500 devices may be packed in one outside packaging; and

(5) The gross weight of the completed package may not exceed 150 pounds or the maximum gross weight permitted by the specification for the outside packaging used, whichever is less.

(b) Detonating primers that are blasting caps with detonating cord in a coil configuration must be packed as specified in paragraph (a) of this section, except the use of inside packaging is not required if the packing configuration restricts movement of the caps and protects them from impact forces.

(c) All other unspecified types of detonating primers may only be offered for transportation if they are packed in accordance with the requirements of paragraph (a) of this section, except that inside packagings are not required for devices that are packed in individual pasteboard, metal, plastic, or wooden tubes.

(d) Detonating primers, with or without inside packagings, as provided for in paragraphs (a) through (c) of this section, must be packed in one of the following outside packagings:

(1) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes.

(2) DOT specification 12H, 23F, or 23H (§§178.209, 178.214, 178.219 of this subchapter) fiberboard box.

(e) Each outside packaging of detonating primers must be plainly marked "DETONATING PRIVERS—HANDLE CAREFULLY" and must bear the appropriate label specified in §172.411 of this subchapter.

(f) Devices subject to this section, which have been approved by an agency listed in §173.86(b) before January 1, 1980, may be transported subject to the conditions of the approval and in accordance with the regulations in effect on October 31, 1979, until December 31, 1984.

§ 173.69 Detonating fuzes, Class A, with or without radioactive components, detonating fuze parts containing an explosive, boosters, bursters, or supplementary charges. (a) Detonating fuzes, class A with or without radioactive components, detonating fuze parts containing an explosive, boosters, bursters, or supplementary charges, when shipped not assembled in projectiles, bombs, etc., must be packed and well secured in strong, tight wooden or metal boxes.

Note 1. A fuze with any radioactive component is also subject to the applicable provisions of Subpart I of this part for the radioactive material.

(b) The gross weight of one outside package containing detonating fuzes, class A, must not exceed 190 pounds. Boosters, bursters and supplementary charges, without detonators, when shipped separately, must not exceed a gross weight of 300 pounds.

(c) Each outside package must be plainly marked "DETONATING FUZES CLASS A EXPLOSIVES—HANDLE CAREFULLY—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVES," or "DETONATING FUZES, CLASS A EXPLOSIVES, RADIOACTIVE—HANDLE CAREFULLY—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVES," or "BOOSTERS (EXPLOSIVE)—HANDLE CAREFULLY," or "BURSTERS (EXPLOSIVE)—HANDLE CAREFULLY," or "SUPPLEMENTARY CHARGES (EXPLOSIVE)—HANDLE CAREFULLY," as the case may be.

§ 173.70 Diazodinitrophenol or lead mononitroresorcinate. (a) The offering of diazodinitrophenol or lead mononitroresorcinate in a dry condition for transportation is forbidden except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Diazodinitrophenol or lead mononitroresorcinate must be packed wet with not less than 40 percent by weight of water in a specification container 5 or 5B (§§178.80, 178.82 of this subchapter) metal barrel or drum, with inside containers which must be bags made of at least 10-ounce cotton duck, rubber, or rubberized cloth. Each bag must be securely closed. The bags containing diazodinitrophenol or lead mononitroresorcinate must be placed in a rubber bag, rubberized cloth bag, or bag made of suitable watertight material and then placed in the barrel or drum. Any empty space in the outside bag must be filled with water and this bag securely closed. The dry weight of diazodinitrophenol in one outside container must not exceed 220 pounds and the dry weight of lead mononitroresorcinate in one outside container must not exceed 100 pounds.

(c) Sufficient outage in outside container must be allowed to prevent rupturing of container in freezing weather, or a mixture of denatured alcohol and water may be used to prevent freezing in transit.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.71 Fulminate of mercury. (a) The offering of fulminate of mercury in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Fulminate of mercury must be packed wet with not less than 25 percent by weight of water in a specification container 5 or 5B (§§178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§178.118 of this subchapter) metal drum (single-trip), with an inside container which must be a bag made of 4-ounce duck. Inside the bag and over the fulminate, there must be placed a cap of the same fabric and of the same diameter as the bag. The bag must be securely tied and placed in a strong grain bag. The grain bag must also be securely tied. The bag and contents must be packed in the center of the metal barrel or drum and must be entirely surrounded by not less than three inches of well-packed sawdust saturated with water. The metal barrel or drum must be lined with a heavy, close-fitting, jute bag closed by secure sewing to prevent escape of sawdust. The barrel or drum must be inspected carefully and all leaks stopped. The dry weight of fulminate in one outside container must not exceed 150 pounds.

(c) If shipment of fulminate is to take place at a time that freezing weather is to be anticipated, a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur in transit must be used.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.72 Guanyl nitrosamino guanylidene hydrazine. (a) The offering of guanyl nitrosamino guanylidene hydrazine in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Guanyl nitrosamino guanylidene hydrazine must be packed wet with not less than 30 percent by weight of water in a specification container 5 or 5B (§§178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§178.118 of this subchapter) metal drum (single-trip), with an inside container which must be a bag made of 4-ounce duck. Inside the bag and over the guanyl nitrosamino guanylidene hydrazine, there must be placed a cap of the same fabric and of the same diameter as the bag. The bag must be securely tied and placed in a strong grain bag. This grain bag must also be securely tied. The bag and contents must be packed in the center of the metal barrel or drum, and must be entirely surrounded by not less than three inches of well-packed sawdust saturated with water. The metal barrel or drum must be lined with a heavy, close-fitting, jute bag closed by secure sewing to prevent escape of sawdust. The barrel or drum must be inspected carefully and all leaks stopped. The dry weight of guanyl nitrosamino guanylidene hydrazine in one outside container must not exceed 75 pounds.

(c) If shipment of guanyl nitrosamino guanylidene hydrazine is to take place at a time that freezing weather is to be anticipated, a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur in transit must be used.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.73 Lead azide. (a) The offering of lead azide in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Lead azide, dextrinated type, or otherwise prepared to effectively control grain size, must be packed wet with not less than 20 percent by weight of water in a specification container 5 or 5B (§§178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§178.118 of this subchapter) metal drum (single-trip), with an inside container which must be a bag made of 4-ounce duck. Inside the bag and over the lead azide, there must be placed a cap of the same fabric and of the same diameter as the bag. The bag must be securely tied and placed in a strong grain bag. This grain bag must also be securely tied. The bag and contents must be packed in the center of the metal barrel or drum, and must be entirely surrounded by not less than three inches of well-packed sawdust saturated with water. The metal barrel or drum must be lined with a heavy, close-fitting, jute bag closed by secure sewing to prevent escape of sawdust. The barrel or drum must be inspected carefully and all leaks stopped. The dry weight of lead azide in one container must not exceed 150 pounds.

(c) If shipment of lead azide is to take place at a time that freezing weather is to be anticipated, a mixture of denatured ethyl alcohol or other suitable antifreeze and water of such proportions that freezing will not occur in transit must be used.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.74 Lead styphnate. (a) The offering of lead styphnate (lead trinitroresorcinate) or barium styphnate, monohydrate in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Lead styphnate (lead trinitroresorcinate) or barium styphnate, monohydrate must be packed wet with at least 20 percent by weight of water in a Specification 5 or 5B (§§178.80, 178.82 of this subchapter) metal barrel or drum, or a Spec. 17H (§178.118 of this subchapter) metal drum (single-trip), lined with a heavy, close-fitting jute bag closed by secure sewing. The lead styphnate (lead trinitroresorcinate) or barium styphnate, monohydrate shall be placed in an inside bag made of rubber or rubberized cloth. This bag should be divided into a number of smaller packages. Inside the bag and over the lead styphnate, (lead trinitroresorcinate) or barium styphnate, monohydrate there must be placed a cap of the same fabric and of the same diameter as the bag. The bag and contents must be packed in the center of the metal barrel or drum, and must be entirely surrounded by at least three inches of well-packed sawdust saturated with water. The barrel or drum must be inspected carefully and be determined free of leaks. The dry weight of lead styphnate (lead trinitroresorcinate) or barium styphnate, monhydrate in one outside container may not exceed 150 pounds.

(c) If lead styphnate (lead trinitroresorcinate) or barium styphnate, monhydrate is to be transported during freezing weather it must be wet with a mixture of denatured ethyl alcohol and water so that it does not freeze.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.75 Nitromannite. (a) The offering of nitromannite in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonator, blasting caps, and exploders.

(b) Nitro mannite must be packed wet with not less than 40 percent by weight of water in a specification container 5 or 5B (§§ 178.80, 178.82 of this subchapter) metal barrel or drum, with inside container which must be bags made of at least 10-ounce cotton duck, rubber or rubberized cloth. Each bag must be securely closed. These bags containing the nitro mannite must then be placed in a rubber bag, rubberized cloth bag, or bag made of suitable watertight material and then placed in the barrel or drum. Any empty space in the outside bag must be filled with water and this bag securely closed. The dry weight of nitro mannite in one outside container must not exceed 100 pounds.

(1) Spec. 21C (§ 178.224 of this subchapter). Fiber drums not over 30 gallons capacity of at least nine-ply construction having, in addition, a sheet of steel having a minimum base box of 75 pounds, not less than 0.008 inch thick, wound between the fifth and sixth plies. The inside ply of kraft paper shall be laminated on each side with polyethylene to form a waterproof lining. The bottom head shall be of fiber, metal covered on the outside. Nitro mannite must be packed wet with not less than 40 percent by weight of water and shall be contained in at least two tightly sealed polyethylene bags of at least 0.004 inch thickness and this unit shall then be placed in a tightly closed polyethylene bag of at least 0.004 inch thickness and this assembly shall be placed within a 0.006 inch thickness polyethylene or other suitable plastic bag, completely filled with water and tightly closed. The 0.006 inch plastic bag shall be of such size as to completely fill the outside shipping container. The dry weight of nitro mannite in one outside container must not exceed 100 pounds.

(c) Sufficient outage in outside container must be allowed to prevent rupturing of container in freezing weather, or a mixture of denatured ethyl alcohol and water may be used to prevent freezing in transit.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.76 Nitrosoguanidine. (a) The offering of nitrosoguanidine in a dry condition for transportation is forbidden except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Nitrosoguanidine must be packed wet with not less than 10 percent by weight of water in a specification container 5 or 5B (§§ 178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§ 178.118 of this subchapter) metal drum (single-trip) with an inside container which must be a bag made of strong cloth, which must in turn be placed in the barrel or drum. The dry weight of nitrosoguanidine in one outside container must not exceed 75 pounds.

(c) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.77 Pentaerythrite tetranitrate. (a) The offering of pentaerythrite tetranitrate in a dry condition for trasportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Pentaerythrite tetranitrate must be packed wet with not less than 40 percent by weight of water in a specification container 5 or 5B (§§ 178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§ 178.118 of this subchapter) metal drum (single-trip) with inside containers which must be bags made of at least 10-ounce cotton duck, rubber, or rubberized cloth. Each bag must be securely closed. These bags containing pentaerythrite tetranitrate must then be placed in a rubber bag, rubberized cloth bag, or bag made of suitable watertight material and then placed in the barrel or drum. Any empty space in the outside bag must be filled with water and this bag securely closed. The dry weight of pentaerythrite tetranitrate in one outside container must not exceed 300 pounds.

(c) Sufficient outage in outside container must be allowed to prevent rupturing of container in freezing weather, or a mixture of denatured ethyl alcohol or other suitable anti-freeze and water may be used to prevent freezing in transit.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.78 Tetrazene. (a) The offering of tetrazene (guanyl nitrosamino guanyl tetrazene) in a dry condition for transportation is forbidden, except as a component of manufactured articles such as percussion caps, detonators, blasting caps, and exploders.

(b) Tetrazene (guanyl nitrosamino guanyl tetrazene) must be packed wet with not less than 30 percent by weight of water in a specification container 5 or 5B (§§ 178.80, 178.82 of this subchapter) metal barrel or drum, 17H (§ 178.118 of this subchapter) metal drum (single-trip) with an inside container which must be a bag made of 4-ounce duck. Inside the bag and over the tetrazene, there must be placed a cap of the same fabric and of the same diameter as the bag. The bag must be securely tied and placed in a strong grain bag. This grain bag must also be securely tied. The bag and contents must be packed in the center of the metal barrel or drum, and must be entirely surrounded by not less than three inches of well-packed sawdust saturated with water. The metal barrel or drum must be lined with a heavy, close-fitting, jute bag closed by secure sewing to prevent escape of sawdust. The barrel or drum must be inspected carefully and all leaks stopped. The dry weight of tetrazene in one outside container must not exceed 75 pounds.

(c) If the shipment of tetrazene is to take place at a time that freezing weather is to be anticipated, it must be wet with a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur in transit.

(d) Each barrel or drum must be plainly marked "INITIATING EXPLOSIVE—DANGEROUS—DO NOT STORE OR LOAD WITH ANY HIGH EXPLOSIVE."

§ 173.79 Jet thrust units (jato), Class A explosives; rocket motors, Class A explosives; igniters, jet thrust (jato), Class A explosives; and igniters, rocket motor, Class A explosives. (a) Jet thrust units (jato), rocket motors, jet thrust (jato) igniters, and rocket motor igniters, which are Class A explosives must be packaged as follows:

(1) Specification 14, 15A, 15E, 16A, or 19B (§§ 178.165, 178.168, 178.172, 178.185, 178.191 of this subchapter). Wooden boxes, or wooden boxes, fiberboard lined.

(2) Wooden boxes, wooden crates, or other packagings of approved military specifications which comply with § 173.7(a).

(b) Jet thrust units, class A explosives or rocket motors, class A explosives, must not be shipped with igniters assembled therein unless shipped by, for, or to the Department of the Army, the Department of the Navy, or the Department of the Air Force.

(c) Jet thrust units Class A explosives or rocket motors, Class A explosives, may be packaged in the same outside packaging with their separately packaged igniters (or igniter components), Class A, B, or C explosives only when shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(d) Each package must be plainly marked "JET THRUST UNITS, CLASS A EXPLOSIVES", "ROCKET MOTORS, CLASS A EXPLOSIVES", "IGNITERS, JET THRUST, CLASS A EXPLOSIVES", or "IGNITERS, ROCKET MOTOR, CLASS A EXPLOSIVES", as appropriate.

§ 173.80 Charged well casing jet perforating guns. (a) Charged well casing jet perforating guns may be transported only by highway and only by private carriers engaged in well operations. These guns may be transported as Class C explosives if the total weight of the explosive contents of the shaped charges assembled to guns does not exceed 20 pounds. See § 173.110.

(b) Charged well casing jet perforating guns of the steel tube type must be packed without blasting caps, electric blasting caps, or other firing devices affixed to or installed in the guns and transported in specifically contructed bodies of motor vehicles operated by private carriers engaged in well operations whose motor vehicles transporting such guns must have specially built racks or carrying cases designed and constructed so that the guns are held securely in place during transportation and are not subject to damage by contact, one to the other or other articles or materials carried on the vehicle. Shaped charges assembled in the steel tubes must be of the type described in § 173.53(h)(1), except that each shaped charge shall contain not over 4 ounces of high explosive and each shaped charge if not completely enclosed in glass or metal must be fully protected by a metal cover after installation in the gun.

(c) Charged well casing jet perforating guns of the metallic strip or tubular framework type must be packed without blasting caps, electric blasting caps, or other firing devices affixed to or installed in the guns and transported in specially constructed bodies of motor vehicles operated by private carriers engaged in well operations whose motor vehicles transporting such guns must have specially built racks or carrying cases designed and constructed so that the guns are held securely in place during transportation and are not subject to damage by contact, one to the other or other articles or materials carried on the vehicle. Shaped charges assembled in the metallic strips or tubular framework must be of the type described in § 173.53(h)(1), except that each shaped charge shall contain not over 4 ounces of high explosive and each shaped charge if not completely enclosed in glass or metal must be fully protected by a metal cover after installation in the gun.

(d) The charged well casing jet perforating guns described in paragraphs (b) and (c) of this section and the bodies of motor vehicles transporting such guns must be so designed and constructed so that the guns are held securely in place during transportation and are not subject to damage by contact, one to the other or other articles or materials carried on the vehicle. The assembled gun or guns packed as required by paragraphs (b) or (c) of this section must not extend beyond the body of the vehicle and must be secured in the body of the motor vehicle in a fixed position so as to prevent movement relative to each other or in the body of the motor vehicle.

(e) Blasting caps, electric blasting caps, or other firing devices transported on any motor vehicle operated by private carriers engaged in well operations transporting charged well casing jet perforating guns shall be segregated; each kind from every other kind, and from jet perforating guns, tools or other supplies. Blasting caps, electric blasting caps, or other firing devices shall be carried in a container having individual pockets for each such device or in a fully enclosed steel container lined with nonsparking material. No more than two blasting caps, electric blasting caps, or other firing devices per gun shall be transported on the same motor vehicle transporting well casing jet perforating guns.

§ 173.81 Cord, detonating. (a) Detonating cord shall be packed in wooden or fiberboard boxes.

(b) Each outside packaging shall be plainly marked "CORD, DETONATING—HANDLE CAREFULLY".

(c) Detonating cord having an explosive content not exceeding 100 grains per linear foot may be offered for transportation and transported as a class C explosive if the gross weight of all packages of detonating cord does not exceed 100 pounds per—

(1) transport vehicle, freight container or cargo only aircraft,
(2) offshore down hole tool pallet carried on a cargo vessel,
(3) cargo compartment of a cargo vessel,
(4) passenger-carrying aircraft used to transport personnel to remote work sites, such as offshore drilling units.

§ 173.85 New explosives definitions; approval and notification. (a) As used in this section, "new explosive" means an explosive compound, mixture or device, produced by a person who:

(1) Has not previously produced that explosive compound, mixture or device; or

(2) Has previously produced the explosive compound, mixture or device, but has made a change in the formulation, design, process or production equipment. An explosive compound, mixture or device will not be considered a "new explosive" if an agency listed in paragraph (b) of this section has determined and confirmed in writing that there are no significant differences in hazard characteristics from the explosive compound, mixture or device previously approved. The written determination must be submitted to, and approved by, the Director, OHMT, before the explosive is offered for transportation.

(b) No person may offer a new explosive for transportation unless it has been examined and assigned a recommended shipping description and hazard class by the Bureau of Explosives or the Bureau of Mines, U.S. Department of the Interior and classed and approved by the Director, OHMT; or examined, classed, and approved by one of the following agencies:

(1) U.S. Department of Energy (DOE) for new explosives made by, or under the direction or supervision of DOE when tested in accordance with the Explosives Hazardous Classification procedures contained in DOT TB 700-2 (May 19, 1967), or

(2) U.S. Army Material Development and Readiness Command (DRCSF), Naval Sea Systems Command (NAVSEA 06H), or HQUSAF (IGD) SEV, for new explosives made by, or under the direction or supervision of the Department of Defense when tested in accordance with Explosives Hazard Classification procedures contained in DOD TB 700-2 (May 19, 1967), (NAVSEAINST 8020.8 AFTO 11A-1-47, DSAR 8220.1).

(c) Each person who offers a new explosive for transportation must file a copy of the approval for the new explosive accompanied by a supporting laboratory report or equivalent data with the Director, OHMT before offering the new explosive for transportation, unless the new explosive is:

(1) Covered under an approval issued by the Director, OHMT;
(2) Being transported under paragraph (d), (e), (f), or (g) of this section; or
(3) A new DOD explosive covered by a security classification.

(d) Notwithstanding paragraph (b) of this section, any person may offer a sample of a new explosive that has not been approved for transportation by railroad, highway, or vessel to a laboratory for examination if:

(1) The new explosive has been assigned a tentative shipping description and class in writing by one of the agencies listed in paragraph (b) of this section;
(2) The sample consists of no more than five pounds of the new explosive;
(3) The new explosive is packaged as required in this part according to the tentative description and class assigned unless otherwise specified in writing by one of the agencies listed in paragraph (b) of this section, and
(4) The package is labeled as required by this subchapter and the following is marked on the package:

(i) The words "SAMPLE FOR LABORATORY EXAMINATION";
(ii) The net weight of the new explosive, and
(iii) The tentative shipping description.

(e) Notwithstanding paragraph (b) of this section, a manufacturer of a new explosive that has not been examined or approved may transport that new explosive from where it was produced to an explosive testing facility if:

(1) The new explosive is not a forbidden explosive or an initiating explosive according to this subchapter;
(2) The new explosive is a compound or mixture it must be described as high explosive or high explosive, liquid, as appropriate (other than when contained in a device) and packed, marked, labeled, and described on the shipping paper as required by this subchapter;
(3) The new explosive is a device it must be assigned a tentative description and class by the owner and packed, marked, labeled, and described on the shipping paper as required by this subchapter based on its tentative description and class;
(4) The new explosive is transported in a motor vehicle operated by the owner of the explosive, and
(5) The new explosive is accompanied by a person, in addition to the driver of the motor vehicle, who is qualified by training and experience to handle the explosive.

(f) Notwithstanding the provisions of paragraph (b) or (d) of this section, the Director, Office of Hazardous Materials Transportation may approve a new explosive on the basis of an approval issued for the explosive by the competent authority of a foreign government, or, when examination of explosives by the Bureau of Explosives or Bureau of Mines is impracticable, on the basis of reports of tests conducted by disinterested third parties, or may approve the transportation of an explosives sample for the purpose of examination by the Bureau of Explosives, or the Bureau of Mines or other government agency.

(g) Notwithstanding the provisions of paragraph (b) of this section, an explosive may be transported under the provisions of §§ 171.11, 171.12 or § 176.11 without the approval of the Director, Office of Hazardous Materials Transportation provided that the Director, Office of Hazardous Materials Transportation has acknowledged, in writing, the acceptability of an approval issued by the competent authority of a foreign government pursuant to the provisions of the UN Recommendations, the ICAO Technical Instructions, the IMDG Code or other national or international regulations based on the provisions of the UN Recommendations. In such cases, a copy of the approval of the foreign competent authority, and a copy of the written acknowledgement of its acceptability must accompany each shipment of that explosive.

(h) The requirements of this section do not apply to small arms ammunition which is:

(1) Not a forbidden explosive under § 173.51;
(2) Ammunition for rifle, pistol, or shotgun;
(3) Ammunition with inert projectile or blank ammunition; and
(4) Ammunition not exceeding 50 caliber for rifle or pistol cartridges or 8 gauge for shotshells.

(i) If experience or other data indicate that the hazard of a material (device) containing an explosive composition is greater or less than indicated according to the definition and criteria specified in §§ 173.53, 173.86, and 173.100 of this Part, the Director, OHMT may, following examination in accordance with paragraph (b) of this section, revise its classification or except the material (device) from the requirements of this subchapter.

§ 173.87 Explosives in mixed packing. Unless specifically authorized in this subchapter, explosives may not be packaged in the same outside packaging with other articles unless packaged by the DOD in accordance with § 173.7(a). Inside packages of different explosives (except detonators and initiating explosives) may be packed in one outside packaging in accordance with the requirements of this subchapter if the gross weight of each inside package does not exceed 8 ounces and the gross weight of the completed package does not exceed 50 pounds.

CLASS B EXPLOSIVES; DEFINITIONS

§ 173.88 Definitions of class B explosives. (a) Explosives, Class B, are defined as those explosives which in general function by rapid combustion rather than detonation and include some explosive devices such as special fireworks, flash powders, some pyrotechnic signal devices and liquid or solid propellant explosives which include some smokeless powders. These explosives are further specifically described in paragraphs (b) to (g) of this section.

(b) Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles or without projectiles, or shell, and catapult charges exceeding 2 inches in diameter, is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer with empty, inert-loaded, or solid projectiles, or without projectiles, which is fired from a cannon, mortar, gun, howitzer or recoilless rifle.

(c) Rocket ammunition is fixed ammunition which is fired from a tube, launcher, rails, trough, or other device as distinguished from cannon ammunition which is fired from a cannon, gun, or mortar. It consists of an igniter, a rocket motor, and empty projectile, inert-loaded projectile, or solid projectile.

(d) Special fireworks are manufactured articles designed primarily for the purpose of producing visible or audible pyrotechnic effects by combustion or explosion. (See § 173.100(r) for common fireworks.) Examples are toy torpedoes, railway torpedoes, some firecrackers and salutes, exhibition display pieces, aeroplane flares, illuminating projectiles, incendiary projectiles, incendiary bombs or incendiary grenades and smoke projectiles or smoke bombs fuzed or unfuzed and containing expelling charges but without bursting charges, flash powders in inner units not exceeding 2 ounces each, flash sheets in interior packages, flash powder or spreader cartridges containing not over 72 grains of flash powder each (see § 173.60 for shipments made as low explosives) and flash cartridges consisting of a paper cartridge shell, small-arms primer, and flash composition, not exceeding 180 grains all assembled in one piece. Fireworks must be in a finished state, exclusive of mere ornamentation, as supplied to the retail trade and must be so constructed and packed that loose pyrotechnic composition will not be present in packages in transportation.

(e) Jet thrust units (jato). Class B explosives; rocket motors, Class B

explosives; igniters, jet thrust (jato), Class B explosives; and igniters, rocket motors, Class B explosives:

(1) Jet thrust units (jato), Class B explosives, are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist aeroplanes to take off.

(2) Rocket motor, Class B explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s), closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. The propelling charge consists of a mixture of chemicals and or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will not sustain a detonation. (The rocket motor carries its own solid oxidizer-fuel combination.) Rocket motors, Class B explosives, should be nonpropulsive in shipment (see paragraphs (e)(2)(i) and (ii) of this section). Rocket motors, class B explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers or other similar devices must be proven by test prior to authorization for use.

(ii) Rocket motors, Class B explosives, may be shipped in a propulsive state only under conditions approved by the Department of Defense or the National Aeronautics and Space Administration.

(3) Igniters, jet thrust (jato), Class B explosives, and igniters, rocket motor, Class B explosives, are devices consisting of an electrically operated or remotely controlled ignition element and a fast burning composition which functions by rapid burning rather than detonation, assembled in a unit for use in igniting the propelling charge of jet thrust units, rocket motors, or rocket engines.

(f) Propellant explosives, Class B. Propellant explosives, Class B, are solid or liquid chemicals or chemical mixtures which function by combustion. The combustion is controlled by composition, size, form of grain, or other chemical or mechanical means. Any propellant is class B which fails to detonate in five trials when tested (see Note 2) in the package in which it is offered for shipment. Propellant explosives, Class B, include smokeless powder for small arms (see Note 4), smokeless powder for cannon, liquid monopropellant fuel (see Note 3), smokeless powder, or solid propellant explosives for rockets, jet thrust units, or other devices. Black powder is not included in this classification and is defined specifically in § 173.53.

(g) Explosives power devices, Class B, are devices designed to operate ejecting apparatus or other mechanisms by means of a propellant explosive, Class B, and differ from explosive power devices, Class C, in that they contain larger or more powerful propellants. The devices must not rupture on functioning and must be of a type examined by the Bureau of Explosives and approved by the Director, OHMT except as otherwise provided in § 173.51(b) and § 173.66(a).

Note 1. Fire extinguisher charges containing not to exceed 50 grains of propellant explosives per unit are exempt from the regulations in Parts 170-189 of this chapter.

Note 2: In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidences of detonation.

Note 3: A liquid monopropellant fuel is defined as any propellant in which the fuel and the oxidizer are physically or chemically combined in one form.

Note 4. Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one car or motor vehicle, except shipments by, for or to the Department of the Army, Navy or Air Force of the United States Government, shall be classed as a flammable solid for purposes of transportation when packaged in accordance with § 173.197a.

(h) Starter cartridges, jet engine, Class B explosives consist of plastic and/or rubber cases, each containing a pressed cylindrical block of propellant explosive and having in the top of the case a small compartment that incloses an electrical squib, small amounts of black powder, and smokeless powder, which constitutes an igniter. The starter cartridge is used to activate a mechanical starter for jet engines.

(i) Rocket engine (liquid), Class B explosives is a complete, self-contained rocket propulsion unit which contains an oxidizer and a fuel, each separated by an aluminum or stainless steel wall of not less than 0.250 inch thickness. Double walls are permitted. Pressurization of the propellant tanks is by use of a gas generator. The ignition source must be in an unarmed position for shipment. Rocket engines (liquid) are used to propel or provide thrust for rockets, missiles or spacecraft.

§ 173.89 Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles, tear gas projectiles or without projectiles. (a) Ammunition for cannon with empty projectiles, inert-loaded projectiles solid projectiles, tear gas projectiles, or without projectiles must be well packed and properly secured in strong wooden or metal containers or in plastic containers of approved military specifications complying with § 173.7(a).

(b) Each outside package must be plainly marked **"AMMUNITION FOR CANNON WITH EMPTY PROJECTILES", "AMMUNITION FOR CANNON WITH INERT-LOADED PROJECTILES", "AMMUNITION FOR CANNON WITH SOLID PROJECTILES", "AMMUNITION FOR CANNON WITHOUT PROJECTILES", or "AMMUNITION FOR CANNON WITH TEAR GAS PROJECTILES, CLASS B EXPLOSIVES,"** as appropriate.

§ 173.90 Rocket ammunition with empty, inert-loaded, or solid projectiles. (a) Rocket ammunition with empty, inert-loaded, or solid projectiles must be well packed and properly secured in strong wooden or metal containers.

(b) Each package must be plainly marked **"ROCKET AMMUNITION WITH EMPTY PROJECTILES," "ROCKET AMMUNITION WITH INERT-LOADED PROJECTILES," or "ROCKET AMMUNITION WITH SOLID PROJECTILES,"** as appropriate.

§ 173.91 Special fireworks. (a) Special fireworks, except as otherwise authorized, must be securely packed in containers complying with the following specifications:

(1) [Reserved]

(2) Specification 15A, 15B, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 500 pounds.

(3) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds except as provided in paragraph (a)(5) of this section. Not permitted for illuminating projectiles and aeroplanes flares.

(4) Fireworks that can be exploded enmasse, by dropping the completed shipping container from a height of six feet or by the impact of a rifle bullet, if found safe for transportation, may be shipped in accordance with the regulations in this part applying to high explosives.

(5) Ship distress signals when packed in tight inside metal containers of not less than 24 gauge sheet iron or other metal of equal strength, securely closed by positive means (not friction) and of such design and so arranged as to completely fill the outside container, may be packed in Spec. 12B (§ 178.205 of this subchapter) fiberboard boxes. Gross weight not to exceed 95 pounds when boxes are made in accordance with § 178.205-29 of this subchapter.

(6) Illuminating projectiles, incendiary projectiles, and smoke projectiles exceeding 90 pounds each, or of not less than 4½ inches in diameter, may be offered for transportation without being boxed only by, for, or to the Department of Defense (DOD) of the U.S. Government when securely blocked and braced in accordance with methods prescribed by DOD.

(i) Illuminating projectiles, incendiary projectiles, and smoke projectiles less than 4½ inches in diameter may be offered for transportation without being boxed, when palletized, only by, for, or to the Department of Defense (DOD) of the U.S. Government when securely blocked and braced in accordance with methods prescribed by DOD.

(b) Flash or spreader cartridges not exceeding 72 grains of flash powders each must be packed in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes or Spec. 12B (§ 178.205 of this subchapter) fiberboard boxes, with inside containers which must be cartons or tin cans containing not over 6 cartridges and not to exceed 150 cartons or cans to an outer box.

(c) Flash cartridges consisting of a paper cartridge shell, small arms primer, and flash composition, not exceeding 180 grains each, all assembled in one piece ready for firing must be packed in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, or spec. 12B (§ 178.205 of this subchapter) fiberboard boxes, with inside containers which must be cartons containing not to exceed 12 cartridges each and not more than 12 such cartons in one outside box.

(2) Flash cartridges, in quantity not exceeding 5 pounds, when in small interior wooden boxes, may be packed with nonexplosive, nonflammable or noncorrosive articles.

(d) Flash sheets must be packed in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, or spec. 12B (§ 178.205 of this subchapter) fiberboard boxes, with inside containers which must be an inner package or envelope containing not more than 6 flash sheets and not more than one dozen inner envelopes or packages inclosed in each inner pasteboard box or carton. Gross weight of wooden box not to exceed 150 pounds. Gross weight of fiberboard box not to exceed 65 pounds.

(2) Flash sheets, in quantity not exceeding 5 pounds, when in small interior wooden boxes, may be packed with nonexplosive, nonflammable, or noncorrosive articles.

(e) Photographic flash powder must be packed in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, or Spec. 12B (§ 178.205 of this subchapter) fiberboard boxes, with inside containers which must be any inside container sufficiently strong to retain contents not exceeding 2 ounces each. If bottles are used, each bottle must be packed in a securely closed fiber mailing tube having metal ends. Not more than 4 dozen 2-ounce bottles may be packed in an outer wooden box. When packed in units not exceeding 1 ounce each without bottles in similar fiber mailing tubes and outer wooden boxes, the gross weight of one outside box must not exceed 150 pounds. Gross weight of fiberboard box not to exceed 65 pounds.

(2) Photographic flash powder, in quantity not exceeding 5 pounds,

when in small interior wooden boxes, may be packed with nonexplosive, nonflammable, or noncorrosive articles.

(f) Railway torpedoes (track torpedoes) must be packed in containers complying with the following specifications:

(1) Spec. 15A, 15B, 16A, 19A, or 19B (§§178.168, 178.169, 178.185, 178.190, or 178.191 of this subchapter). Wooden boxes. Net weight not to exceed 125 pounds.

(2) Spec. 12H, 23F, or 23H (§178.209, §178.214, or §178.219 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside containers which must be cartons containing not to exceed one-half gross track torpedoes each. Gross weight of outside fiberboard box not to exceed 65 pounds.

(4) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes without inside containers may be used for not more than 50 track torpedoes provided the smallest dimension of the box is not less than 6 inches.

(g) Toy torpedoes must be securely packed as prescribed in this section in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, or Spec. 12B (§178.205 of this subchapter) fiberboard boxes which must be constructed to comply with §178.205-30 of this subchapter. Not more than 20 one-quarter gross cartons totalling not more than 5 gross of toy torpedoes are authorized per fiberboard box. Gross weight of fiberboard box must not exceed 35 pounds. Gross weight of wooden box must not exceed 65 pounds.

(2) Toy torpedoes of any kind must not be packed with other fireworks.

(3) Toy torpedoes containing a cap must be packed in sawdust, in inside paper or cardboard cartons. The size of the carton must not be less than 4 cubic inches for each grain of explosive.

(4) Toy torpedoes containing a mixture of potassium chlorate, black antimony and sulfur, must be packed in an inner container, containing not more than one-fourth gross. The capacity of this inner container must be not less than 105 cubic inches, and it must be divided into 12 equal compartments. All vacant space inside the container must then be filled with sawdust or fine shavings.

(5) The gross weight of a container of toy torpedoes must not exceed 65 pounds.

(h) Except as otherwise specified in this section the gross weight of one outside container of special fireworks must not exceed 500 pounds.

(i) Marking. Each outside container of special fireworks must be plainly marked in letters not less than ¾ inch in height "SPECIAL FIREWORKS—HANDLE CAREFULLY—KEEP FIRE AWAY", except that each outside container of railway torpedoes must be plainly marked in letters not less than ¾ inch in height "RAILWAY TORPEDOES—HANDLE CAREFULLY—KEEP FIRE AWAY".

(j) Outside containers of toy torpedoes must in addition be marked "TOY TORPEDOES".

§ 173.92 Jet thrust units (jato), Class B explosives; rocket motors, Class B explosives; igniters, jet thrust (jato), Class B explosives; igniters, rocket motors, Class B explosives; and starter cartridges, jet engine, Class B explosives. (a) Class B explosives covered by this section must be packaged in outside packagings complying with the following specifications:

(1) Specification 14, 15A, 15E, 16A, or 19B (§§178.165, 178.168, 178.172, 178.185, 178.191 of this subchapter). Wooden boxes, or wooden boxes, fiberboard lined.

(2) Specification 15B (§178.169 of this subchapter) wooden boxes. Authorized only for igniters, jet thrust, Class B explosives, or igniters, rocket motors, Class B explosives.

(3) Specification 23F (§178.214 of this subchapter) fiberboard boxes. Authorized only for igniters, jet thrust, Class B explosives; igniters, rocket motor, Class B explosives; or starter cartridges, jet engine, Class B explosives. Items must be packaged in tightly closed inside fiberboard boxes (at least 200-pound test (Mullen or Cady)) or metal containers. Starter cartridges, jet engine, must have igniter wires short-circuited when packed for shipment.

(4) Wooden boxes, wooden crates, or other packagings of approved military specification which comply with §173.7(a).

(b) Jet thrust units, Class B explosives, or rocket motors, Class B explosives, must not be shipped with igniters assembled therein unless shipped by, for, or to the Department of Defense or the National Aeronautics and Space Administration.

(c) Jet thrust units, Class B explosives, or rocket motors, Class B explosives, may be packaged in the same outside packaging with their separately packaged igniters (or igniter components), Class A, B, or C explosives, only when shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(d) Each package must be plainly marked "JET THRUST UNITS, CLASS B EXPLOSIVES", "ROCKET MOTORS, CLASS B EXPLOSIVES", "IGNITERS, JET THRUST, CLASS B EXPLOSIVES", "IGNITERS, ROCKET MOTORS, CLASS B EXPLOSIVES", or "STARTER CARTRIDGES, JET ENGINE, CLASS B EXPLOSIVES" as appropriate.

§ 173.93 Propellant explosives (solid) for cannon, small arms, rockets, guided missiles, or other devices, and propellant explosives (liquid). (a) Propellant explosives (solid) for cannon, small arms, rockets, guided missiles, or other devices, and propellant explosives (liquid) when offered for transportation by carriers by rail freight, highway, or water, must be packed in containers complying with the following specifications (see paragraph (g)(1) of this section for shipments by cargo aircraft only):

(1) Specification 12H, 23G, or 23H (§178.209, 178.218, 178.219 of this subchapter) fiberboard boxes with inside securely closed polyethylene bags having a minimum wall thickness of 0.006 inch.

(2) Smokeless powder for small arms may be shipped as Class B explosives in packagings approved in accordance with §173.197a.

(3) [Reserved]

(4) Tight metal cases in tight wooden boxes not over 200 pounds gross weight, or tight metal containers not over 200 pounds gross weight.

(5) Specification 14, 15A, or 19B (§§178.165, 178.168, 178.191 of this subchapter). Wooden boxes, metal-lined, Spec. 2F (§178.25 of this subchapter). Gross weight not to exceed 200 pounds.

(6) Specification 14, 15A, or 19B (§§178.165, 178.168, 178.191 of this subchapter). Wooden boxes or Spec. 23F or 23H (§§178.214 or 178.219 of this subchapter) fiberboard boxes, with inside cloth or paper bags, not exceeding 25 pounds net weight each and capable of withstanding at least two drops on end from a height of 4 feet, without breakage or sifting of contents. Outside container not to exceed 50 pounds net weight.

(7) [Reserved]

(8) Specification 14, 15A, 15B, 15C, or 19B (§§178.165, 178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes, or Spec. 12H, 23F, or 23H (§§178.209, 178.214, 178.219 of this subchapter) fiberboard boxes, with inside fiber or metal containers not exceeding 1½ pounds capacity each. Gross weight not to exceed 200 pounds in wooden boxes or 65 pounds in fiberboard boxes.

(9) Specification 14, 15A, 15B, 15C, or 19B (§§178.165, 178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes, or Spec. 23F or 23H (§§178.214, 178.219 of this subchapter) fiberboard boxes, with not more than four strong inside tight metal containers of not more than 25 pounds each. The gross weight in fiberboard boxes may not exceed 65 pounds.

(10) Specification 21C (§178.224 of this subchapter). Fiber drum. Drums having a wooden head must contain a strong, sift-proof liner. Net weight may not exceed 265 pounds. Shipment by rail freight is prohibited except in trailer-on-flat-car service.

(11) Specification 14, 15A, 16A, or 19B (§§178.165, 178.168, 178.185, 178.191 of this subchapter). Wooden boxes, not lined, authorized only for grains not less than 1-inch in diameter or 3 inches in length, provided such grains are tightly packed and are coated with a protective material. Gross weight not to exceed 200 pounds.

(b) Propellant explosives (smokeless powder for cannon or small-arms) in water when offered for transportation by carriers by rail freight, highway, or water must be packed in containers complying with the following specifications:

(1) Specification 5, 5A, 5B, 6B, or 6C (§§178.80, 178.81, 178.82, 178.98, or 178.99 of this subchapter). Metal barrels or drums.

(2) Specification 17H (§178.118 of this subchapter). Steel drums (single-trip) not over 30-gallon capacity each.

(3) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes, metal-lined, Specification 2F (§178.25 of this subchapter).

(c) Igniters composed of black powder may be included in shipments of propellant explosives.

(d) Propellant explosives (unstable, condemned, or deteriorated smokeless powder for cannon or small arms) must be packed submerged in water in containers complying with the following specifications:

(1) Specification 5, 5A, 5B, 6B, or 6C (§§178.80, 178.81, 178.82, 178.98, or 178.99 of this subchapter). Metal barrels or drums.

(2) [Reserved]

(3) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes, metal-lined, Specification 2F (§178.25 of this subchapter).

(4) Spec. 103, 103-W or 111A100-W-1 (§§179.200, 179.201 of this subchapter). Tank cars.

(5) Propellant explosives (unstable, condemned, or deteriorated smokeless powder for cannon or small arms) may not be offered for transportation by cargo aircraft only.

(e) Propellant explosives (liquid), when offered for transportation by rail freight, highway, or water, must be packed in containers complying with the following specifications (see §173.93(g) for shipments by rail express):

(1) Specification 15A, 15B, 15E, or 19B (§§178.168, 178.169, 178.172, 178.191 of this subchapter). Wooden box or wooden box fiberboard lined, with inside polyethylene bottles having taped screw-cap closures, not over 1 gallon capacity each. Each bottle must be entirely contained within a polyethylene or other suitable plastic bag formed of material not less than 0.004 inch thickness, with ends securely closed. Each bottle in the plastic bag shall be enclosed in a tight metal container and be surrounded on all sides with at least 2 inches of incombustible cushioning material, cans in the outside box must likewise be cushioned from each other and sides, top, and bottom of the container.

(2) Specification 5B, 6B, 6C, 6D; also 17C or 17H (single-trip containers) (§§178.82, 178.98, 178.99, 178.102, 178.115, 178.118 of this subchapter). Metal barrel, drum, or cylindrical steel overpack, with inside Specification 2S (§178.35 of this subchapter) polyethylene container, packed inside a strong, tight metal drum. Inside steel drum must be surrounded on all sides with at least 2 inches of incombustible

absorbent cushioning material uniformly distributed. Polyethylene containers are authorized only for liquids that will not react dangerously with the plastic or result in container failure.

(3) Outage requirements. Containers must not be entirely filled. Sufficient interior space must be left vacant to prevent leakage or distortion of containers due to the expansion of the contents from increase of temperature during transit.

(f) Each outside container must be plainly marked "PROPELLANT EXPLOSIVES (LIQUID), CLASS B," "PROPELLANT EXPLOSIVES (SOLID), CLASS B," or "PROPELLANT EXPLOSIVES (SOLID), CLASS B, IN WATER," as the case may be. There may be added such additional marketing as "Smokeless Powder for Cannon" or "Smokeless Powder for Small Arms," as the case may be.

(g) Propellant explosives, except as provided in paragraph (d)(5) of this section, when offered for transportation by cargo aircraft only must be packaged as follows (also authorized for transportation by carriers by rail freight, highway, or water):

(1) Solids in tightly closed metal cans or fiber containers, not exceeding 1 pound each, or in inside metal cans or fiber containers containing not more than one grain of propellant, not exceeding 5 pounds each, and liquids in polyethylene bottles compatible with contained liquid, with screw-cap closures taped, not exceeding 1-pound or 16 fluid ounces capacity each, packed in an outside wooden box, Spec. 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter); or outside fiberboard box Spec. 12B, 23F or 23H (§§178.205, 178.214, 178.219 of this subchapter). Not more than 1,000 small-arms primers packed in inside containers as prescribed by § 173.107 may be included in one outside shipping container with solid propellant explosives. Inside containers must be packed so as to prevent movement within the outside container. Not more than 10 pounds of propellant explosives may be shipped in one outside container. Each outside container must be plainly marked "PROPELLANT EXPLOSIVES (LIQUID), CLASS B," or "PROPELLANT EXPLOSIVES (SOLID), CLASS B," or "PROPELLANT EXPLOSIVES, CLASS B, and SMALL-ARMS PRIMERS," as the case may be.

§ 173.94 Explosive power devices, Class B. (a) Explosive power devices, Class B may not be shipped with igniters assembled therein unless shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD. Explosive power devices, Class B, must be packed in outside containers complying with the following specifications:

(1) Specification 14, 15A, 15E, 16A, or 19B (§§178.165, 178.168, 178.172, 178.185, 178.191 of this subchapter). Wooden boxes or wooden boxes, fiberboard lined.

(2) Strong wooden or metal boxes or containers. Authorized only for shipments made by, for, or to the Departments of the Army, Navy, or Air Force of the United States Government.

(b) Explosive power devices, Class B packed in any other manner must be in containers of a type examined by the Bureau of Explosives and approved by the Director, OHMT.

(c) Each outside container must be plainly marked "EXPLOSIVE POWER DEVICES, CLASS B" and "HANDLE CAREFULLY—KEEP FIRE AWAY."

§ 173.95 Rocket engines (liquid), Class B explosives. (a) Rocket engines (liquid), Class B explosives must be packaged as follows:

(1) Specification 14, 15A, 15E, 16A, or 19B (§§178.165, 178.168, 178.172, 178.185, 178.191 of this subchapter). Wooden boxes or wooden boxes, fiberboard lined.

(2) Wooden boxes or metal packagings of approved military specification which comply with § 173.7(a).

(b) Rocket engines (liquid), Class B explosives, may not be shipped with igniters or initiators assembled therein unless shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(c) Rocket engines (liquid), Class B explosives, may be packed in the same outside packaging with their separately packaged igniters, jet thrust, Class B explosives when shipped by or for the Department of Defense (DOD) and in accordance with established practices and procedures specified by DOD.

(d) Each package must be plainly marked "ROCKET ENGINES (LIQUID), CLASS B EXPLOSIVES."

CLASS C EXPLOSIVES; DEFINITIONS

§ 173.100 Definitions of Class C explosives. (a) Explosives, Class C, are defined as certain types of manufactured articles which contain Class A, or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks. These explosives are further specifically described in this section.

(b) Small arms ammunition is fixed ammunition consisting of a metallic, plastic composition, or paper cartridge case, a primer, and a propelling charge, with or without bullet, projectile, shot, tear gas material, tracer components, or incediary compositions, or mixtures, and is further limited to the following:

(1) Ammunition designed to be fired from a pistol, revolver, rifle, or shotgun held by the hand or to the shoulder.

(2) Ammunition of caliber less than 20 millimeters with incendiary solid, inert or empty projectiles (with or without tracers), designed to be fired from machine guns or cannons.

(3) Blank cartridges including canopy remover cartridges, starter cartridges, and seat ejector cartridges, containing not more than 500 grains of propellant powder, provided that such cartridges shall be incapable of functioning en masse as a result of the functioning of any single cartridge in the container or as a result of exposure to external flame.

(4) Twenty millimeter ammunition other than specified in § 173.53(q).

(c) Explosive cable cutters are used for cutting cables, etc. They consist of a metal device containing a knife-edged component which is propelled by a small charge of an explosive compound.

(d) Cord, detonating *flexible* is a device consisting of a core of pentaerythrite tetranitrate, cyclotrimethylene-trinitramine or similar explosive overspun with tapes, yarns and plastics or waterproofing compounds without wire countering. Approval of detonating cord as a class C explosive is contingent upon:

(1) examination by an agency listed in § 173.86(b); and

(2) a demonstrated ability to confine blast effects of a detonation to the package as prepared for transportation, and without propagation of detonation to similar packages which surround it.

(e) Percussion fuzes, combination fuzes, and time fuzes are devices designed to ignite powder charges of ammunition or to initiate an intermediate charge (booster) in projectiles, bombs, etc. When such fuzes are assembled with booster charges they are properly described as "detonating fuzes" (see § 173.53(g)(2)).

(f) Tracer fuzes and tracers are devices which are attached to projectiles and contain a slow-burning composition to show the flight of projectiles at night.

(g) Cartridge bags, empty, with black powder igniters consist of empty bags having attached thereto an igniter composed of black powder. (See § 173.93(b), (c), and (d) when shipped with propellant explosives.)

(h) Igniters consist of fiberboard, plastic, paper or metal tubes containing a small quantity of igniting compound which is ignited by the action of a primer, pull wire or scratch composition.

(i) Delay electric igniters consist of small metal, fiberboard, or pasteboard tubes containing a wire bridge in contact with a small quantity of ignition compound. The ignition compound is in contact with or in close proximity to a short piece of safety fuse.

(j) Electric squibs consist of small tubes or blocks containing a small quantity of ignition compound in contact with a wire bridge.

(k) Fuse lighters and fuse igniters are small cylindrical hollow pasteboard or metal tubes containing an igniting composition in one end, the other end being open to permit it to be placed on safety fuse.

(l) Safety squibs are small paper tubes containing a small quantity of black powder. One end of each tube is usually twisted and tipped with sulfur.

(m) Instantaneous fuse is cotton yarn impregnated with metal powder. No restrictions other than packing in strong wooden boxes or barrels plainly marked "INSTANTANEOUS FUSE" are prescribed in this part.

(n) Primers are devices used to ignite the powder charges of ammunition or the black powder bursting charges of projectiles. For small-arms ammunition the primers are "small-arm primers" or "percussion caps".

(o) Safety fuse, consisting of a core of black powder overspun with yarns, waterproofing compounds, and/or tapes must be packed in outside fiberboard boxes, wooden boxes, wooden barrels, bales, or metal containers, and must be described for shipping purposes as "SAFETY FUSE". No other restrictions apply in this part.

(p) Toy plastic or paper caps for toy pistols in sheets, strips, rolls, or individual caps, must not contain more than an average of twenty-five hundredths of a grain of explosive composition per cap and must be packed in inside packages constructed of cardboard not less than 0.013-inch in thickness, metal not less than 0.008-inch in thickness, noncombustible plastic not less than 0.015-inch in thickness, or a composite blister package consisting of cardboard not less than 0.013-inch in thickness and noncombustible plastic not less than 0.005-inch in thickness, which shall provide a complete enclosure and the minimum dimensions of each side or end of such package shall be not less than ¼-inch in height. The number of caps in these inside packages shall be limited so that not more than 10 grains of explosives composition shall be packed into one cubic inch of space and not exceeding 17.5 grains of the explosive composition of toy caps shall be packed in any inside container. These inner containers must be packed in outside containers as specified in § 173.109.

(q) Explosive rivets, each containing not more than 375 milligrams of explosive composition, are exempt from specification packaging and labeling requirements when packed in pasteboard or other inside boxes in securely closed strong wooden boxes, fiberboard boxes or metal containers. Each outside container must be marked "EXPLOSIVE RIVETS". No other restrictions apply in this part.

(r) Common fireworks are fireworks devices suitable for use by the public and designed primarily to produce visible effects by combustion.

Some small devices designed to produce audible effects are also included in this class. The types, sizes and amount of pyrotechnic contents of these devices are limited as enumerated in this paragraph. No component of any device listed in this paragraph, which produces or is intended to produce an audible effect shall contain pyrotechnic composition in excess of 2 grains in weight, nor shall such device or component, upon functioning, project or disperse any metal, glass or brittle plastic fragments. (Propelling or expelling charges consisting of a mixture of sulfur, charcoal, and saltpeter are not considered as designed to produce audible effects). Any new device, not enumerated in this paragraph, must be examined by the Bureau of Explosives and approved by the Director, OHMT, before being offered for transportation as Common Fireworks. Common fireworks must be in a finished state exclusive of mere ornamentation as supplied to the retail trade and must be so constructed and packed that loose pyrotechnic composition will not be present in packages in transportation. Fireworks, except articles defined in paragraphs (s) through (y) inclusive, of this section, other than common fireworks as defined in this paragraph, and those forbidden for transportation in §173.51, are classed as Special Fireworks (see §173.88(d)).

(t) Roman candles, not exceeding ten balls spaced uniformly in the tube, total pyrotechnic composition not to exceed twenty grams each in weight. The inside tube diameter shall not exceed ¾ inch.

(2) Sky rockets with sticks, total pyrotechnic composition not to exceed twenty grams each in weight. The inside tube diameter shall not exceed ⅛ inch. The rocket sticks must be securely fastened to the tubes.

(3) Helicopter type rockets, total pyrotechnic composition not to exceed twenty grams each in weight. The inside tube diameter shall not exceed ⅛ inch.

(4) Cylindrical fountains, total pyrotechnic composition not to exceed seventy-five grams each in weight. The inside tube diameter shall not exceed ¾ inch.

(5) Cone fountains total pyrotechnic composition not to exceed fifty grams each in weight.

(6) Wheels, total pyrotechnic composition not to exceed sixty grams for each driver unit or two hundred and forty grams for each complete wheel. The inside tube diameter of driver units shall not exceed ½ inch.

(7) Illuminating torches and colored fire in any form, total pyrotechnic composition not to exceed one hundred grams each in weight.

(8) Dipped sticks, the pyrotechnic composition of which contains any chlorate or perchlorate shall not exceed 5 grams. Sparklers, the composition of which does not exceed 100 grams each and which contain no magnesium or magnesium and a chlorate or perchlorate, are not subject to the regulations in Parts 170–189 and 397 of this title.

(9) Mines and shells of which the mortar is an integral part, total pyrotechnic composition not to exceed forty grams each in weight.

(10) Firecrackers and salutes with casings, the external dimensions of which do not exceed one and one-half inches in length or one-quarter inch in diameter, total pyrotechnic composition not to exceed two grains each in weight.

(11) Novelties consisting of two or more devices enumerated in this paragraph when examined by the Bureau of Explosives and approved by the Director, OHMT.

(s) Igniter cord consists of textile yarns and or a wire uniformly covered with a combustible chemical mixture, with or without additional textile or wire counterings, waterproofing or finishing coatings which, when ignited burns externally at various rates according to design. Igniter cord must be packed in strong, tight, outside fiberboard boxes or drums, wooden boxes or metal containers plainly marked "IGNITER CORD."

(t) Explosive auto alarms are tubular devices containing a small amount of explosive composition and igniting compound which is ignited by an electric spark. These devices must be so designed that they will neither burst nor cause external flame on functioning.

(u) Toy propellant devices and toy smoke devices consist of small paper or composition tubes or containers containing a small charge of slow burning propellant powder or smoke producing powder. These devices must be so designed that they will neither burst nor produce external flame on functioning.

Ignition elements, if attached, must be of a design examined by the Bureau of Explosives and approved by the Director, OHMT.

(v) Oil well cartridges are tubular devices each containing not more than 350 grains of propellant powder and having no ignition device or element. Cartridges must be constructed and packed so that they will be incapable of functioning en masse as a result of exposure to external flame.

(w) Actuating cartridges, explosive, fire extinguisher or valve consist of a small metal or fiber housing containing a small amount of initiating explosive and a propellant and are used to actuate valves on remotely controlled fire extinguishers or other apparatus.

(x) Cigarette loads, trick matches, and trick noise makers, explosive, must be of a type examined by the Bureau of Explosives and approved by the Director, OHMT and are described as follows:

(1) Cigarette loads consist of wooden pegs to which are affixed a small amount of explosive composition.

(2) Trick matches consist of book matches, strike anywhere matches, or strike-on-box matches which have small amounts of explosive or pyrotechnic composition affixed to the match stem just below the match head.

(3) Trick noise makers, explosive, consist of spheres containing a small amount of explosive composition.

(y) Smoke candles, smokepots, smoke grenades, smoke signals, signal flares, hand signal devices, and very signal cartridges are devices designed to produce visible effects for signal purposes. These devices must contain no bursting charges and no more than 200 grams of pyrotechnic composition each (see Note 1), exclusive of smoke composition (see Note 2), unless greater weight of composition is examined by the Bureau of Explosives and approved by the Director, OHMT.

Note 1. Pyrotechnic compositions (other than smoke compositions) are defined as chemical mixtures which on burning and without explosion, produce visible or brilliant displays or bright lights.

Note 2. Pyrotechnic smoke compositions are defined as chemical smoke producing mixtures, which on ignition burn at a controlled rate, without the production of flame and without the build-up of internal pressure that would rupture or burst the end product.

(z) Explosive release devices consist of a rod or link fitted with means for mechanical attachment to other apparatus or equipment and containing a small electrically initiated explosive charge which will break the rod or link upon functioning. These devices must be so designed that they will not function other explosive devices in the package sympathetically.

(aa) Explosive power devices, Class C, are devices designed to drive generators or mechanical apparatus by means of propellant explosives, Class B. The devices consist of a housing with a contained propellant charge and an electric igniter or squib. The devices must be of a type examined by the Bureau of Explosives and approved by the Director, OHMT for this classification.

(bb) Detonating fuzes, Class C explosives, are used in the military service to detonate high explosive bursting charges of projectiles, mines, bombs, torpedos, grenades, demolition charges, and safety and arming devices. They contain a detonator and a quantity of high explosives. Additionally they may be used by the military to transmit a detonation between two or more devices. This type detonating fuze contains either an explosive train consisting of mild detonating fuse, metal clad, igniter fuse-metal clad or similar type fuses, and any combination of one or more boosters, detonators and high explosives in a total quantity not exceeding 25 grams of explosive composition. All detonating fuzes, Class C explosives, must be made and packed so that they will not cause functioning of other fuzes, explosives, or other explosive devices if one of the fuzes detonates in a shipping container or in adjacent containers.

(cc) Mild detonating fuses, metal clad and flexible linear shaped charges, metal clad consists of a core containing not more than 2½ grains of high explosive composition per lineal foot, clad with metal either with or without a covering of tapes, yarns, plastics or waterproofing compounds. Mild detonating fuse, metal clad, and flexible linear shaped charges, metal clad, in lengths not over 26 feet and not exceeding 15 grains per lineal foot having the individual lengths separated from adjacent lengths so that mass propagation will not occur, may be shipped as Class C explosives.

(dd) Igniter fuse-metal clad consists of a base metal tube with a core of explosive igniter composition in quantity not exceeding 20 grains per foot.

(ee) Starter cartridges, jet engine, Class C, consist of a metal, plastic, and or rubber case, each containing a pressed cylindrical block of flammable solid material and having in the top of the case a small compartment that encloses an electric squib, small amount of black powder, and or smokeless powder which constitute an igniter. The starter cartridge is used to activate a mechanical starter for jet engines and must be of a type examined by the Bureau of Explosives and approved by the Director, OHMT, except as provided in §173.51(a)(16) and §173.66(a).

(ff) "Cartridge, practice ammunition" means a metal cartridge case containing a primer, a propelling charge of not more than 500 grains of propellant powder, and a solid projectile or a projectile containing a smoke spotting charge.

(gg) Detonators (§173.53(g)(1)), which will undergo only limited propagation in the shipping package, are classed as Class C explosives. For the purposes of this paragraph, limited propagation means that if one detonator near the center of a shipping package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional detonators in the outside packaging that explode may not exceed 25 grams. Detonators which mass detonate in the shipping package may not be classed as Class C explosives. For the purposes of this paragraph "mass detonate" means that more than 90 percent of the devices tested in a package explode practically simultaneously.

(hh) Detonating primers (§173.53(g)(2)) in which the total explosive charge per unit does not exceed 25 grams, and which will undergo only limited propagation in the shipping package, are classed as Class C explosives. For the purposes of this paragraph, limited propagation means that if one detonating primer near the center of a shipping package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional detonating primers in the outside packaging that explode may not exceed 25 grams. Detonating primers which mass detonate in the shipping package may not be

classed as Class C explosives. For the purposes of this paragraph, "mass detonate" means that more than 90 percent of the devices tested in a package explode practically simultaneously.

(ii) Explosive pest control devices, class C explosives, consist of a cardboard-pasteboard type tube not exceeding 4 inches in length and ¾ inch in diameter or a shotgun shell type having an explosive projectile. They may contain a mixture of potassium perchlorate, aluminum power, sulfur, black powder, smokeless powder or similar pyrotechnic mixture. The component which produces the audible effect may not contain more than 40 grains of explosive composition. Devices and packaging must be of a type examined by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT.

§ 173.101 Small-arms ammunition. (a) Small-arms ammunition must be packed in pasteboard or other inside boxes, or in partitions designed to fit snugly in the outside container, or must be packed in metal clips. The partitions and metal clips must be so designed as to protect the primers from accidental injury. The inside boxes, partitions and metal clips must be packed in securely closed strong outside wooden or fiberboard boxes or metal containers. Blank Industrial Power Load cartridges, similar to the 22 long rim-fire cartridge, may be packed in bulk in securely closed fiberboard boxes.

(b) Small-arms ammunition in pasteboard or other inside boxes, in addition to containers prescribed in paragraph (a) of this section, may be shipped when packed in the same outside container with nonexplosive and nonflammable articles; or with small-arms primers or percussion caps in quantity not to exceed 5 pounds. The weight of the small-arms ammunition packed with other articles must not exceed 55 pounds in outside fiberboard box, or 75 pounds in outside wooden box. The outside package must be a securely closed strong wooden or fiberboard container.

(c) Packages containing small-arms ammunition are excepted from the label prescribed in §172.411 of this subchapter, but the outside of each package must be plainly marked "**SMALL ARMS AMMUNITION.**"

(d) Each package containing cartridges loaded with an irritating Material must, in addition to marking prescribed herein, be marked "**IRRITATING AGENT**" and must bear the IRRITANT label.

(e) No restrictions other than proper description, packing and marking for small-arms ammunition and additional marking and labeling for tear gas cartridges are prescribed in this part for the transportation of small-arms ammunition and tear gas cartridges.

(f) Shipments of small-arms ammunition, including broken lots which have lost their identity (lot number identification), may be shipped loosely packed in securely closed strong wooden boxes or metal boxes, in carload or truckload lots, when shipments are made by or for the Departments of the Army, Navy or Air Force of the United States Government to depots or manufacturing plants for reprocessing or demilitarization. Seriously deteriorated ammunition or ammunition damaged to the point of exposing incendiary or tracer composition, spillage of propellant powder, or ammunition with other hazardous defects must not be shipped. Each outside package must be plainly marked "**SMALL-ARMS AMMUNITION.**"

(g) Special exceptions for certain types of small arms ammunition in the ORM-D class are provided in Subpart N of this part.

§ 173.101a Cartridges, practice ammunition. (a) Cartridges, practice ammunition must be packaged in pasteboard or other inside boxes, or in partitions designed to fit snugly in the outside packaging, or must be packed in metal clips. The partitions and metal clips must be so designed as to protect the primers from accidental injury. The inside boxes, partitions, and metal clips must be packaged in securely closed strong outside wooden or fiberboard boxes or metal packagings.

(b) Each package must be plainly marked "**CARTRIDGES, PRACTICE AMMUNITION.**"

§ 173.102 Explosive cable cutters; explosive power devices, Class C; explosive release devices, or starter cartridges, jet engine, Class C explosives. (a) Explosive cable cutters, explosive power devices, Class C, explosive release devices, or starter cartridges, jet engine, Class C must be packed in specification containers as follows:

(1) Spec. 12H, 23F or 23H (§§178.209, 178.214, or §178.219 of this chapter), Fiberboard boxes. Authorized gross weight not to exceed 65 pounds.

(2) In addition to specification containers prescribed in this section, explosive cable cutters, explosive power devices, Class C, explosive release devices, or starter cartridges, jet engines, Class C may be shipped in strong wooden or metal boxes. Starter cartridges, jet engine, must have igniter wires short-circuited when packed for shipment.

(b) Each package must be plainly marked "**EXPLOSIVE CABLE CUTTERS**"; "**EXPLOSIVE POWER DEVICES, CLASS C**"; "**EXPLOSIVE RELEASE DEVICES**", or "**STARTER CARTRIDGES, JET ENGINE, CLASS C EXPLOSIVES**", as appropriate, and "**HANDLE CAREFULLY—KEEP FIRE AWAY.**"

§ 173.103 Detonators, Class C explosives, and detonating primers, Class C explosives. (a) It must be shown by actual tests that detonators and detonating primers which are to be offered for transportation as Class C explosives meet the appropriate definitions in paragraphs (gg) and (hh) in §173.100. Testing must be performed or confirmed and the classification approved as specified in §173.86. Substitution of a representative packaging in place of the actual shipping package for testing purposes may be authorized by one of the agencies specified in §173.86(b).

(b) Detonators, Class C explosives, and detonating primers, Class C explosives, may only be offered for transportation if they are packed in packagings specified in §§173.66 and 173.68 that meet the requirements of paragraph (a) of this section, except that quantity limitations for devices in packagings (other than the gross weight limitation for the specification packaging used) do not apply.

(c) Detonators originally classed as Class C explosives in accordance with the requirements of paragraph (a) of this section, may be offered for transportation in an IME Standard 22 container as Class C explosives subject to the following conditions:

(1) Each detonator may contain no more than 1 gram of explosive (excluding ignition and delay charges);

(2) The detonators must be packed in accordance with the requirements and limitations of §173.66, except paragraphs (a)(3)(ii) and (iii), and paragraph (e);

(3) There are no more than 1,000 detonators in the container; and

(4) Each inside packaging shall be marked "class C explosives".

Note 1. The "class C explosives" marking is the shipper's certification that the contents of the IME Standard 22 container or compartment are class C explosives.

Note 2. Any detonator packed in an inside packaging that is not marked "class C explosives" shall be offered for transportation as a class A explosive.

(d) Detonators, Class C explosives, and detonating primers, Class C explosives, may be offered for transportation on passenger-carrying aircraft only under the following conditions:

(1) They must be packed in accordance with the applicable requirements of §§173.66 and 173.68 except that the maximum gross weight of any completed package may not exceed 50 pounds or the maximum gross weight permitted by the specification for the outside packaging used, whichever is less;

(2) Packages must have been tested in accordance with the requirements of paragraph (a) of this section, except that when one device near the center of the package is detonated, no other device in the package may be caused to detonate and there must be no communication of detonation from one package to another; and

(3) The shipper certifies conformance with requirements of this paragraph by marking the outside of the package with the statement: "This package conforms to conditions and limitations specified in 49 CFR 173.103(d)".

§ 173.104 Cord, detonating; fuse, mild detonating, metal clad; or flexible linear shaped charge, metal clad. (a) Cord, detonating flexible which was properly examined, and classed and described "cordeau detonant fuse, class C explosive" prior to January 1, 1985 by an agency listed in §173.86(b) is reclassed class A explosive and assigned the proper shipping name "cord, detonating *flexible*". However, until June 30, 1986, cord detonating *flexible* which was properly examined, and classed and described "cordeau detonant fuse, class C explosive" may be offered for transportation and transported subject to conditions of the approval and in accordance with requirements of this subchapter in effect on December 31, 1984.

(b) Cord, detonating *flexible*; mild detonating fuse, metal clad or flexible; and flexible linear shaped charges, metal clad may not be packed in the same package with detonators or with any high explosive.

(c) Cord, detonating *flexible*; fuse, mild detonating, metal clad and flexible linear shaped charges, metal clad shall be packed in wooden or fiberboard boxes. Each package shall be marked "CORD, DETONATING—HANDLE CAREFULLY", or "FLEXIBLE LINEAR SHAPED CHARGES, METAL CLAD—HANDLE CAREFULLY", as appropriate.

§ 173.105 Percussion, tracer, combination, time fuzes and tracers. (a) Percussion, tracer, combination, time fuzes and tracers must be packed in strong, tight, outside wooden boxes or Spec. 23F (§178.214 of this subchapter) fiberboard boxes, with special provision for securing individual packages of fuzes or tracers against movement in the box.

(b) The gross weight of one outside wooden box must not exceed 150 pounds, and the gross weight of one outside fiberboard box must not exceed 65 pounds.

(c) Each outside container must be plainly marked with proper descriptive name and also "**HANDLE CAREFULLY**".

(d) No restrictions other than proper description, packing, and marking are prescribed in this part for the transportation of percussion, tracer, time, or combination fuzes, or tracers.

§ 173.106 Cartridge bags, empty, with black powder igniters, igniters, safety squibs, electric squibs, delay electric igniters, igniter fuse-metal clad, and fuse lighters or fuse igniters. (a) Cartridge bags, empty, with black powder igniters, igniters, safety squibs, electric squibs, delay electric igniters, igniter fuse-metal clad, and fuse lighters or fuse igniters must be packed in strong fiberboard or wooden boxes or wooden or metal barrels or drums properly described and properly marked with the name of the article packed therein.

§ 173.107 Primers, percussion caps, and grenades, empty, primed. (a) Primers (cannon, combination and small arms), percussion caps, and empty grenades, primed, must be packed in strong, tight, outside wooden boxes, except as otherwise provided herein, with special provision for securing individual packages against movement in the box.

(b) [Reserved]

(c) Small-arms primers containing anvils must be packed in cellular inside packages, with partitions separating the layers and columns of the primers, so that the explosion of a portion of the primers in the completed shipping package will not cause the explosion of all the primers. They must be packed as prescribed in paragraphs (a) of this section or in Spec. 12B (§178.205 of this subchapter) fiberboard boxes, and equipped with corrugated fiberboard liners having Mullen or Cady test equal to or exceeding that of the box, except liner is not required for full depth telescope style box which may be closed as specified by §178.205-17(a)(2) of this subchapter. Not more than 5,000 primers shall be packed in each fiberboard box.

(1) Spec. 23H (§178.219 of this subchapter) Fiberboard boxes of full depth telescope style with top section having extended end flaps and bottom section with extended side flaps designed to tuck under and form boxes without glued or stapled joints. Boxes shall have full height inside perimeter liner and top and bottom full area pads of double-wall corrugated fiberboard. Hand-holes oval in shape, not more than 1 inch in width by 4 inches in length and horizontal with top score line, are authorized in ends of boxes. Primers shall be packed in cellular inside packages with partitions separating the layers and columns of the primers as required by the introductory text of this paragraph. Not more than 50,000 primers shall be packed in one outside box.

(d) Percussion caps must be packed in metal or other inside boxes containing not more than 500 caps; the construction of the cap or packing and the kind and quantity of explosives in each must be such that the explosion of a part of the caps in the completed shipping package will not cause the explosion of all the caps.

(1) Specification 12B (§178.205 of this subchapter). Fiberboard box. Caps must be packed in inside metal cans containing not more than 100 caps each. Can must then be packed in a chipboard box with not more than 10 cans per box. Not more than 5 chipboard boxes shall be packed in the 12B fiberboard box. The completed package must be such that the explosion of a part of the caps will not cause the explosion of all the caps.

(2) Specification 12B (§178.205 of this subchapter). Fiberboard box. Caps must be packed in inside plastic cans containing not more than 100 caps each. Cans must then be packed in a chipboard box with not more than 8 such chipboard boxes packed tightly in the 12B fiberboard box. The completed package must be such that the explosion of part of the caps will not cause the explosion of all of the caps.

(e) Small-arms primers and or percussion caps may be packed with nonexplosive and or nonflammable articles, or with small-arms ammunition as provided in §173.101(b). Small-arms primers may be included with propellant explosives (solid), class B, in the same outside container as provided in §173.93(g)(1). The weight of the small-arms primers or percussion caps must not exceed 5 pounds in any such outside container.

(f) The gross weight of one outside package must not exceed 150 pounds.

(g) Each outside container must be plainly marked with proper descriptive name and also "**HANDLE CAREFULLY**".

(h) No restrictions other than proper shipping name, packaging and marking are prescribed in this subpart for the transportation of those materials named in paragraph (a) of this section.

§ 173.108 Common fireworks, signal flares, hand signal devices, smoke signals, smoke candles, smoke grenades, smoke pots, and Very signal cartridges. (a) Class C explosives covered by this section must, unless otherwise specifically provided for, be securely packed in packages complying with the following specifications.

(1) [Reserved]

(2) Specification 15A, 15B, 16A, 19A, or 19B (§§178.168, 178.169, 178.185, 178.190, or 178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 100 pounds, except gross weight of 500 pounds is authorized for Very signal cartridges only.

(3) Spec. 12B (§178.205 of this subchapter) Fiberboard boxes. Gross weight not to exceed 65 pounds.

(4) Firecrackers, Chinese, in addition to containers specified in paragraph (a)(1), (2), and (3) of this section, may also be transported in the package in which they are imported, provided these packages consist of wooden boxes, or fiberboard boxes, spec. 12B (§178.205 of this subchapter), in good condition, completely covered with strong matting and do not weigh more than 100 pounds, gross.

(5) Fireworks, such as sparklers, with match tip or head, or similar ignition point or surface, must have each individual tip, head, or similar ignition point or surface entirely covered and securely protected against accidental contact or friction.

(6) Signal flares may be packed with nonexplosive or nonflammable articles provided the outside packages are marked as prescribed in this section.

(b) [Reserved]

(c) Except as otherwise specified herein the gross weight of one outside package containing common fireworks must not exceed 100 pounds.

(d) Each outside package must be plainly marked in letters not less than seven-sixteenths of an inch in height "Common Fireworks," "Signal Flares," "Hand Signal Devices," "Smoke Signals," "Smoke Candles," "Smoke Pots," "Smoke Grenades," or "Very Signal Cartridges," as appropriate, and with the additional words "Handle Carefully—Keep Fire Away."

§ 173.109 Toy caps. (a) Toy caps must be packed in containers complying with the following specifications:

(1) Specification 15A, 15B, 16A, 19A, or 19B (§§178.168, 178.169, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 150 pounds.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds.

(3) Toy caps, in addition to containers specified in paragraphs (a)(1) and (2) of this section, may be transported in the package in which they are imported, provided the package consists of a wooden box, metal-lined, in good condition, and weighing not over 100 pounds gross. Inside packages must be as defined in §173.100(p).

(b) Toy caps may be packed with nonexplosive or nonflammable articles provided the outside containers are marked as prescribed herein.

(c) Toy paper caps of any kind must not be packed with fireworks.

(d) Each outside container must be plainly marked "**TOY CAPS—HANDLE CAREFULLY**".

§ 173.110 Charged well casing jet perforating guns, total explosive content in guns not exceeding 20 pounds per motor vehicle. (a) Charged well casing jet perforating guns transported by motor vehicles operated by private carriers engaged in well operations in which the total weight of the explosive contents of shaped charges assembled to guns being transported does not exceed 20 pounds per such vehicle must be packed as prescribed in §173.60(b), (c), (d) and (e).

(b) Charged well casing jet perforating guns may be offered for transportation and transported only by private carrier by highway.

(c) Charged well casing jet perforating guns may be offered for transportation and transported by private offshore well supply vessels only when carried in special motor vehicles as prescribed in §173.60 or on offshore down hole tool pallets provided that:

(1) No blasting caps, electric blasting caps or other firing devices shall be affixed or installed in the guns;

(2) Each shaped charge shall contain not over 4 ounces of explosives;

(3) Each shaped charge, if not completely enclosed in glass or metal, shall be fully protected by a metal cover after installation in the gun; and

(4) The total weight of the explosive contents of shaped charges assembled in guns being carried does not exceed 20 pounds per vehicle or pallet. Each cargo vessel compartment may contain up to 20 pounds of explosive content if the segregation requirements of §176.83(b)(3) are met. More than one pallet or vehicle, each containing not more than 20 pounds of explosive content, may be stowed "on deck" provided a minimum horizontal separation distance of 10 feet is provided.

§ 173.111 Cigarette loads, explosive auto alarms, toy propellant devices, toy smoke devices, trick matches, and trick noise makers, explosive. (a) Cigarette loads, explosive auto alarms, toy propellant devices, toy smoke devices, trick matches, and trick noise makers, explosive must be packed in specification containers as follows:

(1) Specification 15A, 15B, 16A, 19A or 19B (§178.168, §178.169, §178.185, §178.190, §178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 150 pounds.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds.

(3) Each outside container must be plainly marked with the proper descriptive name and "**HANDLE CAREFULLY**".

§ 173.112 Oil well cartridges. (a) Oil well cartridges must be so packed that the explosive composition does not exceed 20 grains per cubic inch of space in the outside shipping container and must be in specification containers as follows:

(1) Specification 15A, 15B, 16A, 19A or 19B (§178.168, §178.169, §178.185, §178.190, §178.191 of this subchapter). Wooden boxes. Gross weight not to exceed 150 pounds.

(2) Specification 12B, 12H, 23F or 23H (§§178.205, 178.209, 178.214, 178.219 of this subchapter). Fiberboard boxes. Gross weight not to exceed 65 pounds. Hand holes are not authorized.

(3) Each outside container must be plainly marked with the name "Oil Well Cartridge" and "**HANDLE CAREFULLY**".

§ 173.113 Detonating fuzes, Class C explosives. (a) Detonating fuzes, class C explosives, must be packed in specification containers as follows:

(1) Specification 12H (§178.209 of this subchapter). Fiberboard boxes either without liners with well secured inside pasteboard cartons or with suitable filler or lining material to prevent movement in the box.

(2) In addition to specification containers prescribed in this section, detonating fuzes, Class C explosive, may be packed in well secured strong, tight outside wooden or metal boxes. The gross weight of the outside wooden or metal box must not exceed 190 pounds.

(b) Each outside package must be plainly marked "**DETONATING FUZES, CLASS C EXPLOSIVES—HANDLE CAREFULLY**".

§ 173.114 Actuating cartridges, explosive, fire extinguisher or valve. (a) Actuating cartridges, explosive, fire extinguisher or valve must be packed in strong wooden or fiberboard boxes.

(b) Each outside container must be plainly marked "**ACTUATING CARTRIDGES EXPLOSIVE, FIRE EXTINGUISHER—HANDLE**

CAREFULLY" or "ACTUATING CARTRIDGES, EXPLOSIVE, VALVE—HANDLE CAREFULLY".

(c) When shipped as components with fire extinguisher or with valve and with not more than 2 cartridges for each extinguisher or valve, they are exempt from Parts 170–189 of this subchapter.

§ 173.114a Blasting agents.

(a) Definition of a blasting agent. A blasting agent is a material designed for blasting which has been tested in accordance with paragraph (b) of this section and found to be so insensitive that there is very little probability of accidental initiation to explosion or of transition from deflagration to detonation.

(b) Tests. Except as provided in paragraph (c) of this section, no material may be offered for transportation described or classed as a blasting agent unless it passes the following tests:

(1) Blasting cap sensitivity test.

(i) The container used for the blasting agent sample must be cylindrical, having a diameter of 3½ inches and a length of 6½ inches. The container must provide essentially no confinement.

(ii) The container must be filled with the sample. Solid materials must be packed to the same filling density as they will be packed in the shipping container. The temperature of the sample must be between 70°F. and 75°F. If it is difficult to achieve an appropriate filling density in the test container, e.g., auger packed products, it may be necessary to auger fill a special container for the test.

(iii) The filled container must be placed on a solid lead cylinder 4 inches long by 2 inches in diameter which must, in turn, be placed upright on a firm surface.

(iv) A commercial No. 8 fuse blasting cap or electric blasting cap must be inserted in the center of the top of the sample for the full length of the cap. A No. 8 commercial cap means a cap which contains 0.40–.45 grams of pentaerythrite tetranitrate (PETN) base charge pressed into an aluminum shell with bottom thickness not to exceed 0.03 inch to a specific gravity of not less than 1.4 grams per cubic centimeter and primed with standard weights of primer, in accordance with the manufacturer's specifications.

(v) The blasting cap must be initiated from a safe position.

(vi) If the lead block is compressed ½-inch or more, the material is considered to have detonated.

(vii) The test must be conducted three times or until detonation occurs, whichever occurs first.

(viii) A material which detonates in any trial may not be classed as a blasting agent.

(2) Differential thermal analysis test.

(i) This test must be conducted using a standard, commercially produced, differential thermal analysis instrument or a laboratory constructed apparatus which gives comparable results.

(ii) The portion of the blasting agent tested must be representative of the complete mixture.

(iii) The test must be conducted three times. If the first exotherm exhibited by the material in any trial is less than 212°F. (100°C.), it may not be classed as a blasting agent.

(3) Thermal stability test.

(i) At least 50 grams of the material must be placed in a loosely covered glass vessel and maintained at 167°F. (75°C.) for 48 consecutive hours.

(ii) A material which ignites or evidences decomposition by fumes, discoloration, or other characteristics may not be classed as a blasting agent.

(4) Electrostatic sensitivity test.

(i) The apparatus must be designed so that an electrostatic spark can be caused to jump from a pointed electrode to a metal plate which also serves as a sample holder.

(ii) Ten milligrams of material must be used for each test. The portion of the blasting agent tested must be representative of the complete mixture.

(iii) If the test portion flames, smolders, or glows from the spark, the material is considered to have ignited.

(iv) The test must be conducted three times or until ignition occurs, whichever occurs first.

(v) A material which ignites in any trial when exposed to a spark of 0.006 joules delivered from a 0.002 to 0.004 micro-farad capacitor may not be classed as a blasting agent.

(5) Impact sensitivity test.

(i) Impact tests must be conducted in a Bureau of Explosives Impact Apparatus. (see §173.53, Note 4.)

(ii) The tests must be run on ten milligram samples. The test portions must be representative of the complete mixture.

(iii) The drop height used in all trials must be ten inches.

(iv) The test must be conducted ten times or until an explosion occurs, whichever occurs first. An explosion is evidenced by flame or flame and noise. The production of smoke alone is not evidence of explosion.

(v) A material which explodes in any trial may not be classed as a blasting agent.

(6) Fire test.

(i) The largest package [not to exceed 200 kg (440 lbs.)] of each type to be offered for transportation must be placed on incombustible supports and subjected to a fire.

(ii) The fuel used may be kerosene-soaked wood, flammable or combustible liquid, or flammable gas.

(iii) The fire shall be large enough to engulf the bottom of the package. The flames must reach at least halfway up on all sides.

(iv) The duration of the fire must be such as to cause the material in the package to burn or fume off completely, except for substances such as the oxides of aluminum or iron which are incombustible.

(v) Explosion is evidenced by a loud noise and the projection of fragments from the fire area.

(vi) Any material which explodes in this test may not be classed as a blasting agent.

(c) A material containing no ingredients, other than prilled ammonium nitrate and fuel oil, need only pass the test specified in paragraph (b)(1) of this section to be classed as a blasting agent. If a material classed as a blasting agent is offered for transportation under the test exception of this paragraph, it must be described as "ammonium nitrate-fuel oil mixture."

(d) Notification and approval. Except as provided in paragraphs (e) and (f) of this section, approval by the Director, Office of Hazardous Material Transportation (OHMT) is required for materials classed as blasting agents produced by a person who:

(1) Has not previously produced that blasting agent, or

(2) Has previously produced the blasting agent but has made a change in the formulation, process, or components. A blasting agent is not required to be approved by the Director, OHMT if an agency listed in paragraph (d)(3) of this section has determined and confirmed in writing to the Director, OHMT that there are no significant differences in hazard characteristics relative to a blasting agent previously approved by the Director, OHMT.

(3) No person may offer a blasting agent for transportation unless it has been examined by the Bureau of Explosives or Bureau of Mines, U.S. Department of the Interior and classed and approved by the Director, OHMT; or examined, classed, and approved by one of the following agencies:

(i) U.S. Department of Energy (DOE) for blasting agents made by, or under the direction or supervision of DOE; or

(ii) U.S. Army Materiel Development and Readiness Command (DRCSF), Naval Sea Systems Command (NAVSEA 06H) or HQUSAF (IGD SEV) for blasting agents made by, or under the direction or supervision of the DOD.

(4) Except as otherwise provided in this section, each person who offers a blasting agent for transportation must submit a copy of the tentative class accompanied by a supporting laboratory report or equivalent data to, and receive a written approval from, the Director, OHMT prior to offering the blasting agent for transportation.

(e) For each mixture of a blasting agent containing only prilled ammonium nitrate and fuel oil classed in accordance with paragraph (c) of this section, a copy of the test report on which the class is based must be filed with the Director, OHMT before the material is offered for transportation and a copy of the report retained as long as that formulation is in use. As a minimum, the test report must contain the name and address of the person or organization conducting the test, date of test, quantitative composition of the mixture, including prill size and porosity, and a description of test results.

(f) Samples of materials designed for blasting not previously approved may be offered for transportation to a testing facility for examination if:

(1) The material has been assigned a tentative description and class in writing by one of the agencies listed in paragraph (d)(3) of this section.

(2) The material is packaged as required by this part according to the tentative description and class assigned.

(3) The package is labeled as required by this subchapter and the following is marked on the package:

(i) The words "SAMPLE FOR LABORATORY EXAMINATION";

(ii) The net weight of material; and

(iii) The tentative shipping description.

(g) A material designed for blasting that has not been examined or approved may be transported from where it was produced to an explosive testing facility under the following conditions:

(1) The material is not a forbidden explosive or an initiating explosive according to this subchapter;

(2) The material must be described as high explosive or high explosive, liquid, as appropriate and packed, marked, labeled, and described on the shipping paper as required by this subchapter;

(3) The material is transported in a motor vehicle operated by the owner of the material; and

(4) The shipment is accompanied by a person, in addition to the driver of the motor vehicle, who is qualified by training and experience to handle the blasting material.

(h) Packaging for blasting agents. Each package of blasting agent when prepared for shipment must comply with the applicable requirements of §173.24 and withstand one of the following tests:

(1) Rigid packages (e.g., boxes and drums), prepared as for shipment, must be capable of withstanding a four-foot drop onto solid concrete so as to strike the most vulnerable point on the package without rupture or any loss of contents.

(2) Non-rigid packages (e.g., tubes and bags), prepared as for shipment, must be capable of withstanding three four-foot drops onto solid concrete without rupture or any loss of contents.

(i) Blasting agents may not be transported in bulk packagings except in accordance with the terms of specific exemptions issued pursuant to Part 107 of this chapter.

(j) See §§ 174.83, 176.83 and 177.848 of this subchapter for loading requirements.

SUBPART D

FLAMMABLE, COMBUSTIBLE, AND PYROPHORIC LIQUIDS; DEFINITIONS AND PREPARATION

§ 173.115 Flammable, combustible, and pyrophoric liquids; definitions. (a) **Flammable liquid.** (1) For the purposes of this subchapter a flammable liquid means any liquid having a flash point below 100° F. (37.8° C.), with the following exceptions:

(i) Any liquid meeting one of the definitions specified in § 173.300;

(ii) Any mixture having one component or more with a flash point of 100° F. (37.8° C.) or higher, that makes up at least 99 per cent of the total volume of the mixture;

(2) For the purposes of this subchapter, a distilled spirit of 140 proof or lower is considered to have a flash point no lower than 73° F.

(b) **Combustible liquid.** (1) For the purposes of this subchapter, a combustible liquid is defined as any liquid that does not meet the definition of any other classification specified in this subchapter and has a flash point at or above 100° F. (37.8° C.) and below 200° F. (93.3° C.) except any mixture having one component or more with a flash point at 200° F. (93.3° C.) or higher, that makes up at least 99 per cent of the total volume of the mixture.

(2) For the purposes of this subchapter:

(i) An aqueous solution containing 24 percent or less alcohol by volume is considered to have a flash point of no less than 100° F. (37.8° C) if the remainder of the solution is not subject to this subchapter, and

(ii) An aqueous solution containing 24 percent or less alcohol by volume is not subject to the requirements of this subchapter if it contains no less than 50 percent water and no material (other than the alcohol) which is subject to this subchapter.

(3) 200° F. (93.3° C.) is a limitation of the application of the regulations in this subchapter and should not be construed as indicating that liquids with higher flash points will not burn. Markings such as "NONFLAMMABLE" or "NONCOMBUSTIBLE" should not be used on a vehicle containing a material that has a flash point of 200° F. (93.3° C.) or higher.

(c) **Pyrophoric liquids.** (1) For the purposes of this subchapter, a pyrophoric liquid is any liquid that ignites spontaneously in dry or moist air at or below 130° F. (54.5° C.).

Note 1: The Bureau of Explosives is equipped to test samples of flammable liquids to determine whether or not they are pyrophoric.

(d) **Flash point.** (1) "Flash point" means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid and shall be determined as follows:

(i) For a homogeneous, single-phase, liquid having a viscosity less than 45 S.U.S. at 100° F. (37.8° C) that does not form a surface film while under test, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Tag Closed Tester, (ASTM D56–79); or

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D3278–78).

(ii) For a liquid other than one meeting all of the criteria of paragraph (d)(1)(i) of this section, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, (ASTM D93–80). For cutback asphalt, use Method B of ASTM 93–80. (Alternate tests authorized in this standard may be used); or

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D3278–78).

(2) For a liquid that is a mixture of compounds that have different volatility and flash points, its flash point shall be determined as specified in paragraph (d)(1) of this section, on the material in the form in which it is to be shipped. If it is determined by this test that the flash point is higher than 20° F. (—6.67° C), a second test shall be made as follows: a portion of the mixture shall be placed in an open beaker (or similar container) of such dimensions that the height of the liquid can be adjusted so that the ratio of the volume of the liquid to the exposed surface area is 6 to one. The liquid shall be allowed to evaporate under ambient pressure and temperature (20 to 25°C) for a period of 4 hours, or until 10 percent by volume has evaporated, whichever comes first. A flash point is then run on a portion of the liquid remaining in the evaporation container and the lower of the two flash points shall be the flash point of the material.

(3) For flash point determinations by Setaflash closed tester, the glass syringe specified need not be used as the method of measurement of the test sample if a minimum quantity of 2 milliliters is assured in the test cup.

(e) "S.U.S." means Saybolt Universal Seconds as determined by the Standard Method of Test for Saybolt Viscosity (ASTM D88–56) (reapproved 1968) and may be determined by use of the S.U.S. conversion tables specified in the Standard Method for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity ASTM D2161–79 following determination of viscosity in accordance with the Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) (ASTM D445–79).

(f) [Reserved]

(g) If experience or other data indicate that the hazard of a material is greater or less than indicated by the criteria specified in paragraphs (a), (b), and (c) of this section, the Department may revise its classification or make the material subject to the requirements of Parts 170–189 of this subchapter.

§ 173.116 Outage. (a) Outage for packings of flammable liquids offered for transportation, except as otherwise provided in this part, must be as prescribed in paragraphs (b) to (h) of this section.

(b) Packagings must not be completely filled. For packagings of a capacity of 110 gallons or less, sufficient outage must be provided so that the packaging will not be liquid full at 130° F. (55°C).

(c) [Reserved]

(d) Flammable liquids must not be loaded into domes of tank cars. If the dome of the tank car does not provide sufficient outage, then vacant space must be left in the shell to make up the required outage.

(e) Flammable liquids having vapor pressure of 16 pounds per square inch absolute at 100° F. or less must be so loaded in tank cars that the outage shall be not less than 2 percent.

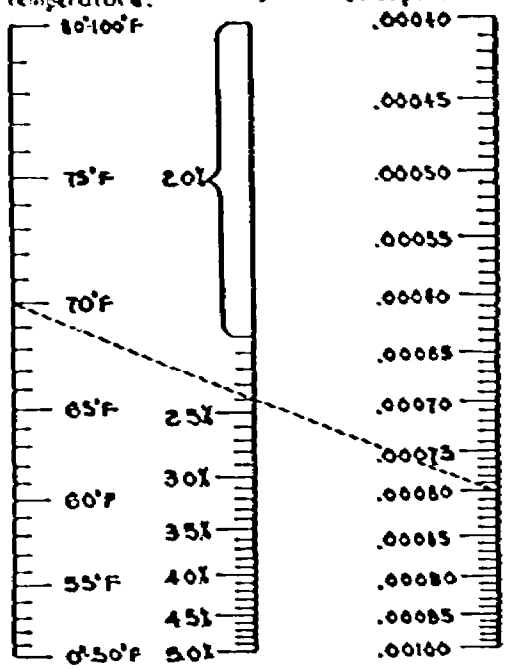
(f) Flammable liquids having a vapor pressure exceeding 16 pounds per square inch absolute at 100° F. for which minimum outage is not otherwise specifically provided herein, when loaded in uninsulated tank cars, must be so loaded that the minimum outage will be the greatest of the following values:

(1) Dome capacity.

(2) Two percent of total capacity of tank and dome.

(3) Outage as shown in paragraph (g) of this section.

(g) Outage chart for flammable liquids loaded in uninsulated tank cars:



(1) Example: Suppose the temperature of the liquid at time of loading is 70° F. and its coefficient of expansion is 0.00080; lay a ruler on the chart running from 70° to 0.00080 as shown by the dotted line and the required outage is 2.4 percent where the ruler crosses the outage scale.

The following coefficients of expansion per degree Fahrenheit, of the principal flammable liquids shall be used in determining outages:

Acetone	0.00085
Amyl acetate	.00068
Benzol (benzene)	.00071
Carbon bisulfide	.00070
Ether	.00098
Ethyl acetate	.00079
Ethyl (grain) alcohol	.00062
Methyl (wood) alcohol	.00072
Toluol (toluene)	.00063
Gasoline or naphtha	
50-55° A.P.I.[1]	.00055
55.1-60° A.P.I.[1]	.00060
60.1-65° A.P.I.[1]	.00065
65.1-70° A.P.I.[1]	.00070
70.1-75° A.P.I.[1]	.00075
75.1-80° A.P.I.[1]	.00080
80.1-85° A.P.I.[1]	.00085
85.1-90° A.P.I.[1]	.00090

[1] A.P.I. (American Petroleum Institute), according to the following formula

$$°A.P.I. = \frac{141.5}{\text{specific gravity}} - 131.5$$

(h) No cargo tank or compartment thereof used for the transportation of any flammable liquid shall be liquid full. The vacant space (outage) in a cargo tank or compartment thereof used in the transportation of flammable liquids shall be not less than 1 percent; sufficient space (outage) shall be left vacant in every case to prevent leakage from or distortion of such tank or compartment by expansion of the contents due to rise in temperature in transit.

§ 173.117 Closing and cushioning. (a) All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

§ 173.118 Limited quantities of flammable liquids. (a) Limited quantities of flammable liquids that do not meet the definition of another hazard class in this subchapter and for which exceptions are permitted as noted by reference to this section in §172.101 of this subchapter, are excepted from labeling (except when offered for transportation by air) and specification packaging requirements of this subchapter when packed according to the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) In metal containers not over 1 quart capacity each, packed in strong outside containers,

(2) In containers having a capacity not over 1 pint or 16 ounces by weight each, packed in strong outside containers, or

(3) In inside containers having a rated capacity of one gallon or less when packed in strong outside containers. The provisions of this partial exemption apply only if the flash point of the material is 73° F. or higher and the flash point, or an indication that the flash point is 73° F. or higher is marked on the outside package.

(b) A flammable liquid that does not meet the definition of another hazard class and has a flash point of 73° F. or higher is not subject to the specification packaging requirements of this part when in packagings of 110 gallons or less. The provisions of this paragraph apply only if the flash point, or an indication that its flash point is 73° F. or higher, is marked on the outside package. Notwithstanding §172.101 of this subchapter, the net quantity limitation for flammable liquids meeting the conditions of this paragraph is one gallon per package for carriage aboard passenger-carrying aircraft or railcar, and 55 gallons per package for carriage aboard cargo aircraft only.

(c) Alcoholic beverages (wine and distilled spirits as defined in 27 CFR 4.10 and 5.11) in containers having a rated capacity of one gallon or less are not subject to the requirements of this subchapter.

(d) Special exceptions for shipment of certain flammable liquids in the ORM-D class are provided in Subpart N of this part.

§ 173.118a Exceptions for combustible liquids. (a) Unless otherwise stated for a specific material, the regulations in this subchapter do not apply to a material classed as a combustible liquid in a packaging having a rated capacity of 110 gallons or less, unless the combustible liquid is a hazardous substance, or a hazardous waste.

(b) A combustible liquid that is a hazardous substance or a hazardous waste in a packaging having a rated capacity of 110 gallons or less, and a combustible liquid in a portable tank, cargo tank or tank car is not subject to the requirements of this subchapter except those pertaining to:

(1) Shipping papers, waybills, switching orders, and hazardous waste manifests;

(2) Marking of portable tanks and marking of packages having a rated capacity of 110 gallons or less that contain hazardous substances or hazardous wastes;

(3) Display of identification numbers on portable tanks, cargo tanks, tank cars and multi-unit tank car tanks;

(4) Placarding of portable tanks, cargo tanks and tank cars;

(5) Carriage aboard aircraft and vessels (for packaging requirements for transport by vessel see §176.340 of this subchapter);

(6) Reporting incidents as prescribed by §§171.15 and 171.16 of this subchapter; and

(7) The requirements of §§173.1, 173.24, 174.1 and 177.804 of this subchapter.

§ 173.119 Flammable liquids not specifically provided for. (a) **Flammable liquids with flash point 20° F. or below.** Flammable liquids with flash point 20° F. or below and having vapor pressure (Reid[1] test) not over 16 pounds per square inch, absolute, at 100° F., other than those for which special requirements are prescribed in this part, must be prepared for shipment in specification containers of a design and constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein as required in the following paragraphs (see paragraphs (c) to (i) of this section for high pressure liquids, paragraphs (j) to (l) of this section for viscous liquids, and paragraph (m) of this section for flammable liquids which are also oxidizers, radioactive material, corrosive liquids, poison B liquids, or organic peroxides and §173.134 for flammable liquids that are also pyrophoric liquids):

(1) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Rated capacity may not exceed 5 gallons for Specification 1A. Not authorized for transportation by aircraft.

(2) Spec. 5, 5A, 5B, 5C, or 5M (§§178.60, 178.81, 178.82, 178.83, or 178.90 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(3) Specification 17E (§178.116 of this subchapter). Metal drums (single-trip) with openings not over 2.3 inches in diameter. Drums with a marked capacity of more than 5 gallons but not more than 30 gallons must be constructed of 19-gauge body and head sheets. Drums with a marked capacity in excess of 30 gallons must be constructed of 18-gauge body and head sheets. Drums with a marked capacity of more than 5 gallons are not authorized for transportation by air.

(4) Spec. 17C (§178.115 of this subchapter). Metal drums (single-trip), with openings not exceeding 2.3 inches in diameter.

(5) [Reserved]

(6) [Reserved]

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be glass or earthenware, not over 1 quart each; metal cans not over 1 gallon each.

Note 1. Spec. 12B fiberboard boxes (§178.205-26(a) of this subchapter), with one inside rectangular metal can, spec. 2F (§178.25 of this subchapter) not to exceed 5 gallons capacity are authorized for gasoline only. Gross weight of completed package not over 65 pounds.

(8) Spec. 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, or 178.191 of this subchapter.) Wooden boxes with inside containers which must be metal pails, kits, or cans, not over 10 gallons each or inside glass or earthenware containers not over 1 gallon each, except that glass or earthenware containers up to 3 gallons each are authorized when only one inside container is packed in each outside container.

(9) Spec. 21C, 22A, or 22B (§178.224, §178.196 or §178.197 of this subchapter). Fiber drums and plywood drums with a single inside glass, earthenware, or metal container of not over one gallon capacity in each drum. Inside container must be so cushioned at top, sides, and bottom, as to prevent breakage or leakage in transit.

(10) Specification 42B, (§178.107, of this subchapter). Aluminum drums.

(11) Cylinders as prescribed for any compressed gas, except acetylene.

(12) Specification 103,[2] 103W, 103ALW, 103DW, 104,[2] 104W, 105A100,[2] 105A100ALW, 105A100W, 106A500X, 106A800XNC, 106A800NCI,[2] 109A100ALW, 109A300W, 110A500W, 111A60ALW1, 111A60F1, 111A60W1, 111A100W3, 111A100W4, 111A100W6, 112A200W, 112A400F, 114A340W, 115A60W1, 115A60ALW, or 115A60W6, (§§179.100, 179.101, 179.200, 179.201, 179.220, 179.300, 179.301 of this subchapter) tank cars. For cars equipped with expansion domes, manway closures must be so designed that pressure will be released automatically by starting the operation of removing the manway cover. Openings in tank heads to facilitate application of lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved manner (§179.3 of this subchapter).

(13) The use of spec. 103AL special riveted aluminum tank cars is authorized for the transportation of gasoline, ethyl acetate, acetone, methanol, or butyraldehyde as provided in special orders of November 5, 1937 and February 1, 1939.

(14) Spec. 15X (§178.181 of this subchapter). Wooden boxes with inside metal containers. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which

[1] ASTM Test D323.

[2] Use of existing tank cars authorized, but new construction not authorized.

are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(15) [Reserved]

(16) [Reserved]

(17) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330 or MC 331 (§§178.340, 178.341, 178.342, 178.343, 178.337 of this subchapter) cargo tanks, subject to the following conditions:

(i) Bottom outlets on Specification MC 304, MC 310, MC 311 or MC 312 cargo tanks must conform to §178.342-5(a). Bottom outlets on Specification MC 330 cargo tanks must be equipped with valves conforming to §178.337-11(c).

(ii) Specification MC 310, MC 311 or MC 312, cargo tanks must be equipped with pressure relief devices conforming to §178.342-4. Safety relief devices on Specification MC 330 cargo tanks must conform with §178.337-9.

(iii) Necessary interior cleaning of cargo tanks must be performed between changes in lading.

(18) [Reserved]

(19) Spec. 5L (§178.69 of this subchapter). Metal barrels or drums for gasoline shipments offered by or consigned to the Departments of the Army, Navy, and Air Force of the United States Government or Allies. Use of this container will be permitted because of the present emergency and until further order of the Department.

(20) Spec. 12D (§178.207 of this subchapter). Fiberboard boxes with inside containers which must be glass or earthenware not over one gallon each, authorized for not more than 75 pounds gross weight, not to contain more than 4 such inside containers if their capacity is greater than 5 pints each. Use of this container will be permitted because of the present emergency and until further order of the Department.

(21) Gasoline samples in boxes of metal not lighter than 20 gauge, United States standard, having hinged cover securely closed, and containing not more than 5 inside rectangular metal cans with screw cap closure, each having a capacity not to exceed ½ gallon, may be shipped when consigned to state laboratories for examination.

(22) Specification 17H or 37A (§§178.118 and 178.131 of this subchapter). Metal drums with inside glass packagings not over 9 pints capacity each. Inside containers may contain biological materials if these materials are not etiologic agents, except that etiologic agents exempt by §173.386(d) are authorized.

(23) Specification 12A (§178.210 of this subchapter). Fiberboard box, with inside glass bottles or specification 2E (178.243 of this subchapter) polyethylene bottles, not over 1 gallon capacity each. Polyethylene bottles are authorized only for materials that will not react with, or cause decomposition of the plastic. Not more than four inside bottles exceeding 5 pints capacity each may be packed in a package. Shipper must have established that the completed package meets the test requirements prescribed by §178.210-10 of this subchapter.

(24) Spec. 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside spec. 2S (§178.35 of this subchapter) polyethylene container.

(25) Spec. 51 (§178.245 of this subchapter). Portable tanks.

(26) Specification 57 (§178.253 of this subchapter). Portable tanks. Not authorized for transportation by water.

(27) Specification 12P (§178.211 of this subchapter). Fiberboard box with one inside specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity, or two inside specification 2U polyethylene containers of not over 2½ gallon capacity each. Authorized only for material which will not react with or cause decomposition of polyethylene. Not authorized for transportation by air.

(28) Specification 12A (§178.210 of this subchapter). Fiberboard boxes with inside metal containers not over 1-gallon capacity each. Not more than six metal containers shall be packed in a 275-pound test, double faced, corrugated fiberboard, specification 12A box and gross weight shall not exceed 45 pounds. The inner flap gaps of the box shall not exceed ¼-inch and the box shall provide a tight fit so there is no movement of the cans within the box.

(29) Marine portable tanks meeting the requirements of 46 CFR Part 64 authorized for highway and cargo vessel only when shipped in support of off-shore oil well drilling activities. Tanks shall comply with mounting and tie-down requirements of §178.245-4 of this subchapter when transported by highway.

(30) IM portable tanks, under conditions specified in the IM Tank Table.

(b) Flammable liquids with flash points above 20° F. to 73° F. Flammable liquids with flash points above 20° F. to 73° F. and having vapor pressure (Reid[3] test) not over 16 pounds per square inch, absolute, at 100° F. other than those for which special requirements are prescribed in this Part, must be packaged in packagings of a design and constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein as follows (see paragraphs (c) through (i) of this section for high-pressure liquids and paragraph (m) of this section for flammable liquids which are also oxidizers, poison B liquids, organic peroxides or corrosive liquids):

(1) Containers as specified in paragraph (a) of this section, except that openings greater than 2.3 inches in diameter in barrels and drums are authorized when permitted by the specification.

(2) Spec. 17E or 17H (§§178.116 or 178.118 of this subchapter). Metal drums (single-trip).

(3) Specification 10B (§178.156 of this subchapter). Wooden barrels or kegs. Authorized only for alcohol and alcohol-water-mixtures.

Note 1: Until further order of the Department, wooden whiskey barrels, properly reconditioned, which comply with all the provisions of spec. 10B (§178.156 of this subchapter), are also authorized. Marking is required on the head of each container, by hot branding or legible stenciling, as follows: DOT-10B

Name or symbol (letters) of reconditioner, this must be registered with the Director, OHMT and located just above, below, or following the mark DOT-10B

Size of marking (minimum) 3/8 inch high.

(4) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be glass, earthenware, polyethylene (bags are not authorized), or metal, not over 1 gallon each. Packages containing inside glass or earthenware containers must not contain more than 4 such inside containers if their capacity is greater than 5 pints each. Polyethylene containers are authorized only for materials that will not react with or cause decomposition of the plastic.

Note 1: Until further order of the Department, fiberboard boxes, spec. 12B (§178.205-2(a) of this subchapter), with one inside rectangular metal can, spec. 2F (§178.25 of this subchapter), not to exceed 5 gallons capacity, are authorized. Gross weight of completed package not over 65 pounds.

(5) Spec. 12E (§178.208 of this subchapter). Fiberboard box with 1 or 2 rectangular metal inside containers of not over 5 gallons capacity each.

(6) Specification 57 (§178.253 of this subchapter). Steel portable tank. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253-4, except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig. Authorized for liquids with flash points above 20° F. and a vapor pressure not over 16 psia at 100° F.

(7) Specification 37P (§178.133 of this subchapter). Steel drums with polyethylene liner (nonreusable container). Authorized only for materials that will not react with polyethylene and result in container failure. Not authorized for transportation by air.

(8) Specification 6D or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpack with an inside specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene container. Authorized only for materials that will not react with polyethylene and result in container failure.

(9) Spec. 21P (§178.225 of this subchapter). Fiber drum overpack with inside spec. 2S or 2SL (§178.35 or 178.35a of this subchapter) polyethylene container. Authorized only for materials that will not react with polyethylene and result in container failure.

(10) Specification 37D (§178.137 of this subchapter). Nonreusable steel drum authorized only for a material not exceeding a weight of 10 pounds per gallon. For a material weighing more than 10 pounds per gallon but not exceeding a weight of 12 pounds per gallon, drum made of not less than 21-gauge body and 20-gauge heads must be used.

(11) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(c) Flammable liquids for which other special packing requirements are not prescribed. Flammable liquids for which other special packing requirements are not prescribed in this part, must be shipped, depending upon their Reid[1] vapor pressures as prescribed in paragraphs (d) to (i) of this section.

(d) When the vapor pressure does not exceed 16 pounds per square inch, absolute, at 100° F. When the vapor pressure does not exceed 16 pounds per square inch, absolute, at 100° F., flammable liquids must be packed as prescribed in paragraphs (a) and (b) of this section.

(e) When the vapor pressure exceeds 16 pounds per square inch, absolute, at 100° F. When the vapor pressure exceeds 16 pounds per square inch, absolute, at 100° F., but does not exceed 27 pounds per square inch, absolute, at 100° F., flammable liquids must be packed in specification containers as follows:

(1) As prescribed in paragraphs (a)(1) to (11) of this section, except spec. 17E (§178.116 of this subchapter). Bung labels required, for metal barrels and drums, as prescribed in paragraph (i) of this section.

(2) Specification 103,[2] 103W, 103ALW, 103DW, 104,[2] 104W, 105A100,[2] 105A100ALW, 105A100W, 106A500X, 106A800XNC, 106A800NCI,[2]

[1] In addition to other requirements of this section, necessary interior cleaning of the tanks must be performed between changes in lading. Safety relief devices must be in accordance with specification MC 331 (§178.337).

[2] The use of existing tank cars authorized but new construction not authorized.

[3] ASTM Test D323.

[1] ASTM Test D323.

[2] The use of existing tank cars authorized, but new construction not authorized.

109A100ALW, 109A300W, 110A500W, 111A60ALW1, 111A60F1, 111A60W1, 111A100W3, 111A100W4, 111A100W6, 112A200W, 112A400F, 114A340W, 115A60W1, 115A60W6, or 115A60ALW, (§§179.100, 179.101, 179.200, 179.201, 179.220, 179.221, 179.300, 179.301 of this subchapter) tank cars. Openings in tank heads to facilitate the application of linings are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved manner (§179.3 of this subchapter).

(3) Specification MC 304, MC 307, MC 310, MC 311, MC 312, MC 330, or MC 331 (§§178.340, 178.342, 178.343, 178.337 of this subchapter) cargo tanks, subject to the following conditions:

(i) Bottom outlets on Specification MC 304, MC 310, MC 311 cargo tanks must conform to §178.342-5. Bottom outlets on Specification MC 330 cargo tanks must be equipped with valves conforming to §178.337-11(c).

(ii) MC 310, MC 311 or MC 312 cargo tanks must have a design pressure of at least 25 psig. These cargo tanks must be equipped with pressure relief devices conforming to §178.342-4.

(iii) MC 330 cargo tanks must be equipped with pressure relief devices conforming to §178.337-9.

(iv) Each safety relief device must be set to discharge at no less than 25 psig.

(v) Necessary interior cleaning of cargo tanks must be performed between changes in lading.

(4) Spec. 51 (§178.245 of this subchapter). Portable tanks.

(5) IM portable tanks, under conditions specified in the IM Tank Table.

(f) When the vapor pressure exceeds 27 pounds per square inch absolute at 100° F. When the vapor pressure exceeds 27 psia at 100° F, but does not exceed 40 psia (see note 1) at 100° F, flammable liquids must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5P (§§178.80, 178.81, or 178.92 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter. Bung label's required as prescribed in paragraph (i) of this section.

(2) Cylinders as prescribed for any compressed gas except acetylene.

(3) Specification 105A100,[2] 105A100ALW, 105A100W, 106A500X, 106A800XNC, 106A800NCL[2] 109A100ALW, 109A300W, 110A500W, 111A100W4, 112A200W, 112A400F, or 114A340W (§§179.100, 179.101, 179.200, 179.201, 179.300, 179.301 of this subchapter), tank cars. (See Note 1 of this paragraph.) Specification 104[2], 104W, and 111A100W3 (§§179.200, 179.201 of this subchapter), tank cars are authorized under conditions prescribed in paragraph (f)(4) of this section and Note 2 of this paragraph. Openings in tank heads to facilitate application of linings are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved manner (§179.3 of this subchapter).

(4) Specification 103,[2] 103W, 103ALW, 104,[2] 104W, 111A60ALW1, 111A60F1, 111A60W1, 115A60W1, 115A60W6, 115A60ALW (§§179.200, 179.201, 179.220, 179.221 of this subchapter). Tank cars.

Note 1: Tanks built in compliance with American Railway Association specifications for class IV-A tank cars authorized for use effective October 1, 1925, may be continued in service for the transportation of ethyl chloride and other liquids which do not have a vapor pressure exceeding 28 pounds per square inch, gauge pressure, at 100° F, provided there is stenciled on each side of the tank immediately below the valve protecting housing the words "Liquids having vapor pressure exceeding 28 pounds per square inch at 100° F must not be loaded into this tank" in letters and figures at least 1 inch high. These tank cars must be retested as prescribed in current spec. 105A100W except that safety valves must open at pressure not exceeding 35 pounds and be vapor tight at 28 pounds per square inch.

Note 2: When the vapor pressure exceeds 40 pounds per square inch, absolute, at 100° F, these flammable liquids are classed as flammable compressed gases and must be described, packed, and shipped as prescribed for such articles.

Note 3: Spec. 104[2] or 104-W tank cars are authorized provided they are equipped with approved fittings designed to provide for the loading, unloading, gauging, sampling, and taking temperature of the contents without removing the manway closure, that pressure relief valves are set to open at pressure of 35 pounds gauge (with a tolerance of plus or minus 3 pounds), and are vapor tight at 28 pounds per square inch gauge pressure, that bottom discharge outlets are of the same type as authorized for specification 104[2] or 104-W tank cars, and that there is stenciled on each side of the tank above the specification mark, in letters and figures at least 1 inch high, "For vapor pressures not exceeding 40 pounds per square inch, absolute, at 100° F." Specification IOC-104[2] or 104-W tank cars, equipped with pressure relief valves set to open at pressure of 35 pounds gauge (with a tolerance of plus or minus 3 pounds) and which are vapor tight at 28 pounds per square inch gauge pressure are authorized provided that they are stenciled as required above.

(5) Specification cargo tanks as prescribed in paragraph (e)(3) of this section.

(6) Spec. 51 (§178.245 of this subchapter). Portable tanks.

(7) IM portable tanks, under conditions specified in the IM Tank Table.

(g) [Reserved]

(h) [Reserved]

(i) **Bung label.** A flammable liquid as described in paragraph (e) or (f) of this section, shipped in a metal drum or barrel, in addition to the **FLAMMABLE LIQUID** label, must be labeled near the bung with a white rectangular label or tag measuring 5 by 3 inches, bearing the wording as displayed below:

BUNG LABEL

(Reduced size)

(Black printing on white)

5 inches

3 inches

CAUTION Unscrew This Bung SLOWLY

Do not unscrew entirely until all interior pressure has escaped through the loosened threads. REMOVE BUNG IN OPEN AIR. Keep all open flame lights and fires away. Inclosed Electric Lights are safe.

(j) **Viscous flammable liquids.** Flammable liquids which are viscous as defined in §171.8 of this subchapter must be shipped in specification packagings as prescribed in paragraph (k) or (l) of this section.

(k) Viscous flammable liquids having a vapor pressure which does not exceed 16 pounds per square inch, absolute, at 100° F. (See paragraphs (c) to (i) of this section for higher pressure liquids) must be prepared for shipment in containers as follows:

(1) As prescribed in paragraphs (a) or (b) of this section, irrespective of flash point.

(2) Specification 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Specification 37A or 37B (§§178.131, 178.132 of this subchapter). Metal drums (single-trip) not over 5 gallons with welded side seams. Not authorized for transportation by air.

(4) [Reserved]

(l) Viscous flammable liquids with flash point above 20° F. to 73° F. and having a vapor pressure which does not exceed 18 pounds per square inch, absolute, at 100° F. Viscous flammable liquids with flash point above 20° F. to 73° F. and having a vapor pressure which does not exceed 18 pounds per square inch, absolute, at 100° F. must be packaged as follows:

(1) As prescribed in paragraphs (e) to (i) of this section.

(2) Spec. 17E or 17H (§178.116 or §178.118 of this subchapter). Metal drums (single-trip).

(m) Flammable liquids which are also organic peroxides, oxidizers, radioactive material, corrosive liquids or poison B liquids. A flammable liquid which is also an organic peroxide, oxidizer, radioactive material, corrosive liquid, or poison B liquid must be packed as follows:

(1) Specification 1A, 1D, 1EX (single-trip) or 1M (§§178.1, 178.4, 178.6, 178.17 of this subchapter). Glass carboys in boxes, plywood drums or expanded polystyrene packagings. Rated capacity may not exceed 5 gallons for Specification 1A. Not authorized for transportation by aircraft.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers which must be glass, earthenware, or polyethylene not over 1 gallon capacity each. Inside containers must be cushioned with noncombustible packaging material in sufficient quantity to absorb the contents of the inner container.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard box with inside metal cans, glass or earthenware containers not over 1-quart capacity each. Inside containers must be cushioned with incombustible packing material in sufficient quantity to absorb the contents of the inner container. Use of the inside metal can is authorized only for materials which will not react dangerously with the metal can, or be decomposed by contact with it.

(4) Specification 5, 5A, 5B, 5C, 5P, 17C (single-trip), or 17E (single-trip) (§§178.80, 178.81, 178.82, 178.83, 178.92, 178.115, 178.116 of this subchapter). Metal barrels or drums. Removable head packagings over 16 gallons capacity are not authorized. Authorized only for materials which will not react dangerously with the drum metal, or be decomposed by contact with it.

[2] The use of existing tank cars authorized, but new construction not authorized.

(5) Specification 37P (§178.133 of this subchapter). Steel drums, not over 15 gallons capacity, with polyethylene liner (non-reusable container). Drums exceeding 1 gallon capacity must be constructed of at least 24-gauge metal. Authorized only for materials that will not react with polyethylene and result in container failure. Not authorized for transportation by air.

(6) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with inside Specification 2E (§178.249 of this subchapter) polyethylene bottles not over 1-gallon capacity each. Not more than four 1-gallon polyethylene bottles shall be packed in one outside fiberboard box. Authorized only for material which will not react dangerously with or be decomposed by contact with polyethylene.

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with one inside polyethylene bottle not over 5-gallons capacity, as specified by §178.205-34 of this subchapter. Authorized only for material which will not react dangerously with or cause decomposition of polyethylene.

(8) Specification 12P (§178.211 of this subchapter). Fiberboard box with one inside specification 2U (§178.24 of this subchapter) polyethylene container of not over 6 gallon capacity or two inside specification 2U polyethylene containers of not over 2½ gallon capacity each. Authorized only for material which will not react with or cause decomposition of polyethylene. Not authorized for transportation by air.

(9) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene. All cylinder valves must be protected by one of the methods described in §173.301(g)(1), (2), or (3) of this part. See §173.34(e)(16).

(10) Specification MC 303 or MC 304: Cargo tank meeting §178.343-2(c) of this subchapter. If the cargo tank is constructed with bottom outlets, they must meet §178.342-5(a) of this subchapter. Not authorized for flammable liquids which are also organic peroxides. MC 303 not authorized for transportation by water.

(11) Specification MC 305, MC 306, or MC 307 (§§178.340, 178.341, 178.342 of this subchapter). Cargo tanks meeting §178.343-2(c) of this subchapter. Not authorized for flammable liquids which are also organic peroxides. MC 305 and MC 306 not authorized for transportation by water.

(12) Specification MC 310, MC 311, or MC 312 (§§178.340, 178.343 of this subchapter). Cargo tanks. If the cargo tank is constructed with bottom outlets, they must meet §§178.342-5(a) and 178.343-5 of this subchapter. Not authorized for flammable liquids which are also organic peroxides.

(13) Specification 103AW, 103ALW, 103A-ALW, 103ANW, 103BW, 103CW, 103DW, 103EW, 103W, 104W, 105A100W, 111A60ALW1, 111A60ALW2, 111A60W1, 111A60W2, 111A60W5, 111A100F2, 111A100W3, 111A100W6, 115A60W6, or AAR206W (§§179.200, 179.201, 179.220 of this subchapter). Tank cars. All special requirements for tank cars according to flashpoint, vapor pressure, and viscosity in paragraphs (a) through (f) of this section apply. Not authorized for flammable liquids which are also organic peroxides.

(14) Specification 112A200W or 114A340W (§§179.100, 179.101 of this subchapter). Tank cars. Authorized only for propylene oxide except 112A200W also authorized for acrylonitrile and dichlorobutene.

(15) Specification 51 (§178.245 of this subchapter). Portable tank. Authorized only for a flammable liquid which is also a Poison B liquid. Bottom outlets are not authorized.

(16) Specification 6D or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with an inside specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene container. Authorized only for materials that will not react with polyethylene and result in container failure.

(17) Specification 6D or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with an inside specification 2U (§178.24 of this subchapter) polyethylene container, not over 5 gallons capacity. Authorized only for materials that will not react with polyethylene and result in container failure.

(18) IM portable tanks, under the conditions specified in the IM Tank Table. Not authorized for flammable liquids which are also organic peroxides or oxidizers.

(19) Specification 34 (§178.19 of this subchapter). Polyethylene drum. Authorized only for flammable liquids which are also organic peroxides or corrosive liquids. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

§ 173.120 Automobiles, motorcycles, tractors, or other self-propelled vehicles. (a) Automobiles, motorcycles, tractors, or other self-propelled vehicles, equipped with flammable liquid fuel tanks, provided these tanks are securely closed, are not subject to any other requirements for transportation by rail or highway. For transportation by air see paragraph (d) of this section.

(b) Engines or motors (internal combustion). Engines or motors (internal combustion) employing liquid fuel classed as flammable liquid in this chapter, whether shipped separately or as a part of other apparatus, unless specifically exempt in paragraph (a) of this section, must have their fuel tanks completely drained. Fuel may be left in the carburetor, fuel pump, and fuel lines provided the total flammable fuel content does not exceed 16 ounces and provided the lines are tightly closed to prevent leakage of the fuel.

(c) Truck bodies or trailers on flat cars. Except as specified in §173.21, truck bodies or trailers with automatic heating or refrigerating equipment of the flammable liquid type may be shipped with fuel tanks filled and equipment operating or not operating, when used for the transportation of other freight and loaded on flat cars as part of a joint rail highway movement. The heating or refrigerating equipment is considered to be a part of the truck body or trailer, and is not subject to any other requirements of this subchapter.

(d) Except as provided in §175.305 of this subchapter, each automobile, motorcycle, tractor, or other self-propelled vehicle, powered by an internal combustion engine fueled by a flammable or combustible liquid, when offered for transportation by air, must have the fuel tank drained of all fuel and have the tank opening tightly closed.

§ 173.121 Carbon bisulfide (disulfide). (a) Carbon bisulfide must be packed in specification containers as follows:

(1) [Reserved]

(2) Spec. 12A or 12B (§178.210 or §178.205 of this subchapter). Fiberboard boxes with inside containers which must be glass or earthenware, not over 1 pint each, or metal cans, not over 1 quart each. Outside containers not to exceed 65 pounds gross weight.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, or 178.191 of this subchapter). Wooden boxes with strong inside metal containers or with inside glass or earthenware containers not over 5 pints capacity each.

(4) Spec. 17E (§178.116 of this subchapter). Metal drums (single-trip) not over 5 gallons capacity each, with openings not exceeding 2.3 inches in diameter.

(5) Spec. 5, 5A, or 17C (single-trip) (§§178.60, 178.81, or 178.115 of this subchapter). Metal barrels or drums not over 55 gallons capacity each, with openings not exceeding 2.3 inches in diameter.

(6) Tank cars as prescribed in §173.119(a)(12). (See §173.10 for shipping instructions.)

(7) Specification cylinders as prescribed for any compressed gas except acetylene.

§ 173.122 Acrolein, inhibited. (a) Acrolein must be inhibited when shipped, and when offered for transportation must be packaged as follows:

(1) Spec. 5, 5A, or 5B (§§178.60, 178.81, or 178.82 of this subchapter). Metal drums not over 55 gallons capacity each. Spec. 5 or 5B drums must have no opening exceeding 2.3 inches in diameter.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with strong inside tight metal containers not over 5 gallons capacity each.

(3) Specification 105A300W (§§179.100, 179.101, of this subchapter) tank car.

(i) Each tank car must be stenciled DOT-105A200W, and must be equipped with the 150 psig safety relief valve required by that specification.

(ii) Each tank car must be marked "ACROLEIN" in accordance with the requirements of §172.330 of this subchapter.

(4) [Reserved]

(5) Specification 4B240, 4BA240, or 4BW240 (§§178.50, 178.51, 178.61 of this subchapter) welded cylinders each having a water capacity not exceeding 500 pounds.

(6) Specification 51 (§178.245 of this subchapter) portable tanks each having a water capacity not exceeding 425 gallons.

(b) Acrolein must be inhibited and when offered for transportation by cargo-only aircraft must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§178.168, §178.169, §178.170, §178.185, §178.190, or §178.191 of this subchapter). Wooden boxes or Spec. 12B (§178.205 of this subchapter) fiberboard boxes having not more than one inside glass container of not over 1-quart capacity, securely cushioned within a metal container.

§ 173.123 Ethyl chloride. (a) Ethyl chloride must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, or 178.191 of this subchapter). Wooden boxes with glass, earthenware, or metal inside containers not over 1 pound capacity each.

(2) Spec. 12B (§178.205 of this subchapter) fiberboard boxes with glass, earthenware, or metal inside containers not over 1 pound capacity each. Outside containers not to exceed 65 pounds gross weight.

(3) Spec. 5A (§178.81 of this subchapter) Metal barrels or drums not over 33 gallons capacity each.

(4) Cylinders as prescribed for any compressed gas, except acetylene.

(5) Specification 105A100,* 105A100W, 111A100W4, 112A200W, 112A400F, or 114A340W (§§179.100, 179.101, 179.200, 179.201 of this subchapter) tank cars. Specification 114A340W tank cars must not be equipped with any bottom outlet. Bottom washout permitted. (See Note 1 following §173.119(l)(3)) (See §173.10 for shipping instructions.)

(6) Specification MC 330 or MC 331 (§178.337) of this subchapter. Cargo tanks. Tank bottom outlets must be equipped with valves conforming with §178.337-11(c) of this subchapter.

(7) Specification 51 (§178.245 of this subchapter) portable tanks.

(b) Outage for all containers except tank cars must be 7.5 percent or more at 70° F. Outage for tank cars must be 4.2 percent or more at 70° F.

(c) Maximum quantity in one package for cargo aircraft only is limited to 300 pounds in cylinders and 15 pounds in other packagings.

§ 173.124 Ethylene oxide. (a) Ethylene oxide must be packed in specification containers as follows and copper or copper bearing alloys shall not be used in any part of a container, container valve or other container appurtenance if that part is normally in contact with ethylene oxide liquid or vapor.

(1) Specification 15A, 15B, 15C, 16A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter) wooden boxes and Spec. 12B (§178.205 of this subchapter) fiberboard boxes, with inside metal packaging not over 12-ounce capacity each. Each inside packaging must have a minimum bursting strength of 180 psig as prepared for shipment and be provided with a safety vent having a minimum diameter of 0.1023 inch and closed with fusible metal having a yield temperature of 157° to 170° F. The safety vent opening must be hot tinned before filling with fusible metal. Filling must be such that the container will not be liquid full below 185° F. Each inside packaging must be completely insulated except for top closure. Not more than 12 inside packages nor more than one layer of packagings may be packed in one outside box.

(2) Cylinders as prescribed for any compressed gas, except acetylene, not exceeding 30 gallons nominal water capacity, which meet the following requirements: All cylinders must be seamless or steel welded. Cylinders must be equipped with safety devices of the fusible plug type with threaded straight bore orifice, with yield temperature of 157° to 170° F, having a minimum vent area of 0.0055 square inch per pound of water capacity for packagings not over 1-gallon capacity and 0.0012 square inch per pound of water capacity for all packagings over 1-gallon capacity. Each cylinder must be tested for leakage at a pressure of at least 15 psig with an inert gas before each refilling. Fillings must be such that the packaging will not be liquid full at 185° F. Pressurizing valves must be provided for all packaging over 1-gallon capacity. Eductor tubes must be provided for all packagings over 5-gallon capacity. Cylinders having a water capacity in excess of 1-gallon must be insulated.

(3) In addition to specification packagings prescribed in this section, ethylene oxide may be shipped when packed in strong noncombustible outside packagings, with inside containers which must be securely sealed glass ampules or vials, contents not over 100 grams each, or inside aluminum cartridges, contents not over 138 grams each, cushioned in vermiculite or equally efficient noncombustible cushioning material. Not more than 100 grams of ethylene oxide shall be packed in any outside packaging except a maximum of 12 aluminum cartridges may be packed in a DOT Specification 12B (§178.205 of this subchapter) fiberboard box having top and bottom pads and an inside perimeter liner. A maximum of 10 such boxes may be overpacked in a master carton under the provisions of §173.25(a).

(4) Spec. 5P (§178.92 of this subchapter) Lagged steel drums not over 61 gallons capacity each. Drums must be equipped with safety devices of the fusible plug type with threaded straight bore orifice, with yield temperature of 157 to 170° F having a minimum vent area of 0.0055 square inch per pound of water capacity of the container for containers not over 1 gallon capacity and 0.0012 square inch per pound of water capacity of the container for all containers over one gallon capacity. Each drum must be tested for leakage at a pressure of at least 15 p.s.i. gauge with an inert gas before each refilling. Top head of each drum must be plainly marked with paint "Keep This End Up." Filling shall be such that the container will not be liquid full below 185° F. and the maximum filling for 61 gallon drums must not exceed 55 gallons of ethylene oxide at 60° F.

(5) Specification 105A100W or 111A100W4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter) tank car. Each 105A***W series tank car must be equipped with a 75 p.s.i.g. safety valve and must be stenciled 105A100W. Outage of each tank must be sufficient to prevent the tank from becoming liquid full at 105° F. Each tank, loaded or empty, must be padded with dry nitrogen or other suitable dry inert gas in sufficient quantity to render the vapor phase in the tank nonflammable at a temperature up to 105° F. Consideration must be given to the lading temperature and the solubility of the gas in ethylene oxide as well as the partial pressure required of the padding gas used to provide this protection. The gas must be free of impurities which may cause the ethylene oxide to rearrange chemically or to polymerize, decompose, or undergo other violent chemical reaction. See §§179.102-12 and 179.202-18 of this subchapter for special requirements for tank cars authorized for ethylene oxide. Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§179.3 of this subchapter) manner (see Note 1 of §173.119(l)(3)).

(i) Each tank car must be marked "ETHYLENE OXIDE" in accordance with the requirements of §172.330 of this subchapter.

(ii) Each Specification 105 tank car built after August 31, 1981, and before March 1, 1984, used for the transportation of ethylene oxide, must conform to DOT Specification 105J, except for the safety relief valve requirements of §179.106-2(c)(4). Each Specification 105 tank car built after February 29, 1984, used for the transportation of ethylene oxide, must conform to DOT Specification 105J.

(iii) After December 31, 1986, each Specification 105 tank car built before September 1, 1981, having a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons and used for the transportation of ethylene oxide shall conform to Specification 105J.

(iv) After December 31, 1986, each Specification 111 tank car with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, used for the transportation of ethylene oxide, shall conform to DOT Specification 111J.

(v) Specification 111 tank cars built after March 1, 1984, are not permitted for the transportation of ethylene oxide.

(6) Specification 51 (§178.245 of this subchapter) portable tank. Each tank, loaded or empty, must be padded with dry nitrogen or other suitable dry inert gas in sufficient quantity to render the vapor phase in the tank nonflammable at a temperature up to 105° F. Consideration must be given to the lading temperature and the solubility of the gas in ethylene oxide as well as the partial pressure required of the padding gas used to provide this protection. The gas must be free of impurities which may cause the ethylene oxide to rearrange chemically or to polymerize, decompose, or undergo other violent chemical reaction. Each tank must be constructed to be in compliance with the following requirements:

(i) The tank must be insulated with mineral wool or glass fiber of sufficient thickness so that the thermal conductance at 60° F. is not more than 0.075 B.t.u. per hour, per square foot, per degree Fahrenheit temperature differential. When a tank is equipped with fusible plugs instead of a safety relief valve or frangible disc, insulation must meet the requirements of paragraph (a)(6)(iii) of this section.

(ii) The insulating material of the tank must be protected by a steel jacket having a minimum thickness of 12 gauge. This jacket must be applied to prevent moisture from coming in contact with the insulation.

(iii) Each tank must be equipped with a safety relief valve or frangible disc, meeting the requirements of §173.315, set to relieve at 75 p.s.i.g. Instead of a safety relief valve or frangible disc, a tank may be equipped with safety devices of the fusible plug type with threaded straight base orifice, with yield temperature of 157° to 170° F, having a minimum vent area of 0.0012 square inch per pound of water capacity of the container. When a fusible plug is used instead of a safety relief valve or frangible disc, the tank must be insulated with mineral wool or glass fiber of such insulating properties and required additional thickness that the tank filled as for shipment will not rupture in a fire.

(iv) Filling must be such that the tank will not be liquid full below 185° F.

(v) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part or appurtenance is normally in contact with ethylene oxide liquid or vapor.

(vi) Neoprene, natural rubber, and asbestos gaskets are prohibited. All packings and gaskets must be constructed of materials which do not react spontaneously with or lower the autoignition temperature of ethylene oxide.

(vii) The capacity of the tank may not exceed 300 gallons.

(b) The maximum quantity in one package for cargo aircraft only is limited to 300 pounds in cylinders and 15 pounds in other packagings.

* The use of existing tank cars authorized but new construction not authorized

§ 173.125 Alcohol, n.o.s. (flammable liquid). (a) Except as otherwise provided in this Part, alcohol, n.o.s., which is classed as a flammable liquid must be packaged as follows:

(1) In containers as prescribed in §173.119(a) and (b).

(2) Securely closed metal tanks of not exceeding 16 gallons capacity, made of metal not lighter than 20 gauge, United States standard, packed in strong outside wooden boxes, may be used for the transportation of natural history or laboratory specimens preserved in alcohol, when shipped by or for the United States Government.

(3) [Reserved]

(4) [Reserved]

(5) [Reserved]

(6) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles, not over 1-gallon capacity each, suitably cushioned to prevent movement within the box.

(7) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

§ 173.126 Nickel carbonyl. Nickel carbonyl must be packed in specification steel or nickel cylinders as prescribed for any compressed gas, except acetylene. A cylinder used exclusively for nickel carbonyl may be given a complete external visual inspection in lieu of the interior hydrostatic pressure test required by §173.34(e) of this part. Visual inspection must be in accordance with CGA Pamphlet C-6. All cylinder valves must be protected by one of the methods described in §173.301(g)(1), (2) or (3) of this part.

§ 173.127 Nitrocellulose or collodion cotton, fibrous or nitrostarch, wet; nitrocellulose flakes; colloided nitrocellulose, granular, flake, or block, and lacquer base or lacquer chips, wet. (a) Nitrocellulose, fibrous, wet with alcohol or solvent, must contain at least 25 percent by weight of alcohol or a solvent with flash point not lower than 25° F; collodion cotton, fibrous and nitrostarch, wet with alcohol or a solvent, must contain at least 30 percent by weight of alcohol or a solvent with flash point not lower than 25° F; nitrocellulose flakes; colloided nitrocellulose, granular or flake; lacquer base or lacquer chips, wet with alcohol or a solvent, must contain at least 20 percent by weight of alcohol or a solvent with flash point not lower than 25° F, and nitrocellulose blocks wet with alcohol must contain at least 25 percent by weight of alcohol and must be packed in specification containers as follows:

(1) Containers, except cargo tanks or tank cars, as prescribed in §173.119.

(2) Specification 6B, 6C, or 6J (§178.98, §178.99, §178.100 of this subchapter). Metal barrels or drums not over 55 gallons capacity. Specification 6J (§178.100 of this subchapter) drums must have removable heads of 14 gauge metal or 16 gauge metal with one or more corrugations near the periphery and heads must have a minimum convexity of ⅜ inch; each drum must have three rolled or swedged-in hoops, one of which shall be in the body near the curl.

(3) [Reserved]

(4) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter). Metal barrels or drums.

(5) Spec. 6J (§178.100 of this subchapter). Metal drums. Authorized only for nitrocellulose in solid block forms and wet with alcohol to not less than 25 percent by weight. Authorized only for carload or truckload shipments.

(b) Except for Spec. 37A which is limited to 480 pounds, gross weight of any container must not exceed 490 pounds.

§ 173.128 Paint and paint related materials (flammable liquids). (a) Except as otherwise provided in this part, the description "Paint" is the proper shipping name for paint, lacquer, enamel, stain, shellac, varnish, liquid aluminum, liquid bronze, liquid gold, liquid wood filler, and liquid lacquer base. The description "Paint related material" is the proper shipping name for a paint thinning, reducing or removing compound. However, if a more specific description is listed in §172.101, that description must be used. Paint and paint related material must be packaged as follows:

(1) As prescribed in §173.119, according to flash point, pressure, or viscosity.

(2) Specification 37A or 37B (§178.131, §178.132 of this subchapter). Metal drums (single-trip) not over 5 gallons capacity, with welded side seams for drums over 2 gallons capacity, irrespective of flash point or viscosity. Specification 37A metal drums constructed with 26-gauge body sheets, 24-gauge removable heads, and 26-gauge bottom heads are authorized for not over 80 pounds gross weight. Not authorized for transportation by air.

(3) Specifications 52[1] or 57 (§§178.251, 178.253 of this subchapter). Metal portable tank. Not authorized for transportation by water except as prescribed in §173.119(b)(6) of this subchapter.

(4) Specification 37C (§178.135 of this subchapter). Metal drums (non-reusable containers) not over 5 gallons capacity each. Authorized only for materials having flash point above 20° F. Not authorized for transportation by air.

(5) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(b) The flammable liquids identified in paragraph (a) of this section, in glass packagings of not over 1 quart capacity each, or in metal packagings of not over 5 gallons capacity each, further overpacked in a strong outside packaging are excepted from the specification packaging requirements of this part.

(c) Special exceptions for shipment of paint and paint related material in the ORM-D class are provided in subpart N of this part.

§ 173.130 Refrigerating machines. Refrigerating machines assembled for shipment and containing limited quantities of 15 pounds or less of a flammable liquid for their operation are excepted from labeling and the specification packaging requirements of this subchapter (except when offered for transportation by air). In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

§ 173.131 Road asphalt, or tar, liquid. (a) Road asphalt, or tar, liquid, must be packaged as follows:

(1) As prescribed in §173.119, according to flash point, pressure, or viscosity.

(2) In cargo tanks that are at least equivalent in design and construction to Specification MC-306 (§§178.340, 178.341 of this subchapter) except for the requirements of §§178.340-10, 178.341-3, 178.341-4, and 178.341-5.

§ 173.132 Adhesive; cement; container cement; linoleum cement; pyroxylin cement; rubber cement; tile cement; wallboard cement, and coating solution. (a) Except as otherwise provided in this part, a flammable liquid which is an adhesive, cement, container cement, linoleum cement, pyroxylin cement, rubber cement, tile cement, wallboard cement, or coating solution must be packaged as follows:

(1) As prescribed in §173.119, irrespective of flash point or viscosity.

(2) Specification 52[1] or 57 (§§178.251, 178.253 of this subchapter). Metal portable tank. Not authorized for transportation by water except as prescribed in §173.119(b)(6) of this subchapter.

(3) Specification 37C (§178.135 of this subchapter). Metal drums (non-reusable container) not over 5 gallons capacity each. Authorized only for materials having flash point above 20° F. Not authorized for transportation by air.

(b) The adhesive and cements identified in paragraph (a) of this section, except any adhesive or cement containing carbon bisulfide (carbon disulfide), in glass or leakproof packagings consisting of a fiberboard body and metal tops and bottoms of not over 1-quart capacity each, or metal packagings of not over 5 gallons capacity each, further overpacked in a strong outside packaging are excepted from the specification packaging requirements of this part.

§ 173.133 Spirits of nitroglycerin. (a) Spirits of nitroglycerin means nitroglycerin in ethyl alcohol or in propylene glycol. Solutions of nitroglycerin means nitroglycerin in acetone. These mixtures and solutions may not contain more than 10 percent by weight of nitroglycerin. They must be packed in specification packings as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes lined with paraffined paper, Spec. 2L (§178.30 of this subchapter), and with inside packagings securely closed with rubber stoppers tied in place. The inside packagings must be entirely surrounded by at least 2 inches of dry, fine sawdust or kieselguhr. Not more than 6 quarts of the spirits or solutions may be packed in any outside wooden box. Inside packagings made of metal are not authorized.

(2) Specification 12A or 12B (§§178.210 or 178.205 of this subchapter). Fiberboard boxes or Spec. 21C (§178.224 of this subchapter) fiber drums laminated with a 0.004 inch polyethylene lining. Inside packagings must be Spec. 2E polyethylene bottles or Spec. 2U polyethylene containers not exceeding 5 gallons capacity each, overpacked in a strong polyethylene bag. The inside packagings must be entirely

[1] Use of existing tanks authorized. Construction not authorized after May 31, 1972.

surrounded by at least 2 inches of dry, fine sawdust or kieselguhr. Not more than 6 quarts of the nitroglycerin mixture may be packed in one outside packaging, except that a maximum of 5 gallons of a nitroglycerin-propylene glycol mixture may be packaged in one Spec. 2U and overpacked in the fiber drum.

(b) Spirits of nitroglycerin consisting of not over 1 percent by weight of nitroglycerin in ethyl alcohol or propylene glycol, in addition to containers specified in paragraphs (a)(1) and (a)(2) of this section, may be packed in specification packagings as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1-quart capacity each, cushioned by at least 2 inches of dry, fine sawdust or kieselguhr.

§ 173.134 Pyroforic liquids, n.o.s. (a) Pyroforic liquids, n.o.s., must be packed in specification packagings as follows:

(1) Specification steel or nickel cylinders prescribed for any compressed gas except acetylene having a minimum design pressure of 175 pounds per square inch are authorized. Cylinders with valves must be:

(i) Equipped with steel valve protection caps or collars, when shipped loose.

(ii) Overpacked in a strong wooden box; or

(iii) Overpacked in a Specification 12A or 12B (§§178.210, 178.205 of this subchapter) fiber board box or Specification 33A (§178.150 of this subchapter) polystyrene case. When overpacked, cylinders must be secured to protect all valves. Unless packed in a box or case, any safety relief device must be in the vapor space of any loaded cylinder. (See §§174.300(d) and 177.837(d) of this subchapter)

(2) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes or Spec. 12B (§178.205 of this subchapter) fiberboard boxes enclosing not more than four strong tight metal cans with inside containers of glass or metal, not over one-quart capacity each, having positive screw cap closures adequately gasketed ahead of the threads. Inside containers must be cushioned on all sides with dry, absorbent, incombustible material in a quantity sufficient to absorb the entire contents. The strong tight metal cans must be closed by positive means, not by friction.

(3) Spec. 17C or 37A (§§178.115 or 178.131 of this subchapter). Metal drums (sing'e-trip) with inside metal cans not over 1 gallon capacity each, constructed of not less than 28 gauge electro-coated tin plate closed by positive means, not friction. Inside containers shall have no opening exceeding 1 inch diameter and must be surrounded on all sides with incombustible cushioning material. Spec. 17C, 30-gallon capacity drums, shall contain not more than 20 gallons of pyroforic liquids, n.o.s. per drum and 55-gallon capacity drums shall contain not more than 35 gallons of pyroforic liquids, n.o.s. per drum; each layer of inside containers must be separated by a tin plate separator in addition to cushioning material. Spec. 37A drums shall not exceed 5 gallons capacity each.

(4) Spec. 105A300-W (§§179.100 and 179.101 of this subchapter) tank cars.

(5) Spec. 51 (§178.245 of this subchapter). Portable tanks having a minimum design pressure of 175 pounds per square inch. Safety relief devices must communicate with the vapor space when tanks are fully loaded.

(6) Specification MC 330 or MC 331 (§178.337 of this subchapter). Cargo tanks having a minimum design pressure of 175 p.s.i. Safety relief devices must communicate with the vapor space when tanks are fully loaded. Tank bottom outlets must be equipped with valves conforming with §178.337-11(c) of this subchapter.

§ 173.135 Diethyl dichlorosilane, dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, and vinyl trichlorosilane. (a) Diethyl dichlorosilane, dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, and vinyl trichlorosilane must be packaged as follows:

(1) Specification 15A, 16B, or 19B (§§178.168, 178.186, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1 gallon capacity each, securely closed and cushioned with incombustible absorbent material.

(2) Spec. 17H or 37A (§178.118 or §178.131 of this subchapter). Metal drums (sing'e-trip) with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.

(3) Spec. 5A (§178.81 of this subchapter). Metal drums not over 55 gallons capacity.

(4) [Reserved]

(5) Specifications 5, 5B, 5C, and 17E (sing'e-trip) (§§178.80, 178.82, 178.83, 178.116 of this subchapter). Metal drums. Not authorized for shipment by air.

(6) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene.

(7) Spec. 103,[1] 103-W, 111A60-F-1, or 111A60-W-1 (§§179.200, 179.201 of this subchapter). Tank cars, without bottom discharge outlet.

(8) Spec. 105A100,[1] 105A100-W, or 111A100-W-4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.

(9) Specification MC 300, MC 303, MC 304, MC 306, MC 307, MC 330 or MC 331 (§§178.340, 178.341, 178.342, 178.337 of this subchapter). Cargo tanks having cargo tanks of steel or stainless steel construction. Bottom outlets, if any, must be equipped with valves conforming with §178.342-5(a) of this subchapter.

(10) Specification 51 (§178.245 of this subchapter). Portable tanks.

(11) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.136 Methyl dichlorosilane and trichlorosilane. (a) Methyl dichlorosilane and trichlorosilane must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1 quart capacity each, securely closed and cushioned with incombustible absorbent material.

(2) Spec. 17H or 37A (§178.118 or §178.131 of this subchapter). Metal drums (sing'e-trip) with glass inside containers not over 1 quart capacity each securely closed and cushioned with incombustible absorbent material.

(3) Specification 5A, 5B, or 5C (§§178.81, 178.82, 178.83 of this subchapter). Metal drums not over 55 gallons capacity each. Specification 5B drums must have no opening exceeding 2 3 inches in diameter. Not authorized for shipment by air.

(4) [RESERVED]

(5) Specification steel or nickel cylinders as prescribed for any compressed gas, except acetylene.

(6) Spec. 103,[1] 103-W, 111A60-F-1, or 111A60-W-1 (§§179.200, 179.201 of this subchapter). Tank cars, without bottom discharge outlet.

(7) Spec. 105A100,[1] 105A100-W, or 111A100-W-4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.

(8) Specification MC 330 or MC 331 (§178.337 of this subchapter). Cargo tanks. Tank bottom outlets must be equipped with valves conforming with §178.337-11(c) of this subchapter.

(9) Spec. 51 (§178.245 of this subchapter). Portable tanks.

(10) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.137 Lithium aluminum hydride, ethereal. (a) Lithium aluminum hydride, ethereal, must be packed in specification containers as follows:

(1) Specification 15A or 19B (§178.168, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1 quart each enclosed in air-tight metal cans and cushioned with sufficient incombustible cushioning material to completely absorb the contents in event of leakage.

(2) Specification 6B, 6C, or 17H (sing'e-trip) (§§178.98, 178.99, 178.118 of this subchapter). Metal barrels or drums with not more than one inside glass container not exceeding 2 gallons capacity. The inside container must be completely cushioned in sufficient incombustible cushioning material to completely absorb the contents in event of breakage.

(3) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene. Valves or fittings must be protected from injury by a metal cap or equally efficient device securely attached to the cylinder.

§ 173.138 Pentaborane. Specification steel or nickel cylinders prescribed for any compressed gas except acetylene are authorized. Each cylinder must be protected with a valve protection cap or must be packed in a strong wooden box and blocked therein so as to protect the valve from injury under conditions normally incident to transportation. Cylinders not exceeding 2 inches in diameter nor 6 inches in length, excluding the length of the valve, may also be packed in strong solid fiberboard boxes, having no outside dimension less than 4 inches, completely filled with layers of strong corrugated fiberboard, the center of which shall be cut out to fit the cylinder valve, and otherwise so designed that neither the cylinder nor the valve will be in contact with the wall of the box under conditions normally incident to transportation.

§ 173.139 Ethylene imine, inhibited, and propylene imine, inhibited. (a) Ethylene imine and propylene imine must be inhibited and must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§178.168, §178.169, §178.191 of this subchapter). Wooden boxes with inside securely sealed glass ampules or glass bottles, contents not over 16 fluid ounces or 1 pound each, in tightly closed metal cans. If more than one ampule or bottle is

[1] Use of existing tanks authorized. Construction not authorized after May 31, 1972.

packed in a metal can, ampules or bottles must be separated by fiberboard partitions. Ampules or bottles must be cushioned with sufficient incombustible cushioning material to completely absorb contents in event of leakage. Not more than 5 pints of liquid may be packed in any outside wooden box.

(2) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with not more than four inside metal drums, Spec. 37B (§178.132 of this subchapter), not over 1-gallon capacity each, or not more than one Spec. 37B metal drum of 5 gallons capacity, in one outside box. Inside drums must be surrounded on all sides with incombustible absorbent cushioning material.

(3) Specification 6B, 6C, or 6J (§§178.93, 178.99, 178.100 of this subchapter). Metal barrels or drums, with one inside Specification 17E (§178.116 of this subchapter) metal drum not over 30 gallons capacity. Inside drum must be completely surrounded with incombustible cushioning material.

(4) Specification 104W, 105A100W, and 111A60W1 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars, for ethylene imine, inhibited only. Specification 111A60W1 tank cars must be insulated in accordance with §179.200–4 of this subchapter.

(5) Spec. 5A (§178.81 of this subchapter). Metal barrels or drums not over 55-gallon capacity. Authorized for propylene imine, inhibited only.

(6) Specification 4B240, 4BA240 or 4BW240 (§§178.50, 178.51, 178.61 of this subchapter). Cylinders of all welded construction.

§ 173.140 Zirconium, metallic, solutions, or mixtures thereof, liquid. (a) Zirconium, metallic, solutions, or mixtures thereof, liquid, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers. Each inside container shall not contain more than 20 individual glass or porcelain jars, not exceeding 2-ounce capacity each, securely closed and completely cushioned in incombustible cushioning material in sufficient quantity to completely absorb the contents in event of leakage.

§ 173.141 Amyl mercaptan, butyl mercaptan, ethyl mercaptan, isopropyl mercaptan, propyl mercaptan, and aliphatic mercaptan mixtures. (a) Amyl mercaptan, butyl mercaptan, ethyl mercaptan, isopropyl mercaptan, propyl mercaptan, and aliphatic mercaptan mixtures must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with securely closed inside metal containers not over 5 gallons capacity each, or in tightly closed glass bottles not exceeding 1 quart capacity each, securely cushioned in incombustible cushioning material in sufficient quantity to completely absorb the contents in event of leakage.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with securely closed inside metal containers not over 1 gallon capacity each; or in tightly closed glass bottles not exceeding 1 quart capacity each, securely cushioned in sufficient quantity of absorbent material to completely absorb the contents in event of leakage.

(3) Spec. 5, 5A, 5B, or 5C (§§178.80, 178.81, 178.82 or 178.83 of this subchapter). Metal barrels or drums, with not more than one opening not exceeding 2.3 inches in diameter and not more than one vent opening not exceeding 1 inch in diameter. Gaskets are required and must be not less than 1/32-inch thick and of resilient material such as polyethylene, neoprene, or equally efficient material.

(4) Spec. 17C (§178.115 of this subchapter). Metal drums (sing'e-trip), with not more than one opening not exceeding 2.3" in diameter and not more than one vent opening not exceeding 1 inch in diameter. Gaskets are required and must be not less than 1/32-inch thick and of resilient material such as polyethylene, neoprene, or equally efficient material.

(5) Spec. 17E (§178.116 of this subchapter). Metal drums (sing'e-trip), not over 5 gallons capacity, without opening except bung hole not exceeding 2.3 inches in diameter. Gaskets are required and must be not less than 1/32-inch thick and of resilient material such as polyethylene, neoprene, or equally efficient material. (See also paragraph (a)(6) of this section.)

(6) Spec. 17E (§178.116 of this subchapter). Metal drums (sing'e-trip), not over 55 gallons capacity, with not more than one opening not exceeding 2.3 inches in diameter and not more than one vent opening not exceeding 1 inch in diameter. Gaskets are required and must be not less than 1/32-inch thick and of resilient material such as polyethylene, neoprene, or equally efficient material. Authorized only for mercaptans having flash point above 20° F.

(7) Specification 103W, 105A100,[1] 105A100W, 105A200ALW, 105A500X, 110A500W, 111A60F1, 111A60W1, 112A200W, 112A400F, or 114A340W (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars. Specifications 103W, 111A60F1, 111A60W1, and 114A340W tank cars must not be equipped with any bottom outlet. Bottom washout permitted. Specification 105A200ALW is authorized for ethyl mercaptan only and is not authorized for transportation by water.

(8) Specification MC 330 or MC 331 (§178.337). Cargo tanks. Tank bottom outlets must be equipped with valves conforming with §178.337–11(c) of this subchapter.

(9) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene.

(10) Specification 51 (§178.245 of this subchapter). Portable tank. Each tank must be equipped with safety relief valves which must be in compliance with all requirements of §173.315(i). A tank must not be liquid full at 130° F.

(11) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Warning or odorizing devices containing not more than one ounce of a mercaptan or an aliphatic mercaptan mixture in a hermetically sealed container or in a hermetically sealed portion of the device are not subject to the regulations in Parts 170–189 and 397 of this title.

§ 173.143 Methylchloromethyl ether, anhydrous. (a) Methylchloromethyl ether, anhydrous, must be packed in specification containers as follows:

(1) Spec. 5K (§178.83 of this subchapter). Nickel barrels or drums.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers, not over 1 gallon capacity each, except that inside containers up to 3 gallons each are authorized when only one inside container is packed in each outside box.

(3) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.144 Ink (flammable liquid). (a) Except as otherwise provided in this part, ink which is classed as a flammable liquid in this subchapter must be packaged as follows:

(1) In containers as prescribed in §173.119, according to flash point, pressure, or viscosity.

(2) Spec. 17C (§178.115 of this subchapter). Full removable head metal drums (sing'e-trip).

(3) Specification 37C (§178.135 of this subchapter). Metal drums (non-reusable container) not over 5 gallons capacity each. Authorized only for material having flash point over 20° F. Not authorized for transportation by air.

(b) Ink in glass packagings not over 1 quart capacity each, or in metal packagings not over 5 gallons capacity each, further overpacked in a strong outside packaging is excepted from the specification packaging requirements of this part.

§ 173.145 Dimethylhydrazine, unsymmetrical, and methylhydrazine. (a) Dimethylhydrazine, unsymmetrical, and methylhydrazine must be packed in specification containers as follows:

(1) Specification 1D or 1M (§§178.4 or 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(2) Specification 15A, 15B, 15C, or 19B (§178.168, §178.169, §178.170, §178.191 of this subchapter). Wooden boxes with inside glass bottles not exceeding 1-gallon capacity each, cushioned by means of vermiculite within tin cans which shall be tightly closed, or containers not over 2 quarts capacity each made of aluminum not less than 0.04 inch thick. Closures and gaskets must be of material which will not react dangerously with or be decomposed by contact with the contents.

(3) Spec. 5, 5A, or 5C (§178.80, §178.81, or §178.83 of this subchapter); or 17E (§178.116 of this subchapter) (sing'e-trip). Metal barrels or drums which shall be of type 304 or 347 stainless steel, with openings not exceeding 2.3 inches in diameter.

(4) Spec. 17C (§178.115 of this subchapter). Metal barrels or drums (sing'e-trip) with openings not exceeding 2.3 inches in diameter. Authorized only for dimethylhydrazine, unsymmetrical.

(5) Spec. 42B (§178.107 of this subchapter). Aluminum drums. Authorized only for dimethylhydrazine, unsymmetrical.

(6) Specification 103W, 103CW, 105A100W, 111A60W1, 111A60W7, or 111A100W4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.[1] Authorized for dimethylhydrazine, unsymmetrical only. Each tank car must be equipped with steel safety valves of approved design and any 103W or 111A*** tank car must not be equipped with any bottom outlet. Bottom washout permitted. Specification 105A200W, 105A300W, 105A400W, 105A500W, and 105A600W (§§179.100, 179.101 of this subchapter) tanks must be restenciled 105A100W and be equipped with safety valves of the type and size used on specification 105A100W tank cars.

(7) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, or MC 312 (§178.341, §178.342, §178.343 of this subchapter). Cargo tanks without bottom discharge outlets and equipped with steel safety valves of approved design.

(8) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

[1] Use of existing tank cars authorized, but new construction not authorized

[1] Use of existing tank cars authorized, but new construction not authorized

§ 173.146 Heaters for refrigerator cars, flammable liquid fuel type. (a) Heaters of the liquid fuel type for refrigerator cars, containing flammable liquid fuel, may be shipped in carload or truckload lots provided each heater shall have been inspected to see that flame has been extinguished, that there is no leakage of fuel, and that controls are in the "off" position. Heaters shall be loaded and braced so as to prevent falling, tipping, or mechanical damage under normal conditions incident to transportation.

(b) Heaters of the liquid fuel type for refrigerator cars must have their flammable liquid fuel tanks completely drained if offered for transportation or transported in less-than-carload or less-than-truckload lots.

§ 173.147 Methyl vinyl ketone, inhibited. (a) Methyl vinyl ketone must be inhibited and must be packed in specification containers as follows:

(1) As prescribed in §173.119(a) or (b).

(b) Limited quantities of inhibited methyl vinyl ketone, in a glass or metal inside container having a capacity of no more than 4 fluid ounces with no more than one such container securely closed and efficiently cushioned in a strong outside packaging, is excepted from labeling and the specification packaging requirements of this subpart (except that labeling is required for transportation by air). In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

§ 173.148 Monoethylamine. (a) Monoethylamine must be packed in specification containers as follows:

(1) Specification 5, 5A, or 5P (§§178.80, 178.81, 178.92 of this subchapter). Metal barrel or drum equipped with openings not exceeding 2.3 inches in diameter. Bung labels must be applied and must meet the requirements prescribed in §173.119(i).

(2) Cylinders as prescribed for any compressed gas except acetylene.

(3) Tank cars prescribed in §173.119(f)(3).

(4) Specification 106A500X or 110A500W (§§179.300, 179.301 of this subchapter) tanks. Authorized only for transportation by rail freight and by highway (See §§174.560 and 177.834(m) of this subchapter for special requirements.)

(5) Cargo tanks as prescribed in §173.119(f)(5).

(6) Specification 51 (§178.245 of this subchapter). Portable tanks. Tanks must have no bottom opening, except one 3-inch maximum plugged opening for maintenance purposes is authorized.

(b) Solution of monoethylamine in water which has a vapor pressure not exceeding 16 pounds per square inch absolute at 100° F. may be shipped in containers prescribed by §173.119(d).

§ 173.149 Methyl magnesium bromide in ethyl ether in concentrations not over 40 percent. (a) Methyl magnesium bromide in ethyl ether in concentrations not over 40 percent must be packed in specification containers as follows:

(1) As prescribed in §173.134.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside glass bottles not over 1 quart capacity each. Inside containers must be surrounded on all sides with dry absorbent noncombustible material in quantity sufficient to absorb entire contents. Authorized gross weight not over 65 pounds.

(3) Spec. 17C (§178.115 of this subchapter). Metal drums (single-trip) with openings not exceeding 2.3 inches in diameter.

§ 173.149a Nitromethane. Nitromethane must be packaged as specified in §173.119(b) except that shipment in cargo tanks, tank cars, portable tanks, and any container having a capacity greater than 110 gallons is forbidden.

SUBPART E

FLAMMABLE SOLIDS, OXIDIZERS, AND ORGANIC PEROXIDES; DEFINITIONS AND PREPARATION

§ 173.150 Flammable solid; definition. For the purpose of this subchapter, "flammable solid" is any solid material, other than one classed as an explosive, which, under conditions normally incident to transportation is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious transportation hazard. Included in this class are spontaneously combustible and water-reactive materials.

§ 173.151 Oxidizer; definition. An oxidizer for the purpose of this subchapter is a substance such as a chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.

§ 173.151a Organic peroxide; definition. (a) an organic compound containing the bivalent —O—O— structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals must be classed as an organic peroxide unless:

(1) The material meets the definition of an explosive A or explosive B, as prescribed in Subpart C of this part, in which case it must be classed as an explosive,

(2) The material is forbidden to be offered for transportation according to §172.101 or §173.21 of this subchapter,

(3) It is determined that the predominant hazard of the material containing an organic peroxide is other than that of an organic peroxide, or

(4) According to data on file with the Research and Special Programs Administration, it has been determined that the material does not present a hazard in transportation.

§ 173.152 Packing. (a) Flammable solids or oxidizing materials must not be packed in the same outside container with corrosive liquids unless the corrosive liquids are in bottles, cushioned by incombustible absorbent material, in tightly closed metal containers.

1. Oxidizing or other materials in quantity not exceeding 4 ounces, in securely closed metal cans, packed in the same compartment with other securely packed materials necessary for a complete fumigant, are acceptable for transportation.

(b) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed or in any case when necessary to prevent breakage or leakage.

§ 173.153 Limited quantities of flammable solids, oxidizers and organic peroxides. (a) Limited quantities of flammable solids for which exceptions are permitted as noted by reference to this section in §172.101 of this subchapter, are excepted from labeling (except when offered for transportation by air) and specification packaging requirements when packed according to the following paragraph. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) Flammable solids in inside containers not over 1 pound net weight each, in outside containers not exceeding 25 pounds net weight each.

(b) Limited quantities of oxidizers and organic peroxides for which exceptions are permitted as noted by reference to this section in §172.101 of this subchapter are excepted from labeling (except when offered for transportation by air) and specification packaging requirements when packed according to the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) Oxidizers in inside containers having a rated capacity of not over 1 pint for liquids or a net weight of not over one pound for solids, in strong outside packagings not exceeding 25 pounds net weight each.

(2) Organic peroxides, except acetyl benzoyl peroxide and benzoyl peroxide, as follows:

(i) In inside containers which must be securely packed and cushioned with noncombustible cushioning material (except that cushioning material is not required when the liquid is contained in strong, securely closed plastic packagings of not over 1 ounce by volume capacity each), further overpacked in strong outside packagings containing not over 1 pint or 1 pound net weight of the material.

(ii) In not more than 24 inside fiberboard containers each having not more than 70 securely closed tubes having a maximum fluid capacity each of ½-ounce and securely packed in non-combustible cushioning material.

(c) Special exceptions for shipment of certain flammable solids, oxidizers and organic peroxides in the ORM-D Class are provided in Subpart N of this part.

§ 173.154 Flammable solids, organic peroxide solids and oxidizers not specifically provided for. (a) Flammable solids, organic peroxide solids and oxidizers as defined in §§173.150 and 173.151, other than those for which special packing requirements are prescribed, must be packed in specification containers of a design and constructed of materials that will not react dangerously with or be decomposed by

the chemical packed therein. Specific packaging requirements are as follows:

(1) Specification 6B, or 6C (§178.98 or §178.99 of this chapter). Metal barrels or drums.

(2) Spec. 17C, 17E, 17H, 37A or 37B (§§178.115, 178.116, 178.118, 178.131, or 178.132 of this chapter), metal drums (sing'e-trip).

(3) Specification 57 (§178.253 of this subchapter). Portable tanks. Tanks must have a fusible plug having a fusing temperature between 70°C and 90°C. Authorized only for dicumyl peroxide, dry and a, a'-bis (t-butylperoxy) diisopropyl-benzene, solid.

(4) Specification MC 303, MC 304, MC 306, MC 307, MC 311 or MC 312 (§§178.341, 178.342, 178.343 of this subchapter). Cargo tanks. Tanks must conform with §178.340-8. Discharge valves must be located inside the tank or at a point outside the tank where the line enters or leaves the tank. The valve seat must be located inside the tank or within the welded flange, its companion flange, nozzle, or coupling. Each product discharge opening shall have a secondary closing means, remote from tank filling or discharge openings, for operation in event of fire or other accident. Tanks may have heating coils if an inorganic heating medium is used. Authorized only for sodium perchlorate or magnesium perchlorate, wet, with 10 percent or more of water, equally distributed within the cargo tank. Specification MC 311 and MC 312 also authorized for potassium nitrite solution. Only Specification MC 304 and MC 307 are authorized for transportation by vessel.

(5) Specification 56 (§178.252 of this subchapter). Metal portable tank. Authorized only for flammable solids (including water reactive material's) and dry oxidizers.

(6) Spec. 12B (§178.205 of this chapter). Fiberboard boxes with inside containers which must be metal cans, sliding-lid wooden boxes, fiber cans or boxes, Spec. 2G (§178.26 of this chapter), not over 5 pounds capacity each; or glass bottles not over 1 pound capacity each. Packages containing glass containers must not weigh over 65 pounds gross.

(7) Spec. 15A or 15B (§§178.168 or 178.169 of this subchapter). Wooden boxes lined, Spec. 2F or 2M (§§178.25 or 178.31 of this subchapter).

(8) Spec. 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers.

(9) Spec. 21C (§178.224 of this subchapter). Fiber drums. Maximum net weight may not exceed 225 pounds except that a 21C400 fiber drum may have a net weight not exceeding 350 pounds.

(10) Spec. 22A (§178.196 of this subchapter). Plywood drums.

(11) Spec. 22B (§178.197 of this subchapter). Plywood drums with inside metal drums, Spec. 2F (§178.25 of this subchapter).

(12) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads shall not require perimeter liner. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having minimum thickness of 0.004 inch. Not more than 25 pounds net weight of product may be packed in one outside box.

(13) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pounds capacity each. Not more than four bottles having capacity of 5 pounds each, shall be packed in one outside container. Shipper must have established that completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(14) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles not over 1-gallon capacity each or polyethylene jars not over 9 pints capacity each. Each jar shall contain not more than 10 pounds net weight of product. Not more than four bottles or jars may be packed in one outside container. Authorized only for materials which will not cause decomposition of polyethylene or container failure.

(15) Specification 103,[1] 103W, 111A60W1, or 111A60F1 (§§179.200, 179.201 of this subchapter). Tank cars. Authorized only for sodium perchlorate or magnesium perchlorate wet with 10 percent or more water equally distributed.

(16) Specification 35 (§178.16 of this subchapter) non-reusable, removable head polyethylene drum for use without overpack and not over seven gallons capacity. Authorized only for dry or paste material that will maintain its form to a minimum temperature of 130°F.

(17) Specification 103ALW or 111A60ALW (§§179.200, 179.201 of this subchapter). Insulated tank cars designed for operation at temperatures up to 250°F. Authorized only for ammonium nitrate with 15 percent or more water in solution at a maximum temperature of 240°F. Transportation by water is not authorized.

(18) Specification MC 307 or MC 311 (§§178.340, 178.342 of this subchapter). Insulated cargo tanks designed for operation at temperatures up to 250°F. Authorized only for ammonium nitrate with 15 percent or more water in solution at a maximum temperature of 240°F. Transportation by water is not authorized.

(19) Specification 6D or 37M (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks (non-reusable containers) with inside specification 2S, 2SL, or 2U (§§178.35, 178.35a, 178.24 of this subchapter) polyethylene packaging.

(20) As prescribed in §173.163(a)(7). Authorized only for ammonium persulfate, hydrated calcium hypochlorite, potassium persulfate, sodium carbonate peroxide, sodium chlorate, dry, sodium perborate monohydrate and sodium persulfate.

(21) Specification 105A200ALW (§§179.100, 179.101 of this subchapter). Tank cars. Authorized only for a mixture of 24 to 26 percent ammonia, 68 to 70 percent ammonium nitrate and 5 to 7 percent water. Transportation by water is not authorized.

(22) Specification 41P (§§178.241 of this subchapter). All plastic bags. Authorized only for ammonium persulfate, potassium persulfate, sodium carbonate peroxide, sodium perborate monohydrate and sodium persulfate. Net weight may not exceed 81 pounds.

(23) Specification 41B or 41C (§§178.236, 178.237 of this subchapter). Multiwall paper bags. Authorized only for ammonium persulfate, dibasic lead phosphite, potassium persulfate, sodium carbonate peroxide, sodium perborate monohydrate and sodium persulfate.

§ 173.154a Fusees. (a) A fusee is a device designed to burn at a controlled rate and to produce visible effects for signaling purposes. It consists of a pasteboard or fiber tube containing a colored flare mixture and with or without a means of support. The composition of the fusee must be such that spontaneous ignition does not occur when the moistened composition is exposed to a temperature of 212°F. for 72 consecutive hours. Fusees must have individual tip, head, or similar ignition point or surface entirely covered and securely protected against accidental contact or friction. Fusees must be securely packed in packages complying with the following specifications:

(1) Specifications 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes having a gross weight not to exceed 150 pounds for specification 19B boxes; 200 pounds for the other boxes. When specification 15C boxes are used, devices must be packed in airtight inside metal receptacles.

(2) Specification 12B (§178.205 of this subchapter) fiberboard boxes. Boxes must have reinforced ends proven to be capable of preventing penetration of spikes through the outside box when a sample package, prepared as for shipment, is subjected to two drops from a height of 4 feet onto a solid surface. The package must be dropped so as to strike diagonally with the spikes in a downward position. Gross weight not to exceed 65 pounds except that gross weight not to exceed 75 pounds is authorized in boxes made in accordance with §178.205-24 of this subchapter.

(3) Specification 29 (§178.226 of this subchapter). Mailing tubes, provided the penetration of the spikes of the fusees through the outside container is prevented by the method specified for fiberboard boxes, specification 12B, in paragraph (a)(2) of this section. Gross weight not to exceed 5 pounds.

(4) Fusees without spikes when offered for shipment may be packed in packages prescribed in this paragraph, omitting the protection required for these devices when equipped with spikes.

(5) Fusees may be packed with nonexplosive or nonflammable articles provided the outside packages are marked as prescribed in this section.

(b) Each outside package must be plainly marked in letters not less than seven-sixteenths inch in height "Fusees" and with the additional words "Handle Carefully—Keep Fire Away."

§ 173.156 Barium peroxide and calcium peroxide. (a) Barium peroxide and calcium peroxide must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1-pound capacity each; or with inside glass containers not over 5 pounds capacity each, cushioned with incombustible cushioning material; or with inside metal containers or lining. Spec. 2F (§178.25 of this subchapter).

(2) [Reserved]

(3) Spec. 6B or 6C (§§178.98 or 178.99 of this subchapter). Metal barrels or drums with not more than 1400 pounds net weight in each container.

(4) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (sing'e-trip).

(5) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 225 pounds.

§ 173.157 Benzoyl peroxide, chlorobenzoyl peroxide (para), cyclohexanone peroxide, dimethylhexane dihydroperoxide, lauroyl peroxide, or succinic acid peroxide, wet. (a) Benzoyl peroxide, chlorobenzoyl peroxide (para), dimethylhexane dihydroperoxide, lauroyl peroxide, and succinic acid peroxide, each wet with at least 30 percent of water by weight, and cyclohexanone peroxide over 50 percent concentration but not exceeding 85 percent concentration, wet, must be packed in specification packagings as follows:

(1) Specification 15A, 15B, 15C, or 19B, (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers or lining. Specification 2F (§178.25 of this subchapter), or with securely

[1] Use of existing tank cars authorized, but new construction not authorized.

closed inside paper bags lined with polyethylene at least 0.002 inch thick, or with inside aluminum drums of at least 16 gage metal throughout. Net weight (dry weight) in each inside DOT-2F metal container or in each paper bag may not exceed 1 pound. Gross weight may not exceed 200 pounds.

(2) [Reserved]

(3) Specification 12B (§178.205 of this subchapter). Fiberboard box with inside fiber containers securely closed by taping or gluing, or with securely closed inside paper bags lined with polyethylene at least 0.002 inch thick. The net weight (dry weight) in each inside container may not exceed 1 pound. Except for lauroyl peroxide, wet, each inside container must be surrounded by an appropriate fire-resistant cushioning material. The gross weight in Specification 12B65 fiberboard boxes may exceed 65 pounds, but may not exceed 80 pounds, provided the net weight (dry weight) of the contents does not exceed 50 pounds.

(4) Specification 21C (§178.224 of this subchapter). Fiber drum with securely closed inside plastic containers made of polyethylene film at least 0.002 inch thick for cyclohexanone peroxide over 50 percent concentration but not exceeding 85 percent concentration and for dimethylhexane dihydroperoxide; with securely closed inside plastic containers made of polyethylene film at least 0.004 inch thick for benzoyl peroxide wet with at least 30 percent of water by weight. Authorized net weight (wet weight) in one outside drum may not exceed 50 pounds for cyclohexanone peroxide, 100 pounds for dimethylhexane dihydroperoxide, or 225 pounds for benzoyl peroxide.

(5) Specification 12B (§178.205 of this subchapter). Fiberboard box with securely closed inside plastic containers made of polyethylene film at least 0.004 inch thick. The net weight (dry weight) in each inside container may not exceed 25 pounds. Each inside container must be surrounded by an appropriate fire-resistant cushioning material. Authorized only for benzoyl peroxide.

(b) Benzoyl peroxide, wet with at least 20 percent of water by weight, must be packed in specification packagings as follows:

(1) Specification 12B (§178.205 of this subchapter). Fiberboard box with securely closed inside paper bags lined with polyethylene at least 0.002 inch thick. The net weight (dry weight) in each bag may not exceed 1 pound. Each bag must be surrounded by an appropriate fire-resistant cushioning material.

(2) Specification 21C (§178.224 of this subchapter). Fiber drum with securely closed inside plastic containers made of polyethylene film at least 0.004 inch thick. Net weight (dry weight) in each outside drum may not exceed 55 pounds.

(3) Specification 12B (§178.205 of this subchapter). Fiberboard box with securely closed inside plastic containers made of polyethylene film at least 0.004 inch thick. The net weight (dry weight) in each inside container may not exceed 25 pounds. Each inside container must be surrounded by an appropriate fire-resistant cushioning material. The net weight (dry weight) in each outside box may not exceed 50 pounds.

§ 173.158 Benzoyl peroxide, dry; chlorobenzoyl peroxide (para) dry; cyclohexanone peroxide, dry; lauroyl peroxide, dry; or succinic acid peroxide, dry. (a) Benzoyl peroxide, dry; chlorobenzoyl peroxide (para), dry; cyclohexanone peroxide over 50 percent concentration but not exceeding 85 percent concentration, dry; lauroyl peroxide, dry; or succinic acid peroxide, dry; must be packed in specification packagings as follows:

(1) Specification 15A, 15B, 19A, or 19B (§178.168, §178.169, §178.190, §178.191 of this subchapter). Wooden boxes, with inside fiber containers securely closed by taping or gluing, or inside securely closed paper bags lined with 0.002 inch thick polyethylene, not over 1 pound capacity each. Except for lauroyl peroxide, dry, each inside container must be surrounded by an appropriate fire-resistant cushioning material. The net weight in outside container must not exceed 50 pounds, except that for lauroyl peroxide, dry, a net weight not over 100 pounds is authorized.

(2) Spec. 21C (§178.224 of this subchapter) fiber drums. Authorized only for lauroyl peroxide, dry. Authorized net weight not over 100 pounds in one drum.

(3) Specification 12B (§178.205 of this subchapter). Fiberboard boxes, with inside fiber containers securely closed by taping or gluing, or inside securely closed paper bags lined with polyethylene not less than 0.002 inch thick, not over 1 pound capacity each. Except for lauroyl peroxide, dry, each inside container must be surrounded by an appropriate fire-resistant cushioning material. The gross weight in Specification 12B65 boxes may be more than 65 pounds, but not more than 80 pounds, provided the net weight of contents does not exceed 50 pounds.

§ 173.159 Burnt cotton. (a) "Burnt cotton" is cotton that has been on fire and from which the burnt portions have not been removed by repicking. It must not be offered for transportation until at least 10 days have elapsed since the last evidence of fire in it.

(b) When burnt cotton is picked and baled, the separated unburnt cotton is subject to the same regulations as cotton that has not been involved in a fire. See §172.101 of this subchapter.

§ 173.160 Calcium chlorite and sodium chlorite. (a) Calcium chlorite and sodium chlorite must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 2½ pounds capacity each or metal not over 5 pounds capacity each.

(2) Specification 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131 or 178.132 of this subchapter). Metal drums (single-trip).

§ 173.161 Calcium phosphide. (a) Calcium phosphide must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, or 178.191 of this subchapter). Wooden boxes lined, Spec. 2F (§178.25 of this subchapter), and with hermetically sealed inside containers.

(2) Specifications 6B, or 6C (§§178.98, or 178.99 of this subchapter). Metal barrels or drums.

§ 173.162 Charcoal. (a) "Limited quantities of charcoal, as described in this paragraph, are excepted from labeling (except when offered for transportation by air) and specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) [Reserved]

(2) Charcoal made from pine wood and processed so that it is not liable to heat dangerously or cause fires in transportation.

(3) Charcoal briquettes made from wood charcoal with starch and water, or tar, for a binder, which have been screened and cooled to a temperature below 100° F. before being offered for transportation.

(4) Charcoal screenings made from "pinon" wood.

(5) Charcoal made from walnut shells, corn cobs, peach pits, and similar material, must be cooled and held not less than five days before shipment, and shipped in bags, barrels, or boxes. The five-day holding period shall not apply to charcoal briquettes screened and cooled to a temperature below 100° F. before being offered for transportation.

(6) Charcoal, lump, made by the old kiln or pit method by which long air exposure is provided before shipment.

(7) Charcoal, wood, except charcoal screenings, when packed in boxes or barrels.

(8) Charcoal, wood, when in bags in less-than-carload or less-than-truckload shipments of not exceeding 2,000 pounds.

(9) When offered for transportation by air, charcoal must be packaged in boxes or barrels.

(10) Charcoal screenings or ground, crushed, granulated, or pulverized charcoal, from pit or kiln burned charcoal, provided the screenings or the material from which the ground charcoal is made has been exposed to the air for not less than 5 days prior to shipment or grinding (see paragraphs (j) and (k) of this section).

(11) Special exceptions for shipment of charcoal in the ORM-D class are provided in Subpart N of this part.

(b) Charcoal made in round retorts must be transferred to air-tight metal cans for cooling, and must be kept in these cans for 24 hours or more. The charcoal after removal from these cans should be aired by spreading on a floor to a depth not exceeding 1 foot. This air exposure must last not less than 44 hours. Not less than 72 hours should elapse from the time the air exposure of the charcoal commences before a car loaded with it is closed for shipment, or before the lump charcoal is placed in paper bags.

(1) The charcoal during this airing period must be protected from the weather, and exposed to good circulation of air. When the charcoal is aired on the floor for only 24 hours and then placed in burlap bags, it must be kept in the bags 60 hours before shipment. If the charcoal is not aired on the floor for at least 24 hours, it must be kept in the burlap bags for at least 96 hours before loading for shipment.

(c) Charcoal made in ovens in slatted cars should be kept for two periods of 24 hours each in first and secondary air-tight cooling chambers respectively. After removing the charcoal from the secondary coolers it must be exposed to good air circulation, but protected from the weather for a period of not less than 44 hours.

(1) Not less than 72 hours must elapse from the time the air exposure of the charcoal commences before a car loaded with it is closed for shipment, or before the lump charcoal is placed in paper bags.

(d) When fire occurs in charcoal during air exposure period, it should be extinguished with as little water as possible. Any charcoal wet in this way or otherwise must be dried, by again heating in the retorts or ovens, and cooled and aired in the usual way described in paragraphs (b) and (c) of this section, or the charcoal must be set aside and allowed to dry for not less than 30 days before shipment.

(e) Charcoal, lump, must be dry and free from screenings and brands.

(1) Shipments must be loaded into tight box cars, tight container cars, or into tight closed-top hopper cars, except that lump charcoal made from soft wood may be shipped in open or stock cars.

(2) When a chute is used in loading the car, the chute must contain a properly constructed screen which must be kept clean. This screen shall be not less than ¾ inch mesh. Forks with prongs not less than 1 inch apart must be used instead of shovels to handle the charcoal. The screenings which accumulate in the doorway of the car must be removed before loading the doorway. The car should be swept before loading, and a car which has contained lime must be thoroughly cleaned before loading with charcoal. The doors of the car must be closed tightly before the car is forwarded.

(3) Lump charcoal may be shipped in bags, barrels or boxes, or bulk in cars.

(4) Lump charcoal, dry and free from screenings and brands, may be shipped in bulk in motor vehicles. Vehicle must be swept before loading and if it contained lime it must be thoroughly cleaned.

(f) Charcoal screenings consist of small pieces of charcoal varying from about one-half inch in the maximum dimension to grains of dust. These screenings are more liable to produce fires than other forms of charcoal. Charcoal screenings from wet charcoal or wet screenings or screenings which have been wet must not be offered for shipment unless they have been dried for not less than 12 hours in a retort or oven, and then subjected to not less than 10 days airing and cooling before shipment.

(1) Charcoal screenings must be stored in a dry place, in loosely piled bags, freely exposed to the air for not less than 20 days after separation from the lump before shipment.

(2) Screenings from pine-wood charcoal must be stored as above described for not less than five days before shipment.

(3) Charcoal screenings must be packed in cotton or jute bags of not greater than 4 bushels capacity.

(g) Charcoal ground, crushed, granulated, or pulverized is prepared from either lump charcoal or screenings.

(1) Lump charcoal used for the preparation of ground, crushed, granulated, or pulverized charcoal must be stored subject to ventilation, and protected from the weather for not less than 20 days after its removal from the coolers before milling; or the ground, crushed, granulated or pulverized charcoal must be stored in bags, subject to ventilation and protected from the weather for not less than 20 days before shipment. Lump charcoal made from pine wood must be stored as above described for not less than 5 days before milling. Ground, crushed, or granulated charcoal made by the "Stafford" process must be stored subject to ventilation and protected from the weather for not less than 7 days before shipment in lieu of the 20-days' storage otherwise prescribed.

(2) Charcoal screenings used for the preparation of ground, crushed, granulated, or pulverized charcoal must be stored in a dry place in loosely piled cotton or jute bags freely exposed to air for a period of not less than 20 days after separation from the lump charcoal, and before milling; or the ground, crushed, granulated, or pulverized charcoal must be stored in bags, subject to ventilation and protected from the weather for not less than 20 days before shipment. Charcoal screenings made from pine wood charcoal must be stored as above described not less than 5 days before milling.

(3) Ground, crushed, granulated, or pulverized charcoal must be packed in tight sift-proof wooden barrels or boxes containing not more than 4 bushels each; or in fiberboard boxes; or in unlined jute bags, or in strong unlined cotton bags, containing not more than 4 bushels each; or in paper-lined jute bags, or in paper bags, containing not more than 2½ bushels each. Whenever practicable, all boxes, barrels, or bags, after filling, should be allowed to remain open and freely exposed to the air, and protected from the weather for not less than 24 hours before being closed. Ground, crushed, granulated, or pulverized charcoal made from pine-wood charcoal should be so stored for not less than 72 hours before the packages are closed.

(h) Charcoal, screenings or ground, crushed, granulated or pulverized charcoal, in bags, when loaded in cars for shipment by rail must be so loaded that the bags are laid horizontally in the car, and so piled that there will be spaces for efficient air circulation. These spaces must be not less than 4 inches wide. If the bags are not compactly filled and closed so as to avoid free space within, transverse wooden strips must be laid between the bags and extending the full width of the car; these strips should be approximately 2 feet apart vertically and longitudinally. The bags must not be piled closer than 6 inches from the top of the car, and no more than 26,000 pounds of screenings, ground, granulated, crushed, or pulverized charcoal, shall be loaded in a 36-foot, 6-inch car; 27,000 pounds in a 37-foot, 6-inch car; 28,000 pounds in a 38-foot, 6-inch car; 29,000 pounds in a 39-foot, 6-inch car; 36,000 pounds in a 40-foot, 6-inch car; and 40,000 pounds in a 50-foot, 6-inch car. A tight car must be used, and any loose material must be swept up and removed from the doorway of the car before completing the loading.

(i) See § 177.838 of this subchapter for loading in motor vehicles.

(j) Charcoal burned in pits or kilns must be thoroughly cooled in the sealed kilns. After the kilns are opened, the charcoal must be allowed to stand in the open kiln or elsewhere exposed to the air for not less than 24 hours before loading in a freight car. Charcoal burned in kilns may be loaded in open cars or in box cars, but after loading in box cars, the cars must be allowed to stand not less than 24 hours with doors open before shipment.

(k) Screenings, or ground, crushed, granulated, or pulverized charcoal, from pit or kiln burned charcoal, are considered as non-hazardous, provided the screenings or the material from which the ground charcoal is made has been exposed to the air for not less than 5 days prior to shipment or grinding.

(l) Reburned charcoal must be cooled and exposed to good fresh-air circulation for not less than five days after removal from the reburning furnaces and before being shipped or ground to produce ground or pulverized charcoal.

§ 173.163 Chlorate of soda, chlorate of potash, and other chlorates. (a) Chlorate of soda, chlorate of potash, and other chlorates must be packed in specification containers as follows:

(1) Specification 6B, or 6C (§§ 178.98 or 178.99 of this subchapter). Metal barrels or drums.

(2) Spec. 17E, 17H, 37A, or 37B (§§ 178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (single-trip).

Note 1. Specs. 37A and 37B. Metal drums for export service, marked for an authorized gross weight of 150 pounds, must be at least 24 gauge metal throughout.

(3) Spec. 21C, 22A, or 22B (§ 178.224, § 178.196 or § 178.197 of this subchapter). Fiber or plywood drums with inside metal drums, Spec. 2F (§ 178.25 of this subchapter). Authorized net weight not over 225 pounds.

(4) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with tightly closed inside containers which must be of metal not over 10 pounds capacity each; or of glass not over 5 pounds each; or of fiber, Spec. 2G (§ 178.26 of this subchapter), not over 6 pounds capacity each.

(5) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with inside metal cans not over 5 pounds capacity each, closed air tight and with not over 25 pounds of chlorate in the outside container.

(6) Chlorates wet with 10 percent or more of water are authorized for shipment in tank cars, spec. 103,[1] 103-W, 111A60-F-1, or 111A60-W-1 (§§ 179.200, 179.201 of this subchapter), when equally distributed therein.

(7) Chlorate of soda, dry, is authorized for shipment in aluminum or steel tank car tanks, cargo tank vehicles, tight sift-proof covered hopper cars, or tight sift-proof covered hopper type motor vehicles. Tank car tanks, cargo tank vehicles, hopper cars, and hopper type motor vehicles must be thoroughly cleaned before loading. Tank car tanks may have their internal operating valve removed provided the bottom outlet is securely capped.

(8) Specification 12A (§ 178.210 of this subchapter). Fiberboard box with inside glass or plastic bottles not over 5 pounds capacity each. Not more than 4 glass bottles or 6 plastic bottles having a capacity of 5 pounds each shall be packed in one outside container. Shipper must have established that completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(9) Specification 56 (§§ 178.251, 178.252 of this subchapter). Metal portable tanks.

§ 173.164 Chromic acid or chromic acid mixture, dry.

(a) Chromic acid and chromic acid mixture, dry, must be packaged as follows:

(1) Specification 6B, or 6C (§§ 178.98 or 178.99 of this subchapter). Metal barrels or drums.

(2) Specifications 17C, 17H or 37A (§§ 178.115, 178.118, 178.131 of this subchapter) metal drums. Spec. 37A metal drums constructed from 22-gauge steel throughout are authorized for a gross weight of 490 pounds or less when shipped in a carload or truckload lot.

(3) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes, with inside glass bottles of not over 5 pounds capacity each, with closures securely fastened, each bottle individually packed in a tight metal container, and cushioned therein with incombustible mineral packing material; or with inside tightly closed metal containers, not over 10 pounds capacity each.

(4) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pounds capacity each. Not more than four bottles having capacity of 5 pounds each, shall be packed in one outside container. Shipper must have established that completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

[1] Use of existing tank cars authorized, but new construction not authorized.

For explanation of abbreviations and reference marks, see last page of this tariff.

(5) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with metal inside containers which must have closing device securely fastened by positive means (not friction), not over 1-gallon capacity each. Not more than 4 metal containers shall be packed in one outside box.

(6) Specification 21C (§178.224 of this subchapter). Fiber drums lined with a plastic material having a minimum thickness of 0.003 inch. Net weight may not exceed 115 pounds.

(7) Specification 56 (§178.252 of this subchapter). Steel portable tank.

§ 173.165 Coal, ground bituminous, sea coal, coal facings. (a) Coal, ground bituminous, sea coal, coal facings, 90 percent of which will pass through a 100-mesh sieve, must be stored for at least six days after grinding, or if not so stored must be shipped in tight metal tank cars or in tight metal containers on container cars, or in permanently covered metal hopper cars, or in other tight metal containers, or in tight, metal-bodied, covered motor vehicles.

(b) Coal, ground bituminous, which has been dried by heating before grinding must be packed in hermetically sealed metal-lined wooden boxes or air-tight metal containers.

§ 173.166 Cobalt resinate, precipitated, calcium resinate, and calcium resinate fused. (a) Cobalt resinate, precipitated, calcium resinate, and calcium resinate fused, must be packed in specification containers as follows:

(1) Specification 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(2) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or §178.132 of this subchapter). Metal drums (single-trip).

(3) Spec. 15A or 15B (§§178.168 or 178.169 of this subchapter). Wooden boxes with air-tight metal inside containers.

§ 173.168 Lithium amide, powdered. (a) Lithium amide, powdered, must be packed as follows:

(1) As prescribed in §173.154(a)(1), (2), (8) and (11).

(2) Spec. 21C (§178.224 of this subchapter). Fiber drums with inside metal drums, Spec. 2F (§178.25 of this subchapter). Authorized net weight not over 225 pounds.

§ 173.171 Fish scrap or fish meal. (a) Fish scrap or fish meal containing less than 6 or more than 12 percent moisture (does not include wet acidulated fish scrap with moisture 40 to 55 percent), or which has not been sufficiently cooled after manufacture, or is liable to spontaneous heating in transit, must be packed in air-tight metal containers.

§ 173.173 Aluminum dross or magnesium dross.

Aluminum dross or magnesium dross must not be shipped when hot or when containing moisture liable to cause heating or fire during transportation.

§ 173.174 Iron sponge, spent oxide, spent iron mass, spent iron sponge. (a) Iron sponge that has not been properly oxidized during manufacture must be packed in hermetically sealed metal-lined wooden boxes or air-tight metal containers.

(b) [Reserved]

(c) Spent oxide, spent iron mass, or spent iron sponge must be loaded in open steel cars or open highway vehicles with steel bodies. After exposure to air for a period of not less than 10 days, these articles may be offered for transportation by carrier by water in bulk in all-steel barges having open holds.

§ 173.175 Lacquer base, or lacquer chips, dry. (a) Lacquer base, or lacquer chips, dry, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§178.25 of this subchapter).

(2) Specification 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 17E, 17H, 37A, 37B or 37C (§§178.116, 178.118, 178.131, 178.132, or 178.135 of this subchapter). Metal drums (single-trip), or Spec. 37C (non-reusable container).

(4) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 225 pounds.

§ 173.176 Safety matches. (a) Safety matches (strike-on-box, book, and card) are matches which are intended to be ignited on a prepared surface. Safety matches, when offered for transportation, must be of a type which will not ignite spontaneously or undergo marked decomposition when subjected for eight consecutive hours to a temperature of 200 °F. (93.3 °C.). As used in this section, the term "safety matches" includes matches combined with or attached to the box, book, or card.

(b) Safety matches must be tightly packed in securely closed inside packagings to prevent accidental ignition under conditions normally incident to transportation, and further packed in outside fiberboard, wooden, or other equivalent-type packagings. Safety matches in outside packagings not exceeding 50 pounds gross weight are not subject to any other requirement (except marking) of this subchapter. Safety matches may be packed in the same outside packaging with materials not subject to this subchapter.

§ 173.176a Strike anywhere matches. (a) Strike anywhere matches are matches which may be ignited by friction on a solid surface. Strike anywhere matches, when offered for transportation, must be of a type which will not ignite spontaneously or undergo marked decomposition when one complete inside package is subjected for eight consecutive hours to a temperature of 200 °F. (93.3 °C.).

(b) Strike anywhere matches may not be packed in the same outside packaging with any material other than safety matches. The safety matches must be packed in separate inside packagings.

(c) **Inside packagings.** Strike anywhere matches must be tightly packed in securely closed chipboard, fiberboard, wooden, or metal inside packagings to prevent accidental ignition under conditions normally incident to transportation. Each inside packaging may contain no more than 700 strike anywhere matches.

(d) **Outside packagings.** Strike anywhere matches must be packed in specification packagings as follows:

(1) Spec. 15A or 19B (§§ 178.191 of this subchapter). Wooden boxes, with inside packages. Gross weight must not exceed 100 pounds.

(2) Spec. 12B or 12C (§§ 178.205, 178.206 of this subchapter). Fiberboard boxes, with inside packages. Gross weight must not exceed 60 pounds. Fill-in pieces specified by §178.205-14 or §178.206-14 of this subchapter are not required.

§ 173.177 Motion-picture film and X-ray film. (a) Motion-picture film and X-ray film (nitrocellulose base) must be packed in specification containers as follows:

(1) Spec. 32A or 32B (§§178.146 or 178.147 of this subchapter). Metal cases.

(2) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with each reel in a tightly closed metal can, or strong cardboard of fiberboard box with cover held in place by adhesive tape or paper. Gross weight must not exceed 200 pounds.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes complying with §178.205-22(a)(1) of this subchapter; authorized for a single tightly closed inside metal can or strong cardboard or fiberboard box with cover held in place by adhesive tape or paper, not over 2,000 feet of film. Taped closure authorized.

(4) Spec. 12B (§178.205 of this subchapter). One-piece fiberboard boxes complying with §178.205-22(a)(2) of this subchapter; authorized only when each film is in a tightly closed metal film-reel can or strong cardboard of fiberboard box with cover held in place by adhesive tape or paper containing not over 2,000 feet (approximately) of film; cans or boxes to be adequately braced in center of box by fiberboard, at least 175-pound test, extending full depth of box. Gross weight not over 65 pounds. Closing of box must be effected by coating entire contact surfaces of flaps with efficient adhesive; stitched closure not authorized. Boxes that have been filled, shipped, and opened, are not authorized for reuse.

(5) Spec. 32C (§178.148 of this subchapter). Trunks with each film in standard metal film-reel can or strong cardboard or fiberboard box with cover held in place by adhesive tape or paper. Trunks to contain no material other than films in cans or boxes and projecting apparatus. The apparatus, as packed, must not be capable of creating an electric current.

(6) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes complying with §178.205-27 of this subchapter; authorized only for not more than two square inside metal cans containing not over 200 feet (approx.) of film each; gross weight not over 15 pounds. Taped closure authorized.

(b) Slow burning motion-picture film is excepted from the requirements of this subchapter, except when packed with flammable film.

§ 173.178 Calcium carbide, calcium silicon powder, and magnesium granules, coated. (a) Calcium carbide, calcium silicon powder, and magnesium granules, coated must be packed as follows:

(1) In water-tight metal drums with rolled, folded top and bottom seams and with welded side seams. Closures must be of the friction-type or screw-type. Full open-top closures must be gasketed and equipped with leverlock or bolted clamping ring. Maximum rated capacity may not exceed 60 gallons.

(2) In water-tight, sift-proof, bulk metal containers.

(3) In water-tight, sift-proof, closed-top metal covered hopper rail cars.

(4) In water-tight, sift-proof, closed-top metal covered hopper motor vehicles.

(5) In water-tight metal containers not exceeding 10 pounds net weight.

§ 173.179 N-methyl-N'-nitro-N-nitrosoguanidine.

N-methyl-N'-nitro-N-nitrosoguanidine must be packaged as follows: The quantity in one outside packaging may not exceed 25 grams and must be placed in a polyethylene bottle which is tightly closed and the closure secured in place with pressure sensitive tape. The bottle must be sealed in a polyethylene bag constructed of polyethylene at least 4 mils thick. The bag containing the bottle must be cushioned in a hermetically sealed can with noncombustible cushioning material. There must be at least one inch of cushioning material between the outer surface of the bag and the inner surface of the can. The metal can must be cushioned in a DOT 12B fiberboard box constructed of at least 350 pound test fiberboard. There must be at least one inch of cushioning material between the outer surface of the can and the inner surface of the fiberboard box.

§ 173.182 Nitrates. (a) Aluminum nitrate, ammonium nitrate (no organic coating), ammonium nitrate (organic coating), ammonium nitrate-carbonate mixture, ammonium nitrate-phosphate, ammonium nitrate fertilizer[1] (containing no more than 0.2 percent carbon), ammonium nitrate mixed fertilizer, barium nitrate, beryllium nitrate, calcium nitrate, cupric nitrate, ferric nitrate. (NOTE: The double salt of calcium and ammonium nitrate ($5Ca(NO_3)_2 \cdot NH_4NO_3 \cdot 10H_2O$) containing not more than 15.5 percent nitrogen and at least 12 percent water is not subject to the regulations in this subchapter), guanidine nitrate, lead nitrate, magnesium nitrate, mercuric nitrate, nickel nitrate, nitrates, n.o.s., nitrate of soda and potash, potassium nitrate, silver nitrate, sodium nitrate, strontium nitrate, zinc nitrate, and zirconium nitrate must be packaged as follows:

(1) In wooden or fiberboard boxes with glass, metal, or other strong inside containers; in metal or fiber drums; in kegs or barrels; or in strong metal cans. When so packed, they are excepted from the specification packaging requirements of this part.

(b) Aluminum nitrate, ammonium nitrate (no organic coating), ammonium nitrate-carbonate mixture, ammonium nitrate-phosphate, ammonium nitrate fertilizer[1] (containing no more than 0.2 percent carbon), ammonium nitrate mixed fertilizer, barium nitrate, beryllium nitrate, calcium nitrate, cupric nitrate, ferric nitrate, guanidine nitrate, mercuric nitrate, nickel nitrate, nitrate of soda and potash, potassium nitrate, sodium nitrate, strontium nitrate, and zirconium nitrate in addition to containers prescribed in paragraph (a) of this section, may be packaged as follows:

(1) In bulk, in tightly closed freight cars.

(2) In bulk, in sift-proof closed or open type motor vehicles.

(3) [Reserved]

(4) In burlap bags not exceeding 200 pounds net weight, water-resistant, made tight against sifting, and made of not less than 7½-ounce burlap.

(5) Multiple-wall paper bags must be constructed as follows:

(i) At least 4-ply including moisture-barrier ply, and made tight against sifting. Maximum authorized net weight is 110 pounds. Completed package, filled to weight with product and closed for shipment, must be capable of withstanding three 4-foot drops on face or back onto solid concrete without rupture.

(ii) At least 3-plies of extensible kraft paper having a minimum total basis weight of 180 pounds including an inner-most ply coated with polyethylene to provide a moisture barrier. Maximum authorized net weight is 80 pounds. Completed package, filled to weight with product and closed for shipment, must be capable of withstanding three 4-foot drops on face or back onto solid concrete without rupture.

(6) Plastic bags must be constructed as follows:

(i) Specification 44P (§178.241 of this subchapter). All plastic bags. Maximum authorized net weight is 81 pounds. Authorized only for ammonium nitrate mixed fertilizer, ammonium nitrate fertilizer (containing no more than 0.2 percent carbon), and potassium nitrate.

(ii) Polypropylene bag made of 9 denier polypropylene fibers spun continuously to form a sheet weighing at least 3½ ounces per square yard. Maximum authorized net weight is 100 pounds. Each bag must have an inner liner of polyethylene not less than 4 mils thick. Each bag filled to weight with product and closed for shipment must be capable of withstanding three 4-foot drops on face or back onto solid concrete without rupture. Authorized only for ammonium nitrate (no organic coating) ammonium nitrate fertilizer, and potassium nitrate; or

(iii) Polyethylene bag made of two plies of high-density polyethylene film laminated together so that the orientation of each ply of film is at right angles to the other. Maximum authorized net weight is 100 pounds. For a net weight not exceeding 50 pounds, the thickness of each bag must be at least 2.5 mils. For a net weight exceeding 50 pounds but not exceeding 100 pounds, the thickness of each bag must be at least 4 mils. Each bag must be capable of withstanding the test requirements of §178.241–4 and each bag must be in compliance with the requirements of §178.241–3 of this subchapter for bag closures. Authorized only for ammonium nitrate (no organic coating), ammonium nitrate fertilizer, and sodium nitrate.

(7) Specification 53[2] or 56 (§§178.251, 178.252 of this subchapter). Portable tank. Authorized only for sodium nitrate.

§ 173.183 Potassium nitrate mixed (fused) with sodium nitrite. (a) Potassium nitrate mixed (fused) with sodium nitrite must be packed in containers as follows:

(1) In containers as prescribed in §173.182(a).

(2) Spec. 103–W (§§179.200 and 179.201 of this subchapter). Tank cars specially designed, equipped and approved for this service without bottom discharge outlet and with heavier plate thicknesses than the minimum prescribed for cars built under this specification. For specification 103–W tank cars made of plates having the minimum prescribed thicknesses, internal reinforcement of the upper sheets of tank in the region of the dome and reinforcing plates attached to the bottom sheet of the tank which rests on bolsters is required, and these tanks must be equipped with baffle plates. Heater pipes must be of welded construction designed for a test pressure of 500 pounds per square inch. A 1-inch woven asbestos lining must be placed between bolster slabbing and bottom of tank to prevent heat transmission. Safety vents of the frangible disc type may be used and if used the frangible discs must be perforated with ⅛ inch hole. If safety valves are used, a vacuum relief valve must be installed on the dome. Each tank car must be marked "Fused Potassium Nitrate and Sodium Nitrite" in accordance with the requirements of §172.330 of this subchapter.

§ 173.184 Nitrocellulose or collodion cotton, wet, or nitrocellulose, colloided, granular, or flake, wet, or nitrostarch, wet, or nitroguanidine, wet. (a) Nitrocellulose or collodion cotton, wet, or nitrocellulose, colloided, granular, or flake, wet, or nitrostarch, wet, or nitroguanidine, wet, must be uniformly wet with at least 20 pounds of water to 80 pounds of dry material and must be packed in specification containers as follows:

(1) [Reserved]

(2) Specification 14, 15A, 15B, or 19B (§178.165, §178.168, §178.169, §178.191 of this subchapter). Wooden boxes lined, Spec. 2M (§178.31 of this subchapter).

(3) Specification 6B, 6C, or 6J (§178.98, §178.99, §178.100 of this subchapter). Metal barrels or drums not over 55 gallons capacity. Specification 6J (§178.100 of this subchapter) drums must have removable heads of 14 gauge metal or 16 gauge metal with one or more corrugations near the periphery and the heads must have a minimum convexity of ¾ inch; each drum must have three rolled or swedged-in hoops, one of which shall be in the body near the top curl.

(4) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter). Metal drums (single-trip) not over 5 gallons capacity. Welded side seams required.

(5) Spec. 17E or 17H (§§178.116 or 178.118 of this subchapter). Metal drums (single-trip).

(6) [Reserved]

(b) Gross weight of any container must not exceed 490 pounds.

§ 173.187 Potassium peroxide; potassium superoxide; sodium peroxide or sodium superoxide. (a) Potassium peroxide; potassium superoxide; sodium peroxide or sodium superoxide must be packed in specification containers as follows:

[1] Applies only to materials tested in accordance with and meeting the definition in The Fertilizer Institute's publication "Definition and Test Procedures for Ammonium Nitrate Fertilizer" dated May 7, 1971.

[2] Use of existing tanks authorized. Construction not authorized after May 31, 1972.

For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside air-tight metal cans.

(2) Specification 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (sing'e-trip).

(4) Spec. 12A or 12B (§178.210 or §178.205 of this subchapter). Fiberboard boxes with inside air-tight metal cans not over 5 pounds capacity each.

§ 173.188 Phosphoric anhydride. (a) Phosphoric anhydride must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside tightly stoppered glass bottles not over 1 pound capacity each; or metal cans, not over 3 pounds capacity each, hermetically sea'ed (soldered) or closed with cork securely held in place by metal strap soldered in position. Inside containers must be cushioned with elastic incombustible packing materials.

(2) Specification 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (sing'e-trip).

(4) Specification 56 (§178.252 of this subchapter). Stainless steel portable tanks.

(5) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 1 pound capacity each. Not more than 12 bottles shall be packed in one outside box. Shipper must have established that completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(6) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles of one-third fluid ounce capacity each. Each bott'e shall be packed in a heat-sea'ed polyethylene or other suitable plastic bag of equal efficiency and not more than 75 such units shall be packed in a heat-sea'ed polyethylene or other suitable plastic bag of equal efficiency, which shall be placed in a securely closed metal can. Not more than 1 can shall be packed in one outside box.

§ 173.189 Phosphorus, amorphous, red. (a) Phosphorus, amorphous, red, must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes, with inside airtight metal containers.

(2) Specification 6B; also 37A or 37B (sing'e-trip containers) (§§178.98, 178.131, 178.130 of this subchapter). Metal barrels or drums. Gross weight not to exceed 160 pounds.

(3) Spec. 29 (§178.226 of this subchapter). Mailing tube having not more than 100 grams of phosphorous contained in an inside glass container, sea'ed under nitrogen or other inert gas, with an air-tight closure. The glass container shall be packed in a metal can having air-tight closure. Both the inside glass container and the metal can shall be surrounded on all sides with incombustible cushioning material.

§ 173.190 Phosphorus, white or yellow. (a) Phosphorus, white or yellow, when offered for transportation by rail freight, highway, or water, must be packed in water or dry.

(b) When placed in water it must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside hermetically sea'ed (soldered) metal cans, inclosed in other hermetically sea'ed (soldered) metal cans; or inside water-tight metal cans containing not over 1 pound with screw-top closures, or Spec. 2F (§178.25 of this subchapter).

(2) Specification 5A or 6B (§§178.81, 178.98 of this subchapter). Metal barrels or drums, not over 30 gallons capacity each.

(3) Spec. 103,[1] 103-W, 111A60-F-1 or 111A60-W-1 (§§179.200, 179.201 of this subchapter). Tank cars without bottom outlet for discharge of lading and with approved dome fittings, external heater systems, and with insulation at least 4 inches in thickness, except that thickness of insulation may be reduced to 2 inches over external heater coils. Bottom washout nozzle of approved design may be applied. The material must be immersed in water or be blanketed with an inert gas and be loaded at a temperature not exceeding 140° F. The water must be loaded in the dome to not more than 50 percent of the capacity of the dome. After unloading, the person who unloaded the tank must fill to its entire capacity with an inert gas or must fill it with water having a temperature not exceeding 140° F, to not more than 50 percent of the capacity of its dome. Before the car is offered for return movement, it must be placarded with FLAMMABLE SOLID-RESIDUE placards, as described in §172.525 of this subchapter.

(i) Each tank car must be marked "PHOSPHORUS" in accordance with the requirements of §172.330 of this subchapter.

Note 1: Until further order of the Department, Specification ARA, III tank cars, converted as follows, are authorized for use without bottom discharge outlet, with insulation at least 2 inches in thickness, internal heater coils, at least one safety valve or frangible disc safety vent of approved design, and dome equipped for top unloading. Cars to be loaded and unloaded as prescribed in paragraph (b)(3) of this section. Cars to be stenciled immediately above the mark ARA III with the words "FOR PHOSPHORUS ONLY".

(4) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks, without bottom outlet and with insulation at least 4 inches in thickness, except that 2 inches of insulation is authorized for tanks equipped with an exterior heating jacket. Interior heating coils are not authorized. The material must be immersed in water or be blanketed with an inert gas and be loaded at a temperature not exceeding 140° F. After unloading, the tank must be filled to its entire capacity with an inert gas or to its entire capacity with water having a temperature not exceeding 140° F.

(5) Specification IM 101 portable tanks (§§178.270, and 178.271 of this subchapter) are authorized under the conditions specified in the IM Tank Table. The material must be immersed in water or blanketed with an inert gas and be loaded at a temperature not exceeding 140° F. After unloading, the tank must be filled with an inert gas or water having a temperature not exceeding 140° F.

(c) Phosphorus, white or yellow, when offered for transportation by air must be packed in water in packaging as follows (also authorized for transportation by rail freight, highway or water):

(1) Specification 15A, 15B, 19A or 19B (§§178.168, 178.169, 178.190, 178.191 of this subchapter). Wooden boxes with inside hermetically sea'ed (soldered) metal cans, inclosed in other water-tight metal cans containing not over 1-pound with screw-top closures, or with soldered closures.

(2) Samples of phosphorus, white or yellow, not to exceed 4 ounces each, placed in water in sea'ed metal cylinders or cans, inclosed in a wooden box, Spec. 15A or 15B (§§178.168 or 178.169 of this subchapter), may be transported only when consigned to the laboratory of the Internal Revenue Bureau or to the Hygienic Laboratory of the Public Health Service, Washington, D.C.

(3) Spec. 29 (§178.226 of this subchapter). Mailing tube having a water-tight rigid polyethylene container in which is placed a quartz tube containing not more than 100 grams of phosphorus sea'ed under nitrogen or other inert gas, with the remaining space in the polyethylene container filled with water. The polyethylene container shall be cushioned within the mailing tube with incombustible cushioning material.

(d) Phosphorus, white or yellow, when dry must be cast solid and shipped in containers as follows:

(1) Specification 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums not over 30 gallons capacity each.

(2) In projectiles or bombs when shipped by, for, or to the Departments of the Army, Navy, and the Air Force of the United States Government, without bursting elements.

§ 173.191 Phosphorus pentachloride. (a) Phosphorus pentachloride must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or glazed earthenware containers, not over 25 pounds capacity each, cushioned with mineral packing. When inside containers are packed in the same outside container with other articles, they must be enclosed in tightly closed metal cans. Net weight not to exceed 50 pounds in each outside box.

(2) Specification 6B, or 6C; also 37A or 37B (sing'e-trip containers) (§§178.98, 178.99, 178.131, or 178.132 of this subchapter). "Black iron" metal barrels or drums.

§ 173.192 Ammonium picrate, picric acid, trinitrobenzoic acid, and urea nitrate, wet. (a) Ammonium picrate, picric acid, trinitrobenzoic acid, and urea nitrate, wet with not less than 10 percent water, in quantity not exceeding 16 ounces in one outside package, may be shipped as drugs, medicines, or chemicals, when in glass bottles securely stoppered, each bottle inclosed in a strong fiber carton properly cushioned in the outside shipping case. No restrictions other than packing prescribed by this section are required when these materials are offered for transportation.

§ 173.193 Picric acid, trinitrobenzoic acid, or urea nitrate, wet. (a) Picric acid, trinitrobenzoic acid, or urea nitrate, wet with not less than 10 percent water must be packed in specification containers as follows:

(1) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers, cushioned and tightly closed. The net weight in an outside package

[1] Use of existing tank cars authorized, but new construction not authorized.

[1] Use of existing tank cars authorized, but new construction not authorized.

must not exceed 25 pounds dry weight. (See § 173.65 for shipment of wet picric acid, wet trinitrobenzoic acid and wet urea nitrate in excess of 25 pounds, and § 173.192 for exemption up to 16 ounces.)

(2) Specification 21C (§ 178.224 of this subchapter). Fiber drums of not over 6½ gallons capacity with one inside 5-mil polyethylene bag. Drum must be made vapor tight through the installation of a 7-mil polyethylene interior lining, plus 1½ mil of polyethylene buried in the inside ply of the drum. The full open head of the container must be made vapor tight by the use of a 24-gauge metal lid with a 10-mil preformed sealing disc glued to the rubber gasket cover and locked with a lever type locking ring and a pilfer proof seal. The net weight of the dry material shall not exceed 25 pounds.

§ 173.194 Potassium permanganate. (a) Potassium permanganate must be packed in specification containers as follows:

(1) In containers as prescribed in § 173.154.

(2) In bulk, in sift-proof, self-clearing, covered hopper or bottom outlet steel cars or in sift-proof all steel flat bottom gondola cars with fixed sides and ends equipped with water-proof and dust-proof wooden or steel covers well secured in place for all openings, or in bulk, in motor vehicles with steel, sift-proof, self-clearing hopper-type or dump-type bodies, with water-proof and dust-proof covers, well secured in place. Such cars, when used exclusively in this service and stenciled "FOR POTASSIUM PERMANGANATE ONLY," are not subject to the requirements of § 174.515 of this subchapter.

§ 173.195 Pyroxylin plastic scrap. (a) Pyroxylin plastic scrap must be packaged as follows:

(1) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes lined, Spec. 2F or 2M (§§ 178.25, 178.31 of this subchapter). Gross weight must not exceed 450 pounds each.

(2) Specification 6B, 6C, or 6J; also 17H, 37A, or 37B (sing'e-trip containers) (§§ 178.98, 178.99, 178.100, 178.118, 178.131, or 178.132 of this subchapter). Metal barrels or drums.

(3) [Reserved]

(4) [Reserved]

(5) Spec. 21C (§ 178.224 of this subchapter). Fiber drums. Must be externally treated to provide protection against moisture. Authorized net weight not over 225 pounds.

(b) Pyroxylin plastic scrap, photographic film scrap, X-ray film scrap, motion picture film scrap, or pieces of exposed or unexposed film which show evidence of decomposition or instability or are liable to decompose or become unstable must be packed submerged in water in specification containers as follows:

(1) Specification 6B or 6C; or 17H (sing'e-trip) (§ 178.98, § 178.99, or § 178.118 of this subchapter). Metal barrels or drums.

(2) Specification 15A, 15B, 15C, or 19B (§ 178.168, § 178.169, § 178.170, 178.191 of this subchapter). Wooden boxes with tightly closed inside metal containers.

§ 173.197 Pyroxylin plastics, in sheets, rolls, rods, or tubes. (a) Pyroxylin plastics, in sheets, rolls, rods, or tubes containing nitrocellulose are subject to this subchapter only when offered for transportation by air or water and then must be packaged as follows:

(1) Specification 15A, 15B, 19A, or 19B (§§ 178.168, 178.169, 178.190, 178.191 of this subchapter). Wooden boxes.

(2) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes. Special boxes §§ 178.205-20 and 178.205-21 authorized only for pyroxylin in sheets, rods or tubes.

(3) Sheets rolled, in spec. 21C (§ 178.224 of this subchapter) fiber drums, having 2 straps applied lengthwise and one or more circumferentially; straps at least ½ by 0.02 inch steel. Authorized net weight not over 225 pounds.

(4) Sheets, rolled, not over 15 pounds net weight in fiber tubes lined throughout with single faced corrugated fiberboard at least 0.2 inch thick and securely closed; tube material at least 0.115 inch thick for side walls and 0.05 inch thick for ends with strength, Mullen or Cady test, at least 245 and 220 pounds respectively; metal ends for tubes acceptable when lined with fiber discs at least 0.05 inch thick.

(b) Pyroxylin plastics in manufactured articles or articles made therefrom is not subject to Parts 170-189 of this subchapter and Part 397 of this title.

§ 173.197a Smokeless powder for small arms. Smokeless powder for small arms in quantities not exceeding 100 pounds net weight transported in one rail car or motor vehicle may be classed as a flammable solid when examined for this classification by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT. Maximum quantity in any inside packaging may not exceed 8 pounds. Inside packagings must be arranged and protected to prevent simultaneous ignition of the contents. The complete package must be a type examined by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT. In addition, inside packages which have been examined by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT, may be overpacked in DOT-12A65, 12B65, or 12H65 fiberboard boxes provided all inside containers are firmly packed to prevent movement and the net weight of smokeless powder in any one box does not exceed 16 pounds. Each outside package must bear a FLAMMABLE SOLID label.

§ 173.198 Sodium hydride. (a) Sodium hydride must be packed in specification containers as follows:

(1) In containers as prescribed in § 173.206(a)(1) and (a)(2).

(2) Spec. 17H (§ 178.118 of this subchapter). Metal drums (single-trip).

(3) Spec. 37A or 37B (§ 178.131 or § 178.132 of this subchapter). Metal drums (sing'e-trip) with welded side seams and hermetically sealed closure or closure made fast by positive pressure of the lid against a rubber gasket with edge of the lid crimped over the lip of the drum and a protective metal ring fastened around the crimped edge, packed in strong outside wooden boxes.

§ 173.202 Sodium metal liquid alloy, potassium metal liquid alloy, and sodium potassium liquid alloy. (a) Sodium metal liquid alloy, potassium metal liquid alloy, and sodium potassium liquid alloy, must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§ 178.168, § 178.169, 178.191 of this subchapter). Wooden boxes with inside metal packagings. Inside packagings must be cushioned with incombustible cushioning material. Each inside metal packaging must have been tested hydrostatically to a pressure of not less than 60 pounds per square inch without rupture. Closing devices on inside metal packagings must be protected from injury. Not more than 300 pounds of the material may be shipped in one outside box.

(2) Spec. 5A (§ 178.81 of this subchapter), metal barrels or drums not exceeding 400 pounds capacity each, having protruding valves protected by a 12-gauge steel dome securely attached to the head of the drum. Shipments are authorized by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 4BW240 (§ 178.61 of this subchapter) cylinder. Each cylinder must be equipped with steel valve protection caps or collars, or be packed in strong wooden boxes and secured therein to protect the valves.

(4) Specification 51 (§ 178.245 of this subchapter) portable tank. Tanks shall have a minimum design pressure of 150 pounds per square inch. Safety relief devices must communicate with the vapor space when tanks are fully loaded. Tank must be blanketed with dry nitrogen at a pressure not to exceed 15 psig at all times.

(b) Packaging of metallic liquid alloys of sodium or potassium in combination with fissile or large quantities of radioactive material, is authorized as provided in § 173.206(a)(10) and (12).

§ 173.203 Tetranitromethane. (a) Tetranitromethane must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes, gross weight not exceeding 150 pounds, with inside containers which must be: glass bottles not more than 1 quart capacity each, with closures securely fastened and of a type not deteriorated by the contents, each bottle individually packed in a tight metal container and cushioned therein with absorbent incombustible material; or aluminum cans or polyethylene bottles, not more than 5 pounds capacity each, with opening not more than 1.25 inches diameter, fitted with securely fastened screw-type closures and gaskets of material not deteriorated by contact with the contents, cushioned with not less than 2 inches of absorbent incombustible cushioning material between the inside containers and any part of the wooden box.

(2) Specification 6B or 6C (§§ 178.98, 178.99 of this subchapter). Metal barrels or drums, with an inside stainless steel or aluminum drum(s). The inside drum may have no opening larger than 2.5 inches in diameter, and must be securely closed by a gasketed screw-type device. Gaskets must be made of materials that will not deteriorate upon contact with the contents. The inside drum(s) must be cushioned with not less than 2 inches of absorbent incombustible cushioning material. Each inside drum shall be of not less than 20-gauge metal and shall be tested for leakage before packing in the outside drum.

§ 173.204 Sodium hydrosulfite. (a) Sodium hydrosulfite must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not exceeding 5 pounds capacity each, or metal containers.

(2) Specification 6B, or 6C (§§ 178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 17E, 17H, or 37K (§§ 178.116, 178.118, or 178.130 of this subchapter). Metal drums (single-trip).

(4) Specification 37A or 37B (§§ 178.131, 178.132 of this subchapter). Metal drums (STC). Not authorized for transportation by air. Authorized for transportation by water only when the containers are fitted with a minimum 4-mil polyethylene liner, the drum covers contain sponge rubber gaskets, the drums are closed with a bolted ring closure and the gross weight is not over 275 pounds.

(5) Spec. 21C (§ 178.224 of this subchapter). Fiber drums with inside metal drums. Authorized net weight not over 225 pounds.

(6) Spec. 21C (§ 178.224 of this subchapter). Fiber drums. Authorized net weight of product not over 250 pounds; drums must have a metal foil (laminated between two sheets of kraft paper with thermoplas-

For explanation of abbreviations and reference marks, see last page of this tariff.

6c adhesive) moisture and water barrier wound into the sidewall of the drum and located not more than 2 plies from the interior of drum but not to be wound as the first ply; a metal foil moisture and water barrier must also be present in the fiber or wood heading; exterior of drum sidewall must be protected with a water resistant coating; in addition to the tests prescribed by §178.224-2(a), (b), and (c) of this subchapter, a drum having been given a 4-foot diagonal bottom chime drop must, after being emptied, withstand complete immersion of the bottom in 6 inches of water for 4 hours without leakage to the interior; drums must not be offered for transportation by carriers by water.

(7) Spec. 22B (§178.197 of this subchapter). Plywood drums with inside metal drums.

(8) Specification 56 (§§178.251, 178.252 of this subchapter). Portable tank. Authorized only for shipment in a closed transport vehicle. For rail transportation see §174.63 of this subchapter. Not authorized for transportation by water.

§ 173.205 Sodium picramate, wet. (a) Sodium picramate must be wet with not less than 20 percent of water by weight and packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not exceeding 1 quart capacity each, and cushioned in outside container.

(2) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside polyethylene container meeting all requirements of Specification 2U (§178.24 of this subchapter) except removable head is authorized. Fiber drum must be rated for a minimum net weight of 600 pounds. Maximum gross weight shall not exceed 400 pounds.

§ 173.206 Sodium or potassium, metallic; sodium amide; sodium potassium alloys; sodium aluminum hydride; lithium metal; lithium silicon; lithium ferro silicon; lithium hydride; lithium borohydride; lithium aluminum hydride; lithium acetylide-ethylene diamine complex; aluminum hydride; cesium metal; rubidium metal; zirconium hydride, powdered. (a) Metallic sodium or potassium, sodium amide, sodium potassium alloys, sodium aluminum hydride, lithium metal, lithium silicon, lithium ferro silicon, lithium hydride, lithium borohydride, lithium aluminum hydride, lithium acetylide-ethylene diamine complex, aluminum hydride, cesium metal, rubidium metal, and powdered zirconium hydride must be packaged as follows:

(1) Specification 15A, 15B, 19A, or 19B (§§178.168, 178.169, 178.190, 178.191 of this subchapter). Wooden boxes must have inside air-tight metal packagings. Each inside air-tight metal packaging must have a closing device securely fastened by positive means (not friction). For shipments of lithium aluminum hydride, each inside metal packaging must not exceed 1 gallon capacity and must be securely closed, positive means not required. Each inside metal packaging containing lithium aluminum hydride must be cushioned in outside packagings with sufficient incombustible packaging material.

(2) Specification 5, 5C, 6B, or 6C (§§178.80, 178.83, 178.98, 178.99 of this subchapter). Metal barrels or drums. Not authorized for lithium aluminum hydride or aluminum hydride.

(3) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (sing'e-trip). Authorized only for lithium metal or sodium, metallic which must be fused solid in the container.

(4) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter). Metal drums (sing'e-trip) not exceeding 6 gallons capacity each, with welded side seams and hermetically sealed closure or closure made fast by positive pressure of the lid against a rubber gasket with edge of the lid crimped over the lip of the drum and a protective metal ring fastened around the crimped edge, cushioned on all sides with incombustible packing material, packed in strong outside wooden boxes (see §173.25). Not more than four inside metal drums shall be packed in one outside wooden box.

(5) Spec. 17C (§178.115 of this subchapter). metal drums (sing'e-trip). Not authorized for lithium aluminum hydride.

(6) Spec. 17H or 37A (§178.118 or §178.131 of this subchapter). Metal drums (sing'e-trip), with air-tight metal inside containers which must have closing device securely fastened by positive means (not friction). Inside metal containers must be cushioned on all sides by incombustible packing material. Authorized for lithium metal or lithium hydride only.

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 375-pound test (Mullen or Cady) solid fiberboard with inside air-tight metal container which must have a closing device securely fastened by positive means (not friction). Each inside metal container must be individually nested into a double-faced corrugated partition of at least 200-pound test (Mullen or Cady) which is in turn surrounded on all sides by a peripheral double-walled corrugated liner of at least 200-pound test (Mullen or Cady). Authorized gross weight not over 90 pounds.

(8) Spec. 21C (§178.224 of this subchapter). Fiber drums constructed for 400 pounds net weight, with the material packed not more than 5 pounds net weight each in not to exceed one-half gallon steel cans equipped with friction-top closures. Authorized for lithium ferro silicon only.

(9) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with non-sparking inside metal cans securely closed by use of plastic tape, or other efficient means to provide moisture tight seal. Authorized only for lithium metal in ribbon form not over ½ inch wide and 1/16 inch thick. Lithium metal ribbon must be coated with heavy mineral oil or petrolatum and be wound on motion picture film reels not over 1,600-foot capacity each.

(10) Tubes of stainless steel, or other metals of equivalent strength and nonreactivity, having sealed, welded end caps, and containing not more than 50 grams of metal. Authorized only for metallic sodium, metallic lithium, metallic potassium, and sodium potassium alloy. Each tube must be enclosed within a secondary sealed metallic tube and further enclosed within strong tight outer packaging.

(11) Specification 12B (§173.205 of this subchapter). Fiberboard box. Authorized only for lithium metal in wire form. Fiberboard box must have inside nonsparking metal packaging. Each inside nonsparking metal packaging must be tin coated and sealed by rolled-on lids. The contents of each inside packaging must be coated with heavy mineral oil or petroleum and wound on a 3-inch by 3-inch nonsparking metal spool. The net weight of the contents in each inside packaging must not exceed one-fourth pound.

(12) Any packaging as prescribed in §§173.416 or 173.417(b).

(13) Specification 21C (§178.224 of this subchapter). Fiber drums with inside hermetically sealed tin-coated steel cans with a minimum wall thickness of 0.015 inch. Not more than four spools made of nonsparking material may be packed in each inside container with not more than 2½ pounds net weight of product in each inside container. Each metal can shall be individually separated with double-faced corrugated partitions and noncombustible packaging material. Authorized only for lithium metal in ribbons.

(b) Sodium or potassium, metallic, sodium amide, and lithium metal, immersed in neutral oil may also be shipped when packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§178.168, §178.169, §178.191 of this subchapter). Wooden boxes with inside metal drums, Spec. 37A or 37B (§178.131, §178.132 of this subchapter) having welded side seams, net weight not over 30 pounds, or with inside glass containers, each enclosed in a tin container.

(2) Spec. 17H (§178.118 of this subchapter). Metal drum (sing'e-trip). Authorized only for lithium metal in the form of cups or ingots.

(c) Sodium, metallic, may also be shipped when packed in specification containers as follows:

(1) Spec. 105A300-W (§§179.100 and 179.101 of this subchapter). Tank cars, having exterior heater coils fushion welded to tank shell and properly stress-relieved, the material to be in molten condition when loaded into the tank and allowed to solidify before car is offered to the carrier. Outage must be 5 percent or more for sodium at fusion temperature of 208° F.

(2) Specification 17C, 17H, 37A, or 37B (§§178.115, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (sing'e-trip). These drums are authorized for cylindrical blocks which must be at least 2 inches in diameter and not less than 6 inches in length, or rectangular blocks not less than 6 inches in length and not less than 2 inches in any other dimension.

(3) Specification MC 330 or MC 331 (§178.337 of this subchapter). Cargo tanks having a minimum design pressure of 150 pounds per square inch and having exterior coils fusion-welded to the tank shell and properly stress-relieved. Tanks must be equipped with safety valves having a start-to-discharge pressure not exceeding 150 pounds per square inch. The material must be in molten condition when loaded and solidified before being moved over a public highway. Outage must be 5 percent or more at a sodium temperature of 208° F.

(4) Specification 51 (§178.245 of this subchapter). Portable tank. Each tank must have a minimum design pressure of 150 p.s.i.g. Each tank must be equipped with safety valves having a start-to-discharge pressure of 150 p.s.i.g. If a tank has exterior heating coils these coils must be welded to the tank and must be stress relieved. The material must be in molten condition when loaded and the tank must be held for sufficient time to allow the material to be completely solidified before being offered for transportation. Outage must be five percent or more at sodium fusion temperature of 208° F.

(d) Limited quantities of lithium metal in cartridges or rubidium metal in cartridges is excepted from labeling (except when offered for transportation by air) and specification packaging requirements, when packaged according to the following paragraph. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) In inside hermetically sealed metal cartridges not exceeding 18 grams net weight each, packed in strong outside packagings with net weight of lithium or rubidium metal not exceeding one pound; which outside packaging may be further overpacked in strong wooden boxes or fiber drums provided total net weight of lithium or rubidium metal in one outside box or drum does not exceed one pound.

(e) Lithium metal or rubidium metal in cartridges, containing more

than 18 grams but not more than 120 grams of lithium or rubidium, must be packed in specification packagings as follows:

(1) Specification 15A, 15B, 19A, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside air-tight copper cartridges having a minimum wall thickness of 0.02-inch. Cartridges having less than 0.022-inch wall thickness must be separated or securely cushioned in the boxes. Gross weight must not exceed 75 pounds.

(f) Lithium batteries comprised of one or more cells are not subject to the requirements of this subchapter, if they meet the following requirements.

(1) Each cell may contain no more than 0.5 gram of lithium or lithium alloy.

(2) Each battery may contain an aggregate quantity of no more than 1 gram of lithium or lithium alloy.

(3) Each cell must be hermetically sealed.

(4) Cells must be separated so as to prevent short circuits.

(5) Batteries must be packed in strong outside packagings except when installed in electronic devices.

(6) If a battery contains more than 0.5 gram of lithium or lithium alloy, it may not contain a liquid or gas that is a hazardous material according to this subchapter unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

§ 173.207 Sulfide of sodium or sulfide of potassium, fused or concentrated, when ground. (a) Sulfide of sodium or sulfide of potassium, fused or concentrated, when ground, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside bottles enclosed in tightly closed metal cans, or hermetically sealed (soldered) metal cans.

(2) Specification 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside containers which must be hermetically sealed (soldered) metal cans of not over 5 pounds capacity.

(b) When fused or concentrated, but not ground (may be chipped, flaked, or broken), may be shipped in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside bottles of not more than 5 pounds capacity each, or tightly sealed metal cans.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be metal cans of not over 5 pounds net weight each or glass bottles of not over 1 pound net weight each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross.

(3) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (single-trip).

(4) Specification 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(5) Spec. 21C (§178.224 of this subchapter). Fiber drums which must be lined or coated, or otherwise treated so as to prevent the entrance of moisture in quantities sufficient to create a hazardous condition in transportation; maximum loaded capacity 250 pounds net.

(6) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads shall not require perimeter liner. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having minimum thickness of 0.004 inch. Not more than 25 pounds net weight of product may be packed in one outside box.

(7) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pounds capacity each. Not more than four bottles having capacity of 5 pounds each shall be packed in one outside box. Shipper must have established that completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(c) Sulfide of potassium, crystallized, is not subject to Parts 170–189 and 397 of this title.

(d) Sodium sulfide when shipped fused in one solid mass in a metal barrel or drum and sodium sulfide, crystallized, are not subject to Parts 170–189 and 397 of this title.

(e) Sodium sulfide containing 35 percent or more combined water by weight, fused or concentrated but not ground (may be chipped, flaked, or broken), when packed in steel barrels or drums or portable metal tanks that are equipped with moisture-tight closures, or in strong tight fiber drums having a moisture-barrier incorporated in the walls and equipped with moisture-tight closures, is not subject to Parts 170–189 and Part 397 of this Title. Portable tanks filled to gross weight to be shipped must be capable of withstanding a drop from a height of 4 feet onto solid concrete without rupture or serious damage, and must be equipped with lifting devices capable of holding 4 times the gross weight of filled tank.

§ 173.208 Titanium metal powder, wet or dry. (a) Titanium metal powder, wet. Titanium metal powder, wet, with not less than 20 percent water, must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal cans not exceeding 1 gallon each, and not more than 12 metal cans in one outside box; or not more than 1 inside metal can of not less than 22-gauge metal and not over 10 gallons capacity. Metal cans must be tightly closed.

(2) Titanium metal powder, wet, with not less than 50 percent water by weight may be packed in any full removable head drum specified in §173.154.

(b) Titanium metal powder, dry. Titanium metal powder, dry, must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.190, 178.191 of this subchapter). Wooden boxes with inside metal containers, closed by push-in covers, held in place by soldering at least four points, or in screw-cap metal cans. Inside containers must not exceed 10 pounds net weight each and must be cushioned by an incombustible material. Gross weight not to exceed 75 pounds each.

(2) Spec. 17H or 37A (§178.118 or §178.131 of this subchapter). Metal barrels or drums (single-trip) with inside metal drum of not less than 20-gauge metal and with closure secured by positive means. The inside container shall be completely surrounded by not less than 1 inch of incombustible cushioning material.

(3) Spec. 5B (§178.82 of this subchapter). Metal barrels or drums not over 15 gallons capacity.

(4) Specification 17C (§178.115 of this subchapter). Metal drums (single trip) not over 30-gallon capacity.

§ 173.212 Trinitrobenzene and trinitrotoluene, wet. (a) Trinitrobenzene and trinitrotoluene, wet with not less than 10 percent water, in quantity not exceeding 16 ounces in one outside package, may be shipped as drugs, medicines, or chemicals, when in glass bottles securely stoppered, each bottle inclosed in a strong fiber carton properly cushioned in the outside shipping case and are not subject to any other requirement of Parts 170–189 and 397 of this title.

§ 173.214 Hafnium metal or zirconium metal, wet, minimum 25 percent water by weight, mechanically produced, finer than 270 mesh particle size; hafnium metal or zirconium metal, dry, in an atmosphere of inert gas, mechanically produced, finer than 270 mesh particle size; hafnium metal or zirconium metal, wet, minimum 25 percent water by weight, chemically produced (see Note 1), finer than 20 mesh particle size; hafnium metal or zirconium metal, dry, in an atmosphere of inert gas, chemically produced (see Note 1), finer than 20 mesh particle size.

Note 1. Produced by means other than attrition or grinding.

Note 2. Any product containing 10 percent or more particle size specified, shall be subject to this section.

Note 3. Any product containing less than 25 percent water by weight is considered dry for purposes of these regulations.

(a) Hafnium metal, wet, mechanically produced finer than 270 mesh particle size or chemically produced finer than 20 mesh particle size with a minimum of 25 percent water by weight (a mixture of water and a suitable anti-freeze agent may be used when freezing temperatures may be encountered during transportation) must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes or Spec. 6B or 6C (§§178.98, 178.99 of this subchapter) metal drums with inside glass or noncarbon polyethylene containers having net weight of not over 10 pounds each. Inside glass containers must be equipped with positive type clamp-on closures equipped with rubber gaskets. Inside polyethylene containers must have screw-cap closures equipped with gaskets ahead of thread and shall be of material which will not react with or be decomposed when in contact with contents. Screw-cap closures must be secured in place by suitable tape. Each glass or polyethylene container must be surrounded on all sides with not less than 1 inch of incombustible cushioning material and in an amount sufficient to completely absorb the entire liquid contents of the containers. Each inside glass or polyethylene container must be placed in a strong tight metal can closed with push-in cover held in place by soldering or crimping at least four points. The authorized net weight of hafnium in one outside container shall not exceed 40 pounds for wooden boxes and shall not exceed 150 pounds for steel drums.

(b) Hafnium metal, dry, in an atmosphere of inert gas, mechanically produced finer than 270 mesh particle size or chemically produced finer than 20 mesh particle size must be packed in specification containers as follows:

(1) Specification 6B or 6C (§§178.98, 178.99 of this subchapter) or Spec. 17C, 17H, or 37A (single-trip containers) (§§178.115, 178.118, 178.131 of this subchapter). Metal barrels or drums with inside noncarbon polyethylene bottles having positive type clamp-on closures equipped with rubber gaskets, or with screw-cap closures having not less than three continuous threads and equipped with gaskets ahead of threads, not over 5 pounds net weight capacity each. Screw-cap closures must be secured in place by suitable tape. Each bottle must be placed in a Specification 2R (§178.34 of this subchapter) metal container having a wall thickness of one-fourth inch and be completely sur-

For explanation of abbreviations and reference marks, see last page of this tariff.

rounded by cushioning material. Specification 2R containers must be separated from one another by incombustible cushioning material. The authorized net weight of metal in one outside container shall not exceed 150 pounds.

(c) Zirconium metal, wet, mechanically produced finer than 270 mesh particle size or chemically produced finer than 20 mesh particle size with a minimum of 25 percent water by weight (a mixture of water and a suitable anti-freeze agent may be used when freezing temperatures may be encountered during transportation) must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter) Wooden boxes or Spec. 6B or 6C (§§178.98, 178.99 of this subchapter) or Spec. 17C or 17H (§§178.115, 178.118 of this subchapter) metal drums with inside glass or noncarbon polyethylene containers having net weight of not over 10 pounds each. Inside glass containers must be equipped with positive type clamp-on closures equipped with rubber gaskets. Inside polyethylene containers must have screw-cap closures equipped with gaskets ahead of the thread and shall be of material which will not react with or be decomposed when in contact with contents. Screw-cap closures must be secured in place by suitable tape. Each glass or polyethylene container must be surrounded on all sides with not less than 1 inch of incombustible cushioning material and in an amount sufficient to completely absorb the entire liquid contents of the containers. Each inside glass or polyethylene container must be placed in a strong metal can closed with push-in cover held in place by soldering or crimping at at least four points. The authorized net weight of zirconium in one outside container shall not exceed 40 pounds in wooden boxes and 150 pounds in steel drums.

(2) [Reserved]

(3) Spec. 37P (§178.133 of this subchapter). Steel drums with polyethylene liner of one-piece molded construction (nonreusable container) not over 5 gallons capacity each. Drums exceeding 1 gallon capacity must be constructed of at least 24-gauge metal.

(4) Specification 37M (§178.134 of this subchapter). Cylindrical steel overpack with inside specification 2S (§178.35 of this subchapter) polyethylene container. Each overpack must be constructed of at least 24-gage steel. Each packaging may not exceed a capacity of 5 gallons. Net weight of contents may not exceed 50 pounds of dry material.

(5) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside specification 2S (§178.35 of this subchapter) noncarbon polyethylene container. Container is limited to single trip only and may not exceed a capacity of 5 gallons. Net weight of contents must not exceed 50 pounds of dry material.

(d) Zirconium metal, dry, in an atmosphere of inert gas, mechanically produced finer than 270 mesh particle size or chemically produced finer than 20 mesh particle size must be packed in specification containers as follows:

(1) Specification 6B or 6C (§§178.98, 178.99 of this subchapter) or Specification 17C, 17H, or 37A (single-trip containers) (§§178.115, 178.118, 178.131 of this subchapter). Metal barrels or drums with inside non-carbon polyethylene bottles having positive type clamp-on closures equipped with rubber gaskets, or with screw-cap closures having not less than three continuous threads and equipped with gaskets ahead of threads, not over 5 pounds net weight capacity each. Screw-cap closures must be secured in place by suitable tape. Each bottle must be placed in a Specification 2R (§178.34 of this subchapter) metal container having a wall thickness of one-fourth inch and be completely surrounded by cushioning material. Specification 2R containers must be separated from one another by incombustible cushioning material. The authorized net weight of metal in one outside container shall not exceed 150 pounds.

(e) Mechanically produced hafnium metal, coarser than 270 mesh particle size and chemically produced coarser than 20 mesh particle size in strong tight containers are not subject to Parts 170–189 of this subchapter and Part 397 of this Title.

(f) Mechanically produced zirconium metal, coarser than 270 mesh particle size and chemically produced coarser than 20 mesh particle size in strong tight containers are not subject to Parts 170–189 and 397 of this title. (See §173.220, zirconium scrap.)

§ 173.216 Zirconium picramate, wet. (a) Zirconium picramate must be wet with not less than 20 percent of water by weight and packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers of not over 1-quart capacity each, tightly stoppered and cushioned.

§ 173.217 Calcium hypochlorite, hydrated; Calcium hypochlorite mixture, dry; lithium hypochlorite mixture, dry; mono-(trichloro) tetra-(monopotassium dichloro)-penta-s-triazinetrione, dry; potassium dichloro-s-triazinetrione, dry; sodium dichloro-s-triazinetrione, dry; trichloro-s-triazinetrione, dry. (a) Calcium hypochlorite, hydrated; calcium hypochlorite mixture, dry, lithium hypochlorite mixture, dry, mono-(trichloro) tetra-(monopotassium dichloro)-penta-s-triazinetrione, dry, potassium dichloro-s-triazinetrione, dry, sodium dichloro-s-triazinetrione, dry, and trichloro-s-triazinetrione, dry, each containing more than 39 percent available chlorine must be packaged as follows:

(1) Specification 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.

(2) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (single-trip).

(3) Specification 21C (§178.224 of this subchapter). Fiber drums with inner ply consisting of a laminated sheet of paper and aluminum foil, internally coated. Cover of drum must be gasketed. Authorized net weight not over 400 pounds.

(4) Specification 21C (§178.224 of this subchapter). Fiber drum with commodity packed in securely closed polyethylene bag constructed of polyethylene film not less than 0.004-inch thickness. Not authorized for calcium hypochlorite mixtures and lithium hypochlorite compounds, dry.

(5) Specification 21C (§178.224 of this subchapter). Fiber drum must be made with integral inner body ply having 0.003-inch minimum thickness aluminum facing and bottom inner ply having 0.001-inch minimum thickness aluminum facing. Cover of drum must be gasketed. Authorized net weight not over 400 pounds. Authorized only for dry calcium hypochlorite mixtures.

(6) Specification 56 (§§178.251, 178.252 of this subchapter). Metal portable tank. Authorized only for calcium hypochlorite, hydrated; mono-(trichloro) tetra-(monopotassium dichloro)-penta-s-triazinetrione, dry; potassium dichloro-s-triazinetrione, dry; sodium dichloro-s-triazinetrione, dry; and trichloro-s-triazinetrione, dry. For rail transportation, see §174.63(b) of this subchapter.

(7) Specification 35 (§178.16 of this subchapter) non-reusable, removable head polyethylene drum for use without overpack and not over seven gallons capacity.

(8) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles with a minimum wall thickness of 0.015 inch. Not more than 2 polyethylene bottles may be packed in one box and each bottle must not contain more than 20 pounds net weight of the material. Packaging must be such that it will not react dangerously with or be decomposed by the commodity.

(9) Specification 12B (§178.205 of this subchapter). Fiberboard box with not more than two inside minimum 30-gauge thick steel pails containing not over 26 pounds net weight each. Each cover must be gasketed.

(b) As prescribed in §173.163(a)(7). Authorized only for calcium hypochlorite, hydrated.

(c) Limited quantities of these materials in strong outside wooden or fiberboard packages with inside packagings of glass not over five pounds capacity each, or with inside metal packagings or plastic bottles or drums not over ten pounds capacity each, are excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

§ 173.218 Isopropyl percarbonate, unstabilized. (a) Isopropyl percarbonate, unstabilized, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§178.168, §178.169, §178.170, §178.185, §178.190, 178.191 of this subchapter). Wooden boxes with inside glass, earthenware, or metal containers of not over 2 gallons capacity each which must be maintained at a temperature below 0° F. Shipments are authorized for transportation by private or contract carrier by motor vehicle only.

§ 173.219 Potassium perchlorate. (a) Potassium perchlorate must be packed as follows:

(1) As prescribed in §173.154(a)(1) to (a)(11) and (a)(14). Plastic bottles may be substituted for the inside glass bottles prescribed in §173.154(a)(6).

§ 173.220 Magnesium or zirconium scrap consisting of borings, clippings, shavings, sheets, turnings, or scalpings, and magnesium metallic (other than scrap), powdered, pellets, turnings, or ribbon; magnesium aluminum powder. (a) Magnesium or zirconium scrap consisting of borings, shavings, or turnings, must be packed in closed metal barrels or drums, wooden barrels, metal pails, fiber drums, fiberboard boxes with inside polyethylene bags or liner, or four-ply paper bags. Fiberboard boxes with inside polyethylene bags or liner or paper bags are not authorized for less-than-carload or less-than-truckload shipments.

(1) Magnesium or zirconium scrap consisting of clippings, scalpings, or scrap sheets may be shipped in bulk in carload or truckload quantities. Cars must be tight box cars or tightly closed steel covered gondola cars and trucks or trailers must have closed or completely covered bodies.

(2) Limited quantities of magnesium or zirconium scrap consisting of clippings, scalpings, or scrap sheets in closed metal drums, wooden barrels, or wooden boxes, unless otherwise provided, is excepted from labeling (except when offered for transportation by air) and specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817.

(3) When transported by vessel, magnesium scrap may not be carried in paper bags and zirconium scrap may only be packaged in an hermetically sealed metal drum not exceeding 80 pounds net weight.

(b) Magnesium metallic (other than scrap), powder, pellets, turnings, or ribbon, magnesium aluminum powder, must be packed in containers as prescribed in §173.154.

(1) Limited quantities of magnesium metallic (other than scrap), pellets, turnings, or ribbon in fiberboard boxes with inside glass bottles not over 1 pound capacity each, with not more than 25 pounds net weight of product in each outside fiberboard box, in closed metal drums, metal pails, fiber drums, or wooden boxes with inside packagings are, unless otherwise provided, excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(2) Specification 56 (§178.252 of this subchapter). Portable tank. Not authorized for transportation by water. For magnesium powder, or magnesium aluminum powder, the following additional requirements must also be met.

(i) The tank must be pressurized with 2 psig of nitrogen before shipment and the pressure relief valve must have a maximum setting of 3 psig; and

(ii) The tank must have both a sift-proof valve with a locking pin and a plug or blind flange on the bottom opening.

§ 173.221 Liquid organic peroxides, n.o.s., and liquid organic peroxide solutions, n.o.s. (a) Liquid organic peroxides, n.o.s., and liquid organic peroxide solutions, n.o.s. must be packed in packagings which may be equipped with venting devices wherever necessary to prevent excessive pressure buildup, as follows:

(1) Specification 1A, 1D or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Rated capacity may not exceed 5 gallons for Specification 1A. Not authorized for transportation by aircraft.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass, earthenware, or metal containers, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb any leakage. Metal containers authorized only for materials which will not react dangerously with or be decomposed by contact with metal.

(3) Specification 12B (§178.205 of this subchapter). Fiberboard box with Specification 2E (§178.24a of this subchapter) inside polyethylene bottles, or with glass or metal inside receptacles, not over 1 gallon each. Not more than six 1-gallon polyethylene bottles may be packed in one fiberboard box. Not more than one 1-gallon glass or metal inside receptacle, which must be cushioned with noncombustible packing material in sufficient quantity to absorb the contents of the inner receptacle, may be packed in one fiberboard box. Metal and polyethylene inside receptacles authorized only for material which will not react dangerously with or be decomposed by contact with metal or polyethylene.

(4) Spec. 42B (§178.107 of this subchapter). Aluminum drums not over 15 gallons capacity. Authorized only for peroxides which will not react dangerously with the aluminum or be decomposed by contact with it.

(5) Spec. 17C or 17E (§§178.115 or 178.116 of this subchapter). Metal drums (sing'e-trip) not over 15 gallons capacity. Authorized only for material which will not react dangerously with the drum metal, or be decomposed by contact with it.

(6) Spec. 22C (§178.198 of this subchapter). Plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside spec. 2T (§178.21 of this subchapter) polyethylene container. Authorized only for material which will not react dangerously with or cause decomposition of the polyethylene.

(7) Specification 6D or 37M (nonreuseable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside Specifications 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene containers. Authorized only for materials which will not react dangerously with or cause decomposition of the polyethylene.

(8) Spec. 37P (§178.133 of this subchapter). Steel drums, not over 5-gallons capacity, with one-piece seamless molded polyethylene liner (nonreusable container). Drums exceeding 1-gallon capacity must be constructed of at least 24-gauge metal. Authorized only for materials that will not react with polyethylene and result in container failure.

(9) Specification 12P (§178.211 of this subchapter). Fiberboard box with one inside specification 2U (§178.24 of this subchapter) polyethylene container of not over 6 gallon capacity, or two inside specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(10) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles, not over 5-gallons capacity each, as specified by §178.205–34 of this subchapter. Not more than one bottle shall be packed in one outside box. Authorized only for material which will not react dangerously with or cause decomposition of polyethylene.

(11) Specification 16A (§178.185 of this subchapter). Wooden boxes with inside Specification 2U, 2S, or 2SL (§§178.24, 178.35, 178.35a of this subchapter) polyethylene containers, not over 5-gallon capacity each. Specification 2U container must have a minimum wall thickness of 0.015 inch. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner, top pad, and bottom pad. Authorized only for materials which will not react dangerously with or be decomposed by contact with polyethylene.

(12) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(13) Specification 57 (§178.253 of this subchapter). Metal portable tanks. Tanks are authorized only for tert-butyl cumyl peroxide. The tank may not be filled to more than 90-percent capacity.

§ 173.222 Acetyl peroxide and acetyl benzoyl peroxide, solution. (a) Acetyl peroxide must be shipped in solution in a non-volatile solvent and must contain not more than 25 percent by weight of the peroxide. Acetyl benzoyl peroxide must be shipped in solution in a non-volatile solvent and must contain not more than 40 percent by weight of the peroxide. They must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb any leakage.

(2) Specification 1A, 1D, or 1M (§§178.1, 178.4 or 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Rated capacity may not exceed 5 gallons for Specification 1A. Not authorized for transportation by aircraft.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be glass or earthenware, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb the contents of the inner container. Not more than one 1-gallon inside container shall be packed in one outside fiberboard box.

(4) Specification 12P (§178.211 of this subchapter). Fiberboard box with one inside specification 2U (§178.24 of this subchapter) polyethylene container of not over 5 gallon capacity or two inside specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(5) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles, not over 5 gallons capacity each, as specified by §178.205–34 of this subchapter. Not more than one bottle shall be packed in one outside box. Authorized only for material which will not react dangerously with or cause decomposition of polyethylene.

(6) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

§ 173.223 Peracetic acid. (a) Peracetic acid must be shipped in solution not exceeding 40 percent strength and must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass, earthenware, or polyethylene containers not over 1-gallon capacity each, cushioned with sterile absorbent cotton or other cushioning material which will not react with the contents to generate heat. Polyethylene container must have a vented closure capable of preventing leakage of liquid contents. Cushioning material must be in sufficient quantity to absorb any leakage. Boxes with inside polyethylene containers must be marked "Keep This Side Up."

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be glass or earthenware, not over one quart capacity each, cushioned with sterile absorbent cotton or other cushioning material which will not react with the contents to generate heat. Cushioning material must be in sufficient quantity to completely absorb the contents of the inner container.

(3) Specification 1D or 1M (§178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(4) Spec. 22C (§178.198 of this subchapter). Plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container.

(5) Specification 6D or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside Specifications 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene containers not over 55-gallon capacity. Polyethylene container must have a vented closure capable of preventing leakage of liquid contents.

(6) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside Specification 2SL (§178.35a of this subchapter) polyethylene container not over 30-gallon capacity. Container must have a vented closure to prevent accumulation of internal pressure and the head with closure must be marked "Keep This End Up."

(7) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(b) Limited quantities of peracetic acid solutions not exceeding 40 percent strength packed in strong wooden or fiberboard boxes, with not more than one inside glass packaging not exceeding 1 pint capacity, cushioned with sterile absorbent cotton or other cushioning material which will not react with the contents to generate heat, and with such

For explanation of abbreviations and reference marks, see last page of this tariff.

cushioning material in sufficient quantity to completely absorb the contents of the bottle, are excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817.

§ 173.224 Cumene hydroperoxide, dicumyl peroxide, diisopropylbenzene hydroperoxide, paramenthane hydroperoxide, pinane hydroperoxide and tertiary butylisopropyl benzene hydroperoxide. (a) Cumene hydroperoxide of strength not exceeding 96 percent in a non-volatile solvent, dicumyl peroxide of strength not exceeding 50 percent in a non-volatile solvent, diisopropylbenzene hydroperoxide of strength not exceeding 60 percent in a non-volatile solvent, paramenthane hydroperoxide of strength not exceeding 60 percent in a non-volatile solvent, and tertiary butylisopropylbenzene hydroperoxide of strength not exceeding 60 percent must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb any leakage.

(2) Spec. 17E (§178.116 of this subchapter). Metal drums (single-trip), with interiors so treated that they will be resistant to the contents.

(3) Specification 103[1], 103W, 103A,[1] 103AW, 111A60F1, 111A60W1, 111A100F2, or 111A100W2 (§§179.200, 179.201 of this subchapter). Tank cars. Authorized for 90 percent or less cumene hydroperoxide in a nonvolatile solvent, dicumyl peroxide of strength not exceeding 50 percent in a nonvolatile solvent, paramenthane hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent and diisopropylbenzene hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent only. Specifications 103,[1] 103W, 111A60F1 and 111A60W1 tank cars must have bottom outlets effectively sealed from the inside.

(4) Specification MC-310, MC-311 or MC-312 (§178.343 of this subchapter). Cargo tanks. Authorized for diisopropylbenzene hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent. Bottom outlets are not authorized. Authorized for paramenthane hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent. Authorized for pinane hydroperoxide of strength not exceeding 45 percent in a nonvolatile solvent. Authorized for cumene hydroperoxide of strength not exceeding 90 percent in a nonvolatile solvent in MC-311 or MC-312 cargo tanks only.

§ 173.225 Phosphorus trisulfide; phosphorus sesquisulfide; phosphorus heptasulfide; phosphorus pentasulfide.

(a) Phosphorus trisulfide, phosphorus sesquisulfide and phosphorus heptasulfide must be packaged as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers, hermetically sealed (soldered) or water-tight metal cans with screw-top closures.

(2) Specification 6B or 6C (§§178.98 or 178.99 of this subchapter). Metal barrels or drums, not over 30 gallons capacity each.

(3) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter). Metal drums (single-trip). Gross weight not over 425 pounds.

(b) Phosphorus pentasulfide must be packed as follows:

(1) In any packaging prescribed in §173.154 which will not permit water to come in contact with the lading.

(2) Specification 53[1] or 56 (§§178.251, 178.252 of this subchapter). Metal portable tank.

(3) Metal drum not over 15 gallons capacity. Authorized only for phosphorus pentasulfide fused into a solid mass before transportation.

§ 173.227 Urea peroxide. (a) Urea peroxide must be packed in specification containers as follows:

(1) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be rubber or plastic containers not exceeding 4 ounces each. Gross weight not over 65 pounds.

(2) Spec. 21C (§178.224 of this subchapter). Fiber drums completely coated on the inside with a suitable wax, synthetic coating, or metal foil suitable to the lading; or fiber drums having a metal foil (laminated between two sheets of kraft paper with thermoplastic adhesive) moisture and water barrier wound into the sidewall of the drum and located not more than 2 plies from the interior of drum but not to be wound as the first ply; a metal foil moisture and water barrier must also be present in the fiber or wood heading; exterior of drum sidewall must be protected with a water resistant coating; in addition to the tests prescribed by §178.224-2(a), (b), and (c) of this subchapter, a drum having been given a 4-foot diagonal bottom chime drop must, after being emptied, withstand complete immersion of the bottom in 6 inches of water for 4 hours without leakage to the interior. Authorized net weight not over 225 pounds.

(3) Spec. 22A (§178.196 of this subchapter). Plywood drums with paper bags, Spec. 2J (§178.28 of this subchapter) coated with suitable wax on the inner surface.

[1] Use of existing tank cars authorized, but new construction not authorized.

§ 173.228 Zinc ammonium nitrite. (a) Zinc ammonium nitrite must be packed in specification containers as follows:

(1) Spec. 6B, or 6C (§§178.98, or 178.99 of this subchapter). Metal barrels or drums.

(2) Spec. 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (single-trip). Gross weight not over 300 pounds.

§ 173.229 Chlorate and borate mixtures or chlorate and magnesium chloride mixtures. (a) Chlorate and borate mixtures or chlorate and magnesium chloride mixtures containing more than 50 percent chlorate and no other hazardous additives must be packed as follows:

(1) As prescribed in §173.163.

(b) Limited quantities of chlorate and borate mixtures or chlorate and magnesium chloride mixtures containing no other hazardous additives and containing less than 50 percent chlorate are excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) Tight metal or fiber drums.

(2) Wooden boxes with tight inside metal containers.

(3) Multi-wall paper bags, net weight not over 50 pounds, moisture proof and sift proof, and having a strength capable of withstanding four 4-foot drops onto solid concrete.

(4) Strong fiberboard boxes with inside fiber containers having metal tops and bottoms, net weight not over 4 pounds each; gross weight of completed package not over 65 pounds.

(5) Strong fiberboard boxes with not more than 4 inside paper bags Spec. 2D (§178.23 of this subchapter), having net weight not over 10 pounds each.

(c) Chlorate and borate mixtures or chlorate and magnesium chloride mixtures containing 28 percent or less chlorate and no other hazardous additives, are not subject to the regulations in Parts 170–189 and 397 of this title.

§ 173.230 Sodium, metallic, dispersion in organic solvent. (a) Sodium, metallic, dispersion in organic solvent must be packed in specification containers as follows.

(1) Specification 15A, or 19B (§178.168, §178.191 of this subchapter). Wooden boxes with inside containers which must be metal cans not exceeding one quart capacity, and each such can must be packed in another metal can and cushioned on all sides with at least one inch of incombustible dry nonhydroscopic material which is nonreactive with sodium at temperatures encountered during normal transportation. Both the inner and outer metal cans shall be equipped with an airtight closing device secured by positive means (not friction). Gross weight of completed package must not exceed 100 pounds.

(2) Spec. 17H (§178.118 of this subchapter). Metal drum (single-trip) of not over 55 gallons capacity, with material contained in an inside spec. 17E (§178.116 of this subchapter) metal drum (single-trip) of not over 30 gallons capacity. The inside drum shall be snugly packed in the outside drum by completely and evenly surrounding it with incombustible dry nonhydroscopic material which is nonreactive with sodium at temperatures encountered during normal transportation.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 375-pound test (Mullen or Cady) solid fiberboard with inside metal cans not exceeding one quart capacity. Each such can must be packed in another metal can and cushioned on all sides with at least one inch of incombustible dry nonhydroscopic material which is nonreactive with sodium at temperatures encountered in normal transportation. Both the inner and outer metal cans shall be equipped with an airtight closing device secured by positive means (not friction) and must be individually nested into a double-faced corrugated partition of at least 200-pound test (Mullen or Cady) which is in turn surrounded on all sides by a peripheral double-walled corrugated liner of at least 200-pound test (Mullen or Cady). Authorized gross weight not over 90 pounds.

(4) Specification 15A, or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes with inside polyethylene bottles not exceeding 1-quart capacity each cushioned on all sides with at least 1-inch soda ash and then placed within an airtight metal can closed by a positive means. Metal cans shall be cushioned so as to prevent movement within the outer box. Solvents used must be compatible with the inner polyethylene bottle. Gross weight of the completed package must not exceed 100 pounds.

(5) Specification 17H (§178.118 of this subchapter). Metal drum, with one inside Specification, 5, 5C, 6B, or 6C (§§178.80, 178.83, 178.98, 178.99 of this subchapter) closed head metal drum not over 30 gallons capacity. Inside drum must be completely surrounded with incombustible cushioning material.

§ 173.231 Calcium, metallic, crystalline. (a) Calcium, metallic, crystalline must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside airtight metal containers not over 1-gallon capacity each.

(2) Spec. 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums, gross weight not over 350 pounds.

(3) Spec. 17C or 17H (§§178.115 or 178.118 of this subchapter). Metal drums (single-trip), gross weight not over 350 pounds.

§ 173.232 Aluminum, metallic powder. (a) Aluminum flake powders which have been rendered nondusting by agglomerating or other treatment of the individual particles, aluminum granules, aluminum atomized powder and aluminum paste are not subject to the requirements of this subchapter.

(b) Limited quantities of metallic aluminum powder, other than the powder described in paragraph (a) of this section in earthenware, glass, metal, or plastic inside packagings of not more than 5 pounds capacity each, in strong outside packaging of not over 25 pounds net weight, is excepted from labeling (except that labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817.

(c) Metallic aluminum powder, other than the powder described in paragraph (a) of this section, when not packed in accordance with paragraph (b) of this section, must be packaged as follows:

(1) Steel barrel or drum, not over 650 pounds net weight.
(2) Wooden box, not over 125 pounds gross weight.
(3) Moisture and sift-proof bag, not over 100 pounds net weight.
(4) Fiber drum, not over 650 pounds net weight.
(5) Fiberboard box, not over 650 pounds net weight.
(6) Portable tanks, not over 6,500 pounds gross weight.
(7) In bulk in rail cars and cargo tanks.

§ 173.234 Sodium nitrite and sodium nitrite mixtures. (a) Sodium nitrite and sodium nitrite mixtures must be packed in specification containers as follows:

(1) In containers as prescribed in §173.154.
(2) Specification 44C (§178.237 of this subchapter). Multiwall paper bags. Each bag must be constructed as follows and, in addition, each bag must have one inner ply bonded or coated with polyethylene or other suitable pliable plastic material having a minimum basis weight of 10 pounds, or an additional polyethylene inner ply (free film) of equivalent moisture barrier properties:
   (i) At least 5 plies having a minimum total basis weight of 310 pounds, or at least 4 plies of extensible Kraft paper having a minimum basis weight of 240 pounds. Maximum authorized net weight is 100 pounds; or
   (ii) At least 3-plies of extensible Kraft paper having a minimum basis weight of 180 pounds. Maximum authorized net weight is 50 pounds.
(3) Spec. 21C (§178.224 of this subchapter). Fiber drums: Authorized net weight not over 400 pounds.
(4) Spec. 37A (§178.131 of this subchapter). Metal drums constructed of steel having minimum thickness of 24 gauge. Bolted or lever-lock closure rings authorized provided drums withstand test prescribed by §178.131-11 of this subchapter. Authorized gross weight not over 425 pounds.
(5) Sodium nitrite is authorized for shipment in tight sift-proof covered hopper cars. Cars must be thoroughly cleaned before loading.
(6) Tank cars which must be thoroughly cleaned before loading.

§ 173.235 Ammonium bichromate (ammonium dichromate). (a) Ammonium bichromate (ammonium dichromate) must be packed in specification containers as follows:

(1) In containers as prescribed in §173.154.
(2) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 400 pounds.

§ 173.236 Decaborane. (a) Decaborane must be packed in specification containers as follows:

(1) Spec. 6B or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums.
(2) Spec. 17C, 17E, 17H, 37A, or 37B (§§178.115, 178.116, 178.118, 178.131, or 178.132 of this subchapter). Metal drums (single-trip).
(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be metal cans; sliding-lid wooden boxes; fiber cans or boxes, spec. 2G (§178.26 of this subchapter), not over 5 pounds capacity each; or glass bottles not over 1 pound capacity each. Packages containing glass containers must not weigh over 65 pounds gross.

§ 173.237 Chlorine dioxide hydrate, frozen; chloric acid. (a) Chlorine dioxide hydrate, frozen, and chloric acid must be packed in specification packaging as follows:

(1) Specification 12B (§178.205 of this subchapter). Fiberboard boxes, with inside packages of polyethylene or other suitable material. Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate or acid in a frozen state during transportation. Shipments are authorized for transportation by private or contract carrier by motor vehicle only.

§ 173.238 [Reserved]

§ 173.239 Barium azide—50 percent or more water wet. (a) Barium azide—50 percent or more water wet, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 1-pound capacity each. Bottles shall have rubber stoppers wire tied for securement. If shipment is to take place at a time freezing weather is to be anticipated, a suitable antifreeze solution must be used to prevent freezing.
(2) Specification 21C (§178.224 of this subchapter). Fiber drum with inside glass bottle not over 1-pound capacity each. Bottles must have rubber stoppers wire-tied for securement. If shipment is to take place at a time freezing weather is to be anticipated, a suitable antifreeze solution must be used to prevent freezing.

§ 173.239a Ammonium perchlorate. (a) Ammonium perchlorate must be packed in specification containers as follows:

(1) In containers as prescribed in §173.154.
(2) Specification 51[1] or 56 (§§178.251, 178.252 of this subchapter). Metal portable tank. Lower side or hopper-type product discharge openings are not permitted.

[1] Use of existing tanks authorized. Construction not authorized after May 31, 1972.

SUBPART F

CORROSIVE MATERIALS: DEFINITION AND PREPARATION

§ 173.240 Corrosive material; definition. (a) For the purpose of this subchapter, a corrosive material is a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or in the case of leakage from its packaging, a liquid that has a severe corrosion rate on steel.

(1) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if when tested on the intact skin of the albino rabbit by the technique described in Appendix A to this part, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less.

(2) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 0.250 inch per year (IPY) on steel (SAE 1020) at a test temperature of 130° F. An acceptable test is described in NACE Standard TM-01-69.

(b) If human experience or other data indicate that the hazard of a material is greater or less than indicated by the results of the tests specified in paragraph (a) of this section, the Department may revise its classification or make the material subject to the requirements of Parts 170-189 of this subchapter.

§ 173.241 Outage. (a) The outage (ullage) for packagings containing corrosive liquids, when offered for transportation, must be in accordance with the following requirements:

(1) **General outage requirements.** Packagings must not be com-

pletely filled. The proper vacant space (outage) in a tank car or other shipping container depends on the coefficient of expansion of the liquid and the maximum increase of temperature to which it will be subjected in transit. Outage must be calculated to the total capacity of the container.

(2) Outage requirements for packagings of 110 gallons or less. Sufficient outage must be provided so that the packaging will not be liquid full at 130° F. (55° C.).

(3) Outage requirements for tank cars. In tank cars, outage must be calculated to percentage of the total capacity of the tank, i.e., shell and dome capacity combined. If the dome of the tank car does not provide sufficient outage, then vacant space must be left in the shell to make up the required outage. The outage for tank cars must not be less than 2 percent, except that outage for Specification 103A, 103B, 103C, 103E, 103A-AL, 103C-AL, 103AW, 103BW, 103CW, 103EW, 103ANW, 103A-ALW, tank cars must not be less than 1 percent.

(4) Outage requirements for cargo tanks or portable tanks. No cargo tank or portable tank, or compartment thereof, used for the transportation of any corrosive liquid shall be completely filled. The outage for cargo tanks and portable tanks must be no less than 2 percent.

§ 173.242 Bottles containing corrosive liquids. (a) Bottles containing corrosive liquids, as defined by § 173.240, may not be packed in the same package with any other hazardous material, except as specifically provided in paragraphs (b) and (c) of this section and §§ 173.25, 173.257, 173.258, 173.259, 173.260, 173.261, or 173.286.

(b) Bottles containing corrosive liquids cushioned by noncombustible, nonreactive absorbent material and securely packed in tightly closed metal packaging, except hydrofluoric acid which must be over packed in a packaging other than one made of metal, may be packed with other hazardous materials. This exception does not apply to nitric acid exceeding 40-percent concentration, perchloric acid, hydrogen peroxide exceeding 52-percent strength by weight, or nitrohydrochloric acid or nitrohydrochloric acid diluted, which may not be packed in the same package with any other article under any circumstances.

(c) Corrosive liquid solutions in securely closed bottles, in quantities necessary for preparing photographic processing mixtures and efficiently cushioned, may be packed in the same outside shipping container with required amounts of packaged chemicals not classed as hazardous materials by these regulations, provided no dangerous reaction would occur should the contents of bottles be mixed with the packaged chemicals. Marking prescribed in Part 172 of this subchapter is not required.

§ 173.243 Closing and cushioning. (a) All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed or in any case when necessary to prevent breakage or leakage.

§ 173.244 Limited quantities of corrosive materials. (a) Limited quantities of corrosive materials for which exceptions are permitted as noted by reference to this section in § 172.101 of this subchapter are excepted from labeling (except when offered for transportation by air) and specification packaging requirements when packed according to the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(1) Corrosive liquids in bottles having a rated capacity not over 16 ounces by volume each enclosed in a metal can packed in strong outside packaging.

(2) Corrosive liquids in metal or plastic containers having a rated capacity not over 16 ounces by volume in strong outside packaging.

(3) Corrosive liquids in glass containers having a rated capacity not over 8 fluid ounces by volume in strong outside packaging and cushioned with sufficient absorbent material to completely absorb the liquid contents in the event of breakage, and which will not react chemically with the corrosive material.

(4) Corrosive solids in earthenware, glass, plastic, or paper containers of not more than 5 pounds capacity each packed in metal, wooden or fiberboard outside packaging not exceeding 25 pounds net weight each.

(5) Corrosive solids in metal, rigid fiber or composition cans or cartons or rigid plastic containers; of not more than 10 pounds capacity each, overpacked in metal, wooden or fiberboard outside containers not exceeding 25 pounds net weight each.

(b) Special exceptions for shipment of certain corrosive materials in the ORM-D class are provided in Subpart N of this part.

§ 173.245 Corrosive liquids not specifically provided for. (a) Corrosive liquids, as defined in § 173.240, other than those for which special requirements are prescribed, must be packed in specification containers constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein, as follows:

(1) Specification 1A (§ 178.1 of this subchapter). Glass carboys in boxes. Not authorized for transportation by aircraft.

(2) Spec. 1X (§ 178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 1D or 1M (§§ 178.4 or 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Pressure in the carboy may not exceed 10 pounds per square inch at 130° F. (55°C). If the package is vented, there may be no significant release of contents to the environment. Not authorized for transportation by aircraft.

(4) Specification 5A, 5B, 5C, or 5M (§§ 178.81, 178.82, 178.83, 178.90 of this subchapter). Metal barrels or drums.

(5) Specification 5K (§ 178.88 of this subchapter). Nickel barrels or drums. Authorized only for commodities that will not react with nickel and result in container failure.

(6) [Reserved]

(7) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers which must be glass, earthenware, polyethylene or other nonfragile plastic material (bags are not authorized), not over 1 gallon each, except that inside containers up to 3 gallons are authorized when only one is packed in each outside container.

(8) [Reserved]

(9) [Reserved]

(10) [Reserved]

(11) [Reserved]

(12) Specification 12B (§ 178.205 of this subchapter). Fiberboard boxes with inside packagings of metal, polyethylene, or other nonfragile plastic material resistant to the lading, not exceeding 1 gallon each. A metal packaging is authorized only for a material that is not corrosive to metal. Gross weight may not exceed 65 pounds.

(13) Spec. 15P or 22C (§ 178.182 or 178.198 of this subchapter). Glued plywood or wooden box, or plywood drum as prescribed by § 178.198-2(a) of this subchapter, with Spec. 2T (§ 178.21 of this subchapter) polyethylene container.

(14) Spec. 17C, 17E, or 17F (§§ 178.115, 178.116, or 178.117 of this subchapter). Metal drums (single-trip) with openings not exceeding 2.3 inches in diameter.

(15) Specification 17H (§ 178.118 of this subchapter). Metal drums (single-trip). Authorized only for liquid boiler compounds, liquid water treatment compounds, and viscous cleaning compounds, liquid.

(16) Specification 6D or 37M (nonreusable container) (§§ 178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside Spec. 2S, 2SL, or 2U (§§ 178.35, 178.35a, 178.24 of this subchapter) polyethylene packaging.

(17) Specification 17H, 37A or 37B (§§ 178.118, 178.131, or 178.132 of this subchapter), metal drums (single-trip), with welded side seams, not over 5 gallons capacity each. Drums must be lined throughout with a pliable plastic material impervious to the lading. Specifications 37A and 37B metal drums must be at least 24 gauge steel. Not authorized for transportation by air.

(18) Specification 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass, polyethylene, or other nonfragile plastic bottles not over 5-quart capacity each. Not more than 4 inside glass bottles exceeding 5-pint capacity each shall be packed in the outside container. Shipper must have established that the completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(19) Specification 37P (§ 178.133 of this subchapter). Steel drum with polyethylene liner (non-reusable container). Authorized only for materials that will not react with polyethylene and result in container failure. Not authorized for transportation by air.

(20) Specification 16D (§ 178.187 of this subchapter). Wirebound wooden overwrap, with inside specification 2T, 2TL, 2S, or 2SL (§§ 178.21, 178.27, 178.35, 178.35a of this subchapter) polyethylene container. Not authorized for transportation by air.

(21) Specification 12P (§ 178.211 of this subchapter). Fiberboard box with one inside Specification 2U (§ 178.24 of this subchapter) polyethylene container of not over 5-gallon capacity, or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(22) Specification 16A (§ 178.185 of this subchapter). Wirebound wooden box (§ 178.185-22 of this subchapter) with inside Specification 2U (§ 178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(23) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles, not over 5 gallons capacity each, as specified by § 178.205-34 of this subchapter. Not more than one bottle shall be packed in one outside box.

(24) Spec. 21P (§178.225 of this subchapter). Fiber drum overpack with inside Spec. 2S, 2SL, or 2U (§§178.35, 178.35a, or 178.24 of this subchapter) polyethylene container.

(25) Specification 12A or 12B (§§178.210 or 178.205 of this subchapter). Fiberboard boxes with inside aluminum packagings which must be compatible with the lading.

(26) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(27) Specification 33A (§178.150 of this subchapter). Polystyrene case (nonreusable container) with inside glass bottles not over 5-pint capacity each. Not more than four 5-pint bottles may be packed in one outside packaging.

(28) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene are authorized. All cylinder valves must be protected by one of the methods described in §173.301(g)(1), (2), or (3) of this part. See §173.34(e)(16).

(29) Specification MC 303 or 304. Cargo tanks meeting §178.343-2(c) of this subchapter. Specification MC 303 must have tanks fabricated from 12-gauge, Type 316 stainless steel. MC 303 is authorized only for monoethanolamine; *primary amyl alcohol*; and phosphoric acid and solutions thereof.

(30) Specification MC 307 (§§178.340, 178.342 of this subchapter). Cargo tanks meeting §178.343-2(c) of this subchapter.

(31) Specification MC 306, MC 310, MC 311, or MC 312 (§§178.340, 178.341, 178.343 of this subchapter). Cargo tanks. If cargo tank is constructed with bottom outlets, they must meet §178.343-5 of this subchapter. Specification MC 306 must have tanks fabricated from 12 gauge, Type 316 stainless steel. MC 306 is authorized only for monoethanolamine, primary amyl alcohol, phosphoric acid and solutions thereof; MC 306 constructed aluminum is authorized only for monoethanolamine *primary amyl alcohol*.

(32) Specification 103AW, 103A-ALW, 103ANW, 103BW, 103CW, 103EW, 105A100W, 105A200ALW, 109A200ALW, 111A100F2, 111A60ALW2, 111A60W2, 111A60W5, or AAR-201 A80W (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars. Specification 105A200ALW tank cars authorized only for acetic anhydride and ammonium hydroxide. Specification 105A100W tank cars authorized only for ammonium hydroxide and dimethyl chlorothiophosphate. AAR-201A80W and 109A200ALW tank cars authorized only for ammonium hydroxide.

(33) Specification 103ALW, 103DW, 103W, 104W, 111A60ALW1, 111A60W1, 111A100W3, 111A100W6, 115A60W6, or AAR206W (§§179.200, 178.201, 179.220 of this subchapter). Tank cars. (See Note 1.)

Note 1: Authorized only on an interim basis pending the Department's decision on use of bottom outlets for tank cars containing hazardous materials.

(34) Specification 42B (§178.107 of this subchapter). Aluminum drum.

(35) Marine portable tanks meeting the requirements of 46 CFR Part 64 authorized for highway and cargo vessel only when shipped in support of off-shore oil well drilling activities. Tank must be compatible with lading. Not authorized for corrosive materials which also meet the definition of another hazard class. Tanks shall comply with mounting and tie-down requirements of §178.245-4 of this subchapter when transported by highway.

(36) Ammonium hydroxide containing no more than 30 percent ammonia by weight may be transported by motor vehicle in non-specification cargo and portable tanks that meet the requirements of §173.24.

(37) Specification IM 101 and IM 102 portable tanks (§§178.270, 178.271, 178.272 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(38) Specification 57 (§178.253 of this subchapter). Steel portable tank. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253-4, except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig.

(b) Except when transportation by aircraft or vessel is involved, and except for a hazardous waste or a hazardous substance a material classed as a corrosive material that is corrosive only to steel and does not meet the definition of any other hazard class defined in this subchapter, is excepted from the requirements of this subchapter for rail or highway when transported in a portable tank, cargo tank, or tank car constructed of materials that will not react dangerously with or be degraded by the material being transported. For hazardous wastes and hazardous substances that would otherwise be subject to this paragraph, only the requirements of Parts 171 and 172 of this subchapter apply.

§ 173.245a Corrosive liquids, n.o.s. shipped in bulk. (a) Corrosive liquids, n.o.s. which are listed in the following table, may not be shipped in bulk unless they are packaged as follows:

Corrosive liquid	Authorized tank car	Authorized portable tank[1]
Dichlorobutene and Dichlorobutene mixtures	105A300W, 112A340W	
Ethyl chlorothioformate	.....	DOT 51 monel or monel clad
Ethyl phosphonothioic dichloride, anhydrous	103AW, 111A60W2	DOT 51
Ethyl phosphonous dichloride, anhydrous	.....	DOT 51
Ethyl phosphorodichloridate	103ANW, 103AW, 111A100F2, 111A100W2	
Methylphosphonothioic dichloride, anhydrous	103AW	DOT 51
Methyl phosphonous dichloride[3]	.....	DOT 51 monel or monel clad
Vanadium oxytrichloride and titanium tetrachloride mixture	.....	DOT 51

[1] In an unlined tank, must be loaded and shipped under a blanket of nonflammable, dry inert gas, adequate to displace any significant amount of air.

[2] Specification 103ANW tank car tanks must be fabricated of solid nickel at least 95 percent pure and containing not more than 1 percent iron. Metal test coupons for welding procedure qualification must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 95.7 percent. Specification 103A tank car tanks must be lead-lined steel or must be made of steel with at least 10 percent nickel cladding. Specification 103AW, 111A100F2, or 111A100W2 tanks must be lead-lined steel or made of steel with a minimum nickel cladding of 1/16 inch thickness. Nickel cladding on tanks must be low carbon nickel in accordance with ASTM B162-80.

[3] Tank must be equipped with a safety relief valve set at not less than 100 psig. In addition, the relief valve must comply with §173.315(k)(1).

(b) Corrosive liquids, n.o.s., except those listed in paragraph (a) of this section, when shipped in bulk, must be packaged as prescribed by §173.245.

§ 173.245b Corrosive solids not specifically provided for. (a) Corrosive solids, as defined in §173.240, other than those for which special requirements are prescribed, must be packaged in containers fully complying with §173.24, as follows:

(1) Metal, wooden, or fiberboard box or case with inside containers which must be earthenware, glass, metal, plastic, or fiber or composition board of not more than 10 pounds net weight capacity each.

(2) Fiberboard box with inside paper bags, not over 50 pounds total net capacity. When shipped by water, each box must include a moisture barrier.

(3) Fiberboard box with one inside plastic bag of not over 120 pounds net weight capacity.

(4) Metal drum.

(5) Fiber drum not exceeding 550 pounds net weight and not over 65-gallon capacity. When shipped by water, each drum must include a moisture barrier.

(6) Open head plastic drum or pail not exceeding 95 pounds net weight and not over 7-gallon capacity or closed head plastic drum not exceeding 550 pounds net weight and not over 55-gallon capacity.

(7) Bag: Each bag filled to weight with product and closed as for shipment must be capable of withstanding four drops from a height of 4 feet onto a solid surface, one drop on each end and one drop on each face, without sifting or rupture. Authorized net weight not to exceed 110 pounds. When shipped by water, each bag must include a moisture barrier.

(8) Metal portable tank or closed bin not over 7,000 pounds gross weight.

(9) Fiberglass or rubber tank or closed bin of not over 74-cubic-foot capacity.

(10) Metal sift-proof cargo tank or tank car, or hopper-type or pneumatic bulk vehicle.

§ 173.246 Antimony pentafluoride, bromide pentafluoride, iodine pentafluoride, bromine trifluoride, and chlorine trifluoride. (a) Antimony pentafluoride must be chemically anhydrous. Materials cited in the heading of this section must be packed in specification packagings as follows:

(1) Specification 3A150, 3AA150, 3B240, 3BN150, 4B240, 4BA240, 4BW240, or 3E1800 (§§178.36, 178.37, 178.38, 178.39, 178.50, 178.51, 178.61, 178.42 of this subchapter). Cylinders. Each valve outlet must be sealed by a threaded cap or a threaded plug. Cylinder valves must be protected as specified for corrosive gases in §173.301(g). No cylinder may be equipped with any safety relief device. Specification 3E1800 cylinders must be packaged in accordance with the requirements of §173.301(k).

(2) Specification 106A500X or 110A500W (§§179.300, 179.301 of this subchapter). Tanks. Authorized for iodine pentafluoride and chlorine trifluoride only. Each tank must be equipped with a valve protection cover and with solid steel plugs in place of fusible plug safety devices. No tank may be equipped with any safety relief device.

(3) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.247 Acetyl bromide; acetyl chloride; acetyl iodide; antimony pentachloride; benzoyl chloride; boron trifluoride acetic

acid complex; chromyl chloride; dichloroacetyl chloride; diphenylmethyl bromide solutions; pyrosulfuryl chloride; silicon chloride; sulfur chloride (mono and di); sulfuryl chloride, thionyl chloride; tin tetrachloride (anhydrous); titanium tetrachloride; trimethyl acetyl chloride. (a) Acetyl bromide, acetyl chloride, acetyl iodide, antimony pentachloride; benzoyl chloride, boron trifluoride-acetic acid complex, chromyl chloride, dichloroacetyl chloride, diphenylmethyl bromide solutions, pyrosulfuryl chloride, silicon chloride, sulfur chloride (mono and di), sulfuryl chloride, thionyl chloride, tin tetrachloride (anhydrous), titanium tetrachloride, and trimethyl acetic chloride must be packaged in specification packagings as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon each, except that inside containers up to 3 gallons each are authorized when only one is packed in an outside box.

(2) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene packaging. Polyethylene used must be Type III as set forth in Appendix B—Specifications for Plastics to Part 178 of this title. Authorized for acetyl chloride, dichloroacetyl chloride, sulfuryl chloride and trimethyl acetyl chloride only.

(3) Specification 1A, 1D, 1K, or 1M (§§178.1, 178.4, 178.14, 178.17 of this subchapter). Glass carboys in boxes, or expanded polystyrene packagings (not permitted for antimony pentachloride or tin tetrachloride, anhydrous). Not authorized for transportation by aircraft.

(4) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only (not permitted for antimony pentachloride or tin tetrachloride anhydrous).

(5) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside aluminum bottles of 99 percent pure aluminum not over 1 gallon capacity each, having aluminum screw caps with gasket resistant to contents. Authorized for chromyl chloride only.

(6) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers of securely closed soft-lead tubes having not more than 65 fluid ounces capacity each, individually packed in securely closed steel tubes, with not more than 3 such steel tubes fastened together as a unit. The inside units shall be cushioned on all sides with an appropriate fire-resistant cushioning material. Authorized only for titanium tetrachloride.

(7) Specification 5, 5A, 5B, or 17C (§§178.80, 178.81, 178.82, 178.115 of this subchapter). Metal barrels or drums with openings not exceeding 2.3 inches in diameter.

(8) Spec. 5K (§178.88 of this subchapter). Nickel drums, authorized for acetyl chloride, benzoyl chloride, pyro sulfuryl chloride, sulfuryl chloride, and thionyl chloride only. When shipped in unstabilized condition, the lading must be anhydrous and must be free from impurities such as iron.

(9) Spec. 5C (§178.83 of this subchapter). Barrels or drums of type 304 stainless steel not over 30-gallon capacity each. Authorized for chromyl chloride and thionyl chloride only.

(10) Spec. 42D (§178.109 of this subchapter). Aluminum drums not over 30 gallons capacity each. Authorized for chromyl chloride only.

(11) Spec. 60 (§178.255 of this subchapter). Portable tanks.

(12) Specification MC 310, MC 311, MC 312, MC 330 or MC 331 (§§178.343, 178.337 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(13) Specification 103A,[1] 103AW, 105A300W, 111A60W2, or 111A100F2 (§§179.100, 179.101 179.200, 179.201 of this subchapter). Tank cars, except that for tin tetrachloride (anhydrous) specification 105A300W tank cars must be used.

(14) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. Authorized for titanium tetrachloride, anhydrous only. Tank cars must have safety valves of approved design and not subject to rapid deterioration by the lading.

(15) Sulfur chloride packed in glass or earthenware bottles or carboys must be cushioned in the outside container by means of incombustible elastic packing material of such nature that a mixture of the liquid and the packing material will not cause fires or heating.

(16) Specification 106A500X or 110A500W (§§179.300, 179.301 of this subchapter) tanks. Authorized only for antimony pentachloride and titanium tetrachloride (anhydrous). Tanks containing titanium tetrachloride (anhydrous) must not be equipped with safety devices. (See §177.834(m) of this subchapter for special requirements for highway shipments.)

[1] Use of existing tank cars authorized, but new construction not authorized.

(17) Specification 4BA240 or 4BW240 (§§178.51, 178.61 of this subchapter). Cylinders authorized for titanium tetrachloride or tin tetrachloride, anhydrous, without any compressed gas. Specification 4BW carbon steel cylinders authorized for antimony pentachloride. Safety relief devices are authorized only on cylinders containing titanium tetrachloride.

(18) Specification 3E1800 (§178.42 of this subchapter). Cylinder authorized only for thionyl chloride, anhydrous and titanium tetrachloride, anhydrous.

(19) Specification 51 (§178.245 of this subchapter). Portable tank authorized only for titanium tetrachloride, anhydrous, without any compressed gas.

(20) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(21) [Reserved]

§ 173.247a Vanadium tetrachloride and vanadium oxytrichloride. (a) Vanadium tetrachloride and vanadium oxytrichloride must be packed in specification packagings as follows:

(1) Specification 3A, 3AA, 4B240, 4BA240, 4BW240, or 3E 1800 (§§178.36, 178.37, 178.50, 178.51, 178.61, 178.42 of this subchapter). Cylinders.

(2) Specification 51 (§178.245 of this subchapter). Portable tanks.

(3) Specification MC 310, MC 311, or MC 312 (§§178.340, 178.343 of this subchapter). Cargo tanks. Authorized only for vanadium oxytrichloride with an inert non-soluble gas padding, adequate to exclude the presence of air. Specification MC 310 and MC 311 cargo tanks must be in compliance with §178.343-2 (b) or (c) as applicable, and §§178.340-9(a) and 178.343-4(a) of this subchapter. Not authorized for transportation by water. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.248 Spent sulfuric acid, or spent mixed acid. (a) Spent sulfuric acid, or spent mixed acid, resulting from the use of sulfuric acid in various processes, not containing hydrofluoric acid, must be packaged as follows:

(1) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Carboys in boxes or expanded polystyrene packagings. Authorized for spent sulfuric acid only. Not authorized for transportation by aircraft.

(2) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers, not over 1-gallon each, except that inside containers up to 3 gallons each are authorized when only one is packed in each outside box.

(4) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200 and 179.201 of this subchapter). Tank cars, provided the product is sufficiently liquid to be unloaded through the dome or manway. Tanks which do not contain products or contaminants that give off noxious or flammable vapors may be equipped with safety vents incorporating lead discs having a ⅛-inch breather hole in the center thereof.

(5) Spec. 103,[1] 103-W, 111A60-F-1, or 111A60-W-1 (§§179.200 and 179.201 of this subchapter). Tank cars, provided the product is too viscous to be unloaded through the dome or manway. Tanks which do not contain products or contaminants that give off noxious or flammable vapors may be equipped with safety vents incorporating lead discs having a ⅛-inch breather hole in the center thereof.

(6) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(7) Spec. 60 (§178.255 of this subchapter). Portable tanks.

(8) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.249 Alkaline corrosive liquids, n.o.s.; Alkaline liquids, n.o.s.; Alkaline corrosive battery fluid; Potassium fluoride solution; Potassium hydrogen fluoride solution; Sodium aluminate, liquid; Sodium hydroxide solution; Potassium hydroxide solution. (a) Alkaline corrosive liquids, n.o.s.; Alkaline liquids, n.o.s.; Alkaline corrosive battery fluid; Potassium fluoride solution; Potassium hydrogen fluoride solution; Sodium aluminate, liquid; Sodium hydroxide solution; and Potassium hydroxide solution; when offered for transportation by carriers by rail freight, highway, or water must be packed in specification containers of a design and constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein as follows:

(1) In containers prescribed in §173.245.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes

with inside glass or earthenware containers, not over 2 gallons each, or with metal containers, not over 5 gallons each.

(3) Specification 5 (§178.80 of this subchapter) metal drums. Openings must not exceed 2.3 inches in diameter.

(4) [Reserved]

(5) Specification 103,[1] 103W, 103A,[1] 103AW, 103B,[1] 103BW, 104,[1] 104W, 105A100,[1] 105A100W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 111A60W5, or 111A100W4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.

(6) Specification MC 303, MC 310, MC 311 or MC 312 (§178.343 of this subchapter). Cargo tanks. Specification MC 303 is authorized for alkaline corrosive liquids, n.o.s., and alkaline liquids, n.o.s. only and is not authorized for transportation by water. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(7) Specification 57 or 60 (§§178.251, 178.253, 178.255 of this subchapter). Portable tanks. Specification 57 portable tank not authorized for transportation by water.

(8) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with glass inside containers of not over 16 ounces capacity each.

(9) [Reserved]

(10) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with not more than one glass inside container not over 1 gallon capacity containing sodium hydroxide solution not over 25 percent strength and packed in a strong fiberboard box. Dry chemicals for photographic development process not classed as dangerous articles, contained in suitable inside packages, may be packed in the same outside box. The marking requirements of §172.312 of this subchapter shall not apply.

(11) Spec. 29 (§178.226 of this subchapter). Mailing tubes, with not more than one inside polyethylene bottle not over 1-quart capacity each.

(12) Spec. 1H (§178.13 of this subchapter). Metal crate with inside polyethylene container Spec. 2T (§178.21 of this subchapter).

(13) Specification 12B (§178.205 of this subchapter). Fiberboard box with inside metal containers. Not more than four 1-gallon or six 1-quart containers may be packed in each box. Maximum gross weight may not exceed 65 pounds and the completed package must meet the test requirements of §178.210-10 of this subchapter.

(14) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) The hazardous materials named in paragraph (a) of this section, when offered for transportation by aircraft, must be packaged as follows (also authorized for transportation by rail freight, highway, or water):

(1) In packagings as prescribed in paragraphs (a)(8), (10), and (11) of this section and §173.245(a)(7) and (12).

(2) Spec. 5 or 5A (§178.80 or 178.81 of this subchapter). Metal barrels or drums, capacity not exceeding 10 gallons, with openings not exceeding 2.3 inches in diameter.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon each, or with inside metal cans not over 5 gallons each.

(c) Limited quantities of alkaline corrosive liquids, n.o.s., alkaline liquids, n.o.s., alkaline corrosive battery fluids, and liquid sodium aluminate in inside packagings of not more than 8 fluid ounces capacity each, packed in strong outside packagings, and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in the event of breakage, are excepted from labeling (except labeling is required for transportation by air) and specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(d) Special exceptions for shipment of certain alkalines in the ORM-D class are provided in Subpart N of this part.

§ 173.249a Cleaning compound, liquid; Coal tar dye, liquid; Dye intermediate, liquid; Mining reagent, liquid; and Textile treating compound mixture, liquid. (a) A liquid cleaning compound subject to this section must not contain any corrosive material specifically named in §172.101 of this subchapter, except phosphoric acid, acetic acid, and not over 15 percent sodium or potassium hydroxide.

(b) A liquid dye intermediate is a ring compound, containing amino, hydroxy, sulfonic acid, or quinone group or a combination of these groups, used in the manufacture of dyes, and not otherwise specifically named in §172.101 of this subchapter.

(c) A liquid textile treating compound mixture is a mixture used to treat woven, knit or otherwise manufactured fabrics. It does not include mixtures used only to treat fibers, filaments, or yarns used in making the fabric.

(d) Liquid coal tar dye, liquid cleaning compound, liquid dye intermediate liquid mining reagent, and liquid textile treating compound mixture must be packaged as follows:

(1) In specification packagings as prescribed in §173.245.

(2) In packagings meeting all of the specific requirements prescribed in §173.245 including packaging type and quantity limitations for inside packagings. The packagings are not required to meet the detailed specification requirements of Part 178 of this subchapter except that size and weight limitations for package types as prescribed in Part 178 may not be exceeded. Not authorized for shipment by aircraft.

(3) Removable (open) head fiber drum lined or coated on the inside with a plastic material, not over 55-gallon capacity. Not authorized for shipment by aircraft.

(4) Removable (open) head metal drum, not over 55-gallon capacity. Not authorized for shipment by aircraft.

(5) Removable (open) head polyethylene drum, not over 6.5-gallon capacity. Not authorized for shipment by aircraft.

§ 173.250 Automobiles, other self-propelled vehicles, engines or other mechanical apparatus. (a) Except as provided in paragraph (b) of this section, automobiles and other self-propelled vehicles equipped with wet electric storage batteries are excepted from all other requirements of this subchapter when shipped as prescribed in paragraphs (a)(1) or (2) of this section, unless other hazardous materials are transported on the self-propelled vehicles, in which instance the regulations covering these other materials apply.

(1) When batteries are removed from the self-propelled vehicles and loaded in the transport vehicle therewith, the batteries must be so loaded, blocked, and braced as to prevent short circuits, spillage of battery fluid or movement within the transport vehicle.

(2) When batteries are installed in self-propelled vehicles they must be completely protected against short circuits and so secured that spillage of battery fluid will not occur under conditions normal to transportation.

(b) For transportation by passenger-carrying aircraft, wheelchairs equipped with wet electric storage batteries must be shipped as prescribed in §175.10 of this subchapter.

(c) When wet electric storage batteries or batteries packed in containers with battery fluid are shipped as part of carload or truckload shipments of automobile parts or assembly materials, they are subject to no other requirements of this subchapter when the batteries and battery fluid are boxed or crated and so loaded, blocked and braced as to prevent short circuits of the batteries, spillage of battery fluid and movement of the materials in the transport vehicle under conditions normal to transportation. When other hazardous materials are included in the shipments, the regulations covering these other materials apply.

(d) Engines or mechanical apparatus of such size or weight as to require securement to skids to facilitate handling may have electric storage batteries, wet, necessary for the operation thereof, either securely fastened in the holder provided on the equipment and protected, including battery terminals, in such manner as to prevent damage thereto or short circuits, or completely boxed in containers of sound lumber and with filling holes upright, securely fastened to the skids upon which the engine or mechanical apparatus is mounted to prevent accidental tipping or looseness in transportation. Electric storage batteries, wet, as described herein are exempt from specification packaging.

§ 173.250a Benzene phosphorus dichloride and benzene phosphorus thiodichloride. (a) Benzene phosphorus dichloride and benzene phosphorus thiodichloride must be packaged as follows:

(1) In packagings prescribed in §173.245 which are made of or lined with materials compatible with the lading.

(2) Spec. MC 310, MC 311, or MC 312 (§178.343 of this subchapter) cargo tanks. Corrosion protection must be provided in accordance with spec. MC 312. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(3) Spec. 103AW (§§179.200 and 179.201 of this subchapter) tank cars. Tanks must be lined.

(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.251 Boron trichloride and boron tribromide. (a) Boron trichloride must be packed in specification containers as follows:

(1) Specification steel or nickel cylinders as prescribed for any compressed gas, except acetylene.

(2) Specification 105A300W or 106A500X (§§179.100, 179.101, 179.300, 179.301 of this subchapter). Tank cars.

(b) Boron tribromide must be packed in specification packagings as follows:

(1) Specification 15A, 15B, 15P, or 19B (§§178.168, 178.169, 178.170, 178.182, 178.191 of this subchapter). Wooden or plywood boxes with inside glass receptacles not over 1 quart capacity each. Each glass receptacle must have a positive closure (not friction) and as prepared for shipment must be capable of withstanding an internal gage pressure of at least 15 p.s.i. The receptacle must be cushioned with sufficient absorbent incombustible material to completely absorb the contents in the event of leakage and must be packed within a securely closed metal can. Each can must then be cushioned with incombustible material within the prescribed outside packaging. Completed packaging for shipment must be capable of passing the tests prescribed in §178.182-3(a)(1) of this subchapter.

(2) Specification 5C or 5M (§§178.83, 178.90 of this subchapter).

[1] Use of existing tank cars authorized, but new construction not authorized.

Metal drums not exceeding 30 gallons capacity Specification 5C drums must be constructed of at least 14-gauge stainless steel.

(3) Specification 37A (§178.131 of this subchapter). Steel drums not over 30-gallon capacity each with inside glass receptacles not over 1-quart capacity each. Inside containers and cushioning must comply with paragraph (b)(1) of this section. Not more than four 8-ounce glass receptacles or two 1-quart glass receptacles may be packed within one 8-gallon 37A drum. Not more than twelve 8-ounce glass receptacles or six 1-quart glass receptacles may be packed within one 30-gallon 37A drum. Completed package must meet test requirements of §178.131-11 of this subchapter.

§ 173.252 Bromine. (a) Bromine must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1 quart each; or with stone or earthenware jugs not over 1 gallon each.

(2) [Reserved]

(3) Specification 105A300W (§§179.100, 179.101 of this subchapter). Tank car. Each tank must have a nickel cladding material on the inside surface comprising at least 20 percent of the total thickness, or be lined with lead no less than 1/16-inch thick. Openings in tank heads to facilitate application of lead lining are authorized and must be closed in an approved manner. All closures and appurtenances which are in contact with the lading must be lead lined or must be made of metal not subject to rapid deterioration by contact with the lading. All interior welds in nickel clad tanks must be protected by pure nickel butt straps. Except as otherwise provided herein, the water weight capacity of the tank must not be more than 20,400 pounds, and the maximum quantity of liquid bromine loaded into the tank must not be more than 60,000 pounds or 300 percent of the water weight capacity of the tank, whichever quantity is less. The total quantity loaded must not be less than 98 percent of the quantity the tank is authorized to carry.

(i) A tank constructed and maintained in full compliance with the requirements of a Specification DOT-105A500W is authorized for larger capacities of bromine. However, this tank may be marked DOT-105A300W and may be equipped with manway cover plates, safety valves, venting valves, loading valves, and unloading valves that are in compliance with the requirements of a Specification DOT-105A300W tank. The water weight capacity of this tank must not be more than 37,400 pounds, and the maximum quantity of liquid bromine loaded into the tank must not be more than 110,000 pounds or 300 percent of the water weight capacity of the tank, whichever quantity is less.

(ii) Each tank car must be marked "BROMINE" in accordance with the requirements of §172.330 of this subchapter.

(4) Specification MC 310 or MC 312 (§178.343 of this subchapter). Cargo tanks. Each tank must have a shell and head thickness of at least three-eighths-inch. Each tank must have a nickel cladding material on the inside surface comprising at least 20 percent of the total thickness or be lined with lead at least 1/16-inch thick. The cladding material must conform to requirements of ASTM Specification B-162-69. The composite plate must conform to requirements of ASTM Specification A-265-69. The maximum quantity of liquid bromine loaded into the tank must not exceed 300 percent of the water weight capacity of the tank. The total quantity loaded must not be less than 92 percent of the quantity the tank is authorized to carry. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. In addition, each tank must have a nickel cladding material on the inside surface comprising at least 20 percent of the total thickness or must be lined with lead at least 5.0 mm thick. The cladding material must conform to requirements of ASTM Specification B-162-69. The composite plate must confirm to requirements of ASTM Specification A-265-69. The total quantity in one tank may not be less than 88 percent nor more than 92 percent of the quantity the tank is authorized to carry.

(b) Outage (vacant space above liquid) for inside containers must be not less than 15 percent of capacity of container.

(c) For other authorized containers an outage of not less than 10 percent is required.

(d) Inside containers must be closed by glass, earthenware, or stone stoppers ground to fit and securely fastened; or bottles may have necks with molded screw threads which must be closed by threaded-type caps with lead or other efficient bromine-resistant gaskets and cushioned by elastic material to insure tight closure. Sealed glass ampoules are also authorized.

(e) Except as provided in paragraphs (g)(2) and (3) of this section, bottles or jugs must be securely cushioned on all sides with incombustible packaging material, such as whiting, mineral wool, infusorial earth (kieselguhr), sifted ashes, powdered china clay, or similar material, at least 1 inch thick, which will not produce heat when mixed with bromine. The use of hay, sawdust, excelsior, or other organic material, either treated or untreated, as a cushioning or packaging material is prohibited.

(f) Not more than 15 quarts of bromine in bottles, nor more than 12 quarts in jugs, may be packed in one box.

(g) Bromine which has been dried in accordance with good commercial practice may also be packed in specification containers as follows:

(1) Specification 5K (§§178.89 of this subchapter) nickel drums, of not over 10 gallons capacity each, and containing not more than 225 pounds net weight of bromine, or Specification 5M (§178.90 of this subchapter) monel drums, of not over 25 gallons capacity each and containing not more than 600 pounds net weight of bromine. Drums must be of metal at least 14-gauge throughout and must have chime reinforcement adequate for their protection. All openings must be in one head and the closing parts (plug, cap, flange, etc.) must be of the same metal as the drum. One opening not over 2 3/8 inches in diameter and one opening not over 3/4-inch standard pipe size are permitted. Each drum must be completely emptied and dried before reuse.

(2) Specification 12A (§178.210 of this subchapter). Fiberboard boxes, constructed of at least 275 pound test (Mullen or Cady) double-wall corrugated fiberboard having not more than six inside glass bottles of not over 1 quart capacity. Each inside glass bottle must be surrounded by a sheet of polyethylene foam at least 1/4 inch thick (see Note 1), and approximately the same height as the bottle, and must also be separated by partitions made of corrugated fiberboard at least 275-pound test (Mullen or Cady). The box must be provided with inside top and bottom pads of polyethylene foam at least 1 1/2 inches thick (see Note 1). Shipper must have established that the completed package closed as for shipment, with inside packagings filled with liquid of same specific gravity as bromine, is capable of withstanding tests prescribed by §178.210-10 of this subchapter. Not authorized for transportation by air.

Note 1. Other materials of equal efficiency and compatibility are also authorized.

(3) Specification 12A (§178.210 of this subchapter). Fiberboard box with inside glass bottles having a capacity not exceeding one quart with closures meeting the requirements of paragraph (d) of this section. Each bottle must be enclosed in a strong metal can surrounded with an appropriate fire-resistant cushioning material. Each box may not contain more than four bottles with each having a capacity not exceeding 1 quart or 12 bottles with each having a capacity not exceeding 8 fluid ounces. The shipper must have established that the completed package closed for shipment, with inside bottles filled with a liquid of the same specific gravity and similar viscosity as bromine, is capable of withstanding the tests prescribed in §178.210-10 of this subchapter. Not authorized for transportation by air.

(4) Specification 33A (§178.150 of this subchapter). Polystyrene case (nonreusable container) having not more than four inside glass jugs of not over 80 fluid ounces (2.5 liters) each. The polystyrene case must be further overpacked in a strong fiberboard box of at least 275-pound test and adequately cushioned. Not authorized for transportation by aircraft.

(5) Specification 15A (§178.168 of this subchapter). Wooden boxes (having an authorized gross weight of not less than 100 pounds) having not more than four inside glass jugs of not over 80 fluid ounces (2.5 liters) each. Jugs must be cushioned with an appropriate absorbent material. Not authorized for transportation by aircraft.

§ 173.253 Chloracetyl chloride. (a) Chloracetyl chloride must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 5 pints capacity each; cushioned by an appropriate fire-resistant cushioning material.

(2) Specification 1M (§178.17 of this subchapter). Glass carboys in expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) [Reserved]

(4) [Reserved]

(5) Spec. 5K (§178.89 of this subchapter). Nickel drums.

(6) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks having tanks fabricated from Type 316 stainless steel or 99 percent pure nickel. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(7) Specification 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. Tanks must have a nickel cladding of 1/16-inch minimum thickness. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162-80.

(8) Specification 103ANW (§§179.200 and 179.201 of this subchapter). Tank cars. Tanks must be fabricated of solid nickel at least 95 percent pure and containing not more than 1 percent iron. Metal test coupons for welding procedure qualifications must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 96.7 percent.

(9) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.254 Chlorosulfonic acid and mixtures of chlorosulfonic acid-sulfur trioxide. (a) Chlorosulfonic acid and mixtures of chlorosulfonic acid-sulfur trioxide must be packed in specification containers as follows:

(1) Spec. 5A or 5C (§§178.81 or 178.83 of this subchapter). Metal barrels or drums.

(2) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon each, except that inside containers up to 3 gallons are authorized when only one is packed in each outside box.

(3) [Reserved]

(4) Specification 103A,[1] 103AW, 103CW, 103EW, 111A60W2, 111A60W7, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars.

(5) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(6) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.255 Dimethyl sulfate. (a) Dimethyl sulfate must be packed in specification containers as follows:

(1) Spec. 5A or 5C (§§178.81 or 178.83 of this subchapter). Metal barrels or drums not over 55 gallons each. Spec. 5C metal barrels or drums must be constructed of Type 304 stainless steel.

(2) Spec. 5 (§178.80 of this subchapter). Metal barrels or drums not over 15 gallons each, with openings not exceeding 2 3 inches in diameter, inclosed in strong crates made of lumber at least ⅝ inch thick.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with one inside glass container not over 1 quart capacity, closed by ground glass stopper or other equally efficient closure securely fastened in place, and cushioned within a hermetically sealed (soldered) metal can with an appropriate fire-resistant absorbent, cushioning material, the can then being cushioned with an appropriate fire-resistant cushioning material in the outside box.

(4) Spec. 103A,[1] 103A-W, 111A100-F-2, or 111A100-W-2 (§§179.200, 179.201 of this subchapter). Tank cars.

(5) Specification MC 310, MC 311 or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(6) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with each box containing not more than six inside glass containers not over 1-quart capacity each, closed by plastic screw-cap resistant to the lading, and each completely surrounded by incombustible absorbent cushioning material and enclosed in a metal can having rolled, seamed-on heads of a key-opening type; or in not more than six inside glass containers not over 1-quart capacity each, closed by ground glass stopper, by plastic screw-cap resistant to the lading, or by other equally efficient closure securely fastened in place, and cushioned with incombustible absorbent material in hermetically sealed (soldered) metal can, the can then being cushioned with incombustible cushioning material in the outside container.

(7) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.256 Compounds, cleaning, liquid. (a) Compounds, cleaning, liquid, containing not more than 60 percent hydrofluoric acid, must be packed in specification containers as follows:

(1) As prescribed in §173.264(a)(1) and (2).

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers of natural rubber, ceresine, lead, or other material of equal strength and not subject to destruction by the lading.

(3) Specification 22B (§178.197 of this subchapter). Plywood drums equipped with a liner of rubber, polyethylene or other material impervious to the solution.

(4) Spec. 16A (§178.185 of this subchapter). Wirebound wooden box (§178.185-22 of this subchapter) with inside Specification 2U (§178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(5) Spec. 6D or 21P (§178.102 or §178.225 of this subchapter). Cylindrical steel overpack or fiber drum overpack with inside Spec. 2U (§178.24 of this subchapter) polyethylene container not over 15-gallons capacity.

(6) Spec. 37M (§178.134 of this subchapter) (nonreuseable). Cylindrical steel overpack with inside Specifications 2SL (§178.35a of this subchapter) polyethylene container. Maximum net weight shall not exceed 490 pounds. Authorized only for compounds containing not more than 30 percent hydrofluoric acid.

(7) Specification 37M (§178.134 of this subchapter). Cylindrical steel overpack with inside Specification 2U (§178.24 of this subchapter) polyethylene container. For compounds containing not more than 7 percent hydrofluoric acid by weight, the steel overpack must be a minimum of 22-gauge. For compounds containing more than 7 percent hydrofluoric acid by weight but not over 14 percent hydrofluoric acid by weight, the steel overpack must be a minimum of 20-gauge body and 18-gauge heads. When a full removable head is used, the bolted type ring closure must be a minimum of 16-gauge.

(8) Specification 12P (§178.211 of this subchapter). Fiberboard boxes with one inside Specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(9) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(b) Compounds, cleaning, liquid containing not more than 20 percent hydrofluoric acid, by weight, may also be shipped in specification containers as follows:

(1) Specification 57 (§178.253 of this subchapter). Steel portable tank. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253-4, except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig. Tanks must have a polyethylene liner impervious to the solution.

§ 173.257 Electrolyte (acid) and alkaline corrosive battery fluid. (a) Electrolyte (acid) may not be over 47 percent strength (39° Baume). Electrolyte or alkaline corrosive battery fluid must be packaged as follows (packaging utilizing a bag to contain the electrolyte or battery fluid is not authorized for transportation by air):

(1) As prescribed in §173.272 except that unlined tank cars and metal barrels or drums must not be used.

(2) [Reserved]

(3) When the material is alkaline it may also be shipped when packed in containers as prescribed in §173.245.

(4) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(5) Spec. 60 (§178.255 of this subchapter). Portable tanks, except that unlined tanks must not be used.

(6) Spec. 12B or 12C (§§178.205 or 178.206 of this subchapter). Fiberboard boxes with inside containers of polyethylene or other electrolyte acid resistant nonfragile materials having secure closures capable of withstanding conditions incident to transportation without leakage and unless containers are rigid or semi-rigid in nature they must be contained in other strong inside containers; minimum thickness of polyethylene or other materials shall be not less than 0.003 inch for any film sheet for multiwall containers or not less than 0.006 inch for single-wall containers; not more than 12 such inside containers shall be packed in one outside box and the marking prescribed in §172.312 shall not be required. Inside containers shall be packed to prevent movement within the box (see §§178.205-34 and 178.206-19 of this subchapter). Dry storage batteries or battery charger device may be packed in the same outside box when adequately separated from other inside containers (see §178.205-33 of this subchapter); gross weight of completed package shall not exceed 65 pounds, except when acid is packed in individual inside containers the gross weight shall be not over 75 pounds. Complete package, closed as for shipment, with inside containers filled with liquid of same specific gravity as commodity to be shipped, must be capable of withstanding at least 2 drops from a height of 4 feet onto solid concrete without leakage from or rupture of inside containers.

(7) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside polyethylene or other electrolyte acid resistant plastic containers, not over 1-gallon each.

(8) Specification 1EX (§178.6 of this subchapter). Carboys in plywood drums. Not authorized for transportation by air.

(9) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test (Mullen or Cady) double-wall corrugated fiberboard or 325-pound test (Mullen or Cady) doublefaced corrugated fiberboard, with not more than 12 inside glass bottles, having acid-proof closures, of not over 32 ounces capacity each. Inside glass bottles must be separated and cushioned by suitable corrugated fiberboard partitions. The box must be equipped with top and bottom pads. (See §178.205-32 of this subchapter).

(10) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes having not more than 1 inside glass bottle, with acid-proof closure, not over 1 gallon capacity. Box shall be constructed of at least 350-pound test (Mullen or Cady) doublefaced corrugated fiberboard of full depth telescope type. Cushioning and closure of box (pressure sensitive tape may be used) must be such that a representative box, with inside glass bottle filled with water, shall be capable of withstanding two drops from a height of 4 feet onto solid concrete without breakage of inner bottle or failure of the closure.

(11) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 1 gallon capacity each. Not more than 4 inside containers exceeding 5 pints capacity each shall be packed in the outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(12) Specification 37P (§178.133 of this subchapter). Steel drums

[1] Use of existing tank cars authorized, but new construction not authorized

with polyethylene liner (non-reusable container). Not authorized for transportation by air.

(13) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

(14) Spec. 12B (§178.205 of this subchapter). Corrugated fiberboard boxes with plastic bags as defined in §178.205-37 of this subchapter. Marking prescribed in §172.312 of this subchapter shall not be required.

(b) Shipments of electrolyte (acid) or corrosive battery fluid with vehicles or engine driven equipment offered for transportation by, for, or to the Departments of the Army, Navy, or Air Force of the U.S. Government are exempt from Parts 171-179 and 397 of this title when packed as follows:

(1) In one inside glass or polyethylene bottle of not over 1-gallon capacity, tightly and securely closed in a strong outside container. Inside glass bottle shall be cushioned therein on all sides with incombustible absorbent material in sufficient quantity to absorb liquid contents in event of breakage. When shipped within or on a motor vehicle or with engines or other mechanical apparatus the outside container must be so blocked, braced, or stayed that it cannot change position during transit.

(c) Electrolyte acid or corrosive battery fluid contained in polyethylene containers not over 2 quarts capacity each and packaged not more than three containers in Specification 15A, 15B, 15C, 16A, 19A, or 19B wooden boxes (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter), or packaged as prescribed in paragraph (a)(6) of this section, and bearing a corrosive label, may be securely attached to self-propelled vehicles or mobile agricultural machinery, or securely braced on a railcar floor.

(d) Strong, tightly closed metal drums not over 15 gallons capacity each, having not to exceed 25 eight-ounce polyethylene, or other suitable plastic bottles, securely cushioned therein. Shipments authorized only by, for, or to the Departments of the Army, Navy, or Air Force of the United States Government. The drum containing the electrolyte acid or corrosive battery fluid may be securely attached to another steel drum containing a dry, charged storage battery or batteries.

§ 173.258 Electrolyte, acid, or alkaline corrosive battery fluid, packed with storage batteries. (a) Electrolyte, acid, or alkaline corrosive battery fluid, packed with storage batteries, except as provided in §173.257(a)(6), must be packed in specification containers as follows:

(1) Spec. 15D or 16B (§§178.171 or 178.186 of this subchapter). Wooden boxes with inside containers of glass bottles not over 1 gallon each nor over 2 gallons total in each outside container. Inside containers must be well cushioned and separated from batteries by a strong solid wooden partition.

(2) Electrolyte, acid, or alkaline corrosive battery fluid included with storage batteries and filling kits may be packed in strong plywood or wooden boxes when shipments are made by, for, or to the Departments of the Army, Navy, or Air Force of the United States Government in outside containers of their specifications provided the electrolyte, acid, or alkaline corrosive battery fluid is packed in polyethylene bottles not over 32-ounce capacity each and not more than 24 bottles securely separated from storage batteries and kits may be shipped in one outside package.

(3) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with not more than 12 inside packagings of polyethylene or other material resistant to the lading, not over 64-ounce capacity each. Polyethylene packagings that are not rigid or semi-rigid in nature must be contained in other strong inside packagings; minimum thickness of polyethylene or other plastic material may be not less than 0.003-inch for any film sheet for multi-wall packagings or not less than 0.006-inch for single-wall packagings. Inside packagings must be adequately separated from the storage battery. Authorized gross weight not over 65 pounds. (See §178.205-33 of this subchapter.) Not authorized for transportation by air.

§ 173.259 Electrolyte, acid, or alkaline corrosive battery fluid, packed with battery charger, radio current supply device, or electronic equipment and actuating devices. (a) Electrolyte, acid, or alkaline corrosive battery fluid packed with battery charger, radio current supply device or parts thereof, or electronic equipment and actuating devices, with only one device or outfit in each package, in the amount necessary for operation of the device or equipment, provided the containers of electrolyte, acid, or alkaline corrosive battery fluid, are adequately cushioned to prevent breakage, leakage, or damage to other articles packed therewith, must be packed in specification containers or as otherwise authorized herein, as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, provided the liquid is in bottles securely closed and cushioned as prescribed in paragraph (a) of this section, and separated from charger supply device, and parts, or electronic equipment by a strong solid wooden partition.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, when the liquid is in a strong bottle not exceeding 16 fluid ounces, which must be securely closed and cushioned as prescribed in paragraph (a) of this section. Not more than 12 such packages may be packed under the provisions of §173.25.

(3) Electrolyte, acid, or alkaline corrosive battery fluid, in separate inside acid or alkaline fluid resistant containers not over 5 gallons capacity each included with electronic equipment and actuating devices, are authorized in strong, tightly closed steel drums.

§ 173.260 Electric storage batteries, wet. (a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid, must be completely protected so that short circuits will be prevented; they must not be packed with other articles except as provided in §§173.250 and 173.258, portable searchlights properly cushioned, battery parts, or hydrometers, securely packed in a separate container. The batteries either with or without other articles must be packed in specification containers as follows:

(1) Spec. 15D or 16B (§§178.171 or 178.186 of this subchapter). Wooden or wirebound wooden boxes except as provided in paragraphs (b) and (c) of this section.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard box as authorized by §§178.205-25(a), 178.205-28(a), and 178.205-35(a) of this subchapter.

(3) Electric storage batteries with case of asphaltum composition, impregnated rubber, steel case type, synthetic resin (plastic), or wooden battery box type, protected against short circuits and firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation, are exempt from specification packaging requirements for transportation by rail freight, highway, or water. The height of the completed unit must not exceed 1½ times the width of the skid or pallet. The unit must weigh not less than 300 pounds gross and must not fail under a superimposed weight equal to two times the weight of the unit or a superimposed weight of 4,000 pounds if the weight of the unit exceeds 2,000 pounds. Battery terminals must not be relied upon to support any part of the superimposed weight. Unless specifically exempt from marking and labeling, each pallet or skid must be marked and labeled as required by Part 172.

(4) Electric storage batteries weighing 500 pounds or more, with case of asphaltum composition, impregnated rubber, steel case type, synthetic resin (plastic), or wooden battery box type, consisting of carriers' equipment may be shipped by rail freight when mounted on suitable skids and protected against short circuits. Such shipments must not be offered in interchange.

(b) Electric storage batteries with case of asphaltum composition, impregnated rubber, steel case type, synthetic resin (plastic), or wooden battery box type; packing authorized as follows:

(1) One to three batteries not over 25 pounds each in outside box, gross weight not over 75 pounds; specification container not required.

(2) Not more than four batteries not over 15 pounds each may be packed in strong outside fiberboard or wooden boxes, when securely cushioned and packed to prevent short circuits; specification container not required. Authorized gross weight 65 pounds.

(3) Not more than five batteries not over 10 pounds each may be packed in strong outside fiberboard or wooden boxes, when securely cushioned and packed to prevent short circuits; specification container not required. Authorized gross weight 65 pounds.

(c) Single batteries not exceeding 75 pounds each, in addition to requirements of paragraphs (a) and (b) of this section, may be shipped in 5-sided slip covers or in completely closed fiberboard boxes, of solid or double-faced corrugated fiberboard complying with the following: (See paragraph (a)(1) of this section for more than one battery in an outside container.)

(1) Slip cover or fiberboard box must fit snugly and provide inside top clearance of at least ½ inch above battery terminals and filler caps with reinforcement in place. Assembled for shipment, the bottom edges of the slip cover may extend to the base of the battery but must not expose more than 1 inch thereof.

(2) Top of slip cover or fiberboard box design must comply with the following:

(i) Top of slip cover or fiberboard box must have interior reinforcement (insert or saddle) of fiberboard, wood, or other material of equal strength and rigidity so formed that any superimposed weight will bear only and directly downward on the top edges of the battery case or intercell connectors (straps), or plastic battery terminal covers designed to transmit any superimposed weight directly to the top inner wall of the battery case, or fiberboard boxes with chip board and chip board jute lined tubes which shall fit directly over the terminal posts and rest directly on battery cell covers.

(ii) Or be protected by a scored one piece cover-liner of 200-pound test (Mullen or Cady) double-faced corrugated fiberboard extending from the base of the battery on one side, across the top of the battery and to the base of the battery on the opposite side.

(iii) Or a five-sided slip cover having top of only one thickness of fiberboard, with lengthwise inner flaps roll folded to form a reinforcement of such height as to provide clearance required by paragraph (c)(1) of this section which shall rest on the side edges of the battery. Outer end flaps to overlap approximately one inch and shall be butt folded and tucked into a center slot cut in the inner flaps. The requirements of paragraphs (c)(2)(i) and (iv) of this section do not apply.

(iv) When top of slip cover or fiberboard box consists of only one thickness of material, reinforcement must have a plane surface of same interior dimensions and thickness. Reinforcement must be

of such height as to provide minimum clearance required above and must be constructed to remain securely in place or be fastened to slip cover or fiberboard box.

(3) All fiberboard must be at least 200 pound test (Mullen) and completed package (battery and slip cover or fiberboard box) must be capable of withstanding top-to-bottom compression test of at least 500 pounds without damage to battery terminals, battery cell covers, and filler caps.

(d) Nonspillable wet electric storage batteries capable of withstanding the tests prescribed in paragraphs (d)(1) and (2) of this section without leakage of battery fluid are excepted from all other requirements of this subchapter when protected against short circuits and securely packaged so as to withstand conditions normal to transportation.

(1) *Vibration test.* Battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.03 inches (0.06 inches maximum total excursion) is applied. The frequency is varied at the rate of one cycle per second per minute between the limits of 10 to 55 cycles per second. The entire range of frequencies and return is traversed in 95 ± minutes for each mounting position (direction of vibrator) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

(2) *Pressure differential test.* Following the vibration test, the battery is stored for six hours at 75°F. ± 7°F. under an external partial pressure of 2 pounds per square inch absolute. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

(e) Electric storage batteries containing electrolyte or corrosive battery fluid are not subject to the requirements of this subchapter for carriage by highway or rail if:

(1) No other hazardous materials are transported in the same vehicle,

(2) The batteries are loaded or braced so as to prevent damage and short circuits in transit,

(3) Any other material loaded in the same vehicle is blocked, braced, or otherwise secured to prevent contact with or damage to the batteries, and

(4) The transport vehicle is carrying no material shipped by any person other than the shipper of the batteries.

(f) [Reserved]

(g) Electric storage batteries, containing electrolyte or corrosive battery fluid in a cell from which it is injected into the battery cells by a gas generator and initiator assembled with the battery, and which are nonspillable and leakproof, are excepted from Parts 170–189 of this title when examined by the Bureau of Explosives and approved by the Director, OHMT.

§ 173.251 Fire-extinguisher charges. (a) Fire-extinguisher charges consisting of sulfuric acid in glass inside containers securely closed may be packed with bicarbonate of soda in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 5 pints each, and cushioned with an appropriate cushioning material.

(2) Spec. 21C (§178.224 of this subchapter). Fiber drums with a single inside container consisting of a glass bottle not over 64 fluid ounces capacity filled with not over six pounds by weight of sulfuric acid (approximately 50 fluid ounces by volume). Bottle must be suspended in center of outside container by means of adequate supports and surrounded by bicarbonate of soda in sufficient quantity to fill drum and neutralize contents in the event of breakage.

(b) Limited quantities of fire-extinguisher charges as described in paragraphs (b)(1) through (3) of this section are excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817.

(1) Fire-extinguisher charges consisting of sulfuric acid in strong 8-fluid ounce or smaller bottles, securely closed and packed with bicarbonate of soda completely surrounding the bottles of acid in outside fiberboard or wooden boxes. Closure must consist of a metal cap lined with an acid-resistant washer or a composition stopper of material that will not be attacked by the acid.

(2) Fire-extinguisher charges, consisting of chlorosulfonic acid in a hermetically sealed bottle not exceeding 2 ounces capacity, securely packed in a metal container inclosed in another metal container, the inner metal container being cushioned in the outer metal container with an appropriate fire resistant cushioning material and the completed package embedded in potassium carbonate in outside fiberboard or wooden boxes.

(3) Fire-extinguisher charges, consisting of sulfuric acid in 10-ounce or smaller bottles, securely closed, packed in a tight fiber carton. Closure must consist of a metal cap lined with an acid-resistant washer or a composition stopper of material that will not be attacked by the acid. The bottle and carton packed in either potassium carbonate or potassium carbonate and alkali packed in a cylindrical tin can, with slip cover, secured by tape in outside fiberboard or wooden boxes.

§ 173.262 Hydrobromic acid. (a) Hydrobromic acid not over 49 percent strength must be packed in specification containers as follows:

(1) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(2) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) [Reserved]

(4) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon each, except that inside containers not over 3 gallons are authorized when only one is packed in each outside box.

(5) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(6) Specification 103B,[1] 103BW, or 111A60W5 (§§179.200, 179.201 of this subchapter). Tank cars.

(7) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint glass bottles may be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(8) Specification 37P (§178.133 of this subchapter). Steel drum, not over 5 gallons capacity, with polyethylene liner (non-reusable container). A drum exceeding 1 gallon capacity must be constructed of at least 24 gauge metal. Not authorized for transportation by air.

(9) Spec. 22C (§178.198 of this subchapter). Plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container.

(10) Spec. 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside spec. 2S (§178.35 of this subchapter) polyethylene container.

(11) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(12) Specification 37M (§178.134 of this subchapter) (non-reuseable) cylindrical steel overpack with inside Specification 2SL (§178.35a of this subchapter) polyethylene container. Overpack must have rolled hoops and be constructed of 20-gauge body and 18-gauge head.

(13) In IM portable tanks as prescribed in paragraph (b)(5) of this section.

(b) Hydrobromic acid greater than 49 percent strength but not over 63 percent strength must be packed in specification containers as follows:

(1) Spec. 22C (§178.198 of this subchapter). Plywood drum as prescribed by §178.198–2(a) of this subchapter, with Spec. 2T (§178.21 of this subchapter) polyethylene container.

(2) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene container.

(3) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes with one inside polyethylene bottle, with screw-cap closure, not over one-gallon capacity.

(4) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table.

(6) Specification 12A (178.210 of this subchapter). Fiberboard box with not more than four inside glass bottles not over one-quart capacity each, or 12 inside glass bottles not over eight fluid ounces each. Each bottle must be enclosed in a metal can and surrounded by a noncombustible cushioning material. Box shall be constructed of at least 275-pound test (Mullen or Cady) corrugated fiberboard.

§ 173.263 Hydrochloric (muriatic) acid; hydrochloric (muriatic) acid mixtures; hydrochloric (muriatic) acid solution, inhibited; sodium chlorite solution (not exceeding 42 percent sodium chlorite); and cleaning compounds, liquids, containing hydrochloric (muriatic) acid.

(a) Hydrochloric (muriatic) acid, hydrochloric (muriatic) acid mixtures, hydrochloric (muriatic) acid solution, inhibited, sodium chlorite solution not exceeding 42 percent sodium chlorite, and cleaning com-

[1] Use of existing tank authorized, but new construction not authorized.

pounds, liquid, containing hydrochloric (muriatic) acid must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter) Wooden boxes with inside glass, earthenware, polyethylene or other nonfragile plastic containers resistant to the lading (bags are not authorized), not over 1-gallon each, except that inside containers not over 3 gallons each are authorized when only one is packed in each outside box.

(2) [Reserved]

(3) [Reserved]

(4) [Reserved]

(5) Specification 1A or 1K (§§178.1, 178.14 of this subchapter). Carboys in boxes. Not authorized for transportation by aircraft.

(6) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(7) Specification 1D, 1EX (sing'e-trip), or 1M (§§178.4, 178.6, 178.17 of this subchapter). Glass carboys in boxes, plywood drums, or expanded polystyrene packagings. Pressure in the carboy may not exceed 10 pounds per square inch gauge at 130° F. (55° C.). If the package is vented, there may be no significant release of contents to the environment. Not authorized for transportation by aircraft.

(8) Specification 57 (§178.253 of this subchapter). Steel portable tank. Authorized only for cleaning compounds, liquid, containing hydrochloric (muriatic) acid of not over 20 percent total acid by weight. Tank must have a polyethylene liner impervious to the solution. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253–4, except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig.

(9) Specification 103B,[1] 103BW, or 111A60W5 (§§179.200, 179.201 of this subchapter). Tank cars. These cars are authorized for acid not over 38 percent strength by weight. A safety relief valve or a safety vent of approved design equipped with frangible disc having ⅛-inch breather hole in center thereof or a safety vent of approved design equipped with carbon discs permitting continuous venting may be used, but may not be used for hydrochloric (muriatic) acid of 22° Baume strength or greater and other fuming acids.

(10) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tank lined with rubber or equally acid-resistant material of equivalent strength and durability. An unlined specification MC 311 or MC 312 tank motor vehicle made from Type 304L or 316 stainless steel is authorized for sodium chlorite solutions not exceeding 42 percent sodium chlorite only. Bottom outlets are authorized if they meet the requirements of §178.343–5 of this subchapter.

(11) Spec. 60 (§178.255 of this subchapter). Portable tanks, rubber-lined.

(12) Specification 103CW, 111A60W7 (§§179.200 and 179.201 of this subchapter). Tank cars having tanks of type 304L stainless steel. Authorized for sodium chlorite solution not exceeding 42 percent sodium chlorite only.

(13) Spec. 1H, 15P, or 22C (§§178.13, 178.182, or 178.193 of this subchapter). Metal crate with inside polyethylene carboy; or glued plywood or wooden box, or plywood drum as prescribed by §178.193–2(a) of this subchapter, with inside Spec. 2T or Spec. 2TL (§§178.21 or 178.27 of this subchapter) polyethylene container.

(14) Specifications 17H, 37A, or 37B (§§178.118, 178.131, 178.132, of this subchapter). Metal drums (sing'e-trip) not over 5 gallons capacity each. Authorized only for 15 percent or less, inhibited hydrochloric (muriatic) acid solution. Drums must be lined throughout with a pliable plastic material impervious to the solution. Specifications 37A and 37B metal drums must be at least 24 gauge steel. Not authorized for transportation by air.

(15) Specification 12A or 12B (§§178.210, or 178.205 of this subchapter). Fiberboard boxes with inside containers of polyethylene, or other nonfragile plastic material resistant to the lading (bags are not authorized), not over 1-gallon capacity each, or not more than one of 3-gallon capacity, suitably cushioned to prevent movement within the box. Gross weight of completed package must not exceed 65 pounds.

(16) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint glass bottles may be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210–10 of this subchapter.

(17) Specification 6D or 37M (nonreusable container) (§§178.102, or 178.134 of this subchapter). Cylindrical steel overpacks with inside Specification 2S, 2SL, 2T, 2TL, or 2U (§§178.35, 178.35a, 178.21, 178.27, 178.24 of this subchapter) polyethylene container.

(18) Specification 37P (§178.133 of this subchapter). Steel drums constructed of at least 24-gauge metal for drums exceeding 1 gallon capacity, with polyethylene liner (nonreusable container). Not authorized for transportation by air.

[1] The use of existing tanks authorized but new construction not authorized.

(19) Spec. 16D (§178.187 of this subchapter). Wirebound wooden overwrap, with inside Spec. 2T, 2TL, 2S, or 2SL (§§178.21, 178.27, 178.35, or 178.35a of this subchapter) polyethylene container.

(20) [Reserved]

(21) Spec. 12C (§178.206 of this subchapter). Fiberboard boxes with inside 5-gallon nominal capacity polyethylene bottles having minimum wall thickness of 0.015 inch and constructed with screw-type closures. Authorized gross weight not over 65 pounds. (See §178.206–19 of this subchapter.)

(22) Spec. 21P (§178.225 of this subchapter). Fiber drum overpack with inside Spec. 2T, 2S, 2SL, or 2U (§§178.21, 178.35, 178.35a, or 178.24 of this subchapter) polyethylene container.

(23) Specification 12P (§178.211 of this subchapter). Fiberboard box with one inside Specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity, each or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failure. Not authorized for transportation by air.

(24) Specification 16A (§178.185 of this subchapter). Wirebound wooden box (§178.185–22 of this subchapter) with inside specification 2U (§178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(25) Spec. 22C (§178.193 of this subchapter). Plywood drum as prescribed by §178.193–2(b), with inside Spec. 2TL (§178.27 of this subchapter) polyethylene container not over 5 gallon nominal capacity.

(26) Spec. 33A (§178.150 of this subchapter). Polystyrene cases (nonreusable container) with inside glass bottles not over 5 pints capacity each. Not more than four 5-pint bottles may be packed in one outside container.

(27) Specification 12R (§178.212 of this subchapter). Paper-faced expanded polystyrene board box with not more than six inside glass bottles or Specification 2E (§178.24a of this subchapter) inside polyethylene bottles, not over 5 pints capacity each.

(28) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

(29) Specification 12R (§178.212 of this subchapter). Paper-faced expanded polystyrene board box with not more than four specification 2E (§178.24a of this subchapter) inside polyethylene bottles, not over 1-gallon capacity each.

(30) Marine portable tanks meeting the requirements of 46 CFR Part 64 authorized for highway and cargo vessel only when shipped in support of off-shore oil well drilling activities. Tanks shall comply with mounting and tie-down requirements of §178.245–4 of this subchapter. Authorized only for mixtures of hydrochloric and hydrofluoric acid containing 2% or less of hydrofluoric acid.

(31) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Hydrochloric acid of not over 20 percent strength (13.25° Baume) and other corrosive liquids containing not over 20 percent hydrochloric acid in addition to containers prescribed in paragraph (a) of this section may be shipped in specification containers as follows:

(1) [Reserved]

(2) Limited quantities of these materials in inside packaging of not more than 8 fluid ounces capacity each, packed in strong outside packagings, and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in the event of breakage, are excepted from labeling (except labeling is required for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817.

(c) When hydrochloric acid contains oils or solvents it must not be shipped in containers or tank cars lined with rubber.

(d) Hydrochloric acid mixtures of not over 28 percent strength, or cleaning compounds, liquid, containing not over 28 percent hydrochloric (muriatic) acid, in addition to the provisions of paragraphs (a) and (b) of this section, may be packed in specification containers as follows:

(1) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test (Mullen or Cady) double-wall corrugated fiberboard or 325-pound test (Mullen or Cady) double-faced corrugated fiberboard, with not more than 12 inside glass bottles, having acid-proof closures, of not over 32 ounces capacity each. Inside glass bottles must be separated and cushioned by suitable corrugated fiberboard partitions. The box must be equipped with top and bottom pads. (See §178.205–32 of this subchapter.)

(2) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 1 gallon capacity each. Not more than 4 inside containers exceeding 5 pints capacity each shall be in the outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210–10 of this subchapter.

(e) Special exceptions for the shipment of certain dilute hydrochloric acid solutions in the ORM-D class are provided in Subpart N of this part.

§ 173.264 Hydrofluoric acid; white acid. (a) Hydrofluoric acid and white acid (ammonium bifluoride and hydrochloric acid mixture), each must be packed in specification packaging as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers which are hydrofluoric acid resistant. These containers are authorized only for strengths of acid for which they are adequate, but in no case may the strength of acid exceed 70 percent.

(2) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with Specification 2E (§178.24a of this subchapter) inside polyethylene bottles or inside receptacles of not over 1 pound capacity each, made of natural rubber, lead, or other hydrofluoric resistant plastic. Authorized only for acid not over 70 percent in strength.

(3) Spec. 16D (§178.187 of this subchapter). Wirebound wooden overwrap, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container. Authorized for hydrofluoric acid not over 70 percent strength.

(4) Specification 12A or 12B (§§178.210, 178.205 of this subchapter). Fiberboard boxes with not more than four Specification 2E (§178.24a of this subchapter) inside polyethylene bottles, having a minimum thickness of 0.030 inch and not over 1 gallon (nominal) capacity each. Bottle closures must be made secure by sealing with pressure-sensitive plastic tape or other equally efficient means. Authorized for acid not over 70 percent strength. Authorized gross weight for Specification 12B fiberboard boxes not over 65 pounds; Specification 12A not over 80 pounds.

(5) [Reserved]

(6) [Reserved]

(7) [Reserved]

(8) Specification 103AW, 105A100W, 111A100F2, 111A60W2, 111A100W4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Unlined metal tanks which have been subjected to adequate passivity or neutralization process. Each metal container, before being put into service must be passivated by an efficient method. Authorized only for hydrofluoric acid of 60 to 80 percent strength. If tanks are washed out with water they must be resubjected to passivity before reshipment.

(i) Hydrofluoric acid solutions and concentrations of 60 percent up to 65 percent when shipped in unlined metal tank cars must be inhibited so that the corrosive effect on steel must not be greater than that of hydrofluoric acid of 65 percent concentration.

(ii) Each tank car must be marked "HYDROFLUORIC ACID" in accordance with the requirements of §172.330 of this subchapter.

(9) [Reserved]

(10) [Reserved]

(11) Specification 103BW, 111A100W4, or 111A60W5 (§§179.200, 179.201 of this subchapter). Tank cars, rubber-lined tanks. Authorized only for acid not over 40 percent strength except Specification 111A100W4 tanks are authorized only for acid of 70 percent strength.

(12) [Reserved]

(13) [Reserved]

(14) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks.

Note 1: Hydrofluoric acid solutions and concentrations of 60 percent up to 65 percent, when shipped in unlined tank motor vehicles, must be inhibited so that the corrosive effect on steel must not be greater than that of hydrofluoric acid of 65 percent concentration.

(15) [Reserved]

(16) Spec. 15P or 22C (§§178.182 or 178.198 of this subchapter). Glued plywood or wooden box, or plywood drum as prescribed by §178.193-2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container. Authorized for acid not over 70 percent strength.

(17) Specification 6D (§178.102 of this subchapter) or 37M (nonreuseable) (§178.134 of this subchapter) cylindrical steel overpacks with inside Specifications 2S, 2SL, or 2T (§§178.35, 178.35a, 178.21 of this subchapter) polyethylene liners. Specification 37M overpack of over 15-gallon capacity must be constructed of at least 20-gauge steel. Authorized only for acid of not over 70 percent strength.

(18) Specification 34 (§178.19 of this subchapter). Polyethylene drum. Authorized only for hydrofluoric acid not over 52 percent strength.

(19) Specification 12P (§178.211 of this subchapter). Fiberboard boxes with one inside Specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity or two inside Specification 2U polyethylene containers of not over 2½-gallon capacity each. Authorized only for acid of 48 to 52 percent.

(20) Marine portable tanks meeting the requirements of 46 CFR Part 64 authorized for highway and cargo vessel only when shipped in support of offshore oil well drilling activities. Tanks shall comply with mounting and tiedown requirements of §178.245-4 of this subchapter when transported by highway. Authorized for hydrofluoric acid mixtures only.

(21) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Hydrofluoric acid, anhydrous (hydrogen fluoride) must be shipped in specification containers as follows:

(1) Specification 3,[1] 3A, 3AA, 3B, 3C, 3E, 4, 4A, 25,[1] or 38[1] (§§178.35, 178.37, 178.38, 178.40, 178.42, 178.48, 178.49 of this subchapter); also Spec. 4B, 4BA, 4BW or 4C (§§178.50, 178.51, 178.61, 178.52, of this subchapter) if not brazed. Cylinders. Filling density must not exceed 85 percent of the pounds water weight capacity of the cylinder. Cylinders used exclusively in this service may, in lieu of the periodic hydrostatic retest required by §173.34(e), be given a complete external visual inspection at the time such periodic retest becomes due. Such inspections shall be made only by competent persons and shall be made on cylinders cleaned to bare metal and results recorded on a suitable data sheet, completed copies of which shall be kept as prescribed in §173.34(e)(5). Points to be checked and recorded on these data sheets are: Date of inspection (month and year) DOT specification number; cylinder identification (registered symbol and serial number, date of manufacture, and if needed for adequate identification, ownership symbol); tare weight; physical condition (record specifically, if present, leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footring or protective ring or fire damage); disposition of cylinders (returned to service, to cylinder manufacturer for repairs, or scrapped). A cylinder which passes the inspection prescribed shall have the data recorded in the manner presently prescribed for the recording of the retest date except that an "E" is to follow the date (month and year) indicating requalification by the external inspection method. Cylinders removed from this service for any reason must be rendered unfit for any other regulatory service (see §173.28(l)).

(2) Specification 105A300W, 112A400W, 114A400W, or ARA-V[1] (§§179.100, 179.101 of this subchapter). Tank cars equipped with special valves and appurtenances approved for this particular service. Filling density must not exceed 90 percent of the pounds water weight capacity of the tank. For Specification 114A400W tanks, valves and fittings must be located on top of the tank. Bottom openings in tank prohibited.

(i) Each tank car must be marked "HYDROGEN FLUORIDE" in accordance with the requirements of §172.330 of this subchapter.

(3) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks.

(4) Spec. 51 (§178.245 of this subchapter). Portable tanks.

(5) [Reserved]

(6) Specification 106A500X or 110A500W (§§179.300, 179.301 of this subchapter) tanks. Tanks may not be equipped with safety devices of any type and valves must be protected by metal caps. Tanks may not be filled to a density in excess of 85 percent of the water weight capacity of the tank. (See §177.834(m) of this subchapter for special requirements for highway shipments.)

(c) Containers must not be entirely filled. Unless otherwise provided in this part, sufficient outage (vacant space) must be allowed so that the liquid portion will not completely fill the container at 130° F. in order to prevent leakage or distortion of containers due to the expansion of the contents from increase in temperature during transit.

[1] The use of existing tanks authorized but new construction not authorized.

§ 173.265 Fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid). (a) Fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid) must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers of natural rubber, ceresine, or other material of equal efficiency resistant to fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid).

(2) [Reserved]

(3) [Reserved]

(4) Specification 16A (§178.185 of this subchapter). Wirebound wooden box (§178.185-22 of this subchapter) with inside Specification 2U (§178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid) of not exceeding 40 percent strength may also be shipped when packed in specification containers as follows:

(1) [Reserved]

(2) [Reserved]

(3) Specification 103B,[1] 103BW, 111A60W5, or 111A100W2 (§§179.200, 179.201 of this subchapter). Tank cars, rubber-lined or elastomer lined tanks.

(4) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(c) Fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid) containing no free hydrofluoric acid or other ingredient that will attack glass, may also be shipped when packed in specification containers as follows:

(1) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Carboys in boxes or expanded polystyrene packagings. Use of a rubber stopper and gasket is authorized for Specification 1A and 1D carboys only. Not authorized for transportation by aircraft.

For explanation of abbreviations and reference marks, see last page of this tariff.

(2) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers, over 1-gallon capacity each, with rubber or ground-in glass stoppers.

(4) The vacant space in containers of these acids must be sufficient so that when raised to a uniform temperature of 130° F. the vapor pressure shall not exceed 6 pounds per square inch.

(d) Fluosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid) of not exceeding 32 percent strength may also be shipped when packed in specification containers as follows:

(1) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with Specification 2E (§178.24a of this subchapter) inside polyethylene bottles or other plastic material resistant to the lading, not over 1-quart capacity each, suitably cushioned to prevent movement within the box. Gross weight of complete package must not exceed 65 pounds.

(2) Spec. 15P or 22C (§§178.182 or 178.198 of this subchapter). Glued plywood or wooden box, or plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container.

(3) Spec. 6D or 37M (nonreusable container) (§178.102 or 178.134 of this subchapter). Cylindrical steel overpacks with inside Spec. 2S or 2SL (§178.35 or 178.35a of this subchapter) polyethylene container. Spec. 37M overpack shall be constructed of at least 20-gauge steel and steel and shall not exceed 16 gallons capacity each.

(4) Specification 37P (§178.133 of this subchapter). Steel drums, not over 5-gallons capacity, with polyethylene liner (non-reusable container). Not authorized for transportation by air.

(5) Spec. 21P (§178.225 of this subchapter). Fiber drum overpack with inside Spec. 2S, 2SL or 2U (§§178.35, 178.35a, or 178.24 of this subchapter) polyethylene container.

(6) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

§ 173.266 Hydrogen peroxide solution in water. (a) Hydrogen peroxide solution in water containing over 52 percent hydrogen peroxide by weight must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 1-quart capacity each; bottles must have vented closure and must be packed in metal container vented at bottom, packed in another metal container vented at top; cushioning material shall be used between glass bottle and inner container and between inner and outer metal containers; cushioning material shall be vermiculite or equivalent in an amount at least 10 times the volume of the solution shipped and shall be wet with at least 10 percent water by volume to which has been added a stabilizing agent.

(2) Spec. 42D (§178.109 of this subchapter). Aluminum drums with vented closure in top head; not over 30 gallons capacity; side openings not permitted. Top head must be plainly marked "KEEP THIS END UP" or "KEEP PLUG UP TO PREVENT SPILLAGE."

(3) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) under the conditions specified in the IM Tank Table are authorized for shipment of hydrogen peroxide solution in water containing 60 percent or less hydrogen peroxide by weight. Pressure relief devices shall be designed to prevent the entry of foreign matter, the leakage of liquid and the development of any dangerous excess pressure. In addition, the tank shall be designed so that internal surfaces may be effectively cleaned and passivated. The tank shall be clearly marked "FOR HYDROGEN PEROXIDE ONLY." Each tank must be equipped with pressure relief devices conforming to the requirements of the following table:

Concentration of hydrogen peroxide solution	Total venting capacity in standard cubic feet per hour (S.C.F.H.) per pound of hydrogen peroxide solution
52 percent or less	11
Over 52 percent but not greater than 60 percent	22
Over 60 percent but not greater than 70 percent	32

(b) Hydrogen peroxide solution in water containing 52 percent or less hydrogen peroxide by weight must be packaged as prescribed in paragraph (a) or (f) of this section or as follows (vented packagings are not permitted aboard aircraft):

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers of not more than 1-gallon capacity each. Inside containers must be well cushioned with an appropriate fire-resistant cushioning material. Cushioning of inside containers in outside wooden boxes by means of elastic packing, such as wooden strips or large corks fastened securely in position, is authorized if the completed package will pass the swing test prescribed for boxed carboys in Specification 1A (§178.1 of this subchapter).

(2) [Reserved]

(3) Spec. 42D (§178.109 of this subchapter). Aluminum drums with vented closure in top head, not over 55 gallons capacity. Top heads must be plainly marked "KEEP THIS END UP" or "KEEP PLUG UP TO PREVENT SPILLAGE."

(4) [Reserved]

(5) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with Specification 2E (§178.24a of this subchapter) inside polyethylene bottles having vented screw-cap closures not over 16-ounce capacity each. Each bottle must be completely contained in a securely closed polyethylene bag or tube constructed of material having minimum film thickness of 0.004 inch. Bottles must be separated from each other by use of fiberboard partitions or other suitable cushioning material. Not more than 12 bottles may be packaged in one box.

(6) Spec. 6D or 37M (nonreusable container) (§§178.102 or 178.134 of this subchapter). Cylindrical steel overpacks with inside spec. 2S or 2SL (§§178.35 or 178.35a of this subchapter) polyethylene container. The closure must be located in one head and must be vented to prevent accumulation of internal pressure and head plainly marked "KEEP THIS END UP" or "KEEP PLUG UP TO PREVENT SPILLAGE."

(7) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside specification 2SL (§178.35a of this subchapter) polyethylene container, not over 55-gallon capacity, or specification 2U (§178.24 of this subchapter) polyethylene container not over 15-gallon capacity. The closure of the inside 2SL and 2U container must be vented to prevent accumulation of internal pressure and the head with the closure must be marked "KEEP THIS END UP" or "KEEP PLUG UP TO PREVENT SPILLAGE."

(8) Specification 34 (§178.19 of this subchapter). Polyethylene drum. Each drum must have a vented closure to prevent accumulation of internal pressure and the head with the closure must be marked "KEEP THIS END UP."

(9) Specification 37P (§178.133 of this subchapter). Steel drums, not over 15-gallon capacity, with inside Specification 2U (§178.24 of this subchapter) polyethylene containers having a minimum thickness of 0.015 mil. The closure of the inside 2U container must be vented to prevent accumulation of internal pressure and the head with the closure must be marked "KEEP THIS END UP" or "KEEP PLUG UP TO PREVENT SPILLAGE".

(10) In IM portable tanks as prescribed in paragraph (a)(3) of this section.

(c) Hydrogen peroxide solution in water containing over 8 percent hydrogen peroxide by weight and not exceeding 37 percent must be packaged as prescribed in paragraph (a), (b), or (f) of this section or as follows (vented packagings are not permitted aboard aircraft):

(1) Specification 1A (§178.1 of this subchapter). Glass carboys. The cushioning must be non-combustible mineral material, elastic wooden-strip packing, or large elastic cushions such as corks fastened securely in position. The use of hay, excelsior, ground cork, or similar material, whether treated or untreated, is prohibited. The carboy stoppers must be vented so as to prevent accumulation of internal pressure; use of cork gasket impregnated with paraffin is authorized. Not authorized for transportation by air.

(2) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 1D or 1M (§§178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Pressure in the carboy may not exceed 10 pounds per square inch gauge at 130° F. (55° C.). If the package is vented, there may be no significant release of contents to the environment. For Specification 1D, the cushioning must be non-combustible mineral material, elastic wooden-strip packaging, or large elastic cushions such as corks fastened securely in position; the use of hay, excelsior, ground cork, or similar material, whether treated or untreated, is prohibited. Not authorized for transportation by aircraft.

(4) Spec. 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers of polyethylene, or other plastic material resistant to the lading, not over 1-pint capacity or 16 ounces by weight each. Inside containers must be securely cushioned with an appropriate fire-resistant cushioning material.

(5) Spec. 1H, 15P, or 22C (§§178.13, 178.182 or 178.198 of this subchapter). Metal crate with inside polyethylene carboy; or glued plywood or wooden box, or plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container.

(6) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside aluminum bottles constructed of at least 99 percent pure aluminum of not over 5 pounds or 5 pints capacity each. Each bottle shall be individually partitioned and surrounded by incombustible mineral pack-

[1] Use of existing tank cars authorized, but new construction not authorized.

ing material in the outside shipping container. Bottle closure shall be by means of a threaded aluminum cap lined with polyethylene gasket or other equally efficient closing device. A venting device which will not leak liquid under conditions normally incident to transportation is permitted.

(7) [Reserved]

(8) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene bottles not over 1 gallon capacity each with vented closures; such bottles over 32 ounces capacity each must be completely contained in a securely closed polyethylene bag or tube constructed of material having minimum film thickness of 0.003 inch. Alkaline solutions containing sodium hydroxide or other alkaline materials packed in glass or polyethylene bottles not over 1 gallon capacity each and with hydrogen peroxide solution contained in polyethylene bottles not over 1 gallon capacity each, when shipped as a wood bleach preparation, may be packed together in inside chipboard or corrugated fiberboard boxes or separated by corrugated fiberboard partitions; not more than six inside chipboard or corrugated fiberboard boxes having inside bottles not over 32 ounces each, or more than 4 one gallon bottles separated by corrugated fiberboard partitions may be packed in one outside box; completed package with mixed contents must be capable of withstanding a drop from a height of four feet onto solid concrete without failure of any inside container.

(9) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass or polyethylene bottles, not over 1-gallon capacity each. Each bottle closure must be vented and each bottle completely contained in a securely closed polyethylene bag or tube constructed of material having minimum film thickness of 0.003 inch. Shipper must have established that completed package meets test requirements prescribed by §178.210–10 of this subchapter.

(10) Spec. 16D (§178.187 of this subchapter). Wirebound wooden overwrap, with inside Spec. 2T or 2TL (§§178.21 or 178.27 of this subchapter) polyethylene container.

(d) Hydrogen peroxide solution in water containing over 8 percent hydrogen peroxide by weight and not exceeding 10 percent must be packaged as prescribed in paragraph (a), (b), (c) or (f) of this section (vented packagings are not permitted aboard aircraft).

(e) Except for transportation by vessel, hydrogen peroxide solution in water not exceeding 52 percent hydrogen peroxide by weight, when shipped in tank cars, cargo tanks, or portable tanks in carload or truckload quantities only, is not subject to any other requirement of Parts 170–189 and 397 of this title.

(f) Hydrogen peroxide solution in water exceeding 52 percent hydrogen peroxide by weight may also be packed in specification containers as follows:

(1) Specification 103A-ALW, 103CW, 111A60ALW2 or 111A50W7 (§§179.200, 179.201 of this subchapter). Tank cars. The 103CW and 111A60W7 tank cars must be fabricated of Type 304L, 316, or 316L stainless steel. (See §§173.31(a)(4) and 179.3(a) for additional requirements).

(i) Each tank car must be marked "HYDROGEN PEROXIDE" in accordance with the requirements of §172.330 of this subchapter.

(2) Specification MC 310 or MC 312 (§178.343 of this subchapter). Cargo tanks. Tanks must be fabricated of aluminum conforming to Aluminum Association Nos. 1060, 1260, 5254, or 5652. Specification MC 312 may be fabricated of Type 304L, 316 or 316L stainless steel. They must be built to a design working pressure of not less than 40 psig and shall be designed so that internal surfaces may be effectively cleaned and passivated. All openings in the tank shall be located on top of tank. All valves and safety devices shall be provided with overturn protection and dust covers. The tank metal identification plate required shall be marked "DOT MC 310–H_2O_2" or "DOT MC 312–AL–H_2O_2" or "DOT MC 312–SS–H_2O_2", as appropriate, and in addition, the cargo tank shall be clearly marked in letters not less than one inch high "FOR HYDROGEN PEROXIDE ONLY". Designs for venting and pressure relief devices must be examined by the Bureau of Explosives and approved by the Director, OHMT.

§ 173.267 Mixed acid (nitric and sulfuric acid) (nitrating acid). (a) Mixed acid (nitric and sulfuric acid) (nitrating acid), when offered for transportation by carriers by rail freight, highway, or water must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 7 pounds capacity each, individually inclosed in tightly closed metal cans and cushioned therein with incombustible mineral material.

(2) Spec. 5C (§178.83 of this subchapter). Metal barrels or drums of Type 304 ELC or 347 stainless steel only (See paragraph (b) of this section.)

(3) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. (See paragraph (b) of this section.)

(4) Specification 1A (§178.1 of this subchapter). Carboys in boxes. Authorized only for mixed nitric and sulfuric acid containing not over 17 percent nitric acid and containing at least 33 percent water. Straight-sided carboys must be used, cushioning must be incombustible mineral material, elastic wooden-strip packing, or large elastic cushions, such as cork, fastened securely in position. The use of hay, excelsior, ground cork, or similar material, whether treated or untreated, is prohibited.

(5) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(6) Specification 1D or 1M (§§178.4, or 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Authorized only for mixed nitric and sulfuric acid, containing not over 17 percent nitric acid and containing at least 33 percent water. Pressure in the carboy may not exceed 10 pounds per square inch gauge at 130° F. (55° C.). If the package is vented, there may be no significant release of contents to the environment. For Specification 1D, cushioning must be incombustible mineral material, elastic wooden strip packing, or large elastic cushions such as cork fastened securely in position; the use of hay, excelsior, ground cork, or similar material, whether treated or untreated, is prohibited.

(7) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. (See paragraph (b) of this section.) Bottom outlets are authorized if they meet the requirements of §178.343-5 of this subchapter.

(8) Spec. 60 (§178.255 of this subchapter). Portable tanks. (See paragraph (b) of this section.)

(9) Spec. 5A (§178.81 of this subchapter). Carbon steel barrels or drums. Authorized only for mixed acids containing less than 80 percent nitric acid. (See paragraph (b) of this section.)

(10) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Mixtures of sulfuric acid and nitric acid (nitrating acid), shipped in tank cars, cargo tanks, tank trucks, or metal barrels or drums, shall contain not less than 10 percent sulfuric acid. These mixtures may contain:

(1) Up to 10 percent water with not less than 10 percent sulfuric acid.
(2) Up to 15 percent water with not less than 15 percent sulfuric acid.
(3) Up to 20 percent water with not less than 20 percent sulfuric acid.
(4) Up to 38 percent water with not less than 62 percent sulfuric acid.

(c) Mixed acid (nitric and sulfuric acid) (nitrating acid), when offered for transportation by air must be packaged as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles with glass stoppers held in place by plaster of Paris covered by strong cloth and securely tied. Glass bottles having necks with molded screw threads, must be closed by threaded-type acid-resistant plastic caps equipped with an elastic composition cushion and with glass, porcelain or similar liner impervious to the acid. Such caps, when secured in place by at least one complete continuous thread, must be capable of preventing any leakage of the acid.

(2) Or glass bottles having necks with molded screw threads must be closed by threaded-type acid-resistant caps. Caps must be lined with a resilient liner which must be impervious to the acid. Such caps, when secured in place by at least one complete continuous thread, must be capable of preventing any leakage of the acid.

(3) Each bottle must be placed in a tightly closed metal container and well cushioned therein on all sides with an appropriate fire-resistant cushioning material. The metal container must be packed in the outside container, and well cushioned by incombustible mineral packing material.

(4) Not more than 1 quart of mixed acid may be shipped in one outside packaging.

§ 173.268 Nitric acid. (a) Nitric acid exceeding 40 percent concentration in any quantity must not be packed with any other article.

(1) Each tank car must be marked "NITRIC ACID" in accordance with the requirements of §172.330 of this subchapter.

(b) Nitric acid in any concentration which does not contain significant quantities of sulfuric acid or hydrochloric acid as impurities, when offered for transportation by carriers by rail freight, highway, or water must be packed in specification containers as follows:

(1) Specification 103CW or 111A60W7 (§§179.200, 179.201 of this subchapter). Tank cars.

(2) The use of spec. 103C–AL special aluminum alloy tank cars is authorized for the transportation of 95 percent or greater nitric acid as provided in special orders of November 14, 1939, June 7, 1940, and August 19, 1941.

(3) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343–5 of this subchapter.

(4) Specification 5C (§178.83 of this subchapter). Metal barrels or drums. Authorized for concentrations of nitric acid as limited by §178.83–3(c) of this subchapter. Containers weighing less than 85 percent of their original marked weight are not authorized.

(5) [Reserved]

[1] The use of existing tanks authorized but new construction not authorized.

(6) Specification 33A (§178.150 of this subchapter). Polystyrene case (nonreusable container) with inside glass bottles not over 5-pint capacity each. Not more than four 5-pint bottles may be packed in one outside packaging.

(c) Nitric acid of 80 percent or greater concentration which does not contain significant quantities of sulfuric acid or hydrochloric acid as impurities, when offered for transportation by carriers by rail freight, highway, or water, in addition to and within limitations of paragraphs (b), (d), and (e) of this section, may be packed in specification containers as follows:

(1) Spec. 42B (§§178.107, of this subchapter) Aluminum drums.

(2) Specification 103A-ALW or 111A60ALW2 (§§179.200, 179.201 of this subchapter). Tank cars. Specification 111A60ALW2 tank cars have a safety relief valve start-to-discharge pressure setting of 45 pounds per square inch.

(d) Nitric acid of 90 percent or greater concentration, when offered for transportation by carriers by rail freight, highway, or water, in addition to and within limitations of paragraphs (b) and (c) of this section, may be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 5 pints capacity each, individually inclosed in tightly closed metal cans and cushioned therein with appropriate fire-resistant cushioning material. (See paragraphs (g) and (h) of this section.)

(2) Specification 105A100-AL-W (§§179.100 and 179.201 of this subchapter). Tank cars. Tanks must be fabricated of aluminum alloy which is compatible with the lading, and must be equipped with safety relief valves made of material which is not adversely affected by the lading.

(e) Nitric acid of concentration of less than 90 percent, when offered for transportation by carriers by rail freight, highway, or water, in addition to and within limitations of paragraphs (b), (c), and (f) of this section, may be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 5 pints capacity each. (See paragraphs (g) and (h) of this section.)

(f) Nitric acid of concentration of 72 percent or less, when offered for transportation by carriers by rail freight, highway, or water, in addition to and within limitations of paragraphs (b) and (e) of this section, may be packed in specification containers as follows:

(1) Spec. 1A or 1K (§§178.1, 178.14 of this subchapter). Straight sided carboys in boxes.

(2) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(3) Specification 1D or 1M (§§178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Pressure in the carboy may not exceed 10 pounds per square inch gauge at 130° F. (55° C). If the package is vented, there may be no significant release of contents to the environment.

(4) Cushioning for carboys must be incombustible mineral material, elastic wooden strips, natural cork blocks or rubber blocks. The use of hay, excelsior, loose ground cork, or similar materials, whether treated or untreated, is prohibited.

(5) Spec. 60 (§178.255 of this subchapter). Portable tanks, glass-lined.

(6) [Reserved]

(7) Spec. 12R (§178.212 of this subchapter). Paper-faced expanded polystyrene board boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint bottles shall be packed in one outside shipping container.

(g) Closures for bottles. Glass stoppers ground to fit and held in place by plaster of Paris covered by a strong cloth securely tied; or:

(1) Threaded-type acid-resistant caps with gasket or lining impervious to the acid and sufficiently resilient, or cushioned, to give an acidproof closure; at least 1 complete continuous thread is required to be engaged when bottle is closed for shipment.

(h) Cushioning inside containers. Inside containers must be well cushioned. Except as provided in paragraph (h)(1) of this section, all material for cushioning must be incombustible mineral material such as whiting, mineral wool, infusorial earth, (Kieselguhr), sifted ashes, etc. The use of hay, excelsior, ground cork, or similar material, whether treated or untreated, is prohibited. Where the cushioning material is very fine or powdery, separate partitions for the individual inside containers shall be provided to prevent bottles from shifting and coming in contact with each other, and the box must be tight to prevent sifting of cushioning material.

(1) Cushioning of inside containers in outside specification wooden boxes by means of elastic packings, such as wooden strips, large corks, or pads formed of an expanded polystyrene resin that is resistant to the action of nitric acid, fastened securely in position, is authorized if the completed package will pass the swing test prescribed for boxed carboys.

(i) Nitric acid of any concentration, when offered for transportation by air, must be packaged as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles with glass stoppers held in place by plaster of Paris covered by strong cloth and securely tied. Glass bottles having necks with molded screw threads must be closed by threaded type acid-resistant plastic caps equipped with an elastic composition cushion and with glass, porcelain or similar liner impervious to the acid. Such caps, when secured in place by at least one complete continuous thread, must be capable of preventing any leakage of the acid.

(2) Or glass bottles having necks with molded screw threads must be closed by thread-type acid-resistant caps. Caps must be lined with a resilient liner which must be impervious to the acid. Such caps, when secured in place by at least one complete continuous thread, must be capable of preventing any leakage of the acid.

(3) Each bottle must be placed in a tightly closed metal container, and well cushioned therein on all sides with an appropriate fire-resistant cushioning material. The metal container must be packed in outside containers, and well cushioned by incombustible mineral packing material.

(4) Not more than 5 pints of nitric acid shall be shipped in one outside package.

(j) Nitric acid of 50 percent or less concentration, when offered for transportation by air, may in addition to the provisions of paragraph (i) of this section be packaged as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, 19B or 12B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191, 178 205 of this subchapter). Wooden or fiberboard boxes with not over 12 inside glass ampoules having a capacity of not over 4 fluid ounces each. Each ampoule must be well cushioned with incombustible mineral packing material, such as vermiculite or other equally efficient material, and be packed in a cylindrical cardboard tube having wall thickness of at least ¼ inch, with the inside coated with wax, and be equipped with metal bottom and with metal screw-cap top. Inside packages must be separated by efficient means.

(k) Specification IM 101 portable tanks (§§178 270 and 178 271 of this subchapter), under conditions specified in the IM Tank Table. Authorized for nitric acid of any concentration.

§ 173.269 Perchloric acid. (a) Perchloric acid in excess of 72 percent must not be shipped. When not exceeding 72 percent strength must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 5 pints capacity each, cushioned with incombustible mineral material in sufficient quantity to absorb any leakage.

(2) Specification 1A, 1D, 1K, or 1M (§§178.1, 178.4, 178.14, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possession of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(4) Spec. 33A (§178.150 of this subchapter). Polystyrene cases (nonreusable container) with inside glass bottles not over 5 pints capacity each. Not more than four 5-pint bottles may be packed in one outside container.

(5) Spec. 12R (§178.212 of this subchapter). Paper-faced expanded polystyrene board boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint bottles shall be packed in one outside shipping container.

(6) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside specification 2S (§178.35 of this subchapter) polyethylene container not exceeding 30-gallon capacity. Maximum net weight may not exceed 380 pounds. Not authorized for transportation by air.

(7) Specification IM 101 portable tanks (§§178 270, 178 271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for perchloric acid not exceeding 50 percent by weight.

(8) Specification 3H (§178.19 of this subchapter). Polyethylene drum. Authorized for perchloric acid not exceeding 50% strength only. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(b) Cushioning for carboys must be incombustible mineral material, elastic wooden strips, natural cork blocks or rubber blocks. The use of hay, excelsior, loose ground cork, or similar materials, whether treated or untreated, is prohibited.

(c) Perchloric acid in any quantity must not be packed with any other article.

(d) Closures for bottles. Required as follows:

(1) Glass stoppers ground to fit and held in place by plaster of Paris covered by a strong cloth securely tied.

(2) Threaded-type acid-resistant caps with a gasket or lining imper-

vious to the acid and sufficiently resilient, or cushioned, to give an acid-proof closure; at least one complete continuous thread is required to be engaged when bottle is closed for shipment.

(e) Inside containers must be well cushioned with an appropriate fire-resistant cushioning material. The use of hay, excelsior, ground cork, or similar material, either treated or untreated, is prohibited. Where the cushioning material is very fine or powdery, separate partitions for the individual inside containers should be provided to prevent the bottles from shifting and coming in contact with each other, and the box must be tight to prevent sifting of cushioning material.

(f) Cushioning of inside containers in outside wooden boxes by means of elastic packings, such as wooden strips, large corks, or pads formed of an expanded polystyrene resin that is resistant to the action of perchloric acid, fastened securely in position, is authorized if the completed package will pass the swing test prescribed for boxed carboys.

§ 173.270 Phosphorus tribromide. (a) Phosphorus tribromide must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1 gallon capacity each, except that inside containers up to 3 gallons each are authorized when only one container is packed in an outside box.

(2) Specification 5K or 5M (§§178.88, 178.90 of this subchapter). Nickel or Monel drums not over 10 gallons capacity each.

(3) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.271 Methyl phosphonic dichloride, phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride. (a) Methyl phosphonic dichloride, phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride must be placed in specification containers as follows:

(1) Specification 34 (§178.19 of this subchapter). Polyethylene drum. Authorized for phosphorus oxychloride only. The shipper shall assure conformance with the requirements of §173.24(d) of this Part prior to first shipment.

(2) Spec. 5K (§178.88 of this subchapter). Nickel drums.

(3) Specification 60 (§178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene packaging. Polyethylene used must be Type III as set forth in Appendix B—Specifications for Plastics to Part 178 of this Title. Authorized for phosphorus oxychloride and thiophosphoryl chloride only.

(4) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, except that inside containers not over 3 gallons each are authorized when only one container is packed in an outside box.

(5) [Reserved]

(6) Spec. 60 (§178.255 of this subchapter). Portable tanks when tanks are lead-lined.

(7) Specification 103ANW (§§179.200, 179.201 of this subchapter). Tank cars. Tanks must be fabricated of solid nickel at least 95 percent pure and containing not more than 1 percent iron. Metal test coupons for welding procedure qualification must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 96.7 percent.

(8) Specification MC 310,[1] MC 311,[1] or MC 312 (§§178.340, 178.343). Cargo tanks, subject to the following conditions:

(i) Lead-lined or nickel-lined tanks. If nickel-lined, the lining must consist of at least one thirty-second inch of uncontaminated nickel at all points including rivets, welds and other joints, and edges of tank plates.

(ii) Tanks fabricated from Type 316 stainless steel or clad with Type 316 stainless steel having a minimum thickness of 0.2 times the design thickness of the parent metal, are authorized only for phosphorus oxychloride, phosphorus trichloride and thiophosphoryl chloride.

(iii) Tanks made from mild steel or austenitic stainless steel, without lining or cladding. Authorized only for phosphorus trichloride.

(iv) Specification MC 311 or MC 312 cargo tanks. Tanks must be fabricated of solid nickel at least 95 percent pure and not more than 1 percent iron. Metal test coupons for welding procedure qualification must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 96.7 percent. Authorized only for phosphorous oxychloride and phosphorus trichloride.

(9) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. Specification 103A[1] tanks must be lead-lined steel or made of steel with nickel cladding of at least 10 percent of the shell thickness. Specification 103AW, 111A60W2, or 111A100F2 tanks must be lead-lined steel or made of steel with nickel cladding with a minimum thickness of 1/8 inch. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162-80.

(10) Spec. 103E W (§§179.200 and 179.201 of this subchapter). Tank cars made from Type 316 stainless steel. Authorized for phosphorus trichloride and thiophosphoryl chloride only.

(11) Specification 103A,[1] 103AW, 103CW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. Specification 103CW must be fabricated from Type 430 stainless steel. Authorized for phosphorus trichloride only.

(12) Spec. 5A or 5C (§§178.81 or 178.83 of this subchapter). Metal barrels or drums. Authorized for phosphorus trichloride and thiophosphoryl chloride.

(13) [Reserved]

(14) [Reserved]

(15) [Reserved]

(16) Spec. 17C (§178.115 of this subchapter). Metal drums (single-trip) with no opening exceeding 2.3 inches in diameter. When drums are not constructed of stainless steel they must be lined with a material impervious to the lading. Authorized for phosphorus trichloride only.

(17) Spec. 5M (§178.90 of this subchapter). Monel drums not over 10 gallons capacity each.

(18) Spec. 5B (§178.82 of this subchapter). Metal barrels or drums lined with a material which is compatible with the commodity. Authorized for thiophosphoryl chloride only.

(19) Spec. 1M (§178.17 of this subchapter). Glass carboys in expanded polystyrene packagings. Authorized only for phosphorus oxychloride. Not authorized for transportation by aircraft.

(20) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.272 Sulfuric acid. (a) Sulfuric acid (oleum, oil of vitriol, etc.) must be packed in specification containers as follows:

(b) Limited quantities of sulfuric acid solutions in concentrations of 25 percent or less, in inside packagings of not over 8 fluid ounces capacity each, packed in strong outside packagings and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in event of breakage, are excepted from labeling (except when offered for transportation by air) and the specification packaging of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(c) Sulfuric acid concentration of 51 percent or less. Authorized packaging is described in paragraphs (1) through (16), (24) through (26) of paragraph (i) of this section.

(d) Sulfuric acid concentration of greater than 51 percent to not over 65.25 percent. Authorized packaging is described in paragraphs (1) through (16), and (27) through (29) of paragraph (i) of this section.

(e) Sulfuric acid concentration of greater than 65.25 percent to not over 77.5 percent. Authorized packaging is described in paragraphs (1) through (16), (20) through (22) and paragraph (29) of paragraph (i) of this section.

(f) Sulfuric acid concentration of greater than 77.5 percent to not over 95 percent. Authorized packaging is described in paragraphs (1) through (22) and paragraph (29) of paragraph (i) of this section.

(g) Sulfuric acid concentration of greater than 95 percent to not over 100.5 percent. Authorized packaging is described in paragraphs (i)(1) through (4), (6), (9), (14) through (22), and (29) of paragraph (i) of this section.

(h) **Sulfuric acid concentration of over 100.5 percent.** Authorized packaging is described in paragraphs (i) (1)-(4), (17), and (19)-(23) of this section.

(i) Authorized packagings are described as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1-gallon capacity each, except that inside containers not over 3 gallons each are authorized when only one container is packed in an outside box.

(2) Specification 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint glass bottles may be packed in one outside container. Shipper must have established that the completed package meets the test requirements prescribed in §178.210-10 of this subchapter.

(3) Specification 33A (§178.150 of this subchapter). Polystyrene cases (nonreusable container) with inside glass bottles not over 5 pints capacity each. Not more than four 5-pint bottles may be packed in one outside container.

(4) Specification 1X (§178.5 of this subchapter). Boxed carboys, single-trip for export only. For shipment by water to noncontiguous territories or possessions of the United States and foreign countries, shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(5) Specifications 1H, 15P, or 22C (§§178.13, 178.182, 178.198 of this subchapter). Metal crate with an inside polyethylene carboy; or glued plywood or wooden box, or plywood drum as prescribed by §178.198-2(a) of this subchapter with an inside Specification 2T or 2TL (§§178.21, 178.27 of this subchapter) polyethylene container.

(6) Specification 60 or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with an inside Specification 2S, 2SL, or 2T (§§178.35, 178.35a, 178.21 of this subchapter) polyethylene container. Overpack of over 30-gallon capacity

[1] Use of existing tanks authorized, but new construction not authorized.

must be constructed of at least 16-gage steel throughout when used for sulfuric acid of 93 percent or greater concentration.

(7) Specification 16D (§178.187 of this subchapter). Wirebound wooden overwrap, with an inside Specification 2T, 2TL, 2S, or 2SL (§§178.21, 178.27, 178.35, 178.35a of this subchapter), polyethylene container.

(8) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with an inside Specification 2T or 2U (§§178.21, 178.24 of this subchapter) polyethylene container not over 15-gallon capacity.

(9) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

(10) Specification 16A (§178.185 of this subchapter). Wirebound wooden box (§178.185-22 of this subchapter) with an inside Specification 2U (§178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(11) Spec. 12P (§178.211 of this subchapter). Fiberboard box with one inside Specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity, or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(12) Specification 12B (§178.205 of this subchapter). Fiberboard boxes with inside polyethylene containers or other containers of plastic compatible with the chemical, not over 1-gallon capacity each. Inside containers must be cushioned to prevent movement in the outside box. Not more than four 1-gallon inside containers may be packed in one outside container. Authorized gross weight not over 75 pounds.

(13) Specification 12R (§178.212 of this subchapter). Paperfaced expanded polystyrene board boxes with inside Specification 2E (§178.24a of this subchapter) polyethylene bottles not over 1-gallon capacity each. Not more than four 1-gallon capacity each. Not more than four 1-gallon polyethylene bottles may be packed in one outside packaging.

(14) Specification 12R (§178.212 of this subchapter). Paperfaced expanded polystyrene board boxes with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint bottles may be packed in one outside shipping container.

(15) Specification 1A or 1K (§§178.1, 178.14 of this subchapter). Carboys in boxes. Not authorized for transportation by aircraft.

(16) Specification 1D or 1M (§§178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(17) Specification 5A (§178.81 of this subchapter). Metal barrels or drums. Authorized for sulfuric acid of 77.5 percent or greater concentrations, with or without an inhibitor, provided such acid has a corrosive effect on steel no greater than 93.2 percent sulfuric acid, measured at 100° F.

Note 1: Tapered steel plugs, without gaskets, for standard Specification 5A flanges are authorized. Threaded length must not be less than 1.5 inches. Major diameter of plug must not be over 2⅛½ inches, and minor diameter not less than 2⅛ inches.

(18) Specification 17F (§178.117 of this subchapter). Metal barrels or drums (single-trip only). Authorized for sulfuric acid of 77.5 percent to 98 percent concentrations with or without an inhibitor, provided such acid has a corrosive effect on steel no greater than 93.2 percent sulfuric acid, measured at 100° F.

(19) Specification 5C (§178.83 of this subchapter). Metal barrels or drums of Type 304, 316, or 347 stainless steel or other types of stainless steel of at least equivalent corrosion resistance and physical properties. Authorized for sulfuric acid of 93 percent or greater concentrations.

(20) Specification 60 (§178.255 of this subchapter). Portable tank. Authorized for sulfuric acid of 65.25 percent of greater concentrations provided the corrosive effect in steel is not greater than that of 65.25 percent sulfuric acid, measured at 100° F.

(21) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Authorized for sulfuric acid of concentrations 65.25 percent or greater concentrations, provided the corrosive effect in steel is not greater than that of 65.25 percent sulfuric acid, measured 100° F. Bottom outlets are authorized if they meet the requirements of § 178.343-5 of this subchapter.

(22) Specification 103A,[1] 103AW, 103CW, 105A300W, 111A60W2, 111A100W6, or 111A100F2 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars. Authorized for sulfuric acid of concentrations 65.25 percent or greater, provided the corrosive effect on steel is not greater than that of 65.25 percent sulfuric acid, measured at 100° F. Tank cars used for sulfuric acid, mixed acid (nitric and sulfuric acids) (nitrating acid), and other fuming acids, may be equipped with safety vents incorporating frangible discs having a ⅛-inch breather hole in their center.

The ⅛-inch breather hole is not permitted in frangible discs of safety vents on oleum tank cars. Specification 103CW and 111A100W6 tank cars must have tanks constructed of type 304-L stainless steel. Bottom outlets are not authorized.

(23) Specification 115A60W6 (§179.220 of this subchapter). Tank cars. Tanks must be constructed of Type 304 or 316 stainless steel. Bottom outlets must be rendered inoperative and blanked off.

(24) Specifications 60 (§178.255 of this subchapter). Rubber-lined portable tanks.

(25) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of § 178.343-5 of this subchapter.

(26) Specification 103B,[1] 103BW, or 111A60W5 (§§179.200, 179.201 of this subchapter). Lined tank cars.

(27) Specification 103AW, 111A100F2, or 111A60W2 (§§179.200, 179.201 of this subchapter). Tank cars having tanks equipped with a phenolic lining impervious to the lading.

(28) Specification MC 310, MC 311 or MC 312 (§178.343 of this subchapter). Cargo tanks must be lined with rubber or equally acid-resistant material of equivalent strength and durability. Bottom outlets are authorized if they meet the requirements of § 178.343-5 of this subchapter. Not authorized for transportation by vessel.

(29) Marine portable tanks meeting the requirements of 46 CFR Part 64 authorized for highway and cargo vessel only when shipped in support of off-shore oil well drilling activities. Tanks shall comply with mounting and tie-down requirements of § 178.245-4 of this subchapter when transported by highway. Authorized for sulfuric acid of concentrations up to 65.25 percent. Concentrations up to 100.5 percent are also authorized if the corrosive effect on steel is not greater than that of 65.25 percent sulfuric acid measured at 100° F.

(30) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Sulfuric acid of concentrations greater than 62.5 percent is authorized provided the corrosive effect on steel is not greater than that of 65.25 percent sulfuric acid, measured at 100° F.

§ 173.273 Sulfur trioxide. (a) Sulfur trioxide, stabilized, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1-gallon each.

(2) Spec. 5A or 5C (§§178.81 or 178.83 of this subchapter). Metal barrels or drums, not over 55 gallons capacity each.

(3) Spec. 17F (§178.117 of this subchapter). Metal drums (single-trip).

(4) Specification 103A,[1] 103AW, 105A100W, 111A60W2, or 111A100F2 (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars. Authorized only for stabilized sulfur trioxide. Tank cars must have safety valves of approved design and not subject to rapid deterioration by the lading. Cars equipped with interior heater coils not permitted. Specification 103AW tank cars may be equipped with standpipe electrical heaters approved by the AAR Committee on Tank Cars.

(i) Each tank car must be marked "SULFUR TRIOXIDE" in accordance with the requirements of § 172.330 of this subchapter.

(5) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Authorized only for stabilized sulfur trioxide. Tanks must be equipped with spring-relief safety valves. Tanks equipped with interior heater coils not permitted. Bottom outlets are authorized if they meet the requirements of § 178.343-5 of this subchapter.

(b) Sulfur trioxide, unstabilized, must be packed in specification containers as follows:

(1) Cylinders as prescribed for any compressed gas, except acetylene. Cylinders must be closed by metal plugs or valves. If valves are used, they must be protected by a valve protection cap, and each valve outlet must be capped or plugged. Cylinders must have a minimum service pressure of 400 psig and a maximum capacity of one gallon. Safety relief devices are not permitted. Cylinders must be overpacked in strong outside containers.

(2) Specification MC 311 or MC 312 (§178.343 of this subchapter). Tank motor vehicles. Tanks must be insulated and equipped with a safety relief valve. If the valve incorporates a rupture disc it may not exceed a maximum pressure of one and one-half times the design pressure of the tank. Tanks equipped with interior heater coils not permitted.

(3) Specification 105A300W (§179.100, 179.101 of this subchapter). Tank car. Tank car must be externally coiled and have a safety-relief valve set at not more than 225 psig. Cars equipped with interior heater coils not permitted.

(i) Each tank car must be marked "SULFUR TRIOXIDE" in accordance with the requirements of § 172.330 of this subchapter.

§ 173.274 Fluosulfonic acid. (a) Fluosulfonic acid must be packed in containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside containers not over 1-gallon each, except that inside containers not over 3 gallons each are authorized when only one container is packed in an outside box, as prescribed in Notes 1 and 2 of this section.

[1] Use of existing tanks authorized but new construction not authorized.

Note 1: Bottles manufactured of Pyrex glass or glass of equal acid resistance, authorized only for material containing an excess of sulfur trioxide, with Pyrex glass stoppers or glass stoppers of equal acid resistance, ground to fit and held in place by plaster of Paris covered by strong cloth securely tied; each bottle must be placed in a metal container, well cushioned therein with an appropriate fire resistant cushioning material.

Note 2: Or steel containers, 14 gauge steel throughout, welded heads and side seams, equipped with ¾ inch welded flange and plug. Threads for plug must be 8 or less per inch. Each drum must be tested for leakage with 15 pounds hydrostatic pressure.

(2) Spec. 5A or 17F (single-trip) (§§178.81 or 178.117 of this subchapter). Metal barrels or drums not over 55 gallons capacity each.

(3) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars.

(4) Specification MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks.

(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.275 Difluorophosphoric acid, anhydrous, monofluorophosphoric acid, anhydrous, hexafluorophosphoric acid, and mixtures thereof. (a) Difluorophosphoric acid, anhydrous, monofluorophosphoric acid, anhydrous, hexafluorophosphoric acid, and mixtures thereof must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes, Spec. 12B (§178.205 of this subchapter) fiberboard boxes, or Spec. 21C (§178.224 of this subchapter) fiber drums with inside polyethylene or other nonfragile plastic bottles resistant to the lading, not over 2 gallons capacity each, closed by means of threaded acid-resistant caps; caps must have at least one complete continuous thread and be additionally sealed to the bottle to prevent turning of cap after bottle is closed.

(2) Spec. 42B, or 42D (§§178.107, 178.109 of this subchapter). Aluminum drums not over 55 gallons capacity.

(3) Spec. 22C (§178.198 of this subchapter). Plywood drums as prescribed by §178.198–2(a) of this subchapter, with inside Spec 2T (§178.21 of this subchapter) polyethylene container.

(4) Spec. 60 (§178.255 of this subchapter). Portable tanks. Authorized for inhibited acids enumerated in this paragraph only.

(5) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene packaging. Net weight may not exceed 550 pounds.

(6) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Mixtures of these materials are not authorized in IM portable tanks.

(b) Inside containers must be packed so they cannot change position in the outside container while in transit and inert absorbent cushioning material must be used where necessary.

§ 173.276 Anhydrous hydrazine and hydrazine solution. (a) Anhydrous hydrazine and hydrazine solution must be packed in specification containers as follows:

(1) Specification 1D or 1M (§§178.4 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(2) Spec. 15A, 15B, 15C, 19A or 19B (§§178.168, 178.169, 178.170, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not exceeding 1-gallon capacity each, cushioned by means of vermiculite within tin cans which shall be tightly closed.

(3) Spec. 5, 5A, 5C, or 17E (single-trip) (§§178.80, 178.81, 178.83, or 178.116 of this subchapter). Metal barrels or drums which shall be of type 304 or 347 stainless steel, with openings not exceeding 2 3 inches in diameter.

(4) Specification 103CW, 111A60W7, or 111A100W6 (§§179.200, 179.201 of this subchapter). Tank cars having tanks of Type 304L or 347 stainless steel with molybdenum content not exceeding one-half of 1 percent. The safety relief valve on Specification 103CW tank car tanks may have a start-to-discharge pressure of not more than 45 p.s.i. in place of 35 p.s.i. Specification 111A100W6 tank cars must not be equipped with bottom outlet. Bottom washout permitted. Vapor space in tanks must be filled with nitrogen gas at atmospheric pressure.

(5) Specification 103A–ALW or 111A60ALW2 (§§179.200, 179.201 of this subchapter). Tank cars. The safety relief valve on tanks may not have a start-to-discharge pressure of more than 45 p.s.i. in place of 35 p.s.i. Vapor space in tanks must be filled with nitrogen gas at atmospheric pressure. Authorized for anhydrous hydrazine only.

(6) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks having tanks of Type 304L or 347 stainless steel with molybdenum content not exceeding one-half of 1 percent. Vapor space in tank must be filled with nitrogen gas at not less than atmospheric pressure. Bottom outlets are authorized if they meet the requirements of §178.343–5 of this subchapter.

(7) Spec. 37M (nonreusable container) (§178.134 of this subchapter). Cylindrical steel overpack with inside Spec. 2SL (§178.35a of this subchapter) polyethylene container. Authorized for hydrazine solution only.

(8) Spec. 42B, or 42D (§§178.107, 178.109 of this subchapter) aluminum drums. Authorized for anhydrous hydrazine only.

(9) Specification 12B (§178.205 of this subchapter). Fiberboard box with one inside Specification 2E (§178.24a of this subchapter) polyethylene bottle not over 4½-quart capacity. Polyethylene bottle must be of type III high density polyethylene having a minimum wall thickness of 30 mils and bottle must be securely closed with a screw cap. Authorized for hydrazine solution only.

(10) Specification 34 (§178.19 of this subchapter) polyethylene drum. Authorized for hydrazine solution only.

(11) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for hydrazine solution containing not more than 64 percent hydrazine by weight.

(12) Specification 57 (§178.253 of this subchapter). Stainless steel portable tank. Authorized for hydrazine, aqueous solution only. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253–4, except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig.

§ 173.277 Hypochlorite solutions. (a) Hypochlorite solutions containing more than 7 percent available chlorine by weight must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 19A or 19B, (§§178.168, 178.169, 178.170, 178.190, 178.191 of this subchapter). wooden boxes or Spec 12A or 12B (§178.210, 178.205 of this subchapter) fiberboard boxes with inside glass, earthenware, or polyethylene packagings of not more than 1 gallon capacity each. Gross weight must not exceed 65 pounds nor contain more than 4 glass or earthenware inside packagings if their capacity is greater than 5 pints each, or more than six such inside polyethylene packagings.

(2) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Spec. 1H, 15P, or 22C (§§178.13, 178.182, or 178.198 of this subchapter). Metal crate with inside polyethylene carboy; or glued plywood or wooden box, or plywood drum as prescribed by §178.198–2(a) of this subchapter, with inside Spec. 2T (§178.21 of this subchapter) polyethylene container. Spec. 15P glued plywood or wooden box may contain Spec. 2S (§178.35 of this subchapter) polyethylene drum. Authorized for not over 16 percent sodium hypochlorite solution only.

(4) Specification 6D or 37M (nonreusable container) (§§178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene liners. Authorized for not over 16 percent sodium hypochlorite solution only.

(5) Spec. 12P (§178.211 of this subchapter). Fiberboard box with one inside specification 2U (§178.24 of this subchapter) polyethylene container of not over 5-gallon capacity or two inside Specification 2U polyethylene containers of not over 2½-gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(6) Spec. 34 (§178.19 of this subchapter). Polyethylene drum. Authorized for not over 16 percent sodium hypochlorite solution only. Vented closures are authorized if head with closure is marked "Keep This End Up."

(7) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside Specifications, 2S, 2SL, 2T, or 2U (§§178.35, 178.35a, 178.21, 178.24 of this subchapter) polyethylene container. Authorized for not over 16 percent sodium hypochlorite solutions only.

(8) Specification 37P (§178.133 of this subchapter). Steel drums with polyethylene liner (nonreuseable container). Containers must be vented to prevent accumulation of pressure and the head with closure must be marked "KEEP THIS END UP." Authorized for not over 16 percent solutions of sodium hypochlorite only.

(9) Specification MC 310, MC 311, or MC 312 (§178.243 of this subchapter). Cargo tanks. Tanks must be lined with rubber or other materials resistant to the lading. Continued use of nonspecification cargo tanks used to transport hypochlorite solutions prior to January 1, 1983, is authorized.

(10) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Closures for inside containers and carboys must be vented and must be of a material resistant to the lading and capable of preventing leakage of liquid contents.

(c) Specification 57 (§178.253 of this subchapter). Steel portable tank. Authorized for not over 15 percent solutions of sodium hypochlorite only. Authorized for transportation by water when having a minimum design pressure of 9 psig and equipped in accordance with §178.253–4.

[1] Use of existing tanks authorized but new construction not authorized

except that frangible devices are not authorized. Also, for water transportation, no pressure relief device may open at less than 5 psig. Tanks constructed of a steel other than stainless steel must have a polythylene liner impervious to the solution. Vented closures are authorized.

(d) Limited quantities of this material in glass inside packaging of not more than 4 fluid ounces capacity each, packed in strong outside packaging, and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in the event of breakage, are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter.

(1) [Reserved]

(e) Limited quantities of this material in polyethylene pouches not over 2½ ounces capacity each, heat sealed, and formed of polyethylene, or other suitable plastic, not less than 0 0035–inch in thickness to which must be laminated a 0 0015–inch, 25–pound basis weight white sulphate paper, when securely packed not more than 144 pouches in a strong fiberboard box, are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements, of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174 24 and to Part 177 of this subchapter, except §177.817.

(f) Special exceptions for shipment of certain hypochlorite solutions in the ORM–D class are provided in Subpart N of this part.

§ 173.278 Nitrohydrochloric acid. (a) Nitrohydrochloric acid, which is a mixture of nitric acid not over 1.42 specific gravity and hydrochloric acid not over 1.19 specific gravity in the approximate proportions of one part nitric acid and three parts hydrochloric acid, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers of not over 5 pints capacity each, individually enclosed in tightly closed metal cans and cushioned therein with sufficient incombustible mineral material.

(2) Specification IM 101 portable tanks (§§178 270, 178 271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Nitrohydrochloric acid diluted, is a solution of nitrohydrochloric acid as described in paragraph (a) of this section, which has been diluted to not less than five times the volume of water and must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass containers of not over 5 pints capacity each, individually enclosed in tightly closed metal cans and cushioned therein with sufficient incombustible mineral material.

(2) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Rated capacity may not exceed 5 gallons for Specification 1A and not over 6.5 gallons nominal capacity for Specifications 1D and 1M. Not authorized for transportation by aircraft.

§ 173.279 Anisoyl chloride. (a) Anisoyl chloride must be packed in specification containers as follows:

(1) Spec. 5C (§178.83 of this subchapter). Metal barrels or drums.

(2) Spec. 5 (§178.80 of this subchapter). Metal barrels or drums of stainless steel only, with flanges for closures welded in place and having no opening exceeding 2.3 inches in diameter.

(3) Specification IM 101 portable tanks (§§178 270, 178 271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Limited quantities of this material in inside packagings of not over 8 fluid ounces capacity each, packed in strong outside packaging, and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in the event of breakage, are excepted from labeling (except that labeling is required for transportation by air) and specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

§ 173.280 Trichlorosilanes. (a) Allyl trichlorosilane, amyl trichlorosilane, butyl trichlorosilane, chlorophenyl trichlorosilane, cyclohexenyl trichlorosilane, cyclohexyl tricholorosilane, dichlorophenyl trichlorosilane, diphenyl dichlorosilane, dodecyl tricholorosilane, ethyl phenyl dichlorosilane, hexadecyl trichlorosilane, hexyl trichlorosilane, nonyl trichlorosilane, octadecyl trichlorosilane, octyl trichlorosilane, phenyl trichlorosilane, and propyl trichlorosilane must be packaged as follows;

(1) Specification 15A, 16B or 19B (§§178.168, 178.186, 178.191 of this subchapter). Wooden boxes with inside glass containers not over 1 gallon capacity each, securely closed and cushioned with incombustible absorbent material.

(2) Spec. 17H or 37A (§§178.118 or 178.131 of this subchapter). Metal drums (single-trip), with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.

(3) Spec. 5A (§178 81 of this subchapter). Metal drums not over 55 gallons capacity.

(4) [Reserved]

(5) Specification 5, 5B, 5C, and 17E single-trip (§§178 80, 178 82, 178 83, 178.116 of this subchapter). Metal drums. Not authorized for shipment by air.

(6) Specification steel or nickel cylinders as prescribed for any compressed gas, except acetylene.

(7) Specification 103W, 103A,[1] 103AW, 105A100,[1] 105A100W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, or 111A100W4 (§§179.100, 179.101, 179 200, 179 201 of this subchapter). Tank cars.

(8) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks of steel or stainless steel construction. Bottom outlets are authorized if they meet the requirements of §178.343–5 of this subchapter.

(9) Specification IM 101 portable tanks (§§178 270, 178 271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.281 Benzyl bromide (bromotoluene, alpha). (a) Benzyl bromide (bromotoluene, alpha) must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C or 19B (§§178.168, 178.169, 178.170, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 1–gallon capacity each, closed by means of screw caps which are resistant to action of the contents. Bottles must be packed in metal cans having slip-on or friction closures and cushioned in outside boxes with incombustible material.

(2) Spec. 5K or 5M (§§178 88 or 178 90 of this subchapter). Nickel or monel barrels or drums. Spec. 5M drums shall not be over 10 gallons capacity.

(3) Specification IM 101 portable tanks (§§178 270, 178 271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.282 Isopropyl percarbonate, stabilized. (a) Isopropyl percarbonate, stabilized, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 2 gallons capacity each which must be maintained at temperature below 75° F. Shipments are authorized only by private or contract motor vehicle.

§ 173.283 Fluoboric acid. (a) Fluoboric acid exceeding 50 percent concentration must be packed as prescribed in §173 264(a) for hydrofluoric acid.

(b) Fluoboric acid of 50 percent concentration or less must be packed as follows:

(1) In specification packaging as prescribed in paragraph (a) of this section.

(2) In specification packaging as prescribed in §173 245(a)(12), (16), (18), (19), (21), (24), and (26).

§ 173.284 Tungsten hexafluoride.

(a) Tungsten hexafluoride must be packed in specification containers as follows:

(1) Specification 3A, 3AA, 3BN, or 3E (§§178.36, 178.37, 178.39, 178.42 of this subchapter). Cylinders. Cylinders shall be equipped with a valve protection cap or be packed in a strong outside container adequate to protect valves. Outlets of any valves must be capped or plugged. As an alternate, the cylinder opening may be closed by the use of a metal plug. Specification 3E cylinders must be shipped in an overpack.

§ 173.286 Chemical kits. (a) Chemical kits, except as otherwise provided in Parts 170–189 of this subchapter, must be packed, marked, and labeled as prescribed by this part for the specific corrosive materials contained therein.

(b) Chemical kits containing limited quantities of corrosive liquids in inside packagings of not over 6 fluid ounces capacity each are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter if all of the following requirements are complied with. In addition, shipments are not

[1] Use of existing drums authorized, but new construction not authorized

subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) The kit may not contain any corrosive liquid for which no exemption from packaging requirements of this Part 173 is permitted by the commodity list in §172.101 of this subchapter.

(2) The kit must be a strong wooden or metal container, or must be packed in a strong wooden or metal container.

(3) The corrosive liquids must be cushioned with sufficient absorbent cushioning material to completely absorb the contents of the individual containers, and must be protected from injury by other materials in the kit.

(4) The contents of the kit must be of a nature and packed so there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

(c) Chemical kits containing corrosive liquids and other chemicals not classed as hazardous materials used for photographic processing, except as otherwise provided for in Parts 170–189 of this subchapter, must be packed in specification containers as follows:

(1) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 32 ounces capacity each, securely cushioned and separated from other inside containers. The contents of the kit must be of such nature and so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas. Shipper must have established that the completed package meets test requirements prescribed by §178.210–10 of this subchapter.

§ 173.287 Chromic acid solution. (a) For the purposes of the regulations in this part, a chromic acid solution is a solution of chromic acid (chromium trioxide) in water, with or without other acids, containing 35 percent or more of chromic acid by weight. (For solutions containing less than 35 percent chromic acid, see paragraph (c) of this section.) Packagings authorized must be of a design and be constructed of materials that will not react dangerously with or be decomposed by the chemical solution packaged therein.

(b) Chromic acid solutions must be packaged in specification containers as follows:

(1) Specification 1A (§178.1 of this subchapter). Glass carboy in a box. Not authorized for transportation by air.

(2) Specifications 5, 5A, 5B (§§178.80, 178.81, 178.82 of this subchapter). Metal barrel or drum with openings not exceeding 2.3 inches in diameter. Authorized for solutions containing chromic acid only.

(3) Specification 17E (§178.116 of this subchapter) steel drum. Authorized for solutions containing chromic acid only.

(4) Specification 12A or 12B (§§178.210 or 178.205 of this subchapter). Fiberboard box with one inside glass container not over 4-fluid ounce capacity, packed in a wax-lined cylindrical fiber carton with metal ends. The bottle closure must consist of a tightly secured, fitted, ground glass stopper. Space between the bottle and the inner surface of the fiber cylinder must be filled with an appropriate fire resistant cushioning material in sufficient quantity to completely absorb the contents of the bottle in the event of breakage. Not authorized for solutions containing nitric acid.

(5) Specification 12R (§178.212 of this subchapter). Paper-faced expanded polystyrene board box with inside glass bottles not over 5 pints capacity each. Not more than six 5-pint bottles may be packaged in one box. Each bottle must be well cushioned. Partitioning and cushioning must be provided to prevent bottles from shifting, or coming in contact with each other, the box wall, or the bottom. Each bottle closure must consist of a tightly secured, fitted, ground glass stopper, or a threaded-type, acid-resistant cap with a gasket or lining impervious to the acid, sufficiently resilient or cushioned to give an acidproof, leakproof closure.

(6) Specification 33A (§178.150 of this subchapter). Polystyrene case (nonreusable container) with inside glass bottles not over 5 pints capacity each. Not more than four 5-pint bottles may be packaged in one outside container. Each bottle closure must consist of a tightly secured, fitted, ground glass stopper, or a threaded-type, acid-resistant cap with a gasket or lining impervious to the acid, sufficiently resilient or cushioned to give an acidproof, leakproof closure.

(7) Specification 29 (§178.226 of this subchapter). Mailing tube with glass bottles not over 1 ounce capacity each. Each bottle must be well cushioned. Partitioning and cushioning must be provided to prevent bottles from shifting or coming in contact with each other or the tube wall, bottom, or top.

(8) Specification MC 312 (§§178.340, 178.343 of this subchapter). Cargo tanks. Authorized for solutions containing chromic acid only. Not authorized for transportation by water.

(9) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(c) Solutions containing chromic acid in water in concentration not exceeding 35 percent by weight, with or without other acids, and which are not otherwise regulated by Subpart E of this part, must be described as "Corrosive liquids, n.o.s." In addition to the packaging and the limitations prescribed therefor in paragraph (b) of this section, solutions of this composition may also be packaged as follows:

(1) In packaging as prescribed in §173.245, except (a)(4), (14), (15), (18), (19), and (24).

(2) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene container.

(3) Specifications 5, 5A, 5B (§§178.80, 178.81, 178.82 of this subchapter). Metal barrel or drum with openings not exceeding 2.3 inches in diameter. Authorized for solutions containing chromic acid only.

(4) Specification 17E (§178.116 of this subchapter) steel drum. Authorized for solutions containing chromic acid only.

§ 173.288 Chloroformates. (a) Allyl chloroformate, benzyl chloroformate, ethyl chloroformate, and methyl chloroformate must be packaged as follows:

(1) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside glass containers of not over 1-pint capacity each, cushioned with incombustible mineral material.

(2) Specification 1A (§178.1 of this subchapter). Boxed carboys. Glass bottles having nominal capacity of 3 gallons also authorized when packed and tested in accordance with requirements of specification 1A (§178.1 of this subchapter); necks must be protected during shipment. Not authorized for transportation by air.

(b) [Reserved]

(c) Spec. 16D (§178.187 of this subchapter). Wooden wirebound overwrap having one inside Spec. 2SL (§178.35a of this subchapter) polyethylene container not over 55 gallons capacity. Authorized for ethyl chloroformate or methyl chloroformate only.

(d) Specification 6D or 37M (§§178.102, 178.131 of this subchapter). Cylindrical steel overpack with inside Specifications 2S, 2SL, or 2P (§§178.35, 178.35a, 178.21 of this subchapter) polyethylene container. Authorized for ethyl chloroformate and methyl chloroformate only.

(e) Specification 34 (§178.19 of this subchapter). Polyethylene drum.

(f) Specification 111A100W2, 111A100W4, 112A200W, or 112A400F (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars. Authorized only for ethyl chloroformate and methyl chloroformate.

(g) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for allyl chloroformate and benzyl chloroformate.

§ 173.289 Formic acid and formic acid solutions. (a) Formic acid and formic acid solutions must be packed in specification containers as follows:

(1) In containers prescribed in §173.245, except Spec. 5A, 17C, 17E or 17F (§§178.81, 178.115, 178.116 or 178.117 of this subchapter). Metal barrels or drums.

(2) Specification 103ALW, 103CW, 103EW, 111A60ALW, or 111A100W6 (§§179.200, 179.201 of this subchapter). Tank cars. Specification 103EW tanks must be of Type 316 stainless steel. Specification 111A100W6 tanks must be of Type 304L or 316L stainless steel. Specification 103ALW tanks without bottom outlets and Specification 111A60ALW tanks are authorized only for concentrations of 97 percent or greater and must be equipped with top loading and unloading devices. Specification 111A100W6 tanks are authorized only for concentrations of 80 percent or greater, must have bottom outlets effectively sealed, and must be equipped with top loading and unloading devices. Specifications 103ALW and 111A60ALW are not authorized for transportation by water.

(i) Each tank car authorized under this section must be marked "FORMIC ACID" in accordance with the requirements in §172.330 of this subchapter.

(3) [Reserved]

(4) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of §178.343–5 of this subchapter.

(5) [Reserved]

(6) Spec. 5 (§178.80 of this subchapter). Metal barrels or drums of stainless steel only, with flanges for closures welded in place and having no opening exceeding 2.3 inches in diameter.

(7) Specification 17H (§178.118 of this subchapter). Metal drums (single-trip) equipped with bag type liners of material and construction approved by the Department. Each drum must have two diametrically opposite vent holes ⅛-inch diameter in the side wall at each end in close proximity to the top curl and bottom chime. Interior of welded side seam must be covered or otherwise treated to provide a nonabrasive surface. Not authorized for transportation by air.

(8) Spec. 60 (§178.255 of this subchapter). Portable tanks, marked "FOR FORMIC ACID ONLY".

(9) Specification 1EX (§178.6 of this subchapter). Carboys in plywood drums. Not authorized for transportation by air.

(10) Spec. 1H (§178.13 of this subchapter). Metal crate with inside polyethylene carboy.

(11) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. The tank must be marked "FOR FORMIC ACID ONLY."

§ 173.290 Mixtures of hydrofluoric and sulfuric acid. (a) Mixtures of hydrofluoric acid and sulfuric acid, containing not more than 80 percent by weight and not less than 70 percent by weight of hydrofluoric acid and sulfuric acid combined, with the hydrofluoric acid content not

less than 25 percent by weight in any case, must be packed in specification containers as follows:

(1) Spec. 5A (§ 178.81 of this subchapter). Unlined metal barrels or drums which have been subjected to an adequate passivation or neutralization process (see Note 1). Containers must be filled to not over 80 percent of capacity at 68° F. If containers are washed out with water, they must be repassivated before shipment.

Note 1. Each metal container, before being put into this service, must be passivated by the following or an equally efficient method: By filling drum to 90 percent of capacity with hydrofluoric acid of 58 percent strength and allowing drum to stand 48 hours at a temperature of 80° F. and then 7 hours at 140° F., the internal pressure maintained at atmospheric pressure by means of a ventilated bung.

(2) Containers not exceeding 55 gallons capacity each are authorized for carload, truckload, less-than-carload, and less-than-truckload shipment. Containers exceeding 55 gallons capacity each are authorized for carload or truckload shipments only but they must be loaded by consignor and unloaded by consignee.

(3) For less-than-carload or less-than-truckload shipments, containers must be of metal at least as heavy as 14 gauge United States standard for not over 20 gallons capacity each or 12 gauge for not over 55 gallons capacity each. Each container must be subjected to at least one of the following tests before shipment: By interior pressure of at least 15 pounds per square inch before filling or by holding for inspection for at least 24 hours after filling. In either case, each container must be vented prior to shipment.

(4) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.291 Flame retardant compound, liquid. (a) Flame retardant compound, liquid, must be packaged as follows:

(1) Specification 1A (§178.1 of this subchapter). Carboys in boxes which must be closed, and when reused must be reconditioned and tested, as provided in the specification. Not authorized for transportation by aircraft.

(2) Specification 1D or 1M (§§178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Pressure in the carboy may not exceed 10 pounds per square inch gauge at 130° F. (55° C.). If the package is vented, there may be no significant release of contents to the environment. Not authorized for transportation by aircraft.

(3) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(4) [Reserved]

(5) [Reserved]

(6) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, except that containers not over 3 gallons are authorized when only one is packed in each outside box.

(7) [Reserved]

(8) Specification 103B,[1] 103BW, or 111A60W5 (§§179.200, 179.201 of this subchapter). Tank cars.

§ 173.292 Hexamethylene diamine solution. (a) Hexamethylenediamine solution must be packed in specification containers as follows:

(1) In containers prescribed in § 173.249.

(2) Specifications MC 300, MC 301, MC 302 or MC 305. Cargo tanks.

§ 173.293 Iodine monochloride. (a) Iodine monochloride must be packed in specification containers as follows:

(1) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside containers not over 1-quart capacity each; or with stone or earthenware jugs not over 1-gallon capacity each.

(2) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Outage (vacant space above liquid) for inside containers must be not less than 15 percent.

(c) Inside containers must be securely closed by hermetical sealing or by glass or stone stoppers ground to fit and securely fastened or by screw caps fitted with gaskets of suitable material resistant to the contents.

(d) Inside containers must be securely cushioned on all sides with incombustible cushioning material which will not produce heat when in contact with iodine monochloride.

§ 173.294 Chloroacetic acid, liquid or solution. (a) Chloroacetic acid, liquid or solution, must be packed in specification containers as follows:

[1] The use of existing tanks authorized but new construction not authorized.

(1) In containers prescribed in § 173.245(a)(1), (2), (3), or (7).

(2) Specification 103ANW, 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars. Specification 103AW, 111A60W2, or 111A100F2 tank cars must be nickel clad with a nickel thickness of at least 20 percent of the shell thickness. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162–80.

(3) Specifications MC 310, MC 311, or MC 312 (§178.343 of this chapter). Cargo tanks. Tanks must be fabricated of solid nickel at least 95 percent pure and containing not more than 1 percent iron, Type 304 or 316 stainless steel or be suitably lined. Nickel metal test coupons for welding procedures qualification must contain no more than 1 percent iron.

(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Chloroacetic acid, anhydrous, when shipped as a liquid must be shipped in Specification 103ANW tank cars fabricated of nickel containing not more than 1 percent iron or in Specification 103AW or 111A60W2 tank car tanks with nickel cladding of at least 20 percent of the shell thickness or be provided with a suitable corrosive resistant coating or lining. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162–80.

§ 173.295 Benzyl chloride. (a) Benzyl chloride must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, except that inside containers not over 3 gallons each are authorized when only one is packed in an outside box.

(2) [Reserved]

(3) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(4) Spec. 1X (§178.5 of this subchapter). Boxed carboys; single-trip for export only. For shipment by common carriers by water to noncontiguous territories or possessions of the United States and foreign countries; shipments from inland points in the United States which are consigned to such destinations are authorized to be transported to ship side by rail freight in carload lots only and by motor vehicle in truckload lots only.

(5) Spec. 5A or 17C (sing'e-trip) (§§178.81 or 178.115 of this subchapter). Metal barrels or drums with openings not exceeding 2.3 inches in diameter. Authorized for stabilized benzyl chloride only.

(6) Spec. 5K (§178.88 of this subchapter). Nickel drums. When shipped in unstabilized condition, the lading must be anhydrous and must be free from impurities such as iron.

(7) [Reserved]

(8) Spec. 60 (§178.255 of this chapter). Portable tanks. Benzyl chloride must be stabilized when loaded in unlined tanks.

(9) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Authorized for stabilized benzyl chloride only. Bottom outlets are authorized if they meet the requirements of § 178.343–5 of this subchapter.

(10) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Tank motor vehicles fabricated from 99 percent pure nickel plates. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of 96.7 percent. When shipped in unstabilized condition, the lading must be anhydrous and must be free from impurities such as iron. Bottom outlets are authorized if they meet the requirements of § 178.343–5 of this subchapter.

(11) Specification 103A,[1] 103AW, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars.

(12) Specification 103ANW (§§179.200, 179.201 of this subchapter). Tank cars. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 96.7 percent. When shipped in unstabilized condition, the lading must be anhydrous and must be free from impurities such as iron.

(13) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.296 Di iso octyl acid phosphate. (a) Di iso octyl acid phosphate must be packed in specification containers as follows:

(1) Spec. 17E (§178.116 of this subchapter). Metal drums (sing'e-trip) with openings not exceeding 2.3 inches in diameter.

(2) Specifications MC 310, MC 311, or MC 312 (§178.343 of this subchapter). Cargo tanks. Bottom outlets are authorized if they meet the requirements of § 178.343–5 of this subchapter.

(3) Specification 103AW, 103GW, 103EW, 111A60W2, 111A60W7, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars.

(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.297 Titanium sulfate solution containing not more than 45 percent sulfuric acid. (a) Titanium sulfate solution containing not more than 45 percent sulfuric acid must be packed in specification containers as follows:

(1) Specifications MC 310, MC 311, or MC 312 (§178.343 of this

subchapter). Cargo tanks, rubber-lined. Bottom outlets are authorized if they meet the requirements of § 178.343-5 of this subchapter.

(2) Specification 103B,[1] 103BW, or 111A60W5 (§§ 179.200, 179.201 of this subchapter). Tank cars.

(3) Spec. 15A, 15B, 15C, 16A or 19A (§§ 178.168, 178.169, 178.170, 178.185 or 178.190 of this subchapter). Wooden boxes with inside glass or earthenware containers, not over 1 gallon capacity each.

(4) Specification 6D (§ 178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S (§ 178.35 of this subchapter) polyethylene container not over 30-gallons capacity. Overpack of over 15 gallons must be constructed of at least 18-gauge steel throughout.

(5) Specification 21P (§ 178.225 of this subchapter). Fiber drum overpack with inside Specification 2U (§ 178.24 of this subchapter) polyethylene container not over 15-gallon capacity or Specification 2SL (§ 178.35a of this subchapter) polyethylene container not over 55-gallon capacity. Authorized only for solutions containing not over 20 percent sulfuric acid.

(6) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(7) Specification 34 (§ 178.19 of this subchapter). Polyethylene container without overpack, not over 30-gallon capacity.

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[1] Use of existing tank cars authorized but new construction not authorized.

§ 173.299 Etching acid liquid, n.o.s. (a) Etching acid liquid shall be a mixture of nitric acid, hydrofluoric acid, having nitric acid in concentrations of not more than 60 percent by weight, hydrofluoric acid in concentrations of not less than 4 percent by weight and water not less than 24 percent by weight, and may contain acetic acid. These mixtures must be packed in specification containers as follows:

(1) Specification 12A (§ 178.210 of this subchapter). Fiberboard boxes with Specification 2E (§ 178.24a of this subchapter) inside polyethylene bottles have a minimum wall thickness of 0.030 inch and screw-cap closures. Net weight per bottle may not be over 10 pounds each. The net weight per package may not be more than 40 pounds.

(2) Specification 6D or 37M (non-reuseable) (§§ 178.102, 178.134 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§ 178.35 or 178.35a of this subchapter) polyethylene container not over 55-gallons capacity. Specification 37M overpack of over 30-gallon capacity must be constructed of at least 20 gauge steel throughout.

(b) All outside shipping containers must be plainly marked "NONREUSABLE CONTAINER." All components of the package must not be reused.

§ 173.299a Tris-(1-aziridinyl) phosphine oxide. (a) Tris-(1-aziridinyl) phosphine oxide must be packed in specification containers as follows:

(1) In containers as prescribed in § 173.245, not over 5 gallons capacity each.

SUBPART G

GASES; DEFINITION AND PREPARATION

§ 173.300 Definitions. For the purpose of Parts 170–189 of this subchapter, the following terminology is defined.

(a) **Compressed gas.** The term "compressed gas" shall designate any material or mixture having in the container an absolute pressure exceeding 40 p.s.i. at 70° F. or, regardless of the pressure at 70° F., having an absolute pressure exceeding 104 p.s.i. at 130° F.; or any liquid flammable material having a vapor pressure exceeding 40 p.s.i. absolute at 100° F. as determined by ASTM Test D-323.

(b) **Flammable compressed gas.** Any compressed gas as defined in paragraph (a) of this section shall be classed as "flammable gas" if any one of the following occurs:

(1) Either a mixture of 13 percent or less (by volume) with air forms a flammable mixture or the flammable range with air is wider than 12 percent regardless of the lower limit. These limits shall be determined at atmospheric temperature and pressure. The method of sampling and test procedure shall be acceptable to the Bureau of Explosives and approved by the Director, OHMT.

(2) Using the Bureau of Explosives' Flame Projection Apparatus (see Note 1), the flame projects more than 18 inches beyond the ignition source with valve opened fully, or, the flame flashes back and burns at the valve with any degree of valve opening.

(3) Using the Bureau of Explosives' Open Drum Apparatus (see Note 1), there is any significant propagation of flame away from the ignition source.

(4) Using the Bureau of Explosives' Closed Drum Apparatus (see Note 1), there is any explosion of the vapor-air mixture in the drum.

Note 1: A description of the Bureau of Explosives' Flame Projection Apparatus, Open Drum Apparatus, Closed Drum Apparatus, and method of tests may be procured from the Bureau of Explosives.

(c) **Non-liquefied compressed gas.** A "non-liquefied compressed gas" is a gas, other than gas in solution, which under the charged pressure is entirely gaseous at a temperature of 70° F.

(d) **Liquefied compressed gas.** A "liquefied compressed gas" is a gas which, under the charged pressure, is partially liquid at a temperature of 70° F.

(e) **Compressed gas in solution.** A "compressed gas in solution" is a non-liquefied compressed gas which is dissolved in a solvent.

(f) **Cryogenic liquid.** A "cryogenic liquid" is a refrigerated liquefied gas having a boiling point colder than −130° F. (−90° C.) at one atmosphere, absolute. A material meeting this definition is subject to requirements of this subchapter without regard to whether it meets the definition of a compressed gas in paragraph (a) of this section. The material is partially described as "****, refrigerated liquid (*cryogenic liquid*)" in § 172.101 of this subchapter.

(g) **Flammable range.** The term "flammable range" shall designate the difference between the minimum and maximum volume percentages of the material in air that forms a flammable compressed gas.

(h) **Service pressure.** The term "service pressure" shall designate the authorized pressure marking on the container. For example, for cylinders marked "DOT 3A1800", the service pressure is 1800 psig (pounds per square inch gauge).

(i) **Refrigerant gas or Dispersant gas.** The term "Refrigerant gas" or "Dispersant gas" applies to all flammable or nonflammable, nonpoisonous refrigerant gases, dispersant gases (fluorocarbons) listed in §§ 172.101, 173.304(a)(2), 173.314(c), 173.315(a)(1) and 173.315(h), and mixtures thereof, or any other compressed gas meeting one of the following:

(1) A nonflammable mixture containing not less than 50% fluorocarbon content, having a vapor pressure not exceeding 260 psig at 130° F.

(2) A flammable mixture containing not less than 50% fluorocarbon content, not over 40% by weight of a flammable component, having a vapor pressure not exceeding 260 psig at 130° F.

§ 173.300a Approval of Independent Inspection agency. (a) Any person who (1) does not manufacture cylinders for use in the transportation of hazardous materials and (2) is not directly or indirectly controlled by any person or firm which manufactures cylinders for use in the transportation of hazardous materials, may apply to the Department of Transportation for approval as an independent inspection agency for the purpose of performing cylinder inspections and verifications required by Part 178 of this subchapter.

(b) Each application filed under this section for approval as an independent inspection agency must:

(1) Be submitted in writing to: Office of Hazardous Materials Transportation, U.S. Department of Transportation, Washington, D.C. 20590;

(2) State the name, address, principal business activity, and telephone number of the applicant and the name and address of each facility where tests and inspections are to be performed;

(3) State the name, address and principal business activity of each person having any direct or indirect ownership interest in the applicant greater than three percent and of each subsidiary or division of the applicant;

(4) If the applicant is not a permanent resident of the United States, include a designation of a permanent resident of the United States as his agent for service of process in accordance with § 107.7 of this title;

(5) Set forth a detailed description of the inspection and testing facilities to be used by the applicant and the applicant's capability to perform the inspections and verify the tests required by Part 178 of this subchapter;

(6) Identify by name each individual whom the applicant proposes to employ as an inspector responsible for certifying inspection and test results and a statement of that person's qualifications; and

(7) Specify the identification or qualification number assigned to each inspector who is supervised by a certifying inspector identified in § 173.300a(b)(6).

(c) Upon the request of the Director, OHMT, the applicant shall allow the Director to inspect the applicant's inspection and testing facilities. In the case of inspection and testing facilities located outside the United States, the applicant shall bear the cost of the inspection.

(d) If, on the basis of information submitted in the application and his own investigation, the Director, OHMT, finds that the applicant is qualified to perform the inspections and verifications required by Part

178 of this subchapter for cylinders to be used in the transportation of hazardous materials, he issues an approval subject to such terms and conditions as he considers necessary. After approval, the Director, OHMT, may authorize, upon request, the independent inspection agency to perform other inspections and functions for which the Director, OHMT, finds the applicant to be qualified. Such additional authorizations will be noted on each inspector's approval documents.

(e) The Director, OHMT, will issue an approval as an independent inspection agency for the purpose of performing inspections and verifications within the United States to any competent and disinterested inspector of cylinders so designated by the Bureau of Explosives before May 1, 1976, who submits a copy of that designation by July 15, 1976, together with the name, the assigned identification or qualification number, and a statement of the qualifications of each person employed as an inspector under that designation to: Office of Hazardous Material Transportation, U.S. Department of Transportation, Washington, D.C. 20590.

(f) Notwithstanding any requirement of this subchapter to the contrary, between May 30, 1976, and August 15, 1976, inspections and verifications required by Part 178 of this subchapter may be performed within the United States by any competent and disinterested inspector so designated by the Bureau of Explosives prior to May 1, 1976.

(g) An approval issued under this section is not transferable and is effective until surrendered or withdrawn or otherwise terminated by the Director, OHMT.

(h) The holder of an approval issued under this section shall notify the Director, OHMT, within 20 days after the date there is any change in the information submitted in the application for the approval.

(i) Upon the request of the Director, OHMT the holder of an approval issued under this section shall allow the Director to inspect the holder's inspection and testing facilities and shall make available for inspection the holder's records pertaining to inspections and verifications required by Part 178 of this subchapter. In the case of inspection and testing facilities located outside the United States and records made available for inspection outside the United States, the holder shall bear the costs of inspection.

§ 173.300b Approval of non-domestic chemical analyses and tests. (a) Any person who manufactures cylinders outside the United States may apply to the Department for approval to have the chemical analyses and tests of those cylinders required by Part 178 of this subchapter performed outside the United States for the purpose of qualifying them for use in the transportation of hazardous materials to, from or within the United States.

(b) Each application filed under this section for approval to perform chemical analyses and tests of cylinders outside the United States must:

(1) Be submitted in writing to: Office of Hazardous Material Transportation, U.S. Department of Transportation, Washington, D.C. 20590;

(2) State the name, address, and telephone number of the applicant and the name, address and a description of each facility at which cylinders are to be manufactured and chemical analyses and tests are to be performed;

(3) If the applicant is not a resident of the United States, include a designation of a permanent resident of the United States as his agent for service of process in accordance with §107.7 of this title;

(4) Set forth complete details concerning the dimension, materials of construction, wall thickness, water capacity, shape, type of joints, location and size of openings and other pertinent physical characteristics of each specification cylinder for which approval is being requested, including calculations for cylinder wall stress and wall thickness which may be shown on a drawing or on separate sheets attached to a descriptive drawing. If units of weights and measures are expressed in the metric system, they must also be stated in the English system equivalents; and

(5) Identify the independent inspection agency to be used.

(c) Upon the request of the Director, OHMT, the applicant shall allow the Director to inspect the applicant's cylinder manufacturing and testing facilities and shall provide such materials and cylinders for analyses and tests as the Director may specify. The applicant shall bear the cost of the inspections, analyses, and tests.

(d) If, on the basis of the information submitted in the application and his own investigation, the Director, OHMT, finds that the applicant has the proper manufacturing equipment and facilities and is otherwise capable of insuring the proper performance of the chemical analyses and tests required by Part 178 of this subchapter for cylinders to be used in the transportation of hazardous materials, he issues an approval, subject to such terms and conditions as he considers necessary.

(e) An approval issued under this section is not transferable and is effective until surrendered or withdrawn or otherwise terminated by the Director, OHMT.

(f) The holder of an approval issued under this section shall notify the Director, OHMT, within 20 days after the date there is any change in the information submitted in the application for the approval.

(g) Upon the request of the Director, OHMT, the holder of an approval issued under this section shall allow the Director to inspect the holder's cylinder manufacturing and testing facilities, any cylinder manufactured under that approval, the holder's inspection and test records, and technical data files pertaining test records, and technical data files pertaining to any cylinder manufactured under that approval. In the case of facilities located outside the United States, or cylinders, records or files made available for inspection outside the United States, the holder shall bear the costs of inspection.

§ 173.300c Termination of approval. (a) The Director, OHMT, may terminate an approval issued under §173.300a or §173.300b of this subpart if he determines:

(1) That information upon which approval was based is fraudulent or substantially erroneous;

(2) That the holder has not complied with Subchapter C of this chapter;

(3) That, in the case of an independent inspection agency, the agency or an employee thereof is or appears to be controlled or improperly influenced by cylinder manufacturing interests;

(4) That the holder is subject to an outstanding final judgment of a Federal court which concerns the enforcement of Subchapter C of this chapter and which has not been satisfied within a reasonable period of time; or

(5) That continuation of the approval is not consistent with the requirements of transportation safety.

(b) The Director, OHMT, before he terminates an approval issued under §173.300a or §173.300b of this subpart, notifies the holder in writing of the reasons therefor and provides the holder an opportunity to show why the approval should not be terminated.

§ 173.301 General requirements for shipment of compressed gases in cylinders.[1] **(a) Gases capable of combining chemically.** A cylinder charged with compressed gas must not contain gases or materials that are capable of combining chemically with each other or with the cylinder material so as to endanger its serviceability. See §173.34(e)(16) regarding the requalification of a cylinder that previously contained a corrosive liquid.

(b) Ownership of container. A container charged with a compressed gas must not be shipped unless it was charged by or with the consent of the owner of the container.

(c) Retest of container. A container for which prescribed periodic retest has become due must not be charged and shipped until such retest has been properly made.

(d) Manifolding containers in transportation. No means of interconnecting such as manifolding of individual containers may be employed for the transportation of compressed gases, except as hereinafter authorized. Containers so manifolded shall be supported and held together as a unit by structurally adequate means. Safety relief devices on manifolded horizontal containers charged with flammable compressed gas shall be arranged to discharge upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the containers.

(1) Manifolding is authorized for containers of the following gases: argon, air, carbon dioxide, helium, neon, nitrogen, nitrous oxide, oxygen or sulfur hexafluoride provided that each container is individually equipped with pressure relief devices as required by §173.34(d) or §173.315(i).

(2) Manifolding is authorized for specification cylinders containing the following nonliquefied gases: boron trifluoride, carbon monoxide, ethylene, hydrogen, hydrocarbon gases, methane, nitrogen trifluoride, and tetrafluoroethylene, inhibited, except that aluminum cylinders are not authorized for boron trifluoride or nitrogen trifluoride service. Individual cylinders must be equipped with approved pressure relief devices as required by §173.34(d) or §173.315(i) of this Part. Each cylinder must be equipped with an individual shutoff valve that must be tightly closed while in transit. Manifold branch lines of these and individual shutoff valves must be sufficiently flexible to prevent damage to the valves which otherwise might result from the use of rigid branch lines. A temperature measuring device may be inserted in one cylinder of a manifold installation in place of the shutoff valve.

(3) Manifolding is authorized for specification cylinders containing the following gases: ethane, ethylene, liquefied hydrocarbon gas, hydrogen chloride, liquefied petroleum gas and propylene, except that aluminum cylinders are not authorized for hydrogen chloride service, provided each cylinder is equipped with approved pressure relief devices as required by §173.34(d) or §173.315(i): *And provided further,* that each cylinder is equipped with an individual shutoff valve that must be tightly closed while in transit. Each cylinder must be separately charged and means must be provided to insure that no interchange of cylinder contents can occur during transportation. Manifold branch lines to these individual shutoff valves must be sufficiently flexible to prevent injury to the valves which otherwise might result from the use of rigid branch lines.

(4) Manifolding is authorized for containers of acetylene, provided that each container is individually equipped with approved safety relief devices as required by §173.34(d): *And further provided,* That each container is equipped with an individual shutoff valve, or valves, which shall be tightly closed while in transit. Manifold branch lines to these individual shutoff valves shall be sufficiently flexible to prevent injury to

[1] Requirements covering cylinders are also applicable to spherical pressure vessels.

the valves which otherwise might result from the use of rigid branch lines. All manifold containers shall be transported in a vertical position. For the checking of tare weights or for replacement of solvent the container shall be removed from the manifold. This requirement is not intended to prohibit the charging of the acetylene cylinders while manifolded.

(5) Manifolding is authorized for cargo tanks of the following gas provided individual cargo tanks are equipped with the safety relief valves and gauging devices, as required by §173.315(h) and (i); and *further provided*, That each cargo tank is equipped with individual valve, or valves, which shall be tightly closed while in transit and that each such container must be separately charged: Anhydrous ammonia.

(e) **Container pressure.** The pressure in the container at 70° F. must not exceed the service pressure for which the container is marked or designated, except as provided in §173.302(c).

Note 1. In certain cases with liquefied gases the pressure at 70° F. must be lower than the marked service pressure to avoid having a greater pressure at a temperature of 130° F. than is permitted.

(1) For authorized containers not marked with a service pressure, the service pressure is designated as follows:

Specification marking	Service pressure—psig
DOT 3	1,800
3E	1,800
4	300
8	250
9	200
25	300
33	480
38	250
40	200
41	240

(2) For containers made prior to the effective date of specifications, the service pressure is designated as the same as for the same type of container made in accordance with current specifications.

(f) **Container pressure at 130° F.** The pressure in the container at 130° F. shall not exceed 5/4 times the service pressure, except:

(1) Containers charged with acetylene, liquefied nitrous oxide and liquefied carbon dioxide.

(2) When a cylinder is charged in accordance with §173.302(c), the pressure in the cylinder at 130° F. must not exceed 5/4 times the filling pressure authorized therein.

(g) **Container valve protection.** Containers charged with flammable, corrosive, or noxious gases, must have their valves protected by one of the following methods.

(1) By equipping the containers with securely attached metal caps of sufficient strength to protect the valves from injury during transit.

(2) By boxing or crating the containers so as to give proper protection to the valves.

(3) By so constructing the containers that the valve is recessed into the container or otherwise protected so that it will not be subjected to a blow when the container is dropped on a flat surface.

(4) By loading the containers compactly in an upright position and securely bracing in cars or motor vehicles, when loaded by the consignor and to be unloaded by the consignee.

(5) By equipping with valves strong enough to avoid injury during transit for containers containing non-liquefied gas under pressure not exceeding 300 psi at 70° F.

(h) **Compressed gas containers.** Compressed gases must be in metal containers built in accordance with the DOT specifications, as shown below, in effect at the time of manufacture, and marked as required by the specification and the regulation for retesting if applicable:

Packagings			
DOT-2P	DOT-3D	DOT-4E/W	DOT-8AL
2Q	3E	4B240E[1]	9[1]
ICC-3[1]	3HT	4C	ICC-25[1]
DOT-3A	DOT-3T	4D	DOT-26[1]
DOT-3AL			
DOT-3AX	4	4DA	33[1]
3AA4500	4A	4DS	38[1]
3AA	4AA	4E	DOT-39
DOT-3AAX	4B	4L	43[1]
3B	4B240FLW	5	41[1]
3BN	4B240X[1]	5F	
3C	4BA	8	

[1] Use of existing cylinders authorized, but new construction not authorized

(i) **Foreign cylinders in domestic use.** Except as provided in paragraph (j) of this section, a charged cylinder manufactured outside the United States may not be offered for transportation to, from, or within the United States unless it has been manufactured, inspected, and tested in accordance with the applicable DOT specification set forth in Part 178 of this subchapter.

(j) **Charging of foreign cylinders for export.** Unless it has been manufactured, inspected, and tested in accordance with the applicable DOT specification set forth in Part 178 of this subchapter, a cylinder manufactured outside the United States and received in the United States for charging with compressed gas may be charged and shipped for export only:

(1) Provided that they are retested in accordance with §173.34(e). This retest may be omitted only if the container can be definitely identified as having been retested under this provision within the prescribed retest period, and

(2) Provided further that the maximum filling density and service pressure for each container shall be in accordance with all packing requirements of this part for the compressed gas involved.

(3) Records showing the results of the tests made on all foreign containers must be preserved for inspection until the next scheduled retest date.

(4) Bill of lading or other shipping paper shall, when possible, identify the containers and shall carry the following certification: "These containers have been retested and refilled in accordance with the DOT requirements for export".

(k) **Outside packagings.** Specifications 2P, 2Q, 3E, 3HT, 4BA spherical type, 4D, 4DA, 4DS, 9,[1] 39, 40,[1] and 41[1] must be shipped in strong outside packagings except that the 4BA spherical type may be securely mounted on pallets to provide protection for the spheres and any attachments.

(l) Outside packaging must provide protection for the cylinder. Unless the cylinder has a protective collar or neck ring, the outside packaging must provide protection to the valve against accidental functioning and damage.

(l) Specifications 3AX, 3AAX, and 3T cylinders are authorized for transportation only when horizontally mounted on a motor vehicle and when valves and safety devices are protected, as follows:

(1) Each cylinder must be fixed at one end of the vehicle with provision for thermal expansion at the opposite end attachment.

(2) The valve and safety relief device protective structure must be sufficiently strong to withstand a force equal to twice the weight involved with a safety factor of four, based on the ultimate strength of the material used, and

(3) Each discharge for a safety relief device on a cylinder containing a flammable gas must be upward and unobstructed.

§ 173.302 Charging of cylinders with non-liquefied compressed gases. (a) **Detailed requirements.** Nonliquefied compressed gases (except gas in solution or poisonous gas) for which charging requirements are not definitely prescribed in §173.304(a)(2) must be shipped, subject to §173.301, and §173.305 in specification containers as follows:

(1) Specification 3,[1] 3A, 3AA, 3B, 3C,[1] 3D,[1] 3E, 4,[1] 4A,[1] 4B, 4BA, 4BW, 4C,[1] 25,[1] 26, 33,[1] or 38[1] (§§178.36, 178.37, 178.38, 178.42, 178.50, 178.51, 178.61 of this subchapter). See §§173.34 and 173.301(e).

Note 2. Authorized cylinders containing oxygen which is continuously fed to tanks containing live fish may be shipped irrespective of the provisions of §173.24.

(2) Specification 3HT (§178.44 of this subchapter) cylinders for aircraft use only, having a maximum service life of 24 years. Authorized only for nonflammable gases. Cylinders must be equipped with safety relief devices only of the frangible disc type which meet the requirements of §173.34(d). Each frangible disc must have a rated bursting pressure which does not exceed 90 percent of the minimum required test pressure of the cylinder. Discs with fusible metal backing are not permitted. Spec. 3HT cylinders may be shipped only when packed in strong outside packagings.

(3) Specification 3AX, 3AAX, or 3T (§§178.36, 178.37, 178.45 of this subchapter) cylinders are authorized only for the following nonliquefied gases: air, argon, boron trifluoride, carbon monoxide, ethane, ethylene, helium, hydrogen, methane, neon, nitrogen, or oxygen, except that specification 3T is not authorized for hydrogen. As used in this paragraph methane is a nonliquefied gas which has a minimum purity of 98.0 percent methane and which is commercially free of corroding components.

(4) Specification 39 (§178.65 of this subchapter) Cylinder. For flammable gases, internal volume may not exceed 75 cubic inches. Aluminum cylinders are authorized for oxygen only under the following conditions:

(i) Cylinder threads must be straight threads;

(ii) Cylinder must be equipped only with brass or stainless steel valve; and

(iii) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b, dated August 1, 1967, paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b, may be used, however any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time, must be tested for oil contamination in accordance with specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(5) Specification 3AL (§178.46 of this subchapter) cylinders are authorized only for the following nonliquefied gases: air, argon, carbon monoxide, diborane, ethylene, helium, mercury free hydrogen, krypton, methane, nitrogen, neon, oxygen and xenon. Flammable gases ship-

[1] Use of existing cylinders authorized, but new construction not authorized

ood in 3AL cylinders are authorized only when transported by highway, rail and cargo-only aircraft. When used in oxygen service, aluminum cylinders must be in compliance with the following conditions:

(i) Cylinder must be equipped only with brass or stainless steel valve;

(ii) Cylinder must have only straight threads in the opening;

(iii) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b, dated August 1, 1967, paragraphs 3.7.2, and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less, cleaned at the same time, must be tested for oil contamination in accordance with Specification RR-C-901b, paragraph 4.4.2.3, and meet the standard of cleanliness specified; and

(iv) The pressure in the cylinder may not exceed 3,000 psig at 70° F.

(b) Filling limits. (See § 173.301(e))

(c) Special filling limits for Specifications 3A, 3AX, 3AA, 3AAX, and 3T cylinders. Specifications 3A, 3AX, 3AA, 3AAX, and 3T (§§ 178.36, 178.37, 178.45 of this subchapter) cylinders may be charged with compressed gases, other than liquefied, dissolved, poisonous, or flammable gases to a pressure 10 percent in excess of their marked service pressure, provided:

(1) That such cylinders are equipped with frangible disc safety relief devices (without fusible metal backing) having a bursting pressure not exceeding the minimum prescribed test pressure.

(2) That the elastic expansion shall have been determined at the time of the last test or retest by the water jacket method.

(3) That either the average wall stress or the maximum wall stress shall not exceed the wall stress limitation shown in the following table (see Notes 1 and 2):

Type of steel	Average wall stress limitation	Maximum wall stress limitation
Plain carbon steels over 0.35 carbon and medium manganese steels	53,000	58,000
Steels of analysis and heat treatment specified in spec. 3AA	67,000	73,000
Steel of analysis and heat treatment specified in Spec. DOT-3T	87,000	94,000
Plain carbon steels less than 0.35 carbon made prior to 1920	45,000	48,000

Note 1: The average wall stress shall be computed from the elastic expansion data using the following formula:

$$S = 1.7EE\,XV - 0.4P$$

where:

S = wall stress, pounds per square inch,
EE = elastic expansion (total less permanent) in cubic centimeters,
X = factor = 10^7 experimentally determined for the particular type of cylinder being tested,
V = internal volume in cubic centimeter (1 cubic inch = 16.387 cubic centimeters),
P = test pressure, pounds per square inch.

Formula derived from formula of Note 2 and the following:

$$EE = \frac{(PXVD^2)}{(D^2 - d^2)}$$

Note 2: The maximum wall stress shall be computed from the formula:

$$S = \frac{(P(1.3D^2 + 0.4d^2))}{(D^2 - d^2)}$$

where:

S = wall stress, pounds per square inch,
P = test pressure, pounds per square inch,
D = outside diameter, inches,
d = $D - 2t$, where t = minimum wall thickness determined by a suitable method.

(4) That an external and internal visual examination made at the time of test or retest shows the cylinder to be free from excessive corrosion, pitting, or dangerous defects.

(5) That a plus sign (+) be added following the test date marking on the cylinder to indicate compliance with paragraphs (c), (2), (3), and (4) of this section.

(d) Fluorine. Fluorine must be shipped in Specification 3A1000, 3AA1000, or 3BN400 (§ 178.36, § 178.37 or § 178.39 of this subchapter) cylinders without safety relief device and equipped with valve protection cap. Such containers must not be charged to over 400 psig at 70° F. and must not contain over 6 pounds of gas.

(e) Verification of container pressure. (1) Each day, the pressure in a container representative of that day's compression must be checked by the charging plant after the container has cooled to a settled temperature and a record of this test kept for at least 30 days.

(f) Carbon monoxide. Carbon monoxide must be shipped in a Specification 3A, 3AX, 3AA, 3AAX, 3AL, 3, 3E, or 3T (§§ 178.36, 178.37, 178.46, 178.42, 178.45 of this subchapter) cylinder having a minimum service pressure of 1,800 psig. The pressure in the cylinder must not exceed 1000 psig at 70° F. except that if the gas is dry and sulfur free, a cylinder may be charged to five-sixths the cylinder service pressure or 2,000 psig, whichever is the lesser. Specification 3AL cylinders are authorized only when transported by highway, rail and cargo-only aircraft.

(g) Diborane and diborane mixtures. Diborane and diborane mixed with compatible compressed gas in Specification 3AA1800 (§ 178.37 of this subchapter), cylinders. The maximum filling density of the diborane shall not exceed 7 percent. Diborane mixed with compatible compressed gas must not have a pressure exceeding the service pressure of the cylinder if complete decomposition of the diborane occurs. Cylinder valves must be protected either by metal caps or by over packing cylinder in strong wooden boxes.

§ 173.303 Charging of cylinders with compressed gas in solution (acetylene). (a) Cylinder, filler and solvent requirements. (Refer to applicable parts of Specification 8 and 8AL.) Acetylene gas must be shipped in Spec. 8 or 8AL (§ 178.59 or § 178.60 of this subchapter) cylinders. The cylinders shall consist of metal shells filled with a porous material, and this material must be charged with a suitable solvent. The cylinders containing the porous material and solvent, shall be tested with satisfactory results in accordance with CGA Pamphlet C-12. Representative samples of cylinders charged with acetylene shall be tested with satisfactory results in accordance with CGA Pamphlet C-12.

(1) The specific gravity of acetone solvent in acetylene cylinders must be 0.796 or over at 15.5° C. (59.9° F.).

(2) The amount of solvent added in the refilling operation must not cause the tare weight of the cylinder to exceed its marked tare weight. The tare weight includes the weight of the cylinder shell, porous filling, valve, safety relief devices and solvent, but without removable cap.

(b) Filling limits. The pressure in cylinders containing acetylene gas must not exceed 250 psi at 70° F., and in case the cylinders are marked for a lower allowable charging pressure, at 70° F., then that pressure must not be exceeded.

(c) Data requirements on filler and solvent. Cylinders containing acetylene gas must not be shipped unless they were charged by or with the consent of the owner, and by a person, firm, or company having possession of complete information as to the nature of the porous filling, the kind and quantity of solvent in the cylinders, and the meaning of such markings on the cylinders as are prescribed by the Department's regulations and specifications applying to containers for the transportation of acetylene gas.

(d) Verification of container pressure. (1) Each day, the pressure in a container representative of that day's compression must be checked by the charging plant after the container has cooled to a settled temperature and a record of this test kept for at least 30 days.

§ 173.304 Charging of cylinders with liquefied compressed gas. (a) Detailed charging requirements. Liquefied gases shall be charged in accordance with the specific provisions of paragraph (a)(2) of this section or paragraph (e) of this section. Where charging requirements are not specifically prescribed, liquefied gases, except gas in solution or poisonous gas, must be shipped, subject to the applicable paragraphs under General Requirements for Shipment (see § 173.301), the charging requirements of this section for liquefied compressed gas, or the charging requirements for mixtures (see § 173.305), in containers manufactured under specifications, as follows:

(1) Specification 3,[1] 3A, 3AA, 3B, 3BN, 3D,[1] 3E, 4,[1] 4A,[1] 4B, 4BA, 4B-ET, 4BW, 4E, 9,[1] 25,[1] 26,[1] 38,[1] 39, 40,[1] or 41[1] (§§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.50, 178.51, 178.55, 178.61, 178.65, 178.68 of this subchapter), except that no specification 4E, 9, 39, 40, 41 packaging may be charged and shipped with a mixture containing a pyrophoric liquid, carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, or poisonous material (Class A, B, or irritating material), unless specifically authorized in this part.

(2) The following requirements must be complied with for the gases named (for cryogenic liquids, see § 173.316):

[1] Use of existing cylinders authorized, but new construction not authorized.

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Containers marked as shown in this column or of the same type with higher service pressure must be used except as provided in § 173.34(e), (b), § 173.301(f) (see notes following table)
Anhydrous ammonia	54	DOT-4, DOT-3AA480, DOT-3AAX480, DOT-3AA480X, DOT-4AA480, DOT-3, DOT-4AA480, DOT-3E1800, DOT-3AL480
Bromotrifluoromethane (R-1381 or H-1301)	124	DOT-3A400, DOT-3AA400, DOT-3E400, DOT-4A400, DOT-4AA400, DOT-4B400, DOT-4BA400, DOT-4B-A400, DOT-3E1800, DOT-39, DOT-3AL400
Carbon dioxide, (see Notes 4, 7, and 9)	68	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3HT2000, DOT-39, DOT-3AL1800

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Containers marked as shown in this column or of the same type with higher service pressure must be used except as provided in § 173.34(e), (h), § 173.301(j) (see notes following table)
Carbon dioxide, nitrous oxide mixture (see Notes 7 and 8)	68	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-3HT2000, DOT-39, DOT-3AL1800
Chlorine (see Note 2)	125	DOT-3A480, DOT-3AA480, DOT-25, DOT-3, DOT-3BN480, DOT-3E1800
Chlorodifluoroethane (R-142b) or 1-chloro-1, 1-difluoroethane (see Note 8)	100	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800, DOT-39, DOT-3AL150
Chlorodifluoromethane (R-22) (See Note 8)	105	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4B240ET; DOT-4E240, DOT-39, DOT-41, DOT-3E1800, DOT-3ALA240
Chloropentafluoroethane (R-115) (see Note 8)	110	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4A225, DOT-4BA225, DOT-4B225; DOT-4BW225, DOT-3E1800, DOT-39, DOT-3AL225
Chlorotrifluoromethane (R-13) (see Note 8)	100	DOT-3A1800, DOT-3AA1800, DOT-3, DOT-3E1800, DOT-39, DOT-3AL1800
Cyclopropane (see Notes 8 and 9)	55	DOT-3A225; DOT-3A480X, DOT-3AA225, DOT-3B225; DOT-4A225; DOT-4AA480, DOT-4B225; DOT-4BA225; DOT-4BW225, DOT-4B240ET; DOT-3, DOT-3E1800, DOT-39, DOT-3AL225
Dichlorodifluoromethane (R-12) (see Note 8)	119	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET; DOT-4E225; DOT-8, DOT-39, DOT-41, DOT-3E1800, DOT-3AL225
Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R-500) (see Note 8)	Not liquid full at 130° F	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4A240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-8, DOT-39
Difluoroethane (R-152a) (see Note 8)	79	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800, DOT-3AL150
Dimethylamine, anhydrous	59	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, ICC-3E1800
Ethane (see Notes 8 and 9)	35.8	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-39, DOT-3AL1800
Ethane (see Notes 8 and 9)	36.8	DOT-3A2000, DOT-3AX2000, DOT-3AA2000, DOT-3AAX2000, DOT-3T2000, DOT-39, DOT-3AL2000
Ethylene (see Notes 8 and 9)	31.0	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-39, DOT-3AL1800
Ethylene (see Notes 8 and 9)	32.5	DOT-3A2000, DOT-3AX2000, DOT-3AA2000, DOT-3AAX2000, DOT-3T2000, DOT-39, DOT-3AL2000
Ethylene (see Notes 8 and 9)	35.5	DOT-3A2400, DOT-3AX2400, DOT-3AA2400, DOT-3AAX2400, DOT-3T2400, DOT-39, DOT-3AL2400
Hydrogen chloride	65	DOT-3A1800, DOT-3AA1800, DOT-3AX1800, DOT-3AAX1800, DOT-3, DOT-3T1800, DOT-3E1800
Hydrogen sulfide (see Note 10)	82.5	DOT-3A480, DOT-3AA480, DOT-3B480, DOT-4A480, DOT-4B480, DOT-4BA480, DOT-4BW480, DOT-26-480, DOT-3E1800, DOT-3AL480
Insecticide, liquefied gas (see Note 8)	Not liquid full at 130° F	DOT-3A300, DOT-3AA300, DOT-3B300, DOT-4B300, DOT-4BA300, DOT-4BW300, DOT-8, DOT-40, DOT-41, DOT-3E1800
Liquefied nonflammable gases, liquid other than those classified as flammable, corrosive, or poisonous, and mixtures or solutions thereof, charged with nitrogen, carbon dioxide, or air (see Notes 7 and 8)	Not liquid full at 130° F	Specification packaging authorized in paragraph (a)(1) of this section and DOT-3HT, DOT-4D, DOT-4DA, DOT-4DS
Methylacetylene-propadiene, stabilized (see Note 5)	Not liquid full at 130° F	DOT-4B240, without brazed seams, DOT-4BA240, without brazed seams, DOT-3AA240, DOT-3AAX240, DOT-3B240, DOT-3E1800, DOT-4BW240, DOT-4E240, DOT-4B240ET; DOT-4, DOT-41; DOT-3AL240
Methyl chloride	84	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-3, DOT-4, DOT-25; DOT-26-300, DOT-38, DOT-3E1800; DOT-4B240E1 Cylinders complying with DOT-3A150, DOT-3B150, DOT-4A150, and DOT-4B150 manufactured prior to Dec. 7, 1936 are also authorized
Methyl mercaptan	80	DOT-3AA240, DOT-3AAX240, DOT-3B240, DOT-4B240, DOT-4B240ET, DOT-3E1800, DOT-4BA240, DOT-4BW240
Monomethylamine, anhydrous	60	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800
Nitrosyl chloride	110	DOT-3BN400 only
Nitrous oxide (see Notes 7, 8, and 11)	68	DOT-3A1800, DOT-3AX1800, DOT-3AA1800, DOT-3AAX1800, DOT-3, DOT-3E1800, DOT-3T1800, DOT-3HT2000, DOT-39, DOT-3AL1800
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (see Note 8)	Not liquid full at 130° F	DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4A240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-8, DOT-39, DOT-3AL240
Sulfur dioxide (see Note 8)	125	DOT-3A225, DOT-3AA225, DOT-3B225, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET; DOT-3, DOT-4, DOT-25, DOT-26-150, DOT-38, DOT-39, DOT-3E1800, DOT-3AL225
Sulfur hexafluoride	120	DOT-3A1800, DOT-3AA1800, DOT-3AAX2400, DOT-3, DOT-3E1800, DOT-3AL1800, DOT-3T1800
Sulfuryl fluoride	106	DOT-3A480, DOT-3AA480, DOT-3E1800, DOT-4B480, DOT-4BA480, DOT-4BW480
Tetrafluoroethylene, inhibited	90	DOT-3A1200, DOT-3AA1200, DOT-3E1800
Trifluorochloroethylene	115	DOT-3A300, DOT-3AA300, DOT-3B300, DOT-4A300, DOT-4B300, DOT-4BA300, DOT-4BW300, DOT-3E1800
Trimethylamine, anhydrous	57	DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-3E1800
Vinyl chloride (see Note 5)	84	DOT-4B150, without brazed seams, DOT-4BA225, without brazed seams, DOT-4BA225, DOT-3A150, DOT-3AA150, DOT-25, DOT-3E1800, DOT-3AL150
Vinyl fluoride, inhibited	62	DOT-3A1800, DOT-3AA1800, DOT-3E1800, DOT-3AL1800
Vinyl methyl ether (see Note 5)	68	DOT-4B150, without brazed seams, DOT-4BA225, without brazed seams, DOT-4BW225, DOT-3A150, DOT-3AA150, DOT-3B150, DOT-25, DOT-3E1800

Note 1: The "filling density" is hereby defined as the percent ratio of the weight of gas in a container to the weight of water that the container will hold at 60°F (1 lb. of water = 27.737 cubic inches at 60° F).

Note 2: Cylinders purchased after Oct. 1, 1944, for the transportation of chlorine must contain no aperture other than that provided in the neck of the cylinder for attachment of a valve equipped with an approved safety relief device. Cylinders purchased after Nov. 1, 1935, and charged with chlorine must not contain over 150 pounds of gas.

Note 3: [Reserved]

Note 4: Special carbon dioxide mining devices containing a heating element and charged with not over 6 pounds of carbon dioxide may be filled to a density of not over 85 percent, provided the cylinder is made of steel with a calculated bursting pressure in excess of 39,000 psi, be fitted with a frangible disc that will operate at not over 57 percent of that pressure, and be able to withstand a drop of 10 feet when striking crosswise on a steel rail while under a pressure of at least 3,000 psi. Such devices must be shipped in strong boxes or must be wrapped in heavy burlap and bound by 12-gauge wire with the wire completely covered by friction tape. Wrapping must be applied so as not to interfere with the functioning of the frangible disc safety relief device. Shipments must be described as "liquefied carbon dioxide gas (mining device)" and marked, labeled, and certified as prescribed for liquefied carbon dioxide.

Note 5: All parts of valve and safety relief devices in contact with contents of cylinders must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides.

Note 6: [Reserved]

Note 7: Spec. 3HT cylinders for aircraft use only having a maximum service life of 24 years. Authorized only for nonflammable gases. Cylinders must be equipped with pressure relief devices only of the frangible disc type which meet the requirements of § 173.34(d). Each frangible disc must have a rated bursting pressure which does not exceed 90 percent of the minimum required test pressure of the cylinder. Discs with fusible metal backing are not permitted. Cylinders may be shipped only when packed in strong outside packagings.

Note 8: See § 173.301(h).

Note 9: When used for shipment of flammable gases, the internal volume of a specification 39 cylinder must not exceed 75 cubic inches.

Note 10: Each valve outlet must be sealed by a threaded cap or a threaded solid plug.

Note 11: See § 173.304(a)(4).

(3) Specification 3AL (§ 178.46 of this subchapter) cylinders are authorized for the following liquefied gases: cyclobutane, hydrogen selenide, propylene, silane, carbonyl sulfide, vinyl bromide, and dimethyl ether. Shipments of flammable gases are authorized only when transported by highway, rail and cargo aircraft only.

(4) Specification DOT 3AL (§ 178.46 of this subchapter) cylinders when used in nitrous oxide service must be in compliance with the following conditions:

(i) Cylinder must be equipped only with brass or stainless steel valve; and

(e) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(b) Filling limits. Except for carbon dioxide, nitrous oxide and vinyl fluoride, inhibited, the liquid portion of a liquefied gas must not completely fill the packaging at any temperature up to and including 130° F. The liquid portion of vinyl fluoride, inhibited, may completely fill the cylinder at 130° F. provided the pressure at the critical temperature does not exceed one and one-fourth times the service pressure.

(c) Verification of content in cylinder. (1) Liquefied gases must be charged by weight, by volume measurement of liquid, charging line, by the use of proper scales, or when lower in pressure than required for liquefaction a pressure-temperature chart may be used in charging to insure that the service pressure at 70° F. times 5/4 will not be exceeded at 130° F.

(2) Except as noted in paragraph (d)(4) of this section, the amount of liquefied gas charged into a container must be determined by weight, or if charged at a pressure lower than the liquefaction point, by pressure shown on a chart for the specific gas. Weight must be checked, after disconnecting from the charging line, by the use of proper scales.

(d) Requirements for liquefied petroleum gas. (1) Filling density limited as follows:

Minimum specific gravity of the liquid material at 60° F.	Maximum filling density in percent of the water-weight capacity of the container	Minimum specific gravity of the liquid material at 60° F.	Maximum filling density in percent of the water-weight capacity of the container
0.271-0.289	26	0.504-0.510	42
0.290-0.306	27	0.511-0.519	43
0.307-0.322	28	0.520-0.527	44
0.323-0.338	29	0.528-0.536	45
0.339-0.354	30	0.537-0.544	46
0.355-0.371	31	0.545-0.552	47
0.372-0.398	32	0.553-0.560	48
0.399-0.425	33	0.561-0.568	49
0.426-0.440	34	0.569-0.576	50
0.441-0.452	35	0.577-0.584	51
0.453-0.462	36	0.585-0.592	52
0.463-0.472	37	0.593-0.600	53
0.473-0.480	38	0.601-0.608	54
0.481-0.488	39	0.609-0.617	55
0.489-0.495	40	0.618-0.626	56
0.496-0.503	41	0.627-0.634	57

(2) Subject to § 173.301(f), any filling density percentage prescribed in this section is authorized to be increased by 2 for liquefied petroleum gas in Spec. 26 or 3 cylinders or in Spec. 3A marked for 1,800 psig. or higher, service pressure.

(3) Liquefied petroleum gas must be shipped in specification containers as follows:

(i) Specification 3,[1] 3A, 3AA, 3B, 3E, 3AL, 4A[1], 4B, 4BA, 4B240ET, 4BW, 4B240X,[1] 4B240FLW, 4E, 4,[1] 9,[1] 25,[1] 26,[1] 38,[1] 39, or 41[1] (§§ 178.36, 178.37, 178.38, 178.42, 178.46, 178.50, 178.51, 178.55, 178.61, 178.54, 178.68, 178.65 of this subchapter) cylinders. The internal volume of a Specification 39 cylinder must not exceed 75 cubic inches. Shipments of flammable gases in 3AL cylinders are authorized only when transported by highway, rail and cargo-only aircraft.

Note 1: Cylinders marked as complying with DOT Spec. 4B240FLW bearing manufacturer's symbol WOD and serial numbers 47A-1 to 47A-59200, inclusive, varying from the specification requirements as to physical properties of steel, are authorized for the transportation of liquefied petroleum gases.

(ii) Additional containers may be used within the limits of quantity and pressure as follows:

Type of container	Maximum capacity		Maximum charging pressure—p.s.i.g.
	Cubic inches	Gallons	
DOT-2P or DOT-2Q (see Note 1)	31.83	.....	45 p.s.i.g. at 70° F. and 105 p.s.i.g. at 130° F. (see Note 2).
DOT-2P or DOT-2Q (see Note 1)	31.83	.....	35 p.s.i.g. at 70° F. and 100 p.s.i.g. at 130° F.
DOT-3C or DOT-4C	3,881	16±5% tolerance	145 p.s.i.g. at 130° F.

Note 1: Containers must be packed in strong wooden or fiber boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each completed container filled for shipment must have been heated until contents reached a minimum temperature of 130° F., without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

Note 2: Containers must be equipped with safety relief devices which will prevent rupture of the containers and dangerous projection of the closing devices when the containers are exposed to the action of fire.

(4) Verification of content. Containers with a water capacity of 200 pounds or more and for use with a liquefied petroleum gas with a specific gravity at 60° F. of 0.504 or greater may have their contents determined by using a fixed length dip tube gauging device. The length of the dip tube shall be such that when a liquefied petroleum gas with a specific volume of 0.03051 cu. ft./lb. at a temperature of 40° F. is charged into the container it just reaches the bottom of the tube. The weight of this liquid shall not exceed 42 percent of the water capacity of the container which must be stamped thereon. The length of the dip tube, expressed in inches carried out to one decimal place and prefixed with the letters "DT" shall be stamped on the container and on the exterior of removable type dip tube; for the purpose of this requirement the marked length shall be expressed as the distance measured along the axis of a straight tube from the top of the boss through which the tube is inserted to the proper level of the liquid in the container. The length of each dip tube shall be checked when installed by weighing each container after filling except when installed in groups of substantially identical containers in which case one of each 25 containers shall be weighed. The quantity of liquefied gas in each container must be checked by means of the dip tube after disconnecting from the charging line. The outlet from the dip tube shall be not larger than a No. 54 drill size orifice. A container representative of each day's filling at each charging plant shall have its contents checked by weighing after disconnecting from the charging line.

(e) Refrigerant gases. Refrigerant gases which are nonpoisonous and nonflammable under this part, must be shipped in cylinders as prescribed in paragraph (a)(1) or (2) of this section, or as follows:

(1) Specifications 2P and 2Q (§§ 178.33, 178.33a of this subchapter). Inside metal containers packed in a strong wooden or fiberboard box of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Pressure in the container must not exceed 85 pounds per square inch absolute at 70° F. Each completed metal container filled for shipment must be heated until content reaches a minimum temperature of 130° F. without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked "Inside Containers Comply With Prescribed Specification."

(f) Engine starting fluid. Engine starting fluid containing compressed gas or gases which are flammable under this part must be shipped in cylinders as prescribed in paragraph (a)(1) of this section, or as follows:

(1) Inside nonrefillable metal containers having capacity not over 32 cubic inches. Containers must be packaged in Spec. 12B (§ 178.205 of this subchapter) fiberboard boxes equipped with top and bottom pads which will provide three complete thicknesses of fiberboard on top and bottom of each box, or Spec. 15A, 15B, 15C, 19A, or 19B (§ 178.168, § 178.169, § 178.170, § 178.190, § 178.191 of this subchapter) wooden boxes. Pressure in the container must not exceed 140 psi, absolute, at 130° F. However, if the pressure exceeds 140 psi, absolute at 130° F., a Spec. 2P (§ 178.33 of this subchapter) container must be used. In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the pressure of the content at 130° F. The liquid content of the material and gas must not completely fill the container at 130° F. Each completed container filled for shipment must have been heated until content reaches a minimum temperature of 130° F., without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked, **"INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."**

§ 173.305 Charging of cylinders with a mixture of compressed gas and other material. (a) Detailed requirements. A mixture of a

[1] Use of existing cylinders authorized, but new construction not authorized.

compressed gas and any other material must be shipped as a compressed gas if the mixture is a compressed gas as designated in §173.300(a) and when not in violation of §173.301(a).

(b) Filling limits. (See §173.301(e).) For mixtures, the liquid portion of the liquefied compressed gas at 130° F. plus any additional liquid or solid must not completely fill the container.

(c) Nonpoisonous and nonflammable mixtures. Mixtures containing compressed gas or gases including insecticides, which mixtures are nonpoisonous and nonflammable under this part must be shipped in cylinders as prescribed in §173.304(a) or as follows:

(1) Specification 2P (§178.33 of this subchapter). Inside metal containers equipped with safety relief devices of a type examined by the Bureau of Explosives and approved by the Director, OHMT, and packed in strong wooden or fiber boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Pressure in the container may not exceed 65 psig at 70° F. Each completed metal container filled for shipment must be heated until content reaches a minimum temperature of 130° F., without evidence of leakage, distortion or other defect. Each outside shipping container must be plainly marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

(d) Poisonous mixtures. A mixture containing any poisonous material, Class A, or irritating material in such proportions that the mixture would be classed as poisonous under §173.326(a) or §173.381(a) must be shipped in packagings as authorized for these poisonous materials.

§ 173.306 Limited quantities of compressed gases. (a) Limited quantities of compressed gases for which exceptions are permitted as noted by reference to this section in §172.101 of this subchapter are excepted from labeling (except when offered for transportation by air) and, unless required as a condition of the exception, specification packaging requirements of this subchapter when packed in accordance with the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) When in containers of not more than 4 fluid ounces capacity (7.22 cubic inches or less) except cigarette lighters. Special exceptions for shipment of certain compressed gases in the ORM–D class are provided in Subpart N of this part.

(2) When in metal containers filled with a material that is not classed as a hazardous material to not more than 90 percent of capacity at 70° F. then charged with nonflammable, nonliquefied gas. Each container must be tested to three times the pressure at 70° F. and, when refilled, be retested to three times the pressure of the gas at 70° F. Also, one of the following conditions must be met:

(i) Container is not over 1 quart capacity and charged to not more than 170 psig at 70° F. and must be packed in a strong outside packaging, or

(ii) Container is not over 30 gallons capacity and charged to not more than 75 psig at 70° F.

(3) When in a metal container charged with a solution of material's and compressed gas or gases which is nonpoisonous, provided all of the following conditions are met. Special exceptions for shipment of aerosols in the ORM–D class are provided in Subpart N of this part.

(i) Capacity must not exceed 50 cubic inches (27.7 fluid ounces).

(ii) Pressure in the container must not exceed 180 psig at 130° F. If the pressure exceeds 140 psig at 130° F., but does not exceed 160 psig at 130° F., a specification DOT 2P (§178.33 of this subchapter) inside metal container must be used; if the pressure exceeds 160 psig at 130° F., a specification DOT 2Q (§178.33a of this subchapter) inside metal container must be used. In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130° F.

(iii) Liquid content of the material and gas must not completely fill the container at 130° F.

(iv) The container must be packed in strong outside packagings.

(v) Each completed container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C.) without evidence of leakage, distortion, or other defect.

(vi) Each outside packaging must be marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED REGULATIONS."

(b) Exemptions for foodstuffs, soap, biologicals, electronic tubes, and audible fire alarm systems. Limited quantities of compressed gases, (except poisonous gases as defined by §173.326) for which exceptions are provided as indicated by reference to this section in §172.101 of this subchapter, when in accordance with one of the following paragraphs are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter, except §177.817. Special exceptions for shipment of certain compressed gases in the ORM–D class are provided in Subpart N of this part.

(1) Foodstuffs or soaps in a nonrefillable metal container not exceeding 50 cubic inches capacity (27.7 fluid ounces), with soluble or emulsified compressed gas, provided the pressure in the container does not exceed 140 p.s.i.g. at 130° F. The metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130° F.

(i) Containers must be packed in strong outside packagings.

(ii) Liquid content of the material and the gas must not completely fill the container at 130° F.

(iii) Each outside packaging must be marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED REGULATIONS."

(2) Cream in refillable metal receptacles with soluble or emulsified compressed gas. Containers must be of such design that they will hold pressure without permanent deformation up to 375 psig and must be equipped with a device designed so as to release pressure without bursting of the container or dangerous projection of its parts at higher pressures. This exception applies to shipments offered for transportation by refrigerated motor vehicles only.

(3) Nonrefillable metal containers charged with a solution containing biological products or a medical preparation which could be deteriorated by heat, and compressed gas or gases, which is nonpoisonous and nonflammable. The capacity of each container may not exceed 35 cubic inches (19.3 fluid ounces). The pressure in the container may not exceed 140 psig at 130° F., and the liquid content of the product and gas must not completely fill the containers at 130° F. One completed container out of each lot of 500 or less, filled for shipment, must be heated, until the pressure in the container is equivalent to equilibrium pressure of the content at 130° F. There must be no evidence of leakage, distortion, or other defect. Container must be packed in strong outside packagings.

(4) Electronic tubes, each having a volume of not more than 30 cubic inches and charged with gas to a pressure of not more than 35 psig and packed in strong outside packagings.

(5) Audible fire alarm systems powered by a compressed gas contained in an inside metal container when shipped under the following conditions:

(i) Each inside container must have contents which are not flammable, poisonous, or corrosive as defined under this part.

(ii) Each inside container may not have a capacity exceeding 35 cubic inches (19.3 fluid ounces).

(iii) Each inside container may not have a pressure exceeding 70 psig at 70° F. and the liquid portion of the gas may not completely fill the inside container at 130° F., and

(iv) Each nonrefillable inside container must be designed and fabricated with a burst pressure of not less than four times its charged pressure at 130° F. Each refillable inside container must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 130° F.

(c) Fire extinguishers. Fire extinguishers charged with limited quantities of a compressed gas to not more than 240 psig at 70° F. are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and to Part 177 of this subchapter except §177.817.

(1) Each fire extinguisher must be shipped as an inside packaging;

(2) Each fire extinguisher must have contents which are not flammable, poisonous, or corrosive as defined under this part;

(3) Each fire extinguisher under stored pressure may not have an internal volume exceeding 1,100 cubic inches. For fire extinguishers not exceeding 35 cubic inches capacity, the liquid portion of the gas plus any additional liquid or solid must not completely fill the container at 130° F. Fire extinguishers exceeding 35 cubic inches capacity may not contain any liquefied compressed gas;

(4) Each fire extinguisher manufactured on and after January 1, 1976, must be designed and fabricated with a burst pressure of not less than six times its charged pressure at 70° F. when shipped.

(5) Each fire extinguisher must be tested, without evidence of failure or damage, to at least three times its charged pressure at 70° F. but not less than 120 psig before initial shipment. For any subsequent shipment, each fire extinguisher must be in compliance with the retest requirements of the Occupational Safety and Health Administration Regulations of the Department of Labor, 29 CFR 1910.157(e), and;

(6) Each fire extinguisher must be marked to indicate the year of the test (within 90 days of the actual date of the original test) and "MEETS DOT REQUIREMENTS." This marking will be considered a certification that the fire extinguisher was manufactured in accordance with the requirements of this section.

Note: The words "This extinguisher meets all requirements of 49 CFR 173.306" may be displayed in place of "MEETS DOT REQUIREMENTS" on extinguishers manufactured prior to January 1, 1976.

(7) When Specification 2P or 2Q (§§178.33, 178.33a of this subchapter) packagings are used, paragraphs (c)(4)–(6) of this section are not applicable provided each packaging meets the requirements of paragraph (a) of this section.

(d) Truck bodies or trailers on flat cars; automobiles, motorcycles, tractors, or other self-propelled vehicles. (1) Except as specified in §173.21, truck bodies or trailers with automatic heating or

refrigerating equipment of the gas burning type may be shipped with tanks containing fuel and equipment operating or not operating, when used for the transportation of other freight and loaded on flat cars as part of a joint rail-highway movement. The heating or refrigerating equipment is considered to be a part of the truck body or trailer and is not subject to any other requirements of this subchapter.

(2) Automobiles, motorcycles, tractors, or other self-propelled vehicles equipped with liquefied petroleum gas or other compressed gas fuel tanks, provided such tanks are securely closed, are not subject to any other requirements for transportation by rail or highway. For transportation by water, see §§ 176.905 and 176.78(k) of this subchapter. For transportation by air, the fuel tank must be removed or emptied and securely closed.

(3) A cylinder which is a component part of a passenger restraint system and is installed in a motor vehicle, charged with nonliquefied, nonflammable compressed gas and having no more than two actuating cartridges per valve, is excepted from the requirements of Parts 170–189 of this subchapter except:

(i) Unless otherwise authorized by the Department, each cylinder must be in compliance with one of the cylinder specifications in Part 178 of this subchapter and authorized for use in § 173.302 for the gas it contains;

(ii) Each cylinder must be in compliance with the filling requirements of § 173.301; and

(iii) Each actuating cartridge must be approved in accordance with § 173.66 and meet the definition set forth in § 173.100(w).

(4) A cylinder which is part of a tire inflator system in a motor vehicle, charged with a nonliquefied, nonflammable compressed gas is excepted from the requirements of Parts 170–189 of this subchapter, except:

(i) Unless otherwise authorized by the Department, each cylinder must be in compliance with one of the cylinder specifications in Part 178 and authorized for use in § 173.302 for the gas it contains;

(ii) Each cylinder must be in compliance with the filling requirements of § 173.301.

(iii) Each cylinder must be securely installed in the trunk of the motor vehicle and the valve must be protected against accidental discharge.

Note: A cylinder containing a gas generator may be included within the provisions of this exception if the requirements of § 173.34(d) are satisfied.

(e) **Refrigerating machines.** (1) New (unused) refrigerating machines or components thereof are excepted from the specification packaging requirements of this part if they meet the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(i) Each pressure vessel may not contain more than 5,000 pounds of Group I refrigerant as classified in American National Standard B9.1 or not more than 50 pounds of refrigerant other than Group I.

(ii) Machines or components having two or more charged vessels may not contain an aggregate of more than 2,000 pounds of Group I refrigerant or more than 100 pounds of refrigerant other than Group I.

(iii) Each pressure vessel must be equipped with a safety device meeting the requirements of American National Standard B9.1.

(iv) Each pressure vessel must be equipped with a shut-off valve at each opening except openings used for safety devices and with no other connection. These valves must be closed prior to and during transportation.

(v) Pressure vessels must be manufactured, inspected and tested in accordance with American National Standard B9.1, or when over 6 inches internal diameter, in accordance with the ASME Code.

(vi) All parts subject to refrigerant pressure during shipment must be tested in accordance with American National Standard B9.1.

(vii) The liquid portion of the refrigerant, if any, may not completely fill any pressure vessel at 130° F.

(viii) The amount of refrigerant, if liquefied, may not exceed the filling density prescribed in § 173.304.

(f) **Accumulators.** The following applies to accumulators, which are hydraulic accumulators containing nonliquefied, nonflammable gas, and nonflammable liquids or pneumatic accumulators containing nonliquefied, nonflammable gas, fabricated from materials which will not fragment upon rupture.

(1) Accumulators installed in motor vehicles, construction equipment, and assembled machinery and designed and fabricated with a burst pressure of not less than five times their charged pressure at 70° F, when shipped, are not subject to the requirements of this subchapter.

(2) Accumulators charged with limited quantities of compressed gas to not more than 200 p.s.i.g. at 70° F are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(i) Each accumulator must be shipped as an inside packaging.

(ii) Each accumulator may not have a gas space exceeding 2,500 cubic inches under stored pressure, and

(iii) Each accumulator must be tested, without evidence of failure or damage, to at least three times its charged pressure at 70° F, but not less than 120 p.s.i. before initial shipment and before each refilling and reshipment.

(3) Accumulators with a charging pressure exceeding 200 p.s.i.g. at 70° F are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions:

(i) Each accumulator must be in compliance with the requirements stated in paragraph (f)(2), (i), (ii), and (iii) of this section, and

(ii) Each accumulator must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 70° F when shipped.

(g) **Water pump system tank.** Water pump system tanks charged with compressed air or limited quantities of nitrogen to not over 40 psig for single-trip shipment to installation sites are excepted from labeling (transportation by air not authorized) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of this subchapter, to part 174 of this subchapter except § 174.24 and part 177 except § 177.817.

(1) The tank must be of steel, welded with heads concave to pressure, having a rated water capacity not exceeding 120 gallons and with outside diameter not exceeding 24 inches. Safety relief devices not required.

(2) The tank must be pneumatically tested to 100 psig. Test pressure must be permanently marked on the tank.

(3) The stress at prescribed pressure must not exceed 20,000 psi using formula:

$$S = Pd/2t$$

where:

S = wall stress in pounds per square inch;
P = prescribed pressure for the tank of at least 3 times charged pressure at 70° F or 100 psig, whichever is greater;
d = inside diameter in inches;
t = minimum wall thickness, in inches

(4) The burst pressure must be at least 6 times the charge pressure at 70° F.

(5) Each tank must be overpacked in a strong outside container in accordance with § 173.301(k).

§ 173.307 Exceptions for compressed gases. (a) The following materials are not subject to the requirements of this subchapter:

(1) Carbonated beverages.

(2) Except as provided in § 175.10(a)(2) of this subchapter, tires when inflated to pressures not greater than their rated inflation pressures.

(3) Balls used for sports.

(4) Refrigerating machines including dehumidifiers and air conditioners, and components thereof such as precharged tubing containing 25 pounds or less of nonflammable liquefied gas.

§ 173.308 Cigarette lighter or other similar device charged with fuel. (a) In addition to the requirements of § 173.21(e), a cigarette lighter or other similar device charged with a flammable gas must be shipped as follows:

(1) No more than 2.3 fluid ounces of liquefied gas may be loaded into each device;

(2) The liquid portion of the gas may not exceed 85 percent of the volumetric capacity of each fluid chamber at 60° F.

(3) Each device, including closures, must be capable of withstanding without leakage or rupture an internal pressure of at least two times the vapor pressure of the fuel at 130° F; and

(4) Devices must be overpacked in packaging that is designed or arranged to prevent movement of the device itself.

(b) When no more than 1,500 devices covered by this section are transported in one motor vehicle by highway, the requirements of Parts 172 and 177 of this subchapter do not apply.

(c) For transportation by water in a closed transport vehicle or a closed freight container, the following warning must be affixed to the access doors: "WARNING—MAY CONTAIN EXPLOSIVE MIXTURES WITH AIR—KEEP IGNITION SOURCES AWAY WHEN OPENING." The warning must be on a contrasting background and must be readily legible from a distance of 25 feet.

§ 173.314 Requirements for compressed gases in tank cars. (a) **Definitions.** For definitions of compressed gases, see § 173.300.

(b) **General requirements.**

(1) Tank cars containing compressed gases must not be shipped unless they were loaded by or with the consent of the owner thereof.

(2) Tank cars must not contain gases capable of combining chemically and must not be loaded with any gas which combines chemically with the gas previously loaded therein, until all residue has been removed and interior of tank thoroughly cleaned.

(3) For cars of the DOT-106A and 110A class, the tanks must be placed in position and attached to car structure by the shipper.

(4) Wherever the word "approved" is used in this part of the regulations, it means approval by the Association of American Railroads Committee on Tank Cars as prescribed in §179.3 of this subchapter.

(5) Each tank car, except series 106A*** or 110A***, containing a flammable compressed gas or flammable compressed gas mixture must be marked with the name of contents (§172.101 of this subchapter) in accordance with the requirements of §172.330 of this subchapter or as otherwise approved by the Department.

(6) Each tank car containing anhydrous ammonia, hydrogen chloride, refrigerated liquid, or chlorine must be marked "ANHYDROUS AMMONIA", "HYDROGEN CHLORIDE" or "CHLORINE," as appropriate, in accordance with the requirements of §172.330 of this subchapter.

(c) **Authorized gases, filling densities, tank cars.** A compressed gas offered for transportation in a tank car must be prepared in accordance with paragraphs (b) through (h) of this section, §173.10, and the following table (for cryogenic liquids, see §173.319):

Kind of gas	Maximum permitted filling density, Note 1	Required tank car, see § 173.31(a) (2) and (3)
Ammonia solution	Note 21	DOT-105A100-W, 105A100AL-W, 105A100AL-W, 109A300-W, 111A100-W-4, Note 20
Anhydrous ammonia	50	DOT-106A500-X, Note 25
	57	DOT-105A300-W, Note 24.
	57	DOT-112S430-E, 112S340-W, 114S340-W, Note 15
	58.8	DOT-112S400E, 112S340W, 114S340-W, Note 15
Argon	Note 20	DOT-107A.
Bromotrifluoromethane (R-1381 or H-1301)	124	DOT-110A800W, Notes 13 and 25.
Butadiene (pressure not exceeding 75 pounds per square inch at 105°F) inhibited	Notes 18 and 21	IDC-105A100-, 105A100-W, 111A100-W-4, Notes 4 and 23
Butadiene (pressure not exceeding 255 pounds per square inch at 115°F), inhibited	Notes 18 and 21	DOT-112T340W, 112J340W, 114T340W, 114J340W, Notes 4 and 20
Butadiene (pressure not exceeding 300 pounds per square inch at 115°F), inhibited	Notes 18 and 21	DOT-112T400W, 112J400W, 114T400W, 114J400W, Notes 4 and 20
Carbon dioxide, refrigerated liquid	Note 5	DOT-105A500-W, Note 8
Chlorine	125	DOT-106A500X, Note 25
	125	DOT-105A500W, Note 12
Chlorodifluoroethane (R-142b) (1-Chloro-1,1-difluoroethane), Notes 4, Note 13	100	DOT-106A500X, 110A500W, Note 25 DOT-105A100W, Note 23 DOT-114T340W, 114J340W, Notes 28 and 29
Chlorodifluoromethane (R-22), Note 13	105	DOT-106A500X, 110A500W, Note 25
	110	DOT-105A300W
	108	DOT-112A400W
	Note 21	DOT-114A340W, Note 29
Chloropentafluoroethane (R-115), Note 13	Note 21	DOT-106A500X, 110A500W, Note 25 DOT-105A300W DOT-114A340W, Note 29
Chlorotetrafluoroethane (R-124), Note 13	125	DOT-106A500X, 110A500W, Note 25
	126	DOT-112A400W
Chlorotrifluoromethane (R-13), Note 13	Note 21	DOT-105A300W DOT-114A340W, Note 29
Crude nitrogen fertilizer solution	Note 21	DOT-106A500X DOT-105A300-W, 105A300-W, Note 20
Crude nitrogen fertilizer solution (pressure not exceeding 75 pounds per square inch at 105°F)	Note 21	DOT-106A500X DOT-105A100-AL-W, 105A100-AL-W, Note 20
Dichlorodifluoromethane (R-12), Note 13	113	DOT-106A500X, 110A500W, Note 25
	123	DOT-112A340W, 114A340W, Note 29
	125	DOT-105A300W
Difluoroethane (R-152a), Note 4, Note 13	79	DOT-106A500X, 110A500W, Note 25.
	79	DOT-112T400W, 112J400W, 114T340W, 114J340W, Notes 28 and 29
	84	DOT-105A300W, Note 23
Dimethylamine, anhydrous	59	DOT-106A500X
	61	DOT-112T340W, 112J340W, Note 26
	62	DOT-105A300-W, Notes 4, 23 and 26
Dimethyl ether	59	DOT-106A500X, 110A500-W
	62	DOT-105A300W, Notes 4, and 23
Fertilizer ammoniating solution containing free ammonia	Note 21	DOT106A500X DOT-105A300-W, 109A300-W, Note 20
Fertilizer ammoniating solution containing free ammonia (pressure not exceeding 75 pounds per square inch at 105°F)	Note 21	DOT-106A500X DOT-105A100-AL-W, 105A100-AL-W, Note 20
Fertilizer ammoniating solution containing free ammonia (pressure not exceeding 150 pounds per square inch at 105°F)	Note 21	DOT-106A500X DOT-105A200-AL-W, Note 20
Helium	Note 20	DOT-107A
Hexafluoropropylene	110	DOT-106A500-X, 110A500-W, Note 25
Hexafluoropropylene oxide	110	DOT-110A500-W, Note 7.
Hydrogen	Note 20	DOT-107A, Note 2
Hydrogen chloride, refrigerated liquid	89.8 maximum to 80.1 minimum at maximum 90 psig when offered for transportation	DOT-105A600W, Note 17.
Hydrogen sulfide	68	DOT-106A500X, Notes 7 and 8
Liquid hydrocarbon gas (pressure not exceeding 75 pounds per square inch at 105°F)	Note 21	IDC-105A100-, 105A100-W, 111A100-W-4, Notes 4 and 23
Liquid hydrocarbon gas (pressure not exceeding 225 pounds per square inch at 105°F)	Note 21	DOT-105A300-W, Notes 4 and 23
Liquid hydrocarbon gas (pressure not exceeding 300 pounds per square inch at 105°F)	Note 21	DOT-105A400-W, Notes 4 and 23
Liquid hydrocarbon gas (pressure not exceeding 375 pounds per square inch at 105°F)	Note 21	DOT-105A500-W, Notes 4 and 23
Liquid hydrocarbon gas (pressure not exceeding 375 pounds per square inch at 130°F)	Note 21	DOT-106A500X
Liquid hydrocarbon gas (pressure not exceeding 450 pounds per square inch at 105°F)	Note 21	DOT-105A600-W, Notes 4 and 23
Liquefied petroleum gas (pressure not exceeding 75 pounds per square inch at 105°F)	Note 18	IDC-105A1001, 105A100-W, 111A100-W-4, Notes 4 and 23
Liquefied petroleum gas (pressure not exceeding 150 pounds per square inch at 105°F)	Note 18	DOT-105A200-W, 105A200AL-W, Notes 4 and 23
Liquefied petroleum gas (pressure not exceeding 225 pounds per square inch at 105°F)	Note 18	DOT-105A300-W, Notes 4, 20 and 23
Liquefied petroleum gas (pressure not exceeding 255 pounds per square inch at 115°F)	Note 18	DOT-112T340-W, 112J340-W, 114T340W, 114J340-W, Notes 4 and 29
Liquefied petroleum gas (pressure not exceeding 300 pounds per square inch at 105°F)	Note 18	DOT-105A400-W, Notes 4, 20 and 23
Liquefied petroleum gas (pressure not exceeding 300 pounds per square inch at 115°F)	Note 18	DOT-112T400-E, 112J400-E, 112T400-W, 112J400-W, 114T400-W, 114J400-W, Notes 4 and 20
Liquefied petroleum gas (pressure not exceeding 375 pounds per square inch at 105°F)	Note 18	DOT-105A500-W, Notes 4, 20 and 23

Kind of gas	Maximum permitted filling density, Note 1	Required tank car, see § 173.31(a) (2) and (3)
Liquefied petroleum gas (pressure not exceeding 375 pounds per square inch at 130°F)	Note 18	DOT-106A500X
Liquefied petroleum gas (pressure not exceeding 450 pounds per square inch at 105°F)	Note 18	DOT-105A500-W, Notes 4, 20 and 23
Methylacetylene propadiene, stabilized	Note 22	DOT-105A300W, 112T340W, 112J340W, 114T340W, 114J340W, 106A500X, Notes 4, 8 and 23
Methyl chloride	84	DOT-106A500X, Note 25
	85	DOT-112T340W, 112J340W, Note 4
	86	DOT-105A300W Notes 4 and 23
Methyl chloride methylene chloride mixture	Note 22	DOT-106A500X, Notes 7, and 14; DOT-105A300-W, Notes 4 and 23
Methyl mercaptan	80	DOT-106A500X, Notes 7 and 14
	82	DOT-105A300-W, Notes 4 and 23
Methylamine, anhydrous	60	DOT-106A500X
	61	DOT-112T340W, 112J340W, Notes 4 and 26
	62	DOT-105A300W, Notes 4, 23, and 26
Nitrogen	Note 20	DOT-107A
Nitrogen fertilizer solution	Note 21	DOT-106A500X
		DOT-105A300-W, 105A300-W, 105A300AL-W, Note 20
Nitrogen fertilizer solution (pressure not exceeding 75 pounds per square inch at 105°F)	Note 21	DOT-106A500X, DOT-105A100-AL-W, 105A100-AL-W, Note 20
Nitrosyl chloride	119	DOT-106A500-X, Notes 7 and 11.
	124	DOT-105A300-W, Note 10
Nitrous oxide	Note 5	DOT-105A500W, 105A500W, Note 6
Oxygen	Note 20	DOT-107A
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (classed as a flammable gas) Note 13	Note 21	DOT-106A500X, 110A500W, Note 25
		DOT-105A300W, Note 23
		DOT-112T340W, 112J340W, 114T340W, 114J340W, Notes 28 and 29
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (classed as a nonflammable gas) Note 13	Note 21	DOT-106A500X, 110A500W, Note 25
		DOT-105A300W, DOT-112A340W, 114A340W, Note 29
Sulfur dioxide	125	DOT-106A500X, 110A500-W, Note 25
		DOT-105A300-W
Sulfuryl fluoride	120	DOT-105A500-W
Trifluorochloroethylene	115	DOT-106A500X, 110A500-W, Note 25
	120	DOT-105A300-W, Notes 4 and 23
Trimethylamine, anhydrous	57	DOT-106A500X
	58	DOT-112T340W, 112J340W, Note 26
	59	DOT-105A300W, Notes 4, 23 and 26
Vinyl chloride, Note 9	84	DOT-106A500X, Note 7.
	87	DOT-105A200W, Notes 4, 16 and 23
	86	DOT-112T340W, 112J340W, 114T340W, 114J340W, Note 4
Vinyl fluoride, inhibited	53.6 maximum to 53.6 minimum at maximum 105 psig when offered for transportation	DOT-105A500-W, Notes 17 and 23
Vinyl methyl ether, Note 9	68	ICC-105A100-1, 105A100W, Notes 4 and 23
	68	DOT-106A500X, Note 7.

1 Use of existing tank cars authorized, but new construction not authorized.

Note 1: The filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60° F. in air shall be 8.3282 pounds.

Note 2: Each tank must be equipped with one or more safety relief devices of approved type and discharge area, the discharge outlet of each safety relief device must be connected to a manifold having an unobstructed discharge area of at least 1½ times the total discharge area of the safety relief devices connected to the manifold, all manifolds must be connected to a single common header having an unobstructed discharge outlet pointing upward and extending above top of the car, the header and the header outlet must each have an unobstructed discharge area at least equal to the total discharge area of the manifolds connected to the header, the header outlet must be equipped with an approved ignition device which will instantly ignite any hydrogen discharged through the safety relief device.

Note 3: [Reserved]

Note 4: For tank cars other than DOT-106A and DOT-110A used for the transportation of liquefied flammable gases, interior pipes of loading and unloading valves must be equipped with excess flow valves of approved design.

Note 5: The liquid portion of the gas at 0° F. must not completely fill the tank.

Note 6: Tank must be insulated with an approved material of a thickness so that the thermal conductance is not more than 0.03 B.t.u. per square foot, per degree F. differential in temperature per hour, except that the insulation thickness directly over the center sills may be reduced to give thermal conductance not exceeding 0.04 B.t.u. per square foot, per degree F. differential in temperature per hour, this reduction is to permit an anchorage which must not exceed 7 inches from top of center sills to bottom of tank. Tank must be equipped with one safety relief valve of approved design set to open at a pressure not exceeding ⅘ of the test pressure of the tank and one frangible disc of approved design set to function at a pressure less than the test pressure of the tank. The discharge capacity of each of these safety relief devices must be sufficient to prevent building up of pressure in the tank in excess of 82.5 percent of the tank test pressure. Tanks must be equipped with two pressure regulating valves of approved design set to open at a pressure not to exceed 350 psi on 105A500-W tanks and at a pressure not to exceed 400 psi on 105A500-W tanks. Each regulating valve and safety relief device must have its final discharge piped to the outside of the protective housing.

Note 7: Specification 106A or 110A tanks authorized only for transportation by rail freight and by highway. (See §§ 174.204 and 177.834(m) of this subchapter for special requirements.)

Note 8: Each tank must be equipped with adequate safety relief devices of the fusible plug type having a yield temperature not over 170° F., nor less than 157° F. Each device must be resistant to extrusion of the fusible alloy and leak tight at 130° F. Each valve outlet must be sealed by a threaded cap or a threaded solid plug. In addition, all valves must be protected by a metal cover.

Note 9: All parts of valves and safety relief devices in contact with content of tank must be of a metal or other material suitably treated if necessary, which will not cause formation of any acetylides.

Note 10: Tanks must be made of or clad with a metal not subject to rapid deterioration by the lading, all appurtenances such as manhole covers, venting, loading and discharge valves, safety relief valves, check valves, and eduction pipes, must be made of metal not subject to rapid deterioration by the lading, cork must be used as an insulating material.

Note 11: Tanks for nitrosyl chloride shall be nickel-clad and safety relief devices shall be of the fusible plug type and shall function at a temperature of not exceeding 176° F. and be vapor tight at 130° F.

Note 12: For special tank requirements applying to chlorine, see § 179.102-2 of this subchapter. The quantity of chlorine loaded into a single-unit tank car must not exceed 90 tons. Nominal 16-, 30-, 55-, 85-, or 90-ton tank car tanks must not be loaded in excess of the normal lading weights. Tank cars built to ICC-105A500 may be stenciled either ICC-105A300 or ICC-105A500; tank cars built to ICC or DOT-105A500W, may be stenciled either 105A300W or 105A500W, each tank must must be equipped with safety relief valve required by the stenciled specification. Cars not larger than 55-ton chlorine capacity built to ICC-105A300, or ICC-105A300W may be continued in service if equipped with excess flow valves in accordance with § 179.102-2. DOT-105A cars having forge welded anchors must not be used for the transportation of chlorine.

Note 13: This gas may be transported in authorized tank car tanks stenciled "DISPERSANT GAS" or "REFRIGERANT GAS."

Note 14: Container shall not be equipped with safety relief devices of any description.

Note 15: A filling density of 58.8 percent may be used during the months of November through March, inclusive. When this filling density is used, tank cars must be loaded and shipped directly to consumers for unloading. Storage in transit is not permitted.

Note 16: Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

Note 17: See paragraph (g) of this section.

Note 18: See paragraph (f) of this section.

Note 19: See paragraph (f)(2) of this section.

Note 20: See paragraph (f)(1) of this section.

Note 21: See paragraph (f)(2) of this section.

Note 22: See paragraph (f) of this section.

Note 23: Each Specification 105 tank car built after August 31, 1981, shall conform to class DOT-105J.

After December 31, 1986, each specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-105J. After December 31, 1986, each specification 111 tank car with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J. Specification 111 tank cars built after March 1, 1984 are not authorized for the transportation of flammable gases.

Note 24: Each Specification 105 tank car built after August 31, 1981, shall conform to class DOT-105S.

After December 31, 1986, each specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume including manways) exceeding 18,500 U.S. gallons, shall conform to class DOT-105S.

Note 25: Specification 106A and 110A tanks for these commodities are authorized for transportation by rail freight, highway and cargo vessel. (See §§ 174.204, 176.200, 176.230 and 177.834(m) of this subchapter for additional requirements.)

Note 26: For these materials only, Specifications 105A300W and 112T340W or 112J340W tank cars may be equipped with safety relief devices with a start-to-discharge pressure setting of 247.5 psi and 280.5 psi respectively.

Note 27: [Reserved]

Note 28: DOT-114T340W and 114J340W tank cars may be equipped with bottom outlets, except that the bottom outlets must be rendered inoperative and effectively sealed to preclude bottom unloading when transporting flammable gases.

Note 29: A maximum safety relief valve setting of 280.5 psig is authorized on DOT Specification 114A340W, 114T340W, and 114J340W tank car tanks.

(d) **Filling limits. (1) Non-liquefied and liquefied gas.** The gas pressure at 105° F. in any insulated tank car tank of the DOT-105A and 109A-W class or Spec. DOT-111A100-W-4; at 115° F. in any uninsulated tank car tank of the DOT-112A-W and 114A-W class; or at 130° F. in any uninsulated tank car tank of the DOT-106A and 110A-W class must not exceed three-fourths times the prescribed retest pressure of the tank. The gas pressure at 130° F. in any uninsulated tank car tank of the DOT-107A series must not exceed seven-tenths of the marked test pressure of the tank.

Note 1: DOT-107A tanks may be charged with helium to a pressure 10 percent in excess of the marked maximum gas pressure at 130° F. of each tank.

(2) Liquefied gas. In addition to the requirements of paragraph (d)(1) of this section, the liquid portion of the gas at 105° F. must not completely fill an insulated tank, nor at 130° F. must not completely fill an uninsulated tank with the exception that the liquid portion of the gas at 115° F. must not completely fill an uninsulated tank car tank of the DOT-112A-W and 114A-W classes.

(e) Verification of content. The amount of liquefied gas loaded into each tank may be determined either by measurement or calculation of the weight. If by measurement, the weight must be checked after disconnecting the loading line by the use of proper scales. If by calculation, the weight of liquefied petroleum gas, methylacetylene-propadiene, stabilized, dimethylamine, monomethylamine, or trimethylamine may be calculated using the outage tables supplied by the tank car owners and the specific gravities as determined at the plant, and this computation must be checked by determination of specific gravity of product after loading. Carriers may verify calculated weights by use of proper scales. The use of a fixed tube gauge device is authorized for determining the weight of methyl mercaptan in Specification 105A300W tanks instead of weighing.

(f) Special requirements for liquefied petroleum gas and butadiene tank cars. (1) Single unit tank cars. Maximum filling density in single unit tank cars shall be as shown in the following table:

Specific gravity at 60° F.	Maximum permitted filling density			
	Insulated cars		Uninsulated cars	
	April through October	November through March (see Note 1)	April through October	November through March (see Note 1)
0.500	45.500	47.43	44.88	46.88
0.501	45.600	47.51	45.00	47.00
0.502	45.700	47.62	45.13	47.10
0.503	45.800	47.73	45.25	47.20
0.504	45.900	47.84	45.38	47.30
0.505	46.000	47.95	45.50	47.40
0.506	46.125	48.06	45.60	47.50
0.507	46.250	48.17	45.70	47.63
0.508	46.375	48.28	45.80	47.75
0.509	46.500	48.39	45.90	47.88
0.510	46.750	48.51	46.00	48.00
0.511	47.000	48.61	46.13	48.10
0.512	47.125	48.72	46.25	48.20
0.513	47.250	48.83	46.38	48.30
0.514	47.375	48.94	46.50	48.40
0.515	47.500	49.05	46.63	48.50
0.516	47.625	49.16	46.75	48.63
0.517	47.750	49.27	46.88	48.75
0.518	47.875	49.38	47.00	48.88
0.519	48.000	49.49	47.13	49.00
0.520	48.125	49.60	47.25	49.10
0.521	48.250	49.70	47.38	49.20
0.522	48.375	49.81	47.50	49.30
0.523	48.500	49.92	47.63	49.40
0.524	48.600	50.03	47.75	49.50
0.525	48.700	50.14	47.88	49.63
0.526	48.800	50.25	48.00	49.75
0.527	48.900	50.36	48.13	49.88
0.528	49.000	50.47	48.25	50.00
0.529	49.125	50.58	48.38	50.10
0.530	49.250	50.69	48.50	50.20
0.531	49.375	50.79	48.63	50.30
0.532	49.500	50.90	48.75	50.40
0.533	49.625	51.01	48.88	50.50
0.534	49.750	51.12	49.00	50.63
0.535	49.875	51.23	49.13	50.75
0.536	50.000	51.34	49.25	50.88
0.537	50.100	51.45	49.38	51.00
0.538	50.200	51.56	49.50	51.10
0.539	50.300	51.67	49.60	51.20
0.540	50.400	51.78	49.70	51.30
0.541	50.500	51.88	49.80	51.40
0.542	50.625	51.99	49.90	51.50
0.543	50.750	52.09	50.00	51.63
0.544	50.875	52.20	50.13	51.75
0.545	51.000	52.31	50.25	51.88
0.546	51.100	52.41	50.38	52.00
0.547	51.200	52.52	50.50	52.10
0.548	51.300	52.62	50.63	52.20
0.549	51.400	52.73	50.75	52.30
0.550	51.500	52.84	50.88	52.40
0.551	51.625	52.94	51.00	52.50
0.552	51.750	53.06	51.13	52.63
0.553	51.875	53.16	51.25	52.75
0.554	52.000	53.26	51.38	52.88
0.555	52.125	53.37	51.50	53.00
0.556	52.250	53.48	51.60	53.10
0.557	52.375	53.58	51.70	53.20
0.558	52.500	53.69	51.80	53.30
0.559	52.625	53.80	51.90	53.40
0.560	52.750	53.91	52.00	53.50
0.561	52.875	54.01	52.13	53.63
0.562	53.000	54.12	52.25	53.75
0.563	53.100	54.22	52.38	53.88
0.564	53.200	54.33	52.50	54.00
0.565	53.300	54.43	52.63	54.10
0.566	53.400	54.54	52.75	54.20
0.567	53.500	54.64	52.88	54.30
0.568	53.600	54.75	53.00	54.40
0.569	53.700	54.85	53.10	54.50
0.570	53.800	54.96	53.20	54.60
0.571	53.900	55.06	53.30	54.70
0.572	54.000	55.17	53.50	54.80
0.573	54.125	55.27	53.50	54.90
0.574	54.250	55.38	53.63	55.00
0.575	54.375	55.48	53.75	55.13
0.576	54.500	55.59	53.88	55.25
0.577	54.600	55.69	54.00	55.38
0.578	54.700	55.80	54.10	55.50
0.579	54.800	55.90	54.20	55.60
0.580	54.900	56.01	54.30	55.70
0.581	55.000	56.11	54.40	55.80
0.582	55.100	56.22	54.50	55.90
0.583	55.200	56.32	54.63	56.00
0.584	55.300	56.43	54.75	56.13
0.585	55.400	56.53	54.88	56.25
0.586	55.500	56.64	55.00	56.38
0.587	55.625	56.74	55.13	56.50
0.588	55.750	56.85	55.25	56.60
0.589	55.875	56.95	55.38	56.70
0.590	56.000	57.06	55.50	56.80
0.591	56.090	57.15	55.60	56.90
0.592	56.180	57.25	55.70	57.00
0.593	56.270	57.34	55.80	57.10
0.594	56.360	57.44	55.90	57.20
0.595	56.450	57.53	56.00	57.30
0.596	56.540	57.63	56.13	57.40
0.597	56.630	57.72	56.25	57.50
0.598	56.720	57.82	56.38	57.60
0.599	56.810	57.91	56.50	57.70
0.600	56.900	58.01	56.62	57.80
0.601	56.990	58.10	56.73	57.90
0.602	57.080	58.20	56.84	58.00
0.603	57.170	58.29	56.95	58.13
0.604	57.260	58.39	57.07	58.25
0.605	57.330	58.49	57.18	58.38
0.606	57.440	58.58	57.30	58.50
0.607	57.530	58.68	57.41	58.63
0.608	57.620	58.77	57.52	58.75
0.609	57.710	58.87	57.64	58.88
0.610	57.800	58.97	57.76	59.00
0.611	57.890	59.06	57.87	59.10
0.612	57.980	59.16	57.98	59.20
0.613	58.070	59.26	58.09	59.30
0.614	58.160	59.35	58.21	59.40
0.615	58.250	59.45	58.32	59.50
0.616	58.340	59.55	58.43	59.63
0.617	58.430	59.64	58.55	59.75
0.618	58.520	59.74	58.66	59.88
0.619	58.610	59.84	58.77	59.97
0.620	58.700	59.94	58.89	60.07
0.621	58.790	60.03	59.00	60.18
0.622	58.880	60.13	59.12	60.28
0.623	58.970	60.23	59.23	60.38
0.624	59.060	60.32	59.34	60.49
0.625	59.150	60.42	59.46	60.59
0.626	59.240	60.52	59.57	60.70
0.627	59.330	60.61	59.68	60.80
0.628	59.420	60.71	59.80	60.90
0.629	59.510	60.81	59.91	61.01
0.630	59.600	60.91	60.02	61.11
0.631	59.690	61.00	60.13	61.18
0.632	59.780	61.10	60.28	61.28
0.633	59.870	61.19	60.34	61.38
0.634	59.960	61.29	60.44	61.47
0.635	60.050	61.39	60.55	61.57

Note 1. When these filling densities are used, tank cars must be shipped directly to consumers for unloading. Storage in transit is not permitted.

(2) DOT-106A class tank cars. Maximum filling density in DOT-106A class tank cars shall be as shown in §173.304(d)(1).

(g) Special Requirements for hydrogen chloride, refrigerated liquid and vinyl fluoride, inhibited.

(1) The shipper shall notify the Bureau of Explosives whenever a car is not received by the consignee within 20 days from the date of shipment.

(2) A tank car containing hydrogen chloride, refrigerated liquid must have the auxiliary valve on the pressure relief device closed during transportation.

(h) Foreign tank cars in domestic use. Except as authorized by §171.12a tank cars made in foreign countries, except Canada, must not be used in domestic traffic until they have been tested in this country and proper reports rendered as required by the specifications that apply.

§ 173.315 Compressed gases in cargo tanks and portable tank containers. (a) A compressed gas offered for transportation in a cargo tank or a portable tank must be prepared in accordance with this section (for cryogenic liquids, see § 173.318) and may only be shipped in a tank as provided in §§ 173.32, 173.33 and this section, as follows:

(1) Compressed gases must not be shipped in cargo tanks or portable tank containers except as provided in this section and §§ 173.32 and 173.33, and in the following table (for marking requirements see §§ 172.326 and 172.328 of this subchapter):

Kind of gas	Maximum permitted filling density		Specification container required	
	Percent by weight (see Note 1)	Percent by volume (see par. (f) of this section)	Type (see Note 2)	Minimum design pressure (psig)
Anhydrous ammonia (see Notes 14 and 17 and paragraph (i) of this section)	56	82; see Note 5	DOT-51, MC-330, MC-331; see Notes 12 and 17.	265; see Note 17
Anhydrous dimethylamine	59	See Note 7	DOT-51, MC-330, MC-331.	150
Anhydrous monomethylamine	60	See Note 7	DOT-51, MC-330, MC-331.	150.
Anhydrous trimethylamine	57	See Note 7	DOT-51, MC-330, MC-331.	150
Ammonia solution	See par. (c) of this section.	See Note 7	MC-330, MC-331; see Note 12	100; see par. (c)(1) of this section.
Bromotrifluoromethane (R-13B1 or H-1301); (See Note 9).	133	See Note 7	DOT-51, MC-330, MC-331.	365
Butadiene, inhibited	See par. (b) of this section.	See par. (b) of this section.	DOT-51, MC-330, MC-331.	100
Carbon dioxide, refrigerated liquid	See par. (c) of this section.	95	DOT-51, MC-330, MC-331.	200; see Note 3
Chlorine	125	See Note 7	MC-330, MC-331.	225; see Notes 4 and 8
Chlorodifluoroethane (R-142b) [1-Chloro 1,1-difluoroethane]; (See Note 9).	100	See Note 7	DOT-51, MC-330, MC-331.	100.
Chlorodifluoromethane (R-22); (See Note 9).	105	See Note 7	DOT-51, MC-330, MC-331.	250
Chloropentafluoroethane (R-115); (See Note 9).	See par. (c) of this section.	See Note 7	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Chlorotrifluoromethane (R-13); (See Note 9).	See par. (c) of this section.	See Note 7	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Dichlorodifluoromethane (R-12); (See Note 9).	119	See Note 7	DOT-51, MC-330, MC-331.	150
Difluoroethane (R-152a); (See Note 9)	79	See Note 7	DOT-51, MC-330, MC-331.	150
Dimethyl ether (see Note 16)	59	See Note 7	DOT-51, MC-330, MC-331.	200
Ethane, refrigerated liquid		See par. (c) of this section	MC-331, MC-338	100; see Note 11.
Ethane-propane mixture, liquid refrigerated		See par. (c) of this section.	MC-331, MC-338	275; see Note 11.
Hexafluoropropylene	110	See Note 7	DOT-51, MC-330, MC-331.	250
Hydrogen chloride, refrigerated liquid	103.0	See Note 7	MC-331, MC-338.	100; see Note 11.
	91.6	See Note 7	MC-331, MC-338.	300; see Note 11.
	86.7	See Note 7	MC-331, MC-338.	450; see Note 11.
Liquefied petroleum gas (see Note 15)	See par. (b) of this section.	See par. (b) of this section.	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Methylacetylene-propadiene, stabilized (see Note 13)	53	90	DOT-51, MC-330, MC-331.	200
Methyl chloride	84	89.5	DOT-51, MC-330 MC-331.	150.
Methyl chloride (optional portable tank 2,000 pounds water capacity, fusible plug)	84	See Note 6	DOT-51.	225
Methyl mercaptan	80	90	DOT-51, MC-330, MC-331.	100
Nitrous oxide, refrigerated liquid	See par. (c) of this section.	95	DOT-51, MC-330, MC-331.	200; see Note 3.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (See Note 9).	See par. (c) of this section.	See Note 7	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Sulfur dioxide (tanks not over 1,200 gallons water capacity)	125	87.5	DOT-51, MC-330, MC-331	150; see Note 4
Sulfur dioxide (tanks over 1,200 gallons water capacity)	125	87.5	DOT-51, MC-330, MC-331.	125; see Note 4
Sulfur dioxide (optional portable tank 1,000–2,000 pounds water capacity, fusible plug)	125	See Note 6	DOT-51.	225
Vinyl chloride	84 (see Note 13)	See Note 7	MC-330, MC-331.	150.
Vinyl fluoride, inhibited	66	See Note 7	MC-330, MC-331.	250; see Note 11.
Vinyl methyl ether	68	See Notes 7 and 13.	MC 330, MC 331.	100

Note 1: Maximum filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60° F. in air shall be 8.32828 pounds.

Note 2: See § 173.32 for authority to use other portable tanks and for manifolding cargo tanks; see § 173.301(d). Specification MC 330 cargo tanks may be painted as specified for MC 331 cargo tanks.

Note 3: If cargo tanks and portable tank containers for carbon dioxide, refrigerated liquid and nitrous oxide are designed to comply with the requirements of the ASME Code for Low Temperature Operation, the design pressure may be reduced to 100 p.s.i.g. or the controlled pressure, whichever is greater.

Note 4: In the design of tanks for sulfur dioxide and chlorine a corrosion allowance of 20 percent or 0.10 inch, whichever is less, must be added to the metal thickness. In chlorine tanks the wall thickness must be at least five-eighths inch, including corrosion allowance.

Note 5: Unlagged cargo tanks and portable tank containers for liquid anhydrous ammonia may be filled to 87.5 percent by volume provided the temperature of the anhydrous ammonia being loaded into such tanks is determined to be not lower than 30° F. or provided the filling of such tanks is stopped at the first indication of frost or ice formation on the outside surface of the tank and is not resumed until such frost or ice has disappeared.

Note 6: Tanks equipped with fusible plugs must be filled by weight.

Note 7: Tanks must be filled by weight.

Note 8: Chlorine cargo tank motor vehicles may be shipped only if the contents are to be unloaded at one unloading point.

Note 9: This gas may be transported in authorized cargo tanks and portable tanks marked "DISPERSANT GAS," or "REFRIGERANT GAS."

Note 10: [Reserved]

Note 11: MC 330, MC 331 and MC 338 cargo tanks must be insulated. Cargo tanks must meet all the following requirements. Each tank must have a design service temperature of minus 100° F. or no warmer than the boiling point at one atmosphere of the hazardous material to be shipped therein, whichever is colder, and must comply with the low temperature requirements of the ASME Code. When the normal travel time is 24 hours or less, the tank's holding time as loaded must be at least twice the normal travel time. When the normal travel time exceeds 24 hours, the tank's holding time as loaded must be at least 24 hours greater than the normal travel time. The holding time is the elapsed time from loading until venting occurs under equilibrium conditions. The cargo tank must have an outer jacket made of steel when the cargo tank is used to transport a flammable gas.

Note 12: No aluminum, copper, silver, zinc, or alloy of any of these metals shall be used in the cargo tank construction where it can come into contact with the lading.

Note 13: All parts of valves and safety devices in contact with contents of tank must be of a metal or other material suitably treated if necessary, which will not cause formation of any acetylides.

Note 14: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel (NQT) are authorized for all grades of anhydrous ammonia. Specifications MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel (QT) (see marking requirements of § 172.328(c) of this subchapter) are authorized for anhydrous ammonia having a minimum water content of 0.2 percent by weight. Any tank being placed in anhydrous ammonia service or a tank which has been in other service or has been opened for inspection, test, or repair, must be cleaned of the previous product and must be purged of air before loading. See § 172.203(h) of this subchapter for special shipping paper requirements.

Note 15: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel (NQT) are authorized for all grades of liquefied petroleum gases. Only grades of liquefied petroleum gases determined to be "noncorrosive" are authorized in specifications MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel (QT). "Noncorrosive" means the corrosiveness of the gas does not exceed the limitations for classification 1 of the ASTM Copper Strip Classifications when tested in accordance with ASTM D1838–64, "Copper Strip Corrosion by Liquefied Petroleum (LP) Gases". (For (QT) and (NQT) marking requirements see § 172.328(c) of this subchapter. For special shipping paper requirements, see § 172.203(h) of this subchapter.)

Note 16: Specifications MC 330 and MC 331 cargo tanks must be equipped with emergency discharge controls that comply with § 178.337–11(c) of this subchapter.

Note 17: A Specification MC-330 or MC-331 cargo tank or a nonspecification cargo tank meeting, and marked in conformance with, the edition of the ASME Code in effect when it was fabricated, may be used for the transportation of anhydrous ammonia if it:

(1) Has a minimum design pressure not lower than 250 psig.

(2) Was manufactured in conformance with the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer's data report.
(3) Is painted white or aluminum.
(4) Complies with Note 12 of this paragraph.
(5) Has been inspected and tested in accordance with § 173.33 as specified for Specification MC-330 or MC-331.
(6) Was used to transport anhydrous ammonia prior to January 1, 1981;
(7) Is operated exclusively in interstate commerce (including its operation by a motor carrier otherwise engaged in interstate commerce) in a state where its operation was permitted by the laws of that State (not including the incorporation of this subchapter) prior to January 1, 1981, and
(8) Is operated in conformance with all other requirements of this subchapter.

(b) Maximum permitted filling densities for cargo and portable tank containers for transportation of butadiene, inhibited, and liquefied petroleum gas are as follows:

Maximum specific gravity of the liquid material at 60° F.	Maximum permitted filling density in percent of the water-weight capacity of the tanks (percent) See Note 1	
	1200 gallons or less	Over 1200 gallons
0.473-0.480	38	41
0.481-0.488	39	42
0.489-0.495	40	43
0.496-0.503	41	44
0.504-0.510	42	45
0.511-0.519	43	46
0.520-0.527	44	47
0.528-0.536	45	48
0.537-0.544	46	49
0.545-0.552	47	50
0.553-0.560	48	51
0.561-0.568	49	52
0.569-0.576	50	53
0.577-0.584	51	54
0.585-0.592	52	55
0.593-0.600	53	56
0.601-0.608	54	57
0.609-0.617	55	58
0.618-0.626	56	59
0.627 and over	57	60

Note 1: Filling is permitted by volume provided the same filling density is used as permitted by weight, except when using fixed length dip tube or other fixed maximum liquid level indicators (paragraph (f) of this section), in which case the maximum permitted filling density shall not exceed 97 percent of the maximum permitted filling density by weight contained in the table.

(1) Odorization. All liquefied petroleum gas shall be effectively odorized as required in Note 2 of this paragraph to indicate positively, by a distinctive odor, the presence of gas down to a concentration in air of not over one-fifth the lower limit of combustibility: *Provided, however,* That odorization is not required if harmful in the use or further processing of the liquefied petroleum gas, or if odorization will serve no useful purpose as a warning agent in such use or further processing.

Note 1: The lower limits of combustibility of the more commonly used liquefied petroleum gases are: Propane, 2.15 percent; butane, 1.55 percent. These figures represent volumetric percentages of gas-air mixtures in each case.

Note 2: The use of 1.0 pound of ethyl mercaptan, 1.0 pound of thiophane, or 1.4 pounds of amyl mercaptan per 10,000 gallons of liquefied petroleum gas shall be considered sufficient to meet the requirements of § 173.315(b)(1). This note does not exclude the use of any other odorant in sufficient quantity to meet the requirements of § 173.315(b)(1).

(c) Except as otherwise provided, the loading of a liquefied gas into a cargo tank or portable tank shall be determined by weight or by a suitable liquid level gauging device. The vapor pressure (psig) at 115° F. must not exceed the design pressure of the cargo tank or portable tank container. The liquid portion of the gas shall not fill the tank at 105° F. if the tank is insulated, or at 115° F. if the tank is uninsulated, except that this requirement shall not apply to:

(1) A tank containing carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid. Such tank is required to be equipped with suitable pressure control valves and may not be filled to a level exceeding 95 percent of the volumetric capacity of the tank.

(2) A tank containing ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid; or hydrogen chloride, refrigerated liquid. Such tank must be filled to allow at least two percent outage below the inlet of the pressure relief valve or pressure control valve under conditions of incipient opening, with the tank in a level attitude.

(d) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by weight, the gross weight shall be checked after the filling line is disconnected in each instance. The gross weight shall be calculated from the tank capacity and tare weight set forth on the metal plate required by the specification, and the maximum filling density permitted for the material being loaded into the tank as set forth in the table, paragraph (a)(1) of this section.

(e) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by adjustable liquid level device, each tank and each compartment thereof shall have a thermometer well, so that the internal liquid temperature can easily be determined, and the amount of liquid in the tank shall be corrected to a 60° F. basis. Liquid levels shall not exceed a level corresponding to the maximum filling density permitted for the material being loaded into the tank as set forth in the table in paragraph (a)(1) of this section.

(f) When the loading of cargo tanks and portable tank containers with liquefied gases is determined only by fixed length dip tube or other fixed maximum liquid level indicator, the device shall be arranged to function at a level not to exceed the maximum permitted volume prescribed by the table, paragraph (a)(1) of this section. Loading shall be stopped when the device functions.

(g) Containers, the liquid level of which has been determined by means of a fixed length dip tube gauging device, shall not be acceptable for stowage as cargo on vessels in commerce subject to the jurisdiction of the United States Coast Guard. Nothing contained in this section shall be so construed as to prohibit the transportation on car floats or car ferries of motor vehicles laden with containers nor cargo tanks the liquid level of either of which has been determined by means of fixed length dip tube devices.

(h) Each cargo tank and portable tank, except a tank filled by weight, must be equipped with one or more of the gauging devices described in the following table which indicate accurately the maximum permitted liquid level. Additional gauging devices may be installed but may not be used as primary controls for filling of cargo tanks and portable tanks. Gauge glasses are not permitted on any cargo tank or portable tank. Primary gauging devices used on cargo tanks of less than 3500 gallons water capacity are exempt from the longitudinal location requirements specified in paragraphs (h)(2) and (3) of this section provided: (1) The tank length does not exceed three times the tank diameter; and (2) the cargo tank is unloaded within 24 hours after each filling of the tank.

Kind of gas	Gaging device permitted for filling purposes
Anhydrous ammonia	Rotary tube, adjustable slip tube, fixed length dip tube.
Anhydrous dimethylamine	None.
Anhydrous monomethylamine	None.
Anhydrous trimethylamine	None.
Aqua ammonia solution containing anhydrous ammonia	Rotary tube, adjustable slip tube, fixed length dip tube.
Butadiene, inhibited	Rotary tube, adjustable slip tube, fixed length dip tube.
Carbon dioxide, refrigerated liquid	Rotary tube, adjustable slip tube, fixed length dip tube.
Chlorine	None.
Dichlorodifluoromethane	None.
Difluoroethane	None.
Difluoromonochloroethane	None.
Dimethyl ether	None.
Ethane, refrigerated liquid	Rotary tube, adjustable slip tube, fixed length dip tube.
Ethane-propane mixture, refrigerated liquid	Rotary tube, adjustable slip tube, fixed length dip tube.
Hexafluoropropylene	None.
Hydrogen chloride, refrigerated liquid	None.
Liquefied petroleum gases	Rotary tube, adjustable slip tube, fixed length dip tube.
Methyl chloride	Fixed length dip tube.
Methyl mercaptan	Rotary tube, adjustable slip tube, fixed length dip tube.
Monochlorodifluoromethane	None.
Nitrous oxide, refrigerated liquid	Rotary tube, adjustable slip tube, fixed length dip tube.
Methylacetylene-propadiene, stabilized	Rotary tube, adjustable slip tube, fixed length dip tube.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.	None.
Sulfur dioxide	Fixed length dip tube.
Vinyl chloride	None.
Vinyl fluoride, inhibited	None.

(1) The design pressure of the liquid level gauging devices shall be at least equal to the design pressure of the tank.

(2) If the primary gauging device is adjustable, it must be capable of adjustment so that the end of the tube will be in the location specified in subparagraph (h)(3) of this section for at least one of the ladings to be transported, at the filling level corresponding to an average loading temperature. Exterior means must be provided to indicate this adjustment. The gauging device must be legibly and permanently marked in increments not exceeding 20 Fahrenheit degrees (or not exceeding 25 p.s.i.g. on tanks for carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid), to indicate the maximum levels to which the tank may be filled with liquid at temperatures above 20° F. However, if it is not practicable to so mark the gauging device, this information must be legibly and permanently marked on a plate affixed to the tank adjacent to the gauging device.

(3) A dip tube gauging device consists of a pipe or tube with a valve at its outer end with its intake limited by an orifice not larger than 0.060 inch in diameter. If a fixed length dip tube is used, the intake must be located midway of the tank both longitudinally and laterally and at maximum permitted filling level. In tanks for liquefied petroleum gases, the intake must be located at the level reached by the lading when the tank is loaded to maximum filling density at 40° F.

(4) Each opening for a pressure gauge, except on a tank used exclusively for the transportation of carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid, must be restricted at or inside the tank by an orifice no larger than 0.060 inch in diameter.

(i) Each tank must be provided with one or more safety relief devices

For explanation of abbreviations and reference marks, see last page of this tariff.

which, unless otherwise specified in this part, must be safety relief valves of the spring-loaded type. Each valve must be arranged to discharge upward and unobstructed to the outside of the protective housing to prevent any impingement of escaping gas upon the tank. For each chlorine tank the protective housing must be in compliance with the requirements set forth in the applicable specification.

(l) Safety relief valves on each tank must have a total relieving capacity as determined by the flow formulas contained in CGA Pamphlet S-1.2. Safety relief valves must have a total relieving capacity sufficient to prevent a maximum pressure in the tank of more than 120 percent of the design pressure. For an insulated tank the required relieving capacity of the relief valves must be the same as for an uninsulated tank, unless the insulation will remain in place and will be effective under fire conditions. In this case, each insulated tank must be covered by a sheet metal jacket of not less than 16 gauge thickness. An MC 330 cargo tank that has safety relief valves sized by Fetterly's formula dated November 27, 1928, may be continued in service. Copies of this formula may be obtained from the Bureau of Explosives.

(2) Each safety relief valve must be arranged to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the safety relief valve must be provided with means for sealing the adjustment and it must be sealed.

(3) Each safety relief valve on a tank must be set to start-to-discharge at pressure no higher than 110 percent of the tank design pressure and no lower than the design pressure specified in paragraph (a)(1) of this section for the gas transported.

(4) Each safety relief valve must be plainly and permanently marked with the pressure in p.s.i.g. at which it is set to discharge, with the actual rate of discharge of the device in cubic feet per minute of the gas or of air at 60° F. and 14.7 p.s.i.a., and with the manufacturer's name or trade name and catalog number. The start-to-discharge valve must be visible after the valve is installed. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

(5) Each safety relief valve must have direct communication with the vapor space in the tank.

(6) Each connection to a safety relief valve must be of sufficient size to provide the required rate of discharge through the safety relief valve.

(7) No shut-off valve may be installed between a safety relief valve and the tank except in cases where two or more safety relief valves are installed on the same tank, and one or more safety shut-off valves are arranged to always provide the required relief capacity through at least one of the safety relief valves.

(8) Each safety relief valve outlet must be provided with a protective device to prevent the entrance and accumulation of dirt and water. This device must not impede flow through the valve.

(9) On tanks for carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid, each safety relief device must be installed and located so that the cooling effect of the contents will not prevent the effective operation of the device. In addition to the required safety relief valves, these tanks may be equipped with one or more pressure controlling devices.

(10) Each tank for carbon dioxide, refrigerated liquid also may be equipped with one or more frangible disc devices set to function at a pressure not over two times nor less than 1.5 times the design pressure of the tank.

(11) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with a safety relief valve without an intervening shut-off valve to prevent excessive hydrostatic pressure that could burst the piping or hose.

(12) Subject to conditions of paragraph (a)(1) of this section for the methyl chloride and sulfur dioxide optional portable tanks, one or more fusible plugs examined by the Bureau of Explosives and approved by the Director, OHMT may be used on these tanks in place of safety relief valves of the spring-loaded type. The fusible plug or plugs must be in accordance with CGA Pamphlet S-1.2, to prevent a pressure rise in the tank of more than 120 percent of the design pressure. If the tank is over 30 inches long, each end must have the total specified safety discharge area.

(13) A safety relief valve on a chlorine cargo tank must conform to one of the following standards of The Chlorine Institute, Inc.: Type 1½ JO225, Dwg. H51970, dated October 7, 1968; or Type 1½ JO225, Dwg. H50155, Revision A, dated April 28, 1969.

(j) Storage containers for liquefied petroleum gas for permanent installation on consumer premises may be shipped by private motor carrier only under the following conditions:

(1) Each container must be constructed in compliance with the requirements of the ASME Code (containers built in compliance with earlier editions starting with 1943 are authorized) and must be marked to indicate compliance in the manner specified by the respective Code.

(2) Each container must be equipped with safety devices in compliance with the requirements for safety devices on containers as specified in NFPA Pamphlet No. 58.

(3) The containers shall be so braced or otherwise secured on the vehicle as to prevent relative motion while in transit. Valves or other fittings shall be adequately protected against injury during transportation. (See § 177.834(g) of this subchapter.)

(4) Except as provided in paragraph (j)(5) of this section, containers shall not be shipped when charged with liquefied petroleum gas to more than 5 percent of their water capacity.

(5) Storage containers of less than 1042 pounds water capacity (125 gallons) may be shipped when charged with liquefied petroleum gas in compliance with DOT filling density.

(k) A nonspecification cargo tank meeting, and marked in conformance with, the edition of the ASME Code in effect when it was fabricated, may be used for the transportation of liquefied petroleum gas if it—

(1) Has a minimum design pressure no lower than 250 psig;

(2) Has a capacity of 3,500 gallons or less;

(3) Was manufactured in conformance with the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer's data report;

(4) Conforms to NFPA Pamphlet 58;

(5) Has been inspected and tested in accordance with § 173.33 as specified for Specification MC-330 or MC-331;

(6) Is operated exclusively in intrastate commerce (including its operation by a motor carrier otherwise engaged in interstate commerce) in a state where its operation was permitted by the laws of that State (not including the incorporation of this subchapter) prior to January 1, 1981;

(7) Was used to transport liquefied petroleum gas prior to January 1, 1981; and

(8) Is operated in conformance with all other requirements of this subchapter.

(l) Anhydrous ammonia must not be offered for transportation or transported in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered ("QT") steel except as provided in this paragraph.

(1) The ammonia must have a minimum water content of 0.2 percent by weight. Any addition of water must be made using steam condensate, de-ionized, or distilled water.

(2) Except as otherwise provided in this paragraph, each person offering for transportation or transporting anhydrous ammonia shall perform a periodic analysis for prescribed water content in the ammonia. The analysis must be performed:

(i) From a sample of the ammonia in storage taken at least once every 7 days, or each time ammonia is added to the storage tanks, whichever is less frequent; or

(ii) At the time the cargo tanks are loaded, then a sample of the ammonia taken from at least one loaded cargo tank out of each 10 loads, or from one cargo tank every 24 hours, whichever is less frequent; or

(iii) At the same frequency as described in subparagraph (l)(2)(ii) of this paragraph, from a sample taken from the loading line to the cargo tank.

(3) If water is added at the time of loading:

(i) The sample for analysis must be taken from a point in the loading line between the water injection equipment and the cargo tank; and

(ii) Positive provisions must be made to assure water injection equipment is operating.

(4) If water injection equipment becomes inoperative, suitable corrective maintenance must be performed after which a sample from the first loaded cargo tank must be analyzed for prescribed water content.

(5) The analysis method for water content must be as prescribed in CGA Pamphlet G-2.2, titled "Tentative Standard Method for Determining Minimum of 0.2 percent water in Anhydrous Ammonia," 1975 edition.

(6) Records indicating the results of the analysis taken, as required by this paragraph, must be retained for 2 years and must be open to inspection by representative of the Department.

(7) Each person receiving anhydrous ammonia containing 0.2 percent water by weight may offer for transportation or transport that ammonia without performing the prescribed analysis for water content provided:

(i) The ammonia received was certified as containing 0.2 percent water as prescribed in §§ 172.203(h)(1)(i) and 177.817(a) of this subchapter; and

(ii) The amount of water in the ammonia has not been reduced by any means.

(m) A cargo tank (commonly known as a nurse tank and considered an implement of husbandry) transporting anhydrous ammonia, and operated by a private carrier exclusively for agricultural purposes does not have to meet the specification requirements of Part 178 of this subchapter if it:

(1) Has a minimum design pressure of 250 psig and meets the requirements of the edition of the ASME code in effect at the time it was manufactured and is marked accordingly;

(2) Is equipped with safety relief valves meeting the requirements of CGA pamphlet S1.2;

(3) Is painted white or aluminum;

(4) Has capacity of 3,000 gallons or less;

(5) Is loaded to a filling density no greater than 56 percent; and

(6) Is securely mounted on a farm wagon; and

(7) Is in conformance with the requirements of Part 172 of this subchapter except that shipping papers are not required; and it need not be marked or placarded on one end if that end contains valves, fittings, regulators or gauges when those appurtenances prevent the markings and placard from being properly placed and visible.

§ 173.316 Cryogenic liquids in cylinders. (a) General requirements.

(1) A cylinder may not be loaded with a cryogenic liquid colder than the design service temperature of the packaging.

(2) A cylinder may not be loaded with any material which may combine chemically with any residue in the packaging to produce an unsafe condition.

(3) The jacket covering the insulation on a cylinder used to transport any flammable cryogenic liquid must be made of steel.

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cylinder used to transport oxygen, cryogenic liquid, unless the parts are anodized in accordance with ASTM Standard B 580.

(5) An aluminum valve, pipe or fitting may not be installed on any cylinder used to transport any flammable cryogenic liquid.

(6) Each cylinder must be provided with one or more pressure relief devices, which must be installed and maintained in compliance with the requirements of this subchapter.

(7) Each pressure relief device must be installed and located so that the cooling effect of the contents during venting will not prevent effective operation of the device.

(8) The maximum weight of the contents in a cylinder with a design service temperature colder than −320° F may not exceed the design weight marked on the cylinder (see §178.57-20(a)(4) of this subchapter).

(b) Pressure control systems. Each cylinder containing a cryogenic liquid must have a pressure control system that conforms to §173.34(d) and is designed and installed so that it will prevent the cylinder from becoming liquid full.

(c) Specification cylinder requirements and filling limits. Specification DOT-4L cylinders (§178.57 of this subchapter) are authorized for the transportation of cryogenic liquids when carried in the vertical position as follows:

(1) For purposes of this section, "filling density," except for hydrogen, is defined as the percent ratio of the weight of lading in the packaging to the weight of water that the packaging will hold at 60° F. (1 lb of water = 27.737 cubic inches at 60° F).

(2) The cryogenic liquids of argon, nitrogen, oxygen, helium and neon must be loaded and shipped in accordance with the following table:

Pressure control valve setting (Maximum elastic discharge pressure, psig)	Maximum permitted filling density density (percent by weight)					
	Air	Argon	Nitrogen	Oxygen	Helium	Neon
45	82.5	133	76	108	12.5	109
75	80.3	130	74	105	12.5	104
105	78.4	127	72	103	12.5	100
170	76.2	122	70	100	12.5	92
230	75.1	119	69	98	12.5	85
295	73.3	115	68	96	12.5	77
360	70.7	113	65	93	12.5	.....
450	65.9	111	61	91	12.5	.....
540	62.9	107	58	88	12.5	.....
625	60.1	104	55	86	12.5	.....
Design service temperature (F)	−320	−320	−320	−320	−452	−411

(3) Hydrogen (minimum 95 percent) parahydrogen must be loaded and shipped as follows:

Column 1	Column 2
Design service temperature	Minus 423° F or colder
Maximum permitted filling density based on cylinder capacity at minus 423° F (see Note 1)	6.7 percent
The pressure control valve must be designed and set to limit the pressure in the cylinder to not more than	17 psig

Note 1: The filling density for hydrogen, cryogenic liquid is defined as the percent ratio of the weight of lading in a packaging to the weight of water that the packaging will hold at minus 423° F. The volume of the packaging at minus 423° F is determined in cubic inches. The volume is converted to pounds of water (1 lb of water = 27.737 cubic inches).

(i) Each cylinder must be constructed, insulated and maintained so that during transportation the total rate of venting shall not exceed 30 SCF of hydrogen per hour.

(ii) In addition to the marking requirements in §178.57-20 of this subchapter, the total rate of venting in SCF per hour (SCFH) shall be marked on the top head or valve protection band in letters at least one-half inch high as follows: "VENT RATE" "SCFH" (with the asterisks replaced by the number representing the total rate of venting, in SCF per hour).

(iii) Carriage by highway is subject to the conditions specified in §177.840(a) of this subchapter.

§ 173.318 Cryogenic liquids in cargo tanks. (a) General requirements.

(1) A cargo tank may not be loaded with a cryogenic liquid colder than the design service temperature of the packaging.

(2) A cargo tank may not be loaded with any material that may combine chemically with any residue in the packaging to produce an unsafe condition (see §178.338-15).

(3) The jacket covering the insulation on a tank used to transport a cryogenic liquid must be made of steel if the cryogenic liquid—

(i) Is to be transported by vessel (see §176.76(h)(1) of this subchapter); or

(ii) Is oxygen or a flammable material.

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cargo tank used to transport oxygen, cryogenic liquid unless the parts are anodized in accordance with ASTM Standard B580.

(5) An aluminum valve, pipe or fitting, external to the jacket that retains lading during transportation may not be installed on any cargo tank used to transport oxygen, cryogenic liquid or any flammable cryogenic liquid.

(6) A cargo tank used to transport oxygen, cryogenic liquid must be provided with a manhole (see §178.338-6 of this subchapter).

(b) Pressure relief systems and pressure control valves.

(1) *Types of pressure relief systems.*

(i) Except as otherwise provided in this paragraph, each tank in oxygen and flammable cryogenic liquid service must be protected by two independent pressure relief systems which are not connected in series, namely:

(A) A primary system of one or more pressure relief valves; and

(B) A secondary system of one or more frangible discs or pressure relief valves. For a tank in carbon monoxide service, the secondary system must be pressure relief valves only.

(ii) *Tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service.* For a tank used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the tank must be protected by at least one pressure relief system consisting of:

(A) One of more pressure relief valves; or

(B) A combination of one or more pressure relief valves and one or more frangible discs.

(2) *Capacities of pressure relief systems.*—(i) *Tanks in oxygen or flammable cryogenic liquid service.* For tanks in oxygen or flammable cryogenic liquid service, the primary system and the secondary system of pressure relief devices must each have a flow capacity equal to or greater than that calculated by the applicable formula in paragraph 5.3.2 or paragraph 5.3.3 of CGA Pamphlet S-1.2. In addition:

(A) The primary pressure relief system must have his total flow capacity at a pressure not exceeding 120 percent of the tank's design pressure.

(B) The secondary pressure relief system must have this total flow capacity at a pressure not exceeding 150 percent of the tank's design pressure.

(ii) *Tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service.* For tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service, the pressure relief system must have a flow capacity equal to or greater than that calculated by the applicable formula in paragraphs 5.3.2 or 5.3.3 of CGA Pamphlet S-1.2. If the pressure relief system consists of a combination of pressure relief valves and frangible discs, the pressure relief valves must have a total venting capacity equal to or greater than that calculated by the applicable formula in paragraph 4.1.10.1.1 of CGA Pamphlet S-1.2. The pressure relief system must have this total flow capacity at a pressure not exceeding 150 percent of the tank's design pressure.

(3) *Type and construction of pressure relief devices.*—(i) Each pressure relief device must be designed and constructed for a pressure equal to or exceeding the tank's design pressure at the coldest temperature reasonably expected to be encountered.

(ii) Pressure relief devices must be either spring-loaded pressure relief valves of frangible discs. Pressure relief valves must be of a type that automatically open and close at predetermined pressures.

(4) *Setting of pressure relief devices.*—(i) On a tank used in oxygen or flammable cryogenic liquid service, the pressure relief devices must perform as follows.

(A) Each pressure relief valve in the primary relief system must be set-to-discharge at a pressure no higher than 110 percent of the tank's design pressure.

(B) Each pressure relief device in the secondary pressure relief system must be designed to commence functioning at a pressure no lower than 130 percent and no higher than 150 percent of the tank's design pressure.

(ii) On a tank used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the pressure relief devices in the pressure relief system must be designed to commence functioning at no higher than 150 percent of the tank's design pressure.

(5) *Optional pressure relief devices and pressure control valves.* In addition to the required pressure relief devices, a cargo tank in cryogenic liquid (except carbon monoxide) service may be equipped with one or both of the following:

(i) One or more pressure control valves set at a pressure below the tank's design pressure.

(ii) One or more frangible discs set to function at a pressure not less than one and one-half times or more than two times the tank's design pressure.

(6) *Maximum filling rate.* (i) For a tank used in oxygen and flammable cryogenic liquid service, the maximum rate at which the tank is filled must not exceed the liquid flow capacity of the primary pressure relief system rated at a pressure not exceeding 120 percent of the tank's design pressure.

(ii) On tanks used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the maximum rate at which the tank is

For explanation of abbreviations and reference marks, see last page of this tariff.

lifted must not exceed the liquid flow capacity of the pressure relief valves rated at 150 percent of the tank's design pressure.

(7) *Arrangement and location of pressure relief devices.* (i) The discharge from any pressure relief system must be directed upward and be unobstructed to the outside of the protective housing in such a manner as to prevent impingement of gas upon the jacket or any structural part of the vehicle.

(ii) Each pressure relief valve must be arranged or protected to prevent the accumulation of foreign material between the relief valve and the atmospheric discharge opening in any relief piping. The arrangement must not impede flow through the device.

(iii) Each pressure relief valve must be designed and located to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the valve adjustment must be sealed.

(iv) Each pressure relief device must have direct communication with the vapor space of the tank at the mid-length of the top centerline.

(v) Each pressure relief device must be installed and located so that the cooling effect of the contents during venting will not prevent the effective operation of the device.

(8) *Connections.* (i) Each connection to a pressure relief device must be of sufficient size to allow the required rate of discharge through the pressure relief device. The inlet connection must be not less than one-half inch nominal pipe size.

(ii) A shut-off valve may be installed in a pressure relief system only when the required relief capacity is provided at all times.

(9) *Pressure relief devices for piping hose and vacuum-insulated jackets.* (i) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with either a hydrostatic pressure relief valve without an intervening shut-off valve, or a check valve permitting flow from the pipe or hose into the tank. If used, the relief valve must be located so as to prevent its discharge from impinging on the tank, piping, or operating personnel.

(ii) On a vacuum-insulated cargo tank the jacket must be protected by a suitable relief device to release internal pressure. The discharge area of this device must be at least 0.00024 square inch per pound of water capacity of the tank. This relief device must function at a pressure not exceeding the internal design pressure of the jacket, calculated in accordance with the ASME Code, or 25 psig, whichever is less.

(10) *Tank inlet, outlet, pressure relief device and pressure control valve markings.* (i) Each tank inlet and outlet, except pressure relief devices and pressure control valves, must be permanently marked to indicate whether it communicates with "vapor" or "liquid" when the tank is filled to the maximum permitted filling density.

(ii) Each pressure relief valve must be plainly and permanently marked with the pressure, in psig, at which it is set-to-discharge, the discharge rate of the device in SCF per minute (SCFM) of free air, and the manufacturer's name or trade name and catalog number. The marked set-to-discharge pressure valve must be visible with the valve in its installed position. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

(iii) Each pressure control valve must be plainly and permanently marked with the pressure, in psig, at which it is set-to-discharge.

(c) **Weight of lading requirements.** The weight of a cryogenic liquid in the tank must be determined by weighing or by the use of a liquid level gauging device authorized in § 178.338-14(a) of this subchapter, and may not exceed the lesser of:

(1) The weight of lading in the tank, based on the water capacity stamped on the nameplate (§ 178.338-18(a)(4) of this subchapter) and the appropriate maximum permitted filling density specified in paragraph (f) of this section; or

(2) The maximum weight of lading for which the cargo tank was designed, as marked on the specification plate (see § 178.338-18(b) of this subchapter).

(d) **Outage.** Except for a cargo tank containing helium, cryogenic liquid, a cargo tank offered for transportation must have an outage of at least two percent below the inlet of the pressure relief device or pressure control valve, under conditions of incipient opening, with the tank in a level attitude.

(e) **Temperature.** A flammable cryogenic liquid in a cargo tank at the start of travel must be at a temperature sufficiently cold that the pressure setting of the pressure control valve or the required pressure relief valve, whichever is lower, will not be reached in less time than the marked rated holding time for the cryogenic liquid (see §§ 173.33(d)(1)(ii) and 178.338-9(b) of this subchapter).

(f) **Specification MC-338 (§ 178.338 of this subchapter) cargo tanks** are authorized for the shipment of the following cryogenic liquids subject to the following additional requirements:

(1) For purposes of this section, "filling density" is defined as the percent ratio of the weight of lading in the tank to the weight of water that the tank will hold at the design service temperature (one pound of water = 27.737 cubic inches at 60° F., or one gallon of water = 231 cubic inches at 60° F. and weighs 8.32828 pounds).

(2) Air, argon, helium, nitrogen, and oxygen, cryogenic liquids must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum set-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)				
	Air	Argon	Helium	Nitrogen	Oxygen
26			12.5		
30	80.3	129	12.5	74	105
40	79.2		12.5		
50	78.0		12.5		
55	77.3	125	12.5	71	102
60	76.9		12.5		
80	75.3		12.5		
85	75.1	121	12.5		99
100	73.0		12.5		
105	73.7		12.5	67	
120	72.2		12.5		
140	71.4		12.5		
145	70.9	115	12.5	64	94
180	68.9		12.5		
200	67.9	110	12.5	61	91
250	63.9	106	12.5	57	87
275	62.9	105	12.5	56	86
325	59.4	101		53	83
Design service temperature	- 320° F.	- 320° F.	- 452° F.	- 320° F.	- 320° F.

(3) Carbon monoxide, hydrogen (minimum 95 percent para-hydrogen), ethylene, and methane or natural gas, cryogenic liquids must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum set-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)			
	Carbon monoxide	Ethylene	Hydrogen	Methane or natural gas
13			6.6	
15	75.0		6.6	40.5
17	74.0		6.6	
20		53.5		40.0
25	73.0			
30	72.0	52.7	6.3	39.1
35				
40		52.0		38.6
45	71.5			
50		51.4	6.0	38.2
55				
60		50.8		
70		50.2	5.7	37.5
90		49.2		
95				
100		48.6	5.4	36.6
115		48.2		
125			5.0	
150			4.5	
175	62.5	45.8		
285	56.0			
Design service temperature	Minus 320° F.	Minus 155° F.	Minus 423° F.	Minus 260° F.

(g) **One-way travel time; marking.** The jacket of a cargo tank to be used to transport a flammable cryogenic liquid must be marked on its right side near the front, in letters and numbers at least two inches high, "One-Way-Travel-Time _____ hrs.", with the blank filled in with a number indicating the one-way travel time (OWTT), in hours, of the cargo tank for the flammable cryogenic liquid to be transported. A cargo tank that is partially unloaded at one or more locations must have additional marking "One-Way-Travel-Time _____ hrs. _____ psig to _____ psig at _____ percent filling density," with the second blank filled in with the pressure existing after partial unloading and the third blank filled in with the set-to-discharge pressure of the control valve or pressure relief valve, and the fourth blank with the filling density following partial unloading. Multiple OWTT markings for different pressure levels are permitted.

(1) OWTT is based on the marked rated holding time (MRHT) of the cargo tank for the cryogenic liquid to be transported in the cargo tank. If the MRHT for the flammable cryogenic liquid is not displayed on or adjacent to the specification plate, this MRHT may be derived.

(2) The MRHT is converted to OWTT, in hours, as follows:

(i) For a tank with an MRHT of 72 hours or less,

$$OWTT = (MRHT - 24)/2$$

(ii) For a tank with an MRHT greater than 72 hours,

$$OWTT = MRHT - 48$$

§ 173.319 Cryogenic liquids in tank cars. (a) **General requirements.**

(1) A tank car containing a flammable cryogenic liquid may not be shipped unless it was loaded by, or with the consent of, the owner of the tank car.

(2) The amount of flammable cryogenic liquid loaded into a tank car must be determined, either by direct measurement or by calculation based on weight, to verify that the tank has not been filled to a level in

excess of the limits specified in paragraph (d)(2) of this section. The weight of any flammable cryogenic liquid loaded, except hydrogen, must be checked by use of scales after disconnecting the loading line.

(3) Whenever a tank car containing any flammable cryogenic lading is not received by the consignee within 20 days from the date of shipment, the shipper of the lading shall notify the Bureau of Explosives.

(4) A tank car may not be loaded with any flammable cryogenic liquid:

(i) That may combine chemically with any residue in the tank to produce an unsafe condition,

(ii) That is colder than the design service temperature of the tank,

(iii) If the average daily pressure rise in the tank exceeded 3 psi during the prior shipment (see §173.31(c)(13)),

(iv) Unless it is marked with the name of contents, in accordance with §172.330 of this subchapter.

(b) When a tank car containing a flammable cryogenic liquid is offered for transportation:

(1) At least 0.5 percent outage must be provided below the inlet of the pressure relief or pressure control valve at the start-to-discharge pressure setting of the valve, with the tank car in a level attitude, and

(2) The absolute pressure in the annular space must be less than 75 microns of mercury.

(c) *Temperature.* A flammable cryogenic liquid must be loaded into a tank car at such a temperature that the average daily pressure rise during transportation will not exceed 3 psi (see paragraph (a)(4)(iii) of this section and §173.31(c)(13)).

(d) A Class DOT–113 tank car is authorized for the shipment of the following cryogenic liquids subject to the following additional requirements:

(1) For purposes of this section, "filling density" is defined as the percent ratio of the weight of lading in the tank to the weight of water that the tank will hold at the design service temperature (one pound of water = 27.737 cubic inches at 60° F, or one gallon of water = 231 cubic inches at 60° F and weighs 8.32828 pounds).

(2) **Ethylene, and hydrogen (minimum 95 percent para-hydrogen),** cryogenic liquids must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum start-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)			
	Ethylene	Ethylene	Ethylene	Hydrogen
17				6.60
45	52.8			
75		51.1	51.1	
Maximum pressure when offered for transportation	10 psig	10 psig	20 psig	
Design service temperature	Minus 260 F	Minus 260 F	Minus 155 F	Minus 423 F
Specification (see §173.31(a)(9))	113D60W 113D60W	113D120W	113D120W	113A175W 113A50W

§ 173.320 **Cryogenic liquids; exceptions.** (a) Atmospheric gases and helium, cryogenic liquids, in Dewar flasks, insulated cylinders, insulated portable tanks, insulated cargo tanks, and insulated tank cars, designed and constructed so that the pressure in such packagings will not exceed 25.3 psig under ambient temperature conditions during transportation are not subject to the requirements of this subchapter when transported by motor vehicle or railcar except as specified in paragraphs (a)(1), (a)(2) and (a)(3) of this section.

(1) Sections 171.15 and 171.16 of this subchapter pertaining to the reporting of incidents, not including a release that is the result of venting through a pressure control valve, or the neck of the Dewar flask.

(2) Subparts A, B, C, and D of Part 172, (§§174.24 for rail and 177.817 for highway) and in addition, Part 172 in its entirety for oxygen.

(3) Subparts A and B of Part 173, and §§174.1 and 177.800, 177.804, 177.807, and 177.823 of this subchapter.

(b) The requirements of this subchapter do not apply to atmospheric gases and helium:

(1) During loading and unloading operations (pressure rises may exceed 25.3 psig); or

(2) When used in operation of a process system; such as a refrigeration system (pressure may exceed 25.3 psig).

(c) For transportation aboard aircraft, see §171.11 of this subchapter.

SUBPART H

POISONOUS MATERIALS, ETIOLOGIC AGENTS, AND RADIOACTIVE MATERIALS; DEFINITIONS AND PREPARATION

§ 173.325 **Classes of poisonous materials.** (a) Poisonous materials for the purpose of this subchapter are divided into three groups according to the degree of hazard in transportation.

(1) Poison A.
(2) Poison B.
(3) Irritating material.

§ 173.326 **Poison A.** (a) For the purpose of Parts 170–189 of this subchapter extremely dangerous poisons, Class A, are poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life. This class includes the following:

(1) Bromacetone.
(2) Cyanogen.
(3) Cyanogen chloride containing less than 0.9 percent water.
(4) Diphosgene.
(5) Ethyldichlorarsine.
(6) Hydrocyanic acid (see Note 1 of this paragraph).
(7) [Reserved]
(8) Methyldichlorarsine.
(9) [Reserved]
(10) Nitrogen peroxide (tetroxide).
(11) [Reserved]
(12) Phosgene (diphosgene).
(13) Nitrogen tetroxide-nitric oxide mixtures containing up to 33.2 percent weight nitric oxide.

Note 1: Diluted solutions of hydrocyanic acid of not exceeding 5 percent strength are classed as poisonous articles, Class B (see §173.343).

(b) Poisonous gases or liquids, Class A, as defined in paragraph (a) of this section, except as provided in §173.331, must not be offered for transportation by rail express.

§ 173.327 **General packaging requirements for Poison A materials.** (a) Cylinders must be maintained in compliance with the requirements of §173.34. Valves must be capable of withstanding the test pressure of the cylinders and must have taper-threaded connections directly to the cylinders (no bushings or straight-threaded connections of valves to cylinders permitted). For corrosive commodities, valves may be of the packed type provided the assembly is made gas-tight by means of a seal cap with compatible gasketed joint to the valve body or to the cylinder to prevent loss of commodity through or past the packing; otherwise the valves must be of the packless type with nonperforated diaphrams and handwheels. Each valve outlet must be sealed by a threaded cap or a threaded solid plug. The outlet caps and plugs, luting, and gaskets must be compatible with each other, the valve assembly, and the lading.

(1) The pressure of the poison gas at 130° F must not exceed the service pressure of the cylinder. Cylinders must not be liquid full at 130° F.

(2) Cylinders packed in boxes must have adequate protection for valves. Box and valve protection must be of strength sufficient to protect all parts of cylinders and valves from deformation or breakage resulting from a drop of at least 6 feet onto a concrete floor, impacting at the weakest point. A cylinder not overpacked in a box must be equipped with a protective cap or other means of valve protection which must be capable of preventing damage to or distortion of the valve if it were subjected to an impact test as follows: The cylinder, prepared as for shipment, is allowed to fall from an upright position with the side of the cap or other valve protection striking a solid steel object projecting not more than 6 inches above the floor level.

(b) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(c) No Class A poisons in cargo tanks. No "extremely dangerous poison, class A," may be loaded into or transported in any cargo tank.

(d) It shall not be permissible to transport class A poison if there be any interconnecting means of any character between the containers.

(e) Unless otherwise specified in this subchapter, packaging used for the transportation of any Poison A material may not be completely filled. Sufficient outage must be provided so that the packaging will not be liquid full at 130° F (55° C.).

(f) Each tank car, except series 106A*** and 110A***, containing Poison A materials must be marked with the name of contents (§172.101 of this subchapter) in accordance with the requirements of §172.330 of this subchapter.

§ 173.328 **Poison A materials not specifically provided for.** (a) Poison A materials, as defined in §173.326, other than those for which special packaging requirements are prescribed in this part, must be packaged as follows:

(1) Specification 33[1] or 3D[1] metal cylinders of not over 125 pounds water capacity (nominal). Gaskets if used between the protection cap and neck of cylinder must be renewed for each shipment. Cylinders not fitted with valve protection extension ring must be packed in wooden boxes complying with the construction, marking, and labeling, requirements of §173.25.

[1] Use of existing cylinders authorized, but new construction not authorized.

For explanation of abbreviations and reference marks, see last page of this tariff.

(2) Specification 3A1800, 3AA1800, 3AL1800 or 3E1800 (§§178.36, 178.37, 178.42, 178.46 of this subchapter) cylinders.

(i) Specifications 3A, 3AA and 3AL cylinders must not exceed 125 pounds water capacity (nominal). Cylinders must have valve protection or be packed in strong wooden or metal boxes as described in §173.327(a)(2). Specification 3AL cylinders containing arsine or phosphine may only be transported by highway and rail.

(ii) Specification 3E1800 cylinders must be packed in strong wooden or metal boxes.

(3) Cyanogen chloride containing less than 0.9 percent water may also be packaged as prescribed by §173.332(a)(2) of this subchapter.

§ 173.329 Bromacetone; chloropicrin and methyl chloride mixtures; chlorpicrin and nonflammable, nonliquefied compressed gas mixtures. (a) Bromacetone, when offered for transportation by carriers by rail freight, highway, or water, must be packed in specification containers as follows:

(1) As prescribed in §173.328.

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Specification 2C (§178.22 of this subchapter). Bottles must not contain over 1-pound of liquid each, may not be filled to over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 24 pounds.

(b) **Chloropicrin and methyl chloride mixtures.** Chloropicrin and methyl chloride mixtures, in addition to containers prescribed in §173.328, when offered for transportation by carriers by rail freight, highway, or water, may be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C,[1] 3E, 4A,[1] 4B, 4BA, 4BW, or 4C[1] (§§178.35, 178.37, 178.38, 178.42, 178.50, 178.51, 178.61 of this subchapter). Cylinders having not over 250 pounds water capacity (nominal). Valves or other closing devices must be protected to prevent damage in transit, by screw-on metal caps or by packing the cylinders in strong boxes or crates. Cylinders having a wall thickness of less than 0.10 inch must be packed in boxes or crates complying with the construction marking and labelling requirements of §173.25.

(c) **Chloropicrin and nonflammable, nonliquefied compressed gas mixtures.** Chloropicrin and nonflammable, nonliquefied compressed gas mixtures, in addition to containers prescribed in §173.328, when offered for transportation by carriers by rail freight, highway, or water, must be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C,[1] 3E, 4A,[1] 4B, 4BA, 4BW, or 4C[1] (§§178.36, 178.37, 178.38, 178.42, 178.50, 178.51, 178.61, of this subchapter). Cylinders having not over 250 pounds water capacity (nominal). Valves or other closing devices must be protected to prevent damage in transit, by screw-on metal caps or by packing the cylinders in strong boxes or crates. Cylinders having a wall thickness of less than 0.10 inch must be packed in boxes or crates complying with the construction, marking, and labelling requirements of §173.25.

§ 173.330 Chemical ammunition. (a) Projectiles, shells, bombs, and grenades containing Poison A materials but not equipped or packaged with ignition elements, bursting charges, detonating fuzes, or explosive components, may be shipped only by, for, or to the Department of Defense. Each shipment must be packaged, marked, and labeled as required by their regulations. Each package must be labeled with POISON GAS label marked "NONEXPLOSIVE" and also marked with the proper shipping name. (See §§173.53(r) and 173.59 for explosive chemical ammunition.)

(b) Chemical ammunition containing poisonous liquids or gases, Class A, must not be offered for transportation by rail express.

§ 173.331 Gas identification sets. (a) Gas identification sets containing Poison A materials, irritating materials, and chlorine must be packaged in Specification 15A, 15B, 19A, or 19B (§§178.168, 178.169, 178.190, or 178.191 of this subchapter). Wooden boxes under the following conditions:

(1) Gas identification sets containing Poison A materials and irritating materials may be shipped in amounts not exceeding 5 cubic centimeters, if a liquid, or 5 grams, if a solid, when mixed with or absorbed in activated charcoal or silica gel, or other absorbent medium, and packed in strong glass bottles of not less than 4 fluid ounces capacity. The Poison A materials and chlorine may be shipped if the gas itself is absorbed in activated charcoal or silica gel, or other absorbent medium, and packed in the same type 4-ounce bottles as described above. Each bottle as herein specified must be surrounded with appropriate absorbent cushioning material, and enclosed in a hermetically sealed metal can. Each can must be surrounded on all sides by at least 1 inch of dry, fine sawdust or wood pulp. The cans must be packed in Specification 15A, 15B, 19A, or 19B (§§178.168, 178.169, 178.190, 178.191 of this subchapter) wooden boxes. The bottles must be closed with ground-in glass stoppers securely fastened. The cushioning material around the bottle must be at least 1 inch thick. The cans must be made from metal of thickness not less than 30 gauge, United States standard. There must be not more than a total of 100 grams or cubic centimeters or a combination of both, in each outside wooden box.

(b) Gas identification sets containing Poison A materials and irritating materials must be packaged as follows:

(1) The liquids or liquefied gases in hermetically sealed glass tubes containing not to exceed 40 cubic centimeters each. Each tube must be securely cushioned and packed in an individual mailing tube with screw-thread metal cover. Not more than 12 such mailing tubes, cushioned with corrugated fiberboard, may be packed in a closed fiberboard container, not to exceed 4 such fiberboard containers, containing an aggregate of not to exceed 48 glass tubes cushioned and packed in an outside steel cylinder of not less than 0.145-inch wall thickness, which is closed by a plate, bolted to a flange welded to cylinder wall. Suitable gasket must be placed between flange and head plate, and closure must prevent leakage of any gas.

(c) Gas identification training sets containing Poison A materials and irritating materials must be packaged as follows:

(1) The Poison A materials and irritating material, in amounts not exceeding 5 cubic centimeters, if a liquid, or 20 grams, if a solid, when mixed with or absorbed in activated charcoal, silica gel, crepe rubber, or other absorbent medium, must be packed in strong glass bottles of not less than 2 fluid ounces capacity, equipped with a polyethylene liner; each bottle as herein specified must have a metal screw-cap closure, equipped with a built-in compression type spring and an insert in the opening of the bottle to match so that when tightened an airtight seal is obtained. Twelve bottles, containing articles as described in this paragraph and not exceeding 100 cubic centimeters or grams, or a combination of both, must be placed in a modified styrene plastic carrying case, in three rows of four bottles each and fitted with a fiberboard cell or separator. The void space around the individual bottles, and around all interior sides of the carrying case, must be filled with dry, fine sawdust or vermiculite. A sheet of sponge rubber must be fitted to the inside of the top and bottom of the carrying case to provide additional cushioning and insure a snug fit of the bottles when the top is secured. The carrying case must be fitted into a snug fitting fiberboard box, domestic type. The case must then be packed in a nailed wooden box, specification 15A or 15B (§§178.168, 178.169 of this subchapter), which must be fitted with a waterproof case liner.

§ 173.332 Hydrocyanic acid, liquid (prussic acid) and hydrocyanic acid liquefied. (a) Hydrocyanic acid, liquid (prussic acid) and hydrocyanic acid liquefied, must be packed in specification containers as follows:

(1) As prescribed in §173.328.

(2) Specification 3A480, 3AA480, 3A480X[1], or 3AL1800 (§§178.36, 178.37, 178.46 of this subchapter). Metal cylinders of not over 278 pounds water capacity (nominal); a valve protection cap must be used and be at least ⅜ inch thick, gas-tight, with ⅛-inch faced seat for gasket and with a United States standard form thread; the cap must be capable of preventing injury or distortion of the valve when it is subjected to an impact caused by allowing the cylinder, prepared as for shipment, to fall from an upright position with side of cap striking a solid steel object projecting not more than 6 inches above floor level. Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(b) Cylinders must be charged with not more than 0.6 pound of liquid for 1-pound water capacity of cylinder. Each filled cylinder must be tested for leakage before shipment and must show absolutely no leakage; this test must consist in passing over the closure of the cylinder, without the protection cap attached, a piece of Guignard's sodium picrate paper to detect any escape of hydrocyanic acid from the cylinder. Other equally efficient test methods may also be used in lieu of the picrate paper.

(c) Liquid hydrocyanic acid completely absorbed in inert material may also be shipped in specification containers as follows:

(1) Specification 15A, or 19B (§178.168, 178.191 of this subchapter). Wooden boxes with inside containers consisting of metal cans, spec. 2N (§178.32 of this subchapter), not over 14 pounds water capacity each. The liquid contents of each can must not exceed 0.33 pound of liquid for 1-pound water capacity of the can. Each can containing 4 ounces or more of liquid must be fitted with fiber caps not less than 0.08 inch thick flanged about 1 inch and fitting snugly over each end of the can. Each can must be tested for leakage after being filled and again after being maintained at ordinary room temperature for a period of at least three weeks. Each can must have its outer surface protected against rust by the use of enamel or lacquer, or each can must be completely wrapped in waterproof paper.

(2) The box lining must consist of not more than two pieces of waterproof paper, one piece completely surrounding the contents and running lengthwise of the box, and the other piece completely surrounding the contents and running crosswise of the box. In each instance, the wrapping must overlap at least 4 inches.

(3) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, constructed in accordance with requirements for a gross weight of 65 pounds but having a gross weight of not over 70 pounds, with inside

[1] Use of existing cylinders authorized, but new construction not authorized.

containers consisting of metal cans, Spec. 2N (§178.32 of this subchapter). The liquid contents of each can must not exceed 0.33 pound of liquid for 1-pound water capacity of the can and the total weight of liquid in each can must not exceed 41 ounces. Each can must be tested for leakage after being filled and again after being maintained at ordinary room temperature for a period of at least three weeks. Each can must have its outer surface protected against rust by the use of enamel or lacquer. Not more than twelve cans shall be packed in the outside fiberboard box and each can shall be separated from the other by 200-pound minimum test fiberboard partitions. Each box shall be provided with 200-pound minimum test fiberboard liner and top and bottom pads of the same material. In addition to the required closure of the boxes, two metal straps measuring ½ inch by .015 inch must be applied around the girth of each box.

(d) Specification 105A500W or 105A600W (§§179.100 and 179.101 of this subchapter). Tank cars. Tank must be restenciled 105A300W and be equipped with safety valves of the type and size used on Spec. 105A300W (§§179.100 and 179.101 of this subchapter). Tank car tank must be equipped with approved dome fittings and safety devices, and with cork insulation at least 4 inches in thickness. Each tank car must be marked "HYDROCYANIC ACID" in accordance with the requirements of §172.330 of this subchapter. Written procedures covering details of tank car appurtenances, dome fittings and safety devices, and marking, loading, handling, inspection, and testing practices shall be examined by the Bureau of Explosives and approved by the Director, OHMT before any tank car is offered for transportation of hydrocyanic acid. The maximum permitted filling density is 63 percent of the water capacity of the tank.

§ 173.333 Phosgene or diphosgene. (a) Phosgene or diphosgene must be packed in specification containers as follows:

(1) As prescribed in §173.328, the filling density (see §173.304(a)(2) Table Note 1) must not exceed 125 percent and a cylinder must not contain more than 150 pounds of phosgene.

(2) Spec. 106A500X (§§179.300, 179.301 of this subchapter) tanks. Authorized only for phosgene. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130° F. (55° C.). Additional requirements are prescribed for rail shipments under §174.200 of this subchapter, and for highway shipments under §177.834(m) of this subchapter.

(b) Each filled cylinder must be tested for leakage before shipment and must show absolutely no leakage; this test must consist in immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 150° F. for at least thirty minutes, during which time frequent examinations must be made to note any escape of gas. The valve of the cylinder must not be loosened after this test and before shipment.

§ 173.334 Organic phosphates mixed with compressed gas. (a) Hexaethyl tetraphosphate, parathion, tetraethyl dithio pyrophosphate, tetraethyl pyrophosphate, or other Poison B organic phosphate, n.o.s. (including a compound or mixture), may be mixed with a compressed gas which must be nonflammable. This mixture must not contain more than 20 percent by weight of organic phosphate and must be packaged as follows:

(1) Specification 3A240, 3AA240, 3B240, 4A240, 4B240, 4BA240, or 4BW240 (§§178.36, 178.37, 178.38, 178.49, 178.50, 178.51, 178.61, of this subchapter) cylinders meeting the following requirements:

(i) Each cylinder may be charged with not more than 10 pounds of the mixture, to a maximum filling density of not more than 80 percent of the water capacity;

(ii) Each cylinder must be charged in compliance with §173.301(e) and (l);

(iii) No cylinder may be equipped with an eduction tube or a fusible plug;

(iv) No cylinder may be equipped with any valve unless the valve is a type approved by the Department for this installation.

(v) Cylinders must be overpacked in a box so arranged to protect each valve or other closing device from damage. No more than four cylinders may be packed in a box except that in a wooden box, up to 12 cylinders may be so packed. Each box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package were dropped six feet onto solid concrete, impacting at the weakest point.

(b) Cylinders must be packed in strong wooden boxes with valves or other closing devices protected from injury, with not more than twelve cylinders in one outside wooden box. A single-trip outside fiberboard box may be used when not more than four such cylinders are to be shipped in one outside container. Valves must be adequately protected. Box and valve protection must be of strength sufficient to protect all parts of inside containers and valves from deformation or breakage resulting from a drop of at least six feet onto a concrete floor, impacting at the weakest point.

§ 173.336 Nitrogen dioxide, liquid; nitrogen peroxide, liquid; and nitrogen tetroxide, liquid. (a) Nitrogen dioxide, liquid, nitrogen peroxide, liquid, and nitrogen tetroxide, liquid must be packed in specification containers as follows:

(1) As prescribed in §173.328.

(2) Specification 3A480, 3AA480, 3AL1800, or 25[1] (§178.36, §178.37, or §178.46 of this subchapter) metal cylinders with valve removed are authorized. Valve opening must be closed by means of a solid metal plug with tapered thread properly luted to prevent leakages; valve protection cap must be used and be at least ¼ inch thick, gastight, with ¼-inch faced seat for gasket and with United States standard form thread. Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(i) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used, however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(3) Specification 106A500X or 110A500W (§§179.300, 179.301 of this subchapter) tanks. Each tank must be equipped with gas tight valve protection caps. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130° F. (55°C.). (See §§174.600 and 177.834(m) of this subchapter for special requirements for rail and highway shipments.) Specification 110A500W tanks must be stainless steel.

(4) Specification 105A500 W (§§179.100, 179.101 of this subchapter). Tank cars. Authorized for nitrogen tetroxide only. Tanks must be lagged with not less than a four-inch thickness of cork. All valves and fittings must be protected by a securely attached cover made of metal not subject to deterioration by the lading, and all valve openings, except the safety valve, must be fitted with screw plugs or caps to prevent leakage in the event of valve failure. Safety valve must be equipped with an approved stainless steel or platinum frangible disc. Each tank car must be marked "NITROGEN TETROXIDE" in accordance with the requirements of §172.330 of this subchapter. Written procedures covering details of tank car appurtenances, dome fittings and safety devices, and marking, loading, handling, inspection, and testing practices must be examined by the Bureau of Explosives and approved by the Director, OHMT before any tank car is offered for transportation of nitrogen tetroxide.

§ 173.337 Nitric oxide. (a) Nitric oxide must be packed in specification containers as follows:

(1) Spec. 3A1800, 3AA1800, 3E1800, or 3AL1800 (§178.36, §178.37, §178.42, or §178.46 of this subchapter) cylinders charged to a pressure of not more than 750 psi at 70° F. Cylinders must be equipped with a valve of stainless steel and valve seat of material which will not be deteriorated by contact with nitric oxide or nitrogen dioxide. Cylinders or valves may not be equipped with safety devices of any type. Valve outlets must be sealed by a solid threaded cap or plug and an inert gasketing material.

(i) Specification 3E1800 cylinders must be packed in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each outside packaging must be plainly marked "Inside containers comply with prescribed specifications."

(ii) Specification 3A, 3AA, and 3AL cylinders must have their valves protected by metal caps or other equally protective guards securely attached to the cylinders and be of sufficient strength to protect the valves from injury during transit, or by packing in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each outside package must be plainly marked "Inside containers comply with prescribed specifications." Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(iii) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(2) Specification 106A500X (§§179.300, 179.301 of this subchapter) tank car tanks. Nitric oxide charge in each tank may not exceed 200 psig at 70° F. Each tank must be equipped with gas-tight valve protection cap (see §179.302 of this subchapter). Each valve outlet must be sealed by a threaded solid plug or a threaded cap with inert luting or gasket material. Valves must be of stainless steel and the caps, plugs, and valve seats must be of material that will not be deteriorated by contact with nitric oxide or nitrogen dioxide. The tank may not be equipped with any safety relief device.

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[1] Use of existing cylinders authorized, but new construction not authorized.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 173.343 Poison B. (a) For the purposes of Parts 170–189 of this chapter and except as otherwise provided in this part, Class B poisons are those substances, liquid or solid (including pastes and semisolids), other than Class A poisons or irritating materials, which are known to be so toxic to man as to afford a hazard to health during transportation; or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man because they fall within any one of the following categories when tested on laboratory animals:

(1) Oral toxicity. Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams at a single dose of 50 milligrams or less per kilogram of body weight, when administered orally.

(2) Toxicity on inhalation. Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams, when inhaled continuously for a period of one hour or less as a concentration of 2 milligrams or less per liter of vapor, mist, or dust, provided such concentration is likely to be encountered by man when the chemical product is used in any reasonable foreseeable manner.

(3) Toxicity by skin absorption. Those which produce death within 48 hours in half or more than half of a group of 10 or more rabbits tested at a dosage of 200 milligrams or less per kilogram body weight, when administered by continuous contact with the bare skin for 24 hours or less.

(b) The foregoing categories shall not apply if the physical characteristics or the probable hazards to humans as shown by experience indicate that the substances will not cause serious sickness or death. Neither the display of danger or warning labels pertaining to use nor the toxicity tests set forth above shall prejudice or prohibit the exemption of any substances from the provisions of Parts 170–189 to this chapter.

§ 173.344 General packaging requirements for Poison B liquids. (a) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(b) Packagings containing liquid material may not be completely filled. Outage must be as follows:

(1) For packagings of 110 gallons or less, sufficient outage must be provided so that the packaging will not be liquid full at 130° F. (55° C.).

(2) The proper vacant space (outage) in a tank car or other shipping container depends on the coefficient of expansion of the liquid and the maximum increase of temperature to which it will be subjected in transit. Outage must be calculated to the total capacity of the container.

(3) Liquid poison must not be loaded into domes of tank cars.

(4) In tank cars, outage must be calculated to percentage of the total capacity of the tank, i.e., shell and dome capacity combined. If the dome of the tank car does not provide sufficient outage, then vacant space must be left in the shell to make up the required outage.

(5) The outage for tank cars must not be less than 1 percent.

(6) No cargo tank or compartment thereof used for the transportation of any liquid poison shall be completely filled; sufficient space shall be left vacant in every case to prevent leakage from or distortion of any such cargo tank by expansion of the contents due to rise in temperature in transit, and such free space (outage) shall be sufficient in every case so that such cargo tank shall not become entirely filled with the liquid at 130° F.

§ 173.345 Limited quantities of Poison B liquids. (a) Limited quantities of Poison B liquids for which exceptions are permitted as noted by reference to this section in § 172.101 of this subchapter or as provided in § 173.359(c), in tightly closed inside packagings, securely cushioned when necessary to prevent breakage, are excepted from the specification packaging requirements when packed according to the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §§ 174.24 and 174.680 and to Part 177 of this subchapter except §§ 177.817 and 177.841(e).

(1) In glass packagings not over 1-quart capacity each, or in metal containers or polyethylene bottles not over 1-gallon capacity each, packed in outside steel or wooden boxes, barrels, or drums.

(2) In glass packagings not over 1 pint capacity each, or in metal or polyethylene packagings (other than bags) not over 1 quart capacity each, packed in a strong outside fiberboard box or molded expanded polystyrene case.

(b) Special exceptions for shipment of certain drugs and medicines in the ORM–D class are prescribed in Subpart N of this part.

§ 173.346 Poison B liquids not specifically provided for. (a) Poison B liquid, as defined in § 173.343, other than those for which special requirements are prescribed, must be packaged as follows:

(1) Spec. 5, 5A, 5B, or 5C (§§ 178.80, 178.81, 178.82, or 178.83 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C or 17E (§§ 178.115 or 178.116 of this subchapter). Metal drums (single-trip containers), with openings not exceeding 2.3 inches in diameter.

(3) Specification 37B (§ 178.132 of this subchapter). Metal drums (single-trip containers), welded side seams, openings not over 2.3 inches in diameter, capacity not over 10 gallons. Not authorized for transportation by air.

(4) Spec. 37A or 37B (§ 178.131 or § 178.132 of this subchapter). Metal drums (single-trip containers), with welded side seams, not over 5 gallons; authorized for pastes only.

(5) [Reserved]

(6) Specification 34 (§ 178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this Part prior to first shipment.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with glass or earthenware inside containers not over 1 quart capacity each, or with metal inside containers not over 1 gallon capacity each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross.

(8) Spec. 12D (§ 178.207 of this subchapter). Fiberboard boxes with inside container which must be glass or earthenware not over one gallon each; authorized for not more than 75 pounds gross weight; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each. Use of this container will be permitted until further order of the Department.

(9) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, except that inside containers not over 3 gallons are authorized when only one is packed in each outside container; or with inside metal containers, not over 10 gallons capacity each.

(10) Specification 103,[1] 103W, 103A,[1] 103ALW, 103AW, 103BW, 104,[1] 104W, 105A100,[1] 105A 100W, 105A200ALW, 109A300ALW, 111A60ALW1, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 111A100W4, 112A400W, 114A400W, or 115A60W6 (§§ 179.100, 179.101, 179.200, 179.201, 179.220, 179.221 of this subchapter). Tank cars. Specification 103BW tank cars must be rubberlined and are authorized only for arsenic acid as prescribed in § 173.348 of this subchapter.

(11) Cylinders as prescribed for any compressed gas, except acetylene, are also authorized.

(12) Specifications MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, or MC 312 (§§ 178.341, 178.342, 178.343 of this subchapter). Cargo tanks. Tank motor vehicles designed and constructed to Specification MC 304 or MC 307 except for bottom outlets equipped with external ball valves may be used only for toluene diisocyanate.

(13) Specification 1A, 1D, or 1M (§§ 178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(14) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(15) Spec. 21C (§ 178.224 of this subchapter). Fiber drums, with inside glass containers not over one gallon capacity each.

(16) Spec. 42B, or 42D (§§ 178.107, 178.109 of this subchapter). Aluminum drums.

(17) [Reserved]

(18) Spec. 15P or 22C (§ 178.182 or § 178.198 of this subchapter). Glued plywood or wooden box, or plywood drum as prescribed by § 178.198–2(a) of this subchapter, with inside spec. 2T (§ 178.21 of this subchapter) polyethylene container.

(19) Specification 37P (§ 178.133 of this subchapter). Steel drums, not over 5 gallons capacity, with polyethylene liner (non-reusable container). Drums exceeding 1 gallon capacity must be constructed of at least 24-gauge metal. Hole in steel drum body must be suitably plugged. Authorized only for materials that will not react with polyethylene and result in container failure. Not authorized for transportation by air.

(20) Specification 6D or 37M (§§ 178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside Specifications 2S or 2SL (§§ 178.35, 178.35a of this subchapter) polyethylene containers. Authorized for materials that will not react with polyethylene and result in container failure.

(21) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with not more than one inside glass bottle not over 1-gallon capacity. Shipper must have established that the completed package meets test requirements prescribed by § 178.210–10 of this subchapter.

(22) Spec. 29 (§ 178.226 of this subchapter). Mailing tubes, with polyethylene bottles not over 2 quarts capacity each.

(23) [Reserved]

(24) Specification 12P (§ 178.211 of this subchapter). Fiberboard boxes with one inside Specification 2U (§ 178.24 of this subchapter) polyethylene container of not over 5 gallon capacity or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except

[1] The use of existing tanks authorized but new construction not authorized.

when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause failures. Not authorized for transportation by air.

(25) Specification 16A (§178.165 of this subchapter). Wirebound wooden box (see §178.165-22 of this subchapter) with inside Specification 2U (§178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(26) Spec. 12B or 12A (§§178.205 or 178.210 of this subchapter). Fiberboard boxes with inside polyethylene bottles having a minimum wall thickness of 0.015 inch and provided with screw-cap closures, not over 1-gallon capacity each. Except for polyethylene bottles having a minimum wall thickness exceeding 0.015 inch, each bottle shall be enclosed in a box constructed of at least 200-pound test (Mullen or Cady) corrugated fiberboard and not more than four such boxes shall be packed in one outside specification shipping container. When Spec. 12A boxes are used, shipper must have established that completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(27) Specification 51 (§178.245 of this subchapter). Portable tank. For rail transportation see §174.63 of this subchapter.

(28) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter), are authorized for transportation of poison B liquids, n.o.s., with no subsidiary hazard, under conditions specified in the IM Tank Table.

§ 173.347 Aniline oil. (a) Aniline oil must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.158, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside metal containers not over 10 gallons capacity each, or glass bottles not over 1-pound capacity each. Not more than 25 glass bottles shall be packed in one outside box.

(2) Specification 103,[1] 103W, 103A,[1] 103AW, 104W, 105A100W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 112A200W, 112A400F, or 114A340W (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.

(3) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, or MC 307 (§§178.340, 178.341, 178.342 of this subchapter) cargo tanks. Bottom outlets on Specification MC 304 cargo tanks must be equipped with valves conforming with §178.342-5(a) of this subchapter.

(4) Spec. 5, 5A, or 5B (§§178.60, 178.81, or 178.82 of this subchapter). Metal barrels or drums. Net weight in 110 gallon drums must not exceed 915 pounds.

(5) Spec. 17C (§178.115 of this subchapter). Metal drums (sing'e-trip).

(6) Spec. 17E (§178.116 of this subchapter). Metal drums (sing'e-trip) not over 5 gallons capacity each.

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with metal inside containers not over 1 gallon capacity each; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each.

(8) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles or metal containers not over 1 gallon capacity each. Not more than four inside containers having capacity of 1 gallon each, shall be packed in one outside container. Shipper must have established that completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(9) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

(b) Openings in metal barrels or drums must not exceed 2.3 inches in diameter.

(1) Gaskets not less than one-eighth inch thick must be used at bung and filling holes. Gaskets must be made of hard fiber impregnated with glycerin, metal-covered cork, impregnated asbestos sheets, or metal-covered asbestos.

(c) Filled drums must be so placed that bungs will be subjected to hydrostatic head of oil contained therein for a period of not less than 12 hours.

(1) The exterior of filled drums must be carefully examined for evidence of aniline oil, any traces of which must be removed by washing off with water or, preferably, weak acetic acid. The space between rolling hoops immediately around the bung should be painted to aid in the detection of leaks at this point.

(d) All returnable drums must bear the following notice, "**PREVENT DAMAGE TO FOODSTUFFS OR OTHER FREIGHT. DRAIN THIS DRUM THOROUGHLY. TIGHTEN BUNGS, WITH GASKET SECURELY IN PLACE BEFORE RETURNING. USE NEW GASKETS WHEN NECESSARY. ANILINE OIL STAINS ON THE OUTSIDE OF DRUMS SHOULD BE WASHED OFF WITH WATER OR, PREFERABLY WEAK ACETIC ACID**", shellacked to head of drum near the consignee's name and address.

[1] The use of existing tanks authorized but new construction not authorized.

§ 173.348 Arsenic acid. (a) Arsenic acid must be packed in specification containers as follows:

(1) As prescribed in §173.346. When shipped in metal barrels or drums, or cargo tanks or tank cars, without lead lining, the arsenic acid must contain not over 0.05 percent nitric acid.

(2) Specification 1A, 1D or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Specification 12A or 12B (§§178.210, 178.205 of this subchapter). Fiberboard boxes with Specification 2E (§178.24a of this subchapter) inside polyethylene bottles made of high-density (Type III) polyethylene having minimum wall thickness of 0.015 inch with screw-cap closures, not over 1-gallon capacity each. Specification 12A fiberboard boxes may have not more than four inside polyethylene bottles which must be packed to provide a snug fit. Specification 12B fiberboard boxes may not contain more than one inside polyethylene bottle and not more than four such boxes may be overpacked in a strong outside fiberboard box under provisions of §173.25.

(4) Specification 21P (§178.225 of this subchapter). Fiber drum overpack with inside Specification 2S, 2SL, or 2U (§§178.35, 178.35a, 178.24 of this subchapter) polyethylene packaging of not over 30-gallon capacity.

(5) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

§ 173.349 Carbolic acid (phenol) liquid. (a) Carbolic acid (phenol) liquid (liquid tar acid containing over 50 percent benzo-phenol), must be packed in specification containers as follows:

(1) As prescribed in §173.346.

(2) Specification 1A, 1D, or 1M (§§178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5-pints capacity each. Not more than 6 inside glass bottles of 5-pints capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(4) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this Part prior to first shipment.

§ 173.350 Chemical ammunition. (a) Chemical ammunition consisting of projectiles, shells, bombs, grenades and other containers filled with Poison B materials, without ignition elements, bursting charges, detonating fuzes, or other explosive components, must be packed for shipment in strong outside wooden or metal boxes. Boxes must be marked with proper shipping name and labeled as prescribed by this part for gases, liquids, or chemicals contained therein.

(b) Chemical ammunition, when shipped as such, must not be equipped or packed with explosive or ignition elements. (See §§173.53(r) and 173.59 for explosive chemical ammunition.)

§ 173.351 Hydrocyanic acid solutions. Hydrocyanic acid solutions not over 5 percent hydrocyanic acid must be packaged in specification containers as follows:

(a) As prescribed in §173.332.

(b) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190 or 178.191 of this subchapter) wooden boxes with inside glass bottles not over 1 pound capacity each for solutions of not over 5 percent hydrocyanic acid and not over 5 pints capacity each for solutions of not over 2 percent strength. Completed package, with glass packaging filled with water, must be capable of withstanding six four-foot drops onto solid concrete in the following order: bottom, four sides, and top, without breakage.

§ 173.352 Sodium and potassium cyanide solutions and cyanide solution, n.o.s. (a) Sodium and potassium cyanide solutions, and cyanide solutions, n.o.s. must be packed in specification packagings as follows:

(1) Spec. 5, 5A, or 5B (§§178.60, 178.81, or 178.82 of this subchapter). Metal barrels or drums without galvanizing inside, with openings not exceeding 2.3 inches in diameter.

(2) Specification 17E or 37B (§§178.116, 178.132 of this subchapter). Metal drums (sing'e-trip), with welded side seams, with openings not exceeding 2.3 inches in diameter. Specification 37B not authorized for transportation by air.

(3) Specification 15A, 15B, 15C, 16A, 19A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, or inside metal containers not over 10 gallons capacity each, and without galvanizing.

(4) Specification 103,[1] 103W, 103A,[1] 103AW, 105A400W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 112A400W, or 114A400W (§§179.100, 179.101, 179.200, 179.201 of this subchapter). Tank cars.

(5) Specifications MC-300, MC-301, MC-302, MC-303, MC-304, MC-305, MC-306, MC-307, or MC-312 (§178.341, 178.342, 178.343 of this chapter). Cargo tanks.

(6) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table

(7) Specification 6D (§178.102 of this subchapter) Cylindrical steel overpack with inside Specification 2S or 2SL (§§178.35, 178.35a of this subchapter) polyethylene packaging. Not authorized for transportation by air.
(8) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

§ 173.353 Methyl bromide and methyl bromide mixtures. (a) Methyl bromide, liquid (bromomethane); methyl bromide and ethylene dibromide mixture liquid; or methyl bromide and more than 2% chloropicrin mixture, liquid; must be packed in specification containers as follows:
(1) Specification 5A (§178.81 of this subchapter). Metal drums not exceeding 30 gallons capacity or metal drums of bilge type not exceeding 33 gallons capacity and with openings not exceeding 2 3 inches in diameter. Not authorized for mixtures containing any compressed gas.
(2) Specification 15A, 15B, 15C, 16A, 19A, 19B or 12B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191, 178.205 of this subchapter). Wooden, wire-bound wooden, or fiberboard boxes, with inside metal cans containing not over 1 pound each, or inside metal cans with a minimum wall thickness of 0.007-inch containing not over 1¼-pound each. The 1-pound can must be able to withstand an interior pressure of 130 psig without leakage or permanent distortion and pressure of contents must not exceed 130 psig at 130°F. (55°C.). The 1¼-pound can must be able to withstand an interior pressure of 140 psig without leakage or permanent distortion and pressure of contents must not exceed 140 psig at 130°F. (55°C.). Outage shall be such that the cans will not become liquid full at 130°F. Cans must be of tinplate or lined with suitable material and must have concave or pressure ends.
(3) Specification 3AA225, 3AA225, 3B225, 3E1800, 4A225[1], 4B225, 4BA225, or 4BW225 (§§178.36, 178.37, 178.38, 178.42, 178.49, 178.50, 178.51, 178.61 of this subchapter). Metal cylinders. Valves and other closing devices must be protected to prevent damage in transit by equipping the cylinder with protection required by §173.301(g). Cylinders having a wall thickness of less than 0.08 inch must be packed in boxes or crates (see §173.25).
(4) Spec. 4D300 or 4DA500 (§178.53 or §178.58 of this subchapter). Metal spheres, must be packed in strong boxes or crates (see §173.25).
(5) Specification 105A100,[1] 105A100W, or 111A100-W-4 (§§179.100, 179.101, 179.200, 179.201 of this subchapter) tank cars. Outage must be sufficient to prevent tank cars from becoming liquid full at 105°F.
(6) Specification 106A500X (§§179.300, 179.301 of this subchapter) tanks. Outage must be sufficient to prevent tanks from becoming liquid full at 130°F. (55°C.). (See §§174.200 and 177.834(m) of this subchapter for special requirements for rail and highway shipments.)
(7) Specification 12B (§178.205 of this subchapter). Fiberboard box with inside tinplated metal cans containing not more than 6 ounces net weight of product per can. Cans must be capable of withstanding a pressure of 75 pounds per square inch at 130°F. without leakage or permanent distortion. Not more than 12 cans may be packed snugly in the outside fiberboard box and gross weight of completed package shall not exceed 30 pounds. Authorized only for methyl bromide and ethylene dibromide mixtures.
(8) Specification 51 (§178.245 of this subchapter). Steel portable tanks having a design pressure of not less than 250 pounds per square inch and equipped with a spring-load safety relief device.
(b) [Reserved]
(c) Outage must be sufficient to prevent cylinders or spheres from becoming entirely filled with liquid at 130°F. (55°C.) and when the vacant space (outage) is charged with a nonflammable nonliquefied compressed gas, the pressure in the cylinder or sphere at 130°F. (55°C.) must not exceed 5/4 the marked service pressure of the cylinder or sphere.
(d) Spec. 17C (§178.115 of this subchapter). Metal drums (single-trip) not over 5¼ gallons marked capacity each and having no opening exceeding 2 3 inches in diameter. Authorized only for mixtures of methyl bromide and ethylene dibromide, liquid containing not over 40 percent by weight of methyl bromide.
(e) Specifications MC 330 and MC 331 (§178.337 of this subchapter). Cargo tanks having a design pressure not less than 250 pounds per square inch equipped with an approved spring-relief safety valve. Outage must be sufficient to prevent tank from becoming entirely filled with liquid at 130°F.

§ 173.353a Methyl bromide, liquid, and nonflammable, nonliquefied compressed gas mixtures. (a) Methyl bromide, liquid and nonflammable, nonliquefied compressed gas mixtures must be packed in specification containers as noted in §173.353a(a)(2), (3), (4), (5), (6), (8), and (c).
(b) Liquid may contain 2 percent or less by weight chloropicrin.

§ 173.354 Motor fuel antiknock compound or tetraethyl lead. (a) Motor fuel antiknock compound (a mixture of one or more organic lead compounds such as tetraethyl lead, triethylmethyl lead, diethyldimethyl lead, ethyltrimethyl lead, and tetramethyl lead, with one or more halogen compounds such as ethylene dibromide and ethylene dichloride, hydrocarbon solvents or other equally efficient stabilizers) or tetraethyl lead must be packed in specification containers as follows:
(1) Specification 15A or 19B (§178.168, §178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers of not over 1 pint capacity each, or metal cans, enclosed in hermetically sealed (soldered) strong metal cans.
(2) Spec. 5 or 5A (§§178.80 or 178.81 of this subchapter). Metal barrels or drums, with openings not exceeding 2 3 inches in diameter.
(3) Specification steel or nickel cylinders as prescribed for any compressed gas, except acetylene.
(4) Specification 105A300-W (§§179.100 and 179.101 of this subchapter). Tank car. Each tank car must be marked "MOTOR FUEL ANTIKNOCK COMPOUND" in accordance with the requirements of §172.330 of this subchapter. Tank car not authorized for tetraethyl lead. Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§179.3 of this subchapter) manner.
(5) Specification MC 330 or MC 331 (§178.337 of this subchapter) cargo tanks. (See Note 1). These cargo tanks are authorized for motor fuel antiknock compound only. A frangible disc may be used in series with and inboard of the pressure relief valve. The relief valve and the frangible disc must be set to function in a range of no less than 100 percent and no greater than 110 percent of the maximum allowable working pressure.
NOTE 1: Spec. MC 300, MC 301,[1] MC 302 or MC 303 (§§178.321, 178.323, or §178.324 of this chapter) cargo tanks in motor fuel antiknock compound service prior to October 1, 1955 may be continued in service.
(6) Spec. 51 (§178.245 of this subchapter). Portable tanks having a minimum design pressure of 100 pounds per square inch. Authorized for motor fuel antiknock compound only. A frangible disc may be used in series with and inboard of the pressure relief valve. The relief valve and the frangible disc must be set to function in a range of no less than 100 percent and no greater than 110 percent of the maximum allowable working pressure.
(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed on at least 375-pound test (Mullen or Cady) solid fiberboard with inside metal cans enclosed in hermetically sealed (soldered) metal cans, not over 5 pounds capacity each. Each inside metal container must be enclosed in a taped, double-faced corrugated liner constructed of at least 200-pound test (Mullen or Cady) fiberboard and fitted with die-cut end caps constructed of at least 200-pound test (Mullen or Cady) double-walled corrugated fiberboard. Authorized gross weight not over 90 pounds.
(b) Outage must be sufficient to prevent any container from becoming entirely filled with liquid at 130°F.
(c) Steel tanks conforming or equivalent to ASME specifications which contain solid or semisolid residual motor fuel antiknock compound (including rust, scale, or other contaminants) may be shipped by rail freight or highway. The tank must have been designed and constructed to be capable of withstanding full vacuum. All openings must be closed with gasketed blank flanges or vapor tight threaded closures. Each tank must be secured and braced to prevent movement under conditions normally incident to transportation.

§ 173.355 Phenyldichlorarsine. (a) Phenyldichlorarsine must be packed in specification containers as follows:
(1) Spec. 5A (§178.81 of this subchapter). Metal barrels or drums, made of not less than 12 gauge steel, and limited to 30 gallons capacity, with openings not exceeding 2 3 inches in diameter. Each metal barrel or drum must be tested before each filling to 20 pounds hydrostatic test.

§ 173.356 Thiophosgene. (a) Thiophosgene must be packed in specification containers as follows:
(1) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside containers which must be tightly closed glass bottles not exceeding 1 pint capacity each, securely packed in absorbent incombustible cushioning material. Cushioning material must be capable of absorbing entire contents of the container.
(2) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 1-quart capacity each, securely packed in absorbent incombustible cushioning material in sufficient quantity to absorb any leakage.
(3) Specification 5C (§178.83 of this subchapter). Steel barrels or drums made of Type 304 stainless steel.
(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.357 Chloropicrin and chloropicrin mixtures containing no compressed gas or Poison A liquid. (a) Chloropicrin. Chloropicrin, when offered for transportation by carriers by rail freight, highway, or water, must be packed in specification containers as follows:
(1) Specification 15A, 15B, 15C, 16A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Spec. 2C (§178.22 of this subchapter). Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 24 pounds.

[1] Use of existing cylinders authorized, but new construction not authorized.

[1] Use of existing cylinders authorized, but new construction not authorized.

(2) Spec. 12B (§178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with inside glass bottles or tubes in hermetically sealed metal cans in individual unsealed one-piece corrugated fiberboard boxes, Spec. 12B at least 200-pound test. Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 12 pounds.

(3) Spec. 12B (§178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with not more than one inside glass bottle or tube in a hermetically sealed metal can. Bottles must contain not over 1 pound of liquid, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard.

(4) Specification 34 (§178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of §173.24(d) of this part prior to first shipment.

(b) *Chloropicrin and chloropicrin mixtures containing no compressed gas or Poison A liquid.* Chloropicrin and mixtures of chloropicrin containing no compressed gas or Poison A liquid, in addition to containers prescribed in paragraph (a) of this section, when offered for transportation by carriers by rail freight, highway, or water, may be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C[1], 3D[1], 3E, 4A[1], 4B, 4BA, 4BW, or 4C[1] (§§178.36, 178.37, 178.38, 178.40, 178.41, 178.42, 178.49, 178.50, 178.51, 178.52, 178.61 of this subchapter). Metal cylinders. Valves and other closing devices must be protected to prevent damage in transit by equipping the cylinders with valve protection, required by §173.301(g) of this subchapter. A cylinder closed by means of a solid plug may have the closure protected by a metal collar. Cylinders having a wall thickness of less than 0.08 inch must be packaged in boxes or crates. Each cylinder having a water capacity over 275 pounds must have a minimum design pressure of 225 p.s.i.g., unless the specification requires a higher minimum design pressure.

(2) Specification 5A or 5B (§§178.81, 178.82 of this subchapter). Metal drums not exceeding 33-gallon capacity with welded seams. Specification 5B authorized only for chloropicrin mixtures containing not over 45 percent chloropicrin by weight. Removable head containers not authorized.

(3) Specification 17C or 17E (§§178.115, 178.116 of this subchapter). Metal drums (sing'e-trip) with openings not over 2 3 inches in diameter. Capacity not to exceed 30 gallons for Spec. 17E. Authorized only for mixtures of chlorpicrin and technical grade dichloropropene containing not more than 15 percent chlorpicrin by weight.

(4) Specification 106A500X (§§179.300, 179.301 of this subchapter) tanks. Valves must be protected by metal caps. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130° F. (55° C.). (See §177.834(m) of this subchapter for special requirements for highway shipments.)

(5) Spec. 105A300–W, 105A400–W, or 105A500–W (§§179.100 and 179.101 of this subchapter). Tank cars.

(c) *Chloropicrin and mixtures of chloropicrin containing no compressed gas or Poison A liquid,* must be packaged as follows:

(1) Specification 15A, 15B, 15C, 16A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Spec. 2C (§178.22 of this subchapter). Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 24 pounds.

(2) Spec. 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes, metal strapped, with chloropicrin absorbed in an efficient absorbing material packed in hermetically sealed metal cans not over 1 quart capacity each.

(3) Spec. 12B (§178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with inside glass bottles or tubes in hermetically sealed metal cans in individual unsealed one-piece corrugated fiberboard boxes. Spec. 12B at least 200-pound test. Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 12 pounds.

(4) Spec. 12B (§178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with not more than one inside glass bottle or tube in a hermetically sealed metal can. Bottles must contain not over 1 pound of liquid, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard.

§ 173.358 Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorous compound, parathion, tetraethyl dithio pyrophosphate, and tetraethyl pyrophosphate, liquid. (a) Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorous compound, parathion, tetraethyl dithio pyrophosphate, and tetraethyl pyrophosphate, liquid must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5B (§§178.80, 178.81, 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2 3 inches in diameter.

(2) Spec. 17C or 17E (§§178.115, 178.116 of this subchapter). Metal drums (sing'e-trip), with openings not exceeding 2 3 inches in diameter. Spec. 17E drums authorized for not over 5 gallons capacity each.

(3) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers of not over 5 gallons capacity each.

(4) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1 gallon capacity each, securely cushioned in liquid-tight metal cans.

(5) Specification 21C (§178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1 gallon capacity each.

(6) Spec. 37A (§178.131 of this subchapter). Metal drums (sing'e-trip), with inside glass containers not over 1-gallon capacity each.

(7) Specification cylinders as prescribed for any compressed gas except acetylene. DOT 3AL cylinders are authorized only for parathion and methyl parathion service.

(8) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides and top without breakage.

(9) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with not more than one inside container of polyethylene, or other nonfragile plastic material, and closed by a screw cap of similar material, not over 16 ounces, surrounded by absorbent cushioning and packed in a one gallon securely closed metal can which shall be surrounded with absorbent cushioning material within the outside fiberboard box.

(10) Spec. 42B (§178.107 of this subchapter). Aluminum drums.

(11) Specification 105A200ALW or 105A300W (§§179.100, 179.101 of this subchapter). Tank cars. Authorized for parathion, methyl parathion, and liquid organic phosphate compounds only. The nominal water capacity of a tank car must not exceed 12,000 gallons.

(12) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§178.35 of this subchapter) polyethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gauge steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a ⅜-inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least ½-inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(13) Specification 51 (§178.245 of this subchapter). Portable tanks. Tanks must have no bottom opening except one 3-inch maximum plugged opening for maintenance purposes is authorized. Contents of the tank must be under no gas pressure except its own vapor pressure and the commodity must be loaded into, and unloaded from, the tank while the tank is mounted on the vehicle chassis. Authorized for parathion, methyl parathion, and organic phosphate compound only and by private motor carrier only.

(14) Specification MC 310, MC 311, MC 312, MC 330 or MC 331 (§§178.343, 178.337 of this subchapter). Cargo tank. Bottom outlets, if any, must be equipped with valves conforming with §178.337–11(c) of this subchapter. MC 311 or MC 312 must have a minimum material thickness of ⅜-inch and designed for a product weight of 13 pounds per gallon or over. Contents of the tank must be under no gas pressure except its own vapor pressure. Authorized for parathion, methyl parathion and organic phosphate compound only, and by private motor carrier only.

(15) Specification 17E (§178.116 of this subchapter). Steel drum (sing'e-trip) which must be made of not less than 18-gauge body and heads. Authorized only for methyl parathion, organic phosphate compound, and parathion. Shipments authorized by private motor carrier only.

(16) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter). Authorized only for organic phosphate compound and organic phosphorous compound, liquid, depending on the toxicity of the material and for methyl parathion, under conditions specified in the IM Tank Table.

§ 173.359 Hexaethyl tetraphosphate mixtures; methyl parathion mixtures; organic phosphorus compound mixtures; organic phosphate compound mixtures; parathion mixtures; tetraethyl dithio pyrophosphate mixtures; and tetraethyl pyrophosphate mixtures, liquid (includes solutions, emulsions, or emulsifiable liquids). (a) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing not more than 50 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, must be packed in specification containers as follows:

[1] Use of existing cylinders authorized, but new construction not authorized.

For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Spec. 5, 5A, or 5B (§§178.80, 178.81, or 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C (§178.115 of this subchapter). Metal drums (single-trip), with openings not exceeding 2.3 inches in diameter.

(3) Spec. 17E or 37B (§178.116 or §178.132 of this subchapter). Metal drums (single-trip) with openings not exceeding 2.3 inches in diameter. Capacity not to exceed 10 gallons for Spec. 17E drums. Spec. 37B drums must be constructed of at least 24-gauge metal with welded side seams, of capacity not over 5½ gallons, and must be tested as prescribed by §§178.116-12 and 178.116-13 of this subchapter. Authorized only for mixtures not classed as flammable under these regulations.

(4) Specification 15A, 15B, 15C, 15E, or 19B (§§178.168, 178.169, 178.170, 178.172, 178.191 of this subchapter). Wooden boxes, with inside metal containers not over 10 gallons capacity each.

(5) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1 gallon capacity each, securely cushioned in liquid-tight metal cans.

(6) Specification 21C (§178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1-gallon capacity each.

(7) Spec. 37A (§178.131 of this subchapter). Metal drums (single-trip), with inside glass containers not over 1 gallon capacity each.

(8) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes as authorized by §178.205-19(a) of this subchapter.

(9) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(10) Spec. 42B (§178.107 of this subchapter). Aluminum drums.

(11) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside high-density polyethylene bottles not over 1-gallon capacity each. Polyethylene bottles must have a minimum wall thickness of 0.015 inch and be equipped with screw-cap closures additionally taped for securement. Each polyethylene bottle shall be packed in an inside fiberboard box. Not more than four inside fiberboard boxes with inside polyethylene bottles shall be packed in one outside shipping container. Polyethylene used in construction of inside polyethylene bottles must be of a type compatible with the lading and shall prevent permeation of contents to a degree that would cause a hazardous condition in transportation and handling.

(12) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside securely closed metal containers not over 1-gallon capacity each. Fiberboard boxes shall be constructed of not less than 500-pound test (Mullen or Cady) double-wall corrugated fiberboard. Not more than six 1-gallon metal containers shall be packed in one outside container. Authorized gross weight not over 65 pounds.

(13) Spec. 105A300-W (§§179.100 and 179.101 of this subchapter). Tank cars. Authorized for organic phosphate compound mixtures, only.

(14) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§178.35 of this subchapter) polyethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gauge steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a ⅜-inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least ½-inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(15) Specification 51 (§178.245 of this subchapter). Portable tanks. Tanks must have no bottom opening except one 3-inch maximum plugged opening for maintenance purposes is authorized. Contents of the tank must be under no gas pressure except its own vapor pressure and the commodity must be loaded into, and unloaded from, the tank while the tank is mounted on the vehicle chassis. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only and by private motor carrier only.

(16) Specification MC 310, MC 311, MC 312, MC 330 or MC 331 §§178.343, 178.337 of this subchapter). Cargo tank. Bottom outlets, if any, must be equipped with valves conforming with §178.337-11(c) of this subchapter. MC 311 or MC 312 must have a minimum material thickness of 7/16 inch and designed for a product weight of 13 pounds per gallon or over. Contents of the tank must be under no gas pressure except its own vapor pressure. Authorized for parathion mixtures, methyl parathion mixtures and organic phosphate compound mixtures only, and by private motor carrier only.

(17) Specification 37D (§178.137 of this subchapter). Nonreusable steel drum which must be made of not less than 21-gauge body and 20-gauge heads. Authorized only for methyl parathion mixtures, parathion mixtures, and organic phosphate compound mixtures, not exceeding a weight of 12 pounds per gallon.

(18) Specification 17E (§178.116 of this subchapter). Steel drum (single-trip), which must be made of not less than 18-gauge body and heads. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only, and by private motor carrier only.

(19) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized for these materials when shipped under conditions specified for a poisonous liquid not listed by name in the IM Tank Table.

(b) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing more than 50 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5B (§§178.80, 178.81, or 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C, 17E, or 37B (§178.115, §178.116, or §178.132 of this subchapter). Metal drums (single-trip) with openings not exceeding 2.7 inches in diameter. Spec. 17E drums authorized for not over 5 gallons capacity each. Spec. 37B drums must be constructed of at least 24-gauge metal with welded side seam, of not over 5½ gallons capacity, and must be tested as prescribed by §§178.116-12 and 178.116-13 of this subchapter.

(3) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers not over 5 gallons capacity each.

(4) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1-gallon capacity each, securely cushioned in liquid-tight metal cans.

(5) Specification 21C (§178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1-gallon capacity each.

(6) Spec. 37A (§178.131 of this subchapter). Metal drums (single-trip), with inside glass containers not over 1 gallon capacity each.

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(8) Spec. 42B (§178.107 of this subchapter). Aluminum drums.

(9) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with not more than six inside high-density polyethylene bottles having screw-cap closures, not over 1-quart capacity each. Fiberboard boxes must have full-height corrugated fiberboard liner, top and bottom pads, and bottles must be separated by corrugated fiberboard partitions. Plastic used in construction of bottles must be of a type compatible with the lading.

(10) Specification 6D (§178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§178.35 of this subchapter) polyethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gauge steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a ⅜-inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least ½-inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(11) Specification 12B30 (§178.205 of this subchapter). Fiberboard boxes of not less than 275-pound test double wall corrugated with a 5-mil one piece polyethylene bag form-fitted to the inner wall. Authorized only for pressure sealed polyethylene capsules containing not over 3 milliliters each.

(12) Specification 37D (§178.137 of this subchapter). Nonreusable steel drum which must be made of not less than 21-gauge body and 20-gauge heads. Authorized only for methyl parathion mixtures, parathion mixtures, and organic phosphate compound mixtures, not exceeding a weight of 12 pounds per gallon.

(13) Specification 17E (§178.116 of this subchapter). Steel drum (single-trip), which must be made of not less than 18-gauge body and heads. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only, and by private motor carrier only.

(c) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing not more than 25 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, in inside metal containers not over 8 fluid ounces capacity each, packed in strong outside containers together with sufficient absorbent material to completely absorb the liquid in the event of leakage, are excepted from specification packaging requirements of this part.

§ 173.360 Perchloro-methyl-mercaptan. (a) Perchloro-methyl-mercaptan in any quantity must not be packed with any other article.

When offered for transportation by carriers by rail freight, highway, or water must be packed in specification containers as follows:

(1) [Reserved]

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes, with inside glass bottles not over 2 quarts capacity each, individually enclosed in tightly closed metal cans and cushioned therein with incombustible material. Net weight not to exceed 100 pounds in one outside box.

(3) [Reserved]

(4) Spec. 5K or 5M (§178.83 or §178.90 of this subchapter). Nickel or monel barrels or drums.

(5) Specification 51 (§178.245 of this subchapter). Portable tanks, monel-clad. Tanks with bottom discharge outlets are prohibited. For rail transportation see §174.63 of this subchapter.

(6) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.361 Aldrin mixtures, liquid, with more than 60 percent aldrin. (a) Aldrin mixtures, liquid, with more than 60 percent aldrin must be shipped in specification containers as follows:

(1) As prescribed in §173.346.

(2) Spec. 6B, or 6C (§§178.98, 178.99 of this subchapter). Metal barrels or drums. Authorized only for viscous mixtures or those which may become partially solid.

(3) Spec. 17C or 17H (§178.115 or §178.118 of this subchapter). Metal drums (single-trip). Drums with opening exceeding 2.3 inches in diameter authorized only for viscous mixtures or those which may become partially solid.

(4) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.362 4-Chloro-o-toluidine hydrochloride. (a) 4-Chloro-o-toluidine hydrochloride must be shipped in specification containers as follows:

(1) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with glass polyethylene, or equally efficient inside containers not over 1 quart capacity each, securely packed in a tightly closed metal container.

(2) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass, polyethylene, or equally efficient containers not over 1-quart capacity each. Glass containers must be securely packed in tightly closed metal containers.

(3) Spec. 17C or 17H (§§178.115 or 178.118 of this subchapter). Metal drums (single-trip).

(4) Spec. 6B or 6C (§§178.98, or 178.99 of this subchapter). Metal barrels or drums.

(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.362a Dinitrophenol solutions. (a) Dinitrophenol solutions must be packed in specification containers as follows:

(1) In containers prescribed in §173.346.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard box with glass, earthenware, or metal inside containers not over 1 gallon capacity each, not to contain more than 4 inside glass or earthenware containers if their capacity is greater than 5 pints each.

(3) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.363 General packaging requirements for Poison B solids. (a) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(b) Testing inside containers. All inside containers, except those made of glass, must be able to pass a test by dropping, after filling, from a height of 4 feet to solid concrete without rupture or sifting of contents, except that for bags with contents weighing 25 pounds, a drop test of 2 feet is required.

§ 173.364 Limited quantities of Poison B solids. (a) Unless otherwise excluded by paragraph (a)(3) of this section, Limited Quantities of Poison B solids for which exceptions are permitted, as noted by reference to this section in §172.101 of this subchapter, are excepted from specification packaging requirements of this part if in tightly closed inside packaging securely cushioned when necessary to prevent breakage according to the following subparagraphs. (In addition, these shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §174.24 and §174.680, or to Part 177 of this subchapter except §177.817 and §177.841(e)).

(1) In inside glass, earthenware, or composition bottles or jars, or metal packaging, or lock-corner sliding-lid wooden boxes, not over 5 pounds capacity each; or inside chipboard, pasteboard, or fiber cartons, cans, boxes, or tightly closed strong plastic bags or bottles compatible with product, not over 1 pound capacity each, packed in an outside wooden or fiberboard box, or wooden barrel or keg, or molded expanded polystyrene case. Net weight of contents of each outside container may not exceed 100 pounds.

(2) In inside plastic bottles or jars, chipboard, pasteboard or fiber cartons, cans, or boxes, of not over 5 pounds capacity each, packed in outside fiberboard or wooden boxes. Not more than 6 of these cartons shall be packed in any outside container.

(3) The following materials, are excluded from this exception: Cyanides (other than as specified in 173.370(b) and (d)), hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, and organic phosphate mixtures.

(b) Special exceptions for shipment of certain drugs and medicines in the ORM-D class are prescribed in Subpart N of this part.

§ 173.365 Poison B solids not specifically provided for. (a) Poison B solids, as defined in §173.343, other than those for which special requirements are prescribed, must be packaged as follows:

(1) Specification 5, 5A, 5B, 6B, or 6C (§§178.80, 178.81, 178.82, 178.98, 178.99 of this subchapter). Metal barrels or drums.

(2) Specification 17E, 17H, 37A, or 37B (§§178.116, 178.118, 178.131, 178.132 of this subchapter). Metal drums (single-trip). Gross weight may not exceed 460 pounds. Regardless of the gross weight marking embossed on the drum, a drum constructed of 22-gauge steel is authorized for material fused solid in the drum with a gross weight not to exceed 880 pounds and for waste material containing arsenic trioxide with a gross weight not to exceed 550 pounds.

(3) Specification 44D (§178.238 of this subchapter). Multiwall paper bags. Where extensible Kraft is used, the minimum total basis weight must be 260 pounds and the outer wall may be no less than 60 pounds basis weight. Bag must have a metal foil inner liner. Net weight not over 50 pounds each. For transportation by vessel, bags must be unitized or containerized. Not authorized for transportation by aircraft. Authorized only for carbamate pesticide mixtures containing not more than 15 percent active ingredient.

(4) [Reserved]

(5) Specification 12B (§178.205 of this subchapter). Fiberboard boxes, with inside wide-mouth, high-density polyethylene jars of 2½-pound capacity with a minimum wall thickness of 0.020 inch, or of 3-pound capacity with a minimum wall thickness of 0.035 inch. Each jar must have a screw-cap closure and not more than six jars are authorized per box. Completed package must meet test requirements of §178.210-10 of this subchapter.

(6) Spec. 12B or 12C (§§178.205 or 178.206 of this subchapter). Fiberboard boxes, with inside containers which must be metal cans not over 25 pounds capacity each; glass bottles not over 1 gallon capacity each; fiber cans or boxes, Spec. 2G (§178.26 of this subchapter); sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each; or paper bags, Spec. 2D (§178.23 of this subchapter). Packages containing glass or earthenware containers must not weigh over 65 pounds gross nor contain more than 4 inside containers of over 5 pints capacity each. Outside containers must be not over 5,000 cubic inches capacity nor contain over 50 pounds net weight each, except as provided in §178.205-23 of this subchapter.

Test: The completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

(7) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with securely closed inside fiberboard or chipboard boxes not over 6 pounds net weight each. Interior containers must be at least .028 inch thick for those not over 2½ pounds net weight each and at least .034 inch thick for others. Outside packages must contain not over 36 pounds net weight of material each.

Test: The individual interior containers as well as the completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

(8) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes with inside paper bags, securely closed and packed within a waterproof duplex bag. Spec. 2J (§178.28 of this subchapter). Net weight not to exceed 100 pounds in one outside box.

(9) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside metal cans not over 25 pounds capacity each; glass or earthenware containers not over 1-gallon capacity each; except that inside containers of not over 5 gallons capacity each and containing not over 25 pounds net weight are authorized when only one inside container is packed in each outside box. Fiber cans or boxes, Spec. 2G (§178.26 of this subchapter), or sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each. Net weight not to exceed 100 pounds in one outside box.

(10) Spec. 16B (§178.193 of this subchapter). Wooden kits lined as prescribed by Spec. 2K (§178.29 of this subchapter). Net weight not over 30 pounds each.

(11) Specification 56 (§178.252 of this subchapter). Metal portable tank. Authorized only for *p-nitrobenzyl bromide*.

(12) Spec. 22A (§178.196 of this subchapter). Plywood drums. Net weight not over 115 pounds each.

(13) Specification 103,[1] 103W, 103A,[1] 103AW, 111A60F1, 111A60W1, 111A60W2, or 111A100F2 (§§179.200, 179.201 of this subchapter). Tank cars.

(14) Specification 21C (§178.224 of this subchapter). Fiber drums. Maximum net weight may not exceed 225 pounds except that a 21C400 fiber drum may have a net weight not exceeding 350 pounds.

(15) Specification 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads need not have a perimeter liner. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having a minimum thickness of 0.004-inch. Not more than 25 pounds net weight of product may be packed in one outside box. Not authorized for transportation by air.

(16) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pounds capacity each. Not more than 4 inside glass bottles of 5 pounds capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210–10 of this subchapter.

(17) Spec. 37P (§178.133 of this subchapter). Steel drums with polyethylene liner (nonreusable container), not over 15-gallons capacity.

§ 173.366 Arsenic (arsenic trioxide) or arsenic acid (solid). (a) Arsenic (arsenic trioxide) or arsenic acid (solid) must be packed in specification containers as follows:

(1) As prescribed in §173.365.

(2) [Reserved]

(b) Import shipments of arsenic (arsenic trioxide) may also be shipped when packed as follows:

(1) Inclosed in strong waterproofed cloth containers, securely sewn and closed so as to provide a sift-proof package, and then packed in strong, tight, metal-strapped wooden boxes constructed of material not less than three-fourths inch thick throughout.

(2) In strong and tight metal drums inclosed in a strong outside wooden barrel.

(3) In tight metal drums of not over 25-gallon capacity and a maximum gross weight of 460 pounds. Drums must be constructed of at least 22-gauge steel.

§ 173.367 Arsenical compounds, n.o.s.; arsenate of lead; calcium arsenate; Paris green; and arsenical mixtures. (a) Arsenical compounds n.o.s., arsenate of lead, calcium arsenate, Paris green, and arsenical mixtures must be packed in specification containers as follows:

(1) As prescribed in §173.365.

(2) Specification 36A or 36B (§§178.230, 178.233 of this subchapter). Triplex bags. Authorized only for arsenical insecticides and fungicides containing 10 percent or less of arsenic trioxide. Not authorized for transportation by air.

(3) Specification 44B (§178.236 of this subchapter). Multiwall paper bags with inside paper bags, Specification 2D (§178.23 of this subchapter). Net weight not over 50 pounds each. Not authorized for transportation by air.

(4) Specification 44C (§178.237 of this subchapter). Multiwall paper bags. For carload and truckload shipments only. Net weight not over 50 pounds each.

(5) Specification 44D (§178.238 of this subchapter). Multiwall paper bags. Where extensible Kraft is used the minimum total basis weight must be 260 pounds and the outer wall may be no less than 60 pounds basis weight. Net weight not over 50 pounds each. Not authorized for transportation by air.

(6) Specification 44E (§178.239 of this subchapter). Multi-wall paper bags constructed with minimum total basis weight of 160 pounds. For carload or truckload shipments only by rail or highway transportation; loaded by the consignor and unloaded by the consignee or his duly authorized agent. Net weight not over 50 pounds each. Where extensible Kraft is used, the minimum total basis weight for 40-pound net weight bags must be 190 pounds and for 20-pound net weight bags it must be 150 pounds. Not authorized for transportation by air or water.

(b) Arsenical compounds n.o.s. containing not more than 6 percent arsenic of which not more than 0.5 percent is water soluble must be packed in specification containers as follows:

(1) As prescribed in paragraph (a)(1), (2) or (3) of this section.

(2) Specification 44B (§178.236 of this subchapter). Paper bags with two added inside thicknesses of No. 1 Kraft paper one sheet having a Mullen test of 50 and the other sheet having a Mullen test of 40. Net weight not over 50 pounds each. Not authorized for transportation by air.

[1] Use of existing cylinders authorized, but new construction not authorized.

§ 173.368 Arsenical dust, arsenical flue dust, and other poisonous noncombustible by-product dusts; also arsenic trioxide, calcium arsenate, and sodium arsenate. (a) Arsenic dust, arsenical flue dust, and other poisonous noncombustible by-product dusts from metal recovery operations not subject to dangerous spontaneous heating, and arsenic trioxide, calcium arsenate, or sodium arsenate, when delivery is made to plants with private sidings only, may, in addition to packagings prescribed in §173.367, be shipped in bulk in the following kinds of transport vehicles, if those transport vehicles are assigned exclusively to this type of service;

(1) Sift-proof, self-clearing, hopper or bottom outlet steel cars.

(2) Sift-proof, all steel flat bottom gondola cars with fixed sides and ends equipped with waterproof and dustproof wooden or steel covers well secured in place for all openings.

(3) Sift-proof box cars of all steel construction, or

(4) "Sift-proof, self-clearing, hopper-type or dump-type motor vehicles having bodies with waterproof and dust-proof covers well secured in place.";

(b) Transport vehicles assigned exclusively to this service must be marked "ARSENICAL SERVICE ONLY," in addition to other required markings, and are not subject to §174.615 or §177.841 of this subchapter while in that service.

§ 173.369 Carbolic acid (phenol), not liquid. (a) Carbolic acid (phenol), not liquid must be packed in specification containers as follows:

(1) Spec. 5, 5A, 5B, 5C, 6B, or 6C (§§178.80, 178.81, 178.82, 178.83, 178.98, or 178.99 of this subchapter). Metal barrels or drums.

(2) [Reserved]

(3) [Reserved]

(4) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with inside containers which must be metal cans not over 25 pounds capacity each.

(5) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes with glass or earthenware inside containers not over 1 quart capacity each, or with metal inside containers not over 1 gallon capacity each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross; packages containing metal cans not over 84 pounds gross as provided in §178.205–23 of this subchapter, 65 pounds for others.

(6) Spec. 12D (§178.207 of this subchapter). Fiberboard boxes with inside containers which must be: Glass or earthenware not over 1 gallon or 5 pounds capacity each; authorized for not more than 75 pounds gross weight, not to contain more than 4 such inside containers if their capacity is greater than 5 pints each.

(7) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon or 5 pounds capacity each, except that inside containers not over 3 gallons or 15 pounds capacity each are authorized when only 1 is packed in each outside box; or with inside metal containers not over 10 gallons capacity each.

(8) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§178.25 of this subchapter). Net weight not to exceed 250 pounds in one outside box.

(9) Spec. 17E or 17H (§178.116 or §178.118 of this subchapter). Metal drums (single-trip).

(10) [Reserved]

(11) Specification 37A or 37B (§§178.131, 178.132 of this subchapter). Metal drums (single-trip). Not authorized for transportation by air.

(12) Specification 42B (§§178.107 of this subchapter). Aluminum drums.

(13) Specification 103,[1] 103W, 103ALW, 103A,[1] 103AW, 103A-ALW, 111A60ALW1, 111A60F1, 111A60W1, 111A60W2, 111A100F2, or 115A60W6 (§§179.200, 179.201, 179.220, 179.221 of this subchapter). Tank cars.

(i) Tank cars must not be entirely filled. Sufficient interior space must be left vacant to prevent leakage from or distortion due to the contents liquefying and expanding from increase of temperature during transit.

(ii) Solid phenol must not be loaded into domes of tank cars.

(iii) In tank cars, outage must be calculated to percentage of the total capacity of the tank, i.e., shell and dome capacity combined. If the dome of the tank car does not provide sufficient outage, then vacant space must be left in the shell to make up the required outage.

(iv) The outage for tank cars must not be less than one percent.

(14) Specifications MC 300, MC 301, MC 302, MC 303, MC 305, MC 306, MC 307, MC 310, MC 311, or MC 312 (§§178.341, 178.342, 178.343 of this subchapter). Cargo tanks.

(i) No cargo tank or compartment thereof shall be completely filled; sufficient space shall be left vacant in every case to prevent leakage from or distortion of any such cargo tank by expansion of

the contents due to rise in temperature in transit, and such free space (outage) shall be sufficient in every case so that such cargo tank shall not become entirely filled with the commodity at 130° F.

(15) Spec. 12A (§178.210 of this subchapter). Fiberboard boxes with inside glass, polyethylene, or other nonfragile plastic bottles not over 5 pounds capacity each. Not more than 4 inside glass bottles of 5 pounds capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by §178.210-10 of this subchapter.

(16) Spec. 21C (§178.224 of this subchapter). Fiber drums with not more than one inside metal container, Spec. 2A (§178.20 of this subchapter), having maximum net weight of 50 pounds.

(b) Carbolic acid (phenol), not liquid, in tightly closed inside packagings, securely cushioned when necessary to prevent breakage and packaged as follows, is excepted from the specification packaging requirements of this part.

(1) In inside glass, earthenware, polyethylene or other nonfragile plastic bottles or jars not over 1 pound capacity each, or metal containers not over 5 pounds capacity each, packed in outside wooden boxes, barrels or kegs, or fiberboard boxes. Net weight of contents in fiberboard boxes shall not exceed 65 pounds; and not more than 100 pounds in wooden boxes, barrels or kegs.

§ 173.370 Cyanides and cyanide mixtures, dry. (a) Cyanides and cyanide mixtures, dry, except cyanide of calcium and mixtures thereof, unless otherwise provided for in this section, if containing the cyanide equivalent of 10 percent or more of potassium cyanide, must be packaged as follows:

(1) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§178.25 of this subchapter), not over 25 pounds capacity each; or hermetically sealed (soldered) metal lining, Spec. 2F (§178.25 of this subchapter), or in glass bottles not over 5 pounds capacity each.

(2) Specification 12B40 (§178.205 of this subchapter). Fiberboard box with inside polyethylene bottles having a minimum thickness of 0.030-inch and not over 5-pound capacity each. Maximum net weight of contents must not exceed 25 pounds per box.

(3) Spec. 12B or 12C (§§178.205 or 178.206 of this subchapter). Fiberboard boxes with metal inside containers, Spec. 2F (§178.25 of this subchapter) not over 25 pounds capacity each.

(4) Spec. 5, 5A, 5B, 6B or 6C (§§178.80, 178.81, 178.82, 178.98, 178.99 of this subchapter). Metal barrels or drums.

(5) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter), metal drums (single-trip containers).

(6) Bulk in watertight metal cars or in watertight container car metal containers.

(7) Spec. 17H (§178.118 of this subchapter) metal drums. Gross weight not over 450 pounds.

(8) Specification 45B (§178.240 of this subchapter). Bags, cloth, and paper, lined. Authorized only for sodium cyanides of globular or pellet form, diameter not less than ¾-inch. Net weight not over 100 pounds. Not authorized for transportation by air.

(9) Bulk in watertight metal-bodied covered motor vehicles.

(10) [Reserved]

(11) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 225 pounds.

(12) Specification 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads may not require perimeter liner. Products must be contained within a tightly closed polyethylene or other equally efficient plastic container constructed of material having minimum thickness of 0.004-inch. Not more than 25 pounds net weight of product may be packed in one outside box. Not authorized for transportation by air.

(13) Bulk in strong, water-tight, metal portable containers of not over 70 cubic feet capacity each and approved by the Director, OHMT.

(b) **Exceptions for cyanides, and cyanide mixtures, except cyanide of calcium and mixtures thereof.** Cyanides and cyanide mixtures, except cyanide of calcium and mixtures thereof, when described and packaged as follows, are excepted from the specification packaging requirements of this part:

(1) Cyanides, or cyanide mixtures, in tightly closed glass, earthenware, metal, or polyethylene inside containers, not over 1 pound each, securely cushioned and packed in outside wooden or fiberboard boxes, or in wooden barrels. Net weight of cyanides or cyanide mixtures in any outside container, not over 25 pounds.

(2) Cyanide mixtures in tightly closed glass, earthenware, or metal inside containers, securely cushioned and packed in outside wooden or fiberboard boxes, or in wooden barrels. Net weight of cyanide mixtures in any outside container not over 5 pounds.

(3) Cyanides of copper, zinc, lead, and silver are excepted from all packaging requirements except §§173.24 and 173.363.

(c) **Cyanide of calcium and mixtures thereof.** Cyanide of calcium and mixtures thereof must be packed in specification containers as follows:

(1) As prescribed in paragraph (a)(2), (3), (4), (6), (9), or (11) of this section.

(2) Specification 15A, 15B, 15C, or 19B (§§178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§178.25 of this subchapter) not over 25 pounds capacity each; or hermetically sealed (soldered) metal lining, Spec. 2F (§178.25 of this subchapter).

(3) Spec. 37A or 37B (§178.131 or §178.132 of this subchapter), metal drums (single-trip containers); welded side seams required for Spec. 37B drums and all seams and closures must be watertight and hermetically sealed.

(d) **Exceptions for cyanide of calcium and mixtures thereof.** Cyanide of calcium and mixtures thereof, when described and packaged as follows, are excepted from the specification packaging requirements of this part.

(1) Cyanide of calcium and mixtures thereof in tightly closed metal inside containers having not over 1 pound net weight each, or metal cans having not over 5 pounds net weight each. Not more than 25-1-pound containers or more than 1-5-pound container securely cushioned may be packed in the outside container which must be wooden or fiberboard boxes, or wooden barrels.

§ 173.371 Dinitrobenzol (dinitrobenzene). (a) Dinitrobenzol must be packaged as follows:

(1) As prescribed in §173.346 or §173.365 according to its physical form at 130° F. (55° C.).

§ 173.372 Mercury bichloride (mercuric chloride). (a) Mercury bichloride (mercuric chloride) must be packed in specification containers as follows:

(1) As prescribed in §173.365.

(2) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes with inside strong paper bags in tightly closed inside wooden boxes.

§ 173.373 Ortho-nitroaniline and paranitroaniline. (a) Ortho-nitroaniline and paranitroaniline must be packed in specification containers as follows:

(1) As prescribed in §173.365.

(2) [Reserved]

(3) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 400 pounds.

(4) In addition to specification containers prescribed in this section, paranitroaniline may be shipped by highway in bulk in strong, watertight, metal bodied covered hopper motor vehicles.

(5) Specification 56 (§178.252 of this subchapter). Metal portable tank. Authorized for para-nitroaniline only. For rail transportation see §174.63 of this subchapter.

(6) Specification MC 304, MC 307, MC 310, MC 311, or MC 312 (§§178.340, 178.342, 178.343 of this subchapter). *Cargo tanks.* If the cargo tank is constructed with bottom outlets, they must meet §§178.342-5(a) and 178.343-5 of this subchapter. Cargo tank must be insulated and have a steel inner tank. Authorized only for ortho-nitroaniline loaded in a liquefied state at a temperature not over 180 F. Not authorized for transportation by water.

§ 173.374 Nitrochlorobenzene, meta or para. (a) Nitrochlorobenzene, meta or para, must be packed in specification containers as follows:

(1) As prescribed in §173.365.

(2) Specification 21C (§178.224 of this subchapter). Fiber drums. Authorized only for nitrochlorobenzene, para, flaked. Net weight not to exceed 400 pounds.

(3) Spec. 17E (§178.116 of this subchapter). Metal drums (single-trip).

(4) Specification MC-312 (§178.343 of this subchapter). Insulated cargo tank equipped with heating coils. Authorized only for nitrochlorobenzene, para, solid. Not authorized for transportation by water.

(5) Specification 105A400W, 112A400W or 114A400W (§§179.100, 179.101 of this subchapter). Tank cars.

§ 173.375 Sodium azide. (a) Sodium azide must be packed in specification containers as follows:

(1) Specification 15A or 19B (§§178.168, 178.191 of this subchapter). Wooden boxes, with inside paper bags, securely closed, packed within a waterproof duplex bag, Spec. 2J (§178.28 of this subchapter). Net weight not to exceed 100 pounds in one outside box.

(2) Specification 21C (§178.224 of this subchapter). Fiber drums with inside polyethylene moisture barrier. Maximum net weight may not exceed 115 pounds.

(3) Specification 56 (§178.252 of this subchapter). Stainless steel portable tank designed for top loading and unloading only. Tanks may be equipped with a bottom clean out plug. No part of the tank or fittings that come in contact with the sodium azide may contain any metal such as copper, lead, silver or mercury which can form explosive azide com-

pounds. Each transport vehicle must be loaded by the consignor and unloaded by the consignee or by persons trained by the consignor. Not authorized for transportation by water.

§ 173.376 Aldrin and aldrin mixtures, dry, with more than 65 percent aldrin. (a) Aldrin and aldrin mixtures, dry, with more than 65 percent aldrin, must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

§ 173.377 Hexaethyl tetraphosphate mixtures; methyl parathion mixtures; organic phosphorus compound mixtures; organic phosphate compound mixtures; parathion mixtures; tetraethyl dithio pyrophosphate mixtures; and tetraethyl pyrophosphate mixtures, dry. (a) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures in which the liquid is absorbed in concentrations greater than 2 percent but not exceeding 27 percent in an inert dry material so as to form a dry mixture, must be packed in specification containers as follows:

(1) Specification 12B or 12C (§178.205 or §178.206 of this subchapter), fiberboard boxes, with inside containers which must be metal or fiber cans not over 12 pounds capacity each, or paper bags, Spec. 2D, (§178.23 of this subchapter), not over 20½ pounds capacity each. Fiberboard boxes manufactured and marked for a gross weight of 65 pounds may have a gross weight of 70 pounds provided net weight of contents does not exceed 62 pounds. Inside containers and the completed package must be capable of withstanding the tests prescribed in paragraphs (c), (d), and (e) of this section.

(2) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter), wooden boxes with inside metal or fiber cans not over 12 pounds capacity each, or paper bags, Spec. 2D (§178.23 of this subchapter), not over 20½ pounds capacity each. Inside containers must be capable of withstanding the tests prescribed in paragraphs (c) and (d) of this section.

(3) Spec. 5, 5B, or 6C (§§178.80, 178.82, 178.99 of this subchapter), Metal barrels or drums.

(4) Spec. 17C, 17H or 37A (§§178.115, 178.118, or 178.131 of this subchapter), metal drums (sing'e-trip). Spec. 37A metal drums authorized for not over 100 pounds net weight.

(5) Spec. 21C (§178.224 of this subchapter). Fiber drums. Authorized net weight not over 250 pounds.

(b) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures in which the liquid is absorbed in concentrations greater than 27 percent in an inert dry material so as to form a dry mixture, must be packed in specification containers as follows:

(1) Spec. 12B or 12C (§§178.205 or 178.206 of this subchapter), fiberboard boxes, with inside containers which must be metal cans not over 12 pounds capacity each. Inside containers and the completed package must be capable of withstanding the tests prescribed in paragraphs (c), and (e) of this section.

(2) Specification 15A, 15B, or 19B (§§178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal cans not over 12 pounds capacity each. Inside containers must be capable of withstanding the tests prescribed in paragraph (c) of this section.

(3) Spec. 5, 5B or 6C (§§178.80, 178.82, 178.99 of this subchapter). Metal barrels or drums.

(4) Spec. 17C, 17H, or 37A (§§178.115, 178.118, or 178.131 of this subchapter), metal drums (sing'e-trip). Spec. 37A metal drums authorized for not over 100 pounds net weight.

(5) Specification 21C (§178.224 of this subchapter). Fiber drums. Authorized only for mixtures in which the liquid is absorbed in concentration not greater than 55 percent. Maximum net weight may not exceed 225 pounds.

(6) Specification 12B (§178.205 of this subchapter). Fiberboard box, with inside Specification 2D (§178.23 of this subchapter) paper bags not over 5-pound capacity each and having an additional foil liner. Completed package may not exceed 65 pounds gross weight and must meet the test requirements of paragraphs (d) and (e) of this section. Authorized only for mixtures in which the liquid is absorbed in concentrations no greater than 67 percent.

(c) Inside metal or fiber cans when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be on side of can and the other diagonally on the top rim or chime.

(d) Inside paper bags when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be made on bottom of bag and the other on either large face.

(e) Completed packages when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be made on bottom of package and the other drop on the smallest adjacent side area.

(f) Dry mixtures containing not more than 2 percent by weight of hexaethyl tetraphosphate, methyl parathion, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate and in which the liquid is absorbed in an inert material, are excepted from specification packaging requirements of this part.

(g) Dry mixtures containing more than 2 percent but not exceeding 15 percent by weight of hexaethyl tetraphosphate, methyl parathion mixture, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a) and (b) of this section, may be packed in specification containers as follows:

(1) Spec. 44B (§178.236 of this subchapter). Multiwall paper bags with inside paper bags, Spec. 2D (§178.23 of this subchapter), not over 5 pounds capacity each. Net weight of material in outside container not over 30 pounds each. Not authorized for transportation by air.

(2) Spec. 12B (§178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and top and bottom pad of at least 275-pound test fiberboard. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having minimum thickness of 0.003 inch. Not more than 50 pounds net weight of product may be packed in one outside box.

(h) Dry mixtures containing more than 2 percent but not exceeding 5 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a), (b), and (g) of this section, may be packed in specification containers as follows:

(1) Spec. 44D (§178.238 of this subchapter). Multiwall paper bags not over 50 pounds net weight each. Where extensible kraft is used the minimum total basis weight shall be 260 pounds. Not authorized for transportation by air.

(i) Dry mixtures containing more than 2 percent but not exceeding 12 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a), (b), and (g) of this section, may be packed in specification containers as follows:

(1) Spec. 44D (§178.238 of this subchapter). Multiwall paper bags not over 50 pounds net weight each. Outer ply to be not less than 60 pounds basis weight. Not authorized for transportation by air.

(j) Dry mixtures containing more than 2 percent but not exceeding 16.5 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a) and (b) of this section, may be packed in specification containers as follows:

(1) Specification 44B (§178.236 of this subchapter). Multiwall paper bags having not more than 5 Specification 2D (§178.23 of this subchapter) inner bags, each fabricated with a foil liner and containing not more than ten pounds net weight. Maximum net weight of material in each outside container may not exceed 50 pounds. For water transportation, the material must also be in containers as prescribed in paragraph (j)(4) of this section or palletized and unit packed as prescribed in subparagraph (5) of this section. Not authorized for transportation by air.

(2) Specification 44D (§178.238 of this subchapter). Multiwall paper bags consisting of 6-ply extensible kraft paper having a minimum total basis weight of 300 pounds. Bags must have a metal foil inner liner and contain not over 60 pounds net weight. For transportation by water, material must be in containers as prescribed in paragraph (j)(4) of this section or palletized and unit packed as prescribed in paragraph (j)(5) of this section. Not authorized for transportation by air.

(3) Specification 44D (§178.238 of this subchapter). Multiwall paper bags consisting of a 5-ply extensible kraft paper having a minimum total basis weight of 300 pounds. Bags may have outer sheet of 60-pound kraft in place of 70-pound basis weight but must have a metal foil inner liner. Maximum net weight may not exceed 54 pounds each. For transportation by water, material must be in containers as prescribed by paragraph (j)(4) of this section or palletized and unit packed as prescribed by paragraph (j)(5) of this section. Not authorized for transportation by air.

(4) Containers must be loaded and sealed at the shipper's plant or warehouse and unsealed and unloaded only at the ultimate destination, unless the Coast Guard Captain of the Port desires to inspect the containers at his Port.

(5) Pallets must be designed to accommodate straps. The bags, fully enclosed by fiberboard or plastic film must be securely strapped to the pallet. The layer or layers of fiberboard or plastic film must fully protect the bags from excessive stress concentration caused by the strapping and normal handling loads.

§ 173.379 Cyanogen bromide. Cyanogen bromide must be packaged in tightly closed metal inside containers not over 1-pound

capacity each, securely cushioned and packaged in an outside wooden box. Net weight may not exceed 25 pounds in one outside packaging.

§ 173.381 Irritating materials; definition and general packaging requirements. (a) For the purpose of Parts 170–189 of this subchapter, an irritating material is a liquid or solid substance which upon contact with fire or when exposed to air gives off dangerous or intensely irritating fumes, such as brombenzylcyanide, chloroacetophenone, diphenylaminechloroarsine, and diphenylchloroarsine, but not including any poisonous material. Class A.

(b) **Cushioning.** All packagings must be hermetically closed. Inside packagings must be cushioned as prescribed when necessary to prevent breakage or leakage.

(c) **Outage.** No packaging used for the transportation of any liquid irritating material may be completely filled. For packagings with a capacity of 110 gallons or less, sufficient outage must be provided so the packaging will not be liquid full at 130° F. (55° C.).

(d) The transportation of an irritating material is not permitted if there is any type of interconnection between packagings.

(e) Any pressure in a cylinder at 130° F. (55° C.) must not exceed ⅔ the marked service pressure of the cylinder.

§ 173.382 Irritating materials, not specifically provided for. (a) Irritating materials, as defined in § 173.381 for which special packaging is not otherwise prescribed, except as provided in paragraph (b) of this section, must be packaged as follows:

(1) Spec. 5, 5A, 5B or 5C (§§ 178.80, 178.81, 178.82 or 178.83 of this subchapter) metal barrels or drums; or spec. 17C (sing'e-trip) (§ 178.115 of this subchapter) metal drums not over 5 gallons capacity each.

(2) Spec. 6B or 6C (§§ 178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers not over 1-gallon capacity each. Net weight not to exceed 80 pounds in one outside box.

(4) Cylinders as prescribed for any compressed gas, except acetylene, are also authorized for use. These cylinders must be qualified, maintained, and filled in accordance with §§ 173.34 and 173.301(g), if used for material with pressure exceeding 25 pounds per square inch at 70° F., they must also be retested as required by § 173.34.

(b) Chloroacetophene, diphenylaminechloroarsine, irritating material, n.o.s., or xylyl bromide, charged with a nonflammable gas exceeding 25 psig at 70° F. must be packaged as specified in paragraph (a)(4) of this section.

§ 173.383 Chemical ammunition. (a) Chemical ammunition consisting of projectiles, shells, bombs, or other containers, except grenades, filled with an irritating material without ignition elements, bursting charges, detonating fuzes, or other explosive components, must be packaged for shipment in strong outside wooden or metal boxes. Boxes must be marked with name of contents and labeled as prescribed in this part for gases, liquids, or chemicals contained therein.

(b) Chemical ammunition, when shipped as such, must not be equipped or packed with explosive or ignition elements (see §§ 173.53(f) and 173.59 for explosive chemical ammunition).

§ 173.384 Monochloroacetone, stabilized. (a) Monochloroacetone, stabilized, must be packed in specification containers as follows:

(1) Specification 5, 5A, or 17C (sing'e-trip) (§§ 178.80, 178.81, 178.115 of this subchapter). Metal barrels or drums.

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in metal cans hermetically sealed or with covers securely taped. The metal cans must be in corrugated fiberboard cartons, Specification 2C (§ 178.22 of this subchapter). Bottles must not contain more than 1 pound of liquid each, must not be filled to more than 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least one-half inch of absorbent material. Cans must be made of metal at least 32-gauge U.S. Standard. The total amount of liquid per package must not exceed 24 pounds.

§ 173.385 Tear gas grenades, tear gas candles, or similar devices. (a) Tear gas grenades, tear gas candles, or similar devices containing lachrymatory (tear producing) substances, for civil or military use must be packed in specification containers as follows (see § 173.101(d) and (e) for packing tear gas cartridges):

(1) Specification 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter). Metal-strapped wooden boxes. Functioning elements not assembled in grenades or devices must be in a separate compartment of these boxes, or in inside or separate outside boxes, Spec. 15A, 15B, 15C, or 19B and must be so packed and cushioned that they may not come in contact with each other or with the walls of box during transportation. Not more than 50 grenades and 50 functioning devices shall be packed in one box and the gross weight of the outside box must not exceed 75 pounds.

(2) Spec. 37A (§ 178.131 of this subchapter). Metal drum (sing'e-trip). Functioning elements must be packed in separate compartment. Not more than 24 grenades and 24 functioning devices shall be packed in one outside container and the gross weight of the container must not exceed 75 pounds.

(3) Specification 12B (§ 178.205 of this subchapter). Fiberboard box with inside tear gas devices meeting Specifications 2P or 2Q (§§ 178.33, 178.33a of this subchapter). Each inside container must be placed into spiral wound tubes fitted with metal ends or a double-faced fiberboard box with suitable padding. Not more than 30 inside containers shall be placed in one outside box and gross weight shall not exceed 35 pounds.

(b) These articles may not be assembled with or packed in the same compartment with mechanically or manually operated firing, igniting, bursting, or other functioning elements, unless of a type or design examined by the Bureau of Explosives and approved by the Director, OHMT.

(c) No shipment of packages containing articles under this section may be made until samples thereof have been examined by the Bureau of Explosives or examined under their supervision, and approved by the Director, OHMT.

Note 1: Grenades or other similar devices may be shipped completely assembled when offered by or consigned to the U.S. Department of Defense, provided the functioning element is so packed that it cannot accidentally function. The outside containers must be metal strapped wooden boxes, Spec. 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter).

§ 173.386 Etiologic agents; definition and scope. (a) **Definition.** For the purpose of Parts 170–189 of this subchapter:

(1) An "etiologic agent" means a viable microorganism, or its toxin, which causes or may cause human disease, and is limited to those agents listed in 42 CFR 72.3 of the regulations of the Department of Health and Human Services.

(2) A "diagnostic specimen" means any human or animal material including, but not limited to, excreta, secreta, blood, and its components, tissue, and tissue fluids, being shipped for purposes of diagnosis.

(3) A "biological product" means a material prepared and manufactured in accordance with the provisions of 9 CFR Part 102 (Licensed veterinary biological products), 21 CFR Part 601 (Licensing), 21 CFR § 312.1 (Conditions for exemption of new drugs for investigational use), 9 CFR Part 103 (Biological products for experimental treatment of animals), or 21 CFR § 312.9 (New drugs for investigational use in laboratory research animals or in vitro tests), and which in accordance with these provisions, may be shipped in interstate commerce.

(b) **Applicability.** Except as provided in paragraph (d), no person may ship any material, including a diagnostic specimen or a biological product, containing an etiologic agent unless this material is packaged and prepared for shipment in accordance with § 173.24 and the other applicable regulations of this subchapter.

(c) **General provisions.** The requirements of these regulations (Parts 170–189 of this subchapter) supplement the requirements of the Department of Health and Human Services' regulations contained in 42 CFR Part 72.

(d) **Exceptions.** The following substances are not subject to any requirements of this subchapter if the items as packaged do not contain any material otherwise subject to the requirements of Parts 170–189 of this subchapter:

(1) Diagnostic specimens.

(2) Biological products.

(3) Cultures of etiologic agents of 50 milliliters (1.666 fluid ounces) or less total quantity in one outside package.

§ 173.387 Packaging requirements for etiologic agents. (a) Except as provided in § 173.386(d) no person may ship a package containing over 4 liters gross volume of an etiologic agent.

(b) In addition to the requirements of 42 CFR Part 72, each package containing an etiologic agent must be designed and constructed so that, if it were subject to the environment and test condition prescribed in this section, there would be no release of the contents to the environment, and the effectiveness of the packaging would not be significantly reduced.

(1) Environmental conditions.

(i) Heat—direct sunlight in an ambient temperature of 130° F. in still air.

(ii) Cold—an ambient temperature of −40° F. in still air and shade.

(iii) Reduced pressure—ambient atmospheric pressure of 0.50 atmosphere (7.3 p s i a.).

(iv) Vibration—vibration normally incident in the mode of transportation the package is to be shipped.

(2) Test conditions.

(i) Water spray—a water spray heavy enough to keep the entire exposed surface of the package (except the bottom) continuously wet during a period of 30 minutes. Packages for which the outer layer consists of metal, wood, ceramic, or plastic, or combination thereof, are exempt from this test.

(ii) Freedrop—a freedrop through a distance of 30 feet onto a flat, essentially unyielding horizontal target surface, the package striking the surface in a position for which maximum damage is expected.

(iii) Penetration—impact of the hemispheric end of a steel cylinder 1.25 inches in diameter and weighing 15 pounds, dropped from a

height of 40 inches on to the exposed surface of the package expected to be most vulnerable to puncture. The long axis of the cylinder must be perpendicular to the impacted surface. This test is not required for a package subject to Paragraph (b)(2)(iv) of this section.

(iv) Penetration (required for packages exceeding 15 pounds gross weight only)—a freedrop of the package through a distance of 40 inches, striking the top end of a vertical cylindrical mild steel solid bar on an essentially unyielding surface, in a position for which maximum damage is expected. The bar must be 1.5 inches in diameter. The top of the bar must be horizontal, with its edge rounded to a radius not exceeding one-quarter inch. The bar must be of such length as to cause maximum damage to the package, but not less than 8 inches long. The long axis of the bar must be vertical to the unyielding horizontal impact surface of the package.

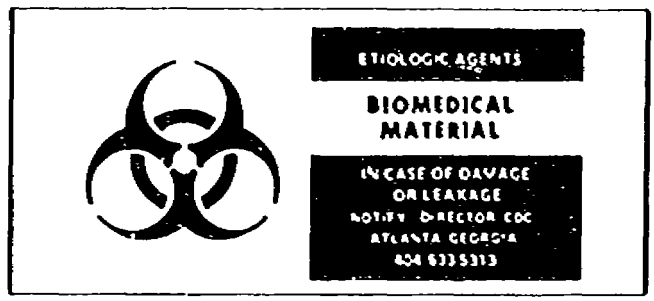
(3) Testing procedure.

(i) At least one sample of each type package (maximum size and gross weight), filled with water, must be subjected to the water spray test unless exempted by paragraph (b)(2)(i) of this section.

(ii) This sample package then must be given the freedrop and one of the penetration tests, as applicable. Separate wetted sample packages may be used for the freedrop and the penetration test.

(iii) If the sample package is exempted from the water spray test by paragraph (b)(2)(i) of this section, at least one sample of each type package (maximum size and gross weight), filled with water, must be subjected consecutively to the freedrop and the penetration test.

§ 173.388 Labeling of packages containing etiologic agents. (a) Each package containing an etiologic agent, except a diagnostic specimen or a biological product, must be labeled as prescribed by the regulations of the Department of Health and Human Services, 42 CFR § 72.3(d). For information, this label is required to be a rectangle measuring 51 mm. (2 inches) high and 102.5 mm (4 inches) long, predominantly red printing on a white background, and appears as follows:



SUBPART I

RADIOACTIVE MATERIALS

§ 173.401 Scope. (a) This subpart sets forth requirements for the transportation of radioactive materials by carriers and shippers subject to this subchapter. The requirements prescribed in this subpart are in addition to, but not in lieu of, other requirements set forth in this subchapter and in 10 CFR Part 71 for the packaging and transportation of radioactive materials.

(b) This subpart does not apply to:

(1) Radioactive materials produced, used, transported, or stored within an establishment other than during the course of transportation.

(2) Radioactive materials contained in a medical device, such as a heart pacemaker, which is implanted in a human being or live animal.

(3) Radiopharmaceuticals that have been injected into, or ingested by, and are still in human beings or live animals.

§ 173.403 Definitions. In this subpart:

(a) "A_1" means the maximum activity of special form radioactive material permitted in a Type A package.

(b) "A_2" means the maximum activity of radioactive material, other than special form or low specific activity radioactive material, permitted in a Type A package. These values are either listed in § 173.435 or may be derived in accordance with the procedure prescribed in § 173.433.

(c) "Closed transport vehicle" means a transport vehicle equipped with a securely attached exterior enclosure that during normal transportation restricts the access of unauthorized persons to the cargo space containing the radioactive materials. The enclosure may be either temporary or permanent, and in the case of packaged materials may be of the "see-through" type, and must limit access from top, sides, and ends.

(d) "Containment system" means the components of the packaging intended to retain the radioactive contents during transportation.

(e) "Conveyance" means:

(1) For transport by public highway or rail: any transport vehicle or large freight container;

(2) For transport by vessel: any vessel, or any hold, compartment, or defined deck area of a vessel; and

(3) For transport by aircraft: any aircraft.

(f) "Depleted uranium" means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.

(g) "Design" means the description of a special form material, a package, or a packaging, that enables those items to be fully identified. The description may include specifications, engineering drawings, reports showing compliance with regulatory requirements, and other relevant documentation.

(h) "Enriched uranium" means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.

(i) "Exclusive use" (also referred to in other regulations as "sole use" or "full load") means the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. Any loading or unloading must be performed by personnel having radiological training and resources appropriate for safe handling of the consignment. Specific instructions for maintenance of exclusive use shipment controls must be issued in writing and included with the shipping paper information provided to the carrier by the consignor.

(j) "Fissile material" means any material consisting of or containing one or more fissile radionuclides. Fissile radionuclides are plutonium-238, plutonium-239, plutonium-241, uranium-233 and uranium-235. Neither natural nor depleted uranium are fissile material. Fissile materials are classified according to the controls needed to provided nuclear criticality safety during transportation, as provided in § 173.455. Certain exclusions are provided in § 173.453.

(k) "Freight container" means a reusable container having a volume of 1.81 cubic meters (64 cubic feet) or more, designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages in unit form during transportation. A small freight container is one which has either one outer dimension less than 1.5 meters (4.9 feet) or an internal volume of not more than 3.0 cubic meters (106 cubic feet). All other are designated as "large freight containers."

(l) "Highway route controlled quantity" means a quantity within a single package which exceeds:

(1) 3000 times the A_1 value of the radionuclides as specified in § 173.433 for special form radioactive material;

(2) 3000 times the A_2 value of the radionuclides as specified in § 173.433 for normal form radioactive material; or

(3) 30,000 curies, whichever is least.

(m) "Limited quantity of radioactive material" means a quantity of radioactive material not exceeding the material's package limits specified in § 173.423 and which conform with requirements specified in § 173.421.

(n) "Low specific activity material (LSA)" means any of the following:

(1) Uranium or thorium ores and physical or chemical concentrates of those ores.

(2) Unirradiated natural or depleted uranium or unirradiated natural thorium.

(3) Tritium oxide in aqueous solutions provided the concentration does not exceed 5.0 millicuries per milliliter.

(4) Material in which the radioactivity is essential uniformly distributed and in which the estimated average concentration of contents does not exceed:

(i) 0.0001 millicurie per gram of radionuclides for which the A_2 quantity is not more than .05 curie;

(ii) 0.005 millicurie per gram of radionuclides for which the A_2 quantity is more than .05 curie, but not more than 1 curie; or

(iii) 0.3 millicurie per gram of radionuclides for which the A_2 quantity is more than 1 curie.

(5) Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioctive material is not readily dispersible and the surface contamination, when averaged over an area of 1 square meter, does not exceed 0.0001 millicurie (220,000 disintegrations per minute) per square centimeter of radionuclides for which the A_2 quantity is not more than .05 curie, or 0.001 millicurie (2,200,000 disintegrations per minute) per square centimeter for other radionuclides.

(o) "Multilateral approval" means approval by both the appropriate competent authority of the country of origin and of each country through or into which the shipment is to be transported. This definition does not imply approval from countries over which radioactive materials are carried in aircraft, if there is no scheduled stop in that country.

(p) "Natural thorium" means thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium-232).

(q) "Natural uranium" means uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235 and the remainder essentially uranium-238).

(r) "Non-fixed radioactive contamination" means radioactive contamination that can be readily removed from a surface by wiping with an absorbent material. Non-fixed (removable) radioactive contamination is not significant if it does not exceed the limits specified in § 173.443.

(s) "Normal form radioactive material" means radioactive material which was not been demonstrated to qualify as "special form radioactive material."

(t) "Package" means, for radioactive materials, the packaging together with its radioactive contents as presented for transport.

(u) "Packaging" means, for radioactive materials, the assembly of components necessary to ensure compliance with the packaging requirements of this subpart. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The conveyance, tie-down system, and auxiliary equipment may sometimes be designated as part of the packaging.

(v) "Radiation level" means the radiation dose-equivalent rate expressed in millirem per hour (mrem/h). Neutron flux densities may be converted into radiation levels according to Table 1:

TABLE 1.—NEUTRON FLUX DENSITIES TO BE REGARDED AS EQUIVALENT TO A RADIATION LEVEL OF 1 MILLIREM PER HOUR (MREM/H)[1]

Energy of neutron	Flux density equivalent to 1 mrem/h (Neutrons per square centimeter per second) (n/cm² s)
Thermal	268 0
5 keV	228 0
20 keV	112 0
100 keV	32 0
500 keV	12 0
1 MeV	7 2
5 MeV	7 2
10 MeV	6 8

[1] Flux densities equivalent for energies between those listed above may be obtained by linear interpolation.

(w) "Radioactive article" means any manufactured instruments and articles such as an instrument, clock, electronic tube or apparatus, or similar instruments and articles having radioactive material as a component part.

(x) "Radioactive contents" means the radioactive material, together with any contaminated liquids or gases, within the package.

(y) "Radioactive material" means any material having a specific activity greater than 0.002 microcuries per gram (uCi/g) (see definition of "specific activity").

(z) "Special form radioactive material" means radioactive material which satisfies the following conditions:

(1) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

(2) The piece or capsule has at least one dimension not less than 5 millimeters (0.197 inch); and

(3) It satisfies the test requirements of § 173.469. Special form encapsulations designed in accordance with the requirements of § 173.389(g) in effect on June 30, 1983, and constructed prior to July 1, 1985 may continue to be used. Special form encapsulations either designed or constructed after June 30, 1985 must meet the requirements of this paragraph.

(aa) "Specific activity" of a radionuclide, means the activity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the activity per unit mass of the material.

(bb) "Transport index" means the dimensionless number (rounded up to the first decimal place) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined as follows:

(1) The number expressing the maximum radiation level in millirem per hour at one meter (3.3 feet) from the external surface of the package; or

(2) For Fissile Class II packages or packages in a Fissile Class III shipment, the number expressing the maximum radiation level at one meter (3.3 feet) from the external surface of the package, or the number obtained by dividing 50 by the allowable number of packages which may be transported together, whichever is larger.

(cc) "Type A package" means a Type A packaging together with its limited radioactive contents. A Type A package does not require competent authority approval, since its contents are limited to A_1 or A_2.

(dd) "Type B package" means a Type B packaging together with its radioactive contents.

(ee) "Type B(M) package" means a Type B packaging, together with its radioactive contents, that for international shipments requires multilateral approval of the package design, and may require approval of the conditions of shipment. Type B(M) packages are those Type B package designs which have a maximum normal operating pressure of more than 7 kilograms per square centimeter (100 pounds per square inch) gauge or a relief device which would allow the release of radioactive material to the environment under the hypothetical accident conditions specified in 10 CFR Part 71.

(ff) "Type B(U) package" means a Type B packaging, together with its radioactive contents, that for international shipments, requires unilateral approval only of the package design and of any stowage provisions that may be necessary for heat dissipation.

(gg) "Type A packaging" means a packaging designed to retain the integrity of containment and shielding required by this part under normal conditions of transport as demonstrated by the tests set forth in §§ 173.465 or 173.466, as appropriate.

(hh) "Type B packaging" means a packaging designed to retain the integrity of containment and shielding required by this part when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR Part 71.

(ii) "Uncompressed gas" means, for the purpose of this subpart, gas at a pressure not exceeding the ambient atmospheric pressure at the time and location the containment system is closed. All other radioactive gases are considered to be compressed.

(jj) "Unilateral approval" means approval by the competent authority of the country of origin only.

(kk) "Unirradiated thorium" means thorium containing not more than 10^{-7} grams uranium-233 per gram of thorium-232.

(ll) "Unirradiated uranium" means uranium containing not more than 10^{-6} grams plutonium per gram of uranium-235 and a fission product activity of not more than 0.25 millicuries of fission products per gram of uranium-235.

§ 173.411 General design requirements.

Except for a package that contains a limited quantity or excepted instrument or article under §§ 173.421 through 173.424, each package used for shipment of radioactive materials shall be designed so that—

(a) The package can be easily handled and properly secured in or on conveyance during transport;

(b) A package with a gross weight exceeding 10 kilograms (22 pounds) and up to 50 kilograms (110 pounds) has a means for manual handling;

(c) A package with a gross weight of 50 kilograms (110 pounds) or more can be safely handled by mechanical means;

(d) Each lifting attachment on the package, when used in the intended manner, with a minimum safety factor of three, does not impose an unsafe stress on the structure of the package. In addition, the lifting attachment shall be so designed that failure under excessive load would not impair the ability of the package to meet all other requirements of this subpart. Each attachment or other feature on the outer surface of the packaging that could be used to lift the package must be removable or otherwise capable of being made inoperable for transport, or shall be designed with strength equivalent to that required for lifting attachments;

(e) The external surface, as far as practicable, may be easily decontaminated;

(f) The outer layer of packaging will avoid, as far as practicable, pockets or crevices where water might collect; and

(g) Each feature that is added to the package at the time of transport and that is not a part of the package, will not reduce the safety of the package.

§ 173.412 Additional design requirements for Type A packages.

In addition to meeting the general design requirements prescribed in § 173.411, each Type A packaging shall be designed so that:

(a) The smallest overall external dimension of the package is not less than 10 centimeters (4 inches);

(b) The outside of the packaging incorporates a feature, such as a seal, that is not readily breakable, and that, while intact, is evidence that the package has not been opened. In the case of packages shipped in exclusive use closed transport vehicles, the cargo compartment may be sealed instead of the individual packages;

(c) As far as practicable, the external surfaces are free from protrusions and are designed and finished so that they can be easily decontaminated;

(d) Containment and shielding would be maintained during transportation and storage in a temperature range of −40°C (−40°F) to 70°C (158°F) with account being taken of the possibility of brittle fracture;

(e) It is able to withstand the effects of any acceleration, vibration, or vibration resonance that may arise during normal transportation, without any deterioration of the effectiveness of closing devices or of the integrity of the package as a whole and without loosening or unintentional release of nuts, bolts, or other securing devices even after repeated use;

(f) It includes a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by pressure that may arise within the package during normal transport. Special form, as demonstrated in accordance with § 173.469 may be considered as a component of the containment system;

(g) The materials of the packaging and any components or structures

For explanation of abbreviations and reference marks, see last page of this tariff.

are physically and chemically compatible with each other and with the contents, taking into account the behavior of each under irradiation;

(h) For each component of the containment system account is taken, where applicable, of radiolytic decomposition of materials and the generation of gas by chemical reaction and radiolysis;

(i) The containment system will retain its radioactive contents under the reduction of ambient pressure to .25 kilograms per square centimeter (3 5 pounds per square inch);

(j) Each valve through which the radioactive contents could otherwise escape is protected against damage and unauthorized operation and, except for a pressure relief device, has an enclosure to retain any leakage;

(k) Any radiation shield that encloses a component of the packaging specified as part of the containment system will prevent the unintentional escape of that component from the shield;

(l) Failure of any tie down attachment on the packaging under excessive load will not impair the ability of the package to meet other requirements of this subpart;

(m) When subjected to the tests specified in § 173.465 or evaluated against these tests by any of the methods authorized by § 173.461(a), the packaging will prevent:

(1) Loss or dispersal of the radioactive contents; and

(2) Any significant increase in the radiation levels recorded or calculated at the external surfaces for the condition before the test;

(n) Each packaging designed for liquids will:

(1) Meet the conditions prescribed in paragraph (m) of this section when subjected to the tests specified in § 173.466 or evaluated against these tests by any of the methods authorized by § 173.461(a);

(2) For any package with a liquid volume not exceeding 50 cubic centimeters (1.7 fluid ounces), have sufficient suitable absorbent material to absorb twice the volume of the liquid contents. The absorbent material shall be compatible with the package contents and suitably positioned to contact the liquid in the event of leakage; and

(3) For any package with a liquid volume exceeding 50 cubic centimeters (1.7 fluid ounces), either:

(i) Have sufficient absorbent material as prescribed in paragraph (n)(2) of this section; or

(ii) Have a containment system composed of primary inner and secondary outer containment components designed to assure retention of the liquid contents within the secondary outer components in the event that the primary inner components leak; and

(o) Each package designed for compressed or uncompressed gases other than tritium or argon-37 not exceeding 200 curies will be able to prevent loss of contents when the package is subjected to the tests prescribed in § 173.466 or evaluated against these tests by any of the methods authorized by § 173.461(a).

§ 173.413 Requirements for Type B packages.

Each Type B(U) or Type B(M) package must be designed and constructed to meet the applicable requirements in 10 CFR Part 71.

§ 173.415 Authorized Type A packages.

The following packages are authorized for shipment, if they do not contain quantities exceeding A_1 or A_2 as appropriate:

(a) U.S. Department of Transportation (DOT) Specification 7A (§ 178 350 of this subchapter) Type A general packaging. Each shipper of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide to DOT on request, a complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification. Specification 7A packagings designed in accordance with the requirements of § 178 350 in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used. Packagings either designed or constructed after June 30, 1985, must meet the requirements of § 178 350 applicable at the time of their design or construction.

(b) DOT Specification 55 metal-encased shielded packaging constructed before April 1, 1975. Such packaging constructed after March 31, 1975, is not authorized unless it is requalified under DOT Specification 7A. Each packaging designed for liquids must also meet the requirements of § 173.412 (m) and (n). Use of this packaging as DOT Specification 55 is not authorized after June 30, 1985.

(c) Any Type B, B(U) or B(M) packaging, pursuant to § 173.416.

(d) Any foreign made packaging that bears the marking "Type A" and which was used for the import of radioactive materials. Such packagings may be subsequently used for domestic and export shipments of radioactive materials. These packagings shall conform with requirements of the country of origin (as indicated by the packaging marking) applicable to Type A packagings. (The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under OMB control number 2137–0533).

§ 173.416 Authorized Type B packages.

Each of the following packages is authorized for shipment of quantities exceeding A_1 or A_2, as appropriate:

(a) DOT Specification 55 metal-encased shielded packaging constructed before April 1, 1975, for domestic shipments only of special form radioactive materials of 300 curies or less. Such packaging constructed after March 31, 1975 may not be designated as DOT Specification 55. Use of this packaging is not authorized after June 30, 1985 unless approved in accordance with paragraph (b) of this section.

(b) Any Type B, Type B(U) or Type B(M) packaging that meets the applicable requirements in the regulations of the U.S. Nuclear Regulatory Commission (10 CFR Part 71) and that has been approved by that Commission may be shipped pursuant to § 173.471.

(c) Any Type B(U) or B(M) packaging that meets the applicable requirements of the regulations of the International Atomic Energy Agency (IAEA) in its "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" and for which the foreign competent authority certificate has been revalidated by DOT pursuant to § 173.473. Authorized only for export and import shipments.

(d) DOT Specification 6M (§ 178.104 of this subchapter) metal packaging, only for solid or gaseous radioactive materials that will not undergo pressure generating decomposition at temperatures up to 121°C (250°F) and that do not generate more than 10 watts of radioactive decay heat.

(e) For contents in other than special form; DOT Specification 20WC (§ 178.194 of this subchapter), wooden protective jacket, when used with a single, snug-fitting inner DOT Specification 2R (§ 178 34 of this subchapter), or a DOT Specification 55 container constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. For liquid contents, the inner packaging must comply with § 173.412 (m) and (n).

(f) For contents in special form only; DOT Specification 20WC (§ 178.194 of this subchapter), wooden protective jacket, with a single snug-fitting inner Type A packaging that has a metal outer wall and conforms to § 178 350 of this subchapter, or an inner DOT Specification 55 packaging constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. Radioactive decay heat may not exceed 100 watts.

(g) For contents in special form only; DOT Specification 21WC (§ 178.195 of this subchapter), wooden protective overpack, with a single inner DOT Specification 2R (§ 178 34 of this subchapter) or an inner DOT Specification 55 container constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. Contents shall be loaded within the inner packaging in such a manner as to prevent loose movement during transportation. The inner packaging shall be securely positioned and centered within the overpack so that there will be no significant displacement of the inner packaging if subjected to the 9 meter (30 feet) drop test described in 10 CFR Part 71.

§ 173.417 Authorized packaging—fissile materials.

(a) Except as provided in § 173.453, fissile materials containing not more than A_1 or A_2 as appropriate, shall be packaged in one of the following packagings:

(1) DOT Specification 6L (§ 178.103 of this subchapter), metal packaging, for materials prescribed in paragraph (b)(1) of this section.

(2) DOT Specification 6M, § 178.104 of this subchapter), metal packaging, for materials prescribed in paragraph (b)(2) of this section.

(3) Any packaging listed in § 173.415, limited to the following radioactive materials:

(i) 500 grams of uranium-235 in a single shipment as Fissile Class III or not more than 40 grams of uranium-235 per package as Fissile Class II. For Fissile Class II shipments, the transport index assigned to each package shall not be less than 0.4 for each gram of uranium-235 above 15 grams up to the maximum of 40 grams (transport index of 10).

(ii) 320 grams of plutonium-239 as plutonium-beryllium neutron sources in special form. Total radioactivity content may not exceed 20 curies. The transport index to be assigned to each package must be 0 5 for each 20 grams, or fraction thereof, of fissile plutonium.

(4) Any other Type A, Type B, Type B(U), or Type B(M) packaging for fissile radioactive materials that also meets the applicable standards for fissile materials in the regulations of the U.S. Nuclear Regulatory Commission (10 CFR Part 71), and is used in accordance with § 173.471.

(5) Any other Type A, Type B, Type B(U), or Type B(M) packaging that also meets the applicable requirements for fissile material packaging in Section VI of the International Atomic Energy Agency "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)", and for which the foreign competent authority certificate has been revalidated by the Director, OHMT, in accordance with § 173.473. Authorized only for export and import shipments.

(6) A DOT Specification 6J (§ 178.100 of this subchapter) or 17H (§ 178.118 of this subchapter) 55-gallon steel drum, subject to the following conditions:

(i) The quantity may not exceed 350 grams of uranium-235 in any nonpyrophoric form, enriched to any degree in the uranium-235 isotope.

(ii) Each drum must have a minimum 18 gauge body and bottom head and 16 gauge removable top head with one or more corrugations in the cover near the periphery.

(iii) Closure must conform to §178.103-5(a) of this subchapter.

(iv) At least four equally spaced 12 millimeter (0.5 inch) diameter vent holes shall be provided on the sides of the drum near the top, each covered with weatherproof tape; or equivalent device.

(v) Appropriate primary inner containment of the contents and sufficient packaging material, such as plastic or metal jars or cans shall be provided such that Specification 7A (§178.350 of this subchapter) provisions are satisfied by the inner packaging.

(vi) Each inner container shall be capable of venting if subjected to the thermal test described in 10 CFR Part 71.

(vii) Liquid contents shall be packaged in accordance with §173.412(m) and (n).

(viii) The maximum weight of contents including internal packaging may not exceed 91 kilograms (200 pounds) with fissile material content limited as shown in Table 2:

TABLE 2.—FISSILE MATERIAL CONTENT AND TRANSPORT INDEX FOR SPECIFICATION 6J or 17H Packages

Maximum U-235 per package (grams)	Minimum transport index per package as Fissile Class II	Maximum packages per transport vehicle as Fissile Class III
350	1.8	72
300	1.0	129
250	0.5	258
200	0.3	500
150	0.1	500
100	0.1	500
50	(1)	(1)

(1) Fissile Class I.

(7) Any metal cylinder that meets the performance requirements of §§173.415 and 178.350 of this subchapter for Specification 7A Type A packaging may be used as a Fissile Class I package for the transport of residual "heels" of enriched solid uranium hexafluoride without a protective overpack in accordance with Table 3:

TABLE 3.—ALLOWABLE CONTENT OF URANIUM HEXAFLUORIDE (UF_6) "HEELS" IN A SPECIFICATION 7A CYLINDER

Maximum cylinder diameter		Cylinder volume		Maximum Uranium-235 enrichment (weight percent)	Maximum "heel" weight per cylinder			
					UF_6		Uranium-235	
Inches	Centimeters	Cubic Feet	Liters		kg	(lb)	kg	(lb)
5	12.7	0.311	8.8	100.0	0.045	0.1	0.031	0.07
8	20.3	1.359	39	12.5	0.227	0.5	0.19	0.04
12	30.5	2.410	68	5.0	0.454	1.0	0.15	0.03
30	76	25.64	725	5.0	11.3	25.0	3.83	0.84
48	122	108.9 (10 ton)	3084	4.5	22.7	50	6.90	1.52
		142.7 (13 ton)	4041	4.5	22.7	50	6.90	1.52

(8) DOT Specifications 20PF-1, 20PF-2 or 20PF-3 (§178.120 of this subchapter) or Specifications 21PF-1 or 21PF-2 (§178.121 of this subchapter) phenolic-foam insulated overpack with snug-fitting inner metal cylinders, for materials prescribed in paragraph (b) (5) of this section.

(b) Fissile radioactive materials with radioactive content exceeding A_1 or A_2 shall be packaged in one of the following packagings:

(1) DOT Specification 6L (§178.103 of this subchapter), metal packaging. Authorized only for uranium-235, plutonium-239 or plutonium-241, as metal, oxide, or compounds that do not decompose at temperatures up to 149°C (300°F). Radioactive decay heat output may not exceed 5 watts. Radioactive materials in normal form shall be packaged in one or more tightly sealed metal cans or polythylene bottles within a DOT Specification 2R (§178.34 of this subchapter) containment vessel. Packages are authorized as Fissile Class II and III with material's limited in accordance with Table 4:

TABLE 4.—AUTHORIZED CONTENTS IN KILOGRAMS (KG) AND CONDITIONS FOR SPECIFICATION 6L PACKAGES

Uranium-235		Plutonium[1]		Fissile Class II transport index	Fissile Class III maximum number of packages per transport vehicle
H/X<3	3<H/X<10	H/X<10	10<H/X<20		
14	3.6[3]	—	—	1.3	80
—	—	2.5	2.4	1.8	50

[1] Plutonium solutions are not authorized.
[2] H/X is the ratio of hydrogen to fissile atoms in the inner containment with all sources of hydrogen in the containment considered.
[3] Volume not to exceed 3.6 liters.

(2) DOT Specification 6M (§178.104 of this subchapter), metal packaging. Authorized only for solid radioactive materials that will not decompose at temperatures up to 121°C(250°F). Radioactive decay heat output may not exceed 10 watts. Radioactive materials in other than special form shall be packaged in one or more tightly sealed metal cans or polyethylene bottles within a DOT Specification 2R (§178.34 of this subchapter) containment vessel. For fissile materials:

(i) Fissile Class I packages are limited to the following amounts of fissile radioactive materials: 1.6 kilograms of uranium-235; 0.9 kilograms of plutonium (except that due to the 10-watt thermal decay heat limitation, the limit for plutonium-238 is 0.02 kilograms); and 0.5 kilograms of uranium-233. The maximum ratio of hydrogen to fissile material must not exceed three, including all of the sources of hydrogen within the DOT Specification 2R containment vessel.

(ii) Maximum quantities of fissile material for Fissile Class II and Fissile Class III, and other restrictions are given in Table 5. For a Fissile Class II package, the minimum transport index to be assigned is shown in Table 5 and for a Fissile Class III shipment, the allowable number of similar packages per conveyance and per transport vehicle is shown. Each Fissile Class III shipment is also subject to the requirements in §173.457. Where a maximum ratio of hydrogen to fissile material is specified in Table 5, only the hydrogen interspersed with the fissile material need be considered. For a uranium-233 shipment, the maximum inside diameter of the inner containment vessel must not exceed 12.1 centimeters (4.75 inches). Where necessary, a tight fitting steel insert shall be used to reduce a larger diameter inner containment vessel specified in §178.104-3(b) of this subchapter to the 12 centimeter (4.75 inch) limit.

TABLE 5.—AUTHORIZED CONTENTS FOR SPECIFICATION 6M PACKAGES[1]

Uranium-233[5]			Uranium-235[6][7]			Plutonium[2][3][8]			Fissile class II transport index	Fissile class III maximum number of packages per transport vehicle
Metal or alloy	Compounds		Metal or alloy	Compounds		Metal or alloy	Compounds			
[8]H/X=0	H/X=0	H/X=3	H/X=0	H/X=0	H/X=3	H/X=0	H/X=0	H/X=3		
3.6	4.6	2.9	7.2	7.6	5.3	3.1	4.1	3.4	0.1	1,250
[4]4.2	5.2	3.5	8.7	9.6	6.4	3.4	4.5	4.1	0.2	625
[4]5.2	6.8	4.5	11.2	13.9	8.3	4.2	.....	4.5	0.5	250
....	.....	.....	13.5	16.0	10.1	4.5	.....	.....	1.0	125
....	.....	.....	....	26.0	16.1	....	.....	.....	5.0	25
....	.....	.....	....	32.0	19.5	....	.....	.....	10.0	12

[1] Quantity in kilograms.
[2] Minimum percentage of plutonium-240 is 5 weight percent.
[3] 4.5 kilogram limitation of plutonium due to 10 watt decay heat limitation.
[4] For a mixture of uranium-235 and plutonium an equal amount of uranium-235 may be substituted for any portion of plutonium authorized.
[5] Maximum inside diameter of Specification 2R containment vessel not to exceed 12 centimeter (4.75 inch) (see par. (b)(2)(ii) of this section).
[6] Granulated or powered metal with any particle less than 8 millimeter (0.25 inch) in the smallest dimension is not authorized.
[7] Maximum permitted uranium-235 enrichment is 93.5 percent.
[8] H/X is the ratio of hydrogen to fissile atoms in the inner containment.

For explanation of abbreviations and reference marks, see last page of this tariff.

(3) Type B, or Type B(U) or B(M) packaging that meets the standards for packaging of fissile materials in 10 CFR Part 71, and is approved by the U.S. Nuclear Regulatory Commission in accordance with § 173.471.

(4) Type B(U) or B(M) packaging that meets the applicable requirements for fissile radioactive materials in Section VI of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" and for which the foreign competent authority certificate has been revalidated by the Director, OHMT in accordance with § 173.472. Authorized only for import and export shipments.

(5) DOT Specification 20PF-1, 20PF-2, or 20PF-3 (§ 178.120 of this subchapter) or Specification 21PF-1 or 21PF-2 (§ 178.121 of this subchapter) phenolic-foam insulated protective overpacks, with snug-fitting inner metal cylinders meeting all of the applicable requirments of §§ 173.24, 173.411, and 173.412. Handling procedures and packaging criteria shall be in accordance with U.S. Department of Energy Report No. ORO-651 or ANSI Standard N-14.1-1982. Quantities of uranium hexafluoride are authorized as shown in Table 6, with each package to be shipped as Fissile Class II, and assigned a minimum transport index as also shown:

TABLE 6.—AUTHORIZED QUANTITIES OF URANIUM HEXAFLUORIDE (UF_6) AS FISSILE CLASS II

Protective overpack specification number	Maximum inner cylinder diameter		Maximum weight of UF_6 contents		Maximum U-235 enrichment (weight percent)	Fissile Class II transport index
	Centimeter	Inch	Kilograms	Pounds		
20PF-1	12.7	5	25	55	100	0.1
20PF-2	20.3	8	118	255	12.5	4.0
20PF-3	30.5	12	209	460	5.0	1.1
21PF-1[1]	27.6	8.30	2.247	4.950	5.0	5.0
	27.6	8.30	2.279	5.020	5.0	5.0
21PF-2[1]	27.6	8.30	2.247	4.950	5.0	6.0
	27.6	8.30	2.279	5.020	5.0	5.0

[1] For 76 centimeter cylinders, the maximum permitted H:U atomic ratio is 0.068
[2] Model 30A inner cylinder (Reference, ORO-651).
[3] Model 30B inner cylinder (Reference, ORO-651).

§ 173.418 Authorized packaging-pyrophoric radioactive materials.

(a) Pyrophoric radioactive materials, as referenced in § 172.101 of this subchapter, in quantities not exceeding A_2 per package shall be packaged in Type A packagings which are constructed of materials which will not react nor be decomposed by the contents. Contents must be:

(1) In solid form and must not be fissile unless excepted by § 173.453;

(2) Contained in sealed and corrosion resistant receptacles with positive closures (friction or slip-fit covers or stoppers are not authorized);

(3) Free of water and any contaminants which would increase the reactivity of the material; and

(4) Made inert to prevent self-ignition during transport by either:

(i) Mixing with large volumes of inerting materials such as graphite or dry sand, or other suitable inerting material, or blended into a matrix of hardened concrete; or

(ii) By filling the innermost receptacle with an appropriate inert gas.

(b) In addition to the applicable requirements of § 173.24 each package must be capable of passing the test conditions of § 173.465 without leakage of contents.

§ 173.419 Authorized packaging-oxidizing radioactive materials.

Certain oxidizing radioactive materials, as referenced in § 172.101 of this subchapter, and which are not fissile materials and not in quantities exceeding A_2, shall be packed in suitable inside packagings of glass, metal or compatible plastic and suitably cushioned with a material which will not react with the contents. Inner packaging and cushioning shall be enclosed within an outside packaging of wood, metal, or plastic. The package shall be capable of meeting the applicable test requirements of § 173.465 without leakage of contents. For shipment by air, the maximum quantity in any package may not exceed 11.3 kilograms (25 pounds).

§ 173.420 Uranium hexafluoride (fissile and low specific activity).

(a) In addition to any other applicable requirements of this subchapter, uranium hexafluoride, fissile or low specific activity, shall be packaged in conformance with the following requirements:

(1) Before initial filling and during periodic inspection and test, packagings shall be cleaned in accordance with American National Standard N14.1-1982;

(2) Packagings used for the transportation of uranium hexafluoride on or before June 30, 1987 are authorized for continued use until further notice. Packagings manufactured after June 30, 1987 shall be designed, fabricated, and marked in accordance with—

(i) American National Standard N14.1-1982; or

(ii) Specifications for DOT Class 106A multi-unit tank car tanks (§§ 179.300, 179.301, and 179.302 of this subchapter).

(3) Uranium hexafluoride must be in solid form when offered for transportation;

(4) The volume of the solid uranium hexafluoride at 70°F must not exceed 61% of the volumetric capacity of the packaging; and

(5) The pressure in the package at 70°F must be less than 14.8 psia.

(b) Packagings of uranium hexafluoride must be periodically inspected, tested and marked in accordance with American National Standard N14.1-1982.

(c) Each repair to a packaging for uranium hexafluoride shall be performed in conformance with American National Standard N14.1-1982.

§ 173.421 Limited quantities of radioactive materials.

Radioactive materials whose activity per package does not exceed the limits specified in § 173.423 are excepted from the specification packaging, shipping paper and certification marking, and labeling requirements of this subchapter and requirements of this subpart if:

(a) The materials are packaged in strong, tight packages that will not leak any of the radioactive materials during conditions normally incident to transportation;

(b) The radiation level at any point on the external surface of the package does not exceed 0.5 millirem per hour;

(c) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in § 173.443(a);

(d) The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive";

(e) Except as provided in § 173.424, the package does not contain more than 15 grams of uranium-235; and

(f) The material is otherwise prepared for shipment as specified in § 173.421-1.

§ 173.421-1 Additional requirements for excepted radioactive materials.

(a) Excepted radioactive materials prepared for shipment under the provisions of § 173.421, § 173.422, § 173.424, or § 173.427 must be certified as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. This notice must include the name of the consignor or consignee and the statement "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted radioactive material, limited quantity, n.o.s., UN2910; 49 CFR 173.422 for excepted radioactive material, instruments and articles, UN2911; 49 CFR 173.424 for excepted radioactive material, articles manufactured from natural or depleted uranium or natural thorium, UN2909; or 49 CFR 173.427 for excepted radioactive material, empty packages, UN2908", as appropriate.

(b) An excepted radioactive material classed radioactive material and prepared for shipment under the provisions of § 173.421, § 173.422, § 173.424, § 173.427 or § 173.421-2 is not subject to the requirements of this subchapter, except for:

(1) Sections 171.15, 171.16, 174.750, 176.710 and 177.861 of this subchapter pertaining to the reporting of incidents and decontamination when transported by a mode other than air; or

(2) Sections 171.15, 171.16, 175.45, and 175.700(b) of this subchapter pertaining to the reporting of incidents and decontamination if transported by aircraft. After May 2, 1989, it is also necessary to comply with §§ 173.448(f) and 175.700(c) of this subchapter.

(Approved by the Office of Management and Budget under control number 2137-0039)

§ 173.421-2 Requirements for multiple hazard limited quantity radioactive materials.

(a) Except as provided in paragraph (b) of this section or in § 173.4 of this subchapter, when a limited quantity radioactive material meets the definition of another hazard class, it shall be:

(1) Classed for the additional hazard;

(2) Packaged to conform with requirements specified in §§ 173.421(a)-(e) or 173.422(a)-(g), as appropriate; and

(3) Offered for transportation in accordance with requirements applicable to the hazard for which it is classed.

(b) When a limited quantity radioactive material meets the definition of an ORM-A, B, or C, or is a combustible liquid in a packaging having a rated capacity of 110 gallons or less, it shall be:

(1) Classed radioactive material if:

(i) The material is not a hazardous waste or hazardous substance; and

(ii) The material is offered for transportation in a mode to which requirements of this subchapter pertaining to the specific material and hazard class do not apply;

(2) Classed combustible liquid or ORM-A, B, or C, as appropriate, if:

(i) The material is a hazardous waste or hazardous substance; or

(ii) The material is offered for transportation in a mode to which requirements of this subchapter pertaining to the specific material and hazard class do apply;

(3) Packaged to conform with requirements specified in §§ 173.421(a)-(e) or 173.422(a)-(g), as appropriate; and

(4) Offered for transportation in accordance with requirements applicable to the hazard for which it is classed.

(c) A limited quantity radioactive material which is classed other than radioactive material under provisions of paragraphs (a) or (b) of this section is excepted from requirements of §§ 173.421-1(a), 172.203(d), and 172.204(c) (4) of this subchapter if the entry "Limited quantity radioactive material" appears on the shipping paper in association with the basic description.

(d) After May 2, 1989, a limited quantity radioactive material classed other than radioactive material may not be offered for transportation aboard a passenger-carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

§ 173.422 Exceptions for instruments and articles.

Instruments and manufactured articles (including clocks, electronic tubes or apparatus) or similar devices having radioactive materials in gaseous or non-dispersible solid form as a component part are excepted from the specification packaging, shipping paper and certification, marking and labeling requirements of this subchapter and requirements of this subpart, if:

(a) The activity of the instrument or article does not exceed the relevant limit listed in table 7 § 173.423;

(b) The total activity per package does not exceed the relevant limit listed in Table 7 in § 173.423;

(c) The radiation level at 10 centimeters (4 inches) from any point on the external surface of any unpackaged instrument or article does not exceed 10 millirem per hour;

(d) The radiation level at any point on the external surface of a package bearing the article or instrument does not exceed 0.5 millirem per hour, or, for exclusive use domestic shipments, 2 millirem per hour;

(e) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in § 173.443(a);

(f) Except as provided in § 173.424, the package does not contain more than 15 grams of uranium-235; and (g) [Reserved]

(h) The instrument or article is otherwise prepared for shipment as specified in § 173.421-1.

§ 173.423 Table of activity limits—excepted quantities and articles.

The limits applicable to instruments, articles and limited quantities subject to exceptions under §§ 173.421 and 173.422 are shown in Table 7:

TABLE 7.—ACTIVITY LIMITS FOR LIMITED QUANTITIES, INSTRUMENTS, AND ARTICLES

Nature of contents	Instruments and Articles		Material's package limits
	Instrument and article limits [1]	Package limits	
Solids			
Special form	10 $^{-2}A_1$	A_1	10 $^{-3}A_1$
Other forms	10 $^{-2}A_2$	A_2	10 $^{-3}A_2$
Liquids			
Tritium water			
< 0.1 Ci/liter			1000 Curies
0.1 Ci to 1.0 Ci/liter			100 Curies
> 1.0 Ci/liter			1 Curie
Other liquids	10 $^{-3}A_2$	10 $^{-1}A_2$	10 $^{-4}A_2$
Gases			
Tritium [2]	20 Curies	200 Curies	20 Curies
Special form	10 $^{-3}A_1$	10 $^{-2}A_1$	10 $^{-3}A_1$
Other forms	10 $^{-3}A_2$	10 $^{-2}A_2$	10 $^{-3}A_2$

[1] For mixture of radionuclides see § 173.433(b).

[2] These values also apply to tritium in activated luminous paint and tritium absorbed on solid carriers.

§ 173.424 Excepted articles containing natural uranium or thorium.

Manufactured articles in which the sole radioactive material content is natural or depleted uranium or natural thorium are excepted from the specification packaging, shipping paper and certification, marking and labeling requirements of this subchapter and requirements of this subpart if:

(a) The outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or other durable protective material;

(b) The conditions specified in § 173.421 (b), (c) and (d) are met; and

(c) The article is otherwise prepared for shipment as specified in § 173.421-1.

§ 173.425 Transport requirements for low specific activity (LSA) radioactive materials.

In addition to other applicable requirements specified in this subchapter, low specific activity (LSA) materials shall be transported in accordance with paragraph (a) of this section, or if transported as exclusive-use may be transported in accordance with paragraph (b) or (c) of this section.

(a) DOT Specification 7A (§ 178.350 of this subchapter) Type A package. The requirements of § 173.412 (a), (b), (d), and (n) do not apply.

(b) Packaged shipments of LSA material consigned as exclusive use shall either be in accordance with paragraph (a) of this section or shall comply with the following in which case they are excepted from specification packaging, marking and labeling:

(1) Materials must be packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation.

(2) Packages must not have any significant removable surface contamination (see § 173.443).

(3) External radiation levels must comply with § 173.441.

(4) Shipments must be loaded by consignor and unloaded by consignee from the conveyance or freight container in which originally loaded.

(5) There must be no loose radioactive material in the conveyance.

(6) Shipment must be braced so as to prevent shifting of lading under conditions normally incident to transportation.

(7) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in accordance with Subpart F of Part 172 of this subchapter, as appropriate.

(8) The exterior of each outside package must be stenciled or otherwise marked "Radioactive—LSA".

(9) Specific instructions for maintenance of exclusive use shipment controls must be provided by the shipper to the carrier. Such instructions must be included with the shipping paper information.
(10) Transportation by aircraft is prohibited.
(c) Unpackaged (bulk) shipments of LSA materials shall be transported only in exclusive use closed transport vehicles and shall comply with the following:
(1) Authorized materials are limited to the following:
(i) Uranium or thorium ores and physical or chemical concentrates of those ores.
(ii) Uranium metal or natural thorium metal, or alloys of these materials.
(iii) Materials of low radioactive concentration, if the average estimated radioactivity concentration does not exceed 0.001 millicurie per gram and the contribution from materials with an A_2 value (see § 173.435) of less than 0.05 curie does not exceed one percent of the total radioactivity.
(iv) Objects of nonradioactive material externally contaminated with radioactive material, if the radioactive material is not readily dispersible and the surface contamination, when averaged over one square meter, does not exceed 0.0001 millicurie per square centimeter of radionuclides for which the A_2 value is less than 0.05 or 0.001 millicurie per square centimeter of other radionuclides. Such objects must be suitably wrapped or enclosed.
(2) Bulk liquids must be transported in the following:
(i) Specification 103CW, 111A60W7 (§§ 179.200, 179.201, 179.202 of this subchapter) tank cars. Bottom openings in tanks prohibited.
(ii) Specification MC 310, MC 311, MC 312, or MC 331 (§§ 178.343 or 178.337 of this subchapter) cargo tanks. Authorized only where the radioactivity concentration does not exceed 10 percent of the specified low specific activity levels (see § 173.403(n)). The requirements of § 173.412(n) do not apply to these cargo tanks. Bottom fittings and valves are not authorized. Trailer-on-flat-car service is not authorized.
(3) External radiation levels must comply with § 173.441(b).
(4) Shipments must be loaded by the consignor, and unloaded by the consignee from the conveyance or freight container in which originally loaded.
(5) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in Subpart F of Part 172 of this subchapter, as appropriate.
(6) There must be no leakage of radioactive materials from the vehicle.
(7) Specific instructions for maintenance of exclusive use shipment controls must be provided by the shipper to carrier. Such instructions must be included with the shipping paper information.
(8) Transportation by aircraft is prohibited.
(d) Except for transportation by aircraft, low specific activity material that conforms with the provisions specified in 10 CFR 20.306 is excepted from all requirements of this subchapter pertaining to radioactive materials when offered for transportation for disposal or recovery. A material which meets the definition of another hazard class is subject to the provisions of this subchapter relating to that hazard class.

§ 173.427 Empty radioactive materials packaging.

A packaging which previously contained radioactive materials and has been emptied of contents as far as practical, is excepted from the shipping paper and certification, marking and labeling requirements of this subchapter, and from requirements of this subpart, provided that:
(a) It complies with the requirements of § 173.421(b), (c) and (e);
(b) The packaging is in unimpaired condition and is securely closed so that there will be no leakage of radioactive material under conditions normally incident to transportation;
(c) Internal contamination does not exceed 100 times the limits specified in § 173.443;
(d) Any labels previously applied in conformance with Subpart E of Part 172 of this subchapter are removed, obliterated or covered and the "Empty" label prescribed in § 172.450 is affixed to the packaging; and
(e) The packaging is prepared for shipment as specified in § 173.421-1.

§ 173.431 Activity limits for Type A and Type B packages.

(a) A Type A package shall not contain a quantity of radioactivity greater than A_1 (for special form radioactive material) or A_2 (for normal form radioactive material) as listed in § 173.435, or for radioactive materials not listed in § 173.435, as determined in accordance with § 173.433.
(b) The limits on activity contained in a Type B, Type B(U), or Type B(M) package are those prescribed in § 173.416 or in the applicable approval certificate under §§ 173.471 or 173.473.

§ 173.433 Requirements for determination of A_1 and A_2 values for radionuclides.

(a) Single radionuclides.
(1) For single radionuclides of known identity, the values of A_1 and A_2 are those given in the table in § 173.435. The values of A_1 and A_2 are also applicable for radionuclides contained in (α,n) or (γ, n) neutron sources.
(2) For any single radionuclide of known identity, which is not listed in § 173.435, the values of A_1 and A_2 shall be determined in accordance with the following:
(i) If the radionuclide emits only one type of radiation, A_1 is determined in accordance with paragraphs (a)(2)(i)(A), (B), (C), and (D) of this section. For radionuclides emitting different kinds of radiation, A_1 is the most restrictive value of those determined for each kind of radiation. However, in both cases, A_1 is restricted to a maximum of 1000 curies. If a parent nuclide decays into a shorter lived daughter, of a half-life not greater than 10 days, A_1 is calculated for both the parent and the daughter, and the more limiting of the two values is assigned to the parent nuclide.
(A) For gamma emitters, A_1 is determined by the expression: $A_1 = 9/\Gamma$ curie
where Γ is the gamma-ray constant, corresponding to the dose in roentgens per hour at 1 meter per curie; the number 9 results from the choice of 1 rem per hour at a distance of 3 meters as the reference dose-equivalent rate.
(B) For x-ray emitters, A_1 is determined by the atomic number (Z) of the nuclide:
$Z < 55$ A_1 = 1000 curies
for $Z > 55$ A_1 = 200 curies
(C) For beta emitters, A_1 is determined by the maximum beta energy ($E_{\beta max}$) according to Table 8:

Table 8—A_1 for Beta Emitters

$E_{\beta max}$ (MeV)	A_1(curies)
< 0.5	1000
0.5 < 1.0	300
1.0 < 1.5	100
1.5 < 2.0	30
> 2.0	10

(D) For alpha emitters, A_1 is determined by the expression: $A_1 = 1000\ A_2$
where A_2 is the value listed in Table 9:

Table 9—A_2 Values

Atomic number	A_2 Half-life less than 1,000 days	A_2 Half-life 1,000 days to 10^9 years	A_2 Half-life greater than 10^9 years
1 to 81	3 curies	50 millicuries	3 curies
82 and above	2 millicuries	2 millicuries	3 curies

(ii) For assignment of A_2 values, A_2 is the more restrictive of the following values:
(A) The corresponding A_1.
(B) The value A_2 obtained from Table 9.
(3) For any single radionuclide whose identity is unknown, the value of A_1 is 2 curies and the value of A_2 is 0.002 curies. However, if the atomic number of the radionuclide is less than 82, the value of A_1 is 10 curies and the value of A_2 is 0.4 curies.
(b) ***Mixture of radionuclides, including radioactive decay chains.***
(1) For mixed fission products, where a detailed analysis of the mixture is not carried out, the following activity limits apply:
(i) A_1 = 10 curies.
(ii) A_2 = 0.4 curies.
(2) A single radioactive decay chain is considered to be a single radionuclide when the radionuclides are present in their naturally occurring portions and no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide. The activity to be taken into account and the A_1 or A_2 value to be applied are those corresponding to the parent nuclide of that chain. When calculating A_1 or A_2 values, radiation emitted by daughters must be taken into account. However, in the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and daughter nuclides are considered to be mixtures of different nuclides.
(3) In the case of a mixture of different radionuclides, where the identity and activity of each radionuclide is known, the permissible activity of each radionuclide $R_1, R_2, \ldots R_n$ must be such that $F_1 + F_2 + \ldots F_n$ is not greater than unity, when—

$$F_1 = \frac{\text{Total activity of } R_1}{A(R_1)}$$

$$F_2 = \frac{\text{Total activity of } R_2}{A(R_2)}$$

$$F_n = \frac{\text{Total activity of } R_n}{AR_n}$$

Where $A(R_1, R_2 \ldots R_n)$ is the value of A_1 or A_2 as appropriate for the nuclide $R_1, R_2 \ldots R_n$.

(4) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the formula given in subparagraph (3) of this paragraph must be applied to establish the values of A_1 or A_2 as appropriate. All the radionuclides whose individual activities are not known (but whose total activity is known) must be classed in a single group and the most restrictive value of A_1 or A_2 applicable to any one of them shall be used as the value of A_1 and A_2 in the denominator of the fraction.

(5) When the identity of each radionuclide is known but the individual activity of the radionuclides is not known, the most restrictive value of A_1 or A_2 applicable to any one of the radionuclides present in the applicable value.

(6) When the identity of the radionuclides is not known, the value of A_1 is 2 curies and the value of A_2 is 0.002 curies. However, if alpha emitters are known to be absent, the value of A_2 is 0.4 curies.

§ 173.434 Activity-mass relationships for uranium and natural thorium.[1]

Radioactive material	Curies per gram	Grams per Curie
Uranium—(Wt% ^{235}U present)		
0.45	5.0×10^{-7}	2.0×10^{6}
0.72 (natural)	7.06×10^{-7}	1.42×10^{6}
1.0	7.6×10^{-7}	1.3×10^{6}
1.5	1.0×10^{-6}	1.0×10^{6}
5.0	2.7×10^{-6}	3.7×10^{5}
10.0	4.8×10^{-6}	2.1×10^{5}
20.0	1.0×10^{-5}	1.0×10^{5}
35.0	2.0×10^{-5}	5.0×10^{4}
50.0	2.5×10^{-5}	4.0×10^{4}
90.0	5.8×10^{-5}	1.7×10^{4}
93.0	7.0×10^{-5}	1.4×10^{4}
95.0	9.1×10^{-5}	1.1×10^{4}
Natural thorium	2.2×10^{-7}	4.6×10^{6}

[1] The figures for uranium include representative values for the activity of uranium-234 which is concentrated during the enrichment process. The activity for thorium includes the equilibrium concentration of thorium-228.

§ 173.435 Table of A_1 and A_2 values for radionuclides.

Symbol of radionuclide	Element and atomic number	A_1(Ci) (Special Form)	A_2(Ci) (Normal Form)
^{227}Ac	Actinium (89)	1000	0.003
^{228}Ac		10	6
^{105}Ag	Silver (47)	40	40
^{110m}Ag		7	7
^{111}Ag		100	20
^{241}Am	Americium (95)[1]	8	0.008
^{243}Am		8	0.008
^{37}A (compressed or uncompressed)	Argon (18)	1000	1000
^{41}A (uncompressed)		20	20
^{41}A (compressed)		1	1
^{73}As	Arsenic (33)	1000	400
^{74}As		20	20
^{76}As		10	10
^{77}As		300	20
^{211}At	Astatine (85)	200	7
^{193}Au	Gold (79)	200	200
^{196}Au		30	30
^{198}Au		40	20
^{199}Au		200	25
^{131}Ba	Barium (56)	40	40
^{133}Ba		40	10
^{140}Ba		20	20
^{7}Be	Beryllium (4)	300	300
^{205}Bi	Bismuth (83)	5	5
^{207}Bi		10	10
^{210}Bi (RaE)		100	4
^{212}Bi		6	6
^{249}Bk	Berkelium (97)	1000	1
^{77}Br	Bromine (35)	20	25
^{82}Br		6	6
^{11}C	Carbon (6)	20	20
^{14}C		1000	60
^{45}Ca	Calcium (20)	1000	25
^{47}Ca		20	20
^{109}Cd	Cadmium (48)	1000	70
^{115m}Cd		30	30
^{115}Cd		80	20
^{139}Ce	Cerium (58)	100	100
^{141}Ce		300	25
^{143}Ce		60	20
^{144}Ce		10	7
^{249}Cf	Californium (98)	2	0.002
^{250}Cf		7	0.007
^{252}Cf		2	0.009
^{36}Cl	Chlorine (17)	300	10
^{38}Cl		10	10
^{242}Cm	Curium (96)	200	0.2
^{243}Cm		9	0.009
^{244}Cm		10	0.01
^{245}Cm		6	0.006
^{246}Cm		6	0.006
^{56}Co	Cobalt (27)	5	5
^{57}Co		90	90
^{58m}Co		1000	1000
^{58}Co		20	20
^{60}Co		7	7
^{51}Cr	Chromium (24)	600	600
^{129}Cs	Cesium (55)	40	40
^{131}Cs		1000	1000
^{134m}Cs		1000	10
^{134}Cs		10	10
^{135}Cs		1000	25
^{136}Cs		7	7
^{137}Cs		30	10
^{64}Cu	Copper (29)	80	25
^{67}Cu		200	25
^{165}Dy	Dysprosium (66)	100	20
^{166}Dy		1000	200
^{169}Er	Erbium (68)	1000	25
^{171}Er		50	20
^{152}Eu	Europium (63)	30	30

For explanation of abbreviations and reference marks, see last page of this tariff.

Symbol of radionuclide	Element and atomic number	A_1(Ci) (Special Form)	A_2(Ci) (Normal Form)
^{152}Eu		20	10
^{154}Eu		10	5
^{155}Eu		400	80
^{18}F	Fluorine (9)	20	20
^{52}Fe	Iron (26)	5	5
^{55}Fe		1000	1000
^{59}Fe		10	10
^{67}Ga	Gallium (31)	100	100
^{68}Ga		20	20
^{72}Ga		7	7
^{153}Gd	Gadolinium (64)	200	100
^{159}Gd		300	20
^{68}Ge	Germanium (32)	20	10
^{71}Ge		1000	1000
^{3}H	Hydrogen (1) See T-Tritium		
^{181}Hf	Hafnium (72)	30	25
^{197}Hg	Mercury (80)	200	200
^{197}Hg		200	200
^{203}Hg		80	25
^{166}Ho	Holmium (67)	30	30
^{123}I	Iodine (53)	50	50
^{125}I		1000	20
^{126}I		40	10
^{129}I		1000	2
^{131}I		40	10
^{132}I		7	7
^{133}I		30	10
^{134}I		8	8
^{135}I		10	10
^{111}In	Indium (49)	30	25
^{113m}In		80	80
^{114m}In		30	20
^{115m}In		100	20
^{190}Ir	Iridium (77)	10	10
^{192}Ir		20	10
^{194}Ir		10	10
^{42}K	Potassium (19)	10	10
^{43}K		20	10
^{85m}Kr (uncompressed)	Krypton (36)	100	100
^{85m}Kr (compressed)		3	3
^{85}Kr (uncompressed)		1000	1000
^{85}Kr (compressed)		5	5
^{87}Kr (uncompressed)		20	20
^{87}Kr (compressed)		0.6	0.6
^{140}La	Lanthanum (57)	30	30
LSA	Low specific activity material—see § 173.403		
^{177}Lu	Lutetium (71)	300	25
MFP	Mixed fission products	10	0.4
^{28}Mg	Magnesium (12)	6	6
^{52}Mn	Manganese (25)	5	5
^{54}Mn		20	20
^{56}Mn		5	5
^{99}Mo	Molybdenum (42)	100	20
^{13}N	Nitrogen (7)	20	10
^{22}Na	Sodium (11)	8	8
^{24}Na		5	5
^{93m}Nb	Niobium (41)	1000	200
^{95}Nb		20	20
^{97}Nb		20	20
^{147}Nd	Neodymium (60)	100	20
^{149}Nd		30	20
^{59}Ni	Nickel (28)	1000	300
^{63}Ni		1000	100
^{65}Ni		10	10
^{237}Np	Neptunium (93)	5	0.005
^{239}Np		200	25
^{185}Os	Osmium (76)	20	20
^{191}Os		600	200
^{191m}Os		200	200
^{193}Os		100	20
^{32}P	Phosphorus (15)	30	30
^{230}Pa	Protactinium (91)	20	0.8
^{231}Pa		2	0.002
^{233}Pa		100	100
^{201}Pb	Lead (82)	20	20
^{210}Pb		100	0.2
^{212}Pb		6	5
^{103}Pd	Palladium (46)	1000	200
^{109}Pd		100	20
^{147}Pm	Promethium (61)	1000	25
^{149}Pm		100	20
^{210}Po	Polonium (84)	200	0.2
^{142}Pr	Praseodymium (59)	10	10
^{143}Pr		300	20
^{191}Pt	Platinum (78)	100	100
^{193m}Pt		200	200
^{197m}Pt		300	20
^{197}Pt		300	20
^{238}Pu	Plutonium (94)[1]	5	0.003
^{239}Pu		2	0.002
^{240}Pu		2	0.002
^{241}Pu		1000	0.1
^{242}Pu		3	0.003
^{223}Ra	Radium (88)	50	0.2
^{224}Ra		6	0.5
^{226}Ra		10	0.05
^{228}Ra		10	0.05
^{81}Rb	Rubidium (37)	30	25

Symbol of radionuclide	Element and atomic number	A_1(Ci) (Special Form)	A_2(Ci) (Normal Form)
^{86}Rb		30	30
^{87}Rb		Unlimited	Unlimited
Rb (natural)		Unlimited	Unlimited
^{186}Re	Rhenium (75)	100	20
^{187}Re		Unlimited	Unlimited
^{188}Re		10	10
Re (natural)		Unlimited	Unlimited
^{103m}Rh	Rhodium (45)	1000	1000
^{105}Rh		200	25
^{222}Rn	Radon (86)	10	2
^{97}Ru	Ruthenium (44)	80	80
^{103}Ru		30	25
^{105}Ru		20	20
^{106}Ru		10	7
^{35}S	Sulphur (16)	1000	60
^{122}Sb	Antimony (51)	30	30
^{124}Sb		5	5
^{125}Sb		40	25
^{46}Sc	Scandium (21)	8	8
^{47}Sc		200	20
^{48}Sc		5	5
^{75}Se	Selenium (34)	40	40
^{31}Si	Silicon (14)	100	20
^{147}Sm	Samarium (62)	Unlimited	Unlimited
^{151}Sm		1000	90
^{153}Sm		300	20
^{113}Sn	Tin (50)	60	60
^{117m}Sn		100	100
^{125}Sn		10	10
^{85m}Sr	Strontium (38)	80	80
^{85}Sr		30	30
^{87m}Sr		50	50
^{89}Sr		100	10
^{90}Sr		10	0.4
^{91}Sr		10	10
^{92}Sr		10	10
T (uncompressed)	Tritium (1)	1000	1000
T (compressed)		1000	1000
T (activated luminous paint)		1000	1000
T (absorbed on solid carrier)		1000	1000
T (tritiated water)		1000	1000
T (other forms)		20	20
^{182}Ta	Tantalum (73)	20	20
^{160}Tb	Terbium (65)	20	10
^{96m}Tc	Technetium (43)	1000	1000
^{96}Tc		6	6
^{97m}Tc		1000	200
^{97}Tc		1000	400
^{99m}Tc		100	100
^{99}Tc		1000	25
^{125m}Te	Tellurium (52)	1000	100
^{127m}Te		300	20
^{127}Te		300	20
^{129m}Te		30	10
^{129}Te		100	20
^{131m}Te		10	10
^{132}Te		7	7
^{227}Th	Thorium (90)	200	0.2
^{228}Th		6	0.008
^{230}Th		3	0.003
^{231}Th		1000	25
^{232}Th		Unlimited	Unlimited
^{234}Th		10	10
Th (natural)		Unlimited	Unlimited
Th (irradiated)[3]			
^{200}Tl	Thallium (81)	20	20
^{201}Tl		200	200
^{202}Tl		40	40
^{204}Tl		300	10
^{170}Tm	Thulium (69)	300	10
^{171}Tm		1000	100
^{230}U	Uranium (92)	100	0.1
^{232}U		30	0.03
^{233}U		100	0.1
^{234}U		100	0.1
^{235}U		100	0.2
^{236}U		200	0.2
^{238}U		Unlimited	Unlimited
U (natural)		Unlimited	Unlimited
U (enriched) ≤20%		Unlimited	Unlimited
20% or greater		100	0.1
U (depleted)		Unlimited	Unlimited
U (irradiated)[3]			
^{48}V	Vanadium (23)	6	6
^{181}W	Tungsten (74)	200	100
^{185}W		1000	25
^{187}W		40	20
^{127}Xe (uncompressed)	Xenon (54)	20	20
^{127}Xe (compressed)		5	5
^{131m}Xe (compressed)		10	10
^{131m}Xe (uncompressed)		100	100
^{133}Xe (uncompressed)		1000	1000
^{133}Xe (compressed)		5	5
^{135}Xe (uncompressed)		20	20
^{135}Xe (compressed)		2	2
^{87}Y	Yttrium (39)	20	20
^{90}Y		10	10

Symbol of radionuclide	Element and atomic number	A_1(Ci) (Special Form)	A_2(Ci) (Normal Form)
^{51}Cr		30	30
^{81}Kr		30	30
^{82}Kr		10	10
^{85}Kr		20	10
^{169}Yb	Ytterbium (70)	80	80
^{175}Yb		300	25
^{65}Zn	Zinc (30)	30	30
^{69m}Zn		40	20
^{88}Zr		300	20
^{93}Zr	Zirconium (40)	1200	200
^{95}Zr		20	20
^{97}Zr		20	20

[1] For shipments solely within the United States the A_1 value is 20 curies for americium and plutonium contained in Am Be or Pu Be neutron sources or in nuclear powered pacemakers.

[2] The values of A_1 and A_2 must be calculated in accordance with the procedure specified in § 173.433 of this subchapter, taking into account the activity of the fission products and of the uranium-233 in addition to that of the thorium.

[3] The values of A_1 and A_2 must be calculated in accordance with the procedure specified in § 173.433 of this subchapter, taking into account the activity of the fission products and plutonium isotopes in addition to that of the uranium.

§ 173.441 Radiation level limitations. (a) Except as provided in paragraph (b) of this section, each package of radioactive materials offered for transportation shall be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed 200 millirem per hour at any point on the external surface of the package, and the transport index does not exceed 10.

(b) A package which exceeds the radiation level limits specified in paragraph (a) of this section shall be transported by exclusive use shipment only and if the radiation levels for such shipment must not exceed the following during transportation:

(1) 200 millirem per hour (2 millisievert per hour) on the external surface of the package unless the following conditions are met, in which case the limit is 1000 millirem per hour (10 millisievert per hour).

(i) The shipment is made in a closed transport vehicle;

(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 millirem per hour (2 millisievert per hour) at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load (or enclosure is used), and on the lower external surface of the vehicle;

(3) 10 millirem per hour (0.1 millisievert per hour) at any point 2 meters (6.6 feet) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in devices and operate under provisions of a State or Federally regulated radiation protection program.

(4) 2 millirem per hour in any normally occupied position in the car or transport vehicle, except that this provision does not apply to private motor carriers when the personnel are operating under a radiation protection program and wear radiation exposure monitoring devices.

(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions for maintenance of the exclusive use shipment controls to the carrier. The instructions shall be included with the shipping paper information.

(d) Packages exceeding the radiation level or transport index prescribed in paragraph (a) of this section shall not be transported by aircraft.

(e) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions which will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures.

(The information collection requirements contained in paragraph (c) were approved by the Office of Management and Budget under control number 2137-0535)

§ 173.442 Thermal limitations. Each package of radioactive material shall be designed, constructed, and loaded so that—

(a) The heat generated within the package because of the radioactive contents will not, at any time during transportation, affect the integrity of the package under conditions normally incident to transportation; and

(b) The temperature of the accessible external surfaces of the loaded package will not, assuming still air in the shade at an ambient temperature of 38°C (100°F), exceed either—

(1) 50°C (122°F) in other than an exclusive use shipment; or

(2) 82°C (180°F) in an exclusive use shipment.

§ 173.443 Contamination control. (a) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment shall be kept as low as practicable. The level of non-fixed radioactive contamination may be determined by wiping an area of 300 square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements shall be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. Except as provided in paragraph (b) of this section, the amount of radioactivity measured on any single wiping material when averaged over the surface wiped shall not exceed the limits given in Table 10 at any time during transport. Other methods of assessment of equal or greater efficiency may be used. When other methods are used the detection efficiency of the method used shall be taken into account and in no case shall the non-fixed contamination on the external surfaces of the package exceed ten times the limits listed in Table 10.

TABLE 10.—REMOVABLE EXTERNAL RADIOACTIVE CONTAMINATION—WIPE LIMITS

Contaminant	Maximum permissible limits	
	uCi/cm²	dpm/cm²
Beta gamma emitting radionuclides, all radionuclides with half-lives less than ten days, natural uranium, natural thorium, uranium-235, uranium-238, thorium 232, thorium 228 and thorium-230 when contained in ores or physical concentrates	10^{-5}	22
All other alpha emitting radionuclides	10^{-6}	2.2

(b) Except as provided in paragraph (d) of this section, in the case of packages transported as exclusive use shipments by rail or public highway only, the removable (non-fixed) radioactive contamination at any time during transport shall not exceed ten times the levels prescribed in paragraph (a) of this section. The levels at the beginning of transport shall not exceed the levels prescribed in paragraph (a) of this section.

(c) Except as provided in paragraph (d) of this section, each transport vehicle used for transporting radioactive materials as an exclusive use shipment which utilizes the provisions of paragraph (b) of this section shall be surveyed with appropriate radiation detection instruments after each use. A vehicle shall not be returned to service until the radiation dose rate at each accessible surface is 0.5 millirem per hour or less, and there is no significant removable (non-fixed) radioactive surface contamination as specified in paragraph (a) of this section.

(d) Paragraph (b) and (c) of this section do not apply to any closed transport vehicle used solely for the transportation by public highway of radioactive material packages with contamination levels that do not exceed 10 times the levels prescribed in paragraph (a) of this section if:

(1) A survey of the interior surfaces of the empty vehicle shows that the radiation dose rate at any point does not exceed 10 millirem per hour at the surface or 2 millirem per hour at 1 meter (3.3 feet) from the surface;

(2) Each vehicle is stenciled with the words "For Radioactive Materials Use Only" in letters at least 76 millimeters (3 inches) high in a conspicuous place on both sides of the exterior of the vehicle; and

(3) Each vehicle is kept closed except for loading or unloading.

§ 173.444 Labeling requirements. Each package of radioactive materials, unless excepted by §§173.421, 173.422, 173.424, 173.425(b), or 173.427 shall be labeled as provided in Subpart E of Part 172 of this subchapter.

§ 173.446 Placarding requirements. See Subpart F of Part 172 of this subchapter.

§ 173.447 Storage incident to transportation-general requirements. The following requirements apply to temporary storage during the course of transportation but not to Nuclear Regulatory Commission or Agreement State licensed facilities or U.S. Government owned or contracted facilities.

(a) The number of packages bearing Radioactive Yellow II or Radioactive Yellow III labels stored in any one storage area, such as a transit area, terminal building, store-room, or assembly yard, shall be limited so that the sum of the transport indexes in any individual group of packages does not exceed 50. Groups of these packages must be stored so as to maintain a spacing of at least 6 meters (20 feet) from other groups of packages containing radioactive materials.

(b) Mixing of different kinds of packages, including Fissile Class I packages with Fissile Class II packages, is authorized in accordance with §173.459 of this subchapter.

§ 173.448 General transportation requirements. (a) Each shipment of radioactive materials shall be secured in order to prevent shifting during normal transportation conditions.

(b) Except as may be specifically required by the competent authority in the applicable certificate, a package of radioactive materials may be carried among packaged general cargo without special stowage provisions, if:

(1) The heat output in watts does not exceed 0.1 times the minimum package dimension in centimeters; or

(2) The average surface heat flux of the package does not exceed 15 watts per square meter and the immediately surrounding cargo is not in sacks or bags or otherwise in a form that would seriously impede air circulation for heat removal.

(c) Packages bearing labels prescribed in §172.403 of this subchapter may not be carried in compartments occupied by passengers, except in those compartments exclusively reserved for couriers accompanying those packages.

(d) Mixing of different kinds of packages, including Fissile Class I packages with Fissile Class II packages, is authorized in accordance with §173.459.

(e) No person shall offer for transportation aboard a passenger-carrying aircraft any single package with a transport index greater than 3.0 or an overpack with a transport index greater than 3.0.—

(f) No person shall offer for transportation aboard a passenger carrying aircraft any radioactive material unless that material is intended for use in, or incident to, research, or medical diagnosis or treatment.

(g) If an overpack is used to consolidate individual packages of radioactive materials, the packages shall comply with the packaging, marking, and labeling requirements of this subchapter, and the following:

(1) The overpack shall be labeled as prescribed in §172.403 of this subchapter except as follows:

(i) the "contents" entry on the label may state "mixed" unless each inside package contains the same radionuclide(s).

(ii) The "activity" entry on the label must be determined by adding together the number of curies of the radioactive materials packages contained therein.

(iii) For a non-rigid overpack, the required label together with required package markings shall be affixed to the overpack by means of a securely attached, durable tag. The transport index shall be determined by adding together the transport indexes of the radioactive materials packages contained therein.

(iv) For a rigid overpack, the transport index shall be determined by:

(A) Adding together the transport indexes of the radioactive materials packages contained in the overpack; or

(B) Except for fissile radioactive materials, direct measurements as prescribed in §173.403(bb) which have been taken by the person initially offering the packages contained within the overpack for shipment.

(2) The overpack shall be marked as prescribed in Subpart D of Part 172 of this subchapter and §173.25(a).

(3) The transport index of the overpack shall not exceed 3.0 for passenger-carrying aircraft shipments, or 10.0 for cargo aircraft only shipments.

§ 173.451 Fissile materials—general requirements. (a) Except as provided in §173.453, each package containing fissile radioactive materials must comply with §§173.451 through 173.459.

§ 173.453 Fissile materials—exceptions. The requirements of §§173.451 through 173.459 do not apply to:

(a) A package containing not more than 15 grams of fissile radionuclides. If the material is transported in bulk, the quantity limitation applies to the conveyance;

(b) A package containing irradiated natural or depleted uranium including the products of irradiation if the irradiation has taken place only in the thermal reactor;

(c) A package containing homogeneous solutions or mixtures where:

(1) The minimum ratio of the number of hydrogen atoms to the number of atoms of fissile radionuclides (H:X) is 5200;

(2) The maximum concentration of fissile radionuclides is 5 grams per liter; and

(3) The maximum mass of fissile radionuclides in the package is 500 grams, except that for a mixture where the total mass of plutonium and uranium-233 does not exceed 1% of the mass of uranium-235 the limit is 800 grams. If the material is transported in bulk, the quantity limitations apply to the conveyance;

(d) A package containing uranium enriched in uranium-235 to a maximum of 1% by weight, and with a total plutonium and uranium-233 content of up to 1% of the mass of uranium-235, if the fissile radionuclides are distributed homogeneously throughout the package contents, and do not form a lattice arrangement within the package;

(e) A package containing any fissile material if it does not contain more than 5 grams of fissile radionuclides in any 10-liter volume, and if the material is packaged so as to maintain this limit of fissile radionuclide concentration during normal transport;

(f) A package containing not more than one kilogram of plutonium of which not more than 20% by mass may consist of plutonium-239, plutonium-241, or any combination of those radionuclides;

(g) A package containing liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2% by weight, with total plutonium and uranium-233 not more than 0.1% of the mass of uranium-235; or

(h) A package containing thorium or uranium with not more than 0.72% by weight of fissile material used for shipment solely within the United States.

§ 173.455 Classification of fissile materials packages. (a) Except as provided in §173.453, each package of fissile materials shall be classified as follows:

(1) **Fissile Class I.** Packages that may be transported in unlimited number, and in any arrangement, and that require no nuclear criticality safety controls during transportation. A transport index is not assigned to Fissile Class I packages for the purposes of nuclear criticality safety control, although, the external radiation levels may require a transport index number.

(2) **Fissile Class II.** Packages that may be transported together in any arrangement but in numbers that do not exceed an aggregate transport index of 50. For the purposes of nuclear criticality safety control, individual packages may have a transport index of not less than 0.1 and not more than 10. However, the external radiation levels may require a higher transport index number. These shipments require no nuclear criticality safety control by the shipper during transportation.

(3) **Fissile Class III.** Shipments of packages of fissile materials that do not meet the requirements of Fissile Class I or Fissile Class II and that are controlled in transportation as prescribed in §173.457 by appropriate arrangements between the shipper and the carrier.

(b) The numerical values for package assignments as Fissile Class I, the transport indexes for Fissile Class II packages, and the conveyance and vehicle limitations for Fissile Class III shipments shall be determined in accordance with 10 CFR Part 71.

§ 173.457 Transportation of Fissile Class III shipments—specific requirements. (a) Fissile Class III shipments shall incorporate transportation controls which are performed by the shipper or carrier, as appropriate, and which:

(1) Provide nuclear criticality safety;

(2) Protect against loading, storing, or transporting that shipment with any other fissile material; and

(3) Include in the shipping papers the description required by §172.203(d) of this subchapter.

(b) Fissile Class III shipments shall be transported:

(1) In a conveyance (transport vehicle if transported by public highway or rail) assigned to the exclusive use of the shipper with a specific restriction for the exclusive use to be provided in the appropriate arrangements between shipper and carrier and with instructions to that effect issued with the shipping papers;

(2) Except for shipments by aircraft, with an escort in a vehicle having the capability, equipment, authority, and instructions to provide administrative controls necessary to assure compliance with this section;

(3) In a conveyance (transport vehicle if transported by public highway or rail) containing no other packages of radioactive material that are required to bear one of the labels prescribed in §172.403 of this subchapter. Specific arrangements must be made between the shipper and the carrier, with instructions to that effect issued with the shipping papers; or

(4) Under any other procedure specifically authorized by the Director, OHMT in accordance with Part 107 of this subchapter. (Approved by the Office of Management and Budget under OMB control number 2137-0535)

(The information collection requirements contained in paragraph (b) were approved by the Office of Management and Budget under control number 2137-0535)

§ 173.459 Mixing of fissile material packages. Shipments of fissile materials packages and the commingling of fissile materials packages with other radioactive materials packages shall be in accordance with the provisions of this section.

(a) Mixing of fissile material packages with other types of radioactive materials, including Fissile Class I with Fissile Class II packages is authorized if the total transport index in any conveyance (transport vehicle if transported by public highway or rail) or storage location does not exceed 50.

(b) For Fissile Class II packages shipped under the exclusive use provisions of §173.441(b), the transport index number which is calculated for nuclear criticality control purposes shall not exceed 10 for any single package nor a total of 50 for the conveyance (transport vehicle if transported by public highway or rail).

(c) Fissile Class II packages may be shipped with an external radiation level greater than 10 millirem per hour at 1 meter (3.3 feet), and combined with other packages of the same or different designs in a Fissile Class III shipment, under the conditions prescribed in §173.457, if:

(1) Each package in the shipment has been assigned a transport

For explanation of abbreviations and reference marks, see last page of this tariff.

index for criticality control purposes in accordance with the Fissile Class II criteria;

(2) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 10 for any single package;

(3) The total transport index for nuclear criticality control purposes does not exceed 100 for all packages in the shipment;

(4) The shipment complies with §173.441(b); and

(5) The shipment is not transported by vessel.

(d) A Fissile Class III shipment of packages may be combined with other packages of the same or different design when each package has been assigned a transport index for nuclear criticality control purposes in accordance with Fissile Class II criteria, and may be combined with Fissile Class II packages into a Fissile Class III shipment under the conditions prescribed in §173.457, if:

(1) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 50 for any single package;

(2) The total transport index for nuclear criticality control purposes for all packages in the shipment does not exceed 100;

(3) The shipment satisfies the provisions of §173.441(b) if any package has a radiation level exceeding 10 millirem per hour at 1 meter (3 3 feet) from any accessible external surface of the package; and

(4) The shipment is not transported by vessel.

§ 173.461 Demonstration of compliance with tests. (a) Compliance with the test requirements in §§173.463 through 173.469 shall be shown by any of the methods prescribed in this paragraph, or by a combination of these methods appropriate for the particular feature being evaluated:

(1) By performance of tests with prototypes or samples of the packaging or special form material as normally presented for transportation, in which case the contents of the packaging for the test shall simulate as closely as practicable the expected normal radioactive contents. The use of non-radioactive substitute contents is encouraged provided that the results of the testing take into account the radioactive characteristics of the contents for which it is being tested;

(2) By reference to a previous, satisfactory demonstration of compliance of a sufficiently similar nature;

(3) By performance of tests with models of appropriate scale incorporating those features that are significant with respect to the item under investigation, when engineering experience has shown results of those tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as the penetrator diameter or the compressive load, must be taken into account; or

(4) By engineering evaluation or comparative data.

(b) With respect to the initial conditions for the tests under §§173.463 through 173.469, except for the water immersion tests, compliance shall be based upon the assumption that the package is in equilibrium at an ambient temperature of 38°C (100°F).

§ 173.462 Preparation of specimens for testing. (a) Each specimen (i.e., sample, prototype or scale model) shall be examined before testing to identify and record faults or damage, including:

(1) Divergence from the specifications or drawings;

(2) Defects in construction;

(3) Corrosion or other deterioration; and

(4) Distortion of features.

(b) Any deviation found under paragraph (a) of this section from the specified design shall be corrected or suitably taken into account in the subsequent evaluation.

(c) The containment system of the packaging shall be clearly specified.

(d) The external features of the specimen shall be clearly identified so that reference may be made to any part of it.

§ 173.463 Packaging and shielding—testing for integrity. After each of the applicable tests specified in §173.465 and §173.466, the integrity of the packaging, or of the packaging and its shielding, shall be retained to the extent required by §173.412(m) for the packaging being tested.

§ 173.465 Type A packaging tests. (a) The proposed packaging with proposed contents must be capable of withstanding the tests prescribed in this section. One prototype may be used for all tests if the requirements of paragraph (b) of this section are complied with.

(b) **Water spray test.** The water spray test must precede each test or test sequence prescribed in this section. The water spray test shall simulate exposure to rainfall of approximately 5 centimers (2 inches) per hour for at least one hour. The time interval between the end of the water spray test and the beginning of the next test shall be such that the water has soaked-in to the maximum extent without appreciable drying of the exterior of the specimen. In the absence of evidence to the contrary, this interval may be assumed to be two hours if the water spray is applied from four different directions simultaneously. However, no time interval may elapse if the water spray is applied from each of the four directions consecutively.

(c) **Free drop test.** The free drop test consists of a fall onto the target in a manner that causes maximum damage to the safety features being tested, and:

(1) For packages weighing 5,000 kilograms (11,000 pounds) or less, the distance of the fall measured from the lowest point of the packaging to the upper surface of the target shall not be less than 1.2 meters (4 feet).

(2) For packages weighing more than 5,000 kilograms (11,000 pounds), the distance of the fall shall not be less than the distance specified in Table 11, for the applicable packaging weight:

TABLE 11.—FREE-FALL DISTANCE FOR PACKAGINGS WEIGHING MORE THAN 5,000 KILOGRAMS

Packaging weight		Free fall distance	
Kilograms	Pounds	Feet	Meters
>5 000 to 10,000	>11,000 to 22 000	3	0 9
>10,000 to 15,000	>22 000 to 33,000	2	0 6
More than 15,000	More than 33 000	1	0 3

(3) For Fissile Class II packagings, the free drop specified in subparagraph (1) or (2) of this paragraph shall be preceded by a free drop from a height of .3 meter (1 foot) on each corner. For cylindrical packagings, the .3 meter (1 foot) drop shall be onto each of the quarters of each rim.

(4) For fiberboard or wood rectangular packages not exceeding 50 kilograms (110 pounds) in weight, a separate specimen of the proposed packaging shall be subjected to a free drop onto each corner from a height of .3 meter (1 foot).

(5) For fiberboard cylindrical packages weighing not more than 100 kilograms (220 pounds) a separate specimen of the proposed packaging shall be subjected to a free drop onto each of the quarters of each rim from a height of .3 meter (1 foot).

(6) The target shall have a flat, horizontal surface of such mass and rigidity that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.

(d) **Compression test.** The compression test shall last for a period of at least 24 hours and consists of a compressive load equivalent to the greater of the following:

(1) Five times the weight of the actual package; or

(2) 1300 kilograms per square meter (265 pounds per square foot) multiplied by the vertically projected area of the package. The compressive load shall be applied uniformly to two opposite sides of the packaging specimen, one of which must be the base on which the package would normally stand.

(e) **Penetration test.** For the penetration test the packaging specimen shall be placed on a rigid, flat, horizontal surface that will not move while the test is being performed. The test shall consist of:

(1) A bar of 3 2 centimeters (1.25 inches) in diameter with a hemispherical end, weighing 6 kilograms (13 2 pounds) being dropped with its longitudinal axis vertical, onto the center of the weakest part of the packaging specimen, so that, if it penetrates far enough, it will hit the containment system. The bar must not be deformed by the test; and

(2) The distance of the fall of the bar measured from its lower end to the upper surface of the packaging specimen shall not be less than 1 meter (3 3 feet).

§ 173.466 Additional tests for Type A packagings designed for liquids and gases. (a) In addition to the tests prescribed in §173.465, Type A packagings designed for liquids and gases shall be capable of withstanding the following tests:

(1) **Free drop test.** The packaging specimen shall fall onto the target in a manner which will cause it to suffer the maximum damage to its containment. The distance of the fall measured from the lowest part of the packaging specimen to the upper surface of the target shall be not less than 9 meters (30 feet).

(2) **Penetration test.** The specimen must be subjected to the test specified in §173.465(e) except that the distance of the fall shall be 1.7 meters (5 5 feet).

§ 173.467 Tests for demonstrating the ability of Type B and fissile radioactive materials packagings to withstand accident conditions in transportation. Each Type B packaging or packaging for fissile material shall meet the test requirements prescribed in 10 CFR Part 71 for ability to withstand accident conditions in transportation.

§ 173.469 Tests for special form radioactive materials. (a) Special form radioactive materials must meet the test requirements of paragraph (b) of this section. Each solid radioactive material or capsule specimen to be tested shall be manufactured or fabricated so that it is representative of the actual solid material or capsule which will be transported with the proposed radioactive content duplicated as closely as practicable. Any differences between the material to be transported and the test material such as the use of non-radioactive contents shall be taken into account. In addition:

(1) A different specimen may be used for each of the tests;

(2) The specimen must not break or shatter when subjected to the impact, percussion, or bending tests;

(3) The specimen must not melt or disperse when subjected to the heat test; and

(4) After each test, leaktightness or indispersibility of the specimen shall be determined by a method no less sensitive than the leaching assessment prescribed in paragraph (c) of this section. For a capsule resistant to corrosion by water, and which has an internal void volume greater than 0.1 milliliters, an alternative to the leaching assessment is a demonstration of leaktightness of 10^{-6} torr-l/s (1.3×10^{-4} atm-cm3/S) based on air at 25°C (77°F) and one atmosphere differential pressure for solid radioactive content, or 10^{-5} torr-l/s (1.3×10^{-3} atm-cm³/s) for liquid or gaseous radioactive content.

(b) **Test methods:** (1) **Impact Test.** The specimen must fall onto the target from a height of not less than 9 meter (30 feet). The target must be as specified in § 173.465(c)(6);

(2) **Percussion Test.**

(i) The specimen shall be placed on a sheet of lead that is supported by a smooth solid surface, and be struck by the flat face of a steel billet so as to produce an impact equivalent to that resulting from a free fall of 1.4 kilograms (3 pounds) through 1 meter (3.3 feet;

(ii) The flat face of the billet shall be 25 millimeters (1 inch) in diameter with the edges rounded off to a radius of 3 millimeters ±0.3 millimeters (.12 inch ±.012 inch);

(iii) The lead shall be of a hardness within 3.5 to 4.5 on the Vickers scale, and not more than 25 millimeters (1 inch) thick, and shall cover an area greater than that covered by the specimen;

(iv) A fresh surface of lead shall be used for each impact; and

(v) The billet must strike the specimen in a manner that causes maximum damage.

(3) **Bending test.**

(i) This test applies only to long, slender sources with a length of 10 centimeters (4 inches) or more and with a length at least 10 times the minimum width;

(ii) The specimen must be securely clamped in a horizontal position so that one half of its length protrudes from the face of the clamp;

(iii) The position of the specimen must be such that it will suffer maximum damage when its free end is struck by the flat face of a steel billet;

(iv) The billet must strike the specimen in a manner that produces an impact equivalent to that resulting from a free vertical fall of 1.4 kilograms (3 pounds) through 1 meter (3.3 feet); and

(v) The flat face of the billet must be 25 millimeters (1 inch) in diameter with the edges rounded off to a radius of 3 millimeters ±0.3 millimeters (.12 inch ±.012 inch)

(4) **Heat test.** The specimen shall be heated in air to a temperature of not less than 800°C (1472°F), held at that temperature for a period of 10 minutes, and the allowed to cool.

(c) **Leaching assessment methods.**

(1) For indispersible solid material—

(i) The specimen shall be immersed for seven days in water at ambient temperature. The water must have a pH of 6–8 and a maximum conductivity of 10 micromho per centimeter at 20°C (68°F);

(ii) The water and specimen shall then be heated to a temperature of 50°C ± 5° (122°F ± 9°) and maintained at this temperature for four hours;

(iii) The activity of the water shall then be determined;

(iv) The specimen shall then be stored for at least seven days in still air with humidity not less than 90 percent at 30°C (86°F);

(v) The specimen shall then be immersed in water with the same pH and maximum conductivity specifications as in subparagraph (1)(i) of this paragraph. The water and specimen must be heated to 50°C ± 5° (122°F ± 9°) and maintained at that temperature for four hours;

(vi) The activity of the water shall then be determined. The activities determined in subparagraph (1)(iii) and this subparagraph shall not exceed 0.05 microcuries.

(2) For encapsulated material—

(i) The specimen shall be immersed in water at ambient temperature. The water must have a pH of 6–8 and a maximum conductivity of 10 micromho per centimeter. The water and specimen shall be heated to a temperature of 50°C ± 5° (122°F ± 9°) and maintained at this temperature for four hours;

(ii) The activity of the water shall then be determined;

(iii) The specimen shall then be stored for at least seven days in still air at a temperature not less than 30°C (86°F);

(iv) Step (i) shall be repeated; and

(v) The activity of the water shall be determined. The activities determined in paragraph (c)(2)(ii) and this paragraph (c)(2)(v) shall not exceed 0.05 microcuries.

§ 173.471 Requirements for U.S. Nuclear Regulatory Commission approved packages. In addition to the applicable requirements of the U.S. Nuclear Regulatory Commission (USNRC) and Parts 171–177 of this subchapter, any shipper of a Type B, Type B(U), Type B(M), or fissile material package that has been approved by the USNRC in accordance with 10 CFR Part 71 shall also comply with the following requirements:

(a) The shipper shall be registered with the USNRC as a party to the approval, and the shipment must be made in compliance with the terms of the approval;

(b) The outside of each package shall be durably and legibly marked with the package identification marking indicated in the USNRC approval;

(c) Each shipping paper related to the shipment of the package shall bear the package identification marking indicated in the USNRC approval;

(d) Before the first export shipment of the package, the shipper shall obtain a U.S. Competent Authority Certificate for that package design or if one has already been issued, the shipper shall register with the U.S. Competent Authority as a user of the certificate. Upon registration as a user of the certificate the shipper will be furnished with a copy of it. The shipper shall then submit a copy of the U.S. Competent Authority Certificate applying to that package design to the national competent authority of each country into or through which the package will be transported, unless a copy has already been furnished;

(e) The U.S. Competent Authority responsible for administering the requirements of Section VIII of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)," is the:

Research and Special Programs Administration, Office of Hazardous Materials Transportation (OHMT), U.S. Department of Transportation, Washington, D.C. 20590.

(f) Each request for a U.S. Competent Authority Certificate as required by the IAEA regulations shall be submitted in writing to the address set forth in paragraph (e) of this section. The request shall be in duplicate and include copies of the applicable USNRC approval and a reproducible drawing showing the make-up of the package. Each request is considered in the order in which it is received. To allow sufficient consideration by OHMT, requests should be received at least 45 days before the requested effective date; and

(g) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0512. The information collection requirements contained in paragraph (d) were approved under control number 2137-0515. The information collection requirements contained in paragraph (e) were approved under control number 2137-0514.)

§ 173.472 Requirements for exporting DOT Specification Type B and fissile packages. (a) Any shipper who exports a DOT Specification Type B or fissile material package authorized by §§ 173.416 or 173.417 shall comply with paragraphs (b) through (f) of this section.

(b) The shipper shall register with the U.S. Competent Authority as a user of the appropriate U.S. Competent Authority Certificate and the shipment shall be made in accordance with the certificate;

(c) The outside of each package must be durably and legibly marked with the package identification marking indicated in the U.S. Competent Authority Certificate;

(d) Each shipping paper related to the shipment of the package must bear the package identification marking indicated in the U.S. Competent Authority Certificate;

(e) Before the first export shipment of the package, the shipper must submit a copy of the U.S. Competent Authority Certificate applying to that package design to the national competent authority of each country into or through which the package will be transported, unless a copy has already been furnished; and

(f) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraphs (b) and (e) were approved by the Office of Management and Budget under control number 2137-0515.)

§ 173.473 Requirements for foreign-made packages. In addition to the applicable requirements of Parts 171 through 177 of this subchapter, each shipper of a foreign-made Type B, Type B(U), Type B(M), or fissile material package for which a competent authority certificate is required by the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" shall also comply with the following requirements:

(a) Prior to the first shipment of such a package of radioactive materials into or from the U.S., the shipper shall:

(1) Have the foreign competent authority certificate revalidated by the U.S. Competent Authority, unless this has been done previously. The request must be in duplicate and contain all the information required by Section VIII of the IAEA regulations. Each request is considered in the order in which it is received. To allow sufficient consideration by OHMT, requests should be received at least 45 days before the requested effective date.

(2) Submit a copy in English of the foreign competent authority certificate with the request for revalidation;

(3) Register its identity in writing with the U.S. Competent Authority as a user of the package covered by the foreign competent authority certificate and its revalidation. If the shipper is requesting the revalidation, this automatically done by OHMT; and

(4) Supply to the carrier, upon request, the applicable competent authority certificates. However, the competent authority certificates are not required to accompany the packages to which they apply.

(b) The outside of each package shall be durably and legibly marked with the same competent authority identification marking indicated on the competent authority certificate and revalidation;

(c) Each shipping paper for a shipment of radioactive materials shall bear a notation of the package identification marking indicated on the competent authority certificate or revalidation;

(d) All requirements of the foreign competent authority certificate and the U.S. Competent Authority revalidation shall be fulfilled; and

(e) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0517)

§ 173.474 Quality control for construction of packaging. (a) Prior to the first use of any packaging for the shipment of radioactive material, the shipper shall determine, that:

(1) The packaging meets the quality of design and construction requirements as specified in this subchapter; and

(2) The effectiveness of the shielding, containment, and, when required, the heat transfer characteristics of the package, are within the limits specified for the package design.

§ 173.475 Quality control requirements prior to each shipment of radioactive materials. Before each shipment of any radioactive material's package, the shipper shall ensure by examination or appropriate tests, that:

(a) The packaging is proper for the contents to be shipped;

(b) The packaging is in unimpaired physical condition, except for superficial marks;

(c) Each closure device of the packaging, including any required gasket, is properly installed, secured, and free of defects;

(d) For fissile material, each moderator and neutron absorber, if required, is present and in proper condition;

(e) Each special instruction for filling, closing, and preparation of the packaging for shipment has been followed;

(f) Each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed;

(g) Each packaging containing liquid in excess of an A_2 quantity and intended for air shipment has been tested to show that it will not leak under an ambient atmospheric pressure of not more than 0.25 atmosphere, absolute, (0.25 kilograms per square centimeter or 3.6 psia). The test must be conducted on the entire containment system, or on any receptacle or vessel within the containment system, to determine compliance with this requirement;

(h) The internal pressure of the containment system will not exceed the design pressure during transportation; and

(i) External radiation and contamination levels are within the allowable limits specified in this subchapter.

§ 173.476 Approval of special form radioactive materials. (a) Each shipper of special form radioactive materials shall maintain on file for at least one year after the latest shipment, and provide to the RSPA on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of § 173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

(b) Prior to the first export shipment of a special form radioactive material from the United States, each shipper shall obtain a Competent Authority Certificate for the specific material. For special form material manufactured outside the United States an IAEA Certificate of Competent Authority from the country of origin may be used to meet this requirement. For special form material's manufactured in the United States each shipper shall obtain a U.S. Competent Authority Certificate for the specific material. Each petition for a U.S. Competent Authority Certificate shall be submitted in accordance with § 173.471(e) and must include the following information:

(1) A detailed description of the material or if a capsule, a detailed description of the contents. Particular reference must be made to both physical and chemical states;

(2) If a capsule is to be used, a detailed statement of its design and dimensions, including complete engineering drawings and schedules of material, and methods of construction; and

(3) A statement of the tests that have been made and their results; evidence based on calculative methods to show that the material is able to pass the tests; or other evidence that the special form radioactive material complies with § 173.469.

(c) Paragraphs (a) and (b) of this section do not apply in those cases where A_1 equals A_2 and the material is not described on the shipping papers as "Radioactive Material, Special Form, n.o.s."

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0518. The information collection requirements contained in paragraph (b) were approved under control number 2137-0519)

§ 173.477 Approval for export shipments. (a) Each export shipment of a package for which an IAEA certificate of competent authority has been issued or revalidated in accordance with §§ 173.471, 173.472, or 173.473 shall have multilateral approval, if the shipment includes:

(1) A vented Type B(M) package;

(2) A Type B(M) packaging containing radioactive materials with an activity greater than $3 \times 10^3 A_1$, or $3 \times 10^3 A_2$, as appropriate, or 3×10^4 curies, whichever is less;

(3) A Fissile Class III shipment; or

(4) Transportation by special arrangement.

(b) Each application for shipment approval shall contain:

(1) The period of time for which the approval is sought;

(2) A description of the contents, the expected modes of transportation, the type of conveyance to be used, and the proposed route; and

(3) An explanation of how the special precautions and special administrative and operational controls referred to in the package design certificates are to be put into effect.

(c) The packaging and shipment approvals may be combined into a single approval issued in accordance with §§ 173.471, 173.472 or 173.473.

(d) Approval by competent authorities is not required for packagings designed for materials covered by §§ 173.421 through 173.427 nor for Type A packagings designed for non-fissile radioactive materials.

(The information collection requirements contained in paragraph (b) were approved by the Office of Management and Budget under control number 2137-0532)

§ 173.478 Notification to competent authorities for export shipments. (a) Before the first export shipment of any packaging with contents exceeding A_1 or A_2, the shipper shall ensure that copies of each applicable competent authority certificate issued in accordance with §§ 173.471, 173.472, or 173.473 have been submitted to the competent authority of each country through which or into which it is to be transported. The shipper is not required to await an acknowledgment from the competent authority prior to shipping the radioactive material, nor is the competent authority required to acknowledge receipt of the certificate.

(b) For each of the shipments described in this paragraph, the shipper shall notify the competent authority of each country through which or into which the shipment is to be transported. This notification must be received by each competent authority at least 15 days before the shipment starts for the following:

(1) Type B(U) packagings containing radioactive materials with an activity greater than $3 \times 10^3 A_1$, $3 \times 10^3 A_2$, as appropriate, or 3×10^4 curies, whichever is the least;

(2) Type B(M) packages;

(3) Fissile Class III shipments under Section VIII of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)"; or

(4) Transportation by special arrangements.

(c) The shipper notification must include—

(1) Sufficient information to enable the packaging to be identified, including all applicable certificate numbers and identification marks; and

(2) Information as to the date of shipment, the expected date of arrival, and the proposed routing.

(d) The shipper is not required to send a separate notification if the required information has been included in the application for shipment approval.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0515. The information collection requirements contained in paragraphs (b) and (c) were approved under control number 2137-0532)

SUBPART J

OTHER REGULATED MATERIAL; DEFINITION AND PREPARATION

§ 173.500 Definitions. (a) An Other Regulated Material (ORM) is a material that

(1) May pose an unreasonable risk to health and safety or property when transported in commerce; and

(2) Does not meet any of the definitions of the other hazard classes specified in this subchapter, or

(3) Has been reclassed an ORM (specifically or permissively) according to this subchapter.

Note: There is no change in the applicability of Subparts K, L, and M of this Part for materials classed as ORM A, B, or C when they are hazardous substances or hazardous wastes (see § 172.101(c)(1)).

(b) ORM-S are divided into classes as follows:

(1) An ORM-A material is a material which has an anesthetic, irritating, noxious, toxic, or other similar property and which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation.

(2) An ORM-B material is a material (including a solid when wet with water) capable of causing significant damage to a transport vehicle from leakage during transportation. Materials meeting one or both of the following criteria are ORM-B materials:

(i) A liquid substance that has a corrosion rate exceeding 0.250 inch per year (IPY) on aluminum (nonclad 7075-T6) at a test temperature of 130° F. An acceptable test is described in NACE Standard TM-01-69.

(ii) Specifically designated by name in § 172.101 of this subchapter.

(3) An ORM-C material is a material which has other inherent characteristics not described as an ORM-A or ORM-B but which make it unsuitable for shipment, unless properly identified and prepared for transportation. Each ORM-C material is specifically named in § 172.101 of this subchapter.

(4) An ORM-D material is a material such as a consumer commodity which, though otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity and packaging. They must be materials for which exceptions are provided in § 172.101 of this subchapter. A shipping description applicable to each ORM-D material or category of ORM-D materials is found in § 172.101 of this subchapter.

(5) An ORM-E is a material that is not included in any other hazard class, but is subject to the requirements of this subchapter. Materials in this class include:

(i) Hazardous waste.

(ii) Hazardous substances as defined in § 171.8 of this subchapter.

§ 173.505 Exceptions for Other Regulated Material (ORM). (a) The following ORMs, unless otherwise provided by § 172.101 of this subchapter, are not subject to the requirements of this subchapter, except §§ 173.6, 173.21 and 173.24 and Subparts C and D of Part 172 of this subchapter when packaged as follows:

(1) ORM—A, B, or C liquid, not over one pint in one packaging;

(2) ORM—A or B solid, not over five pounds in one packaging;

(3) ORM—C solid, not over twenty-five pounds in one packaging.

(b) Strong outside packagings as specified in § 173.1200 and marking requirements specified in § 172.316 of this subchapter are not required for materials classed as ORM-D when unitized in cages, carts, or similar overpacks and when shipped by a private or contract motor carrier from a distribution center to retail outlet.

§ 173.510 General packaging requirements. (a) Except as provided in § 173.505, ORM materials must be prepared for shipment in compliance with the following:

(1) Each material must be offered for transportation and transported in compliance with Subparts B, C, and D of Part 172 of this subchapter and Subparts A and B of Part 173. [Note: Packaging for certain PCB's for disposal, and for storage for disposal is prescribed by EPA in 40 CFR 761.60 and 761.65.]

(2) For packagings of 110 gallon capacity or less, sufficient outage (ullage) must be provided so the packaging will not be liquid full at 130° F. (55° C.).

(3) When a liquid or solid has an absolute vapor pressure exceeding 16 p.s.i. at 100° F. (38° C.), the primary packaging must be capable of withstanding the inside vapor pressure at 130° F. without leakage.

(4) Any material classed as an ORM material, which may cause a hazard in transportation due to its reaction with water, must be packaged with either an inner or outer water proof packaging.

(5) Portable tanks, tank cars, cargo tanks, hopper and dump type transport vehicles must be free from leaks and all discharge openings must be securely closed during transportation.

SUBPART K

OTHER REGULATED MATERIAL; ORM-A

§ 173.605 Ammonium hydrosulfide solution, ammonium polysulfide solution, bromochloromethane, dibromodifluoro-methane, dichlorodifluoroethylene; dichloromethane, 1,1,1-trichloroethane, perfluoro-2-butene, tetrachloroethylene, and trichloroethylene. (a) Ammonium hydrosulfide solution, ammonium polysulfide solution, bromochloromethane, dibromodifluoro-methane, dichlorodifluoroethylene, dichloromethane, 1,1,1-trichloroethane, perfluoro-2-butene, tetrachloroethylene, and trichloroethylene, when offered for transportation on a passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Wooden box with inside earthenware, glass, metal, or plastic packagings of not more than 2 gallons capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage.

(2) Fiberboard box with inside earthenware, glass, metal, or plastic packagings of not more than 1 gallon capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage.

(3) Metal drum of not more than 10 gallons capacity.

(4) Outside packaging with inside earthenware, glass, plastic, or metal packagings of not more than 4 fluid ounces capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage. The maximum amount that may be shipped in any one outside packaging is 5 gallons.

§ 173.610 Camphene. (a) Camphene, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a wooden, metal, or rigid plastic packaging.

(b) Camphene, when offered for transportation by air, must be prepared for shipment in compliance with § 173.510 and must be packaged as prescribed in § 173.154.

§ 173.615 Carbon dioxide, solid (dry ice). (a) Solid carbon dioxide, when offered for transportation by aircraft or water, must be packed in packaging designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packaging. For each shipment by air exceeding five pounds per package, advance arrangements between the shipper and each carrier must be made.

(b) Railroad cars and motor vehicles containing solid carbon dioxide, when accepted for transportation on board ocean vessels, must be conspicuously marked on two sides "WARNING—CO_2 SOLID (DRY ICE)."

(c) Other packagings, when accepted for transportation on board ocean vessels, must be marked "CARBON DIOXIDE, SOLID—DO NOT STOW BELOW DECKS."

(d) Not more than 440 pounds of solid carbon dioxide may be transported in any one cargo pit or bin on any aircraft except by specific and special arrangement between the shipper and the aircraft operator.

(e) Carbon dioxide, solid (Dry ice) is excepted from the shipping paper and certification requirements of this subchapter if the requirements of paragraphs (a) and (d) of this section are complied with and the package is marked "Carbon dioxide, solid" or "Dry ice" and marked with an indication that the material being refrigerated is used for diagnostic or treatment purposes (e.g. Frozen medical specimens).

§ 173.620 Carbon tetrachloride, ethylene dibromide (1,2-dibromoethane), and tetrachloroethane. (a) Carbon tetrachloride, ethylene dibromide, and tetrachloroethane, when offered for shipment by cargo aircraft only and water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) As prescribed in §§ 173.344, 173.345 or 173.346, meeting the packaging requirements applicable to Poison B liquids.

(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity. Not authorized for transportation by air.
(3) Wooden box with inside containers, not over 200 pounds gross weight. Not authorized for transportation by air.
(4) Uniform Freight Classification (UFC), Rule 41, Sections 2 and 3. Fiberboard box, with inside containers, not over 90 pounds gross weight. Not authorized for transportation by air.
(5) Tank cars or motor vehicle tank trucks. Not authorized for transportation by air.
(6) Specification 51 (§178.245 of this subchapter). Portable tanks. Not authorized for transportation by air.
(7) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.
(b) Carbon tetrachloride, ethylene dibromide, and tetrachloroethane, when offered for shipment by passenger-carrying aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged to meet the packaging requirements of §173.345.

§ 173.630 Chloroform. (a) Chloroform, when offered for transportation by aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Wooden box with inside earthenware, glass, metal, or plastic packaging of not more than 2 gallons capacity each.
(2) Fiberboard box with inside earthenware, glass, metal, or plastic packaging of not more than 1 gallon capacity each.
(3) Metal drum, not over 55 gallons capacity.
(4) Outer packaging with inside earthenware, glass, metal, or plastic packagings of not more than 4 fluid ounces capacity each, not exceeding 5 gallons total content.
(b) Chloroform, when offered for shipment by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) As prescribed in §§173.344, 173.345 or 173.346 meeting the packaging requirements applicable to Poison B liquids.
(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity.
(3) Wooden box with inside containers, not over 200 pounds gross weight.
(4) Uniform Freight Classification (UFC), Rule 41, Section 2 and 3. Fiberboard box with inside containers, not over 90 pounds gross weight.
(5) Specification IM 101 portable tanks (§§178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.635 Ferrophosphorus. (a) Ferrophosphorus, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Steel barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden box with inside container; or
(4) Sift-proof railroad freight car.
(5) Fiber drums having an aluminum foil barrier.

§ 173.645 Ferrosilicon. (a) Ferrosilicon, containing 30 percent or more but not more than 70 percent silicon, when offered for shipment by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Steel barrel or drum;
(2) Wooden barrel or keg; or
(3) Wooden box, not over 500 pounds gross weight.
(b) Ferrosilicon, containing 30 percent or more but not more than 70 percent silicon, when offered for shipment by cargo aircraft only must be prepared for shipment in compliance with §§173.510 and 173.154.

§ 173.650 Hexachloroethane. (a) Hexachloroethane, when offered for shipment by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) As prescribed in §§173.363, 173.364 and 173.365, meeting the packaging requirements applicable to Poison B solids.
(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity each.
(3) Wooden box with inside containers, not over 200 pounds gross weight.
(4) Uniform Freight Classification (UFC), Rule 41, Sections 2 and 3. Fiberboard box with inside containers, not over 90 pounds gross weight.

§ 173.655 Naphthalene or naphthalin. (a) Naphthalene or naphthalin, when offered for shipment by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Wooden barrel or keg;
(2) Wooden box;
(3) Fiberboard box;
(4) Metal barrel or drum; or
(5) Burlap (jute) bag, not over 224 pounds net weight. Authorized only when the melting point is 167° F. or higher.
(b) Naphthalene or naphthalin, when offered for shipment by cargo aircraft only, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) As prescribed for passenger-carrying aircraft in paragraph (c) of this section, or
(2) As prescribed in §173.154.
(c) Naphthalene or naphthalin, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Earthenware, glass, metal, or plastic inside packagings of not more than 5 pounds capacity each, in strong outside packaging not over 25 pounds net weight.

SUBPART L

OTHER REGULATED MATERIAL; ORM-B

§ 173.800 Ammonium hydrogen sulfate, ammonium fluoride, barium oxide, chloroplatinic acid, copper chloride, ferric chloride, lead chloride, molybdenum pentachloride, potassium hydrogen sulfate, sodium aluminate, sodium hydrogen sulfate, and or sodium hydrogen sulfite, (each in solid form). (a) Ammonium hydrogen sulfate, ammonium fluoride, barium oxide, chloroplatinic acid, copper chloride, ferric chloride, lead chloride, molybdenum pentachloride, potassium hydrogen sulfate, sodium aluminate, sodium hydrogen sulfate, or sodium hydrogen sulfite, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Earthenware, glass, metal, or plastic inside packagings of not more than 5 pounds net capacity each. Inside packagings must be packed in strong outside packaging, containing not more than 25 pounds net weight.

§ 173.850 Lime, unslaked; quicklime; and calcium oxide. (a) Unslaked lime, quicklime, or calcium oxide when offered for transportation by cargo aircraft only or water, must be prepared for shipment in compliance with §173.510 and must be packed in waterproof packaging as follows:
(1) Steel barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden box;
(4) Multi-wall paper bag, not over 100 pounds net weight;
(5) Paper-lined burlap bag, not over 100 pounds net weight; or
(6) Sift-proof railroad freight car.
(7) Sift-proof bulk freight container with net weight not over 40,000 pounds.
(8) Portable tank with gross weight not over 7,000 pounds.
(b) Unslaked lime, quicklime, or calcium oxide, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Earthenware, glass, metal, or plastic inside packagings, of not more than 5 pounds net capacity each. Inside packagings must be packed in strong outside packaging, containing not more than 25 pounds net weight.

§ 173.860 Mercury, metallic. (a) Except as limited by paragraphs (b) and (c) of this section, metallic mercury, when offered for transportation by aircraft, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:
(1) Earthenware, glass, or plastic inside packagings of not more than 5 pounds capacity each packed in strong outside packagings. Either the inside or the outside packaging must have complete enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(2) Iron or steel flasks packed in outside packagings. Either the inside or the outside packaging must have completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(b) Manufactured devices of which mercury is a component part (except tubes as described in paragraph (c) of this section) packed in outside packagings having completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury, may be transported by aircraft if prepared for shipment in compliance with §173.510.

(c) Electron tubes, vapor tubes, and similar tubes of which mercury is a component part, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) In outside packaging with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the outside packagings; authorized only if the item contains not over one pound (454 grams) of mercury.

(2) In outside packaging having completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(3) In manufacturer's original packaging if each item does not contain more than 0.18-ounce (5 grams) of mercury per tube, and if the outside package does not contain more than 1.1 ounces (30 grams) total net quantity.

(4) In the manufacturer's original packagings if tubes are completely jacketed in sealed leak-tight metal cases.

(5) In manufacturer's original packaging if each item does not contain more than 100 milligrams of mercury per tube and if the outside package does not contain more than one gram total net quantity. Packages conforming to these quantity limitations are not subject to any other requirements of this subchapter.

§ 173.861 Gallium metal, liquid. Gallium metal, liquid, when offered for transportation, must be packaged in earthenware, glass, or plastic inside packagings of not more than 5 pounds net capacity each packed in strong outside packagings. Either the inside or outside packagings must have complete enveloping linings or bags of strong, leak-tight, and puncture-resistant material impervious to liquid gallium metal.

§ 173.862 Gallium metal, solid. Gallium metal, solid, when offered for transportation, must be packaged in glass or rigid plastic inside packagings of not more than 5 pounds net capacity each, enclosed in a sealed bag of strong, leak-tight, and puncture-resistant material impervious to liquid gallium. The sealed bag must be placed in a packaging constructed of wood, fiberboard, or plastic which is lined with a strong, leak-tight, and puncture-resistant material impervious to liquid gallium. This packaging must be enclosed in an outer packaging which contains dry ice or other means of refrigeration sufficient to maintain the gallium in a completely solid state during the entire anticipated time the gallium will be in transportation to its destination.

SUBPART M

OTHER REGULATED MATERIAL; ORM—C

§ 173.906 Inflatable life-rafts, escape slides, and evacuation slides. An inflatable life-raft, escape slide or evacuation slide serviced and ready for use as a life-saving appliance aboard a vessel or aircraft, containing small quantities of hazardous materials which are required as part of the life-saving appliance, including non-flammable compressed gas packaged in cylinders in accordance with this subchapter, Class C explosives that are pyrotechnic signal devices, and flammable liquids in repair kits, must be packed in a strong outside packaging.

§ 173.910 Ammonium sulfate nitrate. (a) Ammonium sulfate nitrate, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Steel barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden box with inside packagings;
(4) Fiberboard box with inside packagings, not over 90 pounds gross weight;
(5) Fiber drum, not over 150 pounds gross weight; or
(6) Paper bag, not over 200 pounds net weight, moisture, and sift-proof, of strength not less than the equivalent of bags made of 8-ounce burlap.

§ 173.915 Battery parts. Battery parts, when exhausted and unwashed, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packed in a metal or wooden barrel with sufficient absorbent material to absorb any liquid present in the parts.

§ 173.920 Bleaching powder. (a) Bleaching powder (or chlorinated lime) containing less than 39 percent available chlorine, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Steel barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden or fiberboard box, with inside containers; or
(4) Fiber drum with inside metallic or polyethylene liner, not over 275 pounds gross weight.

§ 173.945 Calcium cyanamide, not hydrated. (a) Calcium cyanamide, not hydrated, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Steel barrel or drum; or
(2) Wooden barrel or keg.

(b) Calcium cyanamide, not hydrated, when offered for transportation by cargo aircraft only, must be prepared for shipment in compliance with §§173.510 and 173.154.

(c) Calcium cyanamide, not hydrated, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with §173.510 and must be packed in earthenware, glass, metal, or plastic inside packagings of not over 1 pound each, adequately cushioned to prevent breakage and leakage. Inside packagings must be packed in a strong outside package containing not more than 25 pounds each.

§ 173.952 Castor beans and castor pomace. (a) Castor beans and castor pomace, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Sift-proof, five-ply paper bag, not over 100 pounds net weight.
(2) Sift-proof, paper or plastic lined burlap bag, not over 100 pounds net weight.
(3) Sift-proof, paper or plastic lined cotton bag, not over 100 pounds net weight.

§ 173.955 Coconut meal pellets. (a) Coconut meal pellets which contain at least 6 percent water, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Burlap (jute) bag;
(2) Multi-wall paper bag; or
(3) Polyethylene-lined burlap or paper bag.

§ 173.960 Copra. Copra, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged in a burlap bag.

§ 173.965 Cotton and other fibers. Cotton and the fibers jute, hemp, flax, sisal, coir, kapok, or similar vegetable fibers, when offered for transportation by water, must be packaged in bales, securely and tightly bound with rope, wire, or other similar means.

§ 173.985 Exothermic ferrochrome, ferromanganese, and silicon-chrome. Exothermic ferrochrome, ferromanganese, and silicon-chrome, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged in a steel barrel or drum, not over 750 pounds gross weight.

§ 173.995 Fish scrap and fish meal. (a) Except as provided in paragraph (b) of this section, fish scrap and fish meal, containing at least 6 percent but not more than 12 percent water, when offered for transportation by water, must be prepared for shipment in compliance with §173.510 and must be packaged as follows:

(1) Burlap (jute) bag;
(2) Multi-wall paper bag;
(3) Polyethylene-lined burlap or paper bag;
(4) Rail car; or
(5) Freight container.

(b) Fish scrap and fish meal may not be offered for transportation if the temperature of the material exceeds 120° F. (49° C.).

For explanation of abbreviations and reference marks, see last page of this tariff.

(c) When fish scrap or fish meal is offered for transportation by vessel in bulk in freight containers the following additional requirements must be met:
(1) The fish meal must contain at least 100 PPM antioxidant (ethoxyquin) at the time of shipment.
(2) Each shipment must be accompanied by a statement in which the shipper certifies:
(i) The moisture content of the fish meal;
(ii) The concentration of antioxidant (ethoxyquin) in the material in PPM at the time of loading into the freight container.
(iii) The fat content of the fish meal;
(iv) Date and place of production of the fish meal and
(v) The physical state of the material (ground, pelletized, or mixture).

§ 173.1010 Lead dross or scrap containing 3 percent or more free acid. Lead dross or scrap, containing 3 percent or more free acid when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in steel barrels or drums or wooden barrels, boxes, or kegs.

§ 173.1015 Lithium batteries, for disposal. (a) Lithium batteries, for disposal, comprised of one or more cells, may be offered for transportation to a permitted storage facility and disposal site by motor vehicle only, if the battery:
(1) When new, contained not more than 12 grams of lithium per cell;
(2) Is equipped with an effective means of preventing external short circuits;
(3) Is classified and offered for transportation as an ORM–C; and
(4) Is overpacked in a strong fiberboard box, or metal or fiber drum which complies with § 173.24.
(b) Paragraph (a) does not apply to lithium batteries which, when new, were excepted from regulation under § 173.206(f).

§ 173.1020 [Reserved]

§ 173.1025 Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel). Ferrous metal borings, shavings, turnings, or cuttings, other than stainless steel, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a metal barrel or drum.

§ 173.1040 Pesticide, water-reactive. Water reactive pesticide not otherwise subject to this subchapter, and including fungicides, herbicides, etc., which contain manganese ethylene bis-dithio carbamate, when offered for transportation by water, must be packaged in water resistant packaging in compliance with § 173.510.

§ 173.1045 Petroleum coke, uncalcined. Uncalcined petroleum coke, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in metal barrels or drums.

§ 173.1060 RESERVED

§ 173.1065 Rubber curing compound, solid. (a) Solid rubber curing compounds, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:
(1) Metal barrel or drum;
(2) Fiber drum;
(3) Wooden barrel or keg;
(4) Wooden or fiberboard box;
(5) Sift-proof multi-wall paper bag; or
(6) Sift-proof lined burlap bag.

§ 173.1070 Sawdust or wood shavings. (a) Sawdust or wood shavings, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:
(1) Steel barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden or fiberboard box;
(4) Bag; or
(5) Bales, slatted and compactly bound with wire or metal bands.

§ 173.1080 Sulfur. (a) Sulfur, flowers of sulfur (sulfur flower), when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:
(1) Metal barrel or drum;
(2) Wooden barrel or keg;
(3) Wooden or fiberboard box;
(4) Sift-proof multi-wall paper bag;
(5) Sift-proof paper-lined burlap bag;
(6) Sift-proof rail car; or
(7) Sift-proof or lined freight container.

§ 173.1090 Asbestos.
(a) Asbestos includes any of the following hydrated mineral silicates: chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, actinolite asbestos, and every product containing any of these minerals.
(b) Commercial asbestos is any material or product containing asbestos that has commercial value because of its asbestos content.
(c) Asbestos which is immersed or fixed in a natural or artificial binder material (such as cement, plastic, asphalt, resins or mineral ore) and manufactured products containing asbestos or any materials or products whose commercial value is not dependent on their asbestos content, are not subject to the requirements of this subchapter.
(d) Commercial asbestos must be offered for transportation and transported in:
(1) Rigid, leaktight packagings such as metal or fiber drums, portable tanks, hopper-type rail cars, or hopper-type motor vehicles;
(2) Bags or other non-rigid packagings in closed freight containers, motor vehicles, or rail cars that are loaded by and for the exclusive use of the consignor and unloaded by the consignee;
(3) Bags or other non-rigid packagings which are dust and sift-proof. When transported by other than private carrier by highway, such packagings containing asbestos must be palletized and unitized by methods such as shrink-wrapping in plastic film or wrapping in fiberboard secured by strapping. Pallets need not be used during transportation by vessel for loads with slings that are unitized by methods such as shrink-wrapping, if the slings adequately and evenly support the loads and the unitizing method prevents shifting of the bags or other non-rigid packagings during conditions normally incident to transportation; or
(4) Bags or other non-rigid packagings which are dust and sift-proof in strong outside fiberboard or wooden boxes.

SUBPART N

OTHER REGULATED MATERIAL; ORM—D

§ 173.1200 Consumer Commodity. (a) In order to be transported under the proper shipping name of "Consumer commodity," a material must meet that definition. It may be reclassed and offered for shipment as ORM–D material (See § 173.500) provided that an ORM–D exception is authorized in specific sections applicable to the material, and that it is prepared in accordance with the following paragraphs. (The gross weight of each package must not exceed 65 pounds and each package offered for transportation aboard aircraft must meet the requirements of § 173.6.)

(1) **Flammable liquids must be:**
(i) In inside metal containers, each having a rated capacity of 1 quart or less, packed in strong outside packagings;
(ii) In inside containers, each having a rated capacity of 1 pint or less, packed in strong outside packagings.
(iii) In inside containers, each having a rated capacity of one gallon or less, packed in strong outside packagings. The provisions of this exception apply only if the flash point of the material is 73° F. or higher.

(2) **Corrosive liquids must be:**
(i) In bottles, each having a rated capacity of 1 pint or less, each enclosed in a metal can, packed in strong outside packagings.
(ii) In metal or plastic containers, each having a rated capacity of 1 pint or less, packed in strong outside packagings.
(iii) In metal or plastic inside containers, each having a rated capacity of not over 1 quart, packed in strong outside packaging provided the liquid mixture contains 15 percent or less corrosive material and the remainder of the mixture does not meet the definition of a hazardous material as defined in the subchapter. Not authorized for transportation by air.

(3) Corrosive solids must be:

(i) In earthenware, glass, plastic or paper containers each having a net weight of 5 pounds or less, packed in strong metal, wooden, or fiberboard outside packagings, each having a net weight of 25 pounds or less.

(ii) In metal, rigid fiber, or composition cans or cartons or rigid plastic containers each having a net weight of 10 pounds or less, packed in strong outside packagings each having a net weight of 25 pounds or less.

(iii) In metal, rigid fiber, or composition cans or cartons or rigid plastic containers, each having a rated capacity of not over 20 pounds, overpacked in metal, wooden or fiberboard outside containers not exceeding 50 pounds net weight provided the solid mixture contains 10 percent or less corrosive material and the remainder of the mixture does not meet the definition of a hazardous material as defined in this subchapter.

(4) Flammable solids except for charcoal briquettes must be in inside containers each having a net weight of 1 pound or less, packed in strong outside packagings each having a net weight of 25 pounds or less. Charcoal briquettes may be shipped in packagings having a net weight of 65 pounds or less.

(5) Oxidizers must be in inside containers each having a rated capacity of 1 pint or less for liquids or a net weight of 1 pound or less for solids, packed in strong outside packaging each having a net weight of 25 pounds or less.

(6) Organic peroxides must be:

(i) In inside containers which must be securely packed and cushioned with noncombustible cushioning material in strong outside packagings containing not over 1 pint or 1 pound net quantity of the material's. Cushioning is not required when the liquid is contained in strong, securely closed, plastic packagings, not over 1 ounce capacity each, properly packed to prevent leakage or breakage.

(ii) In strong outside packagings of 24 or less inside fiberboard containers, each having 70 or less securely closed tubes having a maximum fluid capacity of ½-ounce each and securely packed in noncombustible cushioning material. Each fiberboard container may not contain more than 1 pint of liquid.

(7) Poison B liquids or solids must be in inside containers, each having a rated capacity of 8 ounces or less by volume for liquids or of 8-ounces or less net weight for solids packed in strong outside packagings.

(8) Compressed gases must be:

(i) In inside containers, each having a water capacity of 4-fluid ounces or less (7.22 cubic inches or less), packed in strong outside packagings.

(ii) In inside metal container charged with a solution of material's and compressed gas or gases which is nonpoisonous, meeting all of the following:

(A) Capacity may not exceed 50 cubic inches (27.7 fluid ounces);

(B) Pressure in the container may not exceed 180 p.s.i.g. at 130° F. (55° C.). If the pressure exceeds 140 p.s.i.g. at 130° F., (55° C.) but does not exceed 160 p.s.i.g. at 130° F., (55° C.) a specification DOT 2P (§178.33 of this subchapter) inside metal container must be used; if the pressure exceeds 160 p.s.i.g. at 130° F., (55° C.), a specification DOT 2Q (§178.33a of this subchapter) inside metal container must be used. In any event the metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 130° F. (55° C.);

(C) Liquid content of the material and gas not completely fill the container at 130° F. (55° C.);

(D) The containers must be packed in strong outside packagings; and

(E) Each completed container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C) without evidence of leakage, distortion, or other defect.

(iii) In a non-refillable inside metal container of 50 cubic-inch capacity or less (27.7 fluid ounces), with foodstuffs or soaps and with soluble or emulsified compressed gas, provided the pressure in the container does not exceed 140 p.s.i.g. at 130° F. (55° C.). The metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 130° F. (55° C.) and must comply with the following provisions:

(A) Containers must be packed in strong outside packagings, and

(B) Liquid content of the material and gas may not completely fill the container at 130° F. (55° C.).

(iv) In refillable inside metal containers with cream and soluble or emulsified compressed gas packed in strong outside packagings. Containers must be of such design that they will hold pressure without permanent deformation up to 375 p.s.i.g. and must be equipped with a device designed so as to release pressure without bursting of the container or dangerous projection of its parts at higher pressures.

(v) In non-refillable inside metal containers charged with a solution, containing biological products or a medical preparation which could be deteriorated by heat, and compressed gas or gasses which is nonpoisonous and nonflammable. The capacity of each container may not exceed 35 cubic inches (19.3 fluid ounces). The pressure in the container may not exceed 140 p.s.i.g. at 130° F. (55° C.), and the liquid content of the product and gas may not completely fill the container at 130° F. (55° C.). One completed container out of each lot of 500 or less, filled for shipment, must be heated, until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C.). There may be no evidence of leakage, distortion, or other defect. Container must be packed in strong outside packagings.

(vi) In electronic tubes, each having a volume of not more than 30 cubic inches and charged with gas to a pressure of not more than 35 p.s.i.g. and packed in strong outside packagings.

(vii) In an inside metal container as a component of an audible fire alarm system powered by a compressed gas meeting the following provisions:

(A) Each inside container must have contents which are not flammable, poisonous, or corrosive as defined under this Part;

(B) Each inside container may not have a capacity exceeding 35 cubic inches (19.3 fluid ounces);

(C) Each inside container may not have a pressure exceeding 70 p.s.i.g. at 70° F. (21° C.) and the liquid portion of the gas may not completely fill the inside container at 130° F. (55° C.);

(D) Each inside container must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 130° F. (55° C.); and

(E) Each fire alarm system must be packed in a strong outside packaging.

§ 173.1201 Small arms ammunition.

(a) Small arms ammunition which has been classed as a Class C explosive may be re-classed and offered for transportation as ORM-D material (See 173.500 of this part) if it is packaged in accordance with paragraph (b) of this section. Small arms ammunition that may be shipped as ORM-D is limited to:

(1) Ammunition for rifle, pistol, or shotgun;

(2) Ammunition with inert projectiles or blank ammunition;

(3) Ammunition having no tear gas, incendiary, or detonating explosive projectiles; and

(4) Ammunition not exceeding 50 caliber for rifle or pistol cartridges or 8 gauge for shotshells.

(b) Packaging for small arms ammunition as ORM-D must be as follows:

(1) Ammunition must be packed in inside boxes, or in partitions which fit snugly in the outside packaging or in metal clips;

(2) Primers must be protected from accidental initiation;

(3) Inside boxes, partitions or metal clips must be packed in securely closed strong outside packagings; and

(4) Maximum gross weight is limited to 65 pounds per package.

SUBPART O

OTHER REGULATED MATERIAL; ORM-E.

§ 173.1300 Hazardous waste, liquid or solid, n.o.s.; hazardous substance, liquid or solid, n.o.s.

Hazardous waste, liquid or solid, n.o.s., or Hazardous substance, liquid or solid, n.o.s., may not be offered for transportation unless packaged in accordance with §173.510.

APPENDIX A - METHOD OF TESTING CORROSION TO SKIN

1. Corrosion to the skin is measured by patch-test technique on the intact skin of the albino rabbit, clipped free of hair. A minimum of six subjects are to be used in this test.

2. Introduce under a square cloth patch, such as surgical gauze measuring not less than 1 inch by 1 inch and two single layers thick, 0.5 milliliter (in the case of liquids) or 0.5 gram (in the case of solids and semi-solids) of the substance to be tested

For explanation of abbreviations and reference marks, see last page of this tariff.

3. Immobilize the animals with patches secured in place by adhesive tape.

4. Wrap the entire trunk of each animal with an impervious material, such as rubberized cloth, for the 4 hour period of exposure. This material is to aid in maintaining the test patches in position and retards the evaporation of volatile substances. It is not applied for the purpose of occlusion.

5. After 4 hours of exposure, the patches are to be removed and the resulting reactions are to be evaluated for corrosion.

6. Following this initial reading, all test sites are washed with an appropriate solvent to prevent further exposure.

7. Readings are again to be made at least at the end of a total of 48 hours (44 hours after the first reading).

8. Corrosion will be considered to have resulted if the substances in contact with the rabbit skin has caused destruction or irreversible alteration of the tissue on at least two out of each six rabbits tested. Tissue destruction is considered to have occurred if, at any of the readings, there is ulceration or necrosis. Tissue destruction does not include merely sloughing of the epidermis, or erythema, edema, or fissuring.

APPENDIX B—PROCEDURE FOR TESTING CHEMICAL COMPATIBILITY AND RATE OF PERMEATION IN POLYETHYLENE PACKAGING AND RECEPTACLES

1. The purpose of this procedure is to determine the chemical compatibility and permeability of liquid hazardous materials packaged in polyethylene packaging and receptacles. Alternatives for this procedure are permitted as specified in § 173.24(d)(3) of this subchapter.

2. Compatibility and rate of permeation are determined by subjecting full size polyethylene containers (or smaller containers as permitted in paragraph 6 of this Appendix) and hazardous material lading to one of the following combinations of time and temperature:

a. Test Method 1: 180 days at a temperature no lower than 18°C. (64°F)

b. Test Method 2: 28 days at a temperature no lower than 50°C. (122°F)

c. Test Method 3: 14 days at a temperature no lower than 60°C. (140°F)

3. Regardless of which test method is used, at least three sample containers shall be tested for each combination of hazardous material and size and design of container. Fill containers to rated capacity with the specific hazardous material (at the concentration to be transported) and close as for shipment. For the first and last 24 hours of storage under the selected test method, place the containers with closures downward, except that containers fitted with a vent are so placed on each occasion for five minutes only.

4. For testing under Test Method 2 or 3 in those instances where it is not practicable to use full size containers, smaller containers may be used. The small container shall be manufactured by the same process as the larger container (for example, using the same method of molding and processing temperatures) and be made of identical resins, pigments and additives.

5. Determine filled container weight or net weight of contents both before and after storage under the selected test method. Rate of permeation is determined from loss of hazardous materials contents, during the conduct of the test, expressed as a percentage of the original weight.

6. After storage under the selected test method, the container shall be drained, rinsed, filled to rated capacity with water and, with filled container at ambient temperature, dropped from a height of 1.2 meters (3.94 feet) onto solid concrete.

7. Each of the following constitute test failure:

a. Visible evidence of permanent deformation due to vapor pressure build-up or collapse of walls, deterioration, swelling, crazing, cracking, excessive corrosion, oxidation, embrittlement, leakage, rupture or other defects likely to cause premature failure or a hazardous condition.

b. For materials meeting the definition of a poison according to this subchapter, a rate of permeation in excess of 0.5% determined over the test period. For all other hazardous materials a rate of permeation in excess of 2.0% determined over the test period.

PART 174—CARRIAGE BY RAIL

SUBPART A

GENERAL REQUIREMENTS

§ 174.1 Purpose and scope. This part prescribes requirements in addition to those contained in Parts 171, 172, 173, and 179 of this subchapter, to be observed with respect to the transportation of hazardous materials in or on rail cars.

§ 174.3 Unacceptable hazardous materials shipments. A shipment of a hazardous material that is not prepared for transportation in accordance with Parts 171, 172 and 173 of this subchapter may not be accepted for transportation or transported by rail except as provided in § 174.47(b).

§ 174.5 Carrier's materials and supplies. This subchapter applies to the transportation of a carrier's materials and supplies moving by rail, except that the shipper's certification is not required when these materials and supplies are being transported by the carrier who owns them. The requirements of this subchapter do not apply to railway torpedoes or fusees when carried in engines or rail cars. Railway torpedoes must be in closed metal boxes when not in use.

§ 174.7 Responsibility for compliance. Unless this subchapter specifically provides that another person is to perform a particular duty, each carrier, including a connecting carrier, shall perform the duties specified and comply with each applicable requirement of this part, and shall instruct his employees in relation thereto.

§ 174.8 Inspection. (a) Methods of manufacture, packing, and storage of hazardous material, insofar as they affect safety in transportation by rail, must be open to inspection by a duly authorized representative of the Department, an initial carrier, and the Bureau of Explosives.

(b) At any point where a train is required to be inspected, each loaded placarded rail car and each rail car immediately adjacent thereto must be inspected. The cars may continue in transit only when the inspection indicates that the cars are in a safe condition for transportation. (See §§ 174.9 and 174.10.) The inspection of a rail car other than a tank car or a rail car containing Class A explosives must include a visual inspection for obvious defects of the running gear and any leakage of contents from the car and to determine whether all required placards are in place and conform to the information given on the train consist or other shipping document as required by § 174.26(b).

(c) For inspection requirements applicable to rail cars containing Class A explosives, see §§ 174.10 and 174.104.

§ 174.9 Inspection of tank cars. (a) Each loaded placarded tank car must be inspected by the carrier before acceptance at the originating point and when received in interchange to see that it is not leaking and that the air and hand brakes, journal boxes, and trucks are in proper condition for service.

(b) An empty tank car which previously contained a hazardous material and which is tendered for movement or received in interchange must have all manhole covers, outlet valve reducers, outlet valve caps, outlet valve cap plugs, end plugs, and plugs or caps or other openings securely in their proper places, except that heater coil inlet and outlet pipes must be left open for drainage.

(c) The safety valves on a tank car may not be tested while the car is loaded. Whenever a test of the safety valves or tank becomes due while a loaded car is in transit, unless the car is leaking or in a manifestly insecure condition, it must be forwarded to its destination, carded on each side with a card exhibiting the following notice:

Safety valves overdue for test.
Tank overdue for test.
Moving under authority of 49 CFR 174.9(c).

A prompt report of each such movement, showing the identifying initials and number of each car, must be made to the Bureau of Explosives by the carrier carding the cars.

§ 174.10 Inspection of cars at interchange. (a) Each rail car containing explosives requiring EXPLOSIVES A placards (see § 174.104) which is offered by a connecting line must be visually inspected externally by the receiving line. If practicable, the receiving carrier should also inspect the lading. The car may not be forwarded until all discovered violations have been corrected.

(b) If the car shows evidence of or if there is any reason to suspect that it has received rough treatment, the lading must be inspected and placed in proper condition before the car is permitted to proceed. When interchange occurs and the inspection is performed after daylight hours, electric flashlights should be used and naked lights may not be used.

(c) A shipment of hazardous materials offered by a connecting carrier must comply with this subchapter, and the revenue waybill, freight bill, manifest of lading, card waybill, switching order, transfer slip ticket, or other billing, must bear the placard notation and endorsement prescribed by § 174.25 of this subpart.

(d) A car containing packages of hazardous materials other than explosives may not be offered in interchange if the packages are in a leaking condition.

(e) In the case of a tank car which has developed small leaks in the course of its movement to an interchange point and which requires a short movement to effect delivery for unloading by the consignee, the movement may be made if it can be made safely adhering to the precautions prescribed by § 174.50.

§ 174.11 Canadian shipments and packings. A Canadian shipment or package may be transported by rail car within the United States if it is in compliance with the requirements of this subchapter or the TDG Regulations and the regulations of the Canadian Transport Commission as provided in § 171.12a of this subchapter.

§ 174.12 Intermediate shippers and carriers. (a) Each origin carrier, including a freight forwarder, must have on file a copy of the shipper's certified shipping paper, as prescribed in Part 172 of this subchapter, for each shipment of hazardous materials it handles. An intermediate shipper or carrier may not forward or transport a shipment of hazardous materials if it does not meet the requirements of this subchapter.

(b) An intermediate carrier offering or delivering for transportation any loaded motor vehicle, trailer, semi-trailer, or container containing any hazardous material must show on the shipping paper the information required by § 172.201 of this subchapter and a description of the type vehicle or container.

§ 174.14 Movements to be expedited. (a) A carrier must forward each shipment of hazardous materials promptly and within 48 hours (Saturdays, Sundays, and holidays excluded), after acceptance at the originating point or receipt at any yard, transfer station, or interchange point, except that where biweekly or weekly service only is performed, a shipment of hazardous materials must be forwarded on the first available train.

(b) A tank car loaded with any flammable liquid or gas, or a poison gas, may not be received and held at any point, subject to forwarding orders, so as to defeat the purpose of this section or of § 174.204 of this subchapter.

§ 174.16 Removal and disposition of hazardous materials at destination. (a) **Delivery at non-agency stations.** A shipment of explosives may not be unloaded at non-agency stations unless the consignee is there to receive it or unless properly locked and secure storage facilities are provided at that point for its protection. If delivery cannot be so made, the shipment must be taken to next or nearest agency station for delivery.

(b) **Delivery at agency stations.** A carrier shall require the consignee of each shipment of hazardous materials to remove the shipment from carrier's property within 48 hours (exclusive of Saturdays, Sundays, and holidays) after notice of arrival has been sent or given. If not so removed, the carrier shall immediately dispose of the shipments as follows:

(1) **Class A explosives:** If safe storage is available, by storage at the owner's expense; if safe storage is not available, by return to the shipper, safe, or destruction under supervision of a competent person; or if safety requires, by destruction under supervision of a competent person.

(2) **Hazardous materials, except Class A explosives, in carload shipments:** By storage on the carrier's property; by storage on other than the carrier's property, if safe storage on the carrier's property is not available; or by sale at expiration of 15 calendar days after notice of arrival has been sent or given to the consignee, provided the consignor has been notified of the non-delivery at the expiration of a 48-hour period and orders for disposition have not been received.

(3) **Hazardous materials, except Class A explosives, in less-than-carload shipments:** By return to the shipper if notice of non-

delivery was requested and given the consignor as prescribed by the carrier's tariff, and orders for return to shipper have been received; by storage on the carrier's property, by storage on other than the carrier's property, if sale storage on the carrier's property is not available; or by sale at expiration of 15 calendar days after notice of arrival has been sent or given to the consignee, provided the consignor has been notified of non-delivery at expiration of a 48-hour period and orders for disposition have not been received.

§ 174.18 Astray shipments. An astray package of hazardous materials other than explosives, of known destination and in proper condition for safe transportation, must be forwarded immediately on an "astray bill", showing the information required by Subpart C of Part 172 of this subchapter. When necessary to replace a label and doubt exists as to the kind, the FLAMMABLE LIQUID label must be applied. For astray shipments of explosives, see §174.103.

§ 174.20 Local or carrier restrictions. (a) When local conditions make the acceptance, transportation, or delivery of hazardous materials unusually hazardous, local restrictions may be imposed by the carrier.

(b) Each carrier must report to the Bureau of Explosives for publication the full information as to any restrictions which it imposes against the acceptance, delivery, or transportation of hazardous materials, over any portion of its lines under this section.

SUBPART B

GENERAL OPERATING REQUIREMENTS

§ 174.24 Shipping papers. (a) Except as provided in paragraph (b) of this section, no person may accept for transportation by rail any hazardous material which is subject to this subchapter unless he has received a shipping paper prepared in the manner specified in Subpart C of Part 172 of this subchapter. In addition, the shipping paper must include a certificate, if required by §172.204 of this subchapter. However, no member of the train crew of a train transporting the hazardous material is required to have a shipper's certificate on the shipping paper in his possession if the original shipping paper containing the certificate is in the originating carrier's possession.

(b) This subpart does not apply to a material classed as an ORM–A, B, C, or D, unless it is a:

(1) Hazardous substance, or

(2) Hazardous waste.

§ 174.25 Additional information on waybills, switching orders and other billings. (a) Each waybill, switching ticket, switching order or other billing used in place thereof, prepared by the carrier from bills-of-lading, shipping orders or other shipping papers, and each shipping order used as a waybill for a rail car required to be placarded by Subpart F of Part 172 of this subchapter must, in addition to containing the information required by §§172.202 and 172.203 of this subchapter, be plainly marked by the carrier with:

(1) In the case of a flatcar carrying trailers or containers, an indication of which trailers or containers contain the hazardous materials; and

(2) The placard endorsement specified in the following table for the hazardous material or class concerned near the space on the face of the billing provided for the car number:

(i) In letters not less than ⅜ of an inch, or (ii) In bold, upper case letters not less than 1/16 of an inch high inside a rectangle made with any symbol such as asterisk (*), dollar sign ($), capital (X), or the symbol for number (#).

Hazardous material or class	Placard notation	Placard endorsement
Explosives, class A	Placarded EXPLOSIVES A	Explosives
Explosive chemical ammunition containing class A poison.	Placarded EXPLOSIVES A and POISON GAS	Explosives and poison gas.
Explosives, class B	Placarded EXPLOSIVES B	Dangerous.
Explosives, class C	Placarded DANGEROUS	Dangerous.
Blasting Agent	Placarded BLASTING AGENT	Dangerous.
Flammable liquids	Placarded FLAMMABLE	Dangerous.
Flammable solids	Placarded FLAMMABLE SOLID	Dangerous.
Oxidizer	Placarded OXIDIZER	Dangerous.
Corrosive material	Placarded CORROSIVE	Dangerous.
Nonflammable gases	Placarded NON FLAMMABLE GAS	Dangerous.
Flammable gases	Placarded FLAMMABLE GAS	Dangerous.
Poisonous gases or liquids, class A	Placarded POISON GAS	Poison gas.
Poison, class B	Placarded POISON	Dangerous.
Radioactive material (Yellow III label only).	Placarded RADIOACTIVE	Radioactive material.
Organic peroxide	Placarded ORGANIC PEROXIDE	Dangerous.
Irritating material	Placarded DANGEROUS	Dangerous.
Combustible liquid	Placarded COMBUSTIBLE	None.
Chlorine	Placarded CHLORINE	Dangerous.
Fluorine	Placarded POISON	Dangerous.
Oxygen, cryogenic liquid	Placarded OXYGEN	Dangerous.
Tank cars which contain a residue of a hazardous material other than a combustible liquid	See Sec. 174.25(c)	Dangerous.
Tank cars which contain a residue of a combustible liquid	See Sec. 174.25(c)	None.

(b) When the initial movement of a loaded rail car required to be placarded is a switching operation, the switching order, switching receipt, or switching ticket, and all copies thereof, prepared by the shipper, or by the carrier under the shipper's written authority, must contain the following:

(1) The shipping description consisting of:

(i) The proper shipping name specified for the material in §172.101 or §172.102 (when authorized) of this subchapter;

(ii) The hazardous class specified for the material in the same table;

(iii) The identification number (preceeded by "UN" or "NA" as appropriate) prescribed for the material in the same Table; and

(iv) The total quantity (by weight, volume, or as otherwise appropriate) of the hazardous material covered by the description.

(2) Except when a certified bill of lading is tendered to the carrier, the shipper's certification and signature specified in §172.204 of this subchapter.

(3) The placard notation specified in the Table in §174.25(a).

(4) For any entry for a material that is a hazardous substance, the letters "RQ" entered either before or after the basic description.

(c) The shipping paper for a tank car that contains only the residue of a hazardous material must contain the words "RESIDUE: Last Contained * * *", followed by the basic description of the hazardous material last contained in the tank car and the placard notation specified in the second column of the table in paragraph (a)(2) of this section followed by the word "RESIDUE." For example, "RESIDUE: Last Contained Petroleum Naptha, Combustible liquid, UN 1255, Placarded: COMBUSTIBLE-RESIDUE". For a tank car that contains a residue that is a hazardous substance, the letters "RQ" must also be entered on the shipping paper either before or after the basic description.

(d) At each station, or other point, where any other shipment of material is loaded into a properly certified and placarded rail car containing a shipment of Explosives A, and when a shipment of Explosives A, is transferred or reloaded, or a carload shipment of Explosives A, is reconsigned, the carrier must make a record of the car, originating point, carrier's name and date of car certificate. In addition, the blocking and bracing must be inspected as required in §174.104 and certified as being in compliance with the requirements of this part by the person making the inspection who shall sign the car certificates immediately below the signature which appears on Certificate Number 2 of the original car certificates attached to the car.

§ 174.26 Notice to train crews of placarded cars. (a) At each terminal or other place where trains are made up or switched by crews other than train crews accompanying the outbound movement of cars, the carrier shall execute consecutively numbered notices showing the location in each train of each rail car placarded EXPLOSIVE A or POISON GAS. A copy of each notice must be delivered to the train and engine crew concerned, and a copy thereof showing delivery to the train and engine crew must be kept on file by the carrier at each point where the notice is given. At points where train or engine crews are changed, the notice must be transferred from crew to crew. See paragraph (b) of this section for other placarded cars.

(b) The train crew must have a document indicating the position in the train of each loaded placarded car containing hazardous materials, except when the position is changed or the placarded car is placed in the train by a member of the train crew. A train consist may be used to meet this requirement.

(c) A member of the train crew of a train transporting hazardous

material's must have in his possession a copy of the shipping papers for the shipment of hazardous material's being transported showing the information required by §§ 172.202 and 172.203 of this subchapter.

§ 174.33 Lost or destroyed labels and placards. Each carrier shall maintain an adequate supply of the labels and placards specified in Subparts E and F of Part 172 of this subchapter on hand to replace those that become lost or destroyed. The carrier shall replace each lost or destroyed label or placard, as the case may be, based on the information on the shipping papers.

§ 174.45 Reporting hazardous material's incidents. When any incident occurs during transportation in which a hazardous material is involved, a report may be required. (See §§ 171.15 and 171.16 of this subchapter.)

§ 174.47 Correction of violations. (a) A shipment of explosives discovered to be in violation of any of the requirements of this subchapter may not be forwarded until all discovered violations have been corrected.

(b) Unless leaking, or in a manifestly insecure condition, each package of hazardous material's other than explosives in transit must be forwarded to its destination and a report made of any violation observed.

§ 174.48 Leaking packages other than tank cars. (a) Leaking packages other than tank cars may not be forwarded until repaired or reconditioned. Leaking or defective packages may be overpacked as required by paragraph (b) of this section. (See §§ 171.15 and 171.16 of this subchapter for reporting requirements.)

(b) Packages of hazardous material's that are damaged or found leaking during transportation, and hazardous material's that have spilled or leaked during transportation, may be forwarded to destination or returned to the shipper in a salvage drum in accordance with the requirements of § 173.3(c) of this subchapter.

§ 174.49 Flammable vapors. A placarded box car, trailer-on-flatcar container-on-flatcar or car known to contain flammable liquids, gases, or vapors may not be entered with a lighted open flame lantern, torch, or other fire, until all car doors are opened and sufficient time has been allowed for ventilation and escape of any vapors.

§ 174.50 Leaking tank cars. (a) A tank car discovered in a leaking condition in transit may not be unnecessarily moved until the unsafe condition has been corrected. In the case of a small leak, short movements may be made if a receptacle is attached under the leak to prevent the spread of the liquid over tracks.

(b) Each leaking tank car must be protected against ignition of the liquid or vapor by flame from sources such as lanterns, torches, flares, fusees, switch lights, switch-thawing flames, fires on sides of tracks, hot coals, lighted pipes, cigars, or cigarettes. All spectators should be kept at a safe distance.

(c) Highly volatile liquids can not be transferred by a vacuum pump unless the pump is placed so that the liquid flows to it from the tank by gravity.

(d) Whenever the leaking condition of a tank car requires the transfer of lading or makes the tank unfit for reloading, the car must be stenciled on both sides in letters three inches in size, adjacent to the car number, "LEAKY TANK. DO NOT LOAD UNTIL REPAIRED". The location of the leak must be indicated and marked with the symbol "X". The owner must be immediately notified by telegram and advised of the exact location of the leak. The stenciling may not be removed until the tank is repaired.

(e) Open-flame lights may not be brought near a placarded tank car that is leaking.

(f) A leaking tank car containing any hazardous material may be switched to a location distant from habitation and highways if the move can be safely made.

SUBPART C

GENERAL HANDLING AND LOADING REQUIREMENTS

§ 174.55 General requirements. (a) Except as otherwise specifically provided, each package of hazardous material's being transported by rail car must be loaded and blocked and braced as prescribed in this subchapter. For recommended methods of blocking and bracing in cars, truck bodies, or trailers, see Bureau of Explosives Pamphlet Nos. 6 and 6C. See loading and storage chart (§ 174.81) before loading labeled material's together.

(b) Packages of hazardous material's must be loaded and securely blocked and braced to prevent the packages from changing position, falling to the floor, or sliding into each other under shocks normally incident to transportation. This requirement does not preclude the use of loading methods that are designed to permit limited movement of the load and that are approved by the Department.

(c) Each package of hazardous material's bearing markings "THIS SIDE UP" or "THIS END UP" must be handled and loaded, blocked and braced, in the car to remain in the position indicated by the markings during transportation.

(d) A heavy package or container of hazardous material's may be trucked, rolled or moved by skid, fork truck, or other handling devices. It may not be dropped from any truck, platform, or rail car. Planks for rolling trucks from platforms to cars must have beveled edges.

(e) A carrier shall store hazardous material's in a secure location while they are being held for loading or delivery. The carrier shall insure that persons not having business with the carrier do not have access to these hazardous material's.

§ 174.57 Cleaning cars. All hazardous material which has leaked from a package in any rail car or on other railroad property must be carefully removed.

§ 174.59 Marking and placarding of rail cars. No person may transport a rail car carrying hazardous material's unless it is marked and placarded as required by this subchapter. Placards and car certificates lost in transit must be replaced at the next inspection point, and those not required must be removed at the next terminal where the train is classified. For Canadian shipments, required placards lost in transit, must be replaced either by those required by Part 172 of this subchapter or by those authorized under § 171.12a.

§ 174.61 Truck bodies, trailers or freight containers on flatcars. (a) A truck body, trailer or freight container containing a hazardous material must be designed and loaded so that it will not rupture or become seriously damaged under conditions normally incident to transportation. Each unit must be secured on a flatcar so that it cannot permanently change position during transit. Packages of hazardous material's contained therein must be loaded and braced as provided by §§ 174.101, 174.112, 174.115 and 174.55. Placards must be applied when prescribed by Part 172 of this subchapter and Part 174.

(b) Except as specified in § 173.21, a truck body, trailer, or freight container equipped with heating or refrigerating equipment which has fuel or any article classed as a hazardous material may be loaded and transported on a flat car as part of a joint rail highway movement. The heating or refrigerating equipment is considered to be a part of the truck body or trailer and is not subject to any other requirements of this subchapter. The truck body, trailer, or freight container must be secured on the flatcar so that it cannot change position during transit.

(c) A cargo tank or multi-unit tank car tank containing hazardous material's may not be transported in trailer-on-flatcar, or container-on-flatcar service except under conditions approved by the Federal Railroad Administrator.

§ 174.63 Freight containers, portable tanks, and IM portable tanks. (a) A freight container or portable tank containing a hazardous material must be designed and loaded so that it will not rupture, or become seriously damaged under conditions normally incident to transportation. Each unit must be secured in a closed or gondola car, on a flatcar, or in a truck body on a flatcar so that it cannot permanently change position during transit. The ends, sidewalls, or doors of a truck body or trailer may not be relied upon to prevent the shifting of a freight container or portable tank.

(b) A Specification 51, 52, 53, 56 or 57 portable tank may not be transported on flatcars or on flat trailers on flatcars, except under conditions approved by the Federal Railroad Administrator. For cargo tanks and multi-unit tank car tanks, see § 174.61(c).

(c) A Specification 51, 52, 53, 56 or 57 portable tank may be shipped only in a rail car that provides specific facilities for bracing and tie-down of these tanks. If TOFC or COFC service is utilized, the tank should be secured in its trailer body in compliance with Bureau of Explosives Pamphlet 6C.

(d) An IM 101 or IM 102 portable tank:

(1) May not be transported in container-on-flat car service (COFC) except under conditions approved by the Associate Administrator for Safety, FRA; and,

(2) May not be transported in trailer-on-flatcar (TOFC) service except under conditions approved by the Associate Administrator for Safety, FRA.

§ 174.67 Tank car unloading. (a) In unloading tank cars, the following rules must be observed (see Subpart F of this Part for gases):

(1) Unloading operations must be performed only by reliable persons properly instructed in unloading hazardous materials and made responsible for careful compliance with this part.

(2) Brakes must be set and wheels blocked on all cars being unloaded.

(3) Caution signs must be so placed on the track or cars to give necessary warning to persons approaching the cars from the open end of a siding and must be left up until after the cars are unloaded and disconnected from the discharge connection. The signs must be of metal or other comparable material, at least 12 inches high by 15 inches wide in size, and bear the words, "STOP—Tank Car Connected", or "STOP—Men at Work", the word "STOP" being in letters at least 4 inches high and the other words in letters at least 2 inches high. The letters must be white on a blue background.

(4) Before a manhole cover or outlet valve cap is removed from a tank car, the car must be relieved of all interior pressure by cooling the tank with water or by venting the tank by raising the safety valve or opening the dome vent at short intervals. However, if venting to relieve pressure will cause a dangerous amount of vapor to collect outside the car, venting and unloading must be deferred until the pressure is reduced by allowing the car to stand overnight or otherwise cooling the contents. These precautions are not necessary when the car is equipped with a manhole cover which hinges inward or with an inner manhole cover which does not have to be removed to unload the car, and when pressure is relieved by piping vapor into a condenser or storage tank.

(b) After the pressure is released, the seal must be broken and the manhole cover removed as follows: (1) Screw type. The cover must be loosened by placing a bar between the manhole cover lug and knob. After two complete turns, so that vent openings are exposed, the operation must be stopped, and if there is any sound of escaping vapor, the cover must be screwed down tightly and the interior pressure relieved as prescribed in paragraph (a)(4) of this section, before again attempting to remove the cover.

(2) Hinged and bolted type. All nuts must be unscrewed one complete turn, after which same precautions as prescribed for screw type cover must be observed.

(3) Interior type. All dirt and cinders must be carefully removed from around the cover before the yoke is unscrewed.

(c) When the car is unloaded through a bottom outlet valve, the manhole cover must be adjusted as follows: (1) Screw type. The cover must be put in place, but not entirely screwed down, so that air may enter the tank through the vent holes in threaded flange of the cover.

(2) Hinged and bolted type. A nonmetallic block must be placed under one edge of the cover.

(3) Interior type. The screw must be tightened up in the yoke so that the cover is brought up within one-half inch of the closed position.

(d) When unloading through the bottom outlet of a car equipped with an interior manhole type cover, and in each case where unloading is done through the manhole (unless a special cover with a safety vent opening and a tight connection for the discharge outlet is used), the manhole must be protected by asbestos or metal covers against the entrance of sparks or other sources of ignition of vapor, or by being covered and surrounded with wet burlap or similar cloth material. The burlap or other cloth must be kept damp by the replacement or the application of water as needed.

(e) Seals or other substances must not be thrown into the tank and the contents may not be spilled over the car or tank.

(f) The valve rod handle or control in the dome must be operated several times to see that outlet valve in bottom of tank is on its seat before valve cap is removed.

(g) The valve cap, or the reducer when a large outlet is to be used, must be removed with a suitable wrench after the set screws are loosened and a pail must be placed in position to catch any liquid that may be in the outlet chamber. If the valve cap or reducer does not unscrew easily, it may be tapped lightly with a mallet or wooden block in an upward direction. If leakage shows upon starting the removal, the cap or reducer may not be entirely unscrewed. Sufficient threads must be left engaged and sufficient time allowed to permit controlled escape of any accumulation of liquid in the outlet chamber. If the leakage stops or the rate of leakage diminishes materially, the cap or reducer may be entirely removed. If the initial rate of leakage continues, further efforts must be made to seat the outlet valve (see paragraph (f) of this section). If this fails, the cap or reducer must be screwed up tight and the tank must be unloaded through the dome. If upon removal of the outlet cap the outlet chamber is found to be blocked with frozen liquid or any other matter, the cap must be replaced immediately and a careful examination must be made to determine whether the outlet casting has been cracked. If the obstruction is not frozen liquid, the car must be unloaded through the dome. If the obstruction is frozen liquid and no crack has been found in the outlet casting, the car may, if circumstances require it, be unloaded from the bottom by removing the cap and attaching unloading connections immediately. Before opening the valve inside the tank car, steam must be applied to the outside of the outlet casting or wrap casting with burlap or other rags and hot water must be applied to melt the frozen liquid.

(h) Unloading connections must be securely attached to unloading pipes on the dome or to the bottom discharge outlets before any discharge valves are opened.

(i) Tank cars may not be allowed to stand with unloading connections attached after unloading is completed. Throughout the entire period of unloading, and while car is connected to unloading device, the car must be attended by the unloader.

(j) If necessary to discontinue unloading a tank car for any reason, all unloading connections must be disconnected. All valves must first be tightly closed, and the closures of all other openings securely applied.

(k) As soon as a tank car is completely unloaded, all valves must be made tight, the unloading connections must be removed and all other closures made tight, except that heater coil inlet and outlet pipes must be left open for drainage. The manhole cover must be reapplied by the use of a bar or wrench, the outlet valve reducer and outlet valve cap replaced by the use of a wrench having a handle at least 36 inches long, and the outlet valve cap plug, end plug, and all other closures of openings and of their protective housings must be closed by the use of a suitable tool.

(l) Railroad defect cards may not be removed.

(m) If oil or gasoline has been spilled on the ground around connections, it must be covered with fresh, dry sand or dirt.

(n) All tools and implements used in connection with unloading must be kept free of oil, dirt, and grit.

§ 174.69 Removal of placards and car certificates after unloading. When lading requiring placards or car certificates is removed from rail cars other than tank cars, placards and car certificates must be removed by the party unloading the car. For a tank car which contained a hazardous material, the person responsible for removing the lading must assure, in accordance with the provisions of § 172.510 (c) of this subchapter, that the tank car is properly placarded for any residue which remains in the tank car.

§ 174.81 Segregation and separation requirements for hazardous materials in rail cars. (a) Charged electric storage batteries must not be loaded in the same car nor stored with any Class A explosive.

(b) Cyanides or cyanide mixtures must not be loaded or stored with acids or corrosive liquids.

(c) Gas identification sets may be loaded and transported with all articles named in the segregation and separation chart, except those in column c.

(d) Nitric acid, when loaded in the same car with other acids or other corrosive liquids in carboys, must be separated from the other carboys. A 2 by 6 inch plank, set on edge, should be nailed across the floor at least 12 inches from the nitric acid carboys, and the space between the plank and the carboys of nitric acid should be filled with sand, sifted ashes, or other incombustible absorbent material.

(e) Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one car shall be classed as flammable solid for purposes of transportation when examined for this classification by the Bureau of Explosives and approved by the Director, OHMT.

(f) Hazardous materials may not be loaded, transported, or stored together, except as provided in the following table:

Segregation and Separation Chart of Hazardous Materials

Footnotes

1. (Reserved)

2. Unless loaded in opposite ends of car, corrosive liquids must not be loaded with flammable solids, oxidizing materials, ammunition for cannon with or without projectiles, or propellant explosives, except that shippers loading carload shipments of corrosive liquids and flammable solids or oxidizing materials and who have obtained prior approval from the Department may load such materials together when it is known that the mixture of contents will not cause a dangerous evolution of heat or gas.

3. Explosives, class A, and explosives, class B must not be loaded or stored with chemical ammunition containing incendiary charges or white phosphorus either with or without bursting charges.

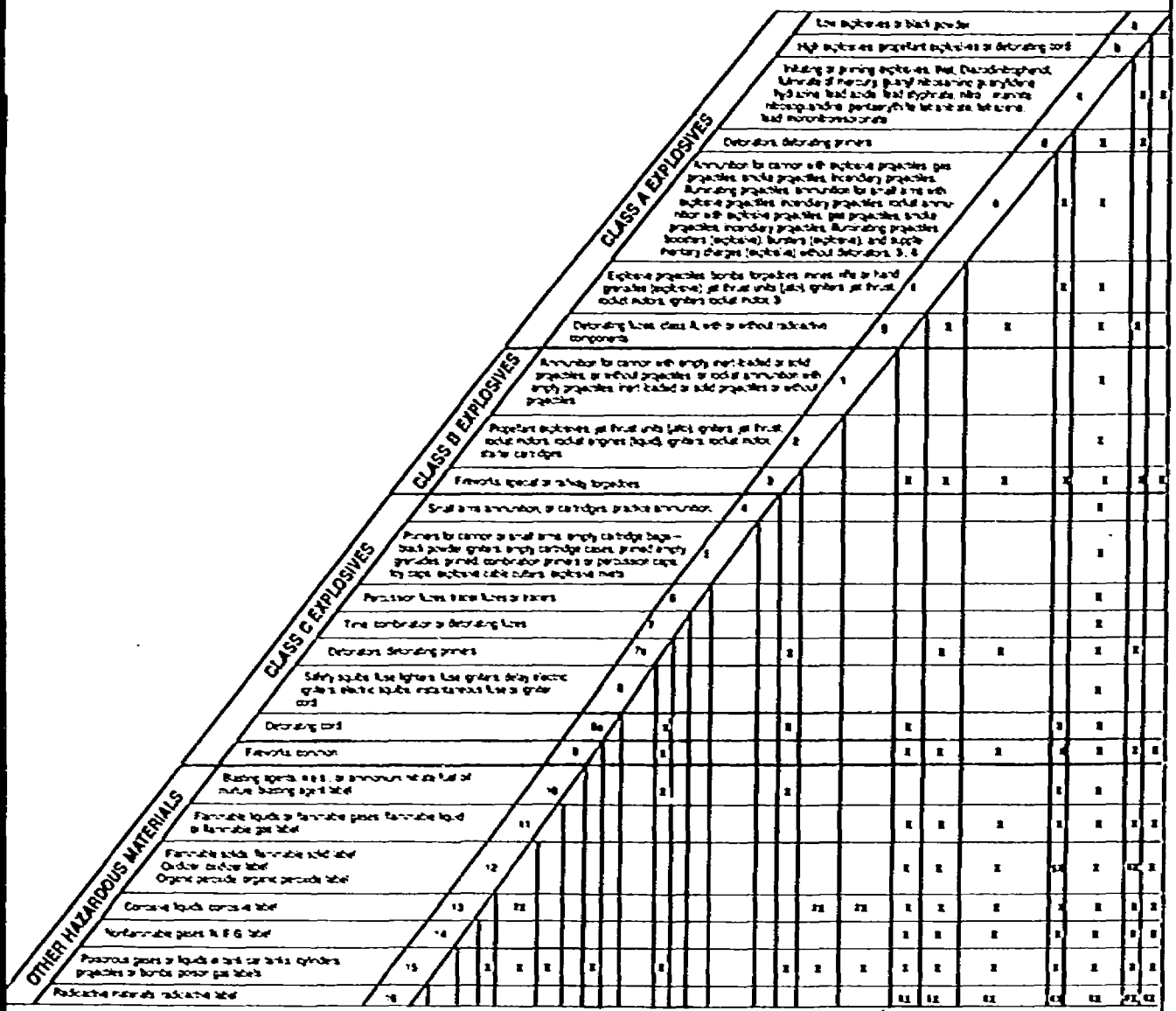
4. Bursters (explosive), boosters (explosive), or supplementary charges (explosive) without detonators when shipped by, to, or for the Departments of the Army, Navy, and Air Force of the United States Government may be loaded with any of the articles named except those in columns c, d, 3, 9, 11, 12, 13, 14, 15 and 16.

5. Does not include ammonium nitrate, fertilizer grade, which may be loaded, transported or stored with high explosives, or with detonators containing no more than 1 gram of explosive each, excluding ignition and delay charges.

6. Normal uranium, depleted uranium, and thorium metal in solid form may also be loaded and transported with articles named in columns a, b, c, d, e, f, and g.

Instructions

The letter X at an intersection shows that these materials must not be loaded or stored together. Example: Detonating fuzes, class A, with or without radioactive components, (g), must not be loaded or stored with high explosives or propellant explosives, (b).


CLASS A EXPLOSIVES
CLASS B EXPLOSIVES
CLASS C EXPLOSIVES
OTHER HAZARDOUS MATERIALS

SUBPART D

HANDLING OF PLACARDED CARS

§ 174.83 Switching of cars containing hazardous materials. (a) In switching operations where the use of hand brakes is necessary, a loaded placarded tank car, or a draft which includes a loaded placarded tank car, may not be cut off until the preceding car or cars clear the ladder track and the draft containing the loaded placarded tank car, or a loaded placarded tank car, shall in turn clear the ladder before another car is allowed to follow. In switching operations where hand brakes are used, it must be determined by trial whether a loaded placarded car, or a car occupied by a rider in a draft containing a placarded car, has its hand brakes in proper working condition before it is cut off.

(b) Any car placarded "EXPLOSIVES A" or "POISON GAS" and any Class DOT–113 tank car placarded "FLAMMABLE GAS" may not be:

(1) cut off while in motion,

(2) coupled into with more force than is necessary to complete the coupling, or

(3) Struck by any car moving under its own momentum.

(c) When transporting a car placarded "EXPLOSIVES A" in a terminal, yard, or on a side track, or siding, it must be separated from the engine by at least one non-placarded car.

(d) The doors of each closed car placarded "EXPLOSIVES A" must be closed, securely fastened, and the lading securely braced before it is moved.

§ 174.84 Switching of flatcars carrying placarded trailers, freight containers, portable tanks or IM portable tanks. (a) A placarded flatcar or a flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank under this subchapter may not be cut off while in motion.

(b) No rail car moving under its own momentum may be permitted to strike any placarded flatcar or any flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank.

(c) No placarded flatcar or any flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank may be coupled into with more force than is necessary to complete the coupling.

§ 174.85 Placement of freight cars placarded "EXPLOSIVES A" in yards, on sidings, or side tracks. A rail car placarded "EXPLOSIVES A" while in a yard or on a siding or side track must be placed so that it will be safe from all probable danger of fire. A car so placarded may not be placed under a bridge or overhead highway crossing, not in or alongside a passenger shed or station except for loading or unloading purposes.

§ 174.86 Position in train of cars placarded "EXPLOSIVES A" or "POISON GAS" when accompanied by cars carrying guards or technical escorts. A rail car placarded "EXPLOSIVES A" or "POISON GAS" in a moving or standing train must be next to and ahead of any car occupied by the guards or technical escorts accompanying this car. However, if a car occupied by guards or technical escorts is equipped with a lighted heater or stove, it must be the fourth car behind any car requiring "EXPLOSIVES A" placards.

§ 174.87 Placarded cars prohibited in passenger trains, limited in mixed trains. (a) A placarded rail car may not be transported in a passenger train. However, it may be transported in a mixed train, but only at such times and between such points that freight train service is not in operation and subject to the following limitations:

(1) A placarded car (other than one placarded "COMBUSTIBLE") may not be transported next to an occupied caboose or a car carrying passengers in mixed trains, except as provided in § 174.86.

(2) When a car containing hazardous materials requiring labels is moved in a mixed train and it is not occupied by an employee of the carrier, placards must be applied to the car as required by Subpart F of Part 172 of this subchapter.

§ 174.88 Position in train of cars placarded "EXPLOSIVES A". In a moving or standing train, a car placarded "EXPLOSIVES A" may not be placed nearer than the sixth car from the engine or an occupied caboose. However, when the length of the train will not permit this car to be so placed, it must be placed as near the middle of the train as possible, but not less than the second car from the engine or occupied caboose.

§ 174.89 Position in train of cars placarded "RADIOACTIVE". In a moving or standing train, a car placarded "RADIOACTIVE" may not be placed next to any other loaded placarded car (other than one placarded "COMBUSTIBLE"), an engine, occupied caboose, or carload of undeveloped film. Cars placarded "RADIOACTIVE" may be placed next to each other.

§ 174.90 Separating cars placarded "EXPLOSIVES A" or "POISON GAS" from other cars in trains. (a) In a moving or standing train, a car placarded "EXPLOSIVES A" or "POISON GAS" may not be placed next to:

(1) A passenger car or combination car that may be occupied except as provided in § 174.86;

(2) Any loaded placarded car other than a car placarded with the same placard or one placarded "COMBUSTIBLE";

(3) An engine;

(4) A wooden underframe car (except on narrow gauge railroads);

(5) A loaded flatcar, except that loaded cars placarded "EXPLOSIVES A" may be placed next to each other. A flatcar equipped with permanently attached ends of rigid construction is considered to be an open-top car. (See paragraph (a)(6) of this section.)

(6) An open-top car when any of the lading protrudes beyond the car ends or when any of the lading extending above the car ends is liable to shift so as to protrude beyond the car ends;

(7) A car with automatic refrigeration or heating apparatus in operation, or a car with open-flame apparatus in service, or with an internal combustion engine in operation;

(8) A car containing lighted heaters, stoves, or lanterns;

(9) A car occupied by any person, including any attendant for the cargo contained therein; or

(10) An occupied caboose, except as provided in § 174.86.

(b) In a moving or standing train, a car placarded "EXPLOSIVES A" may not be placed next to a car placarded "POISON GAS".

§ 174.91 Position in train of loaded placarded tank car other than car placarded "COMBUSTIBLE". Except for a tank car placarded "COMBUSTIBLE", a loaded placarded tank car in a moving or standing train may not be nearer than the sixth car from the engine, occupied caboose, or passenger car. However, when the length of the train will not permit a loaded placarded tank car to be so placed, it must be placed as near the middle of the train as possible and not nearer than the second car from the engine, occupied caboose, or passenger car.

§ 174.92 Separating loaded placarded tank cars other than cars placarded "COMBUSTIBLE" from other cars in trains. (a) In a moving or standing train a loaded placarded tank car, other than one placarded "COMBUSTIBLE", may not be placed next to:

(1) A passenger car or combination car, other than a car occupied by technical escorts and authorized personnel accompanying shipments;

(2) Any car placarded "EXPLOSIVES A", "RADIOACTIVE", or "POISON GAS";

(3) An engine or occupied caboose;

(4) A wooden underframe car (except on narrow gauge railroads);

(5) A loaded flatcar, other than a specially equipped car in trailer-on-flatcar or container-on-flatcar service or a flatcar loaded with vehicles secured by means of a device designed for that purpose and permanently installed on the flatcar, and of a type generally accepted for handling in interchange between railroads subject to the following:

(i) A flatcar equipped with permanently attached ends of rigid construction is considered to be an open-top car (see paragraph (a)(6) of this section); and

(ii) This exception for cars in trailer-on-flatcar service does not apply to loaded flatbed trucks, loaded flatbed trailers, loaded open-top trailers, or loaded trucks or trailers without securely closed doors.

(6) An open-top car when any of the lading protrudes beyond the car ends or when any of the lading extending above the car ends is liable to shift so as to protrude beyond the car ends;

(7) A car with automatic refrigeration or heating apparatus in operation or a car with open-flame apparatus in service or with an internal combustion engine in operation;

(8) A car occupied by any person, including any attendant for the cargo contained therein.

§ 174.93 Position in train of a tank car displaying RESIDUE placards. Except for a tank car placarded COMBUSTIBLE—RESIDUE, a tank car displaying RESIDUE placards in a moving or standing train may not be placed nearer than the second car from an engine or occupied caboose.

SUBPART E

DETAILED REQUIREMENTS FOR EXPLOSIVES

§ 174.100 Forbidden explosives. (a) Explosives described in §173.51 of this subchapter and initiating explosives, dry, may not be accepted for transportation by rail.

(b) Leaking or damaged packages of explosives may not be accepted for transportation by rail. Unless the carrier has knowledge or the shipper has substantiated to the carrier that a stain is due to contact with material other than a liquid explosive ingredient, the carrier shall refuse any package that shows excessive dampness, mold, or other outward sign of any oily stain, or other indication that absorption of the explosive is not perfect, or that the amount of the liquid part is greater than the absorbent can carry.

§ 174.101 Loading explosives. (a) Boxes containing Class A explosives must be loaded so that the ends of wooden boxes will not bear against sides of any fiberboard boxes and so that the ends of any box will not cause a pressure point on a small area of another box.

(b) Explosive bombs, unfuzed projectiles, rocket ammunition and rocket motors, Class A or Class B explosives, which are not packed in wooden boxes, or large metal packages of incendiary bombs, each weighing 500 pounds or more, may be loaded in stock cars or in flat bottom gondola cars only if they are adequately braced. Boxed bombs, rocket ammunition and rocket motors, Class A or Class B explosives, which due to their size cannot be loaded in closed cars, may be loaded in open-top cars or on flatcars, provided they are protected from the weather and accidental ignition.

(c) Boxes of high explosives, low explosives or black powder packed in long cartridges, bags, or sift-proof liners, and containing no liquid explosive ingredient, may be loaded on their sides or ends.

(d) Class A explosives may not be loaded higher than any permanent car lining unless additional lining is provided as high as the lading.

(e) When the lading of a car includes any explosives, the weight of the lading must be distributed insofar as possible to equalize the weight on each side of the car and over the trucks.

(f) Except when boxed, metal kegs containing explosives must be loaded on their sides with their ends toward the ends of the car. Packages of explosives may not be placed in the space opposite the doors unless the doorways are boarded on the inside as high as the lading. This paragraph does not apply to palletized packages if they are braced so they cannot fall or slide into the doorways during transportation.

(g) Wooden kegs, fiber kegs, barrels, and drums must be loaded on their sides or ends, to best suit the conditions.

(h) Package containing any Class A explosives (see § 174.104), detonators or detonating primers must be securely blocked and braced to prevent the packages from changing position, falling to the floor, or sliding into each other, under conditions normally incident to transportation. Explosives must be loaded so as to avoid transfer at stations. For recommended methods of blocking and bracing, see Bureau of Explosives Pamphlets No. 6 and 6A. Heavy packages or containers must be trucked, rolled, or moved by skids, fork trucks, or other handling devices and may not be dropped from trucks, platforms, or cars. Planks or rolling trucks from platforms to cars must have beveled ends. Loading platforms and the shoes of each workman must be free from grit. All possible precautions must be taken against fire. Explosives must be kept in a safe place and inaccessible to unauthorized persons while being held by a carrier for loading or delivery.

(i) To prevent delays of local freight trains, when there are shipments of explosives for different destinations loaded in a "peddler car" or "way car" the shipment for each destination must be stayed separately.

(j) Forwarding and transfer stations for explosives must be provided with the necessary materials for staying.

(k) Shippers must furnish the material for staying packages of explosives loaded by them.

(l) Class A explosives may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or electric devices having exposed heating coils, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(m) [Reserved]

(n) A container car or freight container on a flatcar or a gondola car other than a drop-bottom car, when properly loaded, blocked, and braced to prevent change of position under conditions normally incident to transportation, may be used to transport any Class A explosive except black powder packed in metal containers. A freight container must be designed, constructed, and maintained so as to be weather tight and capable of preventing the entrance of sparks. In addition:

(1) A freight container must be of such design and so braced as to show no evidence of failure of the container or the bracing when subjected to impact from each end of at least 8 miles per hour. Its efficiency shall be determined by actual test, using dummy loads equal in weight and general character to material to be shipped.

(2) A container car or car which is loaded with freight containers must be placarded with the explosives placards as required by Subpart F of Part 172 of this subchapter and with properly executed car certificates as required by § 174.104.

(3) Lading must be so loaded, blocked, and braced within the freight container that it will not change position under impact from each end of at least 8 miles per hour.

(o) Class A or Class B explosives may be loaded and transported in a tight closed truck body or trailer on a flatcar car. Wooden boxed bombs, rocket ammunition, and rocket motors, Class A or Class B explosives, which due to their size cannot be loaded in tight, closed truck bodies or trailers, may be loaded in or on open-top truck bodies or trailers. However, they must be protected against accidental ignition. In addition:

(1) Each truck body or trailer must meet the requirements of Part 177 of this subchapter, applicable to shipments of explosives by motor vehicle.

(2) Each truck body or trailer must be so secured on the rail car so that it will not permanently change position or show evidence of failure or impending failure of the method of securing the truck body or trailer under impact from each end of at least 8 miles per hour. Its efficiency shall be determined by actual test, using dummy loads equal in weight and general character to the material to be shipped. For recommended methods of blocking and bracing, see Bureau of Explosives Pamphlet 6C.

(3) Lading must be so loaded, blocked, and braced within or on the truck body or trailer that it will not change position under impact from each end of at least 8 miles per hour. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet 6C.

(4) Each rail car containing explosives and each rail car loaded with truck bodies, trailers or containers containing explosives must be placarded with explosives placards as required by Subpart F of Part 172 of this subchapter and with properly executed car certificates as required by § 174.104.

(5) Each fuel tank of a heater or refrigerating machinery on the truck bodies or trailers must be drained and all automatic heating or refrigerating machinery must be made inoperative by disconnection of the automatic controls or the source of power for their operations.

§ 174.102 Forbidden mixed loading and storage. (a) Class A explosives and initiating or priming explosives may not be transported together in the same rail car. Additionally, they may not be transported or loaded in the same rail car or stored on carrier property with charged electric storage batteries or with any hazardous material for which a **NONFLAMMABLE GAS, FLAMMABLE GAS, FLAMMABLE LIQUID, FLAMMABLE SOLID, OXIDIZER, ORGANIC PEROXIDE, RADIOACTIVE** or **CORROSIVE** label is required.

(b) Explosives may not be loaded together or with other hazardous materials, except as provided in § 174.81. See § 174.104 for loading shipments of explosives or any other material in a placarded and certified car containing a shipment of Class A explosives.

§ 174.103 Disposition of damaged or astray shipments. (a) Packages of explosives found damaged or broken in transit may be repaired when practicable and not dangerous. A broken box of high explosives that cannot be repaired must be reinforced by stout wrapping paper and twine, placed in another strong box and surrounded by dry, fine sawdust or dry and clean cotton waste or elastic wads made from dry newspapers. A ruptured can or keg must be sealed and enclosed in a strong cloth bag of good quality and boxed. Damaged packages thus protected and properly marked may be forwarded. The box and waybill must be marked to indicate that it has been repacked.

(b) Care must be exercised in repacking damaged containers so that no spark is produced by contact of metal or other hard surfaces which could ignite loose particles of explosive compositions that may be strewn on car floors or freight. In addition, the car floors must be thoroughly swept, and washed with a plentiful supply of water. Iron-wheel trucks, metal hammers, or other metal tools that may produce sparks may not be used. Metal tools must be limited to those made of brass, bronze, or copper.

(c) Each package of explosives showing evidence of leakage of liquid ingredients must:

(1) Be refused if leakage is discovered before acceptance;

(2) Be disposed of to a person who is competent and willing to remove them from the carrier's property, if the leakage is discovered while the shipment is in transit; or

(3) Be removed immediately by consignee, if the leakage is discovered at the shipment's destination.

(d) When the disposition required by paragraph (c) of this section cannot be made, the leaking package must be packed in other boxes large enough to permit enclosure and the leaking boxes must be surrounded by at least 2 inches of dry, fine sawdust or dry and clean cotton

waste, and be stored in a station magazine or other safe place until the arrival of an inspector of the Bureau of Explosives, or other authorized person, to superintend the destruction or disposition of the condemned material.

(e) If careful inspection shows that an astray shipment of explosives is in proper condition for safe transportation, it must be forwarded immediately to its destination if known, or returned to the shipper by the most practicable route.

(f) When a package in an astray shipment is not in proper condition for safe transportation (see paragraphs (a), (c), and (d) of this section), or when the name and address of the consignee and the shipper are unknown, disposition must be made as prescribed by paragraphs (c) and (d) of this section.

§ 174.104 Class A explosives; car selection, preparation, inspection, and certification. (a) Except as provided in § 174.101(b), (n), and (o), Class A explosives being transported by rail may be transported only in a certified and properly placarded closed car of not less than 80,000 pounds capacity, with steel underframes and friction draft gear or cushioned underframe, except that on a narrow-gauge railroad they may be transported in a car of less capacity as long as the car of greatest capacity and strength available is used.

(b) Each rail car used for transporting Class A explosives must meet the following requirements as applicable:

(1) The car must be equipped with air brakes, hand brakes, and roller bearings which are in condition for service.

(2) The car may not have any holes or cracks in the roof, sides, ends, or doors through which sparks may enter, or unprotected decayed spots which may hold sparks and start a fire.

(3) The roof of the car must be carefully inspected from the outside for decayed spots, especially under or near the running board, and such spots must be covered or repaired to prevent their holding fire from sparks. A car with a roof generally decayed, even if tight, may not be used.

(4) The doors must close tightly so that sparks cannot get in at the joints, and, if necessary to achieve this degree of tightness, the doors must be stripped. The stripping should be placed on the inside and fastened to the door frames where it will form a shoulder against which the closed doors are pressed by means of wedges or cleats in door shoes or keepers. The openings under the doors should be similarly closed. The hasp fastenings must be examined with the doors closed and fastened, and the doors must be cleated when necessary to prevent them from shifting. When the car is opened for any reason, the wedges or cleats must be replaced before car containing explosives is permitted to proceed.

(5) The roller bearings and the trucks must be carefully examined and put in such condition as to reduce to a minimum the danger of hotboxes or other failure necessitating the setting out of the car before reaching its destination.

(6) The car must be carefully swept out before it is loaded. For less-than-carload shipments the space in which the packages are to be loaded must be carefully swept. If evidence of a potential hazardous residue is apparent after the floor has been swept, the carrier must either decontaminate the car or provide a suitable substitute car.

(7) Any holes in the floor or lining must be repaired and special care taken that there are no projecting nails or bolts or exposed pieces of metal which may work loose or produce holes in packages of explosives during transit. Protruding nails in the floor or lining which have worked loose must be drawn, and if necessary for the purpose of fastening the floor or lining, new nails must be driven through other parts thereof.

(8) Metal floor plates must be completely covered with wood, plywood, or fiber or composition sheets of adequate thickness and strength to prevent contact of the floor plates with the packages of explosives under conditions incident to transportation, except that the covering of metal floor plates is not necessary for carload shipments loaded by the Department of Defense provided the explosives are of such nature that they are not liable to leakage of dust, powder, or vapor which might become the cause of an explosion.

(9) If the car is equipped with automobile loading devices, it may not be used unless the loading device is securely attached to the roof of the car with fastenings supplementing those already provided and so fixed that it cannot fall.

(10) The car must be equipped with high-friction composition brake shoes (except metal deck flat cars used for COFC/TOFC service may be equipped with high phosphorus cast iron brakeshoes) and brake rigging designed for this type of brake shoe. Each brake shoe on the car must be at least three-eighths inch thick, and in safe and suitable condition for service.

(11) The car must have either a metal subfloor with no combustible material exposed beneath the car, or metal spark shields extending from center sill to side sills and from end sills to at least 12 inches beyond the extreme treads of the inside wheels of each truck, which are tightly fitted against the subfloor so that there is no vacant space or combustible material exposed. The metal subfloor or spark shields may not have an accumulation of oil, grease, or other debris which could support combustion.

(c) Before Class A explosives may be loaded into a rail car, the car must have been inspected and certified to be in compliance with the requirements of paragraph (b) of this section by a qualified person designated under § 215.15 of this title. The certification shall be made in Car Certificate No. 1 on the form prescribed in paragraph (f) of this section.

(d) If the carrier furnishes the car to a shipper for loading Class A explosives, the shipper or his authorized employee shall, before commencing the loading of the car, inspect the interior thereof, and after loading certify to the proper condition of the car and the loading. This certification shall be made on the first signature line in Car Certificate No. 2 on the form prescribed in paragraph (f) of this section. In addition, the finished load must be inspected and certified to be in compliance with the requirements of this part by a qualified person designated under § 215.15 of this title before the car goes forward. This certification shall be made on the second signature line in Car Certificate No. 2 on the form prescribed in paragraph (f) of this section. If the loading is performed by the carrier, Car Certificate No. 2 may only be signed by a qualified person designated under § 215.15 of this title.

(e) If a trailer or container containing Class A explosives is loaded on a flatcar, the loading and securing of the load on the car must be supervised by a representative of the shipper or carrier. The certification shall be made in Car Certificate No. 3 on the form prescribed in paragraph (f) of this section.

(f) Each car certificate for use in connection with the inspection of rail cars for the carriage of Class A explosives shall be printed on strong tag board measuring 7 by 7 inches, or 6 by 8 inches. It must be duly executed in triplicate by the carrier, and by the shipper if he loads the shipments. The original must be filed by the carrier at the forwarding station in a separate file and the other two must be attached to the car, one to each outer side on a fixed placard board or as otherwise provided.

.....RAILROAD

CAR CERTIFICATE

No. 1 .....Station .....
19....

I hereby certify that I have this day personally examined Car Number..... and that the car is in condition for service and complies with the FRA Freight Car Safety Standards [49 CFR Part 215] and with the requirements for freight cars used to transport explosives prescribed by the DOT Hazardous Materials Regulations (49 CFR Part 174).

.....
Qualified Person Designated Under 49 CFR 215.15

No. 2 .....Station .....
19....

I have this day personally examined the above car and hereby certify that the explosives in p on this car, or in or on vehicles or in containers have been loaded and braced, that placards have been applied, according to the regulations prescribed by the Department of Transportation, and that the doors of cars so equipped fit or have been shipped so that sparks cannot enter.

.....
Shipper or his authorized agent

Qualified Person Designated Under 49 CFR 215.15

No. 3 .....Station .....
19....

I hereby certify that I have this day personally supervised the loading of the vehicles o containers on and their securement to the above car.

.....
Shipper or railway employee inspecting loading and securement

Note 1: A shipper must decline to use a car not in proper condition.
Note 2: All certificates, where applicable, must be signed.
Note 3: Car certificates remaining on hand as of the effective date of these regulations may be used until stocks are exhausted but not after July 1, 1977.

§ 174.105 Routing shipments, Class A explosives. Before a shipment of Class A explosives destined to a point beyond the lines o the initial carrier is accepted from the shipper, the initial carrier sha ascertain that the shipment can go forward by the route designated. T avoid delays en route, the initial carrier must be in possession of full rate information before forwarding the shipment.

§ 174.106 "Order-Notify" or "C.O.D." shipments, Class A explosives. (a) A carrier may not accept for transportation Class A explosives, detonators, or detonating primers in any quantity when consigned to "order-notify" or "C.O.D.", except on a through bill of lading to a place outside the United States.

(b) A carrier may not accept for transportation Class A explosives detonators, or detonating primers which the shipper consigns to himself unless the shipper has a resident representative to receive them at the delivery point.

(c) A carrier may not accept Class A explosives for transportation subject to "stop-off privileges en route for partial loading or unloading.

§ 174.107 Shipping days for Class A explosives. (a) Where practicable, each carrier should designate regular days for receiving from shippers less-than-carload lots of Class A explosives for each station where the carrier accepts such shipments.

(b) To enable the carrier to provide proper cars at stations where less-than-carload shipments of Class A explosives are accepted for loading by the carrier, the shipper shall give to the carrier not less than 24-hours notice of his intention to offer such shipments, and state their destinations. When a regular day to receive all explosives shipments offered at such a station has been designated, this notice may be waived by the

carrier, but the explosives shipments must be delivered on such days in time to permit proper inspection, billing, and loading on that day.

§ 174.109 Non-agency shipments. If a shipment of explosives is accepted by a carrier at a non-agency station, the shipper shall make provision for proper certification and placarding of cars, examination of shipments, and the loading and staying of packages in cars. Waybills, switching orders, switching tickets, or other shipping papers must be prepared as prescribed in Part 172 of this subchapter.

§ 174.110 Car magazine. When specially authorized by the carrier, Class A explosives in quantity not exceeding 150 pounds may be carried in construction or repair cars if the packages of explosives are placed in a "magazine" box made of sound lumber not less than 1 inch thick, covered on the exterior with metal, and provided with strong handles. The box must be plainly stenciled on the top, sides, and ends, in letters not less than 2 inches high, "EXPLOSIVES—DANGEROUS—HANDLE CAREFULLY". The box must be provided with strong hinges and with a lock for keeping it securely closed. Vacant space in the box must be filled with a cushioning material such as sawdust or excelsior, and the box must be properly stayed to prevent movement within the car. The car must be placarded with EXPLOSIVES A placards when the magazine contains Explosives A.

§ 174.112 Loading Class B explosives (Also see §174.101). (a) Class B explosives may not be loaded, transported or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) Except as provided in §174.101(b), (n) or (o), Class B explosives must be transported in a closed car or container car which is in good condition, and into which sparks cannot enter. The car does not require the car certificates prescribed in §174.104(c)–(f). If the doors are not tight, they must be stripped to prevent the entrance of sparks. Wood floored cars must be equipped with spark shields (see §174.104). Packages of Class B explosives must be blocked and braced to prevent their movement and possible damage due to movement of other freight during transportation. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6.

(c) Class B explosives may not be transported in a truck body, trailer, or container on a flatcar unless:

(1) The truck body, trailer, or container is closed and tight;

(2) All automatic heating or refrigerating machinery with which the truck body, trailer, or container is equipped is inoperative; and

(3) Packages of Class B explosives are blocked and braced within the truck body, trailer, or container to prevent their movement and possible damage due to movement of other freight during transportation (ends, sidewalls, or doors of the truck body, trailer, or container may not be relied on to prevent the shifting of heavy loads). For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6C. See §174.101(o).

§ 174.114 Record to be made of change of seals on "EXPLOSIVES A" laden cars. (a) When a car seal is changed on a car requiring "EXPLOSIVES A" placards while en route or before delivery to a consignee, a record of the change showing the following information must be made on or attached to the waybill or other form of memorandum which must accompany the car to its destination:

Railroad ..... Place ..... Date .....

Car Initials ..... Car Number .....

Number or description of seal broken .....

Number or description of seal used to reseal car .....

Reasons for opening car .....

Condition of load .....

Name and occupation of person opening car .....

§ 174.115 Loading Class C explosives. (a) Class C explosives may be loaded into any closed car in good condition, or into any container car in good condition. Car certificates are not required. Packages of Class C explosives must be blocked and braced to prevent their movement and possible damage due to movement of other freight during transportation. For methods of recommended loading and bracing see Bureau of Explosives Pamphlet No. 6.

(b) Class C explosives may not be transported in a truck body, trailer, or container on a flatcar unless:

(1) The truck body, trailer, or container is closed and tight;

(2) All automatic heating or refrigerating machinery with which the truck body, trailer, or container is equipped is inoperative; and

(3) Packages of Class C explosives are blocked and braced within the truck body, trailer, or container to prevent their movement and possible damage due to movement of other freight during transportation. Ends, sidewalls, or doors of the truck body, trailer, or container may not be relied on to prevent shifting of heavy loads. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6C.

SUBPART F

DETAILED REQUIREMENTS FOR GASES

§ 174.200 Special handling requirements. (a) Flammable gases may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) Flammable gases may not be loaded in a truck body or trailer equipped with any type of lighted heater or any automatic heating or refrigerating apparatus when such truck bodies or trailers are loaded on flatcars except as provided in paragraph (c) of this section.

(c) Heating or refrigeration apparatus may be operated on a motor vehicle loaded on a flatcar when the motor vehicle is loaded with flammable gases only if:

(1) The lading space is not equipped with any electrical apparatus that is not non-sparking or explosion-proof;

(2) There is no combustion apparatus in the lading space;

(3) There is no connection for the return of air from the lading space to any combustion apparatus; and

(4) The heating system conforms to §393.77 of this title and does not heat any part of the lading over 130 degrees F.

§ 174.201 Compressed gas cylinders. (a) Except as provided in paragraphs (b) and (c) of this section, cylinders containing compressed gases being transported in a rail car must be:

(1) Securely lashed in an upright position so as to prevent their overturning;

(2) Loaded into racks securely attached to the car;

(3) Packed in boxes or crates of such dimensions as to prevent their overturning; or

(4) Loaded in a horizontal position.

(b) Specification DOT–4L (§178.57 of this subchapter) cylinders being transported in a rail car must be loaded in an upright position and be securely braced.

(c) Cylinders containing compressed gases may be transported in stock cars, gondola cars and flatcars. However, they may not be transported in hopper bottom cars.

§ 174.204 Tank car delivery of gases, including cryogenic liquids. (a) A tank car containing compressed gas may not be unloaded unless it is consigned for delivery and unloaded on a private track (see §171.8 of this subchapter). However, if a private track is not available, it may be delivered and unloaded on carrier tracks subject to the following conditions:

(1) A tank car of DOT–106A or 110A type (§179.300 or §179.301 of this subchapter) may not be delivered and the loaded unit tanks may not be removed from the car frame on carrier tracks. However, a carrier may give permission for the unloading of these containers on carrier tracks only if a private siding is not available within a reasonable trucking distance of the final destination. In addition, before the car is accepted for transportation, the shipper must obtain from the delivering carrier and file with the originating carrier, written permission for the removal and the consignee must furnish an adequately strong mechanical hoist by which the tanks can be lifted from the car and deposited directly upon vehicles furnished by the consignee for immediate removal from carrier property.

(2) The following tank cars may not be delivered and unloaded on carrier tracks unless the lading is piped directly from the car to permanent storage tanks of sufficient capacity to receive the entire contents of the car; however, such cars may be stored on a private track (see §171.8

of this subchapter) or on carrier tracks designated by the carrier for such storage:

(i) A tank car containing flammable cryogenic liquid; or

(ii) A tank car, except for a DOT–106A or 110A multi-unit tank car tank (§ 179.300 or § 179.301 of this subchapter), containing anhydrous ammonia; hydrogen chloride, refrigerated liquid; hydrocarbon gas, liquefied; or liquefied petroleum gas; and having interior pipes for liquid and gas discharge valves equipped with check valves.

§ 174.208 Rail cars, truck bodies, or trailers with fumigated or treated lading. (a) A carrier may not accept or transport a rail car or a rail car loaded with a truck body or trailer, containing lading which has been fumigated or treated with a flammable liquid or gas within the preceding 48 hours, unless the truck body or trailer and the car, in the case of a closed car, has been ventilated to remove any danger of fire or explosion due to the presence of flammable vapor.

(b) A rail car or a rail car loaded with a truck body or trailer containing lading which has been fumigated or treated with a poisonous liquid, gas, or solid, must be placarded on each door (or as close as possible to the door if it is not possible to placard the door) with the placard described in § 173.9 of this subchapter.

§ 174.280 Poison gases with foodstuffs. A carrier may not transport any package of gaseous material bearing a poison label in the same car with material which is marked as or known to be foodstuff, feed, or any other edible material intended for consumption by humans or animals.

§ 174.290 Poison A shipped by, for, or to the Department of Defense. (a) Poison A shipped by, for, or to the Department of Defense may be transported by rail only if it is loaded and handled in accordance with the requirements of this section.

(b) Poison A may be transported in:

(1) DOT–5A or WD–5A[1] metal drums, by boxcar, gondola car (flat bottom), or stock car in carload lots. See § 174.55(a)(1) through (4) and § 174.600 for blocking, bracing, and stowage requirements;

(2) Tanks which are authorized under this subchapter for Poison A, Specification DOT 106A (§§ 179.300 and 179.301 of this subchapter), mounted on or secured to a multi-unit car or gondola car (flat bottom) in carload lots only;

(3) Bombs, by boxcar, or gondola car (flat bottom) in carload lots only; or

(4) Projectiles or ammunition for cannon with gas filled projectiles, by boxcar in carload or less-than-carload lots.

(c) Each shipment of one or more carloads of Poison A, as described in paragraph (b) of this section, must be accompanied by a Department of Defense qualified escort supplied with equipment to handle leaks and other packaging failures which could result in escape of the gas. The escort shall remain with the shipment during the entire time that it is in the custody of the carrier and in the event of leakage or escape of gas, shall make repairs and perform decontamination as necessary.

(d) When Poison A is transported in a tank, the tank must be securely mounted on a rail car especially provided for it or on a gondola car prepared with substantial wooden frames and blocks.

(e) Bombs, projectiles, and cannon ammunition being transported by rail must be loaded, blocked and braced as shown in Bureau of Explosives Pamphlet No. 6A, or Department of Defense specifications. When a shipment is loaded in a gondola car it must be securely blocked and braced and not loaded higher than the sides of the car.

(f) When Poison A is transported in drums with filling holes in the heads, they must be loaded on their bottoms. They may be loaded in rows, lengthwise of the car and any space between the sides of the car and the nearest row of drums must be "filled in" with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of drums, or they may be loaded across the car in staggered stacks of which the number of drums in alternate stacks is reduced by one drum. All drums in stacks following the first stack loaded in the end of the car must be placed tightly into the angle of the space formed by the sidewalls of the drum in the preceding stack. Any space between the sides of the car and the drums in stacks having the greater number of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(g) When Poison A is transported in drums with filling holes in the sides, they must be loaded on their sides with the filling holes up. They must be loaded lengthwise of the car in rows and any space between the sides of the car and the nearest row of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(h) When Poison A is transported in drums in a boxcar, they must be loaded from ends of the car toward the space between the car doors, and there braced by center gates and wedges. See Sketch 1, Bureau of Explosives Pamphlet No. 6.

(i) The doorways of a boxcar in which Poison A is being transported must be protected by one of the methods prescribed in Sketch 1, Bureau of Explosives Pamphlet No. 6A.

[1] War Department specification container.

SUBPART G

DETAILED REQUIREMENTS FOR FLAMMABLE LIQUIDS

§ 174.300 Special handling requirements. (a) Flammable liquids may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) A truck body or trailer which is loaded with a flammable liquid and equipped with a lighted heater or any automatic heating or refrigerating apparatus may not be loaded on a flatcar except as provided in paragraph (c) of this section.

(c) Heating or refrigeration apparatus on a motor vehicle loaded with flammable liquids may be operated while the motor vehicle is loaded on a flatcar only if:

(1) The lading space is not equipped with any electrical apparatus that is not non-sparking or explosion-proof;

(2) There is no combustion apparatus in the lading space;

(3) There is no connection for the return of air from the lading space to any combustion apparatus; and

(4) The heating system conforms to § 393.77 of this title and does not heat any part of the lading over 130 degrees F.

(d) Cylinders containing pyrophoric liquids, unless packed in a strong box or case and secured therein to protect valves, must be loaded with all valves and safety relief devices in the vapor space. All cylinders must be secured so that no shifting may occur in transit.

(e) Metal barrels or drums containing flammable liquids may be transported in a steel gondola or flatcar or in a stock car. However, they may not be transported in a hopper bottom car.

§ 174.304 Flammable liquids in tank cars. A tank car containing a flammable liquid, other than liquid road asphalt or tar, may not be transported by rail unless it is originally consigned or subsequently reconsigned to a party having a private track on which it is to be delivered and unloaded (see § 171.8 of this subchapter) or to a party using railroad siding facilities which are equipped for piping the liquid from the tank car to permanent storage tanks of sufficient capacity to receive the entire contents of the car.

§ 174.380 Poisonous flammable liquids with foodstuffs. A carrier may not transport any package of flammable liquid bearing a poison label in the same car with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals.

SUBPART H

DETAILED REQUIREMENTS FOR FLAMMABLE SOLIDS

§ 174.410 Special handling requirements for matches. (a) Each carload lot of strike-anywhere (friction) matches must be loaded as compactly as possible to avoid motion within the car, especially lengthwise of the car. Protruding nails, metal band anchors or other projections on sidewalls, ends, door posts, studding, or car floors likely to puncture packages must be removed or adequately covered to prevent damage to the containers of matches. Car doorways must be boarded on the inside to keep the packages from contacting the doors, and the inside lining of the car must be supplemented when necessary by strips nailed to the car and close enough together to keep the boxes from being jammed against the studding and broken by high pressures on small areas. The strongest dimension of the box must be loaded lengthwise of the car. Partial layers of boxes must be interlocked with the lower layers. The cars used must be made secure against the entrance of sparks or rain.

(b) Each carload lot of strike-anywhere matches handled subject to stop-off privileges must be loaded in accordance with paragraph (a) of this section and when necessary the load must be rearranged or blocked and braced by each consignee before forwarding.

(c) Each less-than-carload lot of strike-anywhere matches must be loaded so that it cannot fall and so that other packages of freight cannot fall on or injure it. Whenever practicable the packages of matches must be placed so as to facilitate ready removal in case of fire.

(d) A carload or less-than-carload lot of strike-anywhere matches which has been damaged by fire, or by water in extinguishing a fire, in transit or on a carrier's property must be reloaded in properly prepared cars, and braced or blocked before being forwarded to destination, to a freight claim department or claim adjuster, or to the original shipper or other party for salvage. Care must be taken to examine and repair damaged outside packages before reloading into car. All loose matches must first be destroyed. Individual interior boxes and paper-wrapped cartons or packages, must then be carefully placed in tight outside packages complying, as nearly as practical, with container specifications, but under no condition shall the outside package be of less strength than required by Specification 15A or 12C (§§178.168, 178.206 of this subchapter), nor of greater capacity than authorized. Charred cases may not be used. Boards used in repairing wooden cases must be so nailed that they will not allow any interior boxes, cartons, or packages to fall out. If the individual boxes or paper-wrapped packages do not fit snugly in the outside package, the vacant spaces must be filled tightly with dry and clean cotton waste, or elastic wads of dry newspapers or dry waste paper.

§ 174.450 Fires. (a) **Cotton.** When fire occurs in a rail shipment of cotton in transit at a point where it cannot be reconditioned and where arrangements cannot be made with the originating carrier to sell it, all burnt cotton in the shipment must be stored under observation in as safe a place as practicable where it shall be held for not less than 10 days after all evidence of fire has been extinguished before forwarding. The billing must be changed to read "Burnt Cotton" and the cotton must be forwarded as a hazardous material. (See § 173.159 of this subchapter.)

(b) **Charcoal.** When fire occurs in a rail shipment of charcoal in transit, water should not be used if it is practicable to locate and remove the burning charcoal. Any charcoal which has become wet in extinguishing a fire must be removed from the car and not reshipped and the remainder of the charcoal must be held under observation in a dry place for at least five days before forwarding.

§ 174.480 Poisonous flammable solids with foodstuffs. A carrier may not transport any package of flammable solid material bearing a poison label in the same car with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals.

SUBPART I

DETAILED REQUIREMENTS FOR OXIDIZERS

§ 174.510 Special handling requirements for nitrates. A nitrate listed in § 173.182(b) of this subchapter being transported by rail may only be transported in a clean closed car, which is free of loose boards, cracks, holes, and exposed decayed spots. The interior of the car must be swept clean and be free of any projections capable of damaging bags when the nitrate is so packaged. The doors of the car must have tight closures. Ammonium nitrate (no organic coating), ammonium nitrate fertilizer (materials tested in accordance with and meeting the definition in the Fertilizer Institute's publication "Definition and Test Procedures for Ammonium Nitrate Fertilizer", dated May 7, 1971), ammonium nitrate mixed fertilizer, or ammonium nitrate phosphate may be transported in bulk in a clean covered hopper car having journals and boxes in good condition.

§ 174.515 Cleaning cars; potassium permanganate. After potassium permanganate is unloaded from a rail car, the car must be thoroughly cleaned unless the car is used exclusively in the carriage of potassium permanganate.

§ 174.580 Poisonous oxidizers with foodstuffs. A carrier may not transport any package of oxidizer material bearing a poison label in the same car with material which is marked as or known to be foodstuff, feed, or any other edible material intended for consumption by humans or animals.

SUBPART J

DETAILED REQUIREMENTS FOR POISONOUS MATERIALS

§ 174.600 Special handling requirements for Poison A materials. A tank car containing Poison A may not be transported by rail unless it is originally consigned or subsequently reconsigned to a party having a private track on which it is to be delivered and unloaded (see § 171.8 of this subchapter) or to a party using railroad siding facilities which are equipped for piping the liquid or gas from the tank car to permanent storage tanks or sufficient capacity to receive the entire contents of the car.

§ 174.615 Cleaning cars. (a) A rail car which has contained arsenic, arsenate of lead, sodium arsenate, calcium arsenate, Paris green, calcium cyanide, potassium cyanide, sodium cyanide, or other poisonous materials which show any evidence of leakage from packages, must be thoroughly cleaned after unloading before the car is returned to service.

(b) After poisonous materials are unloaded from a rail car, that car must be thoroughly cleaned unless the car is used exclusively in the carriage of poisonous materials.

§ 174.680 Poisons with foodstuffs. A carrier may not transport any package of material bearing a poison label in the same car with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals.

SUBPART K

DETAILED REQUIREMENTS FOR RADIOACTIVE MATERIALS

§ 174.700 Special handling requirements for radioactive materials. (a) Each rail shipment of low specific activity materials as defined in §173.403 of this subchapter must be loaded so as to avoid spillage and scattering of loose material. Loading restrictions are prescribed in §173.425 of this subchapter.

(b) The number of packages of radioactive materials that may be transported in any rail car or stored at any single location is limited to that number which does not make a total transport index number (as defined in §173.403(bb) of this subchapter, and determined by adding together the transport index numbers on the labels of the individual packages) of more than 50. This provision does not apply to exclusive use shipments as described in §§173.403, 173.425, 173.441, and 173.547.

(c) Each package of radioactive material bearing **RADIOACTIVE YELLOW–II** or **RADIOACTIVE YELLOW–III** labels when being placed in a rail car, depot, or other place may not be placed closer than three feet to an area (or dividing partition between areas) which may be continuously occupied by any passenger, rail employee, or shipment of animals, nor closer than 15 feet to any package containing undeveloped film (if so marked). If more than one package of radioactive materials is present, the distance must be computed from the table below on the basis of the total transport index number (determined by adding together the transport index numbers on the labels of the individual packages) of packages in the car or storeroom:

Total transport index	Minimum separation distance in feet to nearest undeveloped film [1]	Minimum distance in feet to area of persons, or minimum distance in feet from dividing partition of a combination car [2]
None	0	0
0.1 to 10.0	15	3
10.1 to 20.0	22	4
20.1 to 30.0	29	5
30.1 to 40.0	33	6
40.1 to 50.0	36	7

[1] In feet to nearest undeveloped film.

[2] In feet to area of persons, or minimum distance in feet from dividing partition of a combination car.

Note: The distance in the table must be measured from the nearest point on the packages of radioactive materials.

(d) Each fissile Class III radioactive material shipment (as defined in §173.455(a)(3) of this subchapter) must be transported in accordance with one of the methods prescribed in §173.457 of this subchapter. The transport controls must be adequate to assure that no fissile Class III shipment is transported in the same rail car with any other fissile radioactive material shipment. In loading and storage areas each fissile Class III shipment must be segregated by a distance of at least 20 feet from other packages required to bear one of the "radioactive" labels described in Part 172 of this subchapter.

(e) A flatcar may be used to transport radioactive materials in a container weighing 15,000 pounds or more. A gondola car (other than a drop bottom car) may be used to transport any of the following:

(1) Radioactive materials in containers weighing 5,000 pounds or more;

(2) Strong wooden boxes with inside containers of solid radioactive material, securely braced and cushioned; or

(3) Radioactive material in concrete-filled metal drums or in concrete vaults weighing 700 pounds or more.

(f) A person may not remain unnecessarily in a rail car containing radioactive materials.

(g) In the case of packages shipped under the exclusive use provisions of §173.441(b) for packages with external radiation levels in excess of 200 millirem per hour at the package surface:

(1) The rail car shall meet the requirements for a closed transport vehicle (§173.403 of this subchapter);

(2) Provisions shall be made to secure the packages so that their position within the rail car remains fixed under conditions normally incident to transportation; and

(3) The radiation level shall not exceed 2 millirem per hour in any normally occupied position in the transport vehicle or adjacent rail car.

§ 174.715 Cleanliness of cars after use. (a) Each transport vehicle used for transporting radioactive materials as exclusive use, as defined in §173.403 of this subchapter, must be surveyed with appropriate radiation detection instruments after each use. A vehicle may not be returned to service until the radiation dose rate at any accessible surface is 0.5 millirem per hour or less, and there is no significant removable radioactive surface contamination, as defined in §173.443 of this subchapter.

(b) This section does not apply to any rail car used solely for transporting radioactive materials if a survey of the interior surface of the car shows that the radiation dose rate does not exceed 10 millirem per hour at the interior surface or 2 millirem per hour at 3 feet from any interior surface. The car must be stenciled with the words "**FOR RADIOACTIVE MATERIALS USE ONLY**" in lettering at least 3 inches high in a conspicuous place on both sides of the exterior of the car and it must be kept closed at all times other than during loading and unloading.

§ 174.750 Incidents involving leakage. (a) In addition to the incident reporting requirements of §§171.15 and 171.16 of this subchapter, the carrier shall also notify the shipper at the earliest practicable moment following any incident in which there has been breakage, spillage, or suspected radioactive contamination involving radioactive materials shipments. Vehicles, buildings, areas, or equipment in which radioactive materials have been spilled may not be again placed in service or routinely occupied until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour and there is no significant removable radioactive surface contamination (see §173.443 of this subchapter).

(b) The package or materials should be segregated as far as practicable from personnel contact. If radiological advice or assistance is needed, the U.S. Department of Energy (DOE) should also be notified. In case of obvious leakage, or if it appears likely that the inside container may have been damaged, care should be taken to avoid inhalation, ingestion, or contact with the radioactive material. Any loose radioactive materials should be left in a segregated area and held pending disposal instructions, from qualified persons. Information involving the handling of radioactive materials in the event of a wreck may be found in Bureau of Explosives Pamphlet No. 1 and No. 2.

SUBPART L

DETAILED REQUIREMENTS FOR CORROSIVE MATERIALS

§ 174.800 Special handling requirements for corrosive materials. (a) Carboys of corrosive liquids may not be transported by rail in a container car. Packages of corrosive liquids being transported in a rail car must be loaded, blocked, and braced so that they cannot change position during transportation due to shocks normally incident to transportation. Car doors may be sealed in an open position. Carboys of acid may be transported on a flat or stock car.

(b) When a less-than-carload shipment of corrosive liquids is loaded in a rail car with other freight, the carboys must be placed near the doorway of the car and must have wooden strips not less than 3 inches in height nailed to the car floor about 8 inches from the bracing. These strips must be arranged so that the liquid from a broken carboy will drain toward the doorway and outside the car. The space between the strips and the floor braces or blocking used for staying the carboy boxes must be covered with at least 1 inch thickness of clean and dry sand or earth, not sawdust or other combustible material.

(c) A carrier may not accept any carboy previously used for the shipment of corrosive liquids for transportation as an empty carboy unless it has been thoroughly and completely drained. The carrier must handle them with the necks up.

§ 174.810 Special handling requirements for wet electric storage batteries. (a) Electric storage batteries (wet) for shipment by rail must be completely protected so that short circuits will be prevented and may not be loaded or stored with explosives.

(b) Wet electric storage batteries, and electrolyte must be packed as required by §173.258 of this subchapter for transportation by rail and must be blocked and braced in the rail car so they cannot change

position during transportation due to shocks normally incident to transportation. They must be loaded so that other freight cannot fall onto or slide against them. They may be transported in a gondola car or on a flatcar. However, they may not be transported in a hopper bottom car.

(c) Wet electric storage batteries are not authorized in refrigerator or "plug-door" type cars unless cars are provided with vents which will prevent an accumulation of gas within the car.

§ 174.812 Special handling requirements for nitric acid. (a) Carboys of nitric acid may not be transported in a boxcar or in a truck body or trailer on a flatcar more than two tiers high except that completely boxed carboys, DOT-1D, may be loaded three tiers high.

(b) Nitric acid, being transported by rail, with other corrosive liquids in carboys, must be separated from the other carboys. A 2 x 6 inch plank, set on edge, must be nailed across the car floor at least 12 inches from the nitric acid carboys and the space between the plank and the carboys of nitric acid must be filled with sand, sifted ashes, or other noncombustible absorbent material.

SUBPART M

DETAILED REQUIREMENTS FOR OTHER REGULATED MATERIALS

§ 174.840 Special loading and handling requirements for asbestos. Asbestos must be loaded, handled, and unloaded, and any asbestos contamination of rail cars removed, in a manner that will minimize occupational exposure to airborne asbestos particles released incident to transportation. (See § 173.1090 of this subchapter.)

PART 175—CARRIAGE BY AIRCRAFT

SUBPART A

GENERAL INFORMATION AND REGULATIONS

§ 175.1 Purpose and scope. This part prescribes requirements, in addition to those contained in Parts 171, 172 and 173 of this subchapter, applicable to aircraft operators transporting hazardous materials aboard (including attached to or suspended from) aircraft.

§ 175.3 Unacceptable hazardous materials shipments. Hazardous materials that are not prepared for shipment in accordance with this subchapter may not be accepted for transportation or transported aboard an aircraft.

§ 175.5 Applicability. (a) This part applies to the acceptance for transportation, loading and transportation of hazardous materials in any aircraft in the United States and in aircraft of United States registry anywhere in air commerce. This part does not apply to:

(1) Aircraft owned and operated by a government when not engaged in carrying persons or property for commercial purposes;

(2) Aircraft which are not owned by a government nor engaged in carrying persons or property for commercial purposes but which are under the exclusive direction and control of a government for a period of not less than 90 days as specified in a written contract or lease. An aircraft is under the exclusive direction and control of a government when the government exercises responsibility for:

(i) Approving crew members and determining that they are qualified to operate the aircraft;

(ii) Determining the airworthiness and directing maintenance of the aircraft; and

(iii) Dispatching the aircraft, including the times of departure, airports to be used, and type and amount of cargo to be carried;

(3) Aircraft of United States registry under lease to and operated by foreign nationals outside the United States if:

(i) Hazardous materials forbidden aboard aircraft by §172.101 of this subchapter are not carried on the aircraft; and

(ii) Other hazardous materials are carried in accordance with the regulations of the State (nation) of the aircraft operator.

§ 175.10 Exceptions. (a) This subchapter does not apply to:

(1) Aviation fuel and oil in tanks that are in compliance with the installation provisions of 14 CFR, Chapter 1.

(2) Hazardous materials required aboard an aircraft in accordance with the applicable airworthiness requirements and operating regulations. Unless otherwise approved by the Director, Office of Hazardous Materials Transportation, items of replacement for such hazardous materials must be transported in accordance with this subchapter except that—

(i) In place of the required packagings, packagings specially designed for the transport of aircraft spares and supplies may be used, provided such packagings provide at least an equivalent level of protection to those that would be required by this subchapter.

(ii) Aircraft batteries are not subject to quantity limitations such as those provided in §172.101 or §175.75(a) of this subchapter; and

(iii) A tire assembly with a serviceable tire is not subject to the provisions of this subchapter provided the tire is not inflated to a guage pressure exceeding the maximum rated pressure for that tire.

(3) Hazardous materials loaded and carried in hoppers or tanks of aircraft certificated for use in aerial seeding, dusting, spraying, fertilizing, crop improvement, or pest control, to be dispensed during such an operation.

(4) Non-radioactive medicinal and toilet articles carried by a crewmember or passenger in checked or carry-on baggage, and aerosols, with no subsidiary risk, for sporting or home use, when carried in checked baggage only, when:

(i) The total capacity of all the containers used by a crew member or passenger does not exceed 75 ounces (net weight ounces and fluid ounces);

(ii) The capacity of each container other than an aerosol container does not exceed 16 fluid ounces or 1 pound of material.

(5) Small-arms ammunition for personal use carried by a crewmember or passenger in his baggage (excluding carry-on baggage) if securely packed in fiber, wood, or metal boxes.

(6) [Reserved]

(7) Oxygen, or any hazardous material used for the generation of oxygen, carried for medical use by a passenger in accordance with 14 CFR §121.574 or §135.114.

(8) Human beings and animals with an implanted medical device, such as a heart pacemaker, that contains radioactive material or with radiopharmaceuticals that have been injected or ingested.

(9) Smoke grenades, flares, or similar devices carried only for use during a sport parachute jumping activity.

(10) Personal smoking materials intended for use by any individual when carried on his person except lighters with flammable liquid reservoirs and containers containing lighter fluid for use in refilling lighters.

(11) Smoke grenades, flares, and pyrotechnic devices affixed to aircraft carrying no person other than a required flight crewmember during any flight conducted at and as a part of a scheduled air show or exhibition of aeronautical skill. The affixed installation accommodating the smoke grenades, flares, or pyrotechnic devices on the aircraft must be approved by the FAA for its intended use.

(12) Hazardous materials which are loaded and carried on or in cargo aircraft only and which are to be dispensed or expended during flight for weather control, forest preservation and protection, flood control or avalanche control purposes when the following requirements are met.

(i) Operations may not be conducted over densely populated areas, in a congested airway, or near any airport where air carrier passenger operations are conducted.

(ii) Each operator shall prepare and keep current a manual containing operational guidelines and handling procedures, for the use and guidance of flight, maintenance, and ground personnel concerned in the dispensing or expending of hazardous materials. The manual must be approved by the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the FAA Civil Aviation Security Office in the region where the operator is located. Each operation must be conducted in accordance with the manual.

(iii) No person other than a required flight crewmember, FAA inspector, or person necessary for handling or dispensing the hazardous material may be carried on the aircraft.

(iv) The operator of the aircraft must have advance permission from the owner of any airport to be used for the dispensing or expending operation.

(v) When dynamite and blasting caps are carried for avalanche control flights, the explosives must be handled and, at all times, be under the control of the blaster who is licensed under a state or local authority identified in writing to the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the FAA Civil Aviation Security Office in the region where the operator is located.

(13) Carbon dioxide, solid (dry ice) in quantities not exceeding 5 pounds per package packed as prescribed by §173.615(a) of this subchapter and used as a refrigerant for the contents of the package. The package must be marked with the name of the contents being cooled, the net weight of the dry ice or an indication that the net weight is 5 pounds or less, and also marked "Carbon Dioxide, Solid" or "Dry Ice."

(14) A transport incubator unit necessary to protect life or an organ preservation unit necessary to protect human organs provided:

(i) The compressed gas used to operate the unit is in an authorized DOT specification cylinder and is marked, labeled, filled and maintained as prescribed by this subchapter;

(ii) Each battery used in the operation of the unit is of the nonspillable type;

(iii) The unit is constructed so that valves, fittings, and gauges are protected from damage;

(iv) The pilot in command is advised when the unit is on board, and when it is intended for use;

(v) The unit is accompanied by a person qualified to operate it;

(vi) The unit is secured in the aircraft in a manner so as not to restrict access to or use of any required emergency or regular exit or of the aisle in the passenger compartment; and,

(vii) Smoking within ten feet of the unit is prohibited.

(15) Alcoholic beverages, perfumes, colognes and liquefied gas lighters that have been examined by the Bureau of Explosives (B of E) and approved by the Director, Office of Hazardous Materials Transportation, carried aboard a passenger-carrying aircraft by the operator for use or sale on the aircraft.

(16) Alcoholic beverages, perfumes and colognes purchased through duty free sales, carried by passengers or crew as carry-on baggage.

(17) Carbon dioxide, solid (dry ice) intended for use in food and beverage service aboard aircraft and dry ice in quantities not exceeding 4 pounds per passenger when used to pack perishables in carry-on baggage provided the package permits the release of carbon dioxide gas.

(18) Carbon dioxide gas cylinders worn by passengers for the operation of mechanical limbs and spare cylinders of a similar size for the same purpose in sufficient quantities to ensure an adequate supply for the duration of the journey.

For explanation of abbreviations and reference marks, see last page of this tariff.

(19) Wheel chairs with non-spillable batteries, as defined in § 173.260(d) of this subchapter, as checked baggage, provided that the battery is disconnected, the battery terminals are insulated to prevent accidental short circuits, and the battery is securely attached to the wheel chair.

(20) Wheel chairs with spillable batteries, as checked baggage, provided that the wheel chair can be loaded, stowed, secured, and unloaded always in an upright position. The battery must be disconnected, the terminals insulated to prevent accidental short circuits, and the battery securely attached to the wheel chair. The pilot-in-command must be advised either orally or in writing of the location of the wheel chair aboard the aircraft prior to departure. If the wheel chair cannot be loaded, stowed, secured and unloaded always in an upright position, the battery must be removed and the wheel chair may then be carried as checked baggage without restriction. The removed battery must be carried in strong, rigid, outside packagings as follows:

(i) Outside packagings must be leaktight, impervious to battery fluid, loaded aboard the aircraft in accordance with the required orientation markings and be protected against upset by securing to pallets or by securing them in cargo compartments using appropriate means of securement (other than by bracing with freight or baggage) such as by use of restraining straps, brackets or holders;

(ii) Batteries must be protected against short circuits, secured upright in their outside packagings, and surrounded by compatible absorbent material sufficient to absorb their total liquid contents; and

(iii) Outside packagings must be marked to indicate proper orientation, and with the words "Battery, wet, with wheel chair", and be labeled with a Corrosive label.

(21) Catalytic hair curlers containing hydrocarbon gas, not more than one per passenger or crew member, when carried in checked baggage, provided that the safety cover is securely fitted over the heating element. Gas refills for such curlers are not permitted in checked or carry-on baggage.

(22) A mercurial barometer carried as carry-on-baggage only, by a representative of a government weather bureau or similar official agency, provided that individual advises the operator of the presence of the barometer in his baggage. The barometer must be packaged in a strong outer packaging having sealed inner liner or bag of strong, leak proof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position. The pilot-in-command must be informed of the presence of any such barometer by the operator of the aircraft.

§ 175.20 Compliance. Unless the regulations in this subchapter specifically provide that another person must perform a duty, each operator shall comply with all the regulations in Parts 106, 171, 172, and 175 of this subchapter and shall thoroughly instruct his employees in relation thereto. (See 14 CFR 121.135, 121.401, 121.433a, 135.232, 135.327 and 135.333.)

§ 175.25 Informing passengers about hazardous materials restrictions. (a) Each aircraft operator who engages in for hire transportation of passengers shall display notices to passengers concerning the requirements and penalties associated with the carriage of hazardous materials aboard aircraft. Such a notice shall be prominently displayed in each location at an airport where the aircraft operator issues tickets, checks baggage, and maintains aircraft boarding areas.

(1) Each notice must contain the following information:

Federal law forbids the carriage of hazardous materials aboard aircraft in your luggage or on your person.

A violation can result in penalties of up to $25,000 and 5 years imprisonment. (49 U.S.C. 1809)

Hazardous materials include explosives, compressed gases, flammable liquids and solids, oxidizers, poisons, corrosives and radioactive materials.

Examples: Paints, lighter fluid, fireworks, tear gases, oxygen bottles, and radio-pharmaceuticals.

There are special exceptions for small quantities (up to 75 ounces total) of medicinal and toilet articles carried in your luggage and certain smoking materials carried on your person.

For further information contact your airline representative.

(2) The information contained in paragraph (a)(1) of this section must be printed:

(i) In legible English;

(ii) In lettering of at least three eighths of an inch in height for the first three paragraphs and one quarter inch in height for the last three paragraphs; and

(iii) On a background of contrasting color.

(3) Size and color of the notice are optional. Additional information, if not inconsistent with required information, may be included.

§ 175.30 Accepting and inspecting shipments. (a) No person may accept a hazardous material for transportation aboard an aircraft unless the hazardous material is:

(1) Authorized, and is within the quantity limitations specified for carriage aboard aircraft according to § 172.101 of this subchapter or as otherwise specifically provided by this subchapter.

(2) Described and certified on a shipping paper prepared in duplicate in accordance with Subpart C of Part 172 or as authorized by § 171.11 of this subchapter. The originating aircraft operator must retain one copy of each shipping paper for 90 days;

(3) Labeled and marked in accordance with Subparts D and E of Part 172 or as authorized in § 171.11 of this subchapter, and placarded (when required) in accordance with Subpart F of Part 172 of this subchapter; and,

(4) Labeled with a "CARGO AIRCRAFT ONLY" label (see § 172.448 of this subchapter) if the material as presented is not permitted aboard passenger-carrying aircraft.

(b) Except as provided in paragraph (d) of this section, no person may carry a hazardous material in a package, outside container or overpack aboard an aircraft unless the package, outside container or overpack is inspected by the operator of the aircraft immediately before placing it:

(1) Aboard the aircraft; or,

(2) In a unit loading device or on a pallet prior to loading aboard the aircraft.

(c) A hazardous material may only be carried aboard an aircraft if, based on the inspection prescribed in paragraph (b) of this section, the operator determines that the package, outside container overpack containing the hazardous material:

(1) Has no holes, leakage or other indication that its integrity has been compromised; and

(2) For radioactive materials, does not have a broken seal except that packages contained in overpacks need not be inspected for seal integrity.

(d) The requirements of paragraphs (b) and (c) of this section do not apply to:

(1) An ORM-D material packed in a freight container and offered for transportation by one consignor;

(2) Dry ice (carbon dioxide, solid); or

(3) [Reserved]

(e) An overpack containing packages of hazardous materials may be accepted only if the operator has taken all reasonable steps to establish that—

(1) The overpack does not contain a package bearing the "CARGO AIRCRAFT ONLY" label unless—

(i) The overpack affords clear visibility of and easy access to the package; or

(ii) The package contains a material which may be carried inaccessibly under the provisions of § 175.85(c)(1); or

(iii) Not more than one package is overpacked.

(2) The proper shipping names, identification numbers, labels and special handling instructions appearing on the inside packages are clearly visible or reproduced on the outside of the overpack, and

(3) Has determined that a statement to the effect that the inside packages comply with the prescribed specifications appears on the outside of the overpack, when specification packagings are prescribed.

§ 175.31 Reports of discrepancies.

(a) Each person who discovers a discrepancy, as defined in paragraph (b) of this section, relative to the shipment of a hazardous material following its acceptance for transportation aboard an aircraft shall, as soon as practicable, notify the nearest FAA Civil Aviation Security Office by telephone and shall provide the following information:

(1) Name and telephone number of the person reporting the discrepancy.

(2) Name of the aircraft operator.

(3) Specific location of the shipment concerned.

(4) Name of the shipper.

(5) Nature of discrepancy.

(b) Discrepancies which must be reported under paragraph (a) of this section are those involving hazardous materials which are improperly described, certified, labeled, marked, or packaged, in a manner not ascertainable when accepted under the provisions of § 175.30(a) of this subchapter, including:

(1) Packages which are found to contain hazardous materials—

(i) Other than as described or certified on shipping papers;

(ii) In quantities exceeding authorized limits;

(iii) In inside containers which are not authorized or have improper closures;

(iv) In inside containers not oriented as shown by package markings;

(v) With insufficient or improper absorption materials, when required; or

(2) Packages or baggage which are found to contain hazardous materials subsequent to their being offered and accepted as other than hazardous materials.

§ 175.33 Notification of pilot-in-command. (a) Except as provided in § 175.10, when a hazardous material subject to the provisions of this subchapter is carried in an aircraft, the operator of the aircraft shall provide the pilot-in-command at least the following information in writing as early as practicable prior to departure:

(1) The proper shipping name, hazard class and identification number of the material as specified in § 172.101 of this subchapter or the ICAO Technical Instructions. If a hazardous material is described by the proper shipping name, hazard class, and identification number appearing in:

(i) Section 172.101 of this subchapter, any additional description requirements provided in §§ 172.202 and 172.203 of this subchapter must also be shown in the notification.

(ii) The ICAO Technical Instructions, any additional information required to be shown on shipping papers by § 171.11 of this subchapter must also be shown in the notification.

(2) The total number of packages;

(3) The net quantity or gross weight, as applicable, for each package except those containing radioactive materials and those for which there is no limit imposed on the maximum net quantity per package;

(4) The location of the packages aboard the aircraft;

(5) Confirmation that no damaged or leaking packages have been loaded on the aircraft;

(6) For radioactive materials, the number of packages, overpacks or freight containers their category, transport index (if applicable), and their location aboard the aircraft; and

(7) Confirmation that the package must be carried on cargo aircraft only if its transportation aboard passenger-carrying aircraft is forbidden.

(8) An indication, when applicable, that a hazardous material is being carried under terms of an exemption.

(b) A copy of the written notification to pilot-in-command shall be readily available to the pilot-in-command during flight.

§ 175.35 Shipping papers aboard aircraft. (a) A copy of the shipping papers required by § 175.30(a)(2) must accompany the shipment it covers during transportation aboard an aircraft.

(b) The documents required by paragraph (a) of this section and § 175.33 may be combined into one document if it is given to the pilot-in-command before departure of the aircraft.

§ 175.40 Keeping and replacement of labels. (a) Aircraft operators who engage in the transportation of hazardous materials must keep an adequate supply of the labels specified in Subpart E of Part 172 of this subchapter, on hand at each location where shipments are loaded aboard aircraft.

(b) Lost or detached labels for packages of hazardous materials must be replaced in accordance with the information provided on the shipping papers.

§ 175.45 Reporting hazardous materials incidents. (a) Each operator who transports hazardous materials shall report to the nearest FAA Civil Aviation Security Office by telephone at the earliest practicable moment after each incident that occurs during the course of transportation (including loading, unloading or temporary storage) in which as a direct result of any hazardous materials:

(1) A person is killed;

(2) A person receives injuries requiring his or her hospitalization;

(3) Estimated carrier or other property damage, or both, exceeds $50,000;

(4) Fire, breakage, or spillage or suspected radioactive contamination occurs involving shipment of radioactive materials (see § 175.700(b));

(5) Fire, breakage, spillage, or suspected contamination occurs involving shipment of etiologic agents. In addition to the report required by paragraph (a) of this section, a report on an incident involving etiologic agents should be telephoned directly to the Director, Center for Disease Control, U.S. Public Health, Atlanta, Georgia, area code 404-633-5313; or

(6) A situation exists of such a nature that, in the judgment of the carrier, it should be reported to the Department even though it does not meet the criteria of paragraph (a) (1), (2), or (3) of this paragraph, e.g., a continuing danger to life exists at the scene of the incident.

(7) If the operator conforms to the provisions of this section, the carrier requirements of § 171.15, except § 171.15(c) of this subchapter shall be deemed to have been satisfied.

(b) The following information shall be furnished in each report:

(1) Name of reporting person;

(2) Name and address of carrier represented by reporter;

(3) Phone number where reporter can be contacted;

(4) Date, time, and location of incident;

(5) The extent of the injuries, if any; and

(6) Classification, name and quantity of hazardous material involvement and whether a continuing danger to life exists at the scene.

(c) Each operator who transports hazardous materials shall report in writing, in duplicate, on DOT Form F 5900.1 within 15 days of the date of discovery, each incident that occurs during the course of transportation (including loading, unloading, or temporary storage) in which, as a direct result of hazardous materials, any of the circumstances set forth in paragraph (a) of this section occurs or there has been an unintentional release of hazardous materials from a package. Each operator making a report under this section shall send that report to the Research and Special Programs Administration, Information Systems Manager, Department of Transportation, Washington, D.C. 20590, with a separate copy to the FAA facility indicated in paragraph (a) of this section.

(d) [Reserved]

SUBPART B

LOADING, UNLOADING AND HANDLING

§ 175.75 Quantity limitations aboard aircraft. (a) Except as provided in § 175.85(c)(3), no person may carry on an aircraft:

(1) A hazardous material except as permitted by this subchapter;

(2) More than 50 pounds net weight of hazardous material (and in addition thereto, 150 pounds net weight of nonflammable compressed gas) permitted to be carried aboard passenger-carrying aircraft:

(i) In an inaccessible cargo compartment,

(ii) In any freight container within an accessible cargo compartment, or

(iii) In any accessible cargo compartment in a cargo aircraft only in a manner that makes it inaccessible unless in a freight container;

(3) Packages containing radioactive materials when their combined transport index number (determined by adding together the transport index numbers shown on the labels of the individual packages and or overpacks):

(i) In passenger-carrying aircraft, exceeds 50.0 or, for any single package, exceeds 3.0, or

(ii) In cargo aircraft only, exceeds 200.00 (for fissile radioactive materials, see § 175.702(b)(2)(iv) or, for any single package, exceeds 10.0.

(b) No limitation applies to the number of packages of ORM material aboard an aircraft.

§ 175.78 Stowage compatibility of cargo. (a) Packages containing hazardous materials which might react dangerously with one another may not be stowed in an aircraft next to each other or in a position that would allow a dangerous interaction in the event of leakage. As a minimum, the segregation prescribed in the following Table must be maintained.

Table 1

	A	B	C	D	E	F	G
A Explosives and Blasting Agents or ICAO Class 1	Note 3	Note 4	Note 4	Note 4	Note 4	Note 4	X
B Compressed gases or ICAO Class 2	Note 4	.....	.....	.....	.....	.....	
C Flammable liquids or ICAO Class 3	Note 4	.....	.....	.....	.....	X	
D Flammable liquids and solids (labeled SPONTANEOUSLY COMBUSTIBLE) or ICAO Division 4.2	Note 4	.....	.....	.....	.....	X	X
E Flammable solids (labeled DANGEROUS WHEN WET) or ICAO Division 4.3	Note 4	.....	.....	.....	.....	X	X
F Oxidizers or ICAO Division 5.1 and Organic peroxides or ICAO Division 5.2	Note 4	.....	X	X	X	.....	X
G Corrosive materials or ICAO Class 8	X	.....	.....	X	X	X	..

Note 1: The letters across the top of the Table have the same meaning as the letters along the left side of the Table.

Note 2: An "X" at the intersection of a row and a column in the Table means that packages containing the indicated classes of hazardous materials may not be stowed next to or in contact with each other, or in a position which would allow interaction in the event of leakage of the contents.

Note 3: For import or export shipment, explosives other than explosives of ICAO Division 1.4, Compatibility Group S, that do not belong to the same compatibility group according to the ICAO Technical Instructions may not be stowed together, except that compatibility groups C, D and E may be stowed together. Explosives of ICAO Division 1.4, Compatibility Group S may be stowed with explosives of all compatibility groups with the exception of A and L.

Note 4: Explosives, other than safety explosives (ICAO Division 1.4, Compatibility Group S) must not be stowed together with this class.

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) No person may stow a package labeled BLASTING AGENTS on an aircraft next to, or in a position that will allow contact with a package of special fireworks or railway torpedoes.

§ 175.79 Orientation of cargo. (a) A package containing hazardous materials marked "THIS SIDE UP" or "THIS END UP", or with arrows to indicate the proper orientation of the package, must be stored and loaded aboard an aircraft in accordance with such markings.

(b) A package containing liquid hazardous materials not marked as indicated in paragraph (a) of this section, must be stored and loaded with closures up (other than side closures in addition to top closures).

§ 175.81 Securing of packages containing hazardous materials. (a) Packages containing hazardous materials must be secured in an aircraft in a manner that will prevent any movement in flight which would result in damage to or change in the orientation of the packages.

(b) Packages containing radioactive materials must be secured in a manner that insures that the separation requirements of §§ 175.701 and 175.702 will be maintained at all times during flight.

§ 175.85 Cargo location. (a) Except as provided in § 175.10, no person may carry a hazardous material subject to the requirements of this subchapter in the cabin of a passenger-carrying aircraft or on the flight deck of any aircraft. Hazardous materials may be carried in a main deck cargo compartment of a passenger-aircraft provided that the compartment is inaccessible to passengers and that it meets all certification requirements for a Class B aircraft cargo compartment as provided in 14 CFR 25.857(b).

(b) Each package containing a hazardous material acceptable only for cargo aircraft must be loaded in such a manner that a crew member or other authorized person can see, handle and when size and weight permit, separate such packages from other cargo during flight.

(c) Notwithstanding the provisions of paragraph (b) of this section:

(1) When packages of the following hazardous materials are carried on cargo aircraft only, they may be carried in a location which is inaccessible to a crewmember during flight and are not subject to the weight limitation specified in paragraph (a)(2) of § 175.75 of this subchapter.

(i) Radioactive (ICAO Class 7) materials,
(ii) Poison B, (ICAO Division 6.1) liquids and solids (except those labeled FLAMMABLE),
(iii) Irritating (ICAO Division 6.1) materials,
(iv) Etiologic (ICAO Division 6.2) agents,
(v) Flammable liquids with a flashpoint above 73°F (23°C.) that do not meet the definition of another hazardous class,
(vi) Materials classified as Class 9 materials according to the ICAO Technical Instructions and that are being transported under that classification as provided in § 171.11 of this subchapter, and,
(vii) ORM-A, C, D or E materials.

(2) When packages of hazardous materials acceptable for cargo-only or passenger-carrying aircraft are carried on cargo aircraft only where other means of transportation are impracticable or not available, packages may be carried in accordance with procedures approved in writing by the FAA Air Transportation Security Field Office responsible for the operator's overall aviation security program or the FAA Air Transportation Security Division in the region where the operator is located.

(3) When packages of hazardous materials acceptable for cargo-only or passenger-carrying aircraft are carried on small, single pilot, cargo aircraft only being used where other means of transportation are impracticable or not available, they may be carried without quantity limitation as specified in § 175.75 in a location that is not accessible to the pilot if:

(i) No person other than the pilot, an FAA inspector, the shipper or consignee of the material or a representative of the shipper or consignee so designated in writing, or a person necessary for handling the material is carried on the aircraft;
(ii) The pilot is provided with written instructions on characteristics and proper handling of the materials; and
(iii) Whenever a change of pilots occurs while the material is on board, the new pilot is briefed under a hand-to-hand signature service provided by the operator of the aircraft.

(d) [Reserved]

(e) No person may carry a material subject to the requirements of this subchapter that is acceptable for carriage in a passenger-carrying aircraft (other than magnetized materials) unless it is located in the aircraft in a place that is inaccessible to persons other than crew-members.

(f) Paragraphs (a) and (e) of this section do not apply to a person operating an aircraft under § 175.310 which, because of its size and configuration, makes it impossible for that person to comply.

(g) No person may load magnetized material (which might cause an erroneous magnetic compass reading) on an aircraft, in the vicinity of a magnetic compass, or compass master unit, that is a part of the instrument equipment of the aircraft, in a manner that affects its operation. If this requirement cannot be met, a special aircraft swing and compass calibration may be made.

§ 175.88 Inspection of unit load devices. A unit load device may not be loaded on an aircraft unless the device has been inspected and found to be free from any evidence of leakage from, or damage to, any package containing hazardous materials.

§ 175.90 Damaged shipments. (a) Packages or overpacks containing hazardous materials must be inspected for damage or leakage after being unloaded from an aircraft. When packages or overpacks containing hazardous materials are carried in a unit load device, the area where the unit load device was stowed must be inspected for evidence of leakage or contamination immediately upon removal of the unit load device from the aircraft, and the packages or overpacks inspected for evidence of damage or leakage when the unit load device is unloaded. In the event of leakage or suspected leakage, the compartment in which the package, overpack, or unit load device was carried must be inspected for contamination and any dangerous level of contamination removed.

(b) Except as provided for in § 175.700, the operator of an aircraft shall remove from the aircraft any package subject to this subchapter that appears to be damaged or leaking. In the case of a package which appears to be leaking, the operator must insure that the remainder of the packages in the same shipment are in proper condition for transport aboard the aircraft and that no other package has been contaminated.

(c) No person shall place a package that is damaged or appears to be damaged or leaking aboard an aircraft subject to this part.

(d) If a package containing an etiologic agent is found to be damaged or leaking, the person finding the package shall:

(1) Avoid handling the package or keep handling to a minimum;
(2) Inspect packages adjacent to the leaking package for contamination and withhold from further transportation any contaminated packages until it is ascertained that they can be safely transported;
(3) Comply with the reporting requirement of § 171.15 of this subchapter; and
(4) Notify the consignor or consignee.

SUBPART C

SPECIFIC REGULATIONS APPLICABLE ACCORDING TO CLASSIFICATION OF MATERIAL

§ 175.305 Self-propelled vehicles. (a) Self-propelled vehicles are exempt from the drainage requirements of § 173.120 of this subchapter when carried in aircraft designed or modified for vehicle ferry operations and when all of the following conditions are met:

(1) Authorization for this type operation has been given by the appropriate authority in the government of the country in which the aircraft is registered;
(2) Each vehicle is secured in an upright position;
(3) Each fuel tank is filled in a manner and only to a degree that will preclude spillage of fuel during loading, unloading, and transportation; and
(4) Each area or compartment in which a self-propelled vehicle is being transported is suitably ventilated to prevent the accumulation of fuel vapors.

§ 175.310 Transportation of flammable liquid fuel in small, passenger-carrying aircraft. A small aircraft or helicopter operated entirely within the State of Alaska or into a remote area elsewhere in the United States may carry, in other than scheduled passenger operations, not more than 20 gallons of flammable liquid fuel, if:

(a) Transportation by air is the only practical means of providing suitable fuel;
(b) The flight is necessary to meet the needs of a passenger;
(c) The fuel is carried in metal containers that are either:

(1) In strong tight metal containers of not more than 5 gallons capacity, each packed inside a DOT Specification 12B fiberboard box or each packed inside a DOT Specification 15A, 15B, 15C, 16A, 19A or 19B wooden box, or in the case of a small aircraft in Alaska, each packed inside a wooden box of at least one-half inch thickness;

(2) Airtight, leakproof, inside containers of not more than 10 gallons capacity and of at least 28-gauge metal, each packed inside a DOT Specification 15A, 15B, 15C, 16A, 19A, or 19B wooden box or, in the case of a small aircraft in Alaska, each packed inside a wooden box of at least one-half inch thickness;

(3) DOT Specification 17E containers of not more than 5 gallons capacity; or

(4) Fuel tanks attached to flammable liquid fuel powered equipment under the following conditions:

(i) Each piece of equipment is secured in an upright position;

(ii) Each fuel tank is filled in a manner that will preclude spillage of fuel during loading, unloading, and transportation; and

(iii) (Deleted)

(d) In the case of a helicopter, the fuel is carried on external cargo racks;

(e) Each area or compartment in which the fuel is loaded is suitably ventilated to prevent the accumulation of fuel vapors;

(f) Before each flight, the pilot-in-command:

(1) Informs each passenger of the location of the fuel and the hazards involved; and

(2) Prohibits smoking, lighting matches, the carrying of any lighted cigar, pipe, cigarette or flame, and the use of anything that might cause an open flame or spark, while loading or unloading or in flight; and

(g) Fuel is transferred to the fuel tanks only while the aircraft is on the surface.

§ 175.320 Cargo aircraft only; only means of transportation. (a) Notwithstanding §172.101 of this subchapter, when means of transportation other than air are impracticable or not available, hazardous materials listed in the following table may be carried on a cargo aircraft only, subject to the conditions stated in the table and in paragraph (b) of this section and, when appropriate, paragraph (c) of this section:

Material description	Class	Conditions
Detonators and detonating primers	Class A explosives	Permitted only when no other hazardous material is aboard the aircraft.
Detonators and detonating primers	Class C explosives	Permitted only when there are no Class A explosives aboard aircraft.
Fuel, aviation, turbine engine, Methyl alcohol, or Toluene	Flammable liquid	Permitted in DOT specification metal drums having rated capacities of 55 gallons or less. May not be transported in the same aircraft with materials classed as Class A, B, or C explosives, blasting agents, corrosive materials or oxidizing materials. Permitted in installed tanks each having a capacity of more than 110 gal. subject to the conditions specified in paragraph (c) of this section.
Gasoline	Flammable liquid	Permitted in metal drums having rated capacities of 55 gal or less. May not be transported in the same aircraft with materials classed as class A, B, or C explosives, blasting agents, corrosive materials or oxidizing materials. Permitted in installed tanks each having a capacity of more than 110 gal. Subject to the conditions specified in para. (c) of this section.
High explosives	Class A explosives	Limited to explosives to be used for blasting. Permitted only when no other cargo is aboard the aircraft or when being transported in the same aircraft with an authorized shipment of any 1 or more of the following materials to be used for blasting: Ammonium nitrate fuel oil mixtures Blasting agent, n.o.s. Detonating cord Propellant explosive (solid) Class B (water gel's only). Propellant explosive (liquid) Class B (water gel's only).
Oil, n.o.s.; petroleum oil, or petroleum oil, n.o.s.	Flammable liquid	Permitted in metal drums having rated capacities of 55 gal. or less. May not be transported in the same aircraft with materials classed as Class A, B, or C explosives, blasting agents, corrosive materials, or oxidizing materials. Permitted in installed tanks each having a capacity of more than 110 gal. Subject to the conditions specified in para. (c) of this section.
Combustible liquid, n.o.s.	Combustible liquid	Permitted in installed tanks each having a capacity of more than 110 gal. subject to the conditions specified in par. (c) of this section.

(b) The following conditions apply to the carriage of hazardous materials performed under the authority of this section:

(1) No person other than a required flight crewmember, an FAA inspector, the shipper or consignee of the material or a representative of the shipper or consignee so designated in writing, or a person necessary for handling the material may be carried on the aircraft.

(2) The operator of the aircraft must have advance permission from the owner or operator of each manned airport where the material is to be loaded or unloaded or where the aircraft is to land while the material is on board. When the destination is changed after departure because of weather or other unforeseen circumstances, permission from the owner or operator of the alternate airport should be obtained as soon as practicable before landing.

(3) At any airport where the airport owner or operator or authorized representative thereof has designated a location for loading or unloading the material concerned, the material may not be loaded or unloaded at any other location.

(4) If the material concerned can create destructive forces or have lethal or injurious effects over an appreciable area as a result of an accident involving the aircraft or the material, the loading and unloading of the aircraft and its operation in takeoff, en route, and in landing must be conducted at a safe distance from heavily populated areas and from any place of human abode or assembly.

(5) If the aircraft is being operated by a holder of a certificate issued under 14 CFR Part 121, Part 127, or Part 135, operations must be conducted in accordance with conditions and limitations specified in the certificate holder's operations specifications or operations manual accepted by the FAA. If the aircraft is being operated under 14 CFR Part 91, operations must be conducted in accordance with an operations plan accepted and acknowledged in writing by the Civil Aviation Security Office serving the operator's location or the place where the material is to be loaded.

(6) Each pilot of the aircraft must be provided written instructions stating the conditions and limitations of the operation being conducted and the name of the airport official[s] granting the advance permission required by the first sentence of paragraph (b)(2) of this section.

(7) The aircraft and the loading arrangement to be used must be approved for safe carriage of the particular materials concerned by the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the appropriate FAA Civil Aviation Security Office serving the place where the material is to be loaded.

(8) When Class A explosives are carried aboard cargo aircraft only under the provisions of this section, the aircraft operator shall take all possible action to insure that routes over heavily populated areas are avoided commensurate with considerations of flight safety. During the approach and landing phase, the aircraft operator shall request appropriate vectors when under radar control to avoid heavily populated areas.

(9) During loading and unloading, no person may smoke, carry a lighted cigarette, cigar, or pipe, or operate any device capable of causing an open flame or spark within 50 feet of the aircraft.

(10) If the movement involves international transportation, permission for the shipment may also be required from the appropriate authorities of the countries of origin, destination, transit and overflight prior to departure.

(c) The following additional conditions apply to the carriage of flammable liquids and combustible liquids in tanks each having a capacity of more than 110 gallons under the authority of this section:

(1) The tanks and their associated piping and equipment and the installations thereof must have been approved for the material to be transported by the appropriate FAA Regional Office.

(2) In the case of aircraft being operated by a certificate holder, the operator shall list the aircraft and the approval information in its operating specifications. If the aircraft is being operated by other than a certificate holder, a copy of the FAA Regional Office approval required by this section must be carried on the aircraft.

(3) The crew of the aircraft must be thoroughly briefed on the operation of the particular bulk tank system being used.

(4) During loading and unloading and thereafter until any remaining fumes within the aircraft are dissipated:

(i) Only those electrically operated bulk tank shutoff valves that have been approved under a supplemental type certificate may be electrically operated.

(ii) No engine or electrical equipment, avionic equipment, or auxiliary power units may be operated, except position lights in the steady position and equipment required by approved loading or unloading procedures, as set forth in the operator's operations manual, or for operators that are not certificate holders, as set forth in a written statement.

(iii) No person may fill a container, other than an approved bulk tank, with a flammable or combustible liquid or discharge a flammable or combustible liquid from a container, other than an approved bulk tank, while that container is inside or within 50 feet of the aircraft.

(iv) When filling an approved bulk tank by hose from inside the aircraft, the doors and hatches must be fully open to insure proper ventilation.

(v) Static ground wires must be connected between the storage tank or fueler and the aircraft, and between the aircraft and a positive ground device.

§ 175.630 Special requirements for poisons and etiologic agents. (a) Hazardous materials bearing the POISON or

ETIOLOGIC AGENT label may not be carried in the same compartment of an aircraft with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals unless either poisons or etiologic agents and the foodstuffs, feed, or other edible material are loaded in separate unit load devices which, when stowed on the aircraft, are not adjacent to each other, or the poisons or etiologic agents are loaded in one closed unit load device and the foodstuffs, feed or other materials are loaded in another closed unit load device.

(b) No person may operate an aircraft that has been used to transport any package bearing a POISON label unless, upon removal of such package, the area in the aircraft in which it was carried is visually inspected for evidence of leakage, spillage, or other contamination. All contamination discovered must be either isolated or removed from the aircraft. The operation of an aircraft contaminated with such poisons is considered to be the carriage of poisonous materials under paragraph (a) of this section.

§ 175.640 Special requirements for other regulated materials. Asbestos must be loaded, handled, and unloaded, and any asbestos contamination of aircraft removed, in a manner that will minimize occupational exposure to airborne asbestos particles released incident to transportation. (See § 173.1090 of this subchapter.)

§ 175.700 Special limitations and requirements for radioactive materials. (a) In addition to other requirements, no person may carry in a passenger-carrying aircraft any package required to be labeled in accordance with § 172.403 of this subchapter with a Radioactive Yellow-II or Radioactive Yellow-III label unless:

(1) For a package required to be labeled Radioactive Yellow-II, the transport index does not exceed 1.0;

(2) For a package required to be labeled Radioactive Yellow-III, the transport index does not exceed 3.0;

(3) The package is carried on the floor of the cargo compartment, or freight container; and

(4) The package is carried in the aircraft in accordance with §§ 175.701 and 175.703(c).

(b) In addition to the reporting requirements of § 175.45, the carrier must also notify the shipper at the earliest practicable moment following any incident in which there has been breakage, spillage, or suspected radioactive contamination involving radioactive materials shipments. Aircraft in which radioactive materials have been spilled may not again be placed in service or routinely occupied until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour and there is no significant removable radioactive surface contamination as determined in accordance with § 173.443 of this subchapter. When contamination is present or suspected, the package and or materials it has touched must be segregated as far as practicable from personnel contact until needed radiological advice or assistance is obtained. The Regional Office of the U.S. Department of Energy or appropriate State or local radiological authorities can provide advice or assistance, and should be notified in cases of obvious leakage, or if it appears likely that the inside container may have been damaged. For personnel safety the carrier must take care to avoid possible inhalation, ingestion, or contact with radioactive materials that may have leaked or spilled from its package. Any loose radioactive materials and associated packaging materials must be left in a segregated area pending disposal instructions from responsible radiological authorities.

(c) Except as provided in §§ 173.4, 173.421–1, and 173.421–2 of this subchapter, no person may carry any radioactive material aboard a passenger-carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

(d) Type B(M) packages may not be offered or accepted for transportation, nor transported, on passenger-carrying aircraft.

§ 175.701 Separation distance requirements for packages containing radioactive materials in passenger-carrying aircraft. (a) General. No person may carry in a passenger-carrying aircraft any package required by § 172.403 of this subchapter to be labeled Radioactive Yellow-II, or Radioactive Yellow-III unless the package is placed in the aircraft in accordance with the minimum separation distances prescribed in paragraph (b) or (c) of this section.

(b) Separation distances. (1) Except as provided in paragraph (c) of this section, the minimum separation distances prescribed in paragraph (b)(2) of this section are determined by measuring the shortest distance between the surfaces of the radioactive materials package and the surfaces bounding the space occupied by passengers or animals. If more than one package of radioactive materials is placed in a passenger-carrying aircraft, the minimum separation distance for these packages shall be determined in accordance with paragraph (b)(2) of this section on the basis of the sum of the transport index numbers of the individual packages or overpacks.

(2) The following table prescribes minimum separation distances for the carriage of packages containing radioactive materials labeled Radioactive Yellow-II or Radioactive Yellow-III in passenger-carrying aircraft:

Transport Index or sum of transport indexes of all packages in the aircraft or predesignated area	Minimum separation distances	
	Centimeters	Inches
0.1 to 1.0	30	12
1.1 to 2.0	50	20
2.1 to 3.0	70	28
3.1 to 4.0	85	34
4.1 to 5.0	100	40
5.1 to 6.0	115	46
6.1 to 7.0	130	52
7.1 to 8.0	145	57
8.1 to 9.0	155	61
9.1 to 10.0	165	65
10.1 to 11.0	175	69
11.1 to 12.0	185	73
12.1 to 13.0	195	77
13.1 to 14.0	205	81
14.1 to 15.0	215	85
15.1 to 16.0	225	89
16.1 to 17.0	235	93
17.1 to 18.0	245	97
18.1 to 20.0	260	102
20.1 to 25.0	290	114
25.1 to 30.0	320	126
30.1 to 35.0	350	138
35.1 to 40.0	375	148
40.1 to 45.0	400	157
45.1 to 50.00	425	167

(c) Predesignated areas. A package required by § 172.403 of this subchapter to be labeled Radioactive Yellow-II or Radioactive Yellow-III may be carried in a passenger-carrying aircraft in accordance with a system of predesignated areas established by the aircraft operator. Each aircraft operator that elects to use a system of predesignated areas shall submit a detailed description of the proposed system to the Director, OHMT for approval prior to implementation of the system. A proposed system of predesignated areas is approved if the Director, OHMT determines that it is designed to assure that:

(1) The packages can be placed in each predesignated area in accordance with the minimum separation distances prescribed in paragraph (b)(2) of this section; and

(2) The predesignated areas are separated from each other by minimum distance equal to at least four times the distances required by paragraphs (b)(1) and (b)(2) of this section for the predesignated area containing packages with the largest sum of transport indexes.

§ 175.702 Requirements for carriage of packages containing radioactive materials in a cargo aircraft only. (a) As used in this section, the term "group of packages" means packages that are separated from each other in an aircraft by a distance of 20 feet (6 meters) or less.

(b) No person may carry in a cargo aircraft only any package required by § 172.403 of this subchapter to be labeled Radioactive Yellow-II or Radioactive Yellow-III unless:

(1) The total transport index for all of the packages does not exceed 50.0 and the package is carried in accordance with § 175.701(a); or

(2) The total transport index for all of the packages exceeds 50.0 and:

(i) The separation distance between the surfaces of the radioactive materials packages and the surfaces bounding the space occupied by persons or animals is at least 30 feet (9 meters);

(ii) The transport index for any group of packages does not exceed 50.0; and

(iii) Each group of packages is separated from every other group in the aircraft by not less than 20 feet (6 meters), measured from the outer surface of each group; and

(iv) The total transport index for all packages containing fissile radioactive materials does not exceed 50.0.

§ 175.703 Other special requirements for the acceptance and carriage of packages containing radioactive materials. (a) No person may carry in an aircraft any package of radioactive materials required by § 172.403 of this subchapter to be labeled Radioactive Yellow-II or Radioactive Yellow-III closer than the distances shown in the following table to any package marked as containing undeveloped film:

Transport Index	Minimum separation distance to nearest undeveloped film for various times of transit									
	Up to 2 hours		2 to 4 hours		4 to 8 hours		8 to 12 hours		Over 12 hours	
	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
0.1 to 1.0	0.3	1	0.6	2	0.9	3	1.2	4	1.5	5
1.1 to 5.0	0.9	3	1.2	4	1.8	6	2.4	8	3.3	11
5.1 to 10.0	1.2	4	1.8	6	2.7	9	3.3	11	4.5	15
10.1 to 20.0	1.5	5	2.4	8	3.6	12	4.8	16	6.6	22
20.1 to 30.0	2.1	7	3.0	10	4.5	15	6.0	20	8.7	29
30.1 to 40.0	2.4	8	3.3	11	5.1	17	6.6	22	9.9	33
40.1 to 50.0	2.7	9	3.6	12	5.7	19	7.2	24	10.8	36

(b) No person may accept for carriage in an aircraft packages of radioactive materials, other than limited quantities, contained in a rigid or non-rigid overpack, including a fiberboard box or plastic bag, unless they have been prepared for shipment in accordance with § 173.448(g) of this subchapter.

(c) No person may carry in an aircraft any package containing Fissile Class III radioactive materials (as defined in § 173.455(a)(3) of this subchapter), except:

(1) In a cargo aircraft only which has been assigned for the exclusive use of the shipper for the specific shipment of fissile radioactive material. Instructions for the exclusive use must be developed by the shipper and carrier, and the instructions issued with the shipping papers; or

(2) In an aircraft in which there are no other packages required to bear a radioactive label as prescribed in § 172.403 of this subchapter. Specific arrangements must be made between the shipper and carrier, with instructions to that effect issued with the shipping papers.

(d) No person may offer or accept for transportation, nor transport, by air:

(1) Any Type B(U) or Type B(M) package with an accessible surface temperature in excess of 50°C (122°F);

(2) Continuously vented Type B(M) packages, packages which require external cooling by an ancillary cooling system or packages subject to operational controls during transport; or

(3) Liquid pyrophoric radioactive materials.

(e) Packages with radiation levels at the package surface or a transport index in excess of the limits specified in § 173.441(a) of this subchapter may not be transported by aircraft except under special arrangements approved by RSPA.

§ 175.705 Inspection of aircraft for contamination by radioactive materials. (a) Aircraft used routinely for the carriage of radioactive materials shall be periodically checked for radioactive contamination. The frequency of checks shall be related to the likelihood of contamination and the extent to which radioactive materials are carried.

(b) An aircraft must be taken out of service if the level of contamination exceeds that provided in § 175.700(b).

For explanation of abbreviations and reference marks, see last page of this tariff.

PART 176—CARRIAGE BY VESSEL

SUBPART A

GENERAL

§ 176.1 Purpose and scope. This part prescribes requirements in addition to those contained in Parts 171, 172, and 173 of this subchapter to be observed with respect to the transportation of hazardous materials by vessel.

§ 176.3 Unacceptable hazardous materials shipments. (a) A carrier may not transport by vessel any shipment of a hazardous material that is not prepared for transportation in accordance with Parts 172 and 173 of this subchapter.

(b) A carrier may not transport by vessel any explosive or explosive composition described in § 176.5(c).

§ 176.5 Application to vessels. (a) Except as provided in paragraphs (b) and (e) of this section, this subchapter applies to each domestic or foreign vessel when in the navigable waters of the United States, regardless of its character, tonnage, size, or service, and whether self-propelled or not, whether arriving or departing, underway, moored, anchored, aground, or while in dry dock.

(b) With the exception of paragraph (c) of this section, this subchapter does not apply to:

(1) A public vessel not engaged in commercial service;

(2) A vessel constructed or converted for the principal purpose of carrying flammable or combustible liquid cargo in bulk in its own tanks, when only carrying these liquid cargoes;

(3) A vessel of 15 gross tons or smaller when not engaged in carrying passengers for hire;

(4) A vessel used exclusively for pleasure;

(5) A vessel of 500 gross tons or smaller when engaged in fisheries;

(6) A tug or towing vessel except when towing another vessel having explosives, flammable liquids or flammable compressed gas on board on deck in which case the tug or towing vessel shall make such provisions to guard against and extinguish fire as the Coast Guard may prescribe;

(7) A cable vessel, dredge, elevator vessel, fireboat, icebreaker, pile driver, pilot boat, welding vessel, salvage vessel, or wrecking vessel; or

(8) A foreign vessel transiting the territorial sea of the United States without entering the internal waters of the United States, if all hazardous materials being carried on board are being carried in accordance with the requirements of the IMDG Code.

(c) [Reserved]

(d) The bulk carriage of hazardous materials by water is governed by 46 CFR Subchapters *D, I, O,* and *N*.

(e) The transportation of military explosives on board vessels is governed by 46 CFR Part 146.

§ 176.9 "Order-Notify" or "C.O.D." shipments. (a) A carrier may not transport Class A explosives, detonators, or detonating primers which are—

(1) Consigned to "Order-notify" or "C.O.D.", except on a through bill of lading to a place outside the United States; or

(2) Consigned by the shipper to himself unless he has a resident representative to receive the shipment at the port of discharge.

§ 176.11 Exceptions. (a) A hazardous material may be offered and accepted for transportation by vessel when in conformance with the requirements of the IMDG Code in place of the corresponding requirements of this subchapter pertaining to packaging, marking, labeling, classification, description, certification, and placarding. All hazardous materials must otherwise be stowed and carried in accordance with this subchapter.

(1) Hazardous materials prepared in compliance with the above requirements may also be offered and accepted for transportation and transported by a motor vehicle used in connection with the discharge or loading of a vessel and not operating on a public street or highway.

(2) This exception does not apply to the following:

(i) A hazardous material classed as Explosive A or B, or Radioactive material, or

(ii) A material which is a hazardous material under this subchapter, but which is not a hazardous material under the provisions of the IMDG Code.

(b) Canadian shipments and packages may be transported by vessel if they are transported in accordance with this subchapter. (See § 171.12a of this subchapter.)

(c) The requirements of this subchapter governing the transportation of combustible liquids do not apply to the transportation of combustible liquids in containers of 110 gallons or less on board vessels.

(d) Transport vehicles, containing hazardous materials loaded in accordance with specific requirements of this subchapter applicable to such vehicles, may be transported on board a ferry vessel or carfloat, subject to the applicable requirements specified in § 176.76, 176. 100, and Subpart E of this part.

(e) Hazardous materials classed and shipped as ORM—D are not subject to the requirements of this Part unless they are offered for transportation as hazardous wastes.

(f) The stowage requirements of § 172.101 of this subchapter notwithstanding, a hazardous material which is classed, labeled and described in accordance with § 172.102 may be stowed as provided in that section.

(g) The requirements of this subchapter do not apply to atmospheric gases used in a refrigeration system.

§ 176.13 Responsibility for compliance. Unless this subchapter specifically provides that another person must perform a duty, each carrier, including a connecting carrier, shall comply with all applicable regulations in this part, and shall thoroughly instruct his employees in relation thereto.

§ 176.15 Enforcement. (a) An enforcement officer of the U.S. Coast Guard may at any time and at any place, within the jurisdiction of the United States, board any vessel for the purpose of enforcement of this subchapter and inspect any shipment of hazardous materials as defined in this subchapter.

§ 176.18 Assignment and certification. (a) The National Cargo Bureau, Inc., is authorized to assist the Coast Guard in administering this subchapter with respect to the following:

(1) Inspection of vessels for suitability for loading hazardous materials;

(2) Examination of stowage of hazardous materials;

(3) Making recommendations for stowage requirements of hazardous materials cargo; and

(4) Issuance of certificates of loading setting forth that the stowage of hazardous materials is in accordance with the requirements of this subchapter.

(b) A certificate of loading issued by the National Cargo Bureau, Inc., may be accepted by the Coast Guard as prima facie evidence that the cargo is stowed in conformity with the requirements of this subchapter.

SUBPART B

GENERAL OPERATING REQUIREMENTS

§ 176.24 Shipping papers. A carrier may not transport a hazardous material by vessel unless the material is properly described on the shipping paper in the manner prescribed in Part 172 of this subchapter.

§ 176.27 Certificate. (a) A carrier may not transport a hazardous material by vessel unless he has received a certificate prepared in accordance with §172.204 of this subchapter.

(b) In the case of an import or export shipment of hazardous materials which will not be transported by rail, highway, or air, the shipper may certify on the bill of lading or other shipping paper that the hazardous material is properly classed, described, marked, packaged, and labeled according to Part 172 of this subchapter or in accordance with requirements of the IMDG Code. See §171.12 of this subchapter.

§ 176.30 Dangerous cargo manifest. (a) The carrier, its agents, and any person designated for this purpose by the carrier or agents shall prepare a dangerous cargo manifest, list, or stowage plan. This document may not include a material which is not subject to the requirements of 49 CFR or the IMDG Code. This document must be kept in a designated holder, on or near the vessel's bridge. It must contain the following information:

(1) Name of vessel and official number. (If the vessel has no official number, the international radio call sign must be substituted.);

(2) Nationality of vessel;

(3) Shipping name and identification number of each hazardous material on board as listed in the §172.101 or 172.102 of this subchapter or as listed in the IMDG Code.

(4) The number and description of packages (barrels, drums, cylinders, boxes, etc.) and gross weight for each type of packaging;

(5) Classification of the hazardous material in accordance with either:

(i) The Hazardous Materials Table, §172.101 of this subchapter; or

(ii) The International Maritime Organization's Dangerous Goods Code as follows:

(A) For Classes 7, 8 and 9, either the class name or numerical designation of the Class must be used.

(B) For Classes 1, 3, 4, 5, and 6, either the division name or numerical designation of the division must be used.

(C) For Class 2, the class name or numerical designation of the Class must be accompanied by the description "Flammable gas", "Nonflammable gas" or "Poison gas", as appropriate.

(6) Any additional description required by §172.203 of this subchapter.

(7) Stowage location of the hazardous material on board the vessel.

(8) In the case of a vessel used for the storage of explosives or other hazardous materials, the following additional information is required:

(i) Name and address of vessel's owner;

(ii) Location of vessel's mooring;

(iii) Name of person in charge of vessel;

(iv) Name and address of the owner of the cargo; and

(v) A complete record, by time intervals of one week, of all receipts and disbursements of hazardous materials. The name and address of the consignor must be shown against all receipts and the name and address of the consignee against all deliveries.

(b) The hazardous material information on the dangerous cargo manifest must be the same as the information furnished by the shipper on the shipping order or other shipping paper, except that the IMO "correct technical name" and the IMO class may be indicated on the manifest as provided in paragraphs (a)(3) and (a)(5) of this section. The person who supervises the preparation of the manifest, list, or stowage plan shall ensure that the information is correctly transcribed, and shall certify to the truth and accuracy of this information to the best of his knowledge and belief by his signature and notation of the date prepared.

(c) The carrier and its agents shall insure that the master, or a licensed deck officer designated by the master and attached to the vessel, or in the case of a barge, the person in charge of the barge, acknowledges the correctness of the dangerous cargo manifest, list or stowage plan by his signature.

(d) For barges, manned or unmanned, the requirements of this section apply except for the following: (1) In the case of a manned barge, the person in charge of the barge shall prepare the dangerous cargo manifest.

(2) In the case of an unmanned barge, the person responsible for loading the barge is responsible for the preparation of a dangerous cargo manifest, list, or stowage plan and must designate an individual for that purpose.

(3) For all barges, manned or unmanned, the dangerous cargo manifest must be on board the barge in a readily accessible location and a copy must be furnished to the person in charge of the towing vessel.

(e) Each carrier who transports or stores hazardous materials on a vessel shall retain a copy of the dangerous cargo manifest, list, or stowage plan for at least one year, and shall make that document available for inspection in accordance with §176.36(b) of this subchapter.

§ 176.31 Exemptions. If a hazardous material is being transported by vessel under the authority of an exemption and a copy of the exemption is required to be on board the vessel, it must be kept with the dangerous cargo manifest.

§ 176.33 Labels. Each carrier shall maintain an adequate supply of the labels required in Subpart E of Part 172 of this subchapter to replace those that become lost or detached. Replacement must be based on information taken from the shipping order, delivery receipt, or other shipping paper covering the shipment.

§ 176.36 Preservation of records. (a) When this part requires shipping orders, manifest, cargo lists, stowage plans, reports, or any other papers, documents or similar records to be prepared, the carrier shall preserve them or copies of them in his place of business or office in the United States for a period of one year after their preparation.

(b) Any record required to be preserved must be made available upon request to an authorized representative of the Department of Transportation.

§ 176.39 Inspection of cargo. (a) Manned vessels. The carrier, its agents, and any person designated for this purpose by the carrier or agents shall cause an inspection of each hold or compartment containing hazardous materials to be made after stowage is complete, and at least once every 24 hours thereafter, weather permitting, in order to ensure that the cargo is in a safe condition and that no damage caused by shifting, spontaneous heating, leaking, sifting, wetting, or other cause has been sustained by the vessel or its cargo since loading and stowage. However, freight containers or individual barges need not be opened. A vessel's holds equipped with smoke or fire detecting systems having an automatic monitoring capability need not be inspected except after stowage is complete and after periods of heavy weather. The carrier, its agents, and any person designated for this purpose by the carrier or agents shall cause an entry to be made in the vessel's deck log book for each inspection of the stowage of hazardous materials performed.

(b) Unmanned and magazine vessels. An inspection of the cargo must be made after stowage has been completed to ensure that stowage has been accomplished properly and that there are no visible signs of damage to any packages or evidence of heating, leaking, or sifting. This inspection must be made by the individual who is responsible to the carrier and who is in charge of loading and stowing the cargo on the unmanned vessels or the individual in charge in the case of a magazine vessel.

(c) The carrier, its agents, and any person designated for this purpose by the carrier or agents of each ocean-going vessel carrying hazardous materials shall, immediately prior to entering a port in the United States, cause an inspection of that cargo to be made.

(d) When inspecting a cargo of hazardous materials capable of evolving flammable vapors, any artificial means of illumination must be of an explosion-proof type.

§ 176.45 Emergency situations. (a) When an accident occurs on board a vessel involving hazardous materials, and the safety of the vessel, its passengers or crew are endangered, the master shall adopt such procedures as will, in his judgment, provide maximum safety for the vessel, its passengers, and its crew. When the accident results in damaged packages or the emergency use of unauthorized packagings, these packages may not be offered to any forwarding carrier for transportation. The master shall notify the nearest Captain of the Port, U.S. Coast Guard, and request instructions for disposition of the packages.

(b) Hazardous materials may be jettisoned only if the master believes this action necessary to prevent or substantially reduce a hazard to human life or reduce a substantial hazard to property.

§ 176.48 Situation requiring report. (a) When a fire or other hazardous condition exists on a vessel transporting hazardous materials, the master shall notify the nearest Captain of the Port as soon as possible and shall comply with any instructions given by the Captain of the Port.

(b) When an incident occurs during transportation in which a hazardous material is involved, a report may be required (See §§171.15 and 171.16 of this subchapter).

(c) If a package, portable tank, freight container, highway or railroad vehicle containing hazardous materials is jettisoned or lost, the master shall notify the nearest Captain of the Port as soon as possible of the location, quantity, and type of the material.

§ 176.50 Acceptance of damaged or leaking packages. A carrier may not transport by vessel any package that is so damaged as to

permit the escape of its contents, that appears to have leaked, or that gives evidence of failure to properly contain the contents unless it is restored or repaired to the satisfaction of the master of the vessel. A package containing radioactive materials (other than low specific activity materials) may not be repaired or restored.

§ 176.52 Rejection of shipments in violation. (a) A carrier may not knowingly transport by vessel any hazardous material offered under a false or deceptive name, marking, invoice, shipping paper or other declaration, or without the shipper furnishing written information about the true nature of the material at the time of delivery.

(b) If a shipment in violation is found in transit, the master of the vessel shall adopt procedures which in his judgment provide maximum safety to the vessel, its passengers and its crew and which are in compliance with § 176.45. If the vessel is in port, the material may not be delivered to any party, and the master shall immediately notify the nearest Captain of the Port and request instructions for disposition of the material.

§ 176.54 Repairs involving welding or burning. (a) Except as provided in paragraph (b) of this section, repairs or work involving welding or burning, or the use of power-actuated tools or appliances which may produce intense heat may not be undertaken on any vessel having on board explosives or other hazardous materials as cargo.

(b) Paragraph (a) of this section does not apply if:

(1) The repairs or work are approved by the local Coast Guard Captain of the Port or his authorized representative; or

(2) Emergency repairs to the vessel's main propelling or boiler plant or auxiliaries are necessary.

SUBPART C

GENERAL HANDLING AND STOWAGE

§ 176.57 Supervision of handling and stowage. (a) Hazardous materials may be handled or stowed on board a vessel only under the direction and observation of a qualified person assigned for this duty.

(b) For a vessel engaged in voyages coastwise, or on rivers, bays, sounds or lakes, including the Great Lakes when the voyage is not foreign-going, the person may be an employee of the carrier and assigned to this duty by the carrier, or a licensed officer attached to the vessel and assigned by the master of the vessel.

(c) For a domestic vessel engaged in a foreign-going or intercoastal voyage, the person must be an officer possessing an unexpired license issued by the U.S. Coast Guard and assigned to this duty by the carrier or master of the vessel.

(d) For a foreign vessel, the person must be an officer of the vessel assigned to this duty by the master of the vessel.

§ 176.58 Preparation of the vessel. Each hold or compartment in which hazardous materials are to be transported must be swept clean of all debris before the hazardous materials are stowed therein. Bilges must be examined and all residue of previous cargo removed.

§ 176.60 "No Smoking" signs. When smoking is prohibited during the loading, stowing, storing, transportation, or unloading of hazardous materials by this part, the carrier and the master of the vessel are jointly responsible for posting "NO SMOKING" signs in conspicuous locations.

§ 176.63 Stowage locations. (a) The table in § 172.101 of this subchapter specifies generally the locations authorized for stowage of the various hazardous materials on board vessels. This part prescribes additional requirements with respect to the stowage of specific hazardous materials in addition to those authorized in § 172.101 of this subchapter. This section sets forth the basic physical requirements for the authorized locations.

(b) To qualify as "on deck" stowage, the location must be on the weather deck. If it is in a house on the weather deck, it must have a permanent structural opening to the atmosphere, such as a door, hatch, companionway or manhole, and must be vented to the atmosphere. It may not have any structural opening to any living quarters, cargo, or other compartment unless the opening has means for being closed off and secured. Any deck house containing living quarters, a steering engine, a refrigerating unit, a refrigerated stowage box, or a heating unit may not be used unless that area is isolated from the cargo stowage area by a permanent, and tight metallic bulkhead. Stowage in a shelter or 'tween deck is not considered to be "on deck." A barge which is vented to the atmosphere and is stowed on deck on a barge-carrying ship is considered to be "on deck." When an entry in § 172.101 of this subchapter requires "on-deck" stowage and is qualified by the requirement "shade from radiant heat", the stowage must be protected from the direct rays of the sun by means of structural erections or awnings, except that such protection is not required for shipment in portable tanks.

(c) To qualify as "under deck" stowage, the location must be in a hold or compartment below the weather deck capable of being ventilated and allotted entirely to the carriage of cargo. It must be bounded by permanent steel decks and bulkheads or the shell of the vessel. The deck openings must have means for effectively closing the hold or compartment against the weather, and in the case of superimposed holds, for effectively closing off each hold. A hold or compartment containing a crew passage formed by battens or by mesh or wire screen bulkhead may not be used for the stowage of any hazardous material unless a watchman is provided for this area.

(d) To qualify as "under deck away from heat", the location must be under deck and have built-in means for ventilation. If it is subject to heat from any artificial source, it only qualifies for the stowage of those hazardous materials for which "on deck" stowage is authorized.

§ 176.65 Alternative stowage procedures. When a hazardous material is to be loaded on board a vessel and it is shown to the satisfaction of the Coast Guard Captain of the Port for the place where the vessel is being loaded that it is impracticable to comply with a stowage location requirement specified in the table in § 172.101 of this subchapter or a handling or stowage requirement prescribed in this part, the Captain of the Port may authorize in writing the use of an alternate stowage location or method of handling or stowage subject to such conditions as he finds will ensure a level of safety at least equal to that afforded by the regulatory requirement concerned.

§ 176.69 General stowage requirements for hazardous materials. (a) Hazardous materials (except as provided in (c) of this section and ORM) must be stowed in a manner that will facilitate inspection during the voyage, its removal from a potentially dangerous situation, and the removal of packages in case of fire.

(b) Each package marked "THIS SIDE UP" must be stowed so as to remain in the position indicated during transportation.

(c) If a vessel designed for and carrying hazardous materials in freight containers or a vessel designed for and carrying hazardous materials in barges is equipped with a fixed fire extinguishing and fire detection system, the freight containers or barges need not be stowed in the manner required by paragraph (a) of this section. When freight containers or barges containing hazardous materials are stowed on deck, they need not be stowed in the manner required by paragraph (a) of this section if fire fighting equipment capable of reaching and piercing the freight container or barge is on board the vessel.

§ 176.72 Handling of break-bulk hazardous materials. (a) A metal bale hook may not be used for handling any package of hazardous materials.

(b) The use of equipment designed to lift or move cargo by means of pressure exerted on the packages may not be used for handling any package of hazardous materials if the device can damage the package or the package is not designed to be moved in that manner.

(c) Pallets, slings, cargo nets and other related equipment used in loading packages of hazardous materials must give adequate support to the packages. The packages must be contained so that they are not able to fall during loading.

§ 176.74 On deck stowage of break-bulk hazardous materials. (a) Packages containing hazardous materials must be secured by enclosing in boxes, cribs or cradles and proper lashing by use of wire rope, strapping or other means, including shoring and bracing, or both. Lashing of deck cargo is permitted if eye pads are used to attach the lashings. Lashings may not be secured to guard rails. Bulky articles must be shored.

(b) A packaging susceptible to weather or water damage must be protected so that it will not be exposed to the weather or to sea water.

(c) Not more than fifty percent of the total open deck area should be used for stowage of hazardous materials (except ORM material).

(d) Fireplugs, hoses, sounding pipes, and access to these must be free and clear of all cargo.

(e) Crew and passenger spaces and areas set aside for the crew's use may not be used to stow any hazardous material.

(f) A hazardous material may not be stowed within a horizontal distance of 25 feet of an operating or embarkation point of a lifeboat.

(g) Hazardous materials must be stowed to permit safe access to the crew's quarters and to all parts of the deck required in navigation and necessary working of the vessel.

(h) When runways for use of the crew are built over stowed hazardous materials, they must be constructed and fitted with rails and lifelines so as to afford complete protection to the crew when in use.

§ 176.76 Highway vehicles, railroad vehicles, freight containers, and portable tanks containing hazardous materials. (a) Except as provided in paragraphs (b) through (f) of this section, hazardous materials (other than Class A explosives unless otherwise approved by the Commandant (G-MTH)) authorized to be transported by vessel may be carried on board a vessel in a highway vehicle, railroad vehicle, or freight container subject to the following conditions:

(1) The material must be in proper condition for transportation according to the requirements of this subchapter;

(2) All packages in the transport vehicle or container must be secured to prevent movement in any direction. However, vertical restraint is not required if the shape of the packages and the stuffing pattern precludes shifting of the load;

(3) Bulkheads made of dunnage which extend to the level of the cargo must be provided unless the packages are stowed flush with the sides or ends;

(4) Dunnage must be secured to the floor when the cargo consists of dense materials or heavy packages;

(5) Each package marked "THIS SIDE UP" must be so stowed.

(6) Any slack spaces between packages must be filled with dunnage;

(7) The weight in a container must be distributed throughout as evenly as possible and the maximum permissible weight must not be exceeded.

(8) Adjacent levels of baggaged and baled cargo must be stowed in alternate directions so that each tier binds the tier above and below it.

(9) Packages containing solids should be stowed on top of packages containing liquids.

(10) The lading must be contained entirely within the freight container or vehicle body without overhang or projection except that oversized machinery such as tractors or vehicles with batteries attached may overhang or project outside the intermodal container provided all of that portion of the lading that consists of hazardous materials is contained entirely within the freight container. No open-bed container or vehicle is permitted to carry hazardous materials unless it is equipped with a means of properly securing the lading.

(b) A highway vehicle containing hazardous materials may be carried only on board a trailership, ferry vessel or a carfloat.

(c) A railroad vehicle containing hazardous materials may be carried only on board a trainship, railroad car ferry or a carfloat.

(d) A transport vehicle or freight container equipped with heating or refrigeration equipment may be operated on board a vessel. However, the equipment may not be operated in any hold or compartment in which any flammable liquid or gas is stowed. Any heating or air conditioning equipment having a fuel tank containing a flammable liquid or gas may be stowed only "on deck". Equipment electrically powered and designed to operate within an environment containing flammable vapors may be operated below deck in a hold or compartment containing a flammable liquid or gas. (See § 176.79)

(e) A transport vehicle, loaded with any hazardous material which is required to be stowed "on deck" by § 172.101 of this subchapter, may be stowed one deck below the weather deck when transported on a trainship or trailership which is unable to provide "on deck" stowage because of the vessel's design. Otherwise, the transport vehicle or container must be transported "on deck".

(f) Each transport vehicle, freight container, and portable tank being transported by vessel must be placarded in accordance with the requirements of Subpart F of Part 172 of this subchapter.

(g) A hazardous material may be carried on board a vessel in a portable tank subject to the following conditions:

(1) The material must be in proper condition for transportation according to the requirements of this subchapter.

(2) Small passenger vessels of 100 gross tons, or less, may carry a hazardous material in a portable tank only when 16 or less passengers are on board and only when specifically authorized by the Officer-in-Charge, Marine Inspection, by endorsement of the vessel's Certificate of Inspection.

(3) Portable tanks containing Flammable liquids or gases, Combustible liquids with flashpoints below 141° F. that are insoluble in water, or organic peroxides, spontaneously combustible materials, or water reactive materials must be stowed on deck irrespective of the stowage authorized in § 172.101 of this subchapter. Portable tanks containing hazardous materials not restricted to on deck stowage by the previous sentence must be stowed in accordance with the requirements specified in § 172.101 of this subchapter.

(4) ORM and corrosive materials must be stowed as authorized in the Hazardous Materials Table in § 172.101 of this subchapter.

(5) Aluminum, magnesium, and their alloys are specifically prohibited as materials of construction of portable tanks.

(h) Cryogenic liquids. For shipment of cryogenic liquids on board a vessel the packaging must be designed and filled so that:

(1) Any cryogenic liquid being transported in a cargo tank, regardless of the pressure in the package, must be contained in a steel jacketed Specification MC-338 (§ 178.338 of this subchapter) insulated cargo tank, or a cargo tank approved under the provisions of § 173.33(b)(2) of this subchapter.

(2) Any valve or fitting with moving or abrading parts that may come in contact with any cryogenic liquid may not be made of aluminum.

(3) For a flammable cryogenic liquid being transported in a cargo tank, the elapsed time between the loading of the cargo tank and the subsequent unloading of the cargo tank at its final destination may not exceed the marked rated holding time (MRHT) of the cargo tank for the cryogenic liquid being transported, which must be displayed on or adjacent to the specification plate.

(4) Portable tanks, cargo tanks, and tank cars containing cryogenic liquids must be stowed "on deck" regardless of the stowage authorized in § 172.101 of this subchapter. Cargo tanks or tank cars containing cryogenic liquids may be stowed one deck below the weather deck when transported on a trailership or trainship that is unable to provide "on deck" stowage because of the vessel's design. Tank cars must be Class DOT-113 or AAR-204W tank cars.

§ 176.77 Stowage of barges containing hazardous materials on board barge-carrying vessels. (a) A barge which contains hazardous materials may be transported on board a barge-carrying vessel if it is stowed in accordance with the requirements of this section.

(b) A barge which contains hazardous materials for which only "on deck" stowage is authorized must be stowed above the weather deck and be vented to the atmosphere.

(c) A barge which contains hazardous materials for which both "on deck" and "below deck" storage is authorized may be stowed above or below the weather deck.

§ 176.78 Use of power-operated industrial trucks on board vessels. (a) A power-operated truck (including a power-operated tractor, forklift, or other specialized truck used for cargo handling) may not be used on board a vessel in a space containing a hazardous material unless the truck complies with the requirements of this section.

(b) Each truck must have a specific designation of Underwriter's Laboratories or Factory Mutual Laboratories. Any repair or alteration to a truck must be equivalent to that required on the original designation.

(c) Description of designations. The recognized testing laboratory type designations are as follows:

(1) An "E" designated unit is an electrically-powered unit that has minimum acceptable safeguards against inherent fire hazards.

(2) An "EE" designated unit is an electrically-powered unit that has, in addition to all the requirements for the "E" unit, the electric motor and all other electrical equipment completely enclosed.

(3) An "EX" designated unit is an electrically-powered unit that differs from the "E" and "EE" unit in that the electrical fittings and equipment are so designed, constructed, and assembled that the unit may be used in certain atmospheres containing flammable vapors or dusts.

(4) A "G" designated unit is a gasoline-powered unit having minimum acceptable safeguards against inherent fire hazards.

(5) A "GS" designated unit is a gasoline-powered unit that is provided with additional safeguards to the exhaust, fuel, and electrical systems.

(6) An "LP" designated unit is similar to a "G" unit except that it is powered by liquefied petroleum gas instead of gasoline.

(7) An "LPS" designated unit is a unit similar to a "GS" unit except that liquefied petroleum gas is used for fuel instead of gasoline.

(8) A "D" designated unit is a unit similar to a "G" unit except that it is powered by a diesel engine instead of a gasoline engine.

(9) A "DS" designated unit is a unit powered by a diesel engine provided with additional safeguards to the exhaust, fuel, and electrical systems.

(d) Explosives. A truck may not be used in a hold or compartment containing explosives unless its use is approved by the Commandant (G-MTH). In a space in which packaged small arms ammunition without explosive bullets is stowed, a power operated truck (except "E", "G", or "LP") may be used if approved by the local Captain of the Port.

(e) Other hazardous materials.

(1) Only an "EX", "EE", "GS", "LPS", or "DS" truck may be used in a hold or compartment containing flammable liquids, flammable compressed gases, flammable solids, oxidizers, organic peroxides, articles of a fibrous nature, or bulk sulfur.

(2) Only a designated truck may be used to handle any other hazardous material not covered in paragraph (d) or (e)(1) of this section.

(f) Minimum safety features. In addition to the construction and design safety features required, each truck must have at least the following minimum safety features:

(1) The truck must be equipped with a warning horn, whistle, gong, or other device that may be heard clearly above normal shipboard noises.

(2) When the truck operation may expose the operator to danger from a falling object, the truck must be equipped with a driver's overhead guard. When the overall height of the truck with forks in the lowered position is limited by head room the overhead guard may be omitted. This overhead guard is only intended to offer protection from impact of small packages, boxes, bagged material, or similar hazards.

(3) A fork lift truck which handles small objects or unstable loads must be equipped with a load backrest extension having height, width,

and strength sufficient to prevent any load, or part of it, from falling toward the mast is in a position of maximum backward tilt. It must be constructed in a manner that does not interfere with good visibility.

(4) The forks on a fork lift truck must be secured to the carriage so as to prevent any unintentional lifting of the toe which could create a hazard. The forks may not display permanent deformation when subjected to a test load of three times the rated capacity.

(5) Each fork extension or other attachment must be secured to prevent unintentional lifting or displacement on primary forks.

(6) Tires extending beyond the confines of the truck shall be provided with a guard to prevent the tires from throwing particles at the operator.

(7) Unless the steering mechanism is a type that prevents road reactions from causing the steering handwheel to spin, a mushroom type steering knob must be used to engage the palm of the operator's hand, or the steering mechanism must be arranged in some other manner to prevent injury. The knob must be mounted within the perimeter of the wheel.

(8) All steering controls must be confined within the clearance of the truck or guarded so that movement of the controls will not result in injury to the operator when passing stanchions, obstructions or other.

(g) Special operating conditions.

(1) A truck may not be used on board a vessel unless prior notification of its use is given to the master or senior deck officer on board.

(2) Before a truck is operated on board a vessel, it must be in a safe operating condition as determined by the master or senior deck officer on board.

(3) Any truck that emits sparks or flames from the exhaust system must immediately be removed from service and may not be returned to service until the cause of these sparks or flames has been eliminated.

(4) A truck may not be operated on board a vessel when the temperature of any part of the truck is found to be in excess of a safe operating temperature.

(5) All truck motors must be shut off immediately when an emergency condition arises on board a vessel.

(6) All truck motors must be shut off immediately when a breakage or leakage of packages containing flammable liquids or gases, flammable solids, oxidizers, or organic peroxides occurs or is discovered.

(7) The rated capacity of the truck must be posted on the truck at all times in a conspicuous place. This capacity may not be exceeded.

(8) At least one Coast Guard approved marine type size 1 Type B, or UL approved 5BC portable fire extinguisher, or its approved equivalent, must be affixed to the truck in a readily accessible position or must be kept in close proximity, available for immediate use.

(9) The vessel's fire fighting equipment, both fixed (where installed) and portable, must be kept ready for immediate use in the vicinity of the space being worked.

(h) Refueling.

(1) A truck using gasoline as fuel may not be refueled in the hold or on the weather deck of a vessel unless a portable non-spilling fuel handling system of not over five gallons capacity is used. Gasoline may not be transferred to a portable non-spilling fuel handling device on board the vessel.

(2) A truck using liquefied petroleum gas as fuel may not be refueled in the hold or on the weather deck of a vessel unless it is fitted with a removable tank and the hand-operated shutoff valve of the depleted tank is closed. In addition, the motor must be run until it stalls from lack of fuel and then the hand-operated shut off valve closed before the quick disconnect fitting to the fuel tank is disconnected.

(3) A truck using diesel oil as fuel may not be refueled on the weather deck or in the hold of a vessel unless a portable container of not over a five gallon capacity is used. A truck may be refueled or a portable container may be refilled from a larger container of diesel fuel on the weather deck of a vessel if a suitable pump is used for the transfer operation and a drip pan of adequate size is used to prevent any dripping of fuel on the deck.

(4) Refueling must be performed under the direct supervision of an experienced and responsible person specifically designated for this duty by the person in charge of the loading or unloading of the vessel.

(5) Refueling may not be undertaken with less than two persons specifically assigned and present for the complete operation, at least one of whom must be experienced in using the portable fire extinguishers required in the fuel area.

(6) At least one Coast Guard approved marine type size 1 Type B or UL approved 5BC portable fire extinguisher or its approved equivalent, must be provided in the fueling area. This is an addition to the extinguisher required by paragraph (g)(8) of this section.

(7) The location for refueling trucks must be designated by the master or senior deck officer on board the vessel. "NO SMOKING" signs must be conspicuously posted in the area.

(8) The location designated for refueling must be adequately ventilated to insure against accumulation of any hazardous concentration of vapors. When a truck is being refueled, the ventilation requirements of § 176.79 apply.

(9) Before any truck in a hold is refueled or before any fuel handling device or unmounted liquefied petroleum gas cylinder is placed in a hold, the motors of all trucks in the same hold must be stopped.

(10) All fuel handling devices and unmounted liquefied petroleum gas containers must be removed from a hold before any truck motor is started and the trucks are placed in operation in that hold.

(i) Replacing batteries. Batteries for electrically powered trucks and for the ignition systems of internal combustion powered trucks may be changed in the hold of a vessel subject to the following conditions:

(1) Only suitable handling equipment may be employed.

(2) Adequate precautions must be taken to avoid damage to the battery, short circuiting of the battery, and spillage of the electrolyte.

(j) Charging of batteries. Batteries of industrial trucks may be recharged in a hold of a vessel subject to the following conditions:

(1) The batteries must be housed in a suitable, ventilated, portable metal container with a suitable outlet at the top for connection of a portable air hose, or must be placed directly beneath a suitable outlet at the top for connection of a portable air hose. The air hose must be permanently connected to an exhaust duct leading to the open deck and terminate in a gooseneck or other suitable weather head. If natural ventilation is not practicable or adequate, mechanical means of exhaust must be employed in conjunction with the duct. The air outlet on the battery container must be equipped with an interlock switch so arranged that the charging of the battery cannot take place unless the air hose is properly connected to the box.

(2) If mechanical ventilation is used, an additional interlock must be provided between the fan and the charging circuit so that the fan must be in operation in order to complete the charging circuit for operation. It is preferable that this interlock switch be of a centrifugal type driven by the fan shaft.

(3) The hold may not contain any hazardous materials.

(4) The charging facilities may be part of the truck equipment or may be separate from the truck and located inside or outside the cargo hold. The power supply or charging circuit (whichever method is used) must be connected to the truck by a portable plug connection of the breakaway type. This portable plug must be so engaged with the truck battery charging outlet that any movement of the truck away from the charging station will break the connection between the plug and receptacle without exposing any live parts to contact with a conducting surface or object and without the plug falling to the deck where it may become subject to damage.

(5) All unmounted batteries must be suitably protected or removed from an area in the hold of the vessel before any truck is operated in that area.

(k) Stowage of power-operated industrial trucks on board a vessel.

(1) Trucks may be stowed in any location on board a vessel subject to the following conditions:

(i) Each gasoline-powered truck must have all the fuel expended from the fuel system.

(ii) Each liquefied petroleum gas-operated truck must have the fuel tank removed and all the fuel expended from the fuel system.

(2) Any truck not meeting the conditions set forth in paragraph (k)(1) of this section must be stowed on the open deck except for intervals such as lunch hours, between work shifts, and interdock and intraport movements. If a truck is stowed in a fixed metal enclosure located on or above the weather deck, this enclosure must have access from the weather deck only and must have adequate ventilation arranged to remove vapors from both the upper and lower portions of the space.

(l) Packaging and stowage of fuel on board a vessel.

(1) Packaging. Flammable liquids and gases to be used as fuels for trucks must be packaged in DOT specification containers, A.S.M.E. containers, or portable safety containers approved by a recognized testing laboratory and authorized for the contents.

(2) Marking and labeling. The appropriate DOT label must be affixed to each container of flammable liquid or flammable gas.

(3) Stowage. Each container must be stowed on or above the weather deck as designated by the master. However, a DOT specification container, A.S.M.E. container, or portable safety container having a capacity of five gallons or less and approved by a recognized testing laboratory may be stowed below deck in a paint locker and diesel fuel may be stowed in any location designated by the master.

§ 176.79 Spaces exposed to carbon monoxide or other hazardous vapors. When hazardous materials are transported by vessel in an enclosed space which is exposed to carbon monoxide or other hazardous vapors from exhausts of power-operated industrial trucks or other mechanized equipment, the space must be provided with adequate ventilation to prevent the accumulation of dangerous vapors. The senior deck officer shall insure that a test of the carbon monoxide content of the atmosphere is made as frequently as conditions require to detect the presence of any dangerous concentration of vapors in areas where persons may be working. The test must be made by a person acquainted with the test equipment and procedure. The carbon monoxide concentration in any hold or intermediate deck where any person is working may not exceed 50 parts per million (0.005 percent) as a time weighted average. Persons may not be permitted to remain in any hold or intermediate deck where the concentration exceeds 75 parts per million (0.0075 percent). Portable blowers of adequate size and location may be used to remove any vapors not removed by installed ventilation systems.

SUBPART D

GENERAL SEGREGATION REQUIREMENTS

§ 176.80 Application. (a) This subpart sets forth segregation requirements in addition to any segregation requirements set forth elsewhere in this subchapter.

(b) Hazardous materials in limited quantities when loaded in transport vehicles and freight containers, are excepted from the segregation requirements of this subpart and any additional segregation specified in this subchapter for transportation by vessel.

§ 176.83 Segregation requirements for cargo vessels and passenger vessels. (a) The following table (Table I) specifies the categories of explosives which may not be loaded or stowed together within the same hold or compartment. The letter "X" at an intersection of a horizontal and vertical column indicates that these categories may not be stowed together in the same hold or compartment.

(b) The following table (Table II) specifies the minimum separation requirements that apply when transporting different classes of hazardous materials on board a vessel, other than a ferry vessel. The symbols used in the table below mean the following:

(1) "1"—Away from.
(2) "2"—Separated from.
(3) "3"—Separated by a complete cargo compartment or hold from.
(4) "4"—Separated longitudinally by an intervening complete cargo compartment or hold from.
(5) "0"—No general segregation specified; individual entries in the Hazardous Material Table in §172.101 of this subchapter should be consulted.
(6) "*"—Consult Table I of this section for segregation requirements between different explosives.

(c) Definition of terms.

(1) Legend

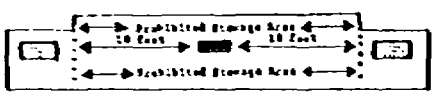
(i) Reference package ***

(ii) Incompatible package ***

(iii) Deck resistant to liquid and fire ***

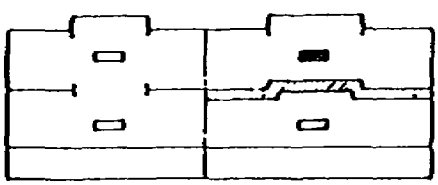
NOTE: Solid vertical lines represent transverse watertight bulkheads between holds.

(2) Away from. "Away from" means effectively segregated so that materials may not interact dangerously in the event of an accident. These materials may be stowed in the same cargo compartment, hold, deck area or barge provided a minimum horizontal separation of 10 feet, projected vertically, is provided.



(3) Separate from.

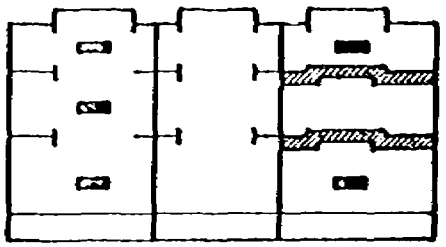
(i) "Separate from" means in separate holds when stowed "under deck". If the intervening deck is resistent to fire and liquid, a vertical separation, i.e., in different cargo compartments, is considered equivalent to this requirement. For "on deck" stowage, "away from" segregation is authorized.



(ii) On barge-carrying vessels, separate barges are required if the barges are constructed of steel. Otherwise separate holds are required.

(4) Separate by a complete cargo compartment or hold from.

(i) "Separate by a complete cargo compartment or hold from" means either a vertical or horizontal separation. If the decks are not resistant to fire and liquid, a longitudinal separation by an intervening complete cargo compartment is required. For "on deck" stowage this segregation means a separation by a corresponding horizontal distance.



*When the stowage location of the incompatible package is in this relation to the reference package, at least one of the intervening decks in the vertical plane must be resistant to fire and liquid.

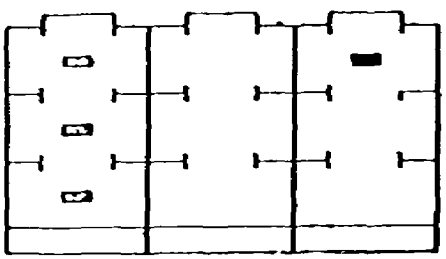
(ii) For barges aboard barge-carrying vessels, the following requirements apply:

(A) For barges loaded on ships having vertical holds, separate barge holds are required.

(B) For barges loaded on ships having horizontal barge levels, separate barge levels are required.

(5) Separate longitudinally by an intervening complete cargo compartment or hold or engine room from.

(i) "Separate longitudinally by an intervening complete cargo compartment or hold or engine room from" means a horizontal separation by a complete intervening hold (two intervening bulkheads) or engine room. Vertical separation alone does not meet this requirement. For "on deck" stowage, this segregation means a separation by the vessel's bridge or superstructure.



(ii) For barges aboard barge-carrying vessels the following requirements apply:

(A) For barges loaded on ships having vertical holds, separation by an intervening barge hold or engine room is required.

(B) For barges loaded on ships having horizontal barge levels, separate barge levels and a longitudinal separation by at least two intervening barges are required.

(d) In applying the minimum separation requirements specified in Table II to freight containers containing hazardous materials, the following additional requirements apply:

(1) Class segregation. Materials for which any segregation is specified in Table II may not be stowed in the same freight container.

(2) Vertical stowage requirements. Freight containers either closed or open may not be stowed in the same vertical line when segregation is required unless separated by a deck resistant to fire and liquid. When a solid substance is required to be stowed "Away from" another substance, it may be stowed above the other provided a minimum distance of eight feet intervenes. When "Separate by a complete cargo compartment or hold from" is required, freight containers separated by a deck resistant to fire and liquid may not be stowed in the same vertical line unless two such decks intervene.

(3) Horizontal stowage requirements.

(i) "Away from":

(A) For closed freight containers stowed on or under deck there are no restrictions in regard to freight container location in relation to other freight containers.

For explanation of abbreviations and reference marks, see last page of this tariff.

Segregation and Separation Chart of Hazardous Materials—Table I

Footnotes

[1]Explosives, class A, and explosives, class B, must not be loaded or stowed with chemical ammunition containing incendiary charges or white phosphorus either with or without bursting charges. Chemical ammunition of the same classification containing incendiary or white phosphorus may be loaded and stowed together.

[2]Bursters (explosive), boosters (explosive), or supplementary charges (explosive) without detonators when shipped by, to, or for the Department's of the Army, Navy, and Air Force of the United States Government may be stowed with any of the articles named, except those in columns 3, 4, 10 and 16.

[3]Detonating cord transported as class C explosive under provisions of §173.61(d) of this subchapter shall, as a minimum, be stowed "Separated from" other consignments of detonating cord.

Instructions

The letter X at an intersection of horizontal rows and vertical columns shows that those materials must not be loaded or stowed together.

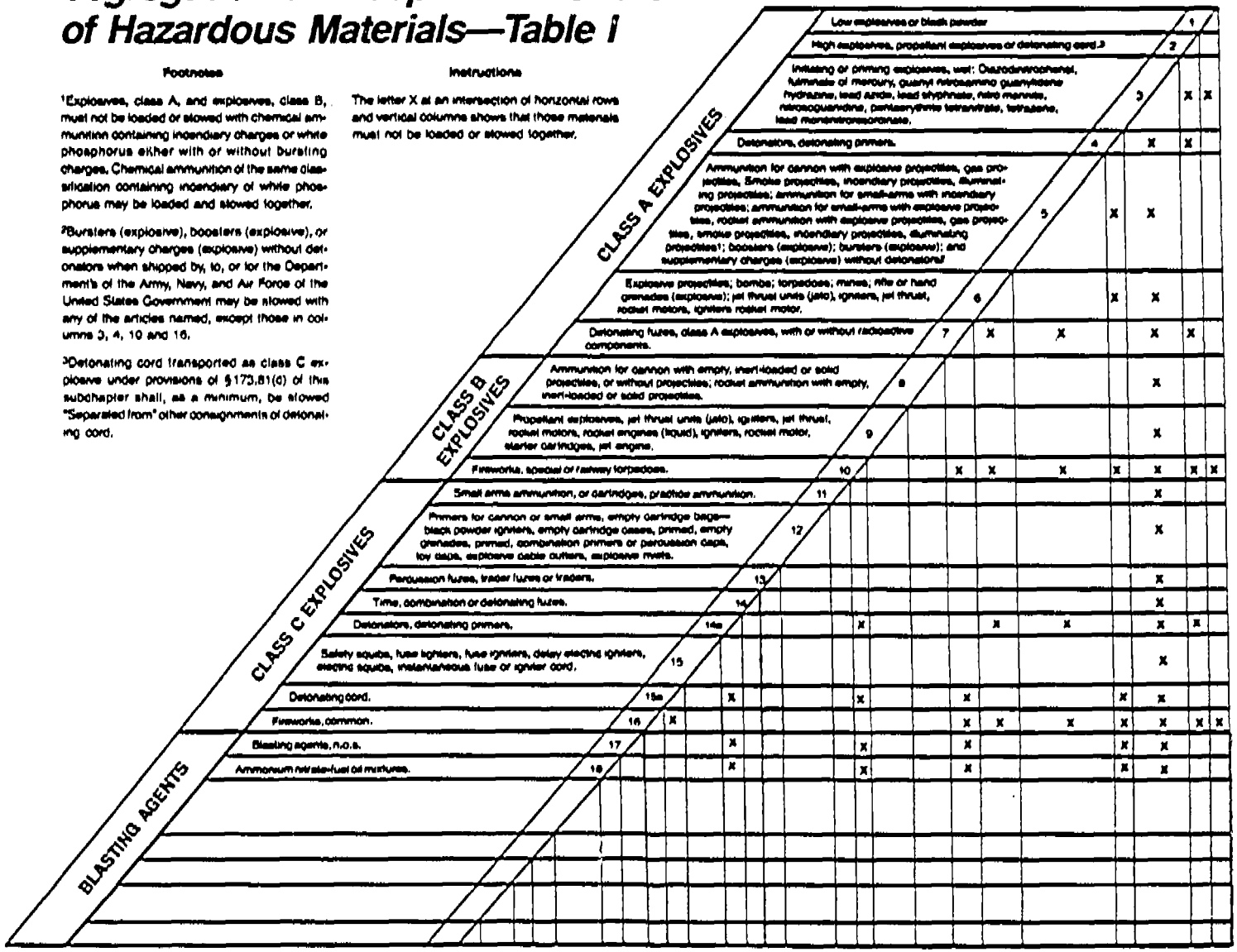


TABLE II

		1(A)	1(B)	1(C)	2(A)	2(B)	3	4(A)	4(B)	4(C)	5(A)	5(B)	6(A)	6(B)	7	8	9
EXPLOSIVES A	1(A)	*	*	*	4	2	4	4	4	4	4	4	2	2	2	4	0
EXPLOSIVES B	1(B)	*	*	*	4	2	4	3	3	4	4	4	2	2	2	2	0
EXPLOSIVES C, BLASTING AGENTS	1(C)	*	*	*	2	1	2	2	2	2	2	2	1	0	2	2	0
FLAMMABLE COMPRESSED GASES	2(A)	4	4	2	.....	0	2	1	2	1	2	4	0	0	2	1	0
NONFLAMMABLE COMPRESSED GASES	2(B)	2	2	1	0	.....	2	0	1	0	0	2	0	0	1	0	0
FLAMMABLE OR COMBUSTIBLE LIQUIDS	3	4	4	2	2	2	.....	2	2	2	2	3	2	0	2	1	0
FLAMMABLE SOLIDS	4(A)	4	3	2	1	0	2	.....	1	1	1	2	0	0	2	1	0
FLAMMABLE SOLIDS LABELED SPONTANEOUSLY COMBUSTIBLE	4(B)	4	3	2	2	1	2	1	.....	1	2	2	1	0	2	1	0
FLAMMABLE SOLIDS LABELED DANGEROUS WHEN WET	4(C)	4	4	2	1	0	2	1	1	.....	2	2	0	0	2	1	0
OXIDIZERS	5(A)	4	4	2	2	0	2	1	2	2	.....	2	0	1	1	2	0
ORGANIC PEROXIDES	5(B)	4	4	2	4	2	3	2	2	2	2	.....	2	1	2	2	0
CLASS A POISONS	6(A)	2	2	1	0	0	2	0	1	0	0	2	.....	0	1	0	0
CLASS B POISONS OR IRRITATING MATERIALS	6(B)	2	2	0	0	0	0	0	0	0	1	1	0	.....	0	0	0
RADIOACTIVE MATERIALS	7	2	2	2	2	1	2	2	2	2	2	2	1	0	.....	2	0
CORROSIVE MATERIALS	8	4	2	2	1	0	1	1	1	1	2	2	0	0	2	.....	0
OTHER REGULATED (ORM) MATERIALS	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.....

(B) For open containers stowed on or under deck, a minimum separation of 20 feet must be provided in the fore and aft direction unless separated by a bulkhead resistant to fire and water or a minimum athwartships separation of 8 feet must be provided.

(ii) "Separated from"—

(A) For closed freight containers on or under deck a fore and aft separation of at least 20 feet must be provided unless separated by a bulkhead resistant to fire and water or a minimum athwartships separation of 16 feet must be provided.

(B) For open freight containers stowed on deck a minimum separation of 20 feet must be provided in the fore and aft direction or a minimum separation of 16 feet must be provided in the athwartships direction.

(C) Open freight containers stowed under deck must be separated by a bulkhead resistant to fire and water.

(iii) "Separate by a complete cargo compartment or hold from":

(A) For closed or open freight containers on deck a minimum separation of 20 feet must be provided in the fore and aft direction or a minimum separation of 24 feet must be provided in the athwartships direction.

(B) Closed freight containers under deck must be segregated by one bulkhead resistant to fire and water.

(C) Open freight containers under deck must be segregated by two bulk-heads resistant to fire and water.

(iv) "Separated longitudinally by an intervening complete cargo compartment or hold from":

(A) Closed or open freight containers on deck must be separated by a distance of 80 feet.

(B) Closed freight containers under deck must be separated by at least two bulkheads resistant to fire and water or one bulkhead resistant to fire and water and a total distance of at least 80 feet provided the containers are not stowed less than 20 feet from the intervening bulkhead.

(C) Open freight containers under deck must be separated by at least two bulkheads resistant to fire and water.

(e) In applying the minimum separation requirements specified in Table II to portable tanks and railroad and highway vehicles containing hazardous materials, paragraph (d) of this section pertaining to freight containers applies.

(f) A ferry vessel (when operating either as a passenger or cargo vessel) which cannot provide the type of separation required in this section may carry incompatible hazardous materials in separate highway or railroad vehicles if they are stowed to give the maximum possible separation.

SUBPART E

SPECIAL REQUIREMENTS FOR TRANSPORT VEHICLES LOADED WITH HAZARDOUS MATERIALS AND TRANSPORTED ON BOARD FERRY VESSELS

§ 176.88 Application. The requirements in this subpart are applicable to transport vehicles containing hazardous materials being transported on board ferry vessels and are in addition to any prescribed elsewhere in this subchapter. Vessels in a service similar to a ferry service, but not over a designated ferry route, may be treated as a ferry vessel for the purpose of this subpart if approved in writing by the District Commander.

§ 176.89 Control of transport vehicles. (a) A transport vehicle containing hazardous materials may be transported on board a ferry vessel, subject to the following conditions:

(1) The operator or person in charge of the vehicle shall deliver to the vessel's representative a copy of the shipping papers and certificate required by §§ 176.24 and 176.27;

(2) The vehicle shall be placed at the location indicated by the vessel's representative;

(3) The parking brakes of the vehicle shall be set securely to prevent movement;

(4) The motor of a highway vehicle shall be shut off and not restarted until the vessel has completed its voyage and docked;

(5) All vehicle lights shall be cut off and not relighted until the vessel has completed its voyage and docked;

(6) The operator of a highway vehicle shall remain with the vehicle;

(7) No repairs or adjustments must be made to the vehicle while it is on the vessel;

(8) No hazardous materials are to be released from the vehicle; and

(9) Any instructions given by the vessel's representative during the voyage, and during "roll on" and "roll off" operations must be observed.

(b) Smoking by any person in or around a vehicle is prohibited.

§ 176.90 Private automobiles. A private automobile which is carrying any explosive (except permitted fireworks or small arms ammunition) may not be transported on a passenger-carrying ferry vessel unless the explosive is in compliance with packaging, labeling, marking, and certification requirements of this subchapter. Permitted fireworks and small arms ammunition may be carried without the required packaging, labeling, marking, or certification if they are in light containers.

§ 176.91 Motorboats. A motorboat may be transported on board a ferry vessel with gasoline in the tank and two other containers not exceeding six gallons capacity each if they are in the motorboat, closed, and in good condition.

§ 176.92 Cylinders laden in vehicles. Any cylinder of compressed gas which is required to have a valve protection cap fitted in place may be transported on board a ferry vessel without having the valve protection cap in place when it is laden in a transport vehicle and is not removed from the vehicle while on the vessel.

§ 176.93 Vehicles having refrigerating or heating equipment. (a) A transport vehicle fitted with refrigerating or heating equipment using a flammable liquid or gas, or diesel oil as fuel, may be transported on a ferry vessel. However, the refrigerating or heating equipment may not be operated while the vehicle is on the vessel, unless the equipment complies with the following requirements:

(1) The installation is rigidly mounted and free of any movement other than normal vibration in operation;

(2) An easily accessible shutoff control is fitted to the fuel and electrical supply of the refrigerating or heating equipment; and

(3) The fuel storage tank, the fuel lines, the carburetor and any other fuel devices are tight and show no signs of leakage.

(b) If the vehicle operator desires to operate the refrigerating or heating equipment while on the vessel and the equipment is not fitted

with automatic starting and stopping devices, it must be started before the vehicle is taken on board. It may continue in operation while the vehicle is on the vessel, but if the motor stops it may not be restarted.

(c) In the case of a ferry vessel on a voyage exceeding 30 minutes duration, stowage must be provided for transport vehicles having refrigerating or heating equipment operated by internal combustion engines which will permit ready diffusion of exhaust gasses to the open air. Passenger vehicles may not be stowed in a position adjacent to vehicles operating internal combustion motors which expose the occupants of the passenger vehicles to excessive concentrations of exhaust fumes from such motors.

(d) A transport vehicle containing solid carbon dioxide as a refrigerant may be transported on a ferry vessel only if it is stowed in a well ventilated location.

SUBPART F

SPECIAL REQUIREMENTS FOR BARGES

§ 176.95 Application. The requirements prescribed in this subpart are applicable to the transportation of packaged hazardous materials on board barges. The requirements prescribed elsewhere in this subchapter for vessels similarly apply, except as provided in this subpart, to the transportation of packaged hazardous materials on board barges.

§ 176.96 Materials of construction. Only barges constructed of steel may be used to transport hazardous materials.

§ 176.97 Prohibition of dump scows. Dump scows are barges having cargo carrying compartments of the hopper type and fitted with a bottom dump or a side dump. This type of barge is prohibited from the carriage of any class of hazardous material.

§ 176.98 Stowage of hazardous materials on board barges. A material for which "on deck" stowage only is required by Column (7) of the Hazardous Materials Table (§ 172.101 of this subchapter) may be stowed "under deck" on unmanned barges.

§ 176.99 Permit requirements for certain hazardous materials. The permits required by §§ 176.100 and 176.415 for loading, unloading, and handling Class A Explosives, blasting agents, and certain ammonium nitrates must be obtained when these materials are loaded on, unloaded from, or handled on board a barge or barge carrying vessel. However, a barge loaded with these materials being placed on, removed from, or handled on board a barge carrying vessel is not subject to these permit requirements.

SUBPART G

DETAILED REQUIREMENTS FOR EXPLOSIVES

§ 176.100 Permit for Class A explosives. Before a shipment of Class A explosives may be discharged from, loaded on, handled, or restowed on board a vessel at any place in the United States, its territories, or its possessions (except the Panama Canal Zone), the carrier must obtain a permit from the Captain of the Port or his authorized representative. Exceptions to this permit requirement may be given only by the Captain of the Port or his authorized representative.

§ 176.105 Loading and unloading explosives. (a) In any particular port, Class A or Class B explosives (except special fireworks), may not be loaded on a vessel until all other cargo has been loaded on board the vessel. No explosives may be loaded or unloaded at the same time that other cargo is being handled.

(b) All explosives must be handled carefully. Packages of explosives may not be thrown, dropped, rolled, dragged, or slid over each other or over a deck.

(c) Packaged Class A explosives must be loaded and discharged from a vessel by using a chute as provided for in § 176.163 or by a mechanical pallet, skipboard, tray or pie plate, fitted with a cargo net or sideboards. A stuffed mattress at least 4 feet wide by 6 feet long and not less than 4 inches thick, or a heavy jute or hemp mat of these dimensions, must be used for depositing explosives lifted by mechanical means or slid on a chute. The maximum load handled in a pallet, skipboard, tray, or pie plate may not exceed 2,640 pounds. A rope net sling with a pallet, skidboard, pie plate or similar base must be loaded so that a minimum displacement of items occurs when it is lifted; the cargo net must completely encompass the bottom and sides of the load. Not more than one-third of the vertical dimension of any package may extend above the sideboard of a tray. A landing mattress and cargo net are not needed for palletized Class A explosives.

(d) Detonators, detonating primers, detonating fuzes, fulminate of mercury, and other initiating or priming explosives defined in this subchapter constitute distinct types of explosives. They must be handled with extreme care. A chute and mattress may not be used when loading or discharging this type of explosive.

(e) A "can" hook may not be used for raising or lowering a barrel, drum, or other container of explosives.

(f) A fire hose of sufficient length to cover the area of the loading operation and connected with an adequate water supply must be laid out and ready for use.

§ 176.110 Condition of package. A package of an explosive which is damp, moldy, stained or in any condition that indicates leakage may not be transported by vessel. The shipper must substantiate any claim that a stain is due to accidental contact with grease, oil, or a similar substance. In case of doubt, the package may not be transported.

§ 176.115 On deck stowage of explosives. (a) The following requirements apply to the stowage of explosives on deck:

(1) An explosive may not be stowed on or under a bridge deck.

(2) An explosive may not be stowed nearer than 25 feet in a horizontal plane to the crew's quarters.

(b) Explosives being transported on deck on a vessel between receiving points and delivery points within the same harbor, bay, sound, lake, or river including explosive anchorages must be covered with a fire resistant or flame-proof tarpaulin securely lashed in place.

§ 176.120 Preparation of decks, gangways, hatches, and cargo ports. (a) All decks, gangways, and hatches over or through which explosives must be passed or handled in loading or unloading must be freed of all loose material and must be swept broom clean before loading and unloading.

(b) All hatches and cargo ports opening into a compartment in which any explosives are stowed must be kept closed, except during loading or unloading of the compartment. After loading, hatches must be securely closed against the weather. If tarpaulins are used, they must be securely battened.

§ 176.125 Handling over deck loads on break-bulk vessels. A deck load over which explosives must be passed may not exceed the height of the hatch coaming, bulwark, or three feet, whichever is greater.

§ 176.130 Securing and dunnaging of packages of explosives. (a) Each package of explosives must be secured and dunnaged to prevent movement in any direction. Vertical restraints are not required if the shape of the package and the stuffing pattern precludes shifting of the load.

(b) Each keg of black powder must be stowed in an upright position with the bungs up and each tier must be completely dunnaged.

(c) Each package of explosives must be braced and dunnaged so

that it is not likely to be pierced by the dunnaging or crushed by any superimposed weight.

§ 176.135 Location of magazines. (a) Each magazine must be located in a hold, preferably a 'tween deck hold, that is dry and well ventilated. It may not be located in horizontal proximity to crew or passenger accommodations or below their living spaces. A magazine may not be built on or under the principal bridge structure or any navigation spaces. Except for inspection purposes, the hold or compartment in which a magazine is constructed must be closed off to all traffic after the explosives are stowed.

(b) A magazine may not be constructed in contact with a collision bulkhead or a bulkhead forming a boiler room, engine room, coal bunker or galley boundary unless there is no practicable alternative. If it is necessary to construct a magazine contacting one of these bulkheads, a cofferdam space of at least one foot must be provided between the permanent bulkhead and the magazine bulkhead. The cofferdam space must remain open to the free circulation of air and may not be used for stowage or storage purposes.

(c) When a magazine is constructed over a 'tween deck hatch, the hatch girders or strongbacks and the hatch covers forming the 'tween deck hatch must be of a design and size to carry the imposed load with safety. Covers of the 'tween deck and over-deck hatch must completely close the hatch opening and fit securely in place. 'Tween deck hatch covers of wood forming the base of a magazine must be completely covered with bulkhead panels approved by the Coast Guard under 46 CFR 164.008, or an equivalent thermal insulative material acceptable to the Captain of the Port. The joints of the panels must be staggered midway between the joints formed by the wooden hatch covers and the magazine must be constructed in accordance with the applicable provisions of §176.138, except that the panels must be completely covered with wood dunnage. No metal structural parts may protrude within any magazine. If the stowage of explosives extends into the over-deck hatch coaming, this coaming must be sheathed with wood. A magazine located in a hatchway may be constructed to occupy only a part of the hatchway. A portable magazine may be stowed in the square of a hatchway; it must be lashed or lommed to prevent movement.

(d) Any construction and location of a magazine for the stowage of explosives other than as provided in this subpart may be authorized only by the Commandant, (G-MTH).

§ 176.138 Construction of magazines. (a) All magazine construction, and other conditioning of holds, deck, or hatches on a vessel, must be completed before the actual loading of explosives on that vessel is initiated.

(b) The following requirements must be observed in the construction of a magazine for stowage of explosives requiring magazine stowage:

(1) Each magazine must be constructed of steel or wood;

(2) Each magazine constructed of steel must have the interior completely protected by wood sheathing not less than ¾-inch thick to form a smooth surface free of any projections. All metal stanchions within the magazine must be boxed with wood not less than ¾-inch thick. When the floor of a magazine would be on a steel deck or tank top, a floor of wood not less than 1 ¼-inch commercial lumber, constructed on bearers, must be installed. This floor may be portable, but must be tight to prevent movement;

(3) Each magazine constructed of wood must have the bulkheads forming the sides and ends constructed of 1-inch lumber, ¾-inch tongue and groove sheathing, or ¾-inch plywood, secured to uprights of at least 3-by 4-inch size, spaced not more than 18 inches apart and secured at the top, bottom, and center with horizontal bracing. When ¾-inch plywood is used, the uprights may be spaced on 24-inch centers. Uprights may not be stepped directly to a metal deck. A 2-by 4-inch header must be fitted against the underside of the overhead deck to receive the top of the uprights. Top of uprights fitted against channel beams may be wedged directly to the beam with 2-by 4-inch spacers fitted between. Upright framing must be secured so that nails do not penetrate the interior of the magazine. When a magazine is constructed as a permanent compartment in a vessel, increased size and finish of lumber and other methods of fastening may be used, provided all fastenings are recessed below the surface of the boarding to avoid any projections within the interior of the magazine. All boarding must be fitted and finished to form a smooth surface within the interior of the magazine.

(i) The construction must separate all containers of explosives from contact with metal surfaces of the structures of the vessel. When a metal stanchion, post, or other obstruction is located in the interior area of the magazine, this obstruction must be completely covered with wood at least ¾-inch thick secured with nails or screws. All screws or nails used in the interior of the magazine for fastening must be counter-sunk below the surface of the wood. Flooring of each magazine must be not less than 1¼-inch commercial lumber, constructed on bearers. This floor may be portable but must be tight to prevent movement. Each door of a magazine must be of substantial construction, fitted reasonably tight in its jamb, and provided with a locking method of a tamper-proof type. The door must be easily accessible;

(4) Plywood ¾-inch thick may be used if the bulkheads forming the sides of a magazine are to be constructed directly against the ship's side and battens are fitted, and if the plywood is securely fastened to vertical furring strips of not less than 1-by 3-inch material, spaced not more than 18 inches apart;

(5) A magazine constructed in accordance with the provisions of paragraphs (b)(2) and (3) of this section, in which it is proposed to stow containers of explosives within 12 inches of the overhead beams or hatch coaming must have such beams and coaming sheathed with wood as prescribed by the provisions of paragraph (b)(2) of this section for stanchions; and

(6) When a Class A explosive magazine exceeds 40 feet in any direction, a partition bulkhead must be fitted in the magazine as near half length as practicable, extending from the deck to at least the top of the stowage. This partition bulkhead must be constructed to the same scantlings as the sides of the magazine, except the boardings may be spaced not more than 6 inches apart alternately on both sides of the uprights. Nail points may not protrude beyond the surface of any boardings. The bulkhead must be constructed before loading commences. This bulkhead is not required when the explosives are palletized.

§ 176.141 Entire hold or compartment forming magazine. When a complete hold or compartment is used for the stowage of explosives requiring magazine stowage, the entire hold or compartment may be considered a magazine. Any frames or bulkhead stiffeners protruding into the hold or compartment must be effectively sheathed to provide a smooth surface. Overhead beams need not be sheathed when the explosives are stowed more than 12 inches from these beams. If explosives are stowed up to the overhead beams and in the square of the hatch formed by the coaming, the overhead beams, including the hatch coaming, must be effectively sheathed. The installation of sheathing must be in accordance with the specifications for the construction of a magazine. However, when cargo battens are fitted to the vessel's shell or a bulkhead forming part of the hold or compartment, the sheathing may be secured vertically to the battens.

§ 176.144 Ventilation of magazines. Each magazine must be effectively ventilated. Each cowl ventilator's weather deck opening must be covered with a 30x30 or finer mesh wire screen, if it leads into a magazine or to an area in the same hold adjacent to a magazine. A magazine which occupied only a portion of a hold, and is not fitted with a ventilator entering into the magazine must be constructed to leave an open space of not more than one inch below the overhead frame.

§ 176.147 Metal lockers for stowage of fireworks. Each metal locker for the stowage of special fireworks which are permitted to be transported on board passenger vessels must meet the following requirements:

(a) **Size.** The cubic capacity of the locker may not exceed 150 cubic feet.

(b) **Division.** If the locker is more than 5 feet in height, it must be fitted with a division shelf at about ½ height constructed to carry the imposed load without deflection.

(c) **Gauge.** The thickness of steel used in the construction of the locker may not be less than 16 gauge steel.

(d) **Type of construction.** The locker must have a completely smooth interior surface. No stiffener element may project beyond any interior surface. The locker must be fitted with a top and bottom closure unless it is "built-in" to the structure of the vessel with the overhead and deck forming the top and bottom of the locker. "Built-in" construction is not authorized if the overdeck or underdeck is wood.

(e) **Closures.** Closures may be the removable plate or hinged door type if the locker is flame tight when closed. A locker having a portable plate closure must have an accessible side opening to permit insertion of a fire hose nozzle for flooding. The opening must be at least 3 inches in diameter, not more than 12 inches below the top of the locker, and fitted with a metal flap cover to preserve the flame tight requirement.

(f) **Location.** The locker must be readily accessible from a companionway or cargo hatch. In vessels constructed of wood, the locker must be easily observable by a watchman on his rounds. The locker must be secured to prevent shifting in a seaway.

§ 176.150 Portable magazine for stowage of explosives. (a) Each portable magazine used for the stowage of explosives on board a vessel must meet the following requirements:

(1) It must be watertight, constructed of wood or of metal lined with wood at least ¾-inch thick and with a capacity of no more than 110 cubic feet.

(2) All inner surfaces must be smooth and free of any protruding nails, screws, or other projections.

(3) If constructed of wood, the scantlings and arrangement must be not less than those required by §176.138. It must be provided with a strong close-fitting, hinged cover or door with hasps and padlock.

(4) When constructed of metal, the metal must be not less than ⅛-inch thick.

(5) Runners, bearers, or skids must be provided to elevate the magazine at least 4 inches from the deck. Pad eyes, ring bolts, or other suitable means must be provided for securing. The magazine must be lashed, chocked, or braced to prevent movement in any direction.

(6) The magazine must be stowed in the square of a 'tween deck hatch unless another stowage is authorized by § 176.155.

(7) The magazine must be marked on the top and four sides, in letters at least 3 inches high, as follows:

"EXPLOSIVES—HANDLE CAREFULLY—KEEP LIGHTS AND FIRE AWAY".

(b) A portable magazine may be used for the stowage of explosives exceeding 110 cubic feet under such conditions of construction, handling, and stowage that meet the approval of the Commandant (G-MTH).

§ 176.155 Stowage of small quantities of explosives. (a) A District Commander may approve the stowage of small quantities of explosives in a location other than "under deck", such as in an isolated compartment, mast or deck house, or in a magazine (which may be portable) secured "on deck" if:

(1) No other stowage is available;

(2) The compartment or stowage area is sheathed with wood;

(3) The boundary of the compartment or magazine is at least 8 feet from the vessel's side; and

(4) The boundary of the explosives stowage area is separated from other incompatible explosives and other hazardous materials by at least one permanent steel deck or bulkhead and a distance of 25 feet or by at least two steel decks or bulkheads and a distance of 10 feet. An intervening steel deck or bulkhead is not required on deck if the separation distance between these materials is not less than 40 feet in any direction.

§ 176.156 Stowage of explosives with combustible liquids. Class A or B explosives may not be stowed in the same hold or compartment with combustible liquids.

§ 176.157 Stowage of explosives in holds containing coal. An explosive may not be stowed in a hold containing coal or in a hold above or adjacent to a hold containing coal.

§ 176.158 Stowage of explosives with fireworks. Fireworks may not be stowed in the same hold in which there is a magazine containing explosives.

§ 176.159 Stowage of explosives and non-dangerous cargo. Each magazine in which explosives are stowed must be protected from damage which may be caused by any heavy cargo stowed in the same hold. When any shafting, steel bar, pipe, heavy machinery, or similar type of cargo is stowed in the same hold with explosives, it must be isolated, dunnaged, or secured to prevent damage to the magazine under any conditions likely to be encountered during the voyage.

§ 176.163 Requirements of equipment for handling explosives. (a) A chute for loading and unloading explosives must be constructed of smooth planed boards not less than one inch thick with side guards of the same material at least 4 inches high. Only brass screws may be used to assemble the sides and bottom. D-shaped wooden strips or runners not more than six inches apart and running the length of the chute must be fastened to the upper surface of the slide by glue and wooden dowels extended through the bottom of the chute. Four lashing rings must be provided, one at each outside corner of the chute, for purposes of securing during use.

(b) A roller conveyor constructed of aluminum or other non-sparking material may be used for loading or unloading explosives. The conveyor must be grounded when in use.

(c) [Reserved]

(d) Before any explosives are loaded or unloaded from a vessel, the master of the vessel must examine the condition and working order of all slings, carts, baskets, booms, chutes, mattresses, tackle and other equipment to be used in the transfer operation. This includes equipment belonging to the vessel, stevedores, and any contractors.

(e) Any equipment which in the judgment of the master of the vessel is not in a safe working condition must be rejected. He shall prohibit its use and take the precautions necessary to ensure that the rejected equipment is not used to load or unload explosives. The master of the vessel shall ensure that all equipment used in the handling of explosives is in good working order. If any part of the equipment shows any defect or is damaged in use, work must be stopped immediately and the damaged or defective equipment repaired or replaced before permitting the loading or unloading to continue.

§ 176.165 Installation of loading chute and roller conveyor. A chute or roller conveyer to be used in loading or unloading explosives may not be positioned or inclined in a manner which will permit any sliding package to violently strike any other package on or at the bottom of the chute or conveyer. Personnel may be stationed alongside the chute or conveyer to control the velocity of the packages to prevent any violent shock. Each chute must be wiped with machine oil before any package of explosives is transferred.

§ 176.167 Lights, tools, and equipment. (a) No artificial light except electric lights or electric lamps or floodlights may be used on board a vessel during the loading or unloading of explosives.

(b) The carrier shall provide flashlights of a non-sparking type for persons required to enter holds in which explosives are stowed.

(c) No person on board a vessel loading, unloading or transporting explosives may carry firearms, matches, bale hooks, or metallic tools of other than the nonsparking type on board.

(d) No person engaged in loading or unloading Class A or Class B explosives may wear boots or shoes shod or strengthened with iron nails or other metal, unless the boots or shoes are covered with rubber, leather, felt or other non-sparking material.

§ 176.169 Fires. (a) No fire is permitted on any dock, lighter, or vessel involved in the loading or unloading of explosives during the loading or unloading unless the fire is necessary.

(b) If a fire is necessary it must be properly safeguarded and under the direct observation of a competent person assigned for that purpose by the master of the vessel for the entire period of cargo transfer.

§ 176.171 Smoking. (a) Smoking is prohibited on and near any vessel loading or unloading explosives at a waterfront facility. The Coast Guard officer having jurisdiction may designate smoking areas at a safe distance from the vessel. "NO SMOKING" signs must be posted during operations of handling, loading, or unloading the cargo. At least one "NO SMOKING" sign must be conspicuously posted on the pier at a reasonable distance from the vessel during the handling, loading or unloading of explosives.

(b) Smoking is prohibited on and near any vessel handling, loading or unloading explosives at an explosives anchorage. However, the Coast Guard officer having jurisdiction may, with the concurrence of the master or person in charge of the vessel, designate a compartment as a smoking area. "NO SMOKING" signs must be posted conspicuously outside the entrance to this compartment and in other parts of the vessel during the loading or unloading operations.

§ 176.173 Liquor or drugs. A person who the master of a vessel finds, in his judgment, to be under the influence of liquor or drugs, may not be permitted on board during the loading, unloading, or transporting of explosives.

§ 176.177 Magazine vessels. (a) **General.** The requirements of this section are applicable to magazine vessels and are in addition to any prescribed elsewhere in this subchapter.

(b) **Type vessel authorized.** A single deck vessel with or without a house on deck is the only type vessel that may be used as a magazine vessel. A magazine vessel may not be moved while explosives are on board.

(c) **Location of explosives.** Class A and Class B explosives in excess of 5,000 pounds, stored in any magazine vessel must be stowed below deck. No explosive may be stowed on deck unless the vessel is fitted with a deck house having a stowage area which meets the requirements in this subpart for the stowage of explosives. Detonators, Class A explosives, and detonating primers, Class A explosives may not be stored on the same magazine vessel with other Class A explosives or Class B explosives.

(d) **Explosives storage spaces.** Any compartment on a magazine vessel used for the stowage of explosives must be completely ceiled with wood so as to provide a smooth interior surface. Each metal stanchion in the compartment must be boxed in the same manner. An overhead ceiling is not required when the overdeck is weathertight. All nail and bolt heads must be countersunk and any exposed metal must be covered with wood.

(e) **Initiating explosives, detonators and detonating primers.** No initiating or priming explosive may be stowed in the same compartment with any other explosive when there is any high explosive on the same magazine vessel. Detonators and detonating primers must be stowed at least 25 feet from any bulkhead forming a boundary of a compartment containing any other explosives.

(f) **Dry storage spaces.** A magazine vessel having a dry storage space capable of being used for any purpose whatsoever must have a cofferdam at least 24 inches wide fitted between the dry storage space and each adjacent compartment containing explosives. The cofferdam must be constructed of wood or steel, formed by two tight athwartship bulkheads extending from the skin of the vessel to the overdeck. If the cofferdam extends to the weather deck, a watertight hatch must be fitted in the deck to provide access to the cofferdam.

(g) **Lighting.** Non-sparking, battery-powered, self-contained electric lanterns or non-sparking hand flashlights are the only means of artificial light authorized.

(h) **Living quarters.** Living quarters must be fitted on the inside with asbestos board or other equivalent fire resistant material. Bracketed ship's lamps are the only lighting fixtures authorized to be used in the living quarters. Any stove used for heating or cooking must be securely fastened and may not be mounted closer than 6 inches to the deck or sides of the house. Any smoke pipe for the stove which passes through the roof of the house must be kept at least 3 inches away from any woodwork. Each smoke pipe must be protected by a layer of asbestos, an air space of at least 1 inch, and a metal collar of at least 16

gauge sheet secured only on the weather side of the roof. There may be no opening from any living quarters into any stowage compartment.

(l) **Storage of other hazardous materials.** Magazine vessels having explosives on board may not be used for the storage of any other hazardous material.

(j) **Magazine vessel's stores.** Articles for use as stores on board any magazine vessel must be in compliance with the requirements of 46 CFR Part 147.

(k) **Matches.** Safety matches requiring a prepared surface for ignition are the only type of matches authorized for use on board a magazine vessel. They must be kept in a metal box or can with a metal cover and stored in the custodian's living quarters.

(l) **Firearms.** Firearms and ammunition (other than cargo) are not permitted on board a magazine vessel.

(m) **Fire extinguishing equipment.** No explosive may be received, stored, or dispensed from any magazine vessel, unless four 2½-gallon extinguishers of the soda-acid type and four 2-gallon pails filled with dry sand are placed about the vessel. The contents of each liquid extinguisher continuously exposed to a temperature lower than 40° F. (45° C.) must be modified or otherwise protected to prevent freezing.

(n) **Supervision.** A magazine vessel containing explosives must be continuously attended by a custodian employed for that purpose by the vessel's owner.

(o) **Unauthorized persons on magazine vessels.** The custodian of a magazine vessel shall prevent unauthorized persons from coming on board unless it is necessary to abate a hazard to human life or a substantial hazard to property.

(p) **Repacking of explosives on board.** No explosive may be repacked on board a magazine vessel. Any broken or damaged package must be placed in an open box and carried to a safe location for repacking or other disposition.

(q) **Work boat.** Each magazine vessel must be equipped with a work boat.

(r) **Life preservers.** One approved personal flotation device must be available for each person employed on a magazine vessel.

(s) **Fenders.** Each magazine vessel must be fitted with fenders in sufficient number and size to prevent any vessel being up alongside from coming in contact with the hull.

SUBPART H

DETAILED REQUIREMENTS FOR COMPRESSED GASES

§ 176.200 General stowage requirements. (a) Each package of compressed gas being transported by vessel must be prevented from making direct contact with the vessel's deck, side or bulwark by dunnage, shoring, or other effective means.

(b) When cylinders of compressed gas being transported by vessel are stowed horizontal, each tier must be stowed in the cantlines of the lower tier and the valves on cylinders in adjacent tiers must be at alternate ends of the stow. Each tier may be stepped back and the ends alternated in order to clear the flange. Lashing must be provided to prevent any movement.

(c) When cylinders of compressed gas being transported by vessel are stowed in a vertical position they must be stowed upright in a block and cribbed or boxed in with suitable sound lumber. The box or crib must be dunnaged at least 4 inches off any metal deck. The cylinders in the box or crib must be braced to prevent any movement. The box or crib must be securely chocked and lashed to prevent any movement.

(d) A compressed gas packaging, bearing a Poison label, must be stowed away from all foodstuffs.

(e) Compressed gas may not be stowed "on deck" over a hold or compartment containing coal.

§ 176.205 Under deck stowage requirements. (a) When compressed gas is stowed below deck, it must be stowed in a hold or compartment capable of being ventilated with no source of artificial heat and clear of crew and passenger living spaces. No bulkhead or deck of the hold or compartment may be a common boundary with any boiler room, engine room, coal bunker, galley or boiler room uptake.

(b) When flammable compressed gas is stowed below deck, it must be stowed in a hold or compartment which complies with paragraph (a) of this section and the following requirements:

(1) Each hold or compartment must be ventilated.

(2) Each hold or compartment must be equipped with an overhead water sprinkler system or fixed fire smothering system.

(3) Each electrical power line in the hold or compartment must be protected by a strong metal covering to prevent crushing by cargo being stowed against it.

(4) Except when fitted with electrical fixtures of the explosion-proof type, each electrical circuit serving the hold or compartment must be disconnected from all sources of power. No circuit may be energized until the flammable compressed gas cargo and any vapors have been removed from the hold or compartment. Portable lighting of the explosion-proof type may be used if the source of power is from electrical outlets outside the hold or compartment and above the weather deck.

(5) Any opening in a common bulkhead of an adjacent hold or compartment must be securely closed off and made gas tight, unless the adjacent hold or compartment is also used for the stowage of flammable compressed gas.

(6) Full and efficient hatch covers must be used. Tarpaulins, if fitted, must be protected by dunnaging before overstowing with any cargo. Each tarpaulin must be in one piece and free of rents, tears, and holes.

(7) A fire screen must be fitted at the weather end of each vent duct leading from the hold or compartment. The fire screen must completely cover the open area. It must consist of two layers of fine brass wire screen at least 20 x 20 mesh or finer, spaced not less than ½ inch or more than 1½ inches apart. The screen may be removable if means for securing it in place when in service are provided.

(8) The hold or compartment may not be fitted with any gooseneck type vent trunk head.

(9) All electrical apparatus located in the hold or compartment must have a positive means for disconnecting from power outside the hold or compartment containing any flammable compressed gas.

§ 176.210 On deck stowage requirements. Cylinders of compressed gas being transported by vessel must be protected from the direct rays of the sun by structural erections or awnings. A tarpaulin covering the cylinders is not acceptable if it comes in contact with them.

§ 176.220 Smoking or open flame and posting of warning signs. (a) Smoking or the use of open flame is prohibited in any hold or compartment containing a flammable compressed gas, near any flammable compressed gas stowed on deck, or near any ventilator leading to a hold containing this material.

(b) A sign carrying the legend:

FLAMMABLE VAPORS
KEEP LIGHTS AND FIRE AWAY

NO SMOKING

must be conspicuously posted at each approach to an "on deck" flammable compressed gas stowage area and near each cargo hold ventilator leading to a hold containing this material. The sign must be painted on a white background using red letters. The letters may not be less than 3 inches high.

§ 176.225 Stowage of chlorine. Chlorine may not be stowed in the same hold or compartment with metallic sodium or potassium, phosphorus, copper or brass leaf sheets, powdered antimony, turpentine, ammonia, finely divided organic material, coal gas, hydrogen, or acetylene.

§ 176.230 Stowage of flammable compressed gases. Flammable compressed gases transported in Specification 106A and 110A multi-unit tank car tanks must be stowed on deck only, and must be shaded from radiant heat.

SUBPART I

DETAILED REQUIREMENTS FOR FLAMMABLE LIQUIDS AND COMBUSTIBLE LIQUIDS

§ 176.305 General stowage requirements. (a) Except as otherwise provided in § 176.76(g), a package containing a flammable liquid and equipped with a vent or safety relief device must be stowed "on deck" only.

(b) The following requirements apply to each hold or compartment in which a flammable or combustible liquid is being transported:

(1) The hold or compartment must be ventilated except that the stowage of packaged flammable liquids with a capacity of 110 gallons or less and with flash points above 73° F. may be in non-ventilated holds.

(2) Stowage of these liquids within 20 feet of a bulkhead which forms a boundary or deck of a boiler room, engine room, coal bunker, galley, or boiler room uptake is not permitted. If the amount of the liquid to be stowed in a hold will not permit compliance with the requirement for a 20-foot separation, less separation distance is authorized if at least one of the following conditions exists:

(i) The bulkhead or deck is covered with at least 3 inches of insulation on the entire area subject to heat;

(ii) A temporary wooden bulkhead at least 2 inches thick is constructed in the hold at least 3 inches off an engine room or 6 inches off a boiler room bulkhead, covering the entire area of the bulkhead that is subject to heat and the space between the permanent bulkhead and the temporary wooden bulkhead is filled with bulk asbestos or mineral wool; or

(iii) A temporary wooden bulkhead is constructed of at least one inch thick tongue and groove sheathing, located 3 feet from the boiler room or engine room bulkhead, and filled with sand to a height of 6 feet above the tank top, or, if the cargo compartment is located between decks, 3 feet of sand.

(3) Combustible liquids may be stowed in a hold within 20 feet of a common bulkhead with the engine room if the means of vessel propulsion is internal combustion engines; and

(4) Each cargo opening in a bulkhead of an adjacent hold must be securely closed off and made gas tight, unless the adjacent hold is also used for the stowage of a flammable or combustible liquid.

(c) In addition to the requirements specified in paragraph (b) of this section, the following requirements apply to each hold or compartment in which a flammable liquid is transported:

(1) Full and effective hatch covers must be used. Tarpaulins, if fitted, must be protected by dunnaging before overstowing with any cargo. Each tarpaulin must be in one piece and free of rents, tears, and holes;

(2) If flammable liquids in excess of one ton are stowed under deck in any one hold or compartment, a fire screen must be fitted at the weather end of each vent duct leading from that hold or compartment. The fire screen must completely cover the open area. It must consist of two layers of fine brass wire screen at least 20 × 20 mesh or finer spaced not less than ½ inch or more than 1½ inches apart. The screen may be removable if means for securing it in place when in service are provided;

(3) Each electrical power line in the hold or compartment must be protected by a strong metal covering to prevent crushing by cargo being stowed against it;

(4) Except when fitted with electrical fixtures of the explosion-proof type, each electrical circuit serving the hold or compartment must be disconnected from all sources of power from a point outside the hold or compartment containing the flammable liquid. No circuit may be energized until the flammable liquids and any vapors have been removed from the hold or compartment. Portable lighting of the explosion-proof type may be used if the source of power is from electrical outlets outside the hold or compartment and above the weather deck;

(5) Flammable liquids in excess of one ton, except flammable liquids with a flashpoint above 73° F., may not be transported in any hold or compartment that is fitted with a gooseneck type of vent head.

(d) On a passenger vessel, each hold or compartment used to transport flammable liquids must be equipped with an overhead water sprinkler system or fixed fire smothering system.

(e) On a passenger vessel, each hold or compartment used to transport a flammable liquid under a passenger space must have an overdeck of an A-60 type construction (see 46 CRF 72.05-10(c)(1)) or equivalent or have its underside covered with at least 3 inches of noncombustible insulation.

(f) No flammable liquid in a drum or wooden case, having inside packagings of more than one quart capacity each, may be stowed as a beam filler. A wooden barrel, a wooden box or a fiberboard box, with any flammable liquid in inside packagings of not more than one quart capacity each, may not be stowed as a beam filler unless it is possible to stow and observe any "THIS SIDE UP" marking.

§ 176.315 Fire protection requirements. (a) For each 21,000 U.S. gallons (or part thereof) of any flammable or combustible liquid being transported on board a vessel in a portable tank, tank car, or a tank truck, there must be provided at least one B-V semiportable foam (40 gallon capacity) (see 46 CFR 95.50), dry chemical (100 lbs. minimum capacity) or equivalent fire extinguisher, or a fire hose fitted with an approved portable mechanical foam nozzle with pick-up tube and two 5 gallon cans of foam liquid concentrate. Each foam system must be suitable for use with each flammable or combustible liquid it is intended to cover. Each fire extinguisher must be accessible to the tank it is intended to cover.

(b) The fire hose at each fire hydrant in the vicinity of flammable or combustible liquid stowage areas must be fitted with an approved combination spray nozzle.

(c) The pressure must be maintained in the vessel's fire mains during the loading and unloading of the flammable or combustible liquid.

(d) Two 15-pound capacity hand portable dry chemical or two portable 2½-gallon foam-type extinguishers must be accessible to any packaged flammable or combustible liquid and suitable for use with the lading.

(e) The requirements of this section do not apply to portable tanks and their contents authorized under 46 CFR 93.35 or 46 CFR Part 64.

§ 176.320 Use of hand flashlights. Each hand flashlight used in a hold or compartment containing any flammable liquid, or on deck near any flammable liquid, must be of the non-sparking type.

§ 176.325 Smoking or open flame and posting of warning signs. (a) Smoking or the use of open flame is prohibited in any hold or compartment containing a flammable or combustible liquid, near any flammable or combustible liquid stowed on deck, or near any ventilator leading to a hold containing such material.

(b) A sign carrying the legend:

FLAMMABLE VAPORS
KEEP LIGHTS AND FIRE AWAY

NO SMOKING

must be conspicuously posted at each approach to a flammable or combustible liquid stowed "on deck" and near each cargo-hold ventilator leading to a hold or compartment containing this material. This sign must be painted on a white background using red letters. The letters may not be less than 3 inches high.

§ 176.331 Transportation of flammable liquids with foodstuffs. Each package containing a flammable liquid which bears a Poison label must be stowed separate from foodstuffs.

§ 176.340 Combustible liquids in portable tanks. (a) Combustible liquids may be transported by vessel in portable tanks only as specified below:

(1) Portable tanks authorized in § 173.119 of this subchapter.

(2) Portable tanks approved and maintained in accordance with 46 CFR 98.35, constructed prior to October 1, 1974. Such tanks may continue in service only until October 1, 1984.

(3) Portable tanks approved by the Commandant of the Coast Guard (G—MTH).

SUBPART J

DETAILED REQUIREMENTS FOR FLAMMABLE SOLIDS, OXIDIZERS, ORGANIC PEROXIDES, AND BLASTING AGENTS

§ 176.400 Stowage of blasting agents, oxidizers and organic peroxides. (a) No blasting agents oxidizer or organic peroxide being transported by vessel may be stowed in the same hold or compartment with any readily combustible material such as a combustible liquid, a textile product, or with a finely divided substance such as an organic powder.

(b) No blasting agents, oxidizer or organic peroxide being transported by vessel may be stowed in a hold or compartment containing sulfur in bulk, or in any hold or compartment above, below, or adjacent to one containing sulfur in bulk.

§ 176.405 Stowage of charcoal. (a) Before stowing charcoal on a vessel for transportation, the hold or compartment in which it is to be stowed must be swept broom clean. All residue of former cargo, including a petroleum product, a vegetable or animal oil, nitrate, or sulfur, must be removed.

(b) Charcoal packed in bags and offered for transportation on board a vessel in a quantity over one ton must be loaded so that the bags are laid horizontally and stacked with space for efficient air circulation. If the bags are not compactly filled and closed to avoid free space within, vertical and horizontal dunnage strips must be laid between the bags. Space for ventilating must be maintained near bulkheads, the shell of the vessel, the deck and the overhead. No more than 40 tons of charcoal may be stowed in a hold or compartment when other stowage space is available. If the unavailability of hold or compartment space requires the stowage of a larger amount, the arrangement of the stow for ventilation must be adjusted to ensure a sufficient venting effect.

(c) Any loose material from bags broken during loading must be removed. Broken bags may be repacked or have the closures repaired and the repaired bags restowed.

(d) Charcoal "screenings" packed in bags must be stowed to provide spaces for air circulation between tiers regardless of the quantity stowed.

§ 176.410 Blasting agents, ammonium nitrate and ammonium nitrate-mixtures. (a) This section prescribes requirements to be observed with respect to transportation of each of the following hazardous materials by vessel:

(1) Blasting agents and ammonium nitrate-fuel oil mixtures.
(2) Ammonium nitrate (no organic coating).
(3) Ammonium nitrate (organic coating).
(4) Ammonium nitrate-carbonate mixture.
(5) Ammonium nitrate fertilizer *(containing no more than 0.2 percent carbon)*
(6) Ammonium nitrate mixed fertilizer.
(7) Ammonium nitrate phosphate.

(b) This section does not apply to any non-acidic ammonium nitrate mixed fertilizer containing 13 percent or less ammonium nitrate, less than 5 percent organic material, no other oxidizing material, and which does not meet the criteria for any other hazard class set forth in Part 173 of this subchapter.

(c) When blasting agents or any of the ammonium nitrates listed in paragraph (a) of this section is transported by vessel;

(1) It must be stowed well away from any steam pipe, electric circuit, or other source of heat;

(2) Smoking may not be permitted except in designated areas away from the material and "NO SMOKING" signs must be posted in accordance with §176.60;

(3) Fire hoses must be connected, laid out, and tested before loading or unloading commences; and

(4) A fire watch must be posted in the hold or compartment where the material is being loaded or unloaded.

(d) When blasting agents or any of the ammonium nitrates listed in paragraph (a) of this section are transported in bags by vessel:

(1) The requirements specified in paragraph (c) of this section must be complied with;

(2) The temperature of the bagged material may not exceed 130° F;

(3) Minimum dunnage and sweatboards must be used to prevent any friction or abrasion of bags, and to allow for the circulation of air and access of water in the event of fire;

(4) The bags must be stowed from side to side, out to the sweatboards;

(5) A space of 18 inches must be provided between any transverse bulkhead and the bags;

(6) The bags must be stowed so as to provide an 18-inch athwartship trench along the centerline of the compartment, continuous from bottom to top;

(7) The bags must be stowed so as to provide an 18-inch amidship trench running fore and aft from bulkhead to bulkhead;

(8) The bags may not be stowed closer than 18 inches from any overhead deck beam;

(9) The bags must be stowed so as to provide vent flues 14 inches square at each corner of the hatch continuous from top to bottom;

(10) Trenching must be accomplished by alternating the direction of the bags in each tier (bulkheading); and

(11) The bags must be blocked and braced as necessary to prevent shifting of the bagged cargo adjacent to any trench area.

(e) Blasting agents or any of the ammonium nitrates listed in paragraph (a) of this section may be transported by vessel with dynamite, commercial boosters, or other non-priming, non-initiating types of explosives which are compatible with dynamite:

(1) In the same hold or compartment with the explosives or in a hold or compartment adjacent to the explosives if the blasting agents or ammonium nitrate is packaged in strong metal cans, metal or fiber drums, barrels, kegs, or wooden or fiberboard boxes with noncombustible inside packagings; or

(2) In proximity to the explosives, if the two are separated by a steel deck or bulkhead, or a fire retardant wooden bulkhead built to the specifications of §176.138(b)(3). The deck or bulkhead must be sheathed on the oxidizing material's stowage side with an appropriate fire-resistant insulation.

(f) An ammonium nitrate mixture containing any ingredient which would accelerate the decomposition of ammonium nitrate under conditions incident to transportation may not be transported by vessel.

§ 176.415 Permit requirements for blasting agents, ammonium nitrates, and certain ammonium nitrate mixtures. (a) Except as provided in paragraph (b) of this section, before any of the following material is loaded on or unloaded from a vessel at any waterfront facility in the United States, its territories, or its possessions (except Panama Canal Zone), the carrier concerned must obtain written permission from the nearest District Commander, U.S. Coast Guard or Captain of the Port:

(1) Ammonium nitrate (organic coating).

(2) Ammonium nitrate mixtures containing more than 60 percent ammonium nitrate, ammonium nitrate-phosphate, or blasting agents or ammonium nitrate-fuel oil mixtures, packaged in a paper bag, burlap bag, or other nonrigid combustible packaging, or any rigid container with combustible inside packagings.

(3) Any other ammonium nitrate or ammonium nitrate mixture not listed in §176.410(a) or (b).

(b) Any of the following may be loaded on or unloaded from a vessel at any waterfront facility without a permit:

(1) Ammonium nitrate (no organic coating) in a rigid container with noncombustible inside packaging.

(2) Ammonium nitrate fertilizer (containing no more than 0.2 percent carbon) if the nearest District Commander, U.S. Coast Guard or Captain of the Port is notified at least 24 hours in advance of any loading or unloading in excess of 1,000 pounds in any one vessel (See footnote 1 to §173.182).

(3) Ammonium nitrate-phosphate in a rigid container with noncombustible inside packaging.

(4) Ammonium nitrate-carbonate mixture containing 40 percent or more fine calcium carbonate or dolomite.

(5) Non-acidic ammonium nitrate mixed fertilizer containing less than 5 per cent organic material and 60 percent or less ammonium nitrate.

(6) Blasting agents or ammonium nitrate-fuel oil mixtures in a rigid container with non-combustible inside packaging.

(c) Before a permit may be issued the following requirements must be met in addition to any others the District Commander or Captain of the Port may require:

(1) If the material is ammonium nitrate (organic coating), ammonium nitrate-phosphate, or blasting agents or ammonium nitrate-fuel oil mixture in non-rigid combustible packaging or in a rigid container with combustible inside packaging, it must be loaded or unloaded at a facility remote from populous areas or high value or high hazard industrial facilities so that in the event of fire or explosion loss of lives and property may be minimized.

(2) If the material is ammonium nitrate (organic coated) in rigid metal drums with non-combustible inside packagings, an ammonium nitrate mixture containing more than 60 percent ammonium nitrate, or ammonium nitrate-phosphate, in rigid containers with combustible inside packagings, it must be loaded or unloaded at a facility removed from congested areas or high value or high hazard industrial facilities;

(3) Each facility at which the material is to be loaded or unloaded must conform with the requirements of the port security and local regulations and must have an abundance of water readily available for fire fighting; and

(4) Each facility at which the material is to be loaded or unloaded must be located so that each vessel to be loaded or unloaded has an unrestricted passage to open water. Each vessel must be moored bow to seaward, and must be maintained in a mobile status during loading, unloading, or handling operations by the presence of tugs or the readiness of engines. Each vessel must have two wire towing hawsers, each having an eye spice, lowered to the water's edge, one at the bow and the other at the stern.

(5) If the material is ammonium nitrate (organic coated), ammonium nitrate-phosphate, an ammonium nitrate mixture containing more than 60 percent ammonium nitrate, or blasting agents or ammonium nitrate-fuel oil mixtures in non-rigid combustible packaging and loaded in freight containers or roll-on, roll-off highway vehicles, it may be loaded or unloaded at a non-isolated facility provided that facility meets the approval of the Coast Guard Captain of the Port.

§ 176.419 Flammable solids or oxidizers transported with foodstuffs. Each package containing a flammable solid or an oxidizer, bearing a Poison label and being transported on a vessel must be stowed separate from foodstuffs.

SUBPART K

[RESERVED]

SUBPART L

DETAILED REQUIREMENTS FOR POISON A, POISON B, AND IRRITATING MATERIALS

§ 176.600 General stowage requirements. (a) Each package bearing a Poison label and being transported on a vessel must be stowed well away from living quarters and any ventilation ducts serving living quarters and separate from foodstuffs.

(b) Each package bearing both a Poison Gas label and a Flammable Gas label must be segregated as a flammable compressed gas.

§ 176.605 Care following leakage or sifting of poisons A or B. A hold or compartment containing a package of Poison A or B which has leaked or sifted must be thoroughly cleaned and decontaminated after the cargo is unloaded and before the hold or compartment is used for the stowage of any other cargo.

SUBPART M

DETAILED REQUIREMENTS FOR RADIOACTIVE MATERIALS

§ 176.700 General stowage requirements.

(a) Radioactive materials must not be stowed in the same hold with mail bags.

(b) A package of radioactive materials which in still air has a surface temperature more than 5°C(9°F) above the ambient air may not be overstowed with any other cargo. If the package is stowed under deck, the hold or compartment in which it is stowed must be ventilated.

(c) Each Fissile Class III shipment must be stowed in a separate hold compartment, or defined deck area and be separated by a distance of at least six meters (20 feet) from all other Radioactive Category II- or III-Yellow labeled packages.

(d) For a shipment of radioactive materials requiring supplemental operational procedures, the shipper must furnish the master or person in charge of the vessel a copy of the necessary operational instructions.

(e) A person may not remain unnecessarily in a hold, or compartment, or in the immediate vicinity of any package on deck, containing radioactive materials.

(The information collection requirements in paragraph (d) were approved by the Office of Management and Budget under control numbers 2137-0534, 2137-0535 and 2137-0536.)

§ 176.704 Requirements relating to transport indexes.

(a) The sum of the transport indexes for all packages of radioactive materials not in freight container on board a vessel, may not exceed 200.

(b) Except as provided in paragraph (e) of this section, the sum of transport indexes for packages not in a freight container may not exceed 50 in any hold, compartment, or defined deck area. Each group of radioactive material packages must be separated by a distance of at least six meters (20 feet) at all times.

(c) Except as provided in paragraph (e) of this section, the number of freight containers with packages of radioactive materials contained therein must be limited so that the total sum of the transport indexes in the containers in any hold or defined deck area does not exceed 200, and:

(1) The sum of transport indexes for any individual freight container, or group of freight containers, does not exceed 50; and

(2) Each freight container or group of freight containers is handled and stowed in such a manner that groups are separated from each other by a distance of at least six meters (20 feet).

(d) The limitations specified in paragraphs (a), (b), and (c) of this section do not apply to consignments of low specific activity materials if the packages are marked "RADIOACTIVE LSA" and no Fissile Class II or Fissile Class III radioactive materials are included in the shipment.

(e) For exclusive use shipments, the limitations specified in paragraphs (b) and (c) of this section do not apply if—

(1) For packages not in freight containers, the sum of the transport indexes of Fissile Class II packages does not exceed 50 in each hold;

(2) For packages in freight containers, the radiation level does not exceed 200 millirem per hour at any point on the surface and 10 millirem at two meters (6 feet) from the outside surface of the freight container and the sum of transport indexes of Fissile Class II packages does not exceed 50 in each freight container and 200 in each hold or defined deck area; and

(3) Each group of Fissile Class II packages is separated from other radioactive material by a distance of at least six meters (20 feet) at all times.

(f) The limitations specified in paragraphs (a) through (e) of this section do not apply when the entire vessel is reserved or chartered for use by a sing'e shipper under exclusive use conditions if the number of Fissile Class II and Fissile Class III packages of radioactive materials aboard the vessel does not exceed the amount authorized in §§ 173.451 through 173.459 of this subchapter. The entire shipment operation must be approved by the Office of Hazardous Materials Transportation (OHMT) in advance.

§ 176.708 Segregation distance table. (a) Table III applies to the stowage of packages of radioactive materials on board a vessel with regard to transport index numbers which are shown on the labels of individual packages. Radioactive Category II or III-Yellow labeled packages may not be stowed any closer to living accommodations, regularly occupied working spaces, spaces that may be continually occupied by any person (except those spaces exclusively reserved for couriers specifically authorized to accompany such packages), and undeveloped film than the distance specified in Table III. Where only one consignment of a radioactive substance is to be loaded on board a vessel under exclusive use conditions, the appropriate segregation distance may be established by demonstrating that the direct measurement of the radiation level at regularly occupied working spaces and living quarters is less than 0.75 millirem per hour. More than one consignment may be loaded onboard a vessel with the appropriate segregation distance established by demonstrating that direct measurement of the radiation level at regularly occupied working spaces and living quarters is less than 0.75 millirem per hour, provided that the vessel has been chartered for the exclusive use of a competent person specialized in the carriage of radioactive material. Stowage arrangements shall be predetermined for the entire voyage, including any radioactive substances to be loaded at ports of call enroute. The radiation level shall be measured by a responsible person skilled in the use of monitoring instruments.

TABLE B

Sum of transport indexes of the packages	Minimum distance in feet from living accommodation of regularly occupied working space	Minimum distance in feet from undeckedged fire and plates: 1 day voyage			2 day voyage			4 day voyage			10 day voyage			20 day voyage			30 day voyage			40 day voyage			50 day voyage		
		Cargo thickness of steel (unit density)																							
		Nil	3	6	Nil	3	6	Nil	3	6	Nil	3	6	Nil	3	6	Nil	3	6	Nil	3	6	Nil	3	6
0.1 to 0.5		5	X	X	6	X	X	8	X	X	11	X	X	17	4	X	25	8	X	30	7	X	35	8	X	38	9	X
0.6 to 1		6	X	X	8	X	X	11	X	X	16	4	X	25	6	X	35	8	X	42	10	X	50	12	X	55	13	X
1.1 to 2		9	X	X	11	X	X	16	4	X	22	5	X	35	8	X	50	12	X	61	14	X	70	17	X	78	19	X
2.1 to 3		10	X	X	14	X	X	19	5	X	27	6	X	42	10	X	61	14	X	74	18	X	86	20	X	96	23	X
3.1 to 5		13	X	X	17	4	X	25	6	X	35	8	X	55	13	X	78	19	X	96	23	X	110	26	X	124	29	7
5.1 to 10		19	4	X	25	6	X	35	8	X	50	12	X	78	18	X	110	26	X	135	33	8	155	37	9	175	42	10
10.1 to 20		26	6	X	35	8	X	50	12	X	69	17	X	110	26	X	155	37	9	190	46	11	220	53	13	250	59	14
20.1 to 30		32	8	X	43	10	X	61	14	X	85	20	X	135	32	8	190	45	11	235	56	13	270	65	16	305	72	17
30.1 to 50		42	10	X	55	13	X	78	18	X	110	26	X	175	42	10	245	58	14	300	73	17	350	84	20	390	94	22
50.1 to 100		59	14	X	78	18	X	110	26	X	155	37	9	245	59	14	350	82	20	430	105	24	515	118	28	550	130	32
100.1 to 150		72	17	X	96	23	X	135	32	8	190	46	11	300	72	17	425	100	24	525	125	30	600	145	35	(7)	165	39
150.1 to 200		84	20	X	110	26	X	155	37	9	200	53	13	350	84	20	490	115	28	600	140	35	(7)	165	40	(7)	190	45
200.1 to 300		105	24	X	135	32	X	190	46	11	270	64	15	425	105	25	600	145	35	(7)	190	42	(7)	295	49	(7)	230	55
300.1 to 400		120	28	X	150	37	9	220	53	13	315	75	18	500	120	29	(7)	165	40	(7)	205	49	(7)	235	57	(7)	265	63

Note

(1) X—indicates that thickness of screening cargo is sufficient without any additional segregation distance

(2) By using 6 feet of intervening unit density cargo for persons and 10 feet for fire and plates, no distance shielding is necessary for any length of voyage specified

(3) Using 1 steel bulkhead or steel deck—multiply segregation distance by 0.8. Using 2 steel bulkheads or steel decks - multiply segregation distance by 0.64

(4) "Cargo of Unit Density" means cargo stowed at a density of 1 ton (long) per 36 cubic feet, where the density is less than this the depth of cargo specified must be increased in proportion.

(5) "minimum distance" means the least in any direction whether vertical or horizontal from the outer surface of the nearest package

(6) The total consignment on board at any time must not exceed transport indexes totaling 200 except if carried under the provisions of § 176.704(f). The figures below the double line of the table should be used in such a contingency.

(7) Not to be carried unless screening by other cargo and bulkheads can be arranged in accordance with the other columns.

Sum of transport indexes of the packages	Minimum distance in feet from living accommodation of regularly occupied working space	Minimum distance in feet from undeckedged fire and plates: 1 day voyage			2 day voyage			4 day voyage			10 day voyage			20 day voyage			30 day voyage			40 day voyage			50 day voyage		
		Cargo thickness of steel (unit density)																							
		Nil	1	2	Nil	1	2	Nil	1	2	Nil	1	2	Nil	1	2	Nil	1	2	Nil	1	2	Nil	1	2
0.1 to 0.5		2	X	X	2	X	X	3	X	X	4	X	X	6	2	X	8	2	X	10	3	X	11	3	X	12	3	X
0.6 to 1.0		2	X	X	3	X	X	4	X	X	5	2	X	8	2	X	11	3	X	13	4	X	15	4	X	17	4	X
1.1 to 2.0		3	X	X	4	X	X	5	2	X	7	2	X	11	3	X	15	4	X	19	5	X	22	5	X	24	6	X
2.1 to 3.0		4	X	X	5	X	X	6	2	X	9	2	X	13	4	X	19	5	X	23	6	X	27	7	X	30	7	X
3.1 to 5.0		4	X	X	6	2	X	8	2	X	11	3	X	17	4	X	24	6	X	30	7	X	34	8	X	38	9	3
5.1 to 10.0		6	2	X	8	2	X	11	3	X	15	4	X	24	6	X	34	8	X	42	10	3	48	12	3	54	13	3
10.1 to 20.0		8	2	X	11	3	X	15	4	X	22	5	X	34	8	X	48	12	3	58	14	4	68	16	4	76	18	5
20.1 to 30.0		10	3	X	13	4	X	19	5	X	26	7	X	42	10	X	58	14	4	72	17	4	83	20	5	93	22	6
30.1 to 50.0		13	3	X	17	4	X	24	6	X	34	8	X	54	13	3	76	18	5	92	23	6	110	26	7	120	29	7
50.1 to 100.0		18	5	X	24	6	X	34	8	X	48	12	3	76	18	5	110	25	6	130	32	8	150	36	9	170	40	10
100.1 to 150.0		22	6	X	30	7	X	42	10	3	59	14	4	93	22	6	130	31	8	150	39	10	185	45	11	(7)	50	12
150.1 to 200.0		26	6	X	34	8	X	48	12	3	68	16	4	110	26	7	150	36	9	185	43	11	(7)	51	13	(7)	58	14
200.1 to 300.0		32	8	X	42	10	3	59	14	4	83	20	5	150	32	8	185	44	11	(7)	55	13	(7)	63	15	(7)	70	17
300.1 to 400.0		36	9	X	48	12	3	68	16	4	95	23	6	150	36	9	(7)	50	13	(7)	63	15	(7)	73	18	(7)	81	20

Note

(1) X—indicates that thickness of screening cargo is sufficient without any additional segregation distance

(2) By using 6 feet of intervening unit density cargo for persons and 10 feet for fire and plates, no distance shielding is necessary for any length of voyage specified

(3) Using 1 steel bulkhead or steel decks—multiply segregation distance by 0.64

(4) "Cargo of Unit Density" means cargo stowed at a density of 1 ton (long) per 36 cubic feet, where the density is less than this the depth of cargo specified must be increased in proportion.

(5) "minimum distance" means the least in any direction whether vertical or horizontal from the outer surface of the nearest package

(6) The total consignment on board at any time must not exceed transport indexes totaling 200 except if carried under the provisions of § 176.704(f). The figures below the double line of the table should be used in such a contingency.

(7) Not to be carried unless screening by other cargo and bulkheads can be arranged in accordance with the other columns.

§ 176.710 Care following leakage or sifting of radioactive materials. (a) In case of fire, collision, or breakage involving any shipment of radioactive materials, other than materials of low specific activity, the radioactive materials must be segregated from unnecessary contact with personnel. In case of obvious leakage, or if the inside container appears to be damaged, the stowage area (hold, compartment, or deck area) containing this cargo must be isolated as much as possible to prevent radioactive material from entering any person's body through contact, inhalation, or ingestion. No person may handle the material or remain in the vicinity unless supervised by a qualified person.

(b) A hold or compartment in which leakage of radioactive materials has occurred may not be used for other cargo until it is decontaminated in accordance with the requirements of § 176.715.

(c) For reporting requirements, see § 171.15 of this subchapter.

§ 176.715 Contamination control. (a) Each hold, compartment, or deck area used for the transportation of low specific activity radioactive materials under exclusive use conditions shall be surveyed with appropriate radiation detection instruments after each use. Such holds, compartments, and deck areas may not be used again until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour, and the removable (non-fixed) radioactive surface contamination is not greater than the limits prescribed in § 173.443 of this subchapter.

For explanation of abbreviations and reference marks, see last page of this tariff.

SUBPART N

DETAILED REQUIREMENTS FOR CORROSIVE MATERIALS

§ 176.800 General stowage requirements. (a) Each package of a corrosive material being transported on a vessel must be stowed well away from living quarters, foodstuffs, and cargo of an organic nature.

(b) Each package of a corrosive material must be stowed so as to be readily observable except when stowed in a freight container or a barge, carried aboard a vessel, that is readily available.

(c) A package of corrosive material may not be stowed over any combustible substance.

(d) Glass carboys containing corrosive material may not be stowed on board any vessel, other than a barge, more than two tiers high unless each carboy is boxed or crated with neck protection extending to the sides of the carboy box. This protective construction must be strong enough to permit stacking one on top of the other.

(e) A corrosive material may not be stowed over a hold or compartment containing cotton unless the deck is of steel and the hatch is fitted with a tight coaming. In addition, the deck must be tight against leakage and the corrosive material may not be stowed over the square of the hatch.

§ 176.805 On deck stowage. (a) When break-bulk corrosive materials being transported on a vessel are stowed "on deck",

(i) Provisions must be made for leakage from any package to drain away from other cargo into an overboard scupper or freeing port. The drainage may not enter an enclosed drainage system other than a direct overboard scupper. If this stowage is not practical, sufficient clean dry sand must be placed under and around the lower tier of packages to absorb any leakage.

(ii) Dunnage must be provided on the deck and arranged so that any leakage will be apparent.

(iii) Any leakage that occurs must be washed down, using liberal quantities of water.

SUBPART O

DETAILED REQUIREMENTS FOR OTHER REGULATED MATERIALS (ORM)

§ 176.900 Stowage of cotton and fibers generally. (a) Cotton or fibers being transported on a vessel must be securely baled and bound. Each cotton or fiber bale must be covered with bagging on at least three-fourths of its surface, including both ends. Cut cotton linters may be accepted for transportation by vessel when baled and covered with bagging on the soft sides only if the bale is compressed to a density of at least 32 pounds per cubic foot and it is bound with at least six bands per bale. Any poorly compressed bale or any bale having damaged bindings may not be transported by vessel.

(b) Each wet bale must be stowed separately from any dry bales, preferably in a 'tween deck space and not overstowed. Any bale which is saturated with water may not be transported by vessel.

(c) Bales showing contact with oil or grease may not be accepted for transportation by vessel.

(d) Cotton or fibers must be stowed in a hold or compartment in accordance with the following requirements:

(1) All traces of oil or residue in the hold or compartment must be removed;

(2) A recently painted hold or compartment may not be used unless it is thoroughly dry;

(3) Each ventilation cowl serving the hold or compartment must be fitted with a spark screen;

(4) When a bulkhead of the hold or compartment is common with a boiler room, engine room, coal bunker, or galley and subjected to heat, a wooden bulkhead must be erected between the bulkhead and any cotton or fibers. This wooden bulkhead must be at least 6 inches from a boiler room bulkhead, and at least 2 inches from an engine room, coal bunker, or galley bulkhead;

(5) Each 'tween deck hatch must be closed with hatch covers, tarpaulins, and dunnage; however, metal hatch covers which are sealed by other means to provide equivalent protection may be used.

(6) Each hold or compartment must be equipped with a carbon dioxide, steam smothering, or overhead water sprinkler system or other approved fixed smothering system. Before loading, the extinguishing system must be examined to ensure that it is in good working condition; and

(7) Each hold or compartment must be clear of all debris and swept broom clean before loading.

(e) Naked lights or any fire likely to produce sparks are not permitted on the vessel, dock area, or any lighters alongside during loading or unloading of cotton or fibers.

(f) Upon completion of stowage, each hatch opening must be completely closed. Where required, tarpaulins must be fitted and secured in place to provide a tight hold. During a period of temporary stoppage of loading or unloading, a hatch may be left open. However, a fire watch, designated by the master or officer-in-charge, must be stationed in the hold or compartment in which the cotton or fibers are stowed.

(g) At least one fire hose must be connected while cotton or fibers are being loaded or unloaded. Each fire pump must be operated before any loading or unloading. Pressure must be maintained on each fire main during the loading and the fire hose laid out ready for immediate use. Portable fire extinguishers must be placed to be readily available. The fire hose, fire pumps and fire extinguishers may be the vessel's equipment or shore equipment.

(h) Smoking is not permitted on a vessel during the loading or unloading of cotton or fibers except at those times and in those places designated by the master or officer-in-charge. "NO SMOKING" signs must be conspicuously posted in appropriate places and the officer in charge of the loading or unloading must see that they are observed.

(i) All cotton or fibers must be segregated in accordance with the requirements applicable to flammable solids (see § 176.83(b)) but may not be stowed in the same hold with other flammable solids.

(j) Cotton or fibers may be stowed in the same hold over bulk sulfur if the sulfur has been trimmed and leveled and the hold is thoroughly cleaned of sulfur dust. A tight floor of two 1 inch crossed clean dunnage boards must be laid on the sulfur before cotton or fibers are stowed. These substances may be stowed alongside each other in the same hold if they are separated by a tight dustproof wood bulkhead.

(k) Cotton or fibers may not be stowed in a 'tween deck hold over bulk sulfur in a lower hold unless the 'tween deck hold has been thoroughly cleaned of all sulfur dust and the 'tween deck hatch covers are in place and covered with tarpaulins and dunnage.

(l) Cotton or fibers may not be stowed in the same hold with any combustible liquid. Cotton or fibers may be stowed in a hold adjacent to any hold above, or any hold below one containing these materials if the holds are separated by a tight steel bulkhead or deck.

§ 176.901 Stowage of cotton or fibers with rosin or pitch. Cotton or fibers being transported on a vessel may not be stowed in the same hold or compartment with rosin or pitch being transported on the same vessel. When separate stowage is not practicable, the cotton or fibers may be stowed in the same hold or compartment with rosin or pitch if they are separated by clean dunnage or a cargo of a non-combustible nature. When stowage within the same hold or compartment involves large amounts of cotton or fibers and rosin or pitch, the rosin or pitch must be floored off with at least two layers of 1 inch dunnaging and the cotton or fibers stowed above.

§ 176.902 Stowage of cotton or fibers with vegetable, animal, or rosin oil. (a) When practicable, fish oil, whale oil, vegetable oil, animal oil, or rosin oil being transported on a vessel may not be stowed in the same hold or compartment with any cotton or fibers being transported on the same vessel. When separate stowage is not practicable, the cotton and fibers must be stowed so that there is no contact with any of those oils. If cotton or other fibers are transported over any of those oils, a tight 2 inch floor of dunnage boards must be laid over the oils before the cotton or fibers are placed on top.

(b) Cotton or fibers may not be stowed in a hold below one in which any of those oils are stowed unless the 'tween deck hatch is fitted with a tight coaming and the deck is of steel and made tight against leakage.

§ 176.903 Stowage of cotton fibers with coal. Cotton or fibers being transported on a vessel may not be stowed in the same hold with coal. They may be stowed in adjacent holds if the holds are separated by a tight steel bulkhead and the cotton or fibers are dunnaged at least 2 inches off the bulkhead. Cotton or fibers may be stowed in a hold above or below one in which coal is stowed if there is a tight steel intervening deck and all hatch covers are in place and covered with tarpaulins.

§ 176.904 Cotton or fibers with synthetic nitrate of soda. Cotton or fibers being transported on a vessel may not be stowed in the same hold with synthetic nitrate of soda. They may be stowed in adjacent holds if the holds are separated by a tight steel bulkhead. Cotton or fibers may be stowed in a hold above or below one in which synthetic nitrate of soda is stowed if there is a tight steel intervening deck and all hatch covers are in place and covered with tarpaulins.

§ 176.905 Motor vehicles or mechanical equipment powered by internal combustion engines. (a) A motor vehicle or any mechanized equipment powered by an internal combustion engine is subject to the requirements of this subchapter when carried as cargo on a vessel if the engine or fuel tank contains fuel or if either battery cable is connected. Such vehicles or equipment are excepted from the requirements of this subchapter if the following requirements are met:

(1) For a motor vehicle or mechanical equipment having an internal combustion engine employing fuel classed as flammable by this subchapter, the fuel tank is empty, the engine is run until it stalls for lack of fuel, both battery cables are disconnected, and no hazardous material is stowed in the vehicle or equipment, or

(2) For motor vehicle or mechanical equipment having an internal combustion engine employing liquid fuel classed as combustible by this subchapter, the fuel tank contains 110 gallons of fuel or less, both battery cables are disconnected and no hazardous material is stowed in the vehicle or equipment.

(b) Before being loaded on a vessel, each vehicle must be inspected for leaks. A vehicle showing any signs of leakage may not be transported.

(c) Each vehicle stowed in a hold or compartment must have the battery cables disconnected and secured away from the battery terminals, unless it is stowed in a hold or compartment designated by the administration of the country in which the vessel is registered to be specially suited for vehicles. See 46 CFR 70.10–44 and 90.10–38 for U.S. vessels.

(d) The fuel tank of a vehicle being transported as cargo on a vessel may not be more than one-fourth full.

(e) All equipment used for handling vehicles must be designed so that the fuel tank and fuel system are protected from stress that might cause rupture or other damage incident to handling.

(f) Whenever possible each vehicle must be stowed to allow for its inspection during transit.

(g) Two hand-held, portable, dry chemical fire extinguishers of at least 10 pounds capacity each must be separately located in an accessible location in each hold or compartment in which any motor vehicle is stowed.

(h) "NO SMOKING" signs must be conspicuously posted at each access opening to the hold or compartment.

(i) Except when being transported in a space specially suited for vehicles, the following additional requirements apply to the stowage of any vehicles containing a flammable liquid:

(1) Each portable electrical light and hand flashlight used in the stowage area must be an approved, explosion-proof type. All electrical connections for any portable light must be made to outlets outside the space in which any vehicle is stowed;

(2) Each hold or compartment must be ventilated and fitted with an overhead water sprinkler system or fixed fire extinguishing system;

(3) Each hold or compartment must be equipped with a smoke or fire detection system; and

(4) All electrical equipment in the hold or compartment other than fixed explosion-proof lighting must be disconnected from its power source at a location outside the hold or compartment during the handling and transportation of any vehicle. Where the disconnecting means is a switch or circuit breaker, it must be locked in the open position until all vehicles have been discharged.

(j) Motor vehicles may be refueled when necessary in the hold of a vessel in accordance with § 176.78.

(k) Motor vehicles with fuel in their tanks may be stowed in a closed freight container if the following warning is affixed to the access doors: "WARNING—MAY CONTAIN EXPLOSIVE MIXTURES WITH AIR—KEEP IGNITION SOURCES AWAY WHEN OPENING." The warning must be on a contrasting background and must be readily legible from a distance of 25 feet.

(l) No hazardous materials other than motor vehicles or mechanized equipment and their equipment may be stowed in the same hold or compartment with any vehicle having a flammable liquid or flammable compressed gas in its tank.

§ 176.906 Stowage and handling of asbestos. Asbestos must be stowed, handled, and unloaded, and any asbestos contamination of vessels removed, in a manner that will minimize occupational exposure to airborne asbestos particles released incident to transportation. (See § 173.1090 of this subchapter.)

PART 177—CARRIAGE BY PUBLIC HIGHWAY

SUBPART A

GENERAL INFORMATION AND REGULATIONS

§ 177.800 Purpose of regulations in Parts 170–189 of this chapter. (a) To promote the uniform enforcement of law and to minimize the dangers to life and property incident to the transportation of hazardous materials, by private, common and contract carriers, by motor vehicle engaged in interstate or foreign commerce, the regulations in Parts 170–189 of this subchapter are prescribed to define these articles for motor vehicle transportation purposes, and to state the precautions that must be observed by the carrier in handling them while in transit. It is the duty of each such carrier to make the prescribed regulations effective and to thoroughly instruct employees in relation thereto.

§ 177.801 Scope of regulations in Parts 170–189 of this chapter. (a) Hazardous materials except such as may not be accepted and transported under Parts 170–189 of this subchapter, may be accepted and transported by private, common and contract carriers by motor vehicle engaged in interstate or foreign commerce, provided they are in proper condition for transportation and are certified as being in compliance with Parts 170–189 of this subchapter, and provided the method of manufacture, packing, and storage, so far as they affect safety in transportation, are open to inspection by a duly authorized representative of the initial carrier or of the Bureau of Explosives. Shipments of explosives or other dangerous articles not in proper condition for transportation, or loaded or stayed as required, or certified as to proper packing, marking and description as required in Parts 170–189 of this subchapter, must not be accepted for transportation or transported.

§ 177.802 Application of regulations in Parts 170–189 of this chapter. (a) Parts 170–189 of this subchapter apply to all private, common and contract carriers by motor vehicle transporting hazardous materials as defined by Department of Transportation "Regulations for Transportation of Hazardous Materials by Land and Water in Rail Freight, Express and Baggage Services and by Motor Vehicle (Highway) and Water". When shipments are accepted by motor vehicle for further transportation by rail express (see also paragraph (c) of this section), rail baggage (see also paragraph (d) of this section), rail freight or by water on board vessel, they must, in addition to Parts 170–189 of this subchapter, comply with the applicable regulations for the service by which they are to be transported.

§ 177.803 Export and import shipments by domestic carriers by motor vehicles. See §171.12 of this subchapter.

§ 177.804 Compliance with Federal Motor Carrier Safety Regulations. Motor carriers and other persons subject to this Part shall comply with 49 CFR Parts 390 through 397 (excluding §§397.3 and 397.9) to the extent those rules apply.

§ 177.805 Canadian shipments and packagings. (a) Canadian shipments and packagings may be carried under conditions specified in §171.12a of this subchapter.

§ 177.806 U.S. Government material. (a) Shipments of hazardous materials offered by or consigned to the Department of Defense (DOD) of the U.S. Government must be packaged, including limitations of weight, in accordance with the regulations in this subchapter or in containers of equal or greater strength and efficiency as required by DOD regulations.

(1) Hazardous materials sold by the DOD in packagings that are not marked in accordance with the requirements of this subchapter may be shipped from DOD installations if the DOD certifies in writing that the packagings are equal to or greater in strength and efficiency than the packaging prescribed in this subchapter. The shipper shall obtain such a certification in duplicate for each shipment. He shall give one copy to the originating carrier and retain the other for no less than 1 year.

(b) Shipments of radioactive materials, made by or under the direction or supervision of the U.S. Department of Energy or the Department of Defense, and which are escorted by personnel specially designated by or under the authority of those agencies, for the purpose of national security, are exempt from the regulations in Parts 170–189 of this subchapter.

§ 177.807 Reporting hazardous materials incidents. When an incident occurs during transportation in which a hazardous material is involved, a report may be required (see §§171.15 and 171.16 of this subchapter.

§ 177.808 Connecting carrier shipments. (a) Shipments of hazardous materials offered by connecting transportation lines must comply with Parts 170–189 of this subchapter.

§ 177.809 Carrier's material and supplies. The regulations in Parts 170–189 of this subchapter apply to all shipments of hazardous materials, including carrier's material and supplies.

§ 177.810 Vehicular tunnels. Except as regards radioactive materials, nothing contained in Parts 170–189 of this subchapter shall be so construed as to nullify or supersede regulations established and published under authority of State statute or municipal ordinance regarding the kind, character, or quantity of any hazardous material permitted by such regulations to be transported through any urban vehicular tunnel used for mass transportation. For radioactive materials, see §177.825 of this part.

§ 177.811 Astray shipments. (a) Any carrier in possession of an astray shipment of hazardous materials (other than explosives) shall forward it promptly to its destination, if known, after inspection has shown the package to be in proper condition for transportation.

(b) If the package of hazardous materials is not labeled and the exact classification of the contents is not determinable, the carrier shall apply a **FLAMMABLE LIQUID** label.

§ 177.812 Containers required. Containers required for hazardous materials are prescribed in Part 173 of this subchapter.

§ 177.813 Inefficient containers. (a) The results of experience gained by examination of broken or leaking containers must be recorded by the Bureau of Explosives to the end that further use of any particular kind of container shown by experience to be inefficient, may be prohibited by the Department.

§ 177.814 Retention of manufacturer's certificate and retest reports. (a) Each motor carrier who uses a cargo tank vehicle shall have in his files a certificate or manufacturer's data report signed by a responsible official of the manufacturer or fabricator of the cargo tank, or a competent testing agency, certifying that the cargo tank identified in the certificate was manufactured and tested in accordance with the requirements contained in the specification under which the cargo tank was constructed. The certificate and any other data furnished as required by the specification must be retained at the principal office of the carrier during the time that the cargo tank is used by the carrier and for one year thereafter.

(1) Except for specifications MC 330 and MC 331 cargo tanks, a motor carrier may himself perform the tests and inspections to determine whether the tank meets the requirements of the specification. If the motor carrier performs the tests and inspections and determines that the tank conforms to the specification, he may use the tank if he retains the test data, in place of a certificate, in his files at his principal office for as long as he uses the tank and one year thereafter.

(2) A motor carrier using a specification MC 330 cargo tank for which such carrier is unable to obtain the manufacturer's data report required by the specification may copy the information contained on the cargo tank's identification plate and ASME Code plate and retain such information as required by this section.

(3) Each motor carrier who uses a specification cargo tank which he does not own and has not tested or inspected shall obtain a copy of the manufacturer's certificate or manufacturer's data report and retain it in his files at his principal office during the time he uses the tank and for one year thereafter. A motor carrier using a specification MC 330 cargo tank which he does not own may copy the information contained on the cargo tank's identification plate and ASME Code plate if the manufacturer's data report is not available from the owner of the tank.

(b) Upon a written request to, and with the approval of, the Regional Director of Motor Carrier Safety, for the region in which a motor carrier has his principal place of business, a motor carrier may retain the certificate and other data specified in paragraph (a) of this section at a regional or terminal office. The address and jurisdictions of the Regional Directors of Motor Carrier Safety are shown in § 390.40 of Chapter III of this title.

(c) **Withdrawal of certification.** See § 177.824(i) of this subchapter.

(d) A copy of retest and inspection reports required by §§ 173.33 and 177.824 of this subchapter and all records of repairs to each cargo tank vessel must be retained in the same file with the manufacturer's certificate or manufacturer's data report for that tank as specified in paragraph (a) of this section. This provision does not apply to a motor carrier leasing a cargo tank for less than 30 days if the lessor has the records required by this section in his files.

§ 177.815 Lost or destroyed label's. Each carrier shall maintain an adequate supply of the labels specified in Subpart E of Part 172 of this subchapter to replace those that become lost or destroyed. The carrier shall replace each lost or destroyed label based on the information on the shipping papers.

§ 177.816 Training. (a) Applicability. No carrier may transport a flammable cryogenic liquid in a cargo tank on a public highway unless the driver of the vehicle has received the training specified in paragraph (b) of this section. This section applies only to an originating carrier when an interchange operation is involved.

(b) Training required. Each carrier subject to paragraph (a) of this section must:

(1) Provide the required training in written form;

(2) Provide the required training before a driver may drive a motor vehicle transporting a flammable cryogenic liquid in a cargo tank and at least one every 24 months thereafter;

(3) Include in the training program instructions pertaining to:

(i) Requirements in this subchapter applicable to cryogenic liquids, generally;

(ii) Requirements in the Federal Motor Carrier Safety Regulations, Parts 390–397 of this title, applicable to drivers;

(iii) The properties and potential hazards of the particular material to be transported;

(iv) The safe operation of the type of cargo tank the driver will be operating, including its handling characteristics, emergency features and loading limitations; and

(v) Procedures to be followed in case of accident or other emergency, including unanticipated pressure increase or decrease.

(c) Record of training. A record certifying that current training has been provided in accordance with paragraph (b) of this section shall be retained in the driver's qualification file (see §391.51 of this title) for as long as the driver is employed by that carrier and for 90 days thereafter. The record shall include:

(1) The driver's name and operators license number;

(2) The date the driver was provided the training and the due date for subsequent training;

(3) A copy of the written training material required by paragraph (b) of this section or a reference indicating the location of a readily available copy; and

(4) The name and address of the person providing the training.

§ 177.817 Shipping papers. (a) General requirements. A carrier may not transport a hazardous material unless it is accompanied by a shipping paper that is prepared in accordance with §§ 172.200, 172.201, 172.202, and 172.203 of this subchapter.

(b) Shipper certification. An initial carrier may not accept a hazardous material offered for transportation unless the shipping paper describing the material includes a shipper's certification which meets the requirements in § 172.204 of this subchapter. Except for a hazardous waste, the certification is not required for shipments to be transported entirely by private carriage and for bulk shipments to be transported in a cargo tank supplied by the carrier.

(c) Requirements when interlining with carriers by rail. A motor carrier shall mark on the shipping paper required by this section, if it offers or delivers a freight container or transport vehicle to a rail carrier for further transportation:

(1) A description of the freight container or transport vehicle; and

(2) The kind of placard affixed to the freight container or transport vehicle.

(d) This section does not apply to any material, other than a hazardous substance or a hazardous waste, that is classed as an ORM–A, B, C, or D. (See §172.200 of this subchapter.)

(e) Shipping paper accessibility—accident or inspection. A driver of a motor vehicle containing hazardous material, and each carrier using such a vehicle, shall ensure that the shipping paper required by this section is readily available to, and recognizable by, authorities in the event of accident or inspection. Specifically, the driver and the carrier shall:

(1) Clearly distinguish the shipping paper, if it is carried with other shipping papers or other papers of any kind, by either distinctively tabbing it or by having it appear first; and

(2) Store the shipping paper as follows:

(i) When the driver is at the vehicle's controls, the shipping paper shall be: (A) Within his immediate reach while he is restrained by the lap belt; and (B) either readily visible to a person entering the driver's compartment or in a holder which is mounted to the inside of the door on the driver's side of the vehicle.

(ii) When the driver is not at the vehicle's controls, the shipping paper shall be: (A) In a holder which is mounted to the inside of the door on the driver's side of the vehicle; or (B) on the driver's seat in the vehicle.

§ 177.818 Special instructions; flammable cryogenic liquids. (a) No carrier may operate, and no driver may drive, a motor vehicle transporting a flammable cryogenic liquid in a package exceeding 125 gallons water capacity unless written instructions containing the following information are carried with the required shipping papers:

(1) General precautions,

(2) Manual venting instructions,

(3) Emergency procedures, and

(4) The names and telephone numbers of persons to be contacted in case of emergency or accident.

§ 177.821 Hazardous materials forbidden or limited for transportation. (a) Nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate forbidden to common carriers. Liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, except as defined in § 173.53(e) of this chapter, may not be accepted for transportation or be transported by any common carrier by motor vehicle.

(b) Rejection of leaking containers of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate. Any individual container used for the transportation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, or any boot used therewith, found in such a condition as to permit leakage, shall be discarded and shall not thereafter be repaired for further use.

(c) Hazardous materials forbidden or limited for transportation. No motor carrier may accept for transportation or transport any hazardous material listed in Hazardous Materials Table (§ 172.101 of this chapter), as "forbidden" for transportation by all motor carriers; nor, if there be any prohibition or limitation regarding the transportation of any particular hazardous material by a particular kind of motor carrier, may any such article be accepted for transportation or be transported by that kind of carrier, except as indicated in this part. (See § 177.870.)

(d) Leaking or damaged packages of high explosive must not be accepted for transportation or transported. Should any package of high explosive when offered for shipment show excessive dampness or be moldy or show outward signs of any oily stain or other indication that absorption of the liquid part of the explosive is not perfect, or that the amount of the liquid part is greater than the absorbent can carry, the package must be refused in every instance. The shipper must substantiate any claim that a stain is due to contact with material other than the liquid explosive ingredient of the explosive. In case of doubt the package must be rejected.

(e) [Reserved]

(f) Smokeless powder for small arms in quantities not exceeding 100 pounds net weight transported in one car or motor vehicle may be classed as a flammable solid when examined for this classification by the Bureau of Explosives and approved by the Director, OHMT. Maximum quantity in any inside packaging must not exceed 8 pounds and inside packagings must be arranged and protected to prevent simultaneous ignition of the contents. The complete package must be a type examined by the Bureau of Explosives and approved by the Director, OHMT. Each outside package must bear a flammable solid label.

§ 177.822 Acceptable articles. (a) Any motor carrier may accept for transportation or transport any acceptable hazardous material listed in the Hazardous Materials Table, § 172.101 of this subchapter: *Provided, however,* That no provision of this section shall be so construed as to permit the acceptance or transportation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate other than as defined in § 173.53(e) of this subchapter, by any common carrier.

(b) Liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol nitrate. Liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, other than as defined in § 173.53(e) of this subchapter, may be transported only by motor carriers other than common carriers in containers complying with specification MC 200 (§ 178.315 of this subchapter). No form of trailer may be attached.

§ 177.823 Marking and placarding motor vehicles. (a) A carrier may not move a transport vehicle containing a hazardous material unless the vehicle is marked and placarded in accordance with Part 172 or as authorized in § 171.12a of this subchapter, or unless, in an emergency:

(1) The vehicle is escorted by a representative of a state or local government;

(2) The carrier has permission from the Department; or:

(3) Movement of the transport vehicle is necessary to protect life or property.

§ 177.824 Retesting and inspection of cargo tanks. (a) Ge

eral. In accordance with § 173.33 of this subchapter (cargo tank use authorization) every cargo tank and every compartment of a cargo tank authorized as a qualified container, except those cargo tanks having a capacity of 3,000 gallons or less used exclusively for the transportation of flammable liquids, must fulfill the applicable requirements as set forth in this section.

(1) Each cargo tank, except a specification MC 330, MC 331, or MC 338 cargo tank, must be in compliance with the testing requirements prescribed in paragraphs (a), (b), (c), and (d) of this section. Each cargo tank must be in accordance with the marking requirement of paragraph (h) of this section.

(2) Every cargo tank whether constructed in accordance with DOT specifications or being operated as a novel tank under exemption authorization shall not continue in service unless it has successfully fulfilled the testing requirements as set forth in this section.

(b) **Visual inspection requirements.** Every cargo tank shall receive an external visual inspection at least once in every 2-year period. The first such inspection shall be required at the time the next hydrostatic retest is due or prior to January 31, 1969, whichever comes first. This inspection shall be made by a responsible and experienced inspector who shall record the condition of the items set forth below. The inspection record shall be approved and signed by an authorized representative of the owner or operator. A written report of each inspection shall be retained in carrier's or owner's files for a period of 2 years after the date of inspection. Where insulation precludes external visual inspection, the cargo tank shall receive a visual internal inspection for corroded areas, defects in welds or tank sheets. Where visual inspection is precluded by both internal coating and external insulation or when the cargo tank is not equipped with a manhole, the tank shall be hydrostatically tested at 5-year intervals except as otherwise provided in paragraph (c) of this section. The tank shall not be placed in or returned to service if evidence of any unsafe condition is discovered and until such condition has been corrected. Inspection shall consist of the following items:

(1) The tank shall be inspected for: Corroded areas, bad dents, and defects in welds; defects in piping, valves, and gaskets; and other conditions, including leakage, which indicate weakness in the tank that might render it unsafe for transportation service.

(2) Devices for tightening manhole covers must be operative and leakage at manhole covers and gaskets must be corrected.

(3) Spring-loaded safety-relief valves rated in excess of 7 p.s.i.g. shall be removed from the cargo tank and tested.

(4) All emergency devices and valves must be free from corrosion, distortion, and any damage which will prevent their normal operation.

(5) Missing or loose bolts or nuts on any flanged connection or blank flange must be replaced or tightened.

(6) Required markings on the tank shall be legible.

(7) The entire vehicle shall be inspected for and comply with the Motor Carrier Safety Regulations, Part 393, Chapter III, of this title.

(c) **Hydrostatic or pneumatic testing requirements.** In addition to the visual inspection requirements as contained in paragraph (b) of this section, hydrostatic or pneumatic testing of cargo tanks (or compartments) is required to be conducted in accordance with the provisions contained in paragraph (d) of this section to qualify as an authorized container if:

(1) The cargo tank has been out of service (transporting dangerous articles) 1 year or more, or

(2) The cargo tank has been involved in an accident in which it may have been dented, torn, or otherwise damaged so as to affect its product retention integrity, or

(3) The shell of the cargo tank as originally manufactured has been modified, or

(4) The cargo tank is operating under exemption authorization. Such tanks shall be hydrostatically tested once every calendar year unless otherwise provided for in the exemption, and shall successfully fulfill the requirements set forth in paragraph (d) of this section. No two such required tests shall be closer than 6 months.

(d) **Hydrostatic or pneumatic testing procedure.** The requalification as an authorized container of cargo tanks (or compartments) required to be hydrostatically or pneumatically tested in accordance with paragraph (a) of this section shall be based on successfully meeting the requirements of this paragraph.

(1) General.

(i) If a cargo tank is compartmented each compartment shall be similarly tested with the adjacent compartment empty and at atmospheric pressure.

(ii) All closures shall be in place while the test is being made. During the test all relief devices shall be clamped, plugged or otherwise rendered inoperative. Relief devices shall be returned to their operative condition immediately after the tests are completed.

(iii) The tank or compartment must hold the prescribed pressure for at least 10 minutes. All tank valves, piping, and other accessories in communication with the lading must be pressure tested and proven tight at the tank design pressure.

(iv) All pressure bearing portions of the heating system of a cargo tank (or compartment) employing such media as steam or hot water for heating the lading shall be tested under hydrostatic pressure and proven to be tight at 14.06 kg./sq. cm (200 psig). Systems employing flues for heating the lading shall be suitably tested to insure against product leakage into the flues or into the atmosphere.

(2) Hydrostatic test. For hydrostatic testing, the tank (including its domes, if any) must be completely filled with water or a liquid having a viscosity similar to water. Pressure must be gauged at the top of the tank applied in accordance with Table I following paragraph (d)(3) of this section.

(3) Pneumatic test. Pneumatic pressure must be applied in accordance with Table I of this paragraph. During the pneumatic test the entire surface of all joints under pressure must be coated with a solution of soap and water, heavy oil, or other materials suitable for the purpose of foaming or bubbling to indicate the presence of leaks. Other methods equally sensitive for determining leaks may be used.

TABLE I

Container type	Test pressure KG/SQ. CM.
MC 300, 301, 302, 303, 305, 306	0.2109 (3 psig)
MC 304, 307	1.76[1] (25[1] psig)
MC 310, 311, 312	0.2109[1] (3[1] psig)

[1] Or 1½ times design pressure whichever is greater.

(4) Required results. A cargo tank) or compartment) required to be hydrostatically or pneumatically tested in accordance with paragraph (a) of this section may not be returned to service as a specification cargo tank unless it has successfully retained the applicable test pressure (see Table I in paragraph (d)(3) of this section) without leakage, undue distortion, excessive permanent expansion, or evidence of impending failure. The suitability of any repairs shall be determined by the same method of test.

(i) Cargo tanks (or compartments) with heating systems shall successfully withstand the hydrostatic pressure and examination specified in paragraph (d)(1)(iv) of this section.

(e) **Compressed gas and cryogenic liquid cargo tanks, specifications MC-330, MC-331, and MC-338.**

(1) **Specification MC-330 and MC-331.** Each cargo tank constructed in compliance with specification MC-330 or MC-331 (§ 178.337 of this subchapter) must be inspected and tested in accordance with § 173.33 of this subchapter.

(2) **Specification MC-338 insulated cargo tanks.** Each insulated cargo tank constructed in compliance with specification MC-338 (§ 178.338 of this subchapter) must be tested, except for the retest pressure, in accordance with § 178.338—16(a) of this subchapter, and must be in compliance with § 173.33 of this subchapter. If the tank is opened for any reason, the cleanliness must be verified after closure in accordance with § 178.338-15.

(f) **Reporting requirements.** Each motor carrier shall file with the Chief, Federal Programs Division, Office of Motor Carrier Safety Field Operations, Federal Highway Administration, Department of Transportation, Washington, D.C. 20590, a written listing of all MC 330 or MC 331 cargo tanks he has in service. Each motor carrier, upon placing in service or withdrawing from service any MC 330 or MC 331 cargo tank (other than a cargo tank used in interchange service which is reported upon by another motor carrier), shall file a supplemental report with the Office of Motor Carrier Safety Field Operations.

(1) The initial listing and each subsequent report must include the following information:

(i) The carrier's name, address, and telephone number.

(ii) One of the following statements: "Cargo tank placed in service" or "Cargo tank withdrawn from service," as appropriate, followed by the date of placement or removal;

(iii) The carrier's equipment number, manufacturer's name, manufacturer's serial number, specification MC 330 or MC 331, and "QT" (quenched and tempered) or "NQT" (not quenched and tempered).

(2) A copy of each report required by this paragraph must be retained by the carrier at its principal place of business during the period the tank is in the carrier's service and for 1 year thereafter. However, upon a written request to, and with the approval of, the Regional Director of Motor Carrier Safety, for the region in which a motor carrier has his principal place of business, the carrier may maintain the reports at a regional or terminal office.

(g) **Special testing required by the Department.** Upon the showing of probable cause of the necessity for retest, the Department may require any cargo tank to be retested at any time in accordance with the requirements prescribed for its periodic retest.

(h) **Test and inspection date markings.** The month and year of the last test or visual inspection, as appropriate, must be durably and legibly marked on the tank in letters not less than 1¼ inches high. These markings must be near the metal certification plate.

(i) **Withdrawal of certification.** If, as the result of an accident or for any other reason a cargo tank no longer meets the applicable specification, the carrier shall remove the metal certification plate or make it illegible (see § 173.24(c)(1)(v) of this subchapter). The details of the conditions necessitating withdrawal of the certification must be recorded and signed on the written certificate for that cargo tank. The vehicle owner shall retain the certificate for at least 1 year after withdrawal of the certification.

§ 177.825 Routing and training requirements for radioactive materials. (a) The carrier shall ensure that any motor vehicle which contains a radioactive material for which placarding is required is operated on routes that minimize radiological risk. The carrier shall consider available information on accident rates, transit time, population density and activities, time of day and day of week during which transportation will occur. In performance of this requirement the carrier shall tell the driver that the motor vehicle contains radioactive materials and shall indicate the general route to be taken. This requirement does not apply when:

(1) There is only one practicable highway route available considering operating necessity and safety, or

(2) The motor vehicle is operated on a preferred highway under conditions described in paragraph (b) of this section.

(b) Unless otherwise permitted by this section, a carrier and any person who operates a motor vehicle containing a package of highway route controlled quantity radioactive materials as defined in §173.403(l) of this subchapter shall ensure that the vehicle operates over preferred routes selected to reduce time in transit, except that an Interstate System bypass or beltway around a city shall be used when available.

(1) A preferred route consists of either or both:

(i) An Interstate System highway for which an alternative route is not designated by a State routing agency as provided in this section, and

(ii) A State-designated route selected by a State routing agency (see §171.8 of this subchapter) in accordance with the DOT "Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials".

(2) When a deviation from a preferred route is necessary (including emergency deviation, to the extent time permits), routes shall be selected in accordance with paragraph (a) of this section. A motor vehicle may deviate from a preferred route under any of the following circumstances:

(i) Emergency conditions that would make continued use of the preferred route unsafe.

(ii) To make necessary rest, fuel and vehicle repair stops.

(iii) To the extent necessary to pick up, deliver or transfer a highway route controlled quantity package of radioactive materials.

(c) A carrier (or his agent) who operates a motor vehicle which contains a package of highway route controlled quantity radioactive materials as defined in §173.403(l) of this subchapter shall prepare a written route plan and supply a copy before departure to the motor vehicle driver and a copy to the shipper (before departure for exclusive use shipments, or otherwise within fifteen working days following departure). Any variation between the route plan and routes actually used, and the reason for it, shall be reported in an amendment to the route plan delivered to the shipper as soon as practicable but within 30 days following the deviation. The route plan shall contain:

(1) A statement of the origin and destination points, a route selected in compliance with this section, all planned stops, and estimated departure and arrival times; and

(2) Telephone numbers which will access emergency assistance in each State to be entered.

(d) No person may transport a package of highway route controlled quantity radioactive materials as defined in §173.403(l) of this subchapter, on a public highway unless:

(1) The driver has received within the two preceding years, written training on:

(i) Requirements in Parts 172, 173, and 177 of this subchapter pertaining to the radioactive materials transported;

(ii) The properties and hazards of the radioactive materials being transported; and

(iii) Procedures to be followed in case of an accident or other emergency.

(2) The driver has in his immediate possession a certificate of training as evidence of training required by this section, and a copy is placed in his qualification file (see §391.51 of this title), showing:

(i) The driver's name and operator's license number;

(ii) The dates training was provided;

(iii) The name and address of the person providing the training;

(iv) That the driver has been trained in the hazards and characteristics of highway route controlled quantity radioactive materials; and

(v) A statement by the person providing the training that information on the certificate is accurate.

(3) The driver has in his immediate possession the route plan required by paragraph (c) of this section and operates the motor vehicle in accordance with the route plan.

(e) A person may transport irradiated reactor fuel only in compliance with a plan if required under §173.22(c) of this subchapter that will ensure the physical security of the material. Variation for security purposes from the requirements of this section is permitted so far as necessary to meet the requirements imposed under such a plan, or otherwise imposed by the U.S. Nuclear Regulatory Commission in 10 CFR Part 73.

§ 177.826 Carrier's registration statement; flammable cryogenic liquids. (a) No person may transport a flammable cryogenic liquid in a portable tank or a cargo tank unless he has filed a registration statement by certified mail, return receipt requested, with the Director, OHMT, RSPA in accordance with paragraphs (b), (c) and (d) of this section.

(b) The registration statement must contain the following information:

(1) The carrier's name and principal place of business.

(2) Locations where cargo tanks used to transport flammable cryogenic liquids are domiciled.

(3) The serial number or vehicle identification number of each cargo tank used by the carrier to transport flammable cryogenic liquids, and the name of each flammable cryogenic liquid transported in each cargo tank.

(c) The registration statement must be filed:

(1) Initially between January 1 and February 28, 1985 (this initial statement is only required to contain information regarding operations that took place during the 90 days prior to the date of the statement); and

(2) Subsequently, between January 1 and February 28 of each odd numbered year after 1985.

(d) For equipment obtained or operations begun between the two-year filing intervals specified in paragraph (c) of this section, the information must be provided on the registration statement filed during the next required filing period.

SUBPART B

LOADING AND UNLOADING

Note: For prohibited loading and storage of hazardous materials, see §177.848

§ 177.834 General requirements. (a) **Packages secured in a vehicle.** Any tank, barrel, drum, cylinder, or other packaging, not permanently attached to a motor vehicle, which contains any flammable liquid, compressed gas, corrosive material, poisonous material, or radioactive material must be secured against movement within the vehicle on which it is being transported, under conditions normally incident to transportation.

(b) **No hazardous materials on pole trailers.** No hazardous materials may be loaded into or on or transported in or on any pole trailer.

(c) **No smoking while loading or unloading.** Smoking on or about any motor vehicle while loading or unloading any explosive, flammable liquid, flammable solid, oxidizing material, or flammable compressed gas is forbidden.

(d) **Keep fire away, loading and unloading.** Extreme care shall be taken in the loading or unloading of any explosive, flammable liquid, flammable solid, oxidizing material, or flammable compressed gas into or from any motor vehicle to keep fire away and to prevent persons in the vicinity from smoking, lighting matches, or carrying any flame or lighted cigar, pipe, or cigarette.

(e) **Handbrake set while loading and unloading.** No hazardous material shall be loaded into or on, or unloaded from, any motor vehicle unless the handbrake be securely set and all other reasonable precautions be taken to prevent motion of the motor vehicle during such loading or unloading process.

(f) **Use of tools, loading and unloading.** No tools which are likely to damage the effectiveness of the closure of any package or other container, or likely adversely to affect such package or container, shall be used for the loading or unloading of any explosive or other dangerous article.

(g) **Prevent relative motion between containers.** Containers of explosives, flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, and poisonous liquids or gases, must be so braced as to prevent motion thereof relative to the vehicle while in transit. Containers having valves or other fittings must be so loaded that there will be the minimum likelihood of damage thereto during transportation.

(h) **Precautions concerning containers in transit; fueling road units.** Reasonable care should be taken to prevent undue rise in temperature of containers and their contents during transit. There must be no tampering with such container or the contents thereof nor any discharge of the contents of any container between point of origin and point of billed destination. Discharge of contents of any container, other than a cargo tank, must not be made prior to removal from the motor vehicle. Nothing contained in this paragraph shall be so construed as to prohibit the fueling of machinery or vehicles used in road construction or maintenance.

(i) **Attendance requirements.** (1) Loading. A cargo tank must be attended by a qualified person at all times when it is being loaded. The person who is responsible for loading the cargo tank is also responsible for ensuring that it is so attended.

(2) Unloading. A motor carrier who transports hazardous materials by a cargo tank must ensure that the cargo tank is attended by a qualified person at all times during unloading. However, the carrier's obligation to ensure attendance during unloading ceases when:

(i) The carrier's obligation for transporting the material's is fulfilled;
(ii) The cargo tank has been placed upon the consignee's premises; and
(iii) The motive power has been removed from the cargo tank and removed from the premises.

(3) A person "attends" the loading or unloading of a cargo tank if, throughout the process, he is awake, has an unobstructed view of the cargo tank, and is within 7.62 meters (25 feet) of the cargo tank.

(4) A person is "qualified" if he has been made aware of the nature of the hazardous material which is to be loaded or unloaded, he has been instructed on the procedures to be followed in emergencies, he is authorized to move the cargo tank, and he has the means to do so.

(5) A delivery hose, when attached to the cargo tank, is considered a part of the vehicle.

(j) **Prohibited loading combinations.** In any single driven motor vehicle or in any single unit of a combination of motor vehicles, hazardous materials shall not be loaded together if prohibited by loading and storage chart, §177.848. This section shall not be so construed as to forbid the carrying of materials essential to safe operation of motor vehicles. (See Motor Carrier Safety Regulations, Part 393 of this Title.)

(k) [Reserved]

(l) **Use of cargo heaters when transporting certain hazardous material.** Transportation includes loading, carrying, and unloading.

(1) **When transporting explosives.** A motor vehicle equipped with a cargo heater of any type may transport explosives only if the cargo heater is rendered inoperable by: (i) Draining or removing the cargo heater fuel tank; and (ii) disconnecting the heater's power source.

(2) **When transporting certain flammable material—**

(i) **Use of combustion cargo heaters.** A motor vehicle equipped with a combustion cargo heater may be used to transport flammable liquid or flammable gas only if each of the following requirements are met:

(A) It is a catalytic heater.
(B) The heater's surface temperature cannot exceed 130° F. (54° C.)—either on a thermostatically controlled heater or on a heater without thermostatic control when the outside or ambient temperature is 60° F. (15.6° C.) or less.
(C) The heater is not ignited in a loaded vehicle.
(D) There is no flame, either on the catalyst or anywhere in the heater.
(E) The manufacturer has certified that the heater meets the requirements under paragraph (l)(2)(i) of this section by permanently marking the heater "**MEETS DOT REQUIREMENTS FOR CATALYTIC HEATERS USED WITH FLAMMABLE LIQUID AND GAS.**"
(F) The heater is also marked "**DO NOT LOAD INTO OR USE IN CARGO COMPARTMENTS CONTAINING FLAMMABLE LIQUID OR GAS IF FLAME IS VISIBLE ON CATALYST OR IN HEATER.**"
(G) Heater requirements under §393.77 of this title are complied with.

(ii) **Effective date for combustion heater requirements.** The requirements under paragraph (l)(2)(i) of this section govern as follows—

(A) Use of a heater manufactured after November 14, 1975, is governed by every requirement under (l)(2)(i) of this section;
(B) Use of a heater manufactured before November 15, 1975, is governed only by the requirements under (l)(2)(i)(A), (C), (D), (F) and (G) of this section until October 1, 1976; and
(C) Use of any heater after September 30, 1976, is governed by every requirement under (l)(2)(i) of this section.

(iii) **Restrictions on automatic cargo-space-heating temperature control devices.** Restrictions on these devices have two dimensions: restrictions upon use and restrictions which apply when the device must not be used.

(A) **Use restrictions.** An automatic cargo-space-heating temperature control device may be used when transporting flammable liquid or flammable gas only if each of the following requirements is met:

(1) Electrical apparatus in the cargo compartment is nonsparking or explosion proof.
(2) There is no combustion apparatus in the cargo compartment.
(3) There is no connection for return of air from the cargo compartment to the combustion apparatus.
(4) The heating system will not heat any part of the cargo to more than 130° F. (54° C.).
(5) Heater requirements under §393.77 of this title are complied with.

(B) **Protection against use.** Flammable liquid or flammable gas may be transported by a vehicle, which is equipped with an automatic cargo-space-heating temperature control device that does not meet each requirement of paragraph (l)(2)(iii)(A) of this section, only if the device is first rendered inoperable, as follows:

(1) Each cargo heater fuel tank, if other than LPG, must be emptied or removed.
(2) Each LPG fuel tank for automatic temperature control equipment must have its discharge valve closed and its fuel feed line disconnected.

(m) Tanks constructed and maintained in compliance with spec. 106A or 110A (§§179.300, 179.301 of this subchapter) that are authorized for the shipment of hazardous materials by highway in Part 173 of this subchapter must be carried in accordance with the following requirements:

(1) Tanks must be securely chocked or clamped on vehicles to prevent any shifting.
(2) Equipment suitable for handling a tank must be provided at any point where a tank is to be loaded upon or removed from a vehicle.
(3) No more than two cargo carrying vehicles may be in the same combination of vehicles.
(4) Compliance with §§174.200 and 174.204 of this subchapter for combination rail freight, highway shipments and for trailer-on-flat-car service is required.

(n) Specification 56, 57, IM 101, and IM 102 portable tanks, when loaded, may not be stacked on each other nor placed under other freight during transportation by motor vehicle.

§ 177.835 Explosives. (See also §§177.834(a) to (j))

(a) **Engine stopped.** No explosives shall be loaded into or on or be unloaded from any motor vehicle with the engine running.

(b) **Care in loading, unloading, or other handling of explosives.** No bale hooks or other metal tools shall be used for the loading, unloading, or other handling of explosives, nor shall any package or other container of explosives, except barrels or kegs, be rolled. No packages of explosives shall be thrown or dropped during process of loading or unloading or handling of explosives. Special care shall be exercised to the end that packages or other containers containing explosives shall not catch fire from sparks or hot gases from the exhaust tailpipe.

(1) Whenever tarpaulins are used for covering explosives, they shall be secured by means of rope, wire or other equally efficient tie downs. Explosives placards or markings required by §177.823 shall be secured, in the appropriate locations, directly to the equipment transporting the explosives. If the vehicle is provided with placard boards, the placards must be applied to these boards.

(c) **Explosives on vehicles in combination.** Class A explosives may not be loaded into or carried on any vehicle of a combination of vehicles if:

(1) More than two cargo carrying vehicles are in the combination;
(2) Any full trailer in the combination has a wheel base of less than 184 inches;
(3) Any vehicle in the combination is a cargo tank which is required to be marked or placarded under §177.823; or
(4) The other vehicle in the combination contains any:
(i) Initiating explosive,
(ii) Packages of radioactive materials bearing "Yellow III" labels,
(iii) Class A or B poisons, or
(iv) Hazardous materials in a portable tank or a DOT specification 106A or 110A tank.

(d) [Reserved]

(e) **No sharp projections inside body of vehicles.** No motor vehicle transporting any kind of explosive shall have on the interior of the body in which the explosives are contained, any inwardly projecting bolts, screws, nails, or other inwardly projecting parts likely to produce damage to any package or container of explosives during the loading or unloading process or in transit.

(f) **Explosives vehicles, floors tight and lined.** Motor vehicles transporting class A or class B explosives shall have tight floors; shall have that portion of the interior in contact with the load lined with either non-metallic material or non-ferrous metals, except that the lining is not required for truck load shipments loaded by the Departments of the Army, Navy or Air Force of the United States Government provided the explosives are of such nature that they are not liable to leakage of dust,

powder, or vapor which might become the cause of an explosion. The interior of the cargo space must be in good condition so that there will not be any likelihood of containers being damaged by exposed bolts, nuts, broken side panels or floor boards, or any similar projections.

(g) No detonating primer may be transported on the same motor vehicle with any class A or class B explosive (except other detonating primers or detonators), blasting agent or detonating cord, class C explosive. No detonator may be transported on the same motor vehicle with any class A or class B explosive (except other detonators or detonating primers), blasting agent or detonating cord, class C explosive unless—

(1) It is packed in a specification MC 201 (§178.318 of this subchapter) container, or

(2) The package conforms with requirements prescribed in §173.103(d) of this subchapter, and its use is restricted to instances when—

(i) There is no class A or class B explosive or blasting agent loaded on the motor vehicle; and

(ii) A separation of 24 inches is maintained between each package of detonators and each package of detonating cord; or

(3) It is packed and loaded in accordance with a method approved by the Department. One method approved by the Department is as follows:

(i) The detonators are in packagings as prescribed in §173.66 of this subchapter which in turn are loaded into suitable containers or separate compartments. Both the detonators and the container or compartment must meet the requirements of the Institute of Makers of Explosives' Standard (IME Safety Library Publication No. 22).

(h) **Lading within body or covered, tailgate closed.** Except as provided in paragraphs (g), (k), and (m) of this section, dealing with the transportation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, other than as defined in §173.53(e) of this subchapter, all of that portion of the lading of any motor vehicle which consists of explosives shall be contained entirely within the body of the motor vehicle or within the horizontal outline thereof, without overhang or projection of any part of the load and if such motor vehicle has a tailboard or tailgate, it shall be closed and secured in place during such transportation. Every motor vehicle transporting explosives must either have a closed body or have the body thereof covered with a tarpaulin, and in either event care must be taken to protect the load from moisture and sparks, except that subject to other provisions of these regulations, explosives other than black powder may be transported on flat-bed vehicles if the explosive portion of the load on each vehicle is packed in fire and water resistant containers or covered with a fire and water resistant tarpaulin.

(i) **Explosives to be protected against damage by other lading.** No motor vehicle transporting any explosive may transport as a part of its load any metal or other articles or materials likely to damage such explosive or any package in which it is contained, unless the different parts of such load be so segregated or secured in place in or on the motor vehicle and separated by bulkheads or other suitable means as to prevent such damage.

(j) **Transfer of explosives en route.** No class A or class B explosives shall be transferred from one container to another, or from one motor vehicle to another vehicle, or from another vehicle to a motor vehicle, on any public highway, street, or road, except in case of emergency. In such cases red electric lanterns, red emergency reflectors or red flags shall be set out in the manner prescribed for disabled or stopped motor vehicles. (See Motor Carrier Safety Regulations, Part 392 of this Title.) In any event, all practicable means, in addition to those hereinbefore prescribed, shall be taken to protect and warn other users of the highway against the hazard involved in any such transfer or against the hazard occasioned by the emergency making such transfer necessary.

(k) **Loading requirements for liquid nitroglycerin, desensitized liquid nitroglycerin, or diethylene glycol dinitrate.** Liquid nitroglycerin, desensitized liquid nitroglycerin, or diethylene glycol dinitrate, other than as defined in §173.53(e) of this chapter, may be accepted for transportation and transported only by motor carriers other than common carriers if it be loaded into or on a truck having the type of body specified in Spec. MC 200 (§178.315 of this subchapter). No liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate may be loaded directly above any other explosive, or in any quantity in excess of 900 quarts on one motor vehicle or 10 quarts in any one individual container. Additional quantities of explosives, other than nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, excepting any type of blasting or percussion cap or other detonating device, may be carried on such motor vehicle in a closed or covered bed or body which shall be firmly bolted or fastened above the lid of the compartment containing the nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate. In no case shall the net load be more than 7,500 pounds. (See paragraph (m) of this section and Spec. MC 201 (§178.318 of this subchapter).

(l) **Separation of tools and supplies for preparing charges.** Motor vehicles transporting liquid nitroglycerin; desensitized liquid nitroglycerin or diethylene glycol dinitrate, may also transport the tools and supplies necessary for preparing and firing charges thereof: *Provided*, That such tools and supplies be properly secured in place so as to prevent their coming in contact with the body above specified.

(m) **Detonators or other explosives.** Any explosive, including desensitized liquid explosives as defined in §173.53(e) of this subchapter, other than liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, transported on any motor vehicle transporting liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, must be segregated, each kind from every other kind, and from tools or other supplies. Detonators must be packed in specification MC 201 (§178.318 of this subchapter) containers.

§ 177.836 Nonexplosive material. (a) No restrictions are prescribed in Parts 170–189 of this subchapter for the packing, handling, and transportation of material relating to ammunition for cannon, but containing no explosive or other dangerous article, such as cartridge cases, "dummy" or "drill" cartridges, etc., sandloaded projectiles, sandloaded bombs, empty projectiles, empty mines, empty bombs, solid projectiles, or empty torpedoes. Rotating bands should be protected against deformation by method of packing or loading.

§ 177.837 Flammable liquids. (See also §§177.834(a) to (j).)

(a) **Engine stopped.** Unless the engine of the motor vehicle is to be used for the operation of a pump, no flammable liquid shall be loaded into, or on, or unloaded from any motor vehicle while the engine is running.

(b) **Bonding and grounding containers other than cargo tanks prior to and during transfer of lading.** For containers which are not in metallic contact with each other, either metallic bonds or ground conductors shall be provided for the neutralization of possible static charges prior to and during transfers of flammable liquids between such containers. Such bonding shall be made by first connecting an electric conductor to the container to be filled and subsequently connecting the conductor to the container from which the liquid is to come, and not in any other order. To provide against ignition of vapors by discharge of static electricity, the latter connection shall be made at a point well removed from the opening from which the flammable liquid is to be discharged.

(c) **Bonding and grounding cargo tanks before and during transfer of lading.** (1) When a cargo tank is loaded through an open filling hole, one end of a bond wire shall be connected to the stationary system piping or integrally connected steel framing, and the other end to the shell of the cargo tank to provide a continuous electrical connection. (If bonding is to the framing, it is essential that piping and framing be electrically interconnected.) This connection must be made before any filling hole is opened, and must remain in place until after the last filling hole has been closed. Additional bond wires are not needed around All-Metal flexible or swivel joints, but are required for nonmetallic flexible connections in the stationary system piping. When a cargo tank is unloaded by a suction-piping system through an open filling hole of the cargo tank, electrical continuity shall be maintained from cargo tank to receiving tank.

(2) When a cargo tank is loaded or unloaded through a vapor-tight (not open hole) top or bottom connection, so that there is no release of vapor at a point where a spark could occur, bonding or grounding, is not required. Contact of the closed connection must be made before flow starts and must not be broken until after the flow is completed.

(3) Bonding or grounding is not required when a cargo tank is unloaded through a nonvapor-tight connection into a stationary tank provided the metallic filling connection is maintained in contact with the filling hole.

(d) **Pyroforic liquids in cylinders.** Cylinders containing pyroforic liquids, unless packed in a strong box or case and secured therein to protect valves, must be loaded with all valves and safety relief devices in the vapor space. All cylinders must be secured so that no shifting may occur in transit.

(e) **Manholes and valves closed.** A person shall not drive a cargo tank and a motor carrier shall not require or permit a person to drive a cargo tank containing a flammable liquid (regardless of quantity) unless:

(1) All manhole closures on the cargo tank are closed and secured, and

(2) All valves and other closures in liquid discharge systems are closed and free of leaks.

§ 177.838 Flammable solids and oxidizing materials. (See also §§177.834(a) to (j).)

(a) **Lading within body or covered; tailgate closed; pick-up and delivery.** All of that portion of the lading of any motor vehicle transporting flammable solids or oxidizing material's shall be contained entirely within the body of the motor vehicle and shall be covered by such body, by tarpaulins, or other suitable means, and if such motor vehicle has a tailboard or tailgate, it shall be closed and secured in place during such transportation: *Provided, however*, That the provisions of this paragraph need not apply to "pick-up and delivery" motor vehicles when such motor vehicles are used in no other transportation than in and about cities, towns, or villages. Shipment in water-tight bulk containers do not have to be covered by a tarpaulin or other means.

(b) **Articles to be kept dry.** Special care shall be taken in the loading of any motor vehicle with flammable solids or oxidizing materials which are likely to become hazardous to transport when wet, to keep them from being wetted during the loading process and to keep them dry during transit. Special care shall also be taken in the loading of any motor vehicle with flammable solids or oxidizing materials, which are likely to become more hazardous to transport by wetting, to keep them from being wetted during the loading process and to keep them dry during transit. Examples of such

dangerous materials are charcoal screenings, ground, crushed, or pulverized charcoal, and lump charcoal.

(c) **Loading ventilation, precautions against spontaneous combustion.** Whenever a motor carrier has knowledge concerning the hazards of spontaneous combustion or heating of any article to be loaded on a motor vehicle, such article shall be so loaded as to afford sufficient ventilation of the load to provide reasonable assurance against fire from this cause; and in such a case the motor vehicle shall be unloaded as soon as practicable after reaching its destination. Charcoal screenings, or ground, crushed, granulated, or pulverized charcoal, in bags, shall be so loaded that the bags are laid horizontally in the motor vehicle, and so piled that there will be spaces for effective air circulation, which spaces shall not be less than 4 inches wide; and air spaces shall be maintained between rows of bags. Bags shall not be piled closer than 6 inches from the top of any motor vehicle with a closed body.

(d) **Loose or baled nitrate of soda bags.** Loose or baled unwashed, empty bags, having contained nitrate of soda, may be transported in truckload lots only in motor vehicles, and such motor vehicles must have closed or covered bodies lined with paper; such shipments are required to be loaded by the shipper and to be unloaded by the consignee.

(e) **Staying or blocking of packages of matches.** Special care shall be exercised in the loading of packages containing "strike-anywhere" matches to prevent the shifting or jamming of any such package during transit. To this end, the packages shall be compactly loaded with the strongest dimensions of each box or other container loaded lengthwise of the motor vehicle.

(f) **Smooth vehicle interior for matches.** Unless strike-anywhere matches are contained in wooden outside boxes, special care shall be taken to provide that the inside surfaces of any motor vehicle into which such matches are to be loaded and with which surfaces the containers might come in contact, shall be smooth, without protrusions of any sort, such as bolts, nuts, sharp edges, or corners, etc., and there shall be provided for this purpose smooth wooden inner linings, if the interior of the motor vehicle is not otherwise smooth in accordance with this requirement.

(2) **Flammable liquids.** Matches must not be loaded next to a package bearing a flammable liquid label.

(f) Nitrates, except ammonium nitrate having organic coating, listed in § 173.182(b) of this subchapter must be loaded in closed or open type motor vehicles, which must be swept clean and be free of any projections capable of injuring bags when so packaged. When shipped in open type motor vehicles, the lading must be suitably covered. Ammonium nitrate having organic coating must not be loaded in all-metal vehicles, other than those made of aluminum or aluminum alloys, of the closed type.

(g) Smokeless powder for small arms in quantities not exceeding 100 pounds net weight transported in one rail car or motor vehicle may be classed as a flammable solid when examined for this classification by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT. Maximum quantity in any inside packaging must not exceed 8 pounds. Inside packagings must be arranged and protected to prevent simultaneous ignition of the contents. The complete package must be a type examined by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT. In addition, inside packages which have been examined by the Bureau of Explosives or the Bureau of Mines and approved by the Director, OHMT, may be overpacked in DOT–12A65, 12B65, or 12H65 fiberboard boxes provided all insider containers are firmly packed to prevent movement and the net weight of smokeless powder in any one box does not exceed 16 pounds. Each outside packaging must bear a FLAMMABLE SOLID label.

§ 177.839 Corrosive liquids. (See also §§ 177.834(a) to (j).)

(a) **Nitric acid.** In addition to the requirements set forth in paragraph (b) of this section no carboy or other container of nitric acid shall be loaded above any container containing any other kind of material. The loading of carboys or other containers of nitric acid shall be limited to two tiers high.

(b) **Carboys and frangible containers.** In general, individual carboys and frangible containers of corrosive liquids, including charged electric storage batteries, must, when loaded by hand, be individually loaded into and unloaded from any motor vehicle in which they are to be, or have been, transported. All reasonable precautions must be taken to prevent, by all practicable means, the dropping of any such containers or batteries containing corrosive liquids. No such container or battery may be loaded into a motor vehicle having an uneven floor surface. It shall be permissible to load on or transport in any motor vehicle any authorized carboys or frangible shipping containers, containing corrosive liquids, more than one tier high above any floor only if such carboys or other containers are boxed or crated, or are in barrels or kegs, as required by Parts 170 through 189 of this subchapter, and only if such containers are so stacked that the weight of each tier above the first is entirely supported by the boxes, crates, barrels, kegs, or other authorized means of enclosing the carboys or frangible containers. Only so many tiers as may adequately be so supported without danger of crushing or breaking, shall be permitted. Means must be provided to prevent by all practicable means, in all cases, the shifting of containers or batteries during transit. Nothing contained in this section shall be so construed as to prevent the use of cleats or other retaining means for the purpose of preventing shifting of containers or batteries. For the purposes of this section a false floor or platform, secured against relative motion within the body of the motor vehicle, shall be deemed to be a floor. (For recommendations for handling leaking or broken packages, see § 177.858(a).)

(c) **Storage batteries.** In addition to the requirements set forth in paragraph (b) of this section, all storage batteries containing any electrolyte shall be so loaded, if loaded with other lading, that all such batteries will be protected against other lading falling onto or against them; and adequate means shall be provided in all cases for the protection and insulation of battery terminals against short circuits.

(d) **Corrosives in cargo tanks.** A person shall not drive a cargo tank and a motor carrier shall not require or permit a person to drive a cargo tank containing corrosives (regardless of quantity) unless:

(1) All manhole closures on the cargo tank are closed and secured; and

(2) All valves and other closures in liquid discharge systems are closed and free of leaks.

§ 177.840 Compressed gases, including cryogenic liquids. (See also §§ 177.834(a) to (j).)

(a) **Floors or platforms essentially flat.** Cylinders containing compressed gases shall not be loaded onto any part of the floor or platform of any motor vehicle which is not essentially flat; cylinders containing compressed gases may be loaded onto any motor vehicle not having a floor or platform only if such motor vehicle be equipped with suitable racks having adequate means for securing such cylinders in place therein. Nothing contained in this section shall be so construed as to prohibit the loading of such cylinders on any motor vehicle having a floor or platform and racks as hereinbefore described.

(b) **Cylinders.** To prevent their overturning, cylinders containing compressed gases must be securely lashed in an upright position; loaded into racks securely attached to the motor vehicle; packed in boxes or crates of such dimensions as to prevent their overturning; or loaded in a horizontal position. Specification DOT–4L cylinders must be loaded in an upright position and securely braced.

(2) **Cylinders for hydrogen, cryogenic liquid.** A Specification DOT–4L cylinder containing hydrogen, cryogenic liquid may only be transported on a motor vehicle as follows:

(i) The vehicle must have an open body equipped with a suitable rack or support having a means to hold the cylinder upright when subjected to an acceleration of 2 "g" in any horizontal direction;

(ii) The combined total of the hydrogen venting rates as marked on the cylinders transported on one motor vehicle may not exceed 60 SCF per hour.

(iii) The vehicle may not enter a tunnel; and

(iv) Highway transportation is limited to private and contract carriage and to direct movement from point of origin to destination.

(b) Portable tank containers containing compressed gases shall be loaded on motor vehicles only as follows:

(1) Onto a flat floor or platform of a motor vehicle.

(2) Onto a suitable frame of a motor vehicle.

(3) In either such case, such containers shall be safely and securely blocked or held down to prevent movement relative to each other or to the supporting structure when in transit, particularly during sudden starts and stops and changes of direction of the vehicle.

(4) Requirements of subparagraphs (1) and (2) of this paragraph (b) shall not be construed as prohibiting stacking of containers provided the provisions of subparagraph (3) of this paragraph (b) are fully complied with.

(c) [Reserved]

(d) **Engine to be stopped in tank motor vehicles, except for transfer pump.** No flammable compressed gas shall be loaded into or on or unloaded from any cargo tank with the engine running unless the engine is used for the operation of the transfer pump of the vehicle. Unless the delivery hose is equipped with a shut-off valve at its discharge end, the engine of the motor vehicle shall be stopped at the finish of such loading or unloading operation while the filling or discharge connections are disconnected.

(e) Chlorine cargo tanks shall be shipped only when equipped (1) with a gas mask of a type approved by the U.S. Bureau of Mines for chlorine service; (2) with an emergency kit for controlling leaks in fittings on the dome cover plate.

(f) No chlorine cargo tank used for transportation of chlorine shall be moved, coupled or uncoupled, when any loading or unloading connections are attached to the vehicle, nor shall any semi-trailer or trailer be left without the power unit unless such semi-trailer or trailer be chocked or equivalent means be provided to prevent motion.

(g) Each liquid discharge valve on a cargo tank, other than an engine fuel line valve, must be closed during transportation except during loading and unloading.

(h) The driver of a motor vehicle transporting a flammable cryogenic liquid in a package exceeding 125 gallons of water capacity shall avoid unnecessary delays during transportation. If unforeseen conditions cause an excessive pressure rise, the driver shall manually vent the tank

at a remote and safe location. For each shipment, the driver shall make a written record of the cargo tank pressure and ambient (outside) temperature:

(1) At the start of each trip,

(2) Immediately before and after any manual venting,

(3) At least once every five hours, and

(4) At the destination point.

(i) No person may transport a flammable cryogenic liquid in a cargo tank unless the pressure of the lading is equal to or less than that used to determine the marked rated holding time (MRHT) and the one-way travel time (OWTT), marked on the tank in conformance with §173.318(g) of this subchapter, is equal to or greater than the elapsed time between the start and termination of travel. This prohibition does not apply if, prior to expiration of the OWTT, the tank is brought to full equilibration as specified in paragraph (j) of this section.

(j) Full equilibration of a cargo tank transporting a flammable cryogenic liquid may only be done at a facility that loads or unloads a flammable cryogenic liquid and must be performed and verified as follows:

(1) The temperature and pressure of the liquid must be reduced by a manually controlled release of vapor; and

(2) The pressure in the cargo tank must be measured at least ten minutes after the manual release is terminated.

(k) A carrier of carbon monoxide, cryogenic liquid must provide each driver with a self-contained air breathing apparatus that is approved by the National Institute of Occupational Safety and Health; for example, Mine Safety Appliance Co., Model 401, catalog number 461704.

§ 177.841 Poisons. (See also §§177.834(a) to (j))

(a) **Arsenical compounds in bulk.** Care shall be exercised in the loading and unloading of "arsenical dust", "arsenic trioxide", and "sodium arsenate", allowable to be loaded into sift-proof, steel hopper-type or dump-type motor-vehicle bodies equipped with water-proof, dust-proof covers well secured in place on all openings, to accomplish such loading with the minimum spread of such compounds into the atmosphere by all means that are practicable; and no such loading or unloading shall be done near or adjacent to any place where there are or are likely to be, during the loading or unloading process assemblages of persons other than those engaged in the loading or unloading process, or upon any public highway or in any public place.

(1) The motor vehicles must be marked in accordance with §173.368(b) of this chapter.

(2) Before any motor vehicle may be used for transporting any other articles, all detectable traces of arsenical materials must be removed therefrom by flushing with water, or by other appropriate method, and the marking removed.

(b) **No Class A or irritating materials in cargo tanks.** No poison, Class A, or irritating material may be loaded into or transported in any cargo tank.

(c) **Class A poisons or irritating materials.** The transportation of a Class A poison or an irritating material is not permitted if there is any interconnection between packagings.

(d) **Poisons in cargo tanks.** A person shall not drive a cargo tank and a motor carrier shall not require or permit a person to drive a cargo tank containing poisons (regardless of quantity) unless:

(1) All manhole closures on the cargo tank are closed and secured; and

(2) All valves and other closures in liquid discharge systems are closed and free of leaks.

(e) A carrier may not transport a package bearing a poison label in the same motor vehicle with material that is marked as or known to be foodstuff, feed or any edible material intended for consumption by humans or animals unless the inside package is overpacked in a liquid-tight and dust-proof container identified as package 4000 in the National Motor Freight Classification 100-I or when overpacked in a metal drum as specified in §173.25(c) of this subchapter. No motor carrier may transport a packaging containing a material which is required to be labeled "Poison", "Poison gas", or "Irritant" in the driver's compartment (including a sleeper berth) of a motor vehicle.

§ 177.842 Radioactive material. (a) The number of packages of radioactive materials in any motor vehicle, trailer, or storage location must be limited so that the total transport index number, as defined in §173.403 of this subchapter and determined by adding together the transport index numbers on the labels of the individual packages, does not exceed 50. This provision does not apply to exclusive use shipments described in §§173.441(b), 173.457, and 173.425 of this subchapter.

(b) Packages of radioactive material bearing "radioactive yellow-II" or "radioactive yellow-III" labels must not be placed in a motor vehicle or in any other place closer than the distances shown in the following table to any area which may be continuously occupied by passengers, employees, or shipments of animals, nor closer than the distances shown in the table below to any package containing undeveloped film (if so marked). If more than one of these packages is present, the distance shall be computed from the following table on the basis of the total transport index number (determined by adding together the transport index numbers on the labels of the individual packages) of packages in the vehicle or storeroom. Where more than one group of packages is present in any single storage location, a single group may not have a total transport index greater than 50. Each group of packages must be handled and stowed not closer than 6 meters (20 feet) (measured edge to edge) to any other group.

(c) Shipments of low specific activity materials, as defined in §173.403 of this subchapter, must be loaded so as to avoid spillage and scattering of loose materials. Loading restrictions are set forth in §173.425 of this subchapter.

(d) Packages must be so blocked and braced that they cannot change position during conditions normally incident to transportation.

Total transport index	Minimum separation distances in feet to nearest undeveloped film for various times of transit					Minimum distance in feet to area of persons, or minimum distance in feet from dividing partition of cargo compartments
	Up to 2 hours	2-4 hours	4-8 hours	8-12 hours	Over 12 hours	
None	0	0	0	0	0	0
0.1 to 1.0	1	2	3	4	5	1
1.1 to 5.0	3	4	6	8	11	2
5.1 to 10.0	4	6	9	11	15	3
10.1 to 20.0	5	8	12	16	22	4
20.1 to 30.0	7	10	15	20	29	5
30.1 to 40.0	8	11	17	22	33	6
40.1 to 50.0	9	12	19	24	36	7

Note 1. The distance in the table must be measured from the nearest point on the packages of radioactive materials

(e) Persons should not remain unnecessarily in a vehicle containing radioactive materials.

(f) Each fissile class III radioactive material shipment (as defined in §173.455(a)(3) of this subchapter) must be transported in accordance with one of the methods prescribed in §173.457 of this subchapter. The transport controls must be adequate to assure that no fissile class III shipment is transported in the same transport vehicle with any other fissile radioactive material shipment. In loading and storage areas each fissile class III shipment must be segregated by a distance of at least 20 feet from other packages required to bear one of the "Radioactive" labels described in §172.403 of this subchapter.

(g) For shipments transported under exclusive use conditions the radiation dose rate must not exceed 2 millirem per hour in any position normally occupied in the motor vehicle. For shipments transported as exclusive use under the provisions of §173.441(b) for packages with external radiation levels in excess of 200 millirem per hour at the package surface, the motor vehicle must meet the requirements of a closed transport vehicle (§173.403 of this subchapter).

§ 177.843 Contamination of vehicles. (a) Each motor vehicle used for transporting radioactive materials under exclusive use conditions in accordance with §173.425(c) or §173.443(c) shall be surveyed with radiation detection instruments after each use. A vehicle may not be returned to service until the radiation dose rate at each accessible surface is 0.5 millirem per hour or less and the removable (non-fixed) radioactive surface contamination is not greater than the level prescribed in §173.443(a).

(b) This section does not apply to any vehicle used solely for transporting radioactive material if a survey of the interior surface shows that the radiation dose rate does not exceed 10 millirem per hour at the interior surface or 2 millirem per hour at 3 feet from any interior surface. These vehicles must be stenciled with the words "For Radioactive Materials Use Only" in lettering at least 3 inches high in a conspicuous place, on both sides of the exterior of the vehicle. These vehicles must be kept closed at all times other than loading and unloading.

(c) In case of fire, accident, breakage, or unusual delay involving shipments of radioactive material, see §177.861.

§ 177.844 Other regulated materials. Asbestos must be loaded, handled, and unloaded, and any asbestos contamination of transport vehicles removed, in a manner that will minimize occupational exposure to airborne asbestos particles released incident to transportation. (See §173.1090 of this subchapter.)

SUBPART C—SEGREGATION AND SEPARATION

CHART OF HAZARDOUS MATERIALS

§ 177.848 Segregation and separation chart of hazardous materials.

(a) Charged electric storage batteries must not be loaded in the same vehicle with explosives, class A.

(b) Cyanides or cyanide mixtures must not be loaded or stored with acids or any other acidic materials which could release hydrocyanic acid from cyanides.

(c) Gas identification sets may be loaded and transported with all articles named in the segregation and separation chart, except those in column c.

(d) Nitric acid, when loaded in the same motor vehicle with other corrosive liquids in carboys, must be separated from the other carboys. A 2 by 6 inch plank set on edge, should be nailed across the motor vehicle floor at least 12 inches from the nitric acid carboys, and the space between the plank and the carboys of nitric acid should be filled with sand, sifted ashes, or other incombustible absorbent material.

(e) Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one motor vehicle shall be classed as a flammable solid for purposes of transportation when examined for this classification by the Bureau of Explosives and approved by the Director, OHMT.

(f) Hazardous materials must not be loaded, transported, or stored together, except as provided in the following table:

Segregation and Separation Chart of Hazardous Materials

Footnotes

1. Except as prescribed in § 173.81(c) or 177.835(g) loading and transportation of detonators or detonating primers with materials named in rows b, c, e, f, 3, 8a or 10 is prohibited.

2. Corrosive liquids must not be loaded above or adjacent to flammable solids, oxidizing materials, ammunition for cannon with or without projectiles or propellant explosives, except that shippers loading truckload shipments of corrosive liquids and flammable solids or oxidizing materials packages and who have obtained prior approval from the Department may load such materials together when it is known that the mixture of contents would not cause a dangerous evolution of heat or gas.

3. Explosives, class A, and explosives, class B must not be loaded or stored with chemical ammunition containing incendiary charges or white phosphorus either with or without bursting charges.

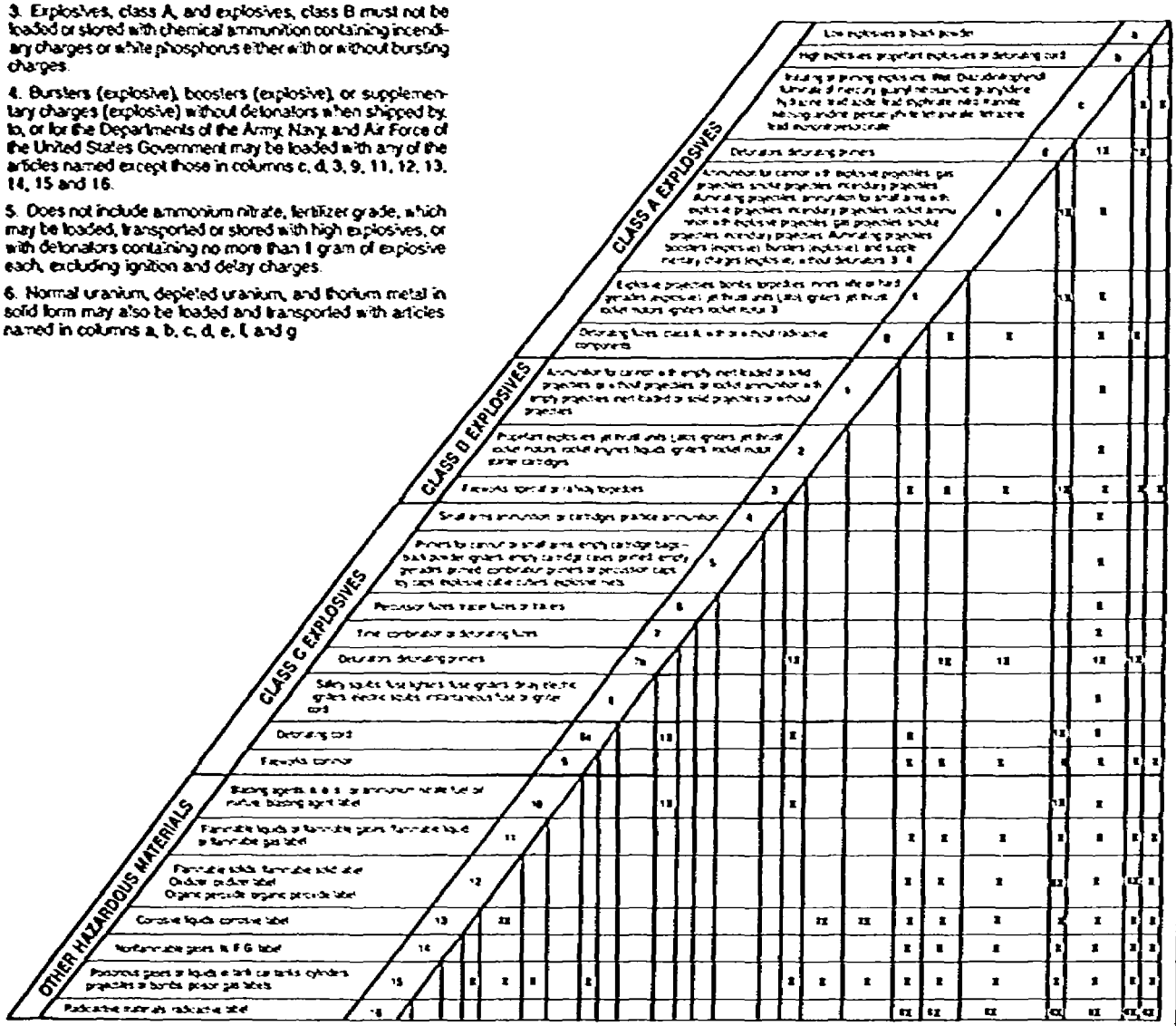
4. Bursters (explosive), boosters (explosive), or supplementary charges (explosive) without detonators when shipped by, to, or for the Departments of the Army, Navy, and Air Force of the United States Government may be loaded with any of the articles named except those in columns c, d, 3, 9, 11, 12, 13, 14, 15 and 16.

5. Does not include ammonium nitrate, fertilizer grade, which may be loaded, transported or stored with high explosives, or with detonators containing no more than 1 gram of explosive each, excluding ignition and delay charges.

6. Normal uranium, depleted uranium, and thorium metal in solid form may also be loaded and transported with articles named in columns a, b, c, d, e, f, and g.

Instructions

The letter X at an intersection shows that these materials must not be loaded or stored together. Example: Detonating fuzes class A, with or without radioactive components, (g), must not be loaded or stored with high explosives or propellant explosives, (b).



BILLING CODE 4910-60-C

For explanation of abbreviations and reference marks, see last page of this tariff.

SUBPART D

VEHICLES AND SHIPMENTS IN TRANSIT; ACCIDENTS

§ 177.853 Transportation and delivery of shipments. (a) **No unnecessary delay in movement of shipments.** All shipments of hazardous materials shall be transported without unnecessary delay, from and including the time of commencement of the loading of the cargo until its final discharge at destination.

(b) **Delivery at destination.** Shipments of hazardous materials which are refused by the consignees, or which can not be delivered within 48 hours after arrival at destination, must be promptly disposed of (1) by return to the shipper, if in proper shipping condition, or (2) by storage, provided a suitable storage place for such articles is available, or (3) by sale, or (4) when necessary to safety, by destruction: *Provided*, That charged electric batteries may be held for 30 days after arrival at destination, pending delivery or disposition.

(c) **Delivery to authorized person, or magazine.** Every shipment of dangerous explosives by motor vehicle shall be delivered only to someone authorized to receive it, except such explosives shipments as are placed in magazines which are immediately thereafter locked.

§ 177.854 Disabled vehicles and broken or leaking packages; repairs. (See also Forbidden articles, §177.821.)

(a) **Care of lading, hazardous materials.** Whenever for any cause other than necessary traffic stops any motor vehicle transporting any hazardous material is stopped upon the traveled portion of any highway or shoulder thereof, special care shall be taken to guard the vehicle and its load or to take such steps as may be necessary to provide against hazard. Special effort shall be made to remove the motor vehicle to a place where the hazards of the materials being transported may be provided against. See §§ 392.22, 392.24, and 392.25 of this title for warning devices required to be displayed on the highway.

(b) **Disposition of containers found broken or leaking in transit.** When leaks occur in packages or containers during the course of transportation, subsequent to initial loading, disposition of such package or container shall be made by the safest practical means afforded under paragraphs (c), (d), and (e) of this section.

(c) **Repairing or overpacking packages.** (1) Packages may be repaired when safe and practicable, such repairing to be in accordance with the best and safest practice known and available.

(2) Packages of hazardous materials that are damaged or found leaking during transportation, and hazardous materials that have spilled or leaked during transportation, may be forwarded to destination or returned to the shipper in a salvage drum in accordance with the requirements of §173.3(c) of this subchapter.

(d) **Transportation of repaired packages.** Any package repaired in accordance with the requirements of paragraph (c)(1) of this section, except as provided in §§177.855(c), 177.856(c), and 177.858(b), may be transported to the nearest place at which it may safely be disposed of only in compliance with the following requirements:

(1) The package must be safe for transportation.

(2) The repair of the package must be adequate to prevent contamination of or hazardous admixture with other lading transported on the same motor vehicle therewith.

(3) If the carrier is not himself the shipper, the consignee's name and address must be plainly marked on the repaired package.

(e) **Disposition of unsafe broken packages.** In the event any leaking package or container cannot be safely and adequately repaired for transportation or transported, it shall be stored pending proper disposition in the safest and most expeditious manner possible.

(f) **Stopped vehicles; other dangerous articles.** Whenever any motor vehicle transporting flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, or poisons, is stopped for any cause other than necessary traffic stops upon the traveled portion of any highway, or a shoulder next thereto, the following requirements shall be complied with during the period of such stop:

(1) For motor vehicles other than cargo tanks used for the transportation of flammable liquids or flammable compressed gases and not transporting explosives, Class A, or Class B, warning devices must be set out in the manner prescribed by §392.22 of this title.

(2) For cargo tanks used for the transportation of flammable liquids or flammable compressed gases, whether loaded or empty, and vehicles transporting explosives Class A or Class B, warning devices must be set out in the manner prescribed by §392.25 of this title.

(g) **Repairs and maintenance of vehicles containing certain hazardous materials—(1) General.** No person may use heat, flame or spark producing devices to repair or maintain the cargo or fuel containment system of a motor vehicle required to be placarded, other than COMBUSTIBLE, in accordance with subpart F of Part 172 of this subchapter. As used in this section, "containment system" includes all vehicle components intended physically to contain cargo or fuel during loading or filling, transport, or unloading.

(2) **Repair and maintenance inside a building.** No person may perform repair or maintenance on a motor vehicle subject to paragraph (g)(1) of this section inside a building unless:

(i) The motor vehicle's cargo and fuel containment systems are closed (except as necessary to maintain or repair the vehicle's motor) and do not show any indication of leakage;

(ii) A means is provided, and a person capable to operate the motor vehicle is available, to immediately remove the motor vehicle if necessary in an emergency;

(iii) The motor vehicle is removed from the enclosed area upon completion of repair or maintenance work; and

(iv) For motor vehicles loaded with explosives A or B, flammable liquids or flammable gases, all sources of spark, flame or glowing heat within the area of enclosure (including any heating system drawing air therefrom) are extinguished, made inoperable or rendered explosion-proof by a suitable method. *Exception:* Electrical equipment on the vehicle, necessary to accomplish the maintenance function, may remain operational.

(h) **No repair with flame unless gas-free.** No repair of a cargo tank used for the transportation of any flammable liquid or poisonous liquid, or any compartment thereof, or of any container for fuel of whatever nature, may be repaired by any method employing a flame, arc, or other means of welding, unless the tank or compartment shall first have been made gas-free.

§ 177.855 Accidents: explosives. (a) **Vehicle disabled; warning of nearby persons; removal of explosives.** In the event of an accident involving any motor vehicle transporting any explosives, every available means shall be employed to prevent individuals, other than those employed in the protection of persons or property or in the removal of hazards or wreckage, from congregating in the vicinity; such means shall also be employed to prevent smoking, to keep flame away, and to safeguard against the aggravation of the hazard present, and to warn other users of the highway. In the event that any motor vehicle laden with or carrying dangerous explosives is entangled with another or with any other object or structure, following an accident, no attempt shall be made to disentangle either vehicle, or the laden vehicle from the object or structure, until the lading, together with any fragments thereof, be removed to a place at least 200 feet from the vehicle (and preferably 200 feet from any habitation). In the event of fire, involving a motor vehicle laden with any explosive every practicable effort shall be made to give warning of danger of explosion to habitants in the vicinity and to other users of the highway.

(b) **Disposition of spilled or leaking explosives.** In the event of any accident involving any motor vehicle transporting any explosive in which packages are broken, all unbroken packages and as much of any broken packages as possible shall be carefully gathered and removed to a place of safety, in order to prevent fire or explosion. In clearing any wreck in which a motor vehicle containing any explosive is involved, care shall be exercised not to produce sparks with tools or by other means in moving of or working about the wreckage, so as to avoid as far as possible fires or explosions.

(c) **Explosives packages in transit capable of repair.** Any package of explosives found injured or broken in transit may be repaired or recoopered when this is evidently practicable and no dangerous. When a box that contains any explosive is so damaged that it cannot be repaired it should be reinforced by stout wrapping paper and twine, placed in another strong box, and surrounded by dry, fine sawdust, or dry and clean cotton waste, or elastic wads made from dry newspapers. The box cover should then be securely attached. A ruptured can or keg should be enclosed in a grain bag of good quality, and boxed. Injured packages thus protected, and properly marked with name of contents and consignee's name and address, may be carried to destination: *Provided, however*, That the motor carrier, if himself the shipper, need not mark his own name and address on the package.

(d) **Liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate.** When any liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate has been spilled on any portion of any motor vehicle it shall be washed with a suitable neutralizing agent until all of any such spillage shall have become completely neutralized.

Note 1: Liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol nitrate may be destroyed by use of a solution composed of:

60 percent commercial sodium sulfide	1 ounce.
Denatured alcohol	7½ fluid ounces.
Acetone	2 fluid ounces
Water	3 fluid ounces.

(e) **Explosives other than liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate.** When particles of any explosive composition other than liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate have escaped from a damaged container to the floor of the body of the carrier's motor vehicle the floor shall be thoroughly swept and any absorbed portion removed.

(f) **Unrepairable explosives packages.** When any package of explosives in transit is found to be leaking or damaged and cannot be recoopered, it may not be transported beyond the minimum distance

necessary to reach a place where the explosive may be disposed of with safety, except as provided in §177.854(e) and paragraph (c) of this section.

§ 177.856 Accidents; flammable liquids. (a) **Accident to vehicle; warnings; no sparks or flame.** In the event of an accident involving any motor vehicle transporting any flammable liquid every available means shall be employed to prevent individuals, other than those employed in the protection of persons or property or in the removal of hazards or wreckage, from congregating in the vicinity; such means shall also be employed to prevent smoking, to keep fires or flame away, to safeguard against the hazard present, and to warn other users of the highway. (See also §177.807.)

(b) **Present leakage from spreading.** Whenever any flammable liquid is escaping from a container, all practical means shall be taken to prevent such liquid from spreading over a wide area, from flowing into sewers and streams, and from becoming ignited.

(c) **Disposition of contents of cargo tank when unsafe to continue.** In the event of a leak in a cargo tank of such a character as to make further transportation unsafe, the leaking vehicle should be removed from the traveled portion of the highway; and every available means employed for the safe disposal of the leaking liquid by preventing, so far as practicable, its spread over a wide area, such as by digging trenches to drain to a hole or depression in the ground, diverting the liquid away from streams or sewers if possible, or catching the liquid in containers if practicable. Smoking and the lighting of cigarettes, cigars, or pipes in the vicinity is prohibited, and fires or flames in the vicinity of the leaking cargo tank must be extinguished.

(d) **Transfer of flammable liquids en route.** No flammable liquid shall be transferred from one container to another, or from one motor vehicle to another vehicle, or from another vehicle to a motor vehicle, on any public highway, street, or road, except in case of emergency. In such cases warning devices must be set out in the manner prescribed by §392.25 of this title. In any event, all practicable means, in addition to those hereinbefore prescribed, shall be taken to protect and warn other users of the highway against the hazard involved in any such transfer, or against the hazard occasioned by the emergency making such transfer necessary. Nothing contained in this rule shall be so construed as to prohibit the fueling of machinery or vehicles used in road construction and maintenance.

(e) **Transportation of leaking cargo tanks.** A leaking cargo tank may only be transported the minimum distance necessary to reach a place where the contents of the tank or compartment may be disposed of with safety. Every available means must be utilized to prevent the leakage or spillage of the liquid upon the highway.

§ 177.857 Accidents; flammable solids and oxidizing materials. (a) **Dangerous articles spilled; warning of nearby persons.** In the event of any accident involving any motor vehicle in which any flammable solid or oxidizing material may have become spilled, every practicable and available means shall be taken to warn all approaching persons of the hazard of fire.

(b) **Prevent spread of fire where possible.** Care shall be exercised in the event of damage to packages of flammable solids or oxidizing materials which either have been or may be on fire, to limit the spread of the fire.

(c) **Disposition of spilled or leaking materials.** In the event of any accident involving any motor vehicle transporting any flammable solid or oxidizing material in which packages are broken, as much as possible of any broken packages shall be carefully gathered and removed to a place of safety, and if the removal of unbroken packages from the motor vehicle would decrease the hazard of fire or other hazard, they shall be removed. The handling of any such materials not contained in packages shall be such as to promote the greatest safety to other users of the highway.

(d) **Reloading of damaged packages of matches; repairs.** In the event of damage to matches or packages of matches by fire or by water in extinguishing a fire in transit, they shall be reloaded in accordance with the applicable requirements for the packing and loading of matches. Great care shall be taken, however, first to examine and repair any damage to outside containers before reloading, and all loose matches shall be destroyed. Smoking boxes of matches shall not be opened in the vicinity of the remainder of the lading. Such boxes shall be destroyed at a safe distance from the motor vehicle, preferably by burning, and shall not be left, either smoking or burning.

(e) **Calcium hypochlorite compounds, dry, involved in fires.** Calcium hypochlorite compounds, dry, packed in metal drums when involved in motor vehicles where fire has occurred from any cause must be held at least five days before forwarding. Drums showing evidence of spontaneous heating or stress from internal pressure must not be reshipped.

§ 177.858 Accidents; corrosive materials. (a) **Accident to vehicle; other lading damaged; vehicle washed.** In the event of any accident involving any motor vehicle transporting corrosive materials in which has been involved the breakage, spillage, or leakage of containers of such materials, care shall be exercised in the handling of any other lading which may have become damaged thereby so as to minimize the hazard in handling such damaged lading during the unloading process. The interior or any other parts of the motor vehicle upon which a corrosive liquid may have become spilled shall be thoroughly washed with water as soon after the unloading process as feasible and prior, in any event, to the subsequent reloading of the motor vehicle. (See also §177.807.)

(b) **Leaking cargo tanks.** In the event of leakage of liquid from any cargo tank or any compartment thereof used for the transportation of corrosive liquids, which develops or is discovered subsequent to the commencement of transportation, any one of the following means, or any means in addition to those herein prescribed, equally or more effective, shall be employed to minimize further hazard:

(1) Further to transport the cargo tank only the minimum distance to reach a place where the contents of the tank or compartment which is leaking may be disposed of with safety, meanwhile employing every available means to prevent the spillage or leaking of any liquid on the highway.

(2) In the event the leak is of such a character as to make further transportation of the cargo tank unsafe, to draw off the traveled portion of the highway, and to employ every available means for the safe disposal of the leaking liquid by preventing, so far as practicable, its spread over a wide area, as by absorbing by means of the use of noncombustible absorbent material, such as fine ashes, sand, earth, etc., or by any other practicable means; by digging trenches to drain to a hole or depression in the ground; by diverting the liquid away from streams or sewers if possible; or by catching the liquid in containers if practicable. So far as practicable, every available means shall be employed to prevent the congregation of spectators and to prevent them from coming in contact with the liquid or its fumes. All available means shall be taken to prevent injury or damage to other users of the highway, or to livestock or farm animals, which might be occasioned by the unloading of the corrosive liquid.

§ 177.859 Accidents; compressed gases. (a) **Accident to vehicle; warnings; keep fire away.** In the event of an accident involving any motor vehicle transporting any compressed gas, the release of which would constitute a hazard to other users of the highway, due care shall be taken that only persons employed in the removal of hazards or wreckage shall be allowed in proximity to the motor vehicle, and the shipper should be notified. In such cases, every practicable and available means shall be taken to warn all approaching persons of the danger involved and to caution them against the use of matches or flame-producing devices, if the gas is flammable.

(b) **Transfer of flammable gas en route; no flame or sparks.** No flammable compressed gas shall be transferred from one container to another, or from one cargo tank to another tank vehicle, or from another tank vehicle to a cargo tank, on any public highway, street, or road, except in case of emergency. In such cases every precaution shall be taken to prevent the escape of gas. Warning devices must be set out in the manner prescribed in §392.25 of this title. All cargo tanks involved in such transfer shall be grounded. The transfer shall be made only during daylight, unless the emergency occurs at night or extends into hours of darkness and the hazard would be increased by waiting until daylight. In any such event, all practicable means, in addition to those hereinbefore prescribed, shall be taken to protect and warn other users of the highway against the hazard involved in any such transfer, or against the hazard occasioned by the emergency making such transfer necessary. Every precaution shall be taken to prevent the ignition of any flammable compressed gas from any source; and when it is possible to prevent the congregation of persons not directly concerned with the emergency, this shall be done. Every practicable precaution shall be taken to keep flames or fire away from the scene of the emergency and to prevent smoking or the lighting of pipes, cigars, or cigarettes. Similarly, special care shall be exercised in the operation of any engine, whether of the motor vehicles involved or any other, and where the operation of any such engine would be likely to produce ignition of the flammable compressed gas, the transfer shall be accomplished by other means, if possible. Nothing contained in this section shall be so construed as to prohibit the fueling of machinery or vehicles used in road construction and maintenance.

§ 177.860 Accidents or leakage; poisons. (a) **Accident to vehicle; warnings; no sparks or flame.** In the event of an accident involving any motor vehicle transporting any poison which is flammable, noxious, or toxic, every available means shall be employed in the protection of persons or property or in the removal of hazards or wreckage, from congregating in the vicinity; such means shall also be employed to prevent smoking, to keep flame away, to safeguard against the aggravation of the hazard present, and to warn other users of the highway. Care shall also be taken to prevent any poison, whether flammable or nonflammable, from contaminating streams or flowing or being spilled into sewers, and poison in powdered form from being scattered by wind. (See also §177.807.)

(b) **Leakage.** A vehicle which has been used to transport material marked as or known to be poison (class A or B) must be inspected for contamination before reuse. A vehicle which has been contaminated must not be returned to service until such contamination has been

removed. This subparagraph does not apply to vehicles used solely for transporting such poisons so long as they are used in that service.

(b) Leaking cargo tanks. In the event of leakage of liquid from any cargo tank or any compartment thereof used for the transportation of any poison which is also flammable, or which would come also within the definition of a flammable liquid, or of any gas or combination of gas and liquid, or any poison which would come within the definition of a compressed gas, the requirements shall be the same as those set forth for flammable liquids and compressed gases. In addition, all possible care shall be taken to warn bystanders or other users of the highway against the hazard of inhaling vapors or coming in contact with the poison.

§ 177.861 Accidents; radioactive materials. (a) In addition to the incident reporting requirements of §§171.15 and 171.16 of this subchapter, the carrier must also notify the shipper at the earliest practicable moment following any incident in which there has been breakage, spillage, or suspected radioactive contamination involving radioactive material's shipments. Vehicles, buildings, areas, or equipment in which radioactive materials have been spilled may not be again placed in service or routinely occupied until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour as there is no significant removable radioactive surface contamination (see §173.443 of this subchapter).

Note 1: In these instances, the package or materials should be segregated as far as practicable from personnel contact. If radiological advice or assistance is needed, the U.S. Department of Energy should also be notified. In case of obvious leakage, or if it appears likely that the inside container may have been damaged, care should be taken to avoid inhalation, ingestion, or contact with the radioactive material. Any loose radioactive material should be left in a segregated area and held pending disposal instructions from qualified persons.

Note 2: Details involving the handling of radioactive materials in the event of an accident can be found in Bureau of Explosives' Pamphlets 1 and 2.

(b) Cleaning vehicles. See §177.843.

SUBPART E

REGULATIONS APPLYING TO HAZARDOUS MATERIAL ON MOTOR VEHICLES CARRYING PASSENGERS FOR HIRE

§ 177.870 Regulations for passenger carrying vehicles. (a) Vehicles transporting passengers and property. In addition to the regulations in Parts 170–189 of this subchapter the following requirements shall apply to vehicles transporting passengers and property.

(b) No explosives or other hazardous materials on passenger-carrying vehicles, exceptions. No hazardous materials except small-arms ammunition, emergency shipments of drugs, chemicals and hospital supplies, and the accompanying munitions of war of the Departments of the Army, Navy, and Air Force of the United States Government, are authorized by Parts 170–189 of this subchapter to be transported on motor vehicles carrying passengers for hire where other practicable means of transportation is available.

(c) Explosives in passenger carrying space forbidden. No explosive, except small-arms ammunition, may be carried in the passenger-carrying space of any motor vehicle transporting passengers for hire.

(d) Hazardous materials on passenger-carrying vehicles; quantity. Where no other practicable means of transportation is available, the following articles in the quantities as shown may be transported in motor vehicles carrying passengers for hire in a space other than that provided for passengers: Not to exceed 100 pounds gross weight of any or all of the kinds of explosives permitted to be transported by passenger-carrying aircraft or rail car may be transported on a motor vehicle transporting passengers: *Provided, however,* That samples of explosives for laboratory examination, not to exceed two samples, or a total of no more than 100 detonators, Class C explosives at one time in a single motor vehicle, may be transported in a motor vehicle transporting passengers.

(e) Articles other than explosives on passenger-carrying vehicles. The gross weight of any given class of hazardous material other than explosives shall not exceed 100 pounds, and the aggregate weight of all such other dangerous articles shall not exceed 500 pounds. This provision does not apply to nontoxic, nonflammable refrigerants, when such refrigerant is for servicing operations of a motor carrier on whose motor vehicles the refrigerant is used. A cylinder secured against movement while in transit and not exceeding 250 pounds gross weight may be transported.

(f) Poisons on passenger-carrying vehicles. No motor carrier may transport any extremely dangerous poison, class A, any tear gas or irritating substance, class C, any less dangerous poison, class B, which is a liquid, or any paranitraniline, in any amount, in or on any bus while engaged in the transportation of passengers; or any less dangerous poison, class B, which is other than a liquid, in any amount exceeding an aggregate of 100 pounds gross weight in or on any such bus.

(g) Radioactive materials. In addition to the limitations prescribed in paragraphs (b) and (e) of this section, no person may transport any radioactive material requiring labels under §§172.436, 172.438, and 172.440 of this subchapter in or on any motor vehicle carrying passengers for hire except where no other practicable means of transportation is available. Packages of radioactive material's must be stored only in the trunk or baggage compartment of the vehicle, and must not be stored in any compartment occupied by persons. Packages of radioactive material's must be handled and placed in the vehicle as prescribed in §177.842.

APPENDIX A TO PART 177

RELATIONSHIP BETWEEN ROUTING REQUIREMENTS IN PART 177 WITH STATE AND LOCAL REQUIREMENTS

I. Purpose. This appendix is a statement of the Department of Transportation policy regarding the relationship of State and local rules with Federal rules in Part 177 of this subchapter for routing motor carriers transporting radioactive materials. The purpose of this appendix is to advise a State or local government how it can exercise authority over motor carriers under its own laws in a manner that the Department of Transportation considers to be consistent with rules in Part 177 (see 49 U.S.C. 1811(a)). This appendix and Part 177 do not delegate Federal authority to regulate motor carriers.

II. Definition. "Routing rule" means any action which effectively redirects or otherwise significantly restricts or delays the movement by public highway of motor vehicles containing hazardous materials, and which applies because of the hazardous nature of the cargo. Permits, fees and similar requirements are included if they have such effects. Traffic controls are not included if they are not based on the nature of the cargo, such as truck routes based on vehicles weight or size, nor are emergency measures.

III. Highway route controlled quantity radioactive materials.

A. State routing rules. A State routing rule which applies to large quantity radioactive materials is inconsistent with Part 177 if:

1. It prohibits transportation of highway route controlled quantity radioactive materials by highway between any two points without providing an alternate route for the duration of the prohibition; or

2. It does not meet all of the following criteria:

(a) The rule is established by a State routing agency as defined in §171.8 of this subchapter;

(b) The rule is based on a comparative radiological risk assessment process at least as sensitive as that outlined in the "DOT Guidelines";

(c) The rule is based on evaluation of radiological risk wherever it may occur, and on a solicitation and substantive consideration of views

from each affected jurisdiction, including local jurisdictions and other States; and

(d) The rule ensures reasonable continuity of routes between jurisdictions.

B. Local routing rules. A local routing rule that applies to highway route controlled quantity radioactive materials is inconsistent with this Part if it prohibits or otherwise affects transportation on routes or at locations either:

1. Authorized by Part 177, or
2. Authorized by a State routing agency in a manner consistent with Part 177.

IV. Quantities of radioactive materials required to be placarded. A State or local routing rule that applies to a radioactive material (other than a highway route controlled quantity radioactive material) for which Part 177 requires placarding, is inconsistent with Part 177 unless it is identical to §177.825(a) of this part.

V. Radioactive materials for which placarding is not required. A State or local routing rule that applies to a radioactive material for which Part 172 does not require placarding is inconsistent with this part.

VI. Other related State and local rules. A State or local transportation rule is inconsistent with Part 177 if it:

A. Conflicts with physical security requirements which the Nuclear Regulatory Commission has established in 10 CFR Part 73 or requirements approved by the Department of Transportation under §173.22(c) of this subchapter;

B. Requires additional or special personnel, equipment, or escort;

C. Requires additional or different shipping paper entries, placards, or other hazard warning devices;

D. Requires filing route plans or other documents containing information that is specific to individual shipments;

E. Requires prenotification;

F. Requires accident or incident reporting other than as immediately necessary for emergency assistance; or

G. Unnecessarily delays transportation.

PART 178—SHIPPING CONTAINER SPECIFICATIONS

§ 178.0 Purpose, scope, and applicability.

§ 178.0-1 Purpose and scope. This part prescribes the manufacturing and testing specifications for packaging and containers used for the transportation of hazardous materials in commerce.

§ 178.0-2 Applicability. (a) Any person who performs a function prescribed in this part, shall perform that function in accordance with this part.

(b) When this part requires (either expressly or by reference to §173.24 of this subchapter) a packaging or container to be marked with a DOT specification (for example, DOT-1A, DOT-17E-304HT, DOT-23G40), compliance with that requirement is the responsibility of the packaging or container manufacturer. Marking the packaging or container with the DOT specification shall be understood to certify compliance by the manufacturer, that the functions performed by the manufacturer, as prescribed in this part, have been performed in compliance with this part. (See also §173.28 of this subchapter "Reuse of containers." That section envisions the marking of containers to be performed by a person other than the original manufacturer.)

(c) Except as specifically provided in §§178.337-18 and 178.340-10, the manufacturer of a packaging or container should inform each person to whom that packaging or container is transferred of any specification requirements which have not been met at time of transfer.

§ 178.0-3 United Nations symbol and packaging identification code. (a) In addition to the markings required by this subchapter, packagings may be marked with the United Nations symbol and packaging identification code as provided in the ICAO Technical Instructions or in Annex 1 to the IMDG Code provided that the person applying these markings has established that the packaging conforms to the applicable provisions of the ICAO Technical Instructions or Annex 1 to the IMDG Code, respectively.

(1) If an indication of the State in whose territory the specified tests have been carried out or of the State authorizing the allocation of the mark is required, the letters "USA" shall be used.

(2) If an indication of "the name of the manufacturer or other identification of the packaging as specified by the competent authority" is required, the name and address or symbol of the person making the mark shall be entered. Symbols, if used, must be registered with the Director, OHMT. Duplicate symbols are not authorized.

SUBPART A

SPECIFICATIONS FOR CARBOYS, JUGS IN TUBS, AND RUBBER DRUMS

§ 178.1 Specification 1A; boxed carboys. Glass, earthenware, clay, or stoneware.

§ 178.1 Compliance. (a) Required in all details.

§ 178.1-2 Reuse of packages. (a) Parts of outside container and cushioning must be replaced when broken, decayed, or inefficient in any way.

(b) Carboys with lip cracked or badly chipped not authorized; gasket seat must be even. Packages must be capable of passing tests prescribed in §178.1-9.

§ 178.1-3 Closing devices required. (a) As follows except when otherwise authorized in the packing regulations:

(1) Acidproof stoppers or other devices, with gaskets, securely fastened; venting closures are required when necessary to prevent internal pressure in excess of 8 pounds per square inch gauge at 130° F.

(2) Glass stoppers ground to fit and securely fastened are authorized when internal pressures do not exceed 8 pounds per square inch gauge at 130° F.

§ 178.1-4 Capacity and marking of carboy. (a) Containers 5 to 13 gallons are classed as carboys. Must be embossed to indicate maker and year of manufacture; mark of maker to be registered with Director, OHMT.

§ 178.1-5 Glass carboys. (a) Thoroughly annealed; top of lip smooth and even; must contain at least 20 pounds of glass for 12-gallon carboys and 21 pounds for 13-gallon carboys. Glass in side walls should be well distributed and at least 1/16" thick. Defective carboys not authorized.

§ 178.1-6 Earthenware, clay, or stoneware carboys. (a) Of acidproof material.

§ 178.1-7 Outside containers. (a) Wooden boxes completely enclosing body of carboy or wooden boxes completely enclosing body and neck of carboy, with 4 vertical corner posts, two cleats for shoes and two carrying cleats. (See paragraph (e) of this section.)

(b) Lumber to be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

(c) Assemble sides and ends with grain of wood horizontal and nail as specified. Nail bottom to sides and ends; fasten top by any efficient means. Cleats for shoes to be along edges of bottom parallel to carrying cleats. (See paragraph (e) of this section.)

(d) Parts and dimensions as follows:

Nominal Carboy capacity not over	Minimum dimensions			Nails—Sides and Bottom	
	Thickness—Sides, top, bottom and ends	[1] Vertical corner posts	[1] Carrying cleats and shoes	[2] Size, not less than	[3] Spacing average not over
Gallons	Inch	Inches	Inches	Penny	Inches
5 to 7	5/8	5/8 x 2 1/2	5/8 x 1 7/8	7	2 1/2
from				6	2
7 to 13	25/32	25/32 x 3 1/8	25/32 x 2 11/32	9	2 3/4
				8	2 1/2

[1] Other dimensions with equal cross section acceptable.
[2] Screws of equal efficiency authorized.
[3] Spacing 6 inches acceptable along edge grain of bottoms.

(e) In place of bottom cleats, the following is authorized; 2 angle irons at least 1 1/4" x 1 1/4" x 1/16", applied across grain of bottom boards from corner to corner, supported by acid resistant metal corner supports securely fastened to sides and ends at each bottom corner so as to raise bottom boards of box at least 3/4" above bottom of corner supports; nailing along end grain of bottom boards not required.

(f) Special box. Must comply with this specification except as follows: Bottom of box must be nailed to 4 nailing cleats which form part of the sides and ends of box. Top of box must be reinforced by 2 cleats of 1/2-inch lumber 4 inches wide, extending the entire width of the top at right angles to the sides of the boards forming the top; a vacant space of 1 inch between outside edge of top and cleat should be allowed for nailing top to box; parts and dimensions must be as follows:

Carboy capacity, not over (gallons)	Minimum dimensions					Nails, sides, and bottom	
	Thickness of sides, top, and ends	Thickness of bottom	Thickness and width of bottom nailing cleats	Carrying cleats and shoes	Triangular vertical corner posts	Size not less than [1]	Spacing average not over [2]
	Inch	Inches	Inches	Inches	Inches	Penny	Inches
5 to 13	1/2	25/32	25/32 x 2 1/2 (short sides)	25/32 x 2 1/2	2 1/2 x 2 1/2	8 10	2 1/2 2 3/4

[1] Screws of equal efficiency authorized.
[2] Spacing 6 inches acceptable along edge grain of bottoms.

(g) Cushioning materials. Cushioning devices or materials must be of such type, or be so secured within the outer container, that the carboy cannot shift in a way that cushioning efficiency is reduced.

§ 178.1–8 Marking of outside container. (a) On each container with letters and figures at least ¾ inch high applied by hot branding iron or printing ink of a color sharply contrasting to background of package with high pressure dies as follows:

(1) DOT–1A.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.1–9 Tests. (a) *Apparatus* Standard required. Detailed prints may be obtained from the Director, OHMT.

(b) Method. Fill with water to lower edge of neck; swing 55° measured from wall to nearest bottom edge of basket:

(1) Side shock; test at least 10 carboys.

(2) Bottom shock; test at least 5 carboys.

Note 1: In instances where 99 or less carboys are in service during either 6-month period of the year it shall be acceptable to test 10 percent of the total but not less than 3 carboys on both the side and bottom swing. If this provision is used, the report of test results must so state.

(c) Acceptable results. 90 percent of carboys must not break under side shock and same for bottom shock, except both results must be 100 percent if modified test authorized by Note 1 of § 178.1–9(b) is used.

(d) When required. By each manufacturer, at intervals not to exceed 6 months; separate tests are required for:

(1) New packages (those with new outside container).

(2) Used packages.

(3) Packages with carboys differing over 2 gallons.

(4) Packages differing in kind of cushioning.

(e) Exception. Tests not required by shipper who fills and ships or reships for one shipment only packages obtained from a manufacturer or shipper who has had tests made.

(f) Reports. Required to be made to Director, OHMT on form as follows:

REPORT OF TESTS OF CARBOYS
(As required by D.O.T. Regulations and Specifications)

(Place) .....

(Date) .....

Test made for .....

(Give name and address of plant for which tests were made) .....

.....

Description of package	Results					
	No. of test	55-inch swing		No. of test	55-inch swing	
		Side	Bottom		Side	Bottom
Capacity	1	.....	.....	13	.....	.....
Condition[1]	2	.....	.....	14	.....	.....
	3	.....	.....	15	.....	.....
Type of inside container[2]	4	.....	.....	16	.....	.....
	5	.....	.....	17	.....	.....
Cushioning[3]	6	.....	.....	18	.....	.....
	7	.....	.....	19	.....	.....
Diameter of bottle	8	.....	.....	20	.....	.....
	9	.....	.....	21	.....	.....
Size of outside container (inside)	10	.....	.....	22	.....	.....
	11	.....	.....	23	.....	.....
	12	.....	.....	24	.....	.....

Specification mark is .....

Identification symbol is .....

Remarks .....

.....

.....

(Signature) .....

(Per) .....

[1] State whether outside container is new or used.

[2] State whether glass, earthenware, etc.

[3] State whether hay, mineral wool, ground cork, excelsior, wood strips .....type, cork pads .....type, etc.

§ 178.1–10 Boxes of veneer, plywood, and laminated wood. (a) Boxes of veneer, plywood, laminated wood, or any combination thereof, which comply with this section (except § 178.1–7(a), (c), and (d)), are authorized provided:

(1) Outside containers shall completely enclose body of carboy or body and neck of carboy.

(2) That these boxed carboys pass the regular test prescribed in § 178.1–9. A copy of the most recent test report must be retained until further tests are made or for five years from the date of test.

(3) (Deleted)

§ 178.4 Specification 1D; boxed glass carboys.

§ 178.4–1 Compliance. (a) Required in all details.

§ 178.4–2 Reuse of packages. (a) Parts of outside container and cushioning must be replaced when broken, decayed, or inefficient in any way.

(b) Carboys with lip cracked or body chipped not authorized; gasket seat must be even. Packages must be capable of passing tests prescribed in § 178.4–8.

§ 178.4–3 Closure. (a) Threaded screw cap which shall be constructed of a suitable plastic or other material resistant to lading.

(b) Gasket or lining for cap must be used and shall be resistant to lading and:

(1) Must be liquid tight or;

(2) Must be liquid tight up to venting pressure when such venting is prescribed for the material which is to be shipped.

(c) At least one complete continuous thread must be engaged with gasket in place.

§ 178.4–4 Capacity and marking of carboy. (a) Capacity. 6.5 United States gallons nominal capacity, 7.0 United States gallons overflow, tolerance plus or minus 10 fluid ounces.

(b) Marking. Each carboy bottle must be embossed in bottom as follows:

Maker's mark (to be registered with Director, OHMT)
Year of Manufacture
DOT–1D

§ 178.4–5 Glass carboy bottle. (a) Must be machine-blown thoroughly and properly annealed, with screw thread finish having at least one continuous thread to accommodate closure; lap of lip smooth and even; must contain 14 pounds of glass, tolerance minus 8 ounces plus 16 ounces. Minimum thickness to be .075 inch. Defective carboys not authorized.

§ 178.4–6 Outside containers. (a) Wooden boxes completely enclosing body and neck of carboy, with 4 vertical corner posts, two cleats for shoes and two carrying cleats. An opening not exceeding 3 inches in width may be provided directly above the neck of bottle, if the top of the box is made up of not more than two pieces of lumber of ⅞ inch thickness. Bottom board of the two ends of the box must be constructed of lumber at least one inch thick, must be flush with the carrying cleats and be at least 2¼ inches in width. Cleats or other fasteners used to secure cover must not extend beyond carrying cleats.

(b) Lumber to be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

(c) Assemble sides and ends with grain of wood horizontal and nail as specified. Nail bottom to sides and ends; fasten top by any efficient means (friction closure not authorized). Cleats for shoes to be along edges of bottom parallel to carrying cleats and at right angle to the direction of bottom board or boards.

(d) Parts and dimensions as follows:

Carboy, capacity, nominal not over (gallons)	Minimum dimensions			[4] Nails—Sides and bottom	
	[1] Thickness—Sides, top, bottom and ends	[2] Vertical corner posts	[3] Carrying cleats and shoes	Size	[5] Spacing average
	Inch	Square inches	Inches	Penny	Inches
6.5	½	20	½ × 2¼	6	2

[1] Except as prescribed or permitted under § 178.4–6 (a).

[2] Cross sectional area.

[3] Other dimensions with equal cross section acceptable. In lieu of separate carrying cleats, side board, at point where cleat should be located, may be constructed of lumber not less than one inch thick so that overhang will be at least ½ inch.

[4] Screws of equal efficiency authorized.

[5] Spacing 6 inches acceptable along edge grain of bottoms.

(e) Cushioning materials. Cushioning devices or materials must be of such type, or be so secured within the outer container, that the carboy cannot shift in a way that cushioning efficiency is reduced.

§ 178.4–7 Marking of outside container. (a) On each container with letters and figures at least ¾ inch high applied by hot branding iron or printing ink of a color sharply contrasting to background of package with high pressure dies as follows:

(1) DOT–1D.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.4–8 Tests. (a) Apparatus. Standard required. Detailed prints may be obtained from the Director, OHMT.

(b) Method. Fill with water to lower edge of neck; swing 55° measured from wall to nearest bottom edge of basket:

(1) Side shock; test at least 10 carboys.
(2) Bottom shock, test at least 5 carboys.

Note 1: In instances where 99 or less carboys are in service during either 6-month period of the year it shall be acceptable to test 10 percent of the total but not less than 3 carboys on both the side and bottom swing. If this provision is used, the report of test results must so state.

(c) Acceptable results. 90 percent of carboys must not break under side shock and same for bottom shock, except both results must be 100 percent if modified test authorized by Note 1 of § 178.4-8(b) is used.

(d) When required. By each manufacturer, at intervals not to exceed 6 months; separate tests are required for:
(1) New packages (those with new outside container).
(2) Used packages.
(3) Packages differing in kind of cushioning.

(e) Exception. Tests not required by shipper who fills and ships or reships for one shipment only packages obtained from a manufacturer or shipper who has had tests made.

(f) Reports. Required to be made to Director, OHMT on form as follows:

REPORT OF TESTS OF CARBOYS
(As required by D.O.T. Regulations and Specifications)

(Place) .....

(Date) .....

Test made for .....

(Give name and address of plant for which tests were made) .....

.....

Description of package	Results					
	No. of test	55-inch swing		No. of test	55-inch swing	
		Side	Bottom		Side	Bottom
Capacity	1	.....	.....	13	.....	.....
Condition[1]	2	.....	.....	14	.....	.....
	3	.....	.....	15	.....	.....
Type of inside container[2]	4	.....	.....	16	.....	.....
	5	.....	.....	17	.....	.....
Cushioning[3]	6	.....	.....	18	.....	.....
	7	.....	.....	19	.....	.....
Diameter of bottle	8	.....	.....	20	.....	.....
	9	.....	.....	21	.....	.....
Size of outside container (inside)	10	.....	.....	22	.....	.....
	11	.....	.....	23	.....	.....
	12	.....	.....	24	.....	.....

Specification mark is .....

Identification symbol is .....

Remarks .....

.....

.....

(Signature) .....

(Per) .....

[1] State whether outside container is new or used.
[2] State whether glass, earthenware, etc.
[3] State whether hay, mineral wool, ground cork, excelsior, wood strips .....type, cork pads .....type, etc.

(g) Internal pressure test. Bottles shall be capable of withstanding a sustained internal pressure of 20 p.s.i.g. for a 15-day period.

(h) Hydrostatic pressure test. One bottle selected at random from each 200 produced on each mold shall be subjected to an instantaneous hydrostatic pressure test to bursting. Pressure at which bottle bursts must not be less than 40 p.s.i. gauge. If bottle so tested fails at a pressure less than 40 p.s.i., 12 additional samples must be selected from the same lot of 200 bottles and tested in the same manner. All 12 samples must pass required test otherwise entire lot shall be rejected.

§ 178.5 Specification 1X; boxed carboys, 5 to 6½ gallons, for export only. Glass, earthenware, clay, or stoneware. Single-trip container.

§ 178.5-1 Compliance. (a) Required in all details.

§ 178.5-2 Closing devices required. (a) As follows except when otherwise authorized in the packing regulations:

(1) Acidproof stoppers or other devices, with gaskets, securely fastened; venting closures are required when necessary to prevent internal pressure in excess of 8 pounds per square inch gauge at 130° F.

(2) Glass stoppers ground to fit and securely fastened are authorized when internal pressures do not exceed 8 pounds per square inch gauge at 130° F.

(3) For box: Two flat metal nailless straps, at least ½ inch by 0.020 inch, encircling top, sides, and bottom and securely sealed, are required.

§ 178.5-3 Capacity and marking of carboy. (a) Containers must be 5 to 6½ gallon size and embossed to indicate maker and year of manufacture.

§ 178.5-4 Glass carboys. (a) Thoroughly annealed; top of lip smooth and even. Glass in side walls should be well distributed and at least ⅛ inch thick. Defective carboys not authorized.

§ 178.5-5 Earthenware, clay, or stoneware carboys. (a) Earthenware, clay, or stoneware carboys of acidproof material.

§ 178.5-6 Outside containers. (a) Wooden boxes completely enclosing body and neck of carboy, with 4 vertical corner posts. Top may consist of cap fitting snugly inside body of box and resting on corner posts.

(b) Lumber to be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

(c) Assemble sides and ends with grain of wood horizontal and nail as specified; nail bottom to ends; fasten top by any efficient means.

(d) Parts and dimensions. Sides, top, and bottom at least ½ inch thick; vertical corner posts at least 2.25 square inches cross section; nails at least 6-penny at 2-inch intervals or 5-penny at 1¾-inch intervals.

(e) Cushioning materials. Cushioning devices or materials must be of such type, or be so secured within the outer container, that the carboy cannot shift in a way that cushioning efficiency is reduced.

§ 178.5-7 Marking of outside container. (a) On each container with letters and figures at least ¾ inch high applied by hot branding iron or printing ink of a color sharply contrasting to background of package with high pressure dies as follows:
(1) DOT-1X.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.5-8 Marking. (a) Each outside container must also be plainly marked "FOR EXPORT ONLY, NOT RETURNABLE" and the top must be marked "THIS SIDE UP."

§ 178.5-9 Tests. (a) Apparatus. Standard required. Detailed prints may be obtained from the Director, OHMT.

(b) Method. Fill with water to lower edge of neck; swing 55° measured from wall to nearest bottom edge of basket:
(1) Side shock; test at least 10 carboys.
(2) Bottom shock; test at least 5 carboys.

(c) Acceptable results. 90 percent of carboys must not break under side shock; same for bottom shock.

(d) When required. By each manufacturer, at intervals not to exceed 6 months; separate tests are required for:
(1) New packages (those with new outside container).
(2) Packages differing in kind of cushioning.

(e) Exception. Tests not required by shipper who fills and ships or reships for one shipment only packages obtained from a manufacturer or shipper who has had tests made.

(f) Reports. Required to be made to Director, OHMT on form as follows:

REPORT OF TESTS OF CARBOYS
(As required by D.O.T. Regulations and Specifications)

(Place) .....

(Date) .....

Test made for .....

(Give name and address of plant for which tests were made) .....

.....

Description of package	Results					
	No. of test	55-inch swing		No. of test	55-inch swing	
		Side	Bottom		Side	Bottom
Capacity	1	.....	.....	13	.....	.....
Condition[1]	2	.....	.....	14	.....	.....
	3	.....	.....	15	.....	.....
Type of inside container[2]	4	.....	.....	16	.....	.....
	5	.....	.....	17	.....	.....
Cushioning[3]	6	.....	.....	18	.....	.....
	7	.....	.....	19	.....	.....
Diameter of bottle	8	.....	.....	20	.....	.....
	9	.....	.....	21	.....	.....
Size of outside container (inside)	10	.....	.....	22	.....	.....
	11	.....	.....	23	.....	.....
	12	.....	.....	24	.....	.....

Specification mark is .....

Identification symbol is .....

Remarks .....

.....

.....

(Signature) .....

(Per) .....

[1] State whether outside container is new or used
[2] State whether glass, earthenware, etc
[3] State whether hay, mineral wool, ground cork, excelsior, wood strips .....type, cork pads .....type, etc

§ 178.6 Specification 1EX; Glass carboys in plywood drums. Single-trip container.

§ 178.6-1 Compliance. (a) Required in all details.

§ 178.6-2 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

§ 178.6-3 Closing devices required. (a) As follows except when otherwise authorized in the packing regulations:
(1) Acidproof stoppers or other devices, with gaskets, securely fastened; venting closures are required when necessary to prevent internal pressure in excess of 8 pounds per square inch gauge at 130° F.
(2) Glass stoppers ground to fit and securely fastened are authorized when internal pressures do not exceed 8 pounds per square inch gauge at 130° F.

§ 178.6-4 Capacity and marking of carboy. (a) Containers must be 5 to 6½ gallons capacity and embossed to indicate maker and year of manufacture.

§ 178.6-5 Glass carboys. (a) Thoroughly annealed; top of lip smooth and even. Glass in side walls should be well distributed and at least 1/16 inch thick. Defective carboys not authorized.

§ 178.6-6 Outside containers. (a) Plywood drums completely enclosing body and neck of carboy and constructed as follows:
(1) Body shell. To be of two plies of hardwood veneer, each not less than 1/12 inch in thickness, firmly glued together, with the grain of the outside ply parallel and the inner ply vertical to the heads. The body shall be butt-jointed and shall be fastened on the outside with a 28-gauge steel strip, not less than 1½ inches in width. 17-gauge staples shall be driven on each side of the joint, spaced not more than 1½ inches apart and clinched on inside of the body.
(2) Heads. Top and bottom heads shall be of three ply hardwood veneer, each ply not less than 1/12 inch in thickness, all firmly glued together, with the grain of each outer ply at right angles to the grain of the center ply. Each head shall be circled to fit snugly inside of the body. Interior heads shall be of the same construction.
(3) Hoops. To be of hardwood veneer, not less than 1¾ inches wide by ⅛ inch thick. Hoops shall be fastened to the body by 17-gauge staples on not less than 3 inch centers and shall be overlapped not less than 3 inches.
(4) Head liners. When plywood cushioning is used the inner lining strips which support the plywood cushion shall be of hardwood veneer not less than ⅛ inch in thickness and ⅜ inch in width and shall butt or slightly gap. All other head lining strips shall be made of hardwood veneer not less than ⅛ inch in thickness and ⅝ inch in width and shall overlap not less than 3 inches. The bottom head liner and the inside liner strips for the false head and support of the top head shall be fastened by 17-gauge staples on not less than 3 inch centers. The staples shall be driven through the outer hoop and body and clinched on the inside of the veneer strips; except that the strips holding the false head shall have staples only through the body shell and liner. The top liner which forms the final closure shall be fastened to the body by 14-gauge staples driven through the head liner and body into the outer hoop on not less than 4 inch centers.
(5) Battens. A ⅝ inch by 2 inch batten shall be applied to top and bottom and shall be secured at each end by two nails driven through the hoops and shell.
(b) Cushioning materials. Cushioning devices or materials must be of such type, or be so secured within the outer container, that the carboy cannot shift in a way that cushioning efficiency is reduced.

§ 178.6-7 [Reserved]

§ 178.6-8 Marking of outside container for compliance with specification. (a) On each container with letters and figures at least ¾ inch high applied by hot branding iron or printing ink of a color sharply contrasting to background of package with high pressure dies as follows:
(1) DOT-1EX.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.6-9 Marking of outside container for use. (a) Each outside container must also be plainly marked "SINGLE-TRIP CONTAINER" just above or below the mark specified in § 178.6-8(a)(1) of this section.

§ 178.6-10 Tests. (a) Apparatus. Standard required. Detailed prints may be obtained from the Director, OHMT.
(b) Method. Fill with water to lower edge of neck; swing 55° measured from wall to nearest bottom edge of basket:
(1) Side shock; test at least 10 carboys.
(2) Bottom shock; test at least 5 carboys.

Note 1: In instances where 99 or less carboys are in service during either 6-month period of the year it shall be acceptable to test 10 percent of the total but not less than 3 carboys on both the side and bottom swing. If this provision is used, the report of test results must so state.

(c) Acceptable results. 90 percent of carboys must not break under side shock and same for bottom shock, except both results must be 100 percent if modified test authorized by Note 1 of § 178.6-10(b) is used.
(d) When required. By each manufacturer, at intervals not to exceed 6 months; separate tests are required for:
(1) New packages (those with new outside containers).
(2) Packages differing in kind of cushioning.
(e) Exception. Tests not required by shipper who fills and ships or reships for one shipment only packages obtained from a manufacturer or shipper who has had tests made.
(f) Reports. Required to be made to Director, OHMT on form as follows:

REPORT OF TESTS OF CARBOYS
(As required by O.O.T. Regulations and Specifications)

(Place) .....

(Date) .....

Test made for .....

(Give name and address of plant for which tests were made) .....

.....

Description of package	Results					
	No. of test	55-inch swing		No. of test	55-inch swing	
		Side	Bottom		Side	Bottom
Capacity	1	.....	.....	13	.....	.....
Condition[1]	2	.....	.....	14	.....	.....
	3	.....	.....	15	.....	.....
Type of inside container[2]	4	.....	.....	16	.....	.....
	5	.....	.....	17	.....	.....
Cushioning[3]	6	.....	.....	18	.....	.....
	7	.....	.....	19	.....	.....
Diameter of bottle	8	.....	.....	20	.....	.....
	9	.....	.....	21	.....	.....
Size of outside container (inside)	10	.....	.....	22	.....	.....
	11	.....	.....	23	.....	.....
	12	.....	.....	24	.....	.....

Specification mark is .....

Identification symbol is .....

Remarks .....

.....

.....

(Signature) .....

(Per) .....

[1] State whether outside container is new or used
[2] State whether glass, earthenware, etc.
[3] State whether hay, mineral wool, ground cork, excelsior, wood strips .....type, cork pads .....type, etc.

§ 178.7 [Reserved]

§ 178.8 [Reserved]

§ 178.9 [Reserved]

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 178.12 [Reserved]

§ 178.13 Specification 1H; polyethylene carboys in low carbon steel or other equally efficient metal crates.

§ 178.13-1 Compliance. (a) Required in all details.

§ 178.13-2 Capacity and marking of carboy. (a) Containers 5 to 13 gallons capacity are classed as carboys. Actual capacity must be marked capacity plus 5 percent minimum. Must be permanently marked to indicate marked capacity, maker (symbols, if used, must be registered with the Director, OHMT), month and year of manufacture, and DOT-2T in figures and letters at least ¼ inch high.

§ 178.13-3 Polyethylene carboys. (a) Carboys shall be made of polyethylene with no plasticisers or additives and have a maximum melt index value of 2.5 grams. Carboys must have a minimum weight and wall thickness in accordance with the following table:

Marked capacity	Minimum wall thickness	Minimum weight of bottles
Gallons	Inch	Pounds
5	1/16	3
6½	1/16	4
13	1/16	8

(b) Closing device shall be of material resistant to the lading and adequate to prevent leakage. Opening for closure shall not be over 3½ inches in diameter.

(c) Polyethylene carboys, as manufactured and filled to marked capacity with a material which remains in a liquid form, shall be capable of withstanding a 4-foot drop without leakage, after prior conditioning so that contents will be 0° Fahr. or colder, onto solid concrete on any portion of the carboy.

§ 178.13-4 Outside containers. (a) Metal crates:

(1) Specifications for each size container must be kept on file by each manufacturer.

§ 178.13-5 Marking of outside container. (a) Each outside container must be plainly marked by attachment of a metal plate, or permanent marking in contrasting color directly on the polyethylene carboy in a visible area. Marking must be in letters and figures at least ¾ inch high and must be by embossing or stamping when applied on metal plates. Marking must be as follows:

(1) DOT-1H.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.13-6 Tests. (a) One sample, taken at random and with inner container filled to marked capacity with water and closed as for use, shall be capable of withstanding prescribed tests without leakage or serious rupture of outer container. Tests shall be made of each size by each company starting production. The type tests are as follows:

(1) Complete package must be capable of withstanding 2 drops from a height of 4 feet onto solid concrete, the first drop to be made diagonally so top corner will strike the concrete; the second drop onto a 2-inch by 6-inch timber resting on the concrete with the 6-inch leg vertical, the drop being made with the package in a horizontal position and at right angles to the timber so that impact is near the center of the crate side-wall members.

§ 178.14 Specification 1K; glass carboys cushioned with expandable polystyrene in wooden wirebound box outside containers.

§ 178.14-1 Reuse of packages. (a) Top, base or side sections of outside container and cushioning must be replaced when broken, decayed, or inefficient in any way.

(b) Carboys with lip cracked or badly chipped not authorized; gasket seal must be even. Packages must be capable of passing tests prescribed in § 178.14-8.

§ 178.14-2 Closing devices required. (a) As follows except when otherwise authorized in the packing regulations:

(1) Acidproof stoppers or other devices, with gaskets, securely fastened, venting closures are required when necessary to prevent internal pressure in excess of 8 pounds per square inch gauge at 130° F.

(2) Glass stoppers ground to fit and securely fastened are authorized when internal pressures do not exceed 8 pounds per square inch gauge at 130° F.

(b) For carboys with threaded closure finishes the threaded cap shall be constructed of a suitable plastic or other material resistant to lading.

(1) Gasket or lining must be used and shall be resistant to lading.

(2) Cap must be liquid tight or;

(3) Must be liquid tight up to venting pressure when such venting pressure is prescribed for the material to be shipped.

(4) At least one complete continuous thread must be engaged with gasket in place.

§ 178.14-3 Capacity and marking of carboy. (a) Containers 5 to 13 gallons are classed as carboys; must be embossed to indicate maker and year of manufacture; mark of maker to be registered with the Director, OHMT.

§ 178.14-4 Bottles. (a) 13-gallon carboys. Must be thoroughly annealed; top of lip smooth and even; must contain at least 21 pounds of glass. Glass in sidewalls should be well distributed and at least 1/16 inch thick.

(b) 6½-gallon carboys. Must be machine-blown, thoroughly and properly annealed, with screw thread finish having at least one continuous thread to accommodate closure; top of lip smooth and even; must contain 14 pounds of glass, tolerance minus 8 ounces plus 16 ounces. Minimum thickness to be 0.075 inch. Defective carboys not authorized.

§ 178.14-5 Cushions. (a) Expandable polystyrene, molded to produce a completely fused closed cell structure and designed as to provide a snug fit in all areas of contact with the inside container, in the following forms:

(1) Formed in place around the inside container; density 1.25 plus or minus 0.25 lbs. per cubic foot, minimum thickness of sidewalls 1 inch and of bottoms 1.5 inches.

(2) Preformed cushions, one top and one bottom; density 2.75 plus or minus 0.5 lbs. per cubic foot, minimum thickness of sidewalls 1 inch and of bottoms 1.37 inches.

(b) Assembled containers must be capable of passing tests prescribed in § 178.14-8.

§ 178.14-6 Outside containers. (a) Wooden wirebound boxes completely enclosing body of carboy or completely enclosing body and neck of carboy.

(b) Lumber shall be as follows:

(1) Lumber shall be well seasoned and commercially dry; free from decay, objectionable knots, slanting shakes, sharp cross grain, and other defects that materially lessen the strength. Grain of wood in cleats and battens must not cross piece within its length.

(2) Authorized tolerances; cleats, battens and handles, minus 1/32 inch; single thickness veneer, minus 5 percent; resawn boards, 1/32 inch below specified thickness for boards ¼ inch or more thick.

(3) Woods authorized are in the following groups:

Group 2

Southern yellow pine	North Carolina pine	Larch (Tamarack)
Hemlock	Douglas fir	

Group 3

White elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple-soft or silver
Sycamore	Black gum	

Group 4

Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

(4) Where plywood is authorized, it must be exterior grade moisture-resistant type.

(c) Binding wires and staples shall be as follows:

(1) Galvanized coated annealed steel or other material of equal strength, Washburn and Moen sizes.

(d) Minimum construction requirements for 13-gallon carboys shall be as follows:

Wirebound boxes	Square box for preformed cushions	Octagonal box for preformed cushions	Cylindrical box for preformed cushions	Octagonal box for formed-in-place cushions
Faceboard thickness (sides only—without handle cleats)				
Group 2 woods	5/16"	5/16"	5/16"	1/2"
Groups 3 and 4 woods	1/2"	1/2"	5/16"	1/2"
Faceboard thickness (sides only—with handle cleats)				
Group 2 woods	3/8"	3/8"	5/16"	1/2"
Group 3 woods	5/16"	5/16"	5/16"	1/2"
Cleats	13/16" x 7/8"	13/16" x 3/8	13/16 x 7/8"	
Handle cleat	2½ x 7/8"	2½ x 7/8"	None	2½ x 7/8"
Binding wires				
Number and gauge over outside cleats	2-12 gauge	2-12 gauge	2-12 gauge	2-12 gauge
Number and gauge intermediate wires	3-13 gauge	3-13 gauge	2-12 gauge	2-13 gauge

Wirebound boxes	Square box for preformed cushions	Octagonal box for preformed cushions	Cylindrical box for preformed cushions	Octagonal box for formed-in-place cushions
	11⅛"-16 gauge	11⅛"-16 gauge	1"-16 gauge	11⅛"-16 gauge
Staples				
Top[1]				
Face material thickness	⅜"	⅜"	½" plywood	⅜"[2]
Battens	4-11⅛" x ⅞"	2-13⅜" x ⅞"	None	2-13⅜" x ⅞"
Base				
Face material thickness	⅜"	⅜"	⅝" plywood	⅜"[2]
Battens	4-11⅛" x ⅞"	3-13⅜" x ⅞"	2-11⅛" x ⅞"	3-13⅜" x ⅞"
Runners	3½" x ⅜"	2-11⅛" x ⅞"	2-11⅛" x ⅞"	2-11⅛" x ⅞"

[1] A hole of suitable type may be made in top of box to provide for the protruding neck of inner container. There shall be 1 inch minimum clearance between bottle and inside of hole.
[2] One half inch plywood face material authorized.

(j) Minimum construction requirements for 6½ gallon carboy shall be as follows:

Wirebound boxes	Dimensions
Faceboard thickness	⅜"
Cleats	13⅛ x ⅞"
Handle cleats	2⅛" x ⅞"
Binding wires	
Number and gauge over outside cleats	2-12 gauge
Number and gauge intermediate wires	2-13 gauge
Staples	11⅛"-16 gauge
Base	
Face material thickness	⅝" plywood
Battens	13⅜" x ⅞"
Top (hood cover)	
Side face board thickness	½"
Cleats	13⅛" x ⅞"
Binding wires	
Number and gauge over outside cleats	2-13 gauge
Top faceboard thickness	⅜" plywood

(l) Outside container closure. When prepared for shipment, top hood cover must be positively secured to body of container.

(e) Assembly:

(1) The box shall be constructed to provide a snug fit with the cushioning for the inside container. Wooden shims of correct thickness may be used to keep carboy tight in overpack.

(2) The boxes shall be closed with threaded loop fasteners using a regular clinch.

§ 178.14-7 Marking of outside container. (a) On each container with letters and figures at least ½ inch high applied by hot branding iron or colored ink with high pressure dies as follows:

(1) DOT-1K.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.14-8 Tests. (a) **Apparatus.** Standard required. Detailed prints may be obtained from the Director, OHMT.

(b) **Method.** Fill with water to lower edge of neck; swing 55 inches measured from wall to nearest bottom edge of basket:

(1) Test 10 carboys each against bottom and one side.

Note 1: Instances where 99 or less carboys are in service during either 6-month period of the year it shall be acceptable to test 10 percent of the total but not less than 3 carboys or both the side and bottom swing. If this provision is used, the report of test results must so state.

(c) **Acceptable results.** One hundred percent of carboys must not break under side or bottom shocks. If failures occur, the test is to be repeated with an additional 10 carboys for which the passing requirement shall be 100 percent.

(d) **When required.** By each manufacturer, at intervals not to exceed 6 months; separate tests required for:

(1) New packages.

(2) Used packages.

(3) Packages differing in kind or shape of cushioning.

(e) **Exception.** Tests not required by shipper who fills and ships or reships for one shipment only packages obtained from a manufacturer or shipper who has had tests made.

(f) **Reports.** Required to be made to the Director, OHMT on form as follows:

REPORT OF TESTS OF CARBOYS
(As required by D.O.T. Regulations and Specifications)

(Place) .....

(Date) .....

Test made for .....

(Give name and address of plant for which tests were made) .....

.....

Description of package	Results: No. of test	55-inch swing: Side	55-inch swing: Bottom	No. of test	55-inch swing: Side	55-inch swing: Bottom
Capacity	1	.....	.....	13	.....	.....
Condition[1]	2	.....	.....	14	.....	.....
	3	.....	.....	15	.....	.....
Type of inside container[2]	4	.....	.....	16	.....	.....
	5	.....	.....	17	.....	.....
Cushioning[3]	6	.....	.....	18	.....	.....
	7	.....	.....	19	.....	.....
Diameter of bottle	8	.....	.....	20	.....	.....
	9	.....	.....	21	.....	.....
Size of outside container (inside)	10	.....	.....	22	.....	.....
	11	.....	.....	23	.....	.....
	12	.....	.....	24	.....	.....

Specification mark is .....

Identification symbol is .....

Remarks .....

.....

.....

(Signature) .....

(Per) .....

[1] State whether outside container is new or used.
[2] State whether glass, earthenware, etc.
[3] State whether hay, mineral wool, ground cork, excelsior, wood strips .....type, cork pads .....type, etc.

§ 178.15 [Reserved]

§ 178.16 Specification Specification 35; non-reusable molded polyethylene drum for use without overpack; removable head required.

§ 178.16-1 Compliance. (a) Required in all details.

(b) Except as otherwise provided within this section, each drum must comply with the requirements of §173.24 of this subchapter.

(c) Each drum must be capable of withstanding the performance tests prescribed in §§178.16-13 and 178.16-16 without failure.

§ 178.16-4 Material. (a) Drums shall be made of an injection-molding grade of high density polyethylene resin which has not been used previously. Regrind from the same production process may be used.

(b) Ultraviolet light protection may be provided by impregnation of polyethylene with carbon black or other equally efficient pigments or inhibitors. If used, these additives must be compatible with lading.

(c) Other materials may be added provided they do not adversely affect the physical properties specified in paragraph (a) of this section or the performance specified in §178.16-13 and are compatible with the lading.

(d) Steel used in top head of drum must be low carbon of standard commercial quality.

§ 178.16-7 Construction and capacity. (a) Rated capacity: not to exceed 7 gallons. Minimum actual capacity shall not be less than

rated capacity plus 4 percent. Maximum actual capacity shall not be greater than rated capacity plus 10 percent.

(b) Minimum thickness of drum measured at any point may not be less than 0.065 inch. If top head is constructed of steel, a minimum of 26-gauge steel must be used.

(c) The gross weight of each drum, when filled, may not exceed the maximum allowable gross weight indicated by the marking on the drum (see § 178.16-19).

§ 178.16-10 Closure. (a) Top head must be of the full removable type, and must be made of steel, polyethylene, or combination thereof. Steel top head must have no less than 16 lugs spaced no more than ¼-inch apart, or be attached to body by tin plate ring seal. Gaskets required when necessary to meet the performance tests prescribed in § 178.16-13.

(b) Openings in body of drum are not authorized.

§ 178.16-13 Design qualification tests. (a) The following tests must be performed at the start of production on each drum size and design. If any change is made to drum design, size, material used, or process, tests in this section must be repeated. Product leakage in any of the required tests will constitute a failure. No single drum will be expected to withstand more than one of the following tests:

(1) *Drop test.* Sample drums of each size and design, selected at random, must be filled to marked gross weight at normal outage with dry powder material and then topped with a minimum of one inch of sodium bicarbonate and closed as for use. Each test drum and contents must be conditioned to be at a temperature of 0°F. or below at the start of each drop test and must be observed immediately following each drop test for any evidence of leakage.

(i) Test drums must be dropped from a height of four feet onto solid concrete under the following conditions of orientation:

(A) Three drums must be dropped flat on bottom.

(B) Three drums must be dropped diagonally on top chime or edge.

(C) Three drums, oriented to impact on bail ear, must be dropped flat on side.

(ii) In event of failure, the individual orientation drop test causing the failure must be repeated with six additional drums. Failure of any of the six additional drums disqualifies that size or design from this specification until design qualification tests have been successfully repeated.

(2) *Vibration test.* Sample drums, three of each size and design, selected at random, must be filled and closed as for use as required in § 178.16-13(a)(1). The three fully loaded test drums must be placed on a platform that has a vertical double-amplitude (peak-to-peak displacement) of one inch. The drums should be constrained horizontally to prevent them from falling off the platform, but otherwise left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the drum to be raised from the vibrating platform to such a degree that a piece of material of approximately 1/16-inch thickness (such as steel strapping or paperboard) can be passed between the bottom of any drum and the platform. Immediately following the period of vibration, each drum must be removed from the platform, turned on its side and observed for any evidence of leakage. If failure (leakage) occurs, the vibration test must be repeated on three additional drums without any leakage of contents. Failure of any one of the three additional drums disqualifies that size or design from this specification until design qualification tests have been successfully repeated.

(3) *Static compression test.* Two drums must be filled and closed as for use as required in § 178.16-13(a)(1) and conditioned so that drums and contents are at a temperature of 130°F. or higher at the start of each compression test. The two drums of identical capacity, stacked two high, must withstand a static compression test applied evenly for 48 hours to the top rim of the top drum without buckling of the side walls or leakage. The compression weight load to be applied must be the greater of 300 pounds or the volume in gallons of one drum times 85 pounds. Total top to bottom deflection of both drums may not exceed one inch. At the conclusion of the 48-hour test period, each drum must be turned on its side and observed for any evidence of leakage. If leakage occurs, or deflection exceeds the limits established above, the drum size or design is disqualified from this specification until design qualification tests have been successfully repeated.

(4) *Reports and records.* The manufacturer shall prepare a report on the tests prescribed in paragraphs (a)(1), (a)(2), and (a)(3) of this section and shall retain the report on the results of these tests for at least two years from the date of tests. A copy of these reports must be retained by the manufacturer at each producing plant.

§ 178.16-16 Periodic testing. (a) At least one sample of each size and design of drum must be drop tested at each production plant from every 10,000 drums produced by each molding machine. As an alternative, the drop tests may be conducted once every 24 hours of uninterrupted production from each machine or at the resumption of production from a machine after shut down for one hour or more. No one drum will be expected to withstand more than one drop. Product leakage from drum in any of the following tests will constitute a failure. Tests must be as follows:

(1) One drum, filled and closed as for use as provided in § 178.16-13(a)(1), must be dropped onto solid concrete from a height of four feet diagonally on its top chime or edge.

(2) One drum, filled and closed as for use as provided in § 178.16-13(a)(1), must be dropped onto solid concrete from a height of four feet flat on its side. The drum must be oriented to impact on bail ear.

(b) Failure of drum when tested as described above disqualifies that size or design from this specification until design qualification tests (§ 178.16-13) have been repeated successfully.

§ 178.16-19 Markings. (a) The markings required by this section must be legible, in characters at least ½-inch in height, and embossed on the bottom of each drum. The marking requirements of § 173.24 of this subchapter, with the exception of paragraph (c)(1)(ii), are applicable.

(b) The markings must be as follows:

(1) DOT-35-*; star to be replaced by maximum allowable gross weight in pounds (for example, DOT-35-50).

(2) "NRC" located near the DOT mark to indicate "non-reusable container."

(3) Month and year of manufacture, for example, DOT-35-20-2/74, to indicate the drum specification, maximum allowable gross weight, and that the drum was manufactured in February 1974.

(4) Registration number (M * * *) of the manufacturer.

(c) A packaging may not be marked with the specification identification "DOT-35" unless:

(1) It was manufactured in compliance with the requirements of this section, and

(2) Its manufacturer has a registration number (M * * *) from the Office of Hazardous Materials Transportation, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

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§ 178.17 Specification 1M; non-reusable glass carboy in non-reusable expanded polystyrene packaging.

§ 178.17-1 General requirements. (a) Compliance is required in all details.

(b) Each glass carboy must fit snugly in its expanded polystyrene packaging.

(c) The glass carboy and expanded polystyrene packaging may not be used again after contents have been removed.

(d) A Specification 1D (§ 178.4 of this subchapter) glass carboy manufactured prior to January 1, 1979 may be used in place of the carboy described in this section, but the Specification 1D carboy must be previously unused and may not be subsequently reused after contents have been removed.

§ 178.17-2 Capacity. Carboy may not exceed 6.5 United States gallons nominal capacity, 7.0 United States gallons overflow, tolerance plus or minus 10 fluid ounces.

§ 178.17-3 Construction requirements.

(a) Glass carboy:

(1) Each carboy must be machine blown with threads in the neck of the glass carboy for closing by a screw cap.

(2) Each carboy must be annealed and have a real temper not greater than 5.

(3) The weight of each carboy must be 14 pounds or greater with a tolerance of minus eight ounces.

(b) Expanded polystyrene packaging:

(1) Expandable polystyrene must be molded to form a protective outside packaging.

(2) This packaging must consist of a top and bottom section which interlock. Each section must be molded with a cavity to maintain a snug fit with the carboy.

(3) The density of the expanded polystyrene may be no less than 1.7 pounds per cubic foot, and no greater than 2.0 pounds per cubic foot.

(4) The minimum thickness of the expanded polystyrene must be 1 inch.

§ 178.17-4 Closure.

(a) Glass carboy:

(1) A gasketed or lined threaded screw cap is required. A vented closure must be provided when prescribed in Part 173 of this subchapter.

(b) Expanded polystyrene packaging:

(1) Except as provided in paragraph (b)(2) of this section, weather resistant, pressure sensitive cloth or other suitable tape must be circumferentially applied at the mating areas of the top and bottom section to prevent separation. The tape must be at least 2½ inches in width and have a tensile strength of not less than 50 pounds per inch of width. Tape must overlap both top and bottom sections circumferentially by not less than one inch. Tape ends must overlap a minimum of three inches.

(2) The two-section expanded polystyrene packaging may be closed for shipment by means of one or more vertical non-metallic straps of at least ½ inch in width and having a tensile strength of not less than 600 pounds.

§ 178.17-5 Tests.

(a) Glass carboy

(1) **Annealing test.** After annealing, each glass carboy must have a real temper no greater than 5, when examined in accordance with the American Society for Testing and Materials publication ASTM C148-77, Method A. One carboy must be taken from each side row and one carboy from a center row of the annealing lehr at least every three hours during manufacture, and examined for temper number. If during polariscopic examination, it is determined that any carboy in a certain row has a real temper greater than 5, all carboys within that row must either be rejected or re-annealed to comply with the prescribed test specification. Production back to the last approved examination must be quarantined, resampled and examined in accordance with the prescribed test procedure, after which production may be released if in conformance, or re-annealed to comply, or rejected.

(2) **Weight test.** Each day one carboy randomly selected from each mold must be weighed. If it fails to meet the weight requirement of §178.17-3(a)(3), production back to the last successful weight test from that mold must be quarantined and tested for weight or rejected. Non-conforming carboys must be rejected.

(3) **Hydrostatic pressure test.** One carboy must be taken from each mold at least every eight hours during manufacture and subjected to a minimum internal hydrostatic pressure of 40 p.s.i.g. instantaneous or 13 p.s.i.g. for one minute. If a carboy from any mold breaks when subjected to the minimum internal pressure, four additional carboys from the same mold must be tested. If one or more of the four additional carboys breaks, all carboys from that mold produced since the last successful pressure test must be quarantined and tested for compliance or rejected.

(4) **Reports and records.** The manufacturer of the glass carboy or a person who performs these tests for the manufacturer must prepare a report on the test prescribed in paragraphs (a)(1), (2), and (3) of this section. The manufacturer of the glass carboy must retain the report on the results of each test for at least three years following the date of the test. These reports must be available for examination by representatives of the Department.

(b) Expanded polystyrene packaging:

(1) **Drop test.** Randomly selected samples of completed packages, with carboys filled with water to capacity and closed as for shipment, must be subjected to drop tests onto an unyielding surface. A minimum of six packages must be tested, each not required to be subjected to more than one drop. A complete test cycle consists of the following:

(i) Two units dropped flat on bottom from a height of four feet;

(ii) Two units dropped flat on side from a height of four feet; and,

(iii) Two units dropped flat on top from a height of four feet.

(2) **Results and testing frequency.** Each package in one test cycle must pass the test without leakage from or breakage of the glass carboy. If any package fails, the condition causing failure must be determined and corrected and additional testing conducted until a successful test cycle is obtained. Testing must be performed as follows:

(i) At the start of initial production from each mold, and upon any change in source of resin, type of resin, or process method. Tests must also be performed when any component or the design of the packaging is changed. Production may not commence until test requirements have been satisfied.

(ii) Periodically, at least every four months. If periodic testing indicates a packaging defect, packagings on hand produced subsequent to the last successful test date must be examined by appropriate means, and rejected if found defective. Users of the packagings must be advised of defects in packagings released prior to an unsuccessful test. Production may not commence until test requirements have been satisfied.

(3) **Records and testing responsibility.** The manufacturer of the expanded polystyrene packaging, or a person who performs these tests for the manufacturer, must conduct the testing prescribed in paragraphs (b)(1) and (b)(2) of this section and prepare a report on the test results. Reports must be retained by the manufacturer of the expanded polystyrene for three years from the date of test. Reports must be available for examination by representatives of the Department of Transportation.

§ 178.17-6 Markings.

(a) The marking required by this section must be legible and in characters at least one inch in height. Sections 173.24(c)(1)(ii) and (iv) do not apply to the glass carboy and expanded polystyrene packaging. The marking provisions of §172.312 apply.

(b) No person may mark any carboy or any expanded polystyrene packaging with the specification identification "DOT-1M" unless:

(1) The carboy or expanded polystyrene packaging is manufactured in compliance with this specification, and

(2) The manufacturer has a registration number (M****) from the Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

(c) Except for Specification 1D glass carboys marked in accordance with §178.4-4, the following markings must be embossed on the bottom of each carboy:

(1) DOT-1M;

(2) NRC;

(3) Year of manufacture; and

(4) Registration number (M****) of the manufacturer.

(d) The following markings must be embossed on the bottom of each expanded polystyrene packaging:

(1) DOT-1M;

(2) NRC;

(3) Year of manufacture; and

(4) Registration number (M****) of the manufacturer.

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§ 178.18 [Reserved]

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§ 178.19 Specification 34; reusable molded polyethylene drum for use without overpack. Removable head not authorized.

§ 178.19-1 Compliance. (a) Required in all details.

(b) Each drum must be capable of withstanding the performance tests prescribed in §178.19-7 without failure.

§ 178.19-2 Material. (a) Drums shall be made of a polyethylene resin which has not been used previously. Regrind from the same production process may be used.

(b) Ultraviolet light protection shall be provided by impregnation of polyethylene with carbon black or other equally efficient pigments or inhibitors. These additives shall be compatible with lading and retain their effectiveness for the life of the drum.

(c) Other materials may be added provided they do not adversely affect the structural integrity of the drum.

§ 178.19-3 Construction and capacity. (a) Container must be constructed in accordance with the following table:

Marked (rated) capacity not over (gallons)	Minimum thickness (inches) measured on any point of container
2½ thru 6½	0.045
15	075
55	.125[2]

[1] Minimum actual capacity shall not be less than rated capacity plus 4 percent. Maximum actual capacity shall not be greater than rated capacity plus 15 percent for containers up to 15 gallons and shall not be greater than rated capacity plus 10 percent for containers 15 gallons and over.

[2] A minimum thickness of 0.090 inch is authorized in corners and undercuts.

§ 178.19-4 Closure. (a) Openings shall not exceed 2.7 inches in diameter.

(b) Closures shall be of material resistant to lading and adequate to prevent leakage under tests prescribed in § 178.19-7 and under conditions incident to transportation.

(c) Vented closures where specified in Part 173 are authorized.

§ 178.19-5 Defective containers. (a) Containers with repaired bodies not authorized.

§ 178.19-6 Marking. (a) Each container must be permanently marked by embossment in letters and figures at least ½ inch in size as follows:

(1) DOT-34**; stars to be replaced by the rated capacity of the container (for example, DOT-34-5).

(2) Month and year of manufacture. For example, DOT-34-5-6 65 to indicate a container of 5 gallons capacity made in June 1965.

(3) Name or symbol of person making the marks specified in paragraphs (a)(1) and (a)(2) of this section and located just above or below those marks. Symbol, if used, must be registered with the Director, OHMT.

§ 178.19-7 Tests. (a) At least three samples taken at random, filled and prepared as specified and closed as for use, shall be capable of withstanding the tests in subparagraphs (1), (2) and (3) of this paragraph without leakage. These tests shall be performed at the start of initial production and at four-month intervals and shall be repeated on any change of type, size, materials, or process method. No single container shall be expected to withstand more than one of the following tests:

(1) The container filled to 98 percent capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge or any part constructed to a lesser strength.

(2) The container filled to 98 percent capacity with a solution compatible with polyethylene and which remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F. Filled container shall be stored at 0° F. or lower temperature for at least 4 hours immediately preceding test.

(3) The container shall be tested by retaining for five minutes hydrostatic pressure of at least fifteen pounds per square inch at equilibrium without showing pressure drop or evidence of leakage.

(b) At least three containers taken at random from each continuous production lot of no more than 1,000 containers of each given type and size shall withstand without leakage or failure the test prescribed in § 178.19-7(a)(2).

(c) At least three containers of each size and type taken at random at start of initial production, and upon any change in materials, design, or process method shall withstand without failure or leakage the following tests. No single container shall be expected to withstand more than one test:

(1) The container filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using a vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

(2) The container filled to 98 percent capacity with water shall withstand the following static compression test without buckling of the side walls sufficient to cause damage, but in no case shall the maximum top to bottom deflection be more than one inch. Compression shall be applied to the load bearing areas of the top of the container for a period of not less than 48 hours.

Marked (rated) capacity not over (gallons)	Compression weight load pounds
2½ thru 6½	600
15	1200
30	1800
55	2400

(d) Records of test results to be maintained in current status and retained by each manufacturer at each producing plant.

SUBPART B

SPECIFICATIONS FOR INSIDE CONTAINERS, AND LININGS

§ 178.20 [Reserved]

§ 178.21 Specification 2T; polyethylene containers.

§ 178.21-1 Compliance. (a) Required in all details.

(b) Each container must be capable of withstanding the performance tests prescribed in § 178.21-3 without failure.

§ 178.21-2 Capacity and marking of container. (a) Containers of 5 to 13 gallons capacity are covered by this specification. Actual capacity of the container must be the marked capacity plus 5 percent minimum.

(b) Each container must be permanently marked with figures and letters at least ¼ inch high to show:

(1) DOT-2T.

(2) Name or symbol of person making the mark specified in paragraph (b)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.

(3) Month and year of manufacture.

§ 178.21-3 Material. (a) Containers shall be made of polyethylene resin which has not been used previously. Regrind from the same production process may be used.

(1) Container must have a minimum weight and wall thickness in accordance with the following table:

Marked capacity not over (gallons)	Minimum wall thickness (inch)	Minimum weight of container (pounds)
5	0.0625	3
6½	.0625	4
13	.0625	8

(b) Closing device shall be of material resistant to the lading and adequate to prevent leakage and not over 3½ inches in diameter.

(c) **Tests.** Samples taken at random, empty or filled, and prepared as specified and closed as for use, shall be capable of withstanding the following tests without breakage or leakage:

(1) Empty container shall be dropped on any part from a height of 6 feet onto solid concrete, immediately after conditioning for at least 24 hours at 10° F.

(2) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge or any part considered weaker.

(3) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with a solution which is compatible with polyethylene and remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F.

(4) The polyethylene container in a prescribed outer specification container, as authorized in Part 173, filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

(d) Polyethylene container must fit snugly in outside container.

§ 178.22 Specification 2C; inside containers, corrugated fiberboard cartons.

§ 178.22-1 Construction. (a) To be of double-wall board, 275 pound strength, or 2 thicknesses of double-faced board, 175-pound strength, Mullen or Cady test; sides or linings to be 1-piece with joint cloth-taped.

§ 178.22-2 Outside container. (a) Outside container must be lined throughout with, and cartons separated by, double-wall corrugated fiberboard of 275-pound strength, Mullen or Cady test.

§ 178.23 Specification 2D; inside containers, duplex paper bags.

§ 178.23-1 Construction. (a) Bags to be at least 2 thicknesses of shipping sack Kraft paper, or equivalent, and as follows:

Maximum weight of contents (pounds)	Minimum [1] weight (per 500 sheets 24" × 36")	
	One sheet	Other sheet
	Weight [1] (pounds)	Weight 1 (pounds)
2	30	30
6	50	40
12	60	50
25	70	60

[1] Weight 15 percent less authorized for rope paper containing 35 percent or more of manila rope fiber.

§ 178.23-2 Test. (a) Bags, filled and closed as for shipment, must be able to withstand drop of 4 feet onto concrete without rupture or sifting, except that 2-foot drop is acceptable for bags to contain 25 pounds.

§ 178.24 Specification 2U; molded or thermoformed polyethylene containers. Removable head containers or containers fabricated from film not authorized.

§ 178.24-1 General requirements. (a) Compliance is required in all details.
(b) Removable head containers and containers fabricated from film are not authorized.
(c) Each container must be capable of withstanding the performance tests prescribed in § 178.24-7 without failure.

§ 178.24-2 Material. (a) Containers shall be made of polyethylene resin which has not been used previously. Regrind from the same production process may be used.

§ 178.24-3 Construction and capacity. (a) Container must be constructed in accordance with the following table:

Rated capacity not over (gallons)	Minimum overall thickness (inch)[1]	Percent outage over marked capacity permitted
5	0.010	15
15	0.015	15
55	0.015	5

[1] For cubical containers, the area adjacent to and forming the opening for closure may have a minimum thickness of 0.008 inch for 5 gallons rated capacity and sizes larger than 5 gallons may have a minimum thickness of 0.010 inch.

(b) Polyethylene container must fit snugly in outside container.
(c) Minimum rated capacity is one gallon.

§ 178.24-4 Closure. (a) Shall be of material resistant to lading and adequate to prevent leakage. Vented closures where specified under Part 173 authorized. No opening over 2.7 inches in diameter authorized.

§ 178.24-5 Marking. (a) Each container must be permanently marked by embossment in figure and letters at least ¼ inch in size to show:
(1) DOT-2U.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.
(3) Month and year of manufacture.
(4) Rated capacity.

§ 178.24-7 Tests. (a) Samples taken at random must withstand prescribed tests without breakage or leakage. Tests must be made on each type and size produced at each manufacturing location starting production and repeated each four months. The type tests are as follows:
(1) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge or any part considered weaker.
(2) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with a solution which is compatible with polyethylene and remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F.
(3) The polyethylene container in a prescribed outer specification container, as authorized in Part 173, filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

§ 178.24a Specification 2E; Inside polyethylene bottle.

§ 178.24a-1 General requirements. (a) Each bottle must meet the applicable requirements of § 173.24.

§ 178.24a-2 Rated capacity. (a) Maximum capacity not to exceed 5 quarts.

§ 178.24a-3 Materials of construction. (a) Each bottle shall be made of a blow-molding grade of polyethylene resin which has not been used previously (except for regrind from the same production process) and shall be constructed so that it will maintain its shape when standing empty and open.
(b) Wall thickness must not be less than 0.008 inch (0.2 millimeters).

§ 178.24a-4 Closure. (a) Closing devices must provide a tight seal. Vented closures are not authorized unless otherwise provided for in Part 173.

§ 178.24a-5 Tests. (a) Each bottle must be capable of withstanding the prescribed tests without breaking or leaking.
(b) The test prescribed in paragraph (d)(1) of this section must be made on at least three random sample bottles for each 1,000 bottles produced by each blow-molding machine. The test must be performed at the start of initial production from each blow-molding machine and upon any change in type of polyethylene or process method.
(c) The test prescribed in paragraph (d)(2) of this section must be made at least once each month on a minimum of three random sample bottles produced and upon any change in type of polyethylene or process method.
(d) Prescribed test:
(1) The bottle, filled to 98 percent of capacity with water, must be dropped from a height of 4 feet onto a solid unyielding surface so as to drop diagonally on the top edge or any other part which is weaker.
(2) The bottle, filled to 98 percent of capacity with a liquid which is compatible with polyethylene and which is liquid at 0° F., must be dropped from a height of 4 feet onto a solid unyielding surface, on any part of the bottle. Immediately prior to the test, the bottle and its contents must have been at a temperature of 0° F. or lower for at least 24 hours.

§ 178.24a-6 Marking. (a) Marking must be as prescribed in § 173.24 of this subchapter, except as follows:
(1) Marking must be by embossment in at least ¼ inch figures for bottles of one quart or less capacity and at least ½ inch figures for bottles of more than one quart capacity as follows: "DOT2E", the minimum thickness of the polyethylene in thousandths of inches (mils), and the year of manufacture (e.g., DOT-2E 15-69).

§ 178.25 Specification 2F; Inside metal containers and liners.

§ 178.25-1 Construction. (a) Containers over 1-gallon capacity and all lining must be at least 30 gauge, United States standard (commercial 107-pound tin plate) and sealed leakproof.

§ 178.26 Specification 2G; Inside containers, fiber cans and boxes.

§ 178.26-1 Capacity, and thickness of metal and fiber. (a) Capacity not over 6 pounds, net. Metal tops, bottoms, and connections of suitable thickness are authorized. Minimum fiber thickness as follows:
(1) Up to ¼-pound size 0.021".
(2) Up to 1-pound size: 0.026".
(3) Up to 3-pound size: 0.036".
(4) Up to 6-pound size: 0.050", provided that 0.036" fiber heads with 130-pound strength[1] are authorized; or 0.028" with 175-pound strength[1]; or 0.035" with 90-pound strength[1], provided each container is wrapped with shipping sack Kraft paper of 60-pound base weight pasted thereon.

§ 178.27 Specification 2TL; Polyethylene container.

§ 178.27-1 Material requirements. (a) Containers shall be made of polyethylene resin which has not been used previously. Regrind from the same production process may be used.
(b) Each container must be capable of withstanding the performance test prescribed in §§ 178.27-3 and 178.27-4 without failure.

§ 178.27-2 Construction, capacity and marking. (a) Container must be constructed in accordance with the following table:

Marked capacity[1] not over (gallons)	Minimum wall thickness (inches)	Minimum weight of containers (pounds)
5	0.015	1
14	0.050	5½

[1] Actual capacity must be the marked capacity plus 5 percent minimum.

(b) Closure. Closure shall be of material resistant to lading and adequate to prevent leakage. Vented closures where specified under Part 173 authorized. No opening over 3½ inches in diameter authorized.

[1] Mullen or Cady test.

(c) Marking. Each container must be permanently marked in figures and letters at least ¼ inch in size to show:
(1) DOT-2TL.
(2) Name or symbol of person making the mark specified in paragraph (c)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.
(3) Month and year of manufacture.
(4) Rated (marked) capacity.
(d) Polyethylene container must fit snugly in outside container.

§ 178.27-3 Type test. (a) Samples taken at random must withstand prescribed test without breakage or leakage. Tests must be made on each type and size produced at each manufacturing location starting production and repeated each four months. Testing may be performed at a location other than the manufacturing location. The type test are as follows:
(1) Empty container shall be dropped on any part from a height of 6 feet onto solid concrete, immediately after conditioning for at least 24 hours at 0° F.

§ 178.27-4 Tests. (a) Samples taken at random, filled and prepared as specified and closed as for use, shall be capable of withstanding the following tests without leakage:
(1) The polyethylene container in a prescribed outer specification container as authorized by Part 173, filled to 98 percent capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge or on any part considered weaker.
(2) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent capacity with a solution which is compatible with polyethylene and remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F.
(3) The polyethylene container in a prescribed outer specification container, as authorized in Part 173, filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

§ 178.28 Specification 2J; inside containers, waterproof paper bags for linings.

§ 178.28-1 Material. (a) Two sheets of paper cemented together and creped to afford 25 percent stretch; paper to be shipping sack Kraft, 30 pounds per ream *500 sheets, 24" × 36"" before creping; total weight 90 pounds per ream.

§ 178.28-2 Test. (a) Material folded into cones and filled with water to depth of 2" 70° F. must not show water on outside within 24 hours.

§ 178.28-3 Construction. (a) Form to fit the outside container without stretching; seams and closures to afford a siftproof bag.

§ 178.29 Specification 2K; inside containers, paper bags or linings.

§ 178.29-1 Paper and construction. (a) Shipping sack Kraft paper, creped; at least 45 pounds per ream (500 sheets, 24" × 36" before creping.
(b) Construction. Form to fit the outside container without stretching; seams and closure to afford a siftproof bag.

§ 178.30 Specification 2L; for lining boxes.

§ 178.30-1 Box lining. (a) Box lining must be of strong parafined paper, or other suitable material, without joints or other openings at the bottom or at sides of box and shall fully protect contents in contact with top of box.
(b) Tensile strength of material must be at least 35 pounds with the grain and 17 pounds across grain, tested by direct pull on strips measuring 3" by 1". Average results of three or more tests with the grain and three or more across grain shall be used.
(c) Material shall be impervious to water and nitroglycerin at 77° F. Test for imperviousness shall consist of folding material into cones, loosely to avoid breakage at creases. Cones tested for nitroglycerin shall be filled to 1" depth; those for water to 2". No leakage of liquid shall occur during 24 hours' exposure.
(d) Material must transmit no oily or greasy stain to unglazed paper. Test shall consist of placing one thickness of material, with two thicknesses of unglazed paper on each side, in an oven at 104° F. for 24 hours, under pressure of a lead disk 1½" thick and of 10 pounds weight resting edgewise on the paper.
(e) Saturating paraffin, when used, shall have melting point of 125° F. or above. Test shall consist of extracting paraffin from 1 ounce or more of material with ether. After evaporation of all ether, paraffin shall be melted and poured upon the surface of water contained in a hemispherical dish approximately 3¼" in diameter. Dish shall be three-fourths full of water above melting point of paraffin. Thermometer shall be placed with bulb three-fourths immersed in center of dish. Water and paraffin shall be allowed to cool until paraffin upon the surface of water commences to solidify. Temperature shall then be read and recorded as melting point of paraffin.

§ 178.30-2 Bag. (a) Bag complying with requirements of paragraphs (b), (c), and (d) of this section also authorized.
(b) Material must be: 2 sheets of shipping sack Kraft paper joined by asphaltum, or equivalent; outer sheet at least 60 pounds and inner sheet at least 30 pounds per ream (500 sheets, 24" × 36""; inner sheet coated with wax, or equivalent, with melting point at least 125° F.; compliance with § 178.30-1(b) and (c) required.
(c) Seams must be pasted with adhesive not affected by nitroglycerin.
(d) Completed bag must be formed to fit outside container without undue strain and must be impervious to seepage of nitroglycerin.

§ 178.31 Specification 2M; waterproofed paper lining.

§ 178.31-1 Waterproofed paper. (a) Waterproofed paper for box lining must be strong, folded or constructed without joints or openings at sides, bottoms, or ends, and shall fully protect contents at top of box.

§ 178.32 Specification 2N; inside containers, metal cans.

§ 178.32-1 Size. (a) Not over 14-pounds water capacity (388 cubic inches).

§ 178.32-2 Material. Each can must be made of good quality tin plate with parts and dimensions in compliance with the requirements of the following table:

Maximum diameter of can	Minimum thickness of metal (inch)	
	In body	In heads
4¾6	0.01134 (107 pound tin plate)	0.01305 (128 pound tin plate)[1]
6¹¹⁄₁₆	0.01134 (107 pound tin plate)	0.01435 (143 pound tin plate)[2]
6¹¹⁄₁₆	0.01405 (135 lb. tin plate)	0.01405 (135 lb. tin plate)[3]

[1] The minimum thickness of metal in each head may be 107 lb. tin plate provided side seams are soldered and heads are attached to body sections by full double seams internally soldered.
[2] The minimum thickness of metal in each head may be 135 lb. tin plate provided side seams are soldered and heads are attached to body sections by full double seams internally soldered.
[3] Top heads must be attached to body sections by full double seams with durable seaming compound, and bottom heads must be attached to body sections by soldering.
Note 1: Because of the present emergency and until further order of the Department, the minimum thickness of metal in heads may be 1XL-107-pound tin plate or cans of not over 4¾6 inch diameter and 1XL-135-pound tin plate for cans of not over 6¹¹⁄₁₆ inches diameter, provided side seams are soldered and heads are attached to body by full double seams internally soldered.

§ 178.32-3 Manufacture. (a) Seams soldered or full double seam. Outside surface rustproofed by lacquer or equivalent.

§ 178.32-4 Test. (a) When closed as for shipment, must be capable of standing 40-pound interior pressure without leakage.

§ 178.33 Specification 2P; inside non-refillable metal containers.

§ 178.33-1 Compliance. (a) Required in all details.

§ 178.33-2 Type and size. (a) Single-trip inside containers. Must be seamless, or with seams, welded, soldered, brazed, double seamed, or swedged.
(b) The maximum capacity of containers in this class shall not exceed 50 cubic inches (27.7 fluid ounces). The maximum inside diameter shall not exceed 3 inches.

§ 178.33-3 Inspection. (a) By competent inspector.

§ 178.33-4 Duties of inspector. (a) To inspect material and completed containers and witness tests, and to reject defective materials or containers.

§ 178.33-5 Material. (a) Uniform quality steel plate such as black plate, electro-tin plate, hot dipped tin plate, tern plate or other

commercially accepted can making plate; or non-ferrous metal of uniform drawing quality.
(b) Material with seams, cracks, laminations or other injurious defects not authorized.

§ 178.33-6 Manufacture. (a) By appliances and methods that will assure uniformity of completed containers; dirt and scale to be removed as necessary; no defect acceptable that is likely to weaken the finished container appreciably; reasonably smooth and uniform surface finish required.
(b) Seams when used must be as follows:
(1) Circumferential seams: By welding, swedging, brazing, soldering, or double seaming.
(2) Side seams. By welding, brazing, or soldering.
(c) Ends. The ends shall be of pressure design.

§ 178.33-7 Wall thickness. (a) The minimum wall thickness for any container shall be 0.007 inch.

§ 178.33-8 Tests. (a) One out of each lot of 25,000 containers or less, successively produced per day shall be pressure tested to destruction and must not burst below 240 pounds per square inch gauge pressure. The container tested shall be complete with end assembled.
(b) Each such 25,000 containers or less, successively produced per day, shall constitute a lot and if the test container shall fail, the lot shall be rejected or ten additional containers may be selected at random and subjected to the test under which failure occurred. These containers shall be complete with ends assembled. Should any of the ten containers thus tested fail, the entire lot must be rejected. All containers constituting a lot shall be of like material, size, design, construction, finish and quality.

§ 178.33-9 Marking. (a) By means of printing, lithographing, embossing, or stamping, each container must be marked to show:
(1) DOT-2P.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.33a Specification 2Q; inside non-refillable metal containers.

§ 178.33a-1 Compliance. (a) Required in all details.

§ 178.33a-2 Type and size. (a) Single-trip inside containers. Must be seamless, or with seams welded, soldered, brazed, double seamed, or swedged.
(b) The maximum capacity of containers in this class shall not exceed 55 cubic inches (30.5 fluid ounces). The maximum inside diameter shall not exceed 3 inches.

§ 178.33a-3 Inspection. (a) By competent inspector.

§ 178.33a-4 Duties of inspector. (a) To inspect material and completed containers and witness tests, and to reject defective materials or containers.

§ 178.33a-5 Material. (a) Uniform quality steel plate such as black plate, electrotin plate, hot dipped tinplate, tern plate or other commercially accepted can making plate; or nonferrous metal of uniform drawing quality.
(b) Material with seams, cracks, laminations or other injurious defects not authorized.

§ 178.33a-6 Manufacture. (a) By appliances and methods that will assure uniformity of completed containers; dirt and scale to be removed as necessary; no defect acceptable that is likely to weaken the finished container appreciably; reasonably smooth and uniform surface finish required.
(b) Seams when used must be as follows:
(1) Circumferential seams; by welding, swedging, brazing, soldering, or double seaming.
(2) Side seams. By welding, brazing or soldering.
(c) Ends. The ends shall be of pressure design.

§ 178.33a-7 Wall thickness. (a) The minimum wall thickness for any container shall be 0.008 inch.

§ 178.33a-8 Tests. (a) One out of each lot of 25,000 containers or less, successively produced per day, shall be pressure tested to destruction and must not burst below 270 pounds per square inch gauge pressure. The container tested shall be complete with end assembled.
(b) Each such 25,000 containers or less, successively produced per day, shall constitute a lot and if the test container shall fail, the lot shall be rejected or ten additional containers may be selected at random and subjected to the test under which failure occurred. These containers shall be complete with ends assembled. Should any of the ten containers thus tested fail, the entire lot must be rejected. All containers constituting a lot shall be of like material, size, design, construction, finish and quality.

§ 178.33a-9 Marking. (a) By means of printing, lithographing, embossing, or stamping, each container must be marked to show:
(1) DOT-2Q.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.34 Specification 2R; inside containment vessel.

§ 178.34-1 General Requirements. (a) Each vessel must be made of stainless steel, malleable iron, or brass, or other material having equivalent physical strength and fire resistance.
(b) Each vessel must meet all of the applicable requirements of § 173.24(c) and (d) of this subchapter. Letters and numerals at least 6 millimeters (¼-inch) in height are authorized for the marking of a vessel not exceeding 5 centimeters (2 inches) inside diameter.

§ 178.34-2 Manufacture. (a) The ends of the vessel must be fitted with screw-type closures or flanges (see § 178.34-4), except that one or both ends of the vessel may be permanently closed by a welded or brazed plate. Welded or brazed side seams are authorized.
(b) Welding or brazing must be done in a workmanlike manner and must be free from defects.

§ 178.34-3 Dimensions. (a) The inside diameter of the vessel may not exceed 30 centimeters (12 inches) exclusive of flanges for handling or fastening devices and must have wall thickness and length in accordance with the following:

Inside diameter maximum		Wall thickness minimum			Length maximum	
		Threaded closure		Flanged closure		
Inches	Centimeters	Inches	Millimeters		Inches	Centimeters
2	5	3/32	2.5	Not less than that prescribed for schedule 40 pipe	16	41
6	15	1/8	3.2		72	183
12	30	1/4	6.5		72	183

§ 178.34-4 Closure devices. (a) Each closure device must be as follows:
(1) Screw-type cap or plug; number of threads per inch must not be less than United States standard pipe threads and must have sufficient length of thread to engage at least 5 threads when securely tightened. Pipe threads must be lited with an appropriate nonhardening compound which must be capable of withstanding up to 149° C. (300° F) without loss of efficiency. Tightening torque must be adequate to maintain leak tightness with the specific luting compound.
(2) An opening may be closed by a securely bolted flange and leaktight gasket. Each flange must be welded or brazed to the body of the 2R vessel per (ANSI) Standard B16.5 or (AWWA) Standard C207-55, section 10. A torque wrench must be used in securing the flange with a corresponding torque of no more than twice the force necessary to seal the selected gasket. Gasket material must be capable of withstanding up to 149° C. (300° F) without loss of efficiency. The flange, whether of ferrous or non-ferrous metal, must be constructed from the same metal as the vessel and must meet the dimensional and fabrication specifications for welded construction as follows:
(i) Pipe flanges described in Tables 13, 14, 16, 17, 19, 20, 22, 23, 25, and 26 of ANSI B16.5.
(ii) For nominal pipe sizes 6, 8, 10, and 12 inches, AWWA Standard C207-55 Table 1, class B, may be used in place of the tables prescribed by paragraph (a)(2)(i) of this section.
(iii) Sizes under 6 inches, nominal pipe size, the following table with the same configuration as illustrated in AWWA C207-55, Table I, class B, may be used in place of paragraph (a)(2)(i) of this section.

Nominal pipe size		Flange O.D.		Number of bolts	Bolt circle diameter		Diameter of bolts		Flange thickness	
Inches	Centimeters	Inches	Centimeters		Inches	Centimeters	Inches	Centimeters	Inches	Centimeters
2	5	6	15	4	4¾	11.8	½	1.2	5/8	1.6
2½	6.2	7	17.5	4	5½	13.8	½	.....	5/8	.....
3	7.5	7½	18.8	4	6	15	½	.....	5/8	.....
3½	8.8	8½	21.3	8	7	17.5	½	.....	5/8	.....
4	10	9	22.5	8	7½	18.8	½	.....	5/8	.....
5	12.6	10	25.4	8	8½	21.3	½	.....	5/8	.....

(iv) Cast iron flanges prohibited.

§ 178.35 Specification 2S; polyethylene container.

§ 178.35-1 General requirements. (a) Compliance is required in all details.
(b) Removable head containers are not authorized.
(c) Each container must be capable of withstanding the performance test prescribed in § 178.35-5 without failure.

§ 178.35-2 Material requirements. (a) Containers shall be made of a polyethylene resin which has not been used previously. Regrind from the same production process may be used.

§ 178.35-3 Construction, capacity and marking. (a) Container must be constructed in accordance with the following table:

Marked capacity not over (gallons)[1]	Maximum capacity (gallons)	Minimum thickness: Side wall and heads (inches)[2]	Minimum weight (pounds)
5	6	0.0625	1.4
13.5	14.5	0.0625	3.25
15	16	0.0625	3.5
30	32	0.0625	5.5
55	58	0.0625	9.0

[1] Marked capacity shall be minimum capacity
[2] Side openings are not authorized

(b) Marking. Each container must be permanently marked with figures and letters at least ¼ inch in size to show:
(1) DOT-2S.
(2) Name or symbol of person making the mark specified in paragraph (b)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.
(3) Month and year of manufacture.
(4) Minimum capacity.
(c) Polyethylene container must fit snugly in outside container.

§ 178.35-4 Closures. (a) Closing devices must be of screw thread type or fastened by positive means and be of material resistant to the lading and adequate to prevent leakage.
(b) Openings over 2.3 inches in diameter not permitted.

§ 178.35-5 Tests. (a) Samples taken at random, empty or filled, and prepared as specified and closed as for use, shall be capable of withstanding the following tests without breakage or leakage:
(1) Empty container shall be dropped on any part from a height of 6 feet onto solid concrete, immediately after conditioning for at least 24 hours at 0° F.
(2) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge of any part considered weaker.
(3) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with a solution which is compatible with polyethylene and remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F.
(4) The polyethylene container in a prescribed outer specification container, as authorized in Part 173, filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

§ 178.35a Specification 2SL; molded or thermoformed polyethylene container.

§ 178.35a-1 General requirements. (a) Compliance is required in all details.
(b) Removable head containers and containers fabricated from film are not authorized.
(c) Each container must be capable of withstanding the performance tests prescribed in §§ 178.35a-3 and 178.35a-4 without failure.
(d) Containers shall be made of polyethylene resin which has not been used previously. Regrind from same production process may be used.

§ 178.35a-2 Construction, capacity and marking. (a) Container must be constructed in accordance with the following table:

Marked capacity not over (gallons)[1]	Maximum capacity (gallons)	Minimum thickness: Side wall and heads (inches)[2]	Minimum weight (pounds)
13.5	14.5	0.030	2.0
15	15.0	0.030	2.25
30	32	0.030	3.25
55	58	0.040	5.0

[1] Marked (actual) capacity shall be minimum capacity
[2] Side openings are not authorized

(b) Closure. Closure shall be of material resistant to lading and adequate to prevent leakage. Vented closures where specified under Part 173 are authorized. No opening over 2.3 inches in diameter authorized.
(c) Markings. Each container must be permanently marked with the figures and letters at least ¼ inch in size to show:
(1) DOT-2SL.
(2) Name or symbol of person making the mark specified in paragraph (c)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.
(3) Month and year of manufacture.
(4) Minimum capacity.
(d) Polyethylene container must fit snugly in outside container.

§ 178.35a-3 Type test. (a) Samples taken at random must withstand prescribed tests without breakage or leakage. Test must be made on each type and size produced at each manufacturing location starting production and repeated each four months. Testing may be performed at a location other than the manufacturing location. The type test is as follows:
(1) Empty container shall be dropped on any part from a height of 6 feet onto solid concrete immediately after conditioning for at least 24 hours at 0° F.

§ 178.35a-4 Tests. (a) Samples taken at random, filled and prepared as specified and closed as for use, shall be capable of withstanding the following tests without leakage:
(1) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with water shall be dropped from a height of 4 feet onto solid concrete so as to drop diagonally on top edge or any part considered weaker.
(2) The polyethylene container in a prescribed outer specification container, as authorized by Part 173, filled to 98 percent of capacity with a solution which is compatible with polyethylene and remains liquid at 0° F. shall be dropped from a height of 4 feet onto solid concrete on any part of the container when container and contents are at or slightly below 0° F.
(3) The polyethylene container in a prescribed outer specification container, as authorized in Part 173, filled to 98 percent of capacity with water shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

SUBPART C

SPECIFICATIONS FOR CYLINDERS

§ 178.36 SPECIFICATION 3A; SEAMLESS STEEL CYLINDERS OR 3AX SEAMLESS STEEL CYLINDERS OF CAPACITY OVER 1,000 POUNDS WATER VOLUME.

§ 178.36-1 Compliance. (a) Required in all details.

§ 178.36-2 Type, size and service pressure.[1] (a) DOT-3A; seamless, not over 1,000 pounds water capacity (nominal) and service pressure at least 150 pounds per square inch.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder; for example, DOT-3A2000 indicates the service pressure as 2,000 pounds per square inch.

(b) DOT-3AX; seamless, not less than 1,000 pounds water capacity and service pressure at least 500 pounds per square inch. Cylinders shall meet the following additional conditions:

(1) Assuming the cylinder to be supported horizontally at its two ends only and to be uniformly loaded over its entire length consisting of the weight per unit of length of the straight cylindrical portion filled with water and compressed to the specified test pressure; the sum of two times the maximum tensile stress in the bottom fibers due to bending (Note 1), plus that in the same fibers longitudinal stress (Note 2), due to hydrostatic test shall not exceed 80 percent of the minimum yield strength of the steel at such maximum stress. Wall thickness shall be increased when necessary to meet the requirement.

Note 1: To calculate the maximum tensile stress due to bending the following formula shall be used

$$S = \frac{Mc}{I}$$

Note 2: To calculate the maximum longitudinal tensile stress due to hydrostatic test pressure, the following formula shall be used

$$S = \frac{A_v P}{A_s}$$

where

S = tensile stress—psi;
M = bending moment—inch pounds $\frac{wl^2}{8}$;
w = weight per inch of cylinder filled with water,
l = length of cylinder—inches,
c = radius $\frac{(D)}{(2)}$ of cylinder—inches,
I = moment of inertia 0.04909 (D^4—d^4) inches fourth,
D = outside diameter—inches,
d = inside diameter—inches,
A_v = internal area in cross section of cylinder—square inches,
A_s = area of metal in cross section of cylinder—square inches,
P = hydrostatic test pressure—psi

§ 178.36-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT in accordance with § 173.300(b) of this subchapter.

§ 178.36-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after parting and shown to be free from pipe, cracks, excessive segregation and other injurious defects.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.36-5 Steel. (a) Open-hearth or electric steel of uniform quality. Content percent for the following not over: Carbon, 0.55; phosphorus, 0.045; sulphur, 0.050.

§ 178.36-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.36-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.36-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no fissure or other defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. If not originally free from such defects, the surface may be machined or otherwise treated to eliminate these defects. The thickness of the bottoms of cylinders welded or formed by spinning is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thickness to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

§ 178.36-9 Welding or brazing. (a) Welding or brazing for any purpose whatsoever is prohibited except as follows: (1) Welding or brazing is authorized for the attachment of neckrings and footrings which are non-pressure parts, and only to the tops and bottoms of cylinders having a service pressure of 500 pounds per square inch or less. Cylinders, neckrings, and footrings must be made of weldable steel, carbon content of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure. (2) As permitted in § 178.36-8(a).

Note 1: Cylinders used solely in anhydrous ammonia service may have a ½ inch diameter bar welded within their concave bottoms in accordance with the foregoing requirements.

§ 178.36-10 Wall thickness. (a) For cylinders with service pressure less than 900 pounds the wall stress shall not exceed 24,000 pounds per square inch. Minimum wall 0.100" for any cylinder over 5" outside diameter.

(b) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where

S = wall stress in pounds per square inch,
P = minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater,
D = outside diameter in inches,
d = inside diameter in inches.

§ 178.36-11 Heat treatment. (a) The completed cylinders must be uniformly and properly heat-treated prior to test.

§ 178.36-12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used to be of length not less than as specified for American Standard taper pipe threads.

(c) Straight threads having at least 6 engaged threads are authorized; to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.36-13 Safety devices and protection for valves safety devices, and other connections if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g).

§ 178.36-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent of 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the offical test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each cylinder must be tested to at least ⅗ times service pressure.

§ 178.36-15 Flattening test. Between knife edges, wedge shaped 60° angle, rounded to ½" radius; test 1 cylinder,[1] taken at random out of each lot of 200 or less cylinders. Longitudinal axis of the cylinder must be at approximately a 90-degree angle to knife edges.

§ 178.36-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches; provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16-inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical test detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "off set" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

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[1] For lots of 30 or less, physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

For explanation of abbreviations and reference marks, see last page of this tariff.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.36-17 Acceptable results for physical and flattening tests. (a) Either of the following:

(1) Elongation at least 40 percent for 2-inch gauge length or at least 20 percent in other cases; yield strength not over 73 percent of tensile strength; flattening test not required.

(2) Elongation at least 20 percent for 2-inch gauge length or 10 percent in other cases; yield strength not over 73 percent of tensile strength; flattening required, without cracking, to 6 times wall thickness.

§ 178.36-18 Leakage test. (a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least ¼ of the total area of the bottom but not less than ⅜ inch in diameter, including the closure, for at least 1 minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See Note 1 to § 178.36-19.)

Note 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable, around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.36-19 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

Note 1: Spun cylinders rejected under the provisions of § 178.36-18 may be removed from the spun cylinder category by drilling to remove defective material, tapping and plugging.

§ 178.36-20 Marking. (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, or neck as follows:

(1) When cylinders are constructed to § 178.36-2(a), they shall be marked DOT-3A followed by the service pressure (for example, DOT-3A1800, etc.)

(2) When cylinders are constructed to § 178.36-2(b), they shall be marked DOT-3AX followed by the service pressure (for example, DOT-3AX1800, etc.).

(3) A serial[2] number and an identifying symbol (letters); location[3] of number to be just below or immediately following the DOT mark; location[3] of symbol to just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-3A1800 1234 XY — DOT-3A1800-1234 XY

(4) Inspector's offical mark near serial number; date of test (such as 5-50 for May 1950), so placed that dates of subsequent tests can be easily added, and word "SPUN" or "PLUG" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process, or effected by plugging.

§ 178.36-21 Size of marks. (a) At least ¼" high if space permits.

§ 178.36-22 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....

(Date) .....

Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size .....

[WO] inches outside diameter by ..... inches long

Marks stamped into the shoulder of the cylinder are:

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks (if any) .....

These cylinders were made by process of .....

.....

.....

The ..... permitted in § 178.36-9
(heckings—botings)

were attached by process of .....
(welding—brazing)

The material used was identified by the following .....
(heat purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto.

The heat numbers .....
(were—were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends; all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness ..... noted was inch. The outside diameter was determined by ..... a close approximation to be inches. The wall stress was ..... calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-3A were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3A except as follows:

Exceptions .....

.....

.....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	....	....	....	....	....	....	.....
.....	.....	.....	.....	....	....	....	....	....	....	.....
.....	.....	.....	.....	....	....	....	....	....	....	.....
.....	.....	.....	.....	....	....	....	....	....	....	.....

[1] For lots of 30 or less, physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

[2] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 60 cubic inches.

[3] Symbol in front of or following the number with ample space between is authorized. Other variation in location authorized only when necessitated by lack of space.

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.36-23 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

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§ 178.37 Specification 3AA; seamless steel cylinders made of definitely prescribed steels or 3AAX; seamless steel cylinders made of definitely prescribed steels of capacity over 1,000 pounds water volume.

§ 178.37-1 Compliance. (a) Required in all details.

§ 178.37-2 Type, size and service pressure.[1] (a) DOT-3AA; seamless, not over 1,000 pounds water capacity (nominal) and service pressure at least 150 pounds per square inch.

(b) DOT-3AAX; seamless, not less than 1,000 pounds water capacity and service pressure at least 500 pounds per square inch. Cylinders shall meet the following additional conditions:

(1) Assuming the cylinder to be supported horizontally at its two ends only and to be uniformly loaded over its entire length consisting of the weight per unit of length of the straight cylindrical portion filled with water and compressed to the specified test pressure; the sum of two times the maximum tensile stress in the bottom fibers due to bending (Note 1), plus that in the same fibers (longitudinal stress) (Note 2), due to hydrostatic test shall not exceed 80 percent of the minimum yield strength of the steel at such maximum stress. Wall thickness shall be increased when necessary to meet the requirement.

where

S = tensile stress—psi.

M = bending moment—inch pounds $\left(\frac{wl^2}{8}\right)$.

w = weight per inch of cylinder filled with water.

l = length of cylinder—inches.

c = radius $\left(\frac{D}{2}\right)$ of cylinder—inches.

I = moment of inertia $0.04909\,(D^4-d^4)$ inches fourth.

D = outside diameter—inches.

d = inside diameter—inches.

A_1 = internal area in cross section of cylinder—square inches.

A_2 = area of metal in cross section of cylinder—square inches.

P = hydrostatic test pressure—psi.

§ 178.37-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.37-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after parting and shown to be free from pipe, cracks, excessive segregation and other injurious defects.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.37-5 Authorized steel. (a) Open-hearth, basic oxygen, or electric steel of uniform quality. The following chemical analyses are authorized (see note 1):

Designation	4130X (percent) (see note 2)	NE-8630 (percent) (see note 2)	9115 (percent) (see note 2)	9125 (percent) (see note 2)	Carbon-boron steel (percent) (see par. b)	Intermediate manganese (percent)
Carbon	0.25-0.35	0.28-0.33	0.10-0.20	0.20-0.30	0.27-0.37	0.40 max.
Manganese	0.40-0.90	0.70-0.90	0.50-0.75	0.50-0.75	0.80-1.40	1.35-1.65
Phosphorus	0.04 max.	0.04 max.	0.04 max.	0.04 max.	0.035 max.	0.04 max.
Sulphur	0.05 max.	0.04 max.	0.04 max.	0.04 max.	0.045 max.	0.05 max.
Silicon	0.15-0.35	0.20-0.35	0.60-0.90	0.60-0.90	0.3 max.	0.10-0.30
Chromium	0.80-1.10	0.40-0.60	0.50-0.65	0.50-0.65	.....	.....
Molybdenum	0.15-0.25	0.15-0.25	.....	.....	.....	.....
Zirconium	.....	.....	0.05-0.15	0.05-0.15	.....	.....
Nickel	.....	0.40-0.70	.....	.....	.....	.....
Boron	.....	.....	.....	.....	0.0005-0.003	.....

Designation	9115X (percent) (see note 2)	9125X (percent) (see note 2)	Intermediate manganese (percent)
Carbon	0.10-0.20	0.20-0.30	0.40 max.
Manganese	0.50-0.75	0.50-0.75	1.35-1.65
Phosphorus	0.04 max.	0.04 max.	0.04 max.
Sulphur	0.04 max.	0.04 max.	0.05 max.
Silicon	0.60-0.90	0.60-0.90	0.10-0.30
Chromium	0.50-0.65	0.50-0.65	.....
Molybdenum	0.10-0.20	0.10-0.20	.....
Zirconium	0.05-0.15	0.05-0.15	.....
Nickel	.....	.....	.....

Note 1: A heat of steel made under the above specifications check chemical analysis of which is slightly out of the specified range, is acceptable, if satisfactory in all other respects, provided the tolerances shown in the following tables are not exceeded.

Note 2—This designation shall not be restrictive and the commercial steel is limited in analysis as shown in the table.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-3AA2000 indicates the service pressure as 2,000 pounds per square inch.

CHECK ANALYSIS TOLERANCES

Element	Limit or maximum specified (percent)	Tolerance (percent) over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	To 0.15 incl.	0.02	0.03
	Over 0.15 to 0.40 incl.	0.03	0.04
Manganese	To 0.60 incl.	0.03	0.03
	Over 0.60 to 1.15 incl.	0.04	0.04
	Over 1.15 to 2.50 incl.	0.05	0.05
Phosphorus[1]	All ranges		0.01
Sulphur	All ranges		0.01
Silicon	To 0.30 incl.	0.02	0.03
	Over 0.30 to 1.00 incl.	0.05	0.05
Nickel	To 1.00 incl.	0.03	0.03
Chromium	To 0.90 incl.	0.03	0.03
	Over 0.90 to 2.10 incl.	0.05	0.05
Molybdenum	To 0.20 incl.	0.01	0.01
	Over 0.20 to 0.40	0.02	0.02
Zirconium	All ranges	0.01	0.05

[1] Rephosphorized steels not subject to check analysis for phosphorus.

(b) When a carbon-boron steel is used, a hardenability test must be performed on the first and last ingot of each heat of steel. The results of this test must be recorded on the Record of Chemical Analysis of Material for Cylinders required by §178.37-22 of this section. This hardness test must be made 1/16-inch from the quenched end of the Jominy quench bar and the hardness shall be at least Rc 33 and no more than Rc 53.

§ 178.37-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.37-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.37-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no fissure or other defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. If not originally free from such defects, the surface may be machined or otherwise treated to eliminate these defects. The thickness of the bottoms of cylinders welded or formed by spinning is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thicknesses to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

§ 178.37-9 Welding or brazing. (a) Welding or brazing for any purpose whatsoever is prohibited except as follows:

(1) Welding or brazing is authorized for the attachment of necklrings and footrings which are non-pressure parts, and only to the tops and bottoms of cylinders having a service pressure of 500 pounds per square inch or less. Cylinders, necklrings, and footrings must be made of weldable steel, carbon content of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure.

(2) As permitted in §178.37-8.

§ 178.37-10 Wall thickness. (a) For cylinders with service pressure less than 900 pounds the wall stress shall not exceed 24,000 pounds per square inch. Minimum wall 0.100" for any cylinder over 5" outside diameter.

(b) For cylinders with service pressure of 900 p.s.i. or more the minimum wall shall be such that the wall stress at the minimum specified test pressure shall not exceed 67 percent of the minimum tensile strength of the steel as determined from the physical tests required in §§178.37-16 and 178.37-17 and shall be not over 70,000 p.s.i.

(c) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where—

S = wall stress, pounds per square inch.
P = minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater.
D = outside diameter, inches.
d = inside diameter in inches.

§ 178.37-11 Heat treatment. (a) The completed cylinders must be uniformly and properly heat treated prior to tests. Heat treatment of cylinders of the authorized analyses shall be as follows:

(1) All cylinders must be quenched by oil, or other suitable medium except as provided in subparagraph (5) of this paragraph.

(2) The steel temperature on quenching shall be that recommended for the steel analysis, but in no case shall exceed 1750° F.

(3) All steels shall be tempered at a temperature most suitable for that steel.

(4) The minimum tempering temperature shall be not less than 1000° F. except as noted in paragraph (a)(6) of this section.

(5) Steel 4130X may be normalized at a temperature of 1650° F. instead of being quenched, and cylinders so normalized need not be tempered.

(6) Intermediate manganese steels may be tempered at temperatures not less than 1150° F., and after heat treating, each cylinder must be submitted to a magnetic test to detect the presence of quenching cracks. Cracked cylinders shall be rejected and destroyed.

(7) (Reserved).

(8) Except as otherwise provided in subparagraph (6) of this paragraph, all cylinders, if water quenched or quenched with a liquid producing a cooling rate in excess of 90 percent of the cooling rate of water, must be inspected by the magnetic particle, dye penetrant or ultrasonic method to detect the presence of quenching cracks. Any cylinder designed to the requirements for specification 3AA and found to have a quenching crack must be rejected and may not be requalified. Cylinders designed to the requirements for specification 3AAX and found to have cracks must have cracks removed to sound metal by mechanical means. Such specification 3AAX cylinders will be acceptable if the repaired area is subsequently examined to assure no defect, and it is determined that design thickness requirements are met.

§ 178.37-12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for American Standard taper pipe threads.

(c) Straight threads having at least 6 engaged threads are authorized, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.37-13 Safety devices and protection for valves, safety devices and other connections, if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§173.34(d) and 173.301(g)).

§ 178.37-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each cylinder must be tested to at least 5/3 times service pressure.

§ 178.37-15 Flattening test. Between knife edges, wedge shaped, 60° angle, rounded to 1/2" radius; test 1 cylinder[1] taken at random out of each lot of 200 or less cylinders. Longitudinal axis of the cylinder must be at approximately a 90-degree angle to knife edges.

§ 178.37-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches: Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction any may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

[1] For lots of 30 or less, physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8–78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.37-17 Physical and flattening tests. (a) Acceptable results for physical and flattening tests; elongation at least 20 percent for 2" gauge length or at least 10 percent in other cases; flattening required without cracking to 6 times wall thickness.

§ 178.37-18 Leakage test. (a) All spun cylinders and plugged cylinders (See Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least ⅛ of the total area of the bottom but not less than ¾ inch in diameter, including the closure, for at least one minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See Note 1 to § 178.37-19.)

Note 1: A spun cylinder in one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable, around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.37-19 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

Note 1: Spun cylinders rejected under the provisions of § 178.37-18 may be removed from the spun cylinder category by drilling to remove defective material, tapping and plugging.

§ 178.37-20 Marking. (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, or neck as follows:

(1) When cylinders are constructed to § 178.37-2(a), they shall be marked DOT-3AA followed by the service pressure (for example, DOT-3AA1800 etc.).

(2) When cylinders are constructed to § 178.37-2(b), they shall be marked DOT-3AAX followed by the service pressure (for example, DOT-3AAX1800, etc.).

(3) A serial[1] number and an identifying symbol (letters); location[2] of number to be just below or immediately following the DOT mark; location[2] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples:	DOT-3AA1800	DOT-3AA1800-1234-XY
	1234	
	XY	

(4) Inspector's offical mark near serial number; date of test (such as 5–50 for May 1950), so placed that dates of subsequent tests can be easily added; and word "SPUN" or "PLUG" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process, or effected by plugging.

§ 178.37-21 Size of marks. (a) At least ¼" high if space permits.

§ 178.37-22 Inspector's report. (a) Required to be clear, legible, and in the following form:

(Place) .....

(Date) .....

Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the shoulder of the cylinder are

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks (if any) .....

These cylinders were made by process of .....

.....

.....

The cylinders were heat treated by the process of .....

.....

.....

The ..... permitted in § 178.37-9
(neckrings—bottings)

were attached by process of .....
(welding—brazing)

The material used was identified by the following .....
(heat purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto. The heat numbers .....
(were—were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-3AA were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3AA except as follows:

Exceptions .....

.....

.....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis								
				C	P	S	Si	Mn	Ni	Cr	Mo	Zr

The analyses were made by .....
(Signed) .....

(Place) .....

(Date) .....

[1] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 60 cubic inches.

[2] Symbol in front of or following the number with ample space between is also authorized. Other variations in location authorized only when necessitated by lack of space.

For explanation of abbreviations and reference marks, see last page of this tariff.

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength at 0.2 percent offset (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested (arranged numerically)	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.37-23 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.38 Specification 3B; seamless steel cylinders.

§ 178.38-1 Compliance. (a) Required in all details.

§ 178.38-2 Type, size, and service pressure. (a) Type and size. Seamless; not over 1,000 pounds water capacity (nominal).

(b) Service pressure.[1] At least 150 to not over 500 pounds per square inch.

§ 178.38-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.38-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.38-5 Steel. (a) Open-hearth or electric steel of uniform quality. Content percent for the following not over: Carbon, 0.55; phosphorus, 0.045; sulphur, 0.050.

§ 178.38-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.38-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.38-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no fissure or other defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. If not originally free from such defects, the surface may be machined or otherwise treated to eliminate these defects. The thickness of the bottoms of cylinders welded or formed by spinning is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thicknesses to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

§ 178.38-9 Welding or brazing. (a) Welding or brazing for any purpose whatsoever is prohibited except as follows:

(1) Welding or brazing is authorized for the attachment of necklrings and footrings which are non-pressure parts, and only to the tops and bottoms of cylinders having a service pressure of 500 pounds per square inch or less. Cylinders, necklrings, and footrings must be made of weldable steel, carbon content of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure.

(2) As permitted in § 178.38-8.

§ 178.38-10 Wall thickness. (a) The wall stress shall not exceed 24,000 pounds per square inch. Minimum wall 0.090" for any cylinder over 6" outside diameter.

(b) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where—

S = wall stress, pounds per square inch,

P = at least two times service pressure or 450 pounds per square inch, whichever is the greater,

D = outside diameter, inches,

d = minimum wall thickness determined by a suitable method

§ 178.38-11 Heat treatment. (a) The completed cylinders must be uniformly and properly heat-treated prior to tests.

§ 178.38-12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for American Standard taper pipe threads.

(c) Straight threads having at least 4 engaged threads are authorized, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.38-13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

§ 178.38-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent of 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent of 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) Each cylinder, to at least 2 times service pressure.

(2) Or, 1 cylinder out of each lot of 200 or less, to at least 3 times service pressure. Other must be examined under pressure of 2 times service pressure and show no defect.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-3E300 indicates the service pressure as 300 pounds per square inch.

§ 178.38-15 Flattening test. (a) Between knife edges, wedge shaped, 60° angle, rounded to ½" radius; test 1 cylinder[1] taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.38-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1 ½ inches; or, gauge length 2 inches with width not over 1½ inches; Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 7/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or, "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.38-17 Acceptable results for physical and flattening tests. (a) Either of the following:

(1) Elongation at least 40 percent for 2-inch gauge length or at least 20 percent in other cases; yield strength not over 73 percent of tensile strength; flattening test not required.

(2) Elongation at least 20 percent for 2-inch gauge length or 10 percent in other cases; yield strength not over 73 percent of tensile strength; flattening required, without cracking, to 6 times wall thickness.

§ 178.38-18 Leakage test. (a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least 7/16 of the total area of the bottom but not less than 3½ inch in diameter, including the closure, for at least one minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See Note 1 to §178.38-19.)

Note 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable, around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.38-19 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

Note 1: Spun cylinders rejected under the provisions of § 178.38-18 may be removed from the spun cylinder category by drilling to remove defective material, tapping and plugging.

§ 178.38-20 Marking. (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, or neck as follows:

(1) DOT-3B followed by the service pressure (for example, DOT-38300, etc.).

(2) A serial[1] number and an identifying symbol (letters); locations[2] of number to be just below or immediately following the DOT mark; location[2] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-38300 1234 XY — DOT-38300-1234-XY

(4) Inspector's official mark near serial number; date of test (such as 5-50 for May 1950), so placed that dates of subsequent tests can be easily added; and word "SPUN" or "PLUG" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process, or effected by plugging.

(b) Marking stamped into the sidewalls of cylinders having a service pressure of 150 psi is permitted only if all of the following conditions are met:

(1) Wall stress at test pressure shall not exceed 24,000 psi.
(2) Minimum wall thickness shall be not less than .090".
(3) Depth of stamping shall be no greater than 15% of the minimum wall thickness, but at no time shall it exceed .015".
(4) Maximum outside diameter of cylinder shall not exceed 5".
(5) Carbon content of cylinder shall not exceed 0.25%. If the carbon content exceed 0.25%, the complete cylinder must be normalized after stamping.
(6) Stamping shall be adjacent to top head.

§ 178.38-21 Size of marks. (a) At least ¼" high if space permits.

§ 178.38-22 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....
(Date) .....

Gas Cylinders

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The ..... permitted in § 178.38-9
(heatings—footings)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
(heat-purchase order)
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers .....
(were—were not)
marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-3B were made in the presence of the inspector and all material and

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[1] For lots of 30 or less physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

[1] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 170 cubic inches.

[2] Symbol in front of or following the number with ample space between is also authorized. Other variation in location authorized only when necessitated by lack of space.

cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3B except as follows:

Exceptions .....

.....

.....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...

The analyses were made by .....
(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading: Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect.

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.39-23 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.39 Specification 3BN; seamless nickel cylinders.

§ 178.39-1 Compliance. (a) Required in all details.

§ 178.39-2 Type, size and service pressure. (a) Type and size. Seamless; not over 125 pounds water capacity (nominal).

(b) Service pressure.[1] At least 150 lb not over 500 pounds per square inch.

§ 178.39-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.39-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: *Provided*, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests, verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.39-5 Nickel. (a) At least 99.0 percent pure nickel plus cobalt.

§ 178.39-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.39-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.39-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. Cylinders closed in by spinning process not authorized.

§ 178.39-9 Welding or brazing. (a) Welding or brazing for any purpose whatsoever is prohibited except that welding is authorized for the attachment of neckrings and footrings which are nonpressure parts, and only to the tops and bottoms of cylinders. Neckrings and footrings must be of weldable material, carbon content of which must not exceed 0.25 percent. Nickel welding rod must be used.

§ 178.39-10 Wall thickness. (a) The wall stress shall not exceed 15,000 pounds per square inch. Minimum wall 0.100" for any cylinder over 5" outside diameter.

(b) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch,
P = minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater,
D = outside diameter in inches,
d = inside diameter in inches.

§ 178.39-11 Heat treatment. (a) The completed cylinders must be uniformly and properly heat-treated prior to tests.

§ 178.39-12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for American Standard taper pipe threads.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-3BN400 indicates the service pressure as 400 pounds per square inch.

(c) Straight threads having at least 6 engaged thread are authorized; to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.39-13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

§ 178.39-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each cylinder must be tested to at least 2 times service pressure.

§ 178.39-15 Flattening test. (a) Between knife edges, wedge shaped, 60° angle, rounded to ½" radius; test 1 cylinder[1] taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.39-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material; Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches; Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.39-17 Acceptable results for physical and flattening tests. (a) Either of the following:

(1) Elongation at least 40 percent for 2" gauge length or at least 20 percent in other cases; yield point not over 50 percent of tensile strength; flattening test not required.

(2) Elongation at least 20 percent for 2" gauge length or 10 percent in other cases; yield point not over 50 percent of tensile strength; flattening required, without cracking, to 6 times wall thickness.

§ 178.39-18 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding not authorized.

§ 178.39-19 Marking (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, or neck as follows:

(1) DOT-3BN followed by service pressure (for example DOT-3BN400, etc.).

(2) A serial[2] number and an identifying symbol (letters); location[3] of number to be just below or immediately following the DOT mark; location[3] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-3BN400 1234 XY — DOT 3BN400-1234-XY

(3) Inspector's official mark, near serial number; date of test (such as 5-50 for May 1950), so placed that dates of subsequent tests can be easily added.

§ 178.39-20 Size of marks. (a) At least ¼" high if space permits.

§ 178.39-21 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....
(Date) .....

Gas Cylinders

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The ..... permitted in § 178.39-9
(neckrings—footrings)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
(heat-purchase order)
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers .....
(were—were not)
marked on the material.

All material, such as plates, billets and seamless tubing was inspected and each cylinder was inspected both before and after closing in the ends; all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-3BN were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3BN except as follows:

Exceptions .....
.....
.....

(Signed) .....
Inspector

(Place) .....
(Date) .....

[1] For lots of 30 or less physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

[2] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter.

[3] Symbol in front of or following the number with ample space between is also authorized. Other variation in location authorized only when necessitated by lack of space.

For explanation of abbreviations and reference marks, see last page of this tariff.

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.39-22 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.40 (Reserved)

§ 178.41 (Reserved)

§ 178.42 Specification 3E; seamless steel cylinders.

§ 178.42-1 Compliance. (a) Required in all details.

§ 178.42-2 Type, size, and service pressure. (a) Type and size. Seamless. Must have outside diameter not greater than 2 inches nominal, length less than 2 feet.

(b) Service pressure.[1] Must be 1,800 pounds per square inch.

§ 178.42-3 Inspection by whom and where. (a) Inspection and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.42-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of steel by analysis or by obtaining certified analysis: Provided, That check analysis of samples taken from one cylinder out of each lot of 200 or less is acceptable.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.42-5 Steel. (a) Open-hearth or electric steel of uniform quality. Content percent for the following not over: Carbon, 0.55; phosphorus, 0.045; sulphur, 0.050.

§ 178.42-6 Identification of steel. (a) Required; any suitable method.

§ 178.42-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.42-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. The thickness of the spun bottom is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thickness to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

§ 178.42-9 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for American Standard taper pipe threads.

(c) Straight threads having at least 4 engaged threads are authorized, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.42-10 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

§ 178.42-11 Hydrostatic test. (a) Cylinders must be tested as follows:

(1) One cylinder out of each lot of 500 or less to be subjected to hydrostatic pressure of 6,000 pounds per square inch or higher.

(2) The cylinder referred to in subparagraph (1) of this paragraph shall burst at a pressure higher than 6,000 pounds per square inch without fragmenting or otherwise showing lack of ductility, or shall hold a pressure of 12,000 pounds per square inch for 30 seconds without bursting, in which case it shall be subjected to a flattening test without cracking to six times wall thickness between knife edges, wedge shaped, 60 degrees angle, rounded out of ½ inch radius.

Note 1: Inspector's report shall be suitably changed to show results of later alternate and flattening tests.

(3) Other cylinders must be examined under pressure of at least 3,000 pounds per square inch and not to exceed 4,500 pounds per square inch and show no defect. Cylinders tested at a pressure in excess of 3,600 pounds per square inch shall burst at a pressure higher than 7,500 pounds per square inch when tested as specified in paragraph (a)(2) of this section. The pressure must be maintained for at least 30 seconds and sufficiently longer to insure complete examination.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-3E1800 indicates the service pressure as 1,800 pounds per square inch.

§ 178.42-12 Leakage test. (a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least ¼ of the total area of the bottom but not less than ¼ inch in diameter, including the closure, for at least one minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See Note 1 to § 178.42-13.)

Note 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable, around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.42-13 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

Note 1: Spun cylinders rejected under the provisions of § 178.42-12 may be removed from the spun cylinder category by drilling to remove defective material, tapping and plugging.

§ 178.42-14 Marking. (a) Marking on each cylinder by stamping plainly and permanently on the shoulder, top head, neck or sidewall as follows:

(1) DOT-3E1800.

(2) An identifying symbol (letters); location to be just following or below the DOT mark. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-3E1800
XY

§ 178.42-15 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....

(Date) .....

Steel Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the shoulder of the cylinder are:

Specification—DOT-3E1800

Serial numbers ..... to ..... inclusive (if numbered)

Identifying symbol (registered) .....

Test date .....

These cylinders were made by process of .....

.....

.....

The steel used was identified by the following ..... (heat purchase order)

numbers .....

The steel used was certified as to chemical analysis and record thereof is ..... attached hereto .....

The heat numbers ..... (were—were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends; all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness ..... noted was inch. The tare weight per cylinder without valve is ..... (approx.)

The volumetric capacity per cylinder is ..... (approx.)

Each and every cylinder was properly tapped with a taper thread, the threads were inspected and found to be clean-cut, of proper length, and correct as to gauge.

One finished cylinder out of each lot of 500 or less was taken at random and burst by interior pressure with the following results:

Date of test	Pressure at which cylinder ruptured

Each and every cylinder with bottom closed in by spinning was subjected to an interior gas pressure of at least 1,800 pounds per square inch and showed no leakage.

Each and every cylinder was subjected to an interior pressure of at least 3,000 pounds per square inch and showed no defect.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3A except as follows:

Exceptions .....

.....

.....

(Signed) ..... Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation thereon reading. Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect.

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 178.42-16 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.43 [Reserved]

§ 178.44 Specification 3HT; inside containers, seamless steel cylinders for aircraft use made of definitely prescribed steel.

§ 178.44-1 Compliance. (a) Required in all details.

§ 178.44-2 Type, size and service pressure. (a) Type and size. Seamless; not over 150 pounds water capacity (nominal).

(b) Service pressure.[1] At least 900 pounds per square inch.

§ 178.44-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.44-4 Duties of inspector. (a) Inspect all materials and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. Test reports must be retained by the inspector for the authorized service life of the cylinder.

§ 178.44-5 Authorized steel. (a) Open hearth or electric furnace steel of uniform quality. Steel of the following chemical analysis is authorized (see Notes 1 and 2):

Designation	AISI 4130 (percent)
Carbon	0.25-0.33
Manganese	0.40-0.60
Phosphorus	0.040 maximum
Sulfur	0.040 maximum
Silicon	0.15-0.35
Chromium	0.80-1.10
Molybdenum	0.15-0.25

Note 1: A heat of steel made under the specifications listed in the first table, check chemical analysis of which is slightly out of the specified range, is acceptable, if satisfactory in all other respects, provided the tolerances shown in the following table are not exceeded.

CHECK ANALYSIS TOLERANCES

Element	Limit or maximum specified (percent)	Tolerance (percent over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	Over 0.15 to 0.40 incl.	0.03	0.04
Manganese	To 0.60 incl.	0.03	0.03
Phosphorus[1]	All ranges		0.01
Sulphur	All ranges		0.01
Silicon	To 0.30 incl.	0.02	0.03
	Over 0.30 to 1.00 incl.	0.05	0.05
Chromium	To 0.90 incl.	0.03	0.03
	Over 0.90 to 2.10 incl.	0.05	0.05
Molybdenum	To 0.20 incl.	0.01	0.01
	Over 0.20 to 0.40 incl.	0.02	0.02

[1] Rephosphorized steels not subject to check analysis for phosphorus.

Note 2: Grain size 6 or finer according to ASTM Spec. E19-45.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-3HT2000 indicates the service pressure as 2,000 pounds per square inch.

§ 178.44-6 Identification of material. (a) Required; any suitable method. Steel stamping of heat identifications shall not be made in any area which will eventually become the side wall of the cylinder. Depth of stamping shall not encroach upon the minimum prescribed wall thickness of the cylinder.

§ 178.44-7 Defects. (a) Material with seams, cracks, laminations, severe inclusions, numerous or severe draw marks, or any other injurious defect not authorized.

§ 178.44-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no fissure or other defect acceptable that is likely to weaken the finished container appreciably; the general surface finish shall not exceed a roughness of 250 RMS. Individual irregularities such as drawmarks, scratches, pits, etc., should be held to a minimum consistant with good high stress pressure vessel manufacturing practices. If the cylinder is not originally free of such defects or does not meet the finish requirements, the surface may be machined or otherwise treated to eliminate these defects. The point of closure of cylinders closed by spinning is not to be less than two times the prescribed wall thickness of the cylindrical shell. Cylinder end contour shall be hemispherical or ellipsoidal with a ratio of major to minor axis not exceeding two to one and with concave side to pressure.

§ 178.44-9 Welding or brazing. (a) Welding or brazing for any purpose whatsoever is prohibited except as follows:

(1) Welding by spinning is permitted to close the bottom of spun cylinders. Machining or grinding to produce proper surface finish at point of closure is required.

§ 178.44-10 Wall thickness. (a) Minimum wall thickness for any cylinder shall be .050 inch.

(b) Minimum wall thickness shall be such that the wall stress at the minimum specified test pressure shall not exceed 75 percent of the minimum tensile strength of the steel as determined from the physical tests required in § 178.44-18 and shall not be over 105,000 psi.

(c) Calculations must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch.
P = minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater.
D = outside diameter in inches.
d = inside diameter in inches.

(d) Wall thickness of hemispherical bottoms only permitted to 90 percent of minimum wall thickness of cylinder sidewall but shall not be less than .050 inch. In all other cases, thickness to be no less than prescribed minimum wall.

§ 178.44-11 Heat treatment. (a) The completed cylinders must be uniformly and properly heated prior to tests. Heat treatment of the cylinders of the authorized analysis shall be as follows:

(1) All cylinders must be quenched by oil, or other suitable medium.

(2) The steel temperature on quenching shall be that recommended for the steel analysis, but in no case shall it exceed 1750° F.

(3) The steel shall be tempered at a temperature most suitable for the particular steel analysis but not less than 850° F.

(4) Cancelled.

(5) All cylinders must be inspected by the magnetic particle or dye penetrant method to detect the presence of quenching cracks. Any cylinder found to have a quenching crack must be rejected and may not be requalified.

§ 178.44-12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings. (a) Threads required to be clean cut, even, without cracks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for National Gas Tapered Thread (NGT) as required by American Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections.[1]

(c) Straight threads having at least 6 engaged threads are authorized; to have tight fit and a calculated shear stress of at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.44-13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by applicable regulations in Part 173 (see §§ 173.34(d), 173.301(g), 173.302(a)(2), and 173.304(a)(2) Note 7).

§ 178.44-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge

[1] Available for a nominal charge from the American National Standards Institute, 1430 Broadway, New York, New York 10018 and the Compressed Gas Association, Inc., 500 Fifth Avenue, New York, New York 10036.

must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent of 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each cylinder must be tested to at least ⅗ times service pressure.

§ 178.44-15 Cycling tests. (a) Prior to the initial shipment of any specific cylinder design, cyclic pressurization tests shall have been performed on at least three representative samples without failure as follows:

(1) Pressurization shall be performed hydrostatically between approximately zero psig and the service pressure at a rate not in excess of 10 cycles per minute. Adequate recording instrumentation shall be provided if equipment is to be left unattended for periods of time.

(b) Tests prescribed in §178.44-15(a)(1) shall be repeated on one random sample out of each lot of cylinders. Cylinder may then be subjected to burst test.

(c) A lot is defined as a group of cylinders fabricated from the same heat of steel, manufactured by the same process and heat treated in the same equipment under the same conditions of time, temperature, and atmosphere, and shall not exceed a quantity of 200 cylinders.

(d) All cylinders used in cycling tests must be destroyed.

§ 178.44-16 Burst test. (a) One cylinder taken at random out of each lot of cylinders shall be hydrostatically tested to destruction.

§ 178.44-17 Flattening test. Between knife edges, wedge shaped, 60° angle, rounded to ½ inch radius, test one cylinder taken at random out of each lot of 200 or less cylinders. Longitudinal Axis of the cylinder must be at approximately a 90° angle to knife edges.

§ 178.44-18 Physical tests. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1 cylinder taken at random out of each lot of cylinders.

(b) Specimens must be: Gauge length at least 24 times thickness with width not over six times thickness. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.44-19 Magnetic particle inspection. (a) Inspection shall be performed on inside of container before closing and externally on the finished container after heat treatment. Evidence of discontinuities, which in the opinion of a qualified inspector may appreciably weaken or decrease the durability of the cylinder, shall be cause for rejection.

§ 178.44-20 Leakage test. (a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by dry gas or dry air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least 1/16 of the total area of the bottom but not less than ⅜ inch in diameter, including the closure, for at least one minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected (see Notes 1, 2, and 3 and §178.44-22).

Note 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.44-21 Acceptable results of tests. (a) Flattening required without cracking to ten times the wall thickness of the cylinder.

(b) Physical tests:

(1) Elongation at least 6 percent in gauge length of 24 times wall thickness.

(2) Tensile strength shall not exceed 165,000 p.s.i.

(c) Burst pressure shall be at least 4/3 times the test pressure.

(d) Cycling—at least 10,000 pressurizations.

§ 178.44-22 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

(b) For each cylinder subjected to reheat treatment during original manufacture, sidewall measurements must be made to verify that the minimum sidewall thickness meets specification requirements after the final heat treatment.

§ 178.44-23 Marking. (a) Cylinders shall be marked by low stress type steel stamping in an area and to a depth which will insure that the wall thickness measured from the root of the stamping to the interior surface is equal to or greater than the minimum prescribed wall thickness. Stamping must be permanent and legible. Stamping on side wall not authorized. The following markings shall appear:

(1) DOT-3HT followed by the service pressure (for example, DOT-3HT1800, etc.).

(2) A serial number and an identifying symbol (letters); location[1] of number to be just below or immediately following the DOT mark; location[1] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-3HT1800 1234 XY DOT-3HT1800-1234-XY

(3) Inspector's official mark near serial number; date of test such as 5-59 for May 1959, so placed that dates of subsequent tests can be easily added; and word "SPUN" or "PLUG" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process, or effected by plugging.

(4) Rejection elastic expansion (REE) in cubic centimeters (cc) near the date of test. The REE for a cylinder is 1.05 times its original elastic expansion.

§ 178.44-24 Name plates. (a) Authorized, provided that they can be permanently and securely attached to the cylinder. Attachment by either brazing or welding is not permitted. Attachment by soldering is permitted provided steel temperature does not exceed 500° F.

§ 178.44-25 Inspector's report. (a) Required to be clear, legible, and in the following form:

(Place) .....

(Date) .....

Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the shoulder of the cylinder are:

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks (if any) .....

---

[1] Symbol in front of or following the number with ample space between is also authorized. Other variations in location authorized only when necessitated by lack of space.

These cylinders were made by process of .....
.....
.....
The cylinders were heat treated by the process of .....
.....
.....
The material used was identified by the following ..... (Heat purchase order)
numbers .....
The material used was verified as to chemical analysis ..... and record thereof is attached hereto.
The heat numbers ..... (were—were not)
marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum ..... thickness noted was inch. The outside diameter was determined by a close ..... approximation to be inches. The wall stress was calculated to be pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-3HT were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3HT except as follows:

Exceptions .....
.....
.....

(Signed) ..... Inspector
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....

The analyses were made by .....
(Signed) .....
(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....
(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.
[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.44-26 Report retention. The maker of the cylinder under this specification must retain the test reports required by this specification for the authorized service life of the cylinder.

§ 178.45 Specification 3T; seamless steel cylinder.

§ 178.45-1 Compliance. Each cylinder must meet the applicable requirements of § 173.24 of this subchapter.

§ 178.45-2 Type, size, and service pressure. (a) Type. Each cylinder must be of seamless construction with integrally formed heads concave to pressure at both ends. The inside head shape must be hemispherical, ellipsoidal in which the major axis is two times the minor axis, or a dished shape falling within these two limits. Permanent closures formed by spinning are prohibited.
(b) Size. The minimum water capacity is 1,000 pounds.
(c) Service pressure. The minimum service pressure is 1,800 p.s.i.

§ 178.45-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.45-4 Duties of the inspector. (a) The inspector must determine that all materials are in compliance with the requirements of this specification.
(b) The inspector must verify compliance with the requirements of § 178.45-5 by making a chemical analysis or obtaining a certified chemical analysis from the material manufacturer for each heat of material. If an analysis is not provided by the material manufacturer, a sample from each heat must be analyzed.
(c) The inspector must determine that each cylinder is made and marked in compliance with this specification by:
(1) Complete internal and external inspection;
(2) Verification of proper heat treatment;
(3) Selection of samples to be tested;
(4) Witnessing all tests;
(5) Verification of threads by gage; and
(6) Preparation of required report.

§ 178.45-5 Material, steel. (a) Only open hearth, basic oxygen, or electric furnace process steel of uniform quality is authorized. The steel analysis must conform to the following:

ANALYSES TOLERANCES

Element (percent)	Ladle analysis	Check analysis	
		Under	Over
Carbon	0.35 to 0.50	0.03	0.04
Manganese	0.75 to 1.05	0.04	0.04
Phosphorus (max)	0.035	.....	0.01
Sulfur (max)	0.04	.....	0.01
Silicon	0.15 to 0.35	0.02	0.03
Chromium	0.80 to 1.15	0.05	0.05
Molybdenum	0.15 to 0.25	0.02	0.02

(b) A heat of steel made under these specifications, the ladle analysis of which is slightly out of the specified range, is acceptable if satisfactory in all other aspects. However, the check analysis tolerances shown in the above table may not be exceeded except as approved by the Department.
(c) Material with seams, cracks, laminations, or other injurious defects is not permitted.
(d) Material used must be identified by any suitable method.

§ 178.45-6 Manufacture. (a) General manufacturing requirements are as follows:

(1) Dirt and scale must be removed prior to inspection and processing.

(2) Surface finish must be uniform and reasonably smooth.

(3) Inside surfaces must be clean, dry, and free of loose particles.

(4) No defect of any kind is permitted if it is likely to weaken a finished cylinder.

(b) If the cylinder surface is not originally free from the defects described in paragraph (a) of this section, the surface may be machined or otherwise treated to eliminate these defects provided the minimum wall thickness is maintained.

(c) Welding or brazing on a cylinder is not permitted.

§ 178.45-7 Wall thickness. (a) The minimum wall thickness must be such that the wall stress at the minimum specified test pressure does not exceed 67 percent of the minimum tensile strength of the steel as determined by the physical tests required in §§178.45-14 and 178.45-15. A wall stress of more than 90,500 p.s.i. is not permitted. The minimum wall thickness for any cylinder may not be less than 0.225 inch.

(b) Calculation of the stress for cylinders must be made by the following formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch,
P = minimum test pressure at least 5/3 service pressure,
D = outside diameter in inches,
d = inside diameter in inches.

(c) Each cylinder must meet the following additional requirements which assumes a cylinder horizontally supported at its two ends and uniformally loaded over its entire length. This load consists of the weight per inch of length of the straight cylindrical portion filled with water compressed to the specified test pressure. The wall thickness must be increased when necessary to meet this additional requirement.

(1) The sum of two times the maximum tensile stress in the bottom fibers due to bending (see paragraph (c)(1)(i) of this section), plus the maximum tensile stress in the same fibers due to hydrostatic testing (see paragraph (c)(1)(ii) of this section) may not exceed 80 percent of the minimum yield strength of the steel at this maximum stress.

(i) The following formula must be used to calculate the maximum tensile stress due to bending:

$$S = \frac{Mc}{I}$$

where:

S = tensile stress in pounds per square inch,
M = bending moment in inch-pounds $\frac{wL^2}{8}$;
I = moment of inertia—0.04909 $(D^4 - d^4)$ in inches fourth,
c = radius $\frac{D}{2}$ of cylinders in inches,
w = weight per inch of cylinder filled with water,
L = length of cylinder in inches,
D = outside diameter in inches,
d = inside diameter in inches.

(ii) The following formula must be used to calculate the maximum longitudinal tensile stress due to hydrostatic test pressure:

$$S = \frac{A_1 P}{A_2}$$

where:

S = tensile stress in pounds per square inch,
A_1 = internal area in cross section of cylinder in square inches,
P = hydrostatic test pressure in pounds per square inch,
A_2 = area of metal in cross section of cylinder in square inches.

§ 178.45-8 Heat treatment. (a) Each completed cylinder must be uniformly and properly heat treated prior to testing, as follows:

(1) Each cylinder must be heated and held at the proper temperature for at least one hour per inch of thickness based on the maximum thickness of the cylinder and then quenched in a suitable liquid medium having a cooling rate not in excess of 80 percent of water. The steel temperature on quenching must be that recommended for the steel analysis, but it must never exceed 1750° F.

(2) After quenching, each cylinder must be reheated to a temperature below the transformation range but not less than 1050° F., and must be held at this temperature for at least one hour per inch of thickness based on the maximum thickness of the cylinder. Each cylinder must then be cooled under conditions recommended for the steel.

§ 178.45-9 Openings. (a) Openings are permitted on heads only.

(b) The size of any centered opening in a head may not exceed one half the outside diameter of the cylinder.

(c) Openings in a head must have ligaments between openings of at least three times the average of their hole diameter. No off-center opening may exceed 2.625 inches in diameter.

(d) All openings must be circular.

(e) All openings must be threaded. Threads must be in compliance with the following:

(1) Each thread must be clean cut, even, without any checks, and to gage.

(2) Taper threads, when used, must be the American Standard Pipe thread (NPT) type and must be in compliance with the requirements of NBS Handbook H-28, Part II, Section VII.

(3) Taper threads conforming to National Gas Taper thread (NGT) standards must be in compliance with the requirements of NBS Handbook H-28, Part II, Sections VII and IX.

(4) Straight threads conforming with National Gas Straight thread (NGS) standards are authorized. These threads must be in compliance with the requirements of NBS Handbook H-28, Part II, Sections VII and IX.

§ 178.45-10 Safety devices and protection for valves, safety devices, and other connections. Safety devices and protection arrangements for valves, safety devices, and other connections must be in compliance with § 173.34(d) of this subchapter. See also § 173.301(f) of this subchapter.

§ 178.45-11 Hydrostatic test. (a) Each cylinder must be tested at an internal pressure by the water jacket method or other suitable method. The testing apparatus must be operated in a manner that will obtain accurate data. Any pressure gage used must permit reading to an accuracy of one percent. Any expansion gage used must permit reading of the total expansion to an accuracy of one percent.

(b) Any internal pressure applied to the cylinder after heat treatment and before the official test may not exceed 90 percent of the test pressure.

(c) The pressure must be maintained sufficiently long to assure complete expansion of the cylinder. In no case may the pressure be held less than 30 seconds.

(d) If, due to failure of the test apparatus, the required test pressure cannot be maintained, the test must be repeated at a pressure increased by 10 percent or 100 p.s.i., whichever is lower or, the cylinder must be reheat treated.

(e) Permanent volumetric expansion of the cylinder may not exceed 10 percent of its total volumetric expansion at the required test pressure.

(f) Each cylinder must be tested to at least 5/3 times its service pressure.

§ 178.45-12 Ultrasonic examination. After the hydrostatic test, the cylindrical section of each vessel must be examined in accordance with ASTM Standard A-388-67 using the angle beam technique. The equipment used must be calibrated to detect a notch equal to five percent of the design minimum wall thickness. Any discontinuity indication greater than that produced by the five percent notch shall be cause for rejection of the cylinder unless the discontinuity is repaired within the requirements of this specification.

§ 178.45-13 Basic requirements for tension and Charpy impact tests. (a) When the cylinders are heat treated in a batch furnace, two tension specimens and three Charpy impact specimens must be tested from one of the cylinders or a test ring from each batch. The lot size represented by these tests may not exceed 200 cylinders.

(b) When the cylinders are heat treated in a continuous furnace, two tension specimens and three Charpy impact specimens must be tested from one of the cylinders or a test ring from each four hours or less of production. However, in no case may a test lot based on this production period exceed 200 cylinders.

(c) Each specimen for the tension and Charpy impact tests must be taken from the side wall of a cylinder or from a ring which has been heat treated with the finished cylinders of which the specimens must be representative. The axis of the specimens must be parallel to the axis of the cylinder. Each cylinder or ring specimen for test must be of the same diameter, thickness, and metal as the finished cylinders they represent. A test ring must be at least 24 inches long with ends covered during the heat treatment process so as to simulate the heat treatment process of the finished cylinders it represents.

(d) A test cylinder or test ring need represent only one of the heats in a furnace batch provided the other heats in the batch have previously been tested and have passed the tests and that such tests do not represent more than 200 cylinders from any one heat.

(e) The test results must conform to the requirements specified in §§178.45-14 and 178.45-15.

(f) When the test results do not conform to the requirements specified, the cylinders represented by the tests may be reheat treated and the tests repeated. Paragraph (e) of this section applies to any retesting.

§ 178.45-14 Basic conditions for acceptable physical testing. (a) The following criteria must be followed to obtain acceptable physical test results:

(1) Each tension specimen must have a gage length of two inches with a width not exceeding one and one-half inches. Except for the grip ends, the specimen may not be flattened. The grip ends may be flattened to within one inch of each end of the reduced section.

(2) A specimen may not be heated after heat treatment specified in §178.45-8.

For explanation of abbreviations and reference marks, see last page of this tariff.

(3) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gage length.

(i) This yield strength must be determined by the "offset" method or the "extension under load" method described in ASTM Standard E8–78.

(ii) For the "extension under load" method, the total strain (or extension under load) corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gage length under appropriate load and adding thereto 0.2 percent of the gage length. Elastic extension calculations must be based on an elastic modulus of 30,000,000. However, when the degree of accuracy of this method is questionable the entire stress-strain diagram must be plotted and the yield strength determined from the 0.2 percent offset.

(iii) For the purpose of strain measurement, the initial strain must be set with the specimen under a stress of 12,000 p.s.i. and the strain indicator reading set at the calculated corresponding strain.

(iv) The cross-head speed of the testing machine may not exceed ⅛ inch per minute during the determination of yield strength.

(4) Each impact specimen must be Charpy V-notch type size 10 mm x 10 mm taken in accordance with paragraph 11 of ASTM Standard A-333–67. When a reduced size specimen is used, it must be the largest size obtainable.

§ 178.45–15 Acceptable physical test results. (a) Results of physical tests must conform to the following:

(1) The tensile strength may not exceed 155,000 p.s.i.

(2) The elongation must be at least 16 percent for a two-inch gage length.

(3) The Charpy V-notch impact properties for the three impact specimens which must be tested at 0° F. may not be less than the values shown below:

Size of specimen (mm)	Average value for acceptance 3 specimens	Minimum value 1 specimen only of the three
10.0 x 10.0	25.0 ft. lbs.	20.0 ft. lbs.
10.0 x 7.5	21.0 ft. lbs.	17.0 ft. lbs.
10.0 x 5.0	17.0 ft. lbs.	14.0 ft. lbs.

(4) After the final heat treatment, each vessel must be hardness tested on the cylindrical section. The tensile strength equivalent of the hardness number obtained may not be more than 165,000 p.s.i. (R-36). When the result of a hardness test exceeds the maximum permitted, two or more retests may be made; however, the hardness number obtained in each retest may not exceed the maximum permitted.

§ 178.45–16 Rejected cylinders. (a) Reheat treatment is authorized. However, each reheat treated cylinder must subsequently pass all the prescribed tests.

(b) Repair by welding is not authorized.

§ 178.45–17 Markings. (a) Marking must be done by stamping into the metal of the cylinder. All markings must be legible and located on a shoulder.

(b) Required markings are as follows:

(1) "DOT–3T," followed by the service pressure (for example: "DOT–3T1800");

(2) The appropriate serial number;

(3) The registration number of the manufacturer ("M****");

(4) The inspector's official mark near the serial number;

(5) The tare weight in pounds; and

(6) The date of the test (for example "5–72" for May 1972), so placed that dates of subsequent tests may be easily added.

(c) Markings must be at least ½ inch high.

(d) The markings prescribed by paragraphs (b)(1), (2), and (3) of this section must be displayed one immediately below the previous one as follows:

DOT–3T1800
1234
M 6789

(e) No person may mark any cylinder with the specification identification "DOT–3T" unless (1) it was manufactured in compliance with the requirements of this section and (2) its manufacturer has a registration number (M****) from the Office of Hazardous Materials Transportation, Department of Transportation, Washington, D.C. 20590.

§ 178.45–18 Inspector's report. (a) The inspector's report must be retained indefinitely by the manufacturer as long as DOT–3T cylinders are authorized for use by these regulations and a copy must be supplied the purchaser and owner of each cylinder. Upon sale by the original purchaser or owner, the seller must furnish the buyer a copy of the report. The manufacturer and owner must keep all reports available for examination upon request by representatives of the Department.

(b) Each report must be legible, and contain at least the following information:

INSPECTION REPORT COVERING THE MANUFACTURE OF SPECIFICATION DOT–3T CYLINDERS

The cylinders covered by this report were manufactured for .....

.....

located at .....

They were manufactured by .....

located at .....

The cylinders are ..... inches in diameter (OD), ...

in length, and have a minimum wall thickness of ..... inches

The calculated stress is ..... p.s.i. under a test pressure

of ..... p.s.i.

The marks stamped into shoulder of the cylinder are:

Specification DOT- .....;

Serial numbers ..... to ..... inclusive,

Inspector's mark .....;

DOT registration number M .....

Tare weight .....;

Test date .....;

Other marks (if any) .....

These cylinders were made by process of .....

.....

The cylinders were heat treated by process of .....

.....

The metal used was identified by the following .....

numbers .....

(heat purchase order)

The metal used was verified as to chemical analysis as shown in the "Record of Chemical Analysis of Metal" attached hereto.

The heat numbers ..... marked on the metal.

(were—were not)

All material was inspected visually and by ultrasonic means and all that was accepted was found free of injurious defects which might significantly affect the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were observed and found satisfactory.

The cylinder walls and outside diameter were measured and the calculated stress for the cylinder design covered herein was verified.

Hydrostatic test, physical tests of the material, and other tests as prescribed in specification DOT–3T were made in the presence of the inspector. All materials, tests results, and cylinders accepted were found to be in compliance with the requirements of that specification and records thereto are attached hereto.

I hereby certify that all these cylinders proved satisfactory in every way and are in compliance with the requirements of Department of Transportation Specification 3T.

Inspector's name .....
(Print)

Signed .....
(Inspector)

Inspector's employer .....
(Name & address)

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIALS FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis							
				C	P	S	Si	Mn	Ni	Cr	Mo
.....	.....	.....	.....	...	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...	...

The analyses were made by .....

(Signed) .....
Inspector's name .....
(Print)

Inspector's employer .....
(Name & address)
.....
(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength at 0.2 percent offset (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 2 inches)	Reduction of area (percent)	Charpy V-notch	
						Average value for 3 specimens	Minimum value for one specimen
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

The analyses were made by .....
(Signed) .....
Inspector's name .....
(Print)
Inspector's employer .....
(Name & address)
.....
(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.
[2] State whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....
Inspector's name .....
(Print)
Inspector's employer .....
(Name & address)
.....

§ 178.46 Specification 3AL; seamless cylinders made of definitely prescribed aluminum alloys.

§ 178.46-1 Compliance. Each specification 3AL seamless cylinder must comply with this section.

§ 178.46-2 Size and service pressure. (a) The maximum water capacity is 1000 pounds.
(b) The minimum service pressure is 150 psig (see § 173.300(h) of this subchapter).

§ 178.46-3 Inspection. Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT in accordance with § 173.300a of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT in accordance with § 173.300b of this subchapter.

§ 178.46-4 Duties of the inspector. (a) The inspector shall determine that all materials are in compliance with the requirements of this specification.
(b) The inspector shall verify compliance with the provisions of § 178.46-5(d)(1) by:
(1) Performing or witnessing the performance of the chemical analyses on each melt or cast lot or other unit of starting material; or
(2) Obtaining a certified chemical analysis from the material or cylinder manufacturer for each melt, or cast of material; or
(3) Obtaining a certified check analysis on one cylinder out of each lot of 200 cylinders or less, if a certificate containing data to indicate compliance with the material specification is obtained.
(c) The inspector shall verify ultrasonic inspection of all material by inspection or by obtaining the material producer's certificate of ultrasonic inspection. Ultrasonic inspection must be performed or verified as having been performed in accordance with § 178.46-5(e).
(d) The inspector shall determine that each cylinder complies with this specification by:
(1) Making a complete internal inspection before closing;
(2) Making a complete external inspection;
(3) Verifying that heat treatment was proper;
(4) Selecting the samples for all tests;
(5) Selecting the samples for check analyses performed by other than the material producer;
(6) Witnessing each test;
(7) Verifying that the prescribed minimum thickness was met by measuring or witnessing the measurement of the wall thickness;
(8) Verifying that the identification of material is proper;
(9) Verifying the threads, by gauge;
(10) Reporting volumetric capacity, tare weight, and minumum thickness noted;
(11) Determining that each cylinder is marked in compliance with the specification; and
(12) Furnishing complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.
(e) Prior to initial production of any design or design change, verify that the design qualification tests prescribed in § 178.46-6(f) have been performed with acceptable results.
(f) In this specification, a "lot" means of group of cylinders successively produced having the same:
(1) Size and configuration;
(2) Specified material of construction;
(3) Process of manufacture and heat treatment;
(4) Equipment of manufacture and heat treatment; and
(5) Conditions of time, temperature and atmosphere during heat treatment.

In no case may the lot size exceed 200 cylinders, but any cylinder processed for use in the required destructive physical testing need not be counted as being one of the 200.

§ 178.46-5 Authorized material and identification of material.
(a) Starting stock must be cast stock or traceable to cast stock.
(b) Material with seams, cracks, laminations, or other defects likely to weaken the finished cylinder may not be used.
(c) Material must be identified by a suitable method that will identify the alloy, the aluminum producer's cast number, the solution heat treat batch number and the lot number.
(d) The material must be of uniform quality. Only the following heat treatable aluminum alloys are permitted:

(1) Chemical Composition Limits[1]

Aluminum Association alloy designation No.	Chemical composition (in weight percent)										Other[2]		Al
	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Bi	Each	Total	
6351	0.7–1.3	0.50	0.10	0.40–0.80	0.40–0.80	.....	0.20	0.20	0.01	0.01	0.05	0.15	Remainder
6061	0.40–0.80	0.70	0.15–0.40	0.15	0.80–1.20	0.04–0.35	0.25	0.15	0.01	0.01	0.05	0.15	Co.

[1] ASTM B 221-76 Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Shapes, and Tubes, Table 1 Chemical Composition Limits except for Pb and Bi. Limits are in percent maximum unless otherwise indicated.
[2] Analysis is regularly made only for the elements for which specific limits are shown, except for unalloyed aluminum. If, however, the presence of other elements is suspected to be, or in the course of routine analysis is indicated to be in excess of specified limits, further analysis is made to determine that these other elements are not in excess of the amount specified. (Aluminum Association Standards and Data—Sixth Edition 1979.)

For explanation of abbreviations and reference marks, see last page of this tariff.

(2) Mechanical Property Limits

Alloy and temper	Tensile strength—PSI		Elongation—percent minimum for 5[1] or 4D[1] size specimen
	Ultimate—minimum	Yield—minimum	
6351-T6	42,000	37,000	14[2]
6061-T6	38,000	35,000	14[2]

[1] "D" represents specimen diameters. When the cylinder wall is greater than 3/16 inch thick, a retest without reheat treatment using the 4D size specimen is authorized if the test using the 2 inch size specimen fails to meet elongation requirements.

[2] When cylinder wall is not over 3/16 inch thick, 10 percent elongation is authorized when using a 2.0 × 8" size test specimen.

(e) All starting stock must be 100 percent ultrasonically inspected, along the length at right angles to the central axis from two positions at 90° to one another. The equipment and continuous scanning procedure must be capable of detecting and rejecting internal defects such as cracks which have an ultrasonic reponse greater than that of a calibration block with a 5/64-inch diameter flat bottomed hole.

(f) Cast stock must have uniform equiaxed grain structure not to exceed 500 microns maximum.

(g) Any starting stock not complying with the above must be rejected.

§ 178.46-6 Manufacture. (a) Cylinder shells must be manufactured by the backward extrusion method and have a cleanliness level adequate to ensure proper inspection.

(b) No fissure or other defect is acceptable that is likely to weaken the finished cylinder below the design strength requirements. A reasonably smooth and uniform surface finish is required. If not originally free from such defects, the surface may be machined or otherwise conditioned to eliminate these defects.

(c) Thickness of the cylinder base may not be less than the prescribed minimum wall thickness of the cylindrical shell. The cylinder base must have a basic torispherical, hemispherical, or ellipsoidal interior base configuration where the dish radius is no greater than 1.2 times the inside diameter of the shell. The knuckle radius may not be less than 12 percent of the inside diameter of the shell. The interior base contour may deviate from the true torispherical, hemispherical or ellipsoidal configuration provided that—

(1) Any areas of deviation are accompanied by an increase in base thickness;

(2) All radii of merging surfaces are equal to or greater than the knuckle radius;

(3) Each design has been qualified by successfully passing the cycling tests in § 178.46-6(f); and

(4) Detailed specifications of the base design are available to the inspector.

(d) For free standing cylinders, the base thickness must be at least two times the minimum wall thickness along the line of contact between the cylinder base and the floor when the cylinders are in the vertical position.

(e) Welding or brazing is prohibited.

(f) Each new design and any significant change to any acceptable design must be qualified for production by testing prototype samples as follows:

(1) Three samples must be subjected to 100,000 pressure reversal cycles between zero and service pressure or 10,000 pressure reversal cycles between zero and test pressure, at a rate not in excess of 10 cycles per minute without failure.

(2) Three samples must be pressurized to destruction and failure must not occur at less than 2.5 times the marked cylinder service pressure. Each cylinder must remain in one piece. Failure must initiate in the cylinder sidewall in a longitudinal direction. Rate of pressurization must not exceed 200 psi per second.

(g) In this specification "significant change" means a 10 percent or greater change in cylinder wall thickness, service pressure, or diameter; a 30 percent or greater change in water capacity or base thickness; any change in material; over 100 percent increase in size of openings; or any change in the number of openings.

§ 178.46-7 Wall thickness. (a) The minimum wall thickness must be such that the wall stress at the minimum specified test pressure will not exceed 80 percent of the minimum yield strength nor exceed 67 percent of the minimum ultimate tensile strength as verified by physical tests in § 178.46-13.

(b) Calculations must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch.
P = prescribed minimum test pressure in pounds per square inch (see § 178.46-11(c)).
D = outside diameter in inches; and
d = inside diameter in inches.

(c) The minimum wall thickness for any cylinder with an outside diameter greater than 5 inches must be 0.125 inch.

§ 178.46-8 Openings. (a) Openings are permitted in heads only.

(b) The size of any centered opening in a head may not exceed one-half the outside diameter of the cylinder.

(c) Other openings are permitted in the head of a cylinder if:

(1) Each opening does not exceed 2.625 inches in diameter, or one-half the outside diameter of the cylinder, whichever is less;

(2) Each opening is separated from each other by a ligament; and

(3) Each ligament which separates two openings must be at least three times the average of the diameters of the two openings.

(d) All openings must be circular.

(e) All openings must be threaded. Threads must comply with the following:

(1) Each thread must be clean cut, even, without checks, and to gauge.

(2) Taper threads, when used, must conform to one of the following:

(i) American Standard Pipe Thread (NPT) type, conforming to the requirements of Federal Standard H-28 (1978), Section 7;

(ii) National Gas Taper Thread (NGT) type, conforming to the requirements of Federal Standard H-28 (1978), Sections 7 and 9; or

(iii) Other taper threads conforming to other standards may be used provided the length is not less than that specified for NPT threads.

(3) Straight threads, when used, must conform to one of the following:

(i) National Gas Straight Thread (NGS) type, conforming to the requirements of Federal Standard H-28, (1978), Sections 7 and 9;

(ii) Unified Thread (UN) type, conforming to the requirements of Federal Standard H-28, (1978), Section 2;

(iii) Controlled Radius Root Thread (UNJ) type, conforming to the requirements of Federal Standard H-28 (1978), Section 4.

(iv) Other straight threads conforming to other recognized standards may be used provided that the requirements in subparagraph (e)(4) of this section are met.

(4) All straight threads must have at least 6 engaged threads, a tight fit, and a factor of safety in shear of at least 10 at the test pressure of the cylinder. Shear stress must be calculated by using the appropriate thread shear area in accordance with Federal Standard H-28 (1978), Appendix A5, Section 3.

§ 178.46-9 Heat treatment. Prior to any test, all cylinders must be subjected to a solution heat treatment and aging treatment appropriate for the aluminum alloy used.

§ 178.46-10 Pressure relief devices and protection for valves, pressure relief devices, and other connections. Pressure relief devices and protection arrangements for valves, pressure relief devices, and other connections must comply with §§ 173.34(d) and 173.301(g) of this subchapter.

§ 178.46-11 Hydrostatic test. (a) Each cylinder must be subjected to an internal test pressure using the water jacket equipment and method or other suitable equipment and method. The testing apparatus must be operated in a manner so as to obtain accurate data. The pressure gauge used must permit reading to an accuracy of one percent. The expansion gauge must permit reading the total expansion to an accuracy of either one percent or 0.1 cubic centimeter.

(b) The test pressure must be maintained for a sufficient period of time to assure complete expansion of the cylinder. In no case may the pressure be held less than 30 seconds. If, due to failure of the test apparatus, the required test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psi, whichever is lower. If the test apparatus again fails to maintain the test pressure, the cylinder being tested must be rejected. Any internal pressure applied to the cylinder before any official test may not exceed 90 percent of the test pressure.

(c) The minimum test pressure is the greatest of the following:

(1) 450 psi regardless of service pressure;

(2) Two times the service pressure for cylinders having service pressure less than 500 psi; or

(3) Five-thirds times the service pressure for cylinders having a service pressure of at least 500 psi.

(d) Permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.

§ 178.46-12 Flattening test. (a) The flattening test must be performed on one cylinder taken at random out of each lot of 200 or less by placing the cylinder between wedge shaped knife edges having a 60° included angle, and rounded in accordance with the following table. The longitudinal axis of the cylinder must be at an angle 90° to the knife edges during the test.

Cylinder wall thickness in inches	Radius in inches
Under .150	500
.150 to .249	875
.250 to .349	1 500
.350 to .449	2 125
.450 to .549	2 750
.550 to .649	3 500
.650 to .749	4.125

(b) An alternate bend test in accordance with ASTM E 290-77 using a mandrel diameter not more than 6 times the wall thickness is authorized to qualify lots that fail the flattening test of this section without reheat treatment. If used, this test must be performed on two samples from one cylinder taken at random out of each lot of 200 cylinders or less.

(c) Each test cylinder must withstand flattening to nine times the wall thickness without cracking. When the alternate bend test is used, the test specimens shall remain uncracked when bent inward around a mandrel in the direction of curvature of the cylinder wall until the interior edges are at a distance apart not greater than the diameter of the mandrel.

§ 178.46-13 Mechanical properties test. (a) Two test specimens cut from one cylinder representing each lot of 200 cylinders or less must be tested. The results of the test must conform to at least the minimum acceptable mechanical property limits for aluminum alloys as specified in § 178.46-5(d)(2).

(b) Specimens must be 4D bar or gauge length 2 inches with width not over 1½ inch taken in the direction of extrusion approximately 180° from each other; *provided* that gauge length at least 24 times thickness with width not over 6 times thickness is authorized, when cylinder wall is not over ¾ inch thick. The specimen, exclusive of grip ends, may not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When the size of the cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold by pressure only, not by blows. When such specimens are used, the inspector's report must show that the specimens were so taken and prepared. Heating of specimens for any purpose is forbidden.

(c) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength must be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard B-557-79.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations must be based on an elastic modulus of 10,000,000 psi. In the event of controversy, the entire stress-strain diagram must be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain must be set while the specimen is under a stress of 6,000 psi, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine may not exceed ⅛ inch per minute during yield strength determination.

§ 178.46-14 Rejected cylinder. Reheat treatment of rejected cylinders is authorized one time; subsequent thereto, cylinders must pass all prescribed tests to be acceptable.

§ 178.46-15 Marking. (a) Each cylinder must be plainly and permanently marked, by stamping on the cylinder shoulder, top head, or neck, in the following order:

(1) The specification marking "DOT 3AL" must appear first on the cylinder followed immediately by the service pressure (for example: DOT-3AL 1800).

(2) The serial number and an identifying symbol or letters appear next; location of the number to be just below or immediately following the DOT mark; location of the symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT. No duplication is authorized.

Examples:
DOT-3AL 1800
1234
XY

or, DOT-3AL 1800-1234-XY

(3) Inspectors official mark, near serial number, date of test (such as 5-81 for May 1981), so placed that dates of subsequent tests can be easily added.

(4) Marks must be at least ¼ inch high if space permits.

(b) Other marks are authorized provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks may not conflict with any DOT required markings.

§ 178.46-16 Inspector's report. Required to be clear, legible, and in the following form:

(Place) .....
(Date) .....

Gas Cylinders:

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to .....
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Specification DOT .....
Serial numbers ..... to ..... inclusive
Cylinder manufacturer's identification symbol .....
Inspector's mark .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The cylinders were heat treated by the process of .....
(alloy and temper designation).

The material used was verified as to chemical analysis and record thereof is attached hereto.

All material and each cylinder were inspected, all that were accepted were found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was at least equal to the minimum design thickness. The outside diameter was determined to be ..... inches.

The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch. The required minimum thickness is ..... inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in Specification DOT-3AL were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the Department of Transportation Specification 3AL except as follows:

Exceptions .....
.....
.....

(Signed) .....
Inspector

(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSES OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long.
Made by ..... Company
For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Alloy designation*	Cylinders represented (Serial Nos.)	Chemical analyses										
		Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others: Ea.	Others: Total	Al
....	.....	...	...	...	...	...	...	...	...	...	.....	...
....	.....	...	...	...	...	...	...	...	...	...	.....	...
....	.....	...	...	...	...	...	...	...	...	...	.....	...
....	.....	...	...	...	...	...	...	...	...	...	.....	...

*Aluminum Association Alloy Designation Number.

The analyses were made by .....

(Signed) .....

(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long.
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (serial Nos.)	Yield strength at 0.2 percent offset (lbs. per sq. inch)	Tensile strength (pounds per sq. inch)	Elongation (percent in ..... size specimen)	Flattening test (record as multiple of t)
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company

For explanation of abbreviations and reference marks, see last page of this tariff.

Serial Nos. of cylinders tested arranged numerically	Actual test pressure (lbs. per sq. inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1] (Actual value)	Tare weight (lbs)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressures, then the basic data on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquids, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

(Place) .....

(Date) .....

§ 178.47 Specification 4DS; inside containers, welded stainless steel for aircraft use.

§ 178.47-1 Compliance. (a) Required in all details.

§ 178.47-2 Type, size and service pressure. (a) Type and size, welded stainless steel spheres (two seamless hemispheres) or circumferentially welded cylinders not over 100 pounds water capacity.

(b) Service pressure[1]. At least 500 to not over 900 pounds per square inch.

§ 178.47-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.47-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis; provided, that a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one container out of each lot of 200 or less.

(c) Verify compliance of containers with all requirements including markings; inspect inside before closing; verify heat treatment and welding procedure as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gage; report volumetric capacity and tare weight and minimum thickness of wall noted. Verify that all tests are conducted at temperatures between 60° F. and 90° F.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.47-5 Steel. (a) Types 304, 321 and 347 stainless steel are authorized with proper welding procedure and complying with the following analyses:

	Stainless steels		
	304 (percent)	321 (percent)	347 (percent)
Carbon (maximum)	0.08	0.08	0.08
Manganese (maximum)	2.00	2.00	2.00
Phosphorus (maximum)	.030	.030	.030
Sulfur (maximum)	.030	.030	.030
Silicon (maximum)	.75	.75	.75
Nickel	8.0/11.0	9.0/13.0	9.0/13.0
Chromium	18.0/20.0	17.0/20.0	17.0/20.0
Molybdenum	.....	.....	.....
Titanium	.....	[1]	.....
Columbium	.....	.....	[2]

[1] Titanium shall be not less than 5 × C and not more than 0.8 percent.

[2] Columbium shall be not less than 10 × C and not more than 1.0 percent.

Note 1: A heat of steel made under the above specifications check chemical analysis of which is slightly out of the specified range, is acceptable, if satisfactory in all other respects, provided the tolerances shown in the following table are not exceeded except as approved by the Department.

CHECK ANALYSIS TOLERANCES

Element	Limit or maximum specified (percent)	Tolerance (percent over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	To 0.15 incl.	0.01	0.01
	Over 1.15 to 2.50 incl.	0.05	0.05
Manganese	All ranges	.....	0.01
Phosphorus[1]	All ranges	.....	0.01
Sulphur	All ranges	0.05	0.05
Silicon	Over 0.30 to 1.00 incl.	0.05	0.05
Nickel	Over 5.30 to 10.00 incl.	0.10	0.10
	Over 10.00 to 14.00 incl.	0.15	0.15
Chromium	Over 15.00 to 20.00 incl.	0.20	0.20
Titanium	All ranges	0.05	0.05
Columbium	All ranges	0.05	0.05

[1] Rephosphorized steels not subject to check analysis for phosphorus.

§ 178.47-6 Identification of material. (a) Required; any suitable method.

§ 178.47-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized. Defects in welded joints shall not exceed the limits specified in § 178.47-16 covering radiographic inspection.

§ 178.47-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect is acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. No abrupt change in wall thickness is permitted. Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

(b) All seams of the sphere or cylinder must be fusion welded. Seams shall be of the butt type and means must be provided for accomplishing complete penetration of the joint.

§ 178.47-9 Attachments. (a) Attachments to the container are authorized by fusion welding provided that such attachments are made of weldable stainless steel in accordance with § 178.47-5.

§ 178.47-10 Wall thickness. (a) The minimum wall thickness shall be such that the wall stress at the minimum specified test pressure shall not be over 60,000 psi. Minimum wall .040 inch for any diameter container.

(b) Calculation for sphere must be made by the formula:

$$S = \frac{PD}{4tE}$$

where:

S = wall stress in pounds per square inch;
P = test pressure prescribed for water jacket test, i.e., at least two times service pressure, in pounds per square inch;
D = outside diameter in inches;
t = minimum wall thickness in inches;
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zones which zone shall extend a distance of 6 times wall thickness from center of weld);
E = 1.0 (for all other areas).

(c) Calculation for a cylinder must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch;
P = test pressure prescribed for water jacket test, i.e., at least two times service pressure, in pounds per square inch;
D = outside diameter in inches;
d = inside diameter in inches.

§ 178.47-11 Heat treatment. (a) The seamless hemispheres and cylinders may be stress relieved or annealed for forming. Welded container shall be stress relieved at a temperature of 775° F. ± 25° after process treatment and before hydrostatic test.

§ 178.47-12 Openings in container. (a) Each opening in the container must be provided with a fitting, boss, or pad of weldable stainless steel securely attached to the container by fusion welding.

(b) Attachments to a fitting, boss, or pad must be adequate to prevent leakage. Threads must comply with the following:

(1) Threads must be clean cut, even, without checks, and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the container; gaskets required, adequate to prevent leakage.

§ 178.47-13 Safety relief devices. (a) Safety relief devices must be as required by Department of Transportation Regulations (see § 173.34(d)).

[1] The "service pressure" limits the use of the container. It is shown by marks on container, for example DOT-4DS500 indicates the service pressure as 500 pounds per square inch.

§ 178.47-14 Process treatment. (a) Each container shall be hydraulically pressurized in a water jacket to at least 100 percent, but not more than 110 percent, of the test pressure and maintained at this pressure for a minimum of 3 minutes. Total and permanent expansion shall be recorded and included in the inspector's report.

§ 178.47-15 Hydrostatic test. (a) By water-jacket, operated so as to obtain accurate data. Pressure gage must permit reading to an accuracy of 1 percent. Expansion gage must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each container must be tested to at least 2 times service pressure.

(e) Container will then be inspected. Wall thickness lower than that required by § 178.47-10 shall be cause for rejection. Bulges and cracks shall be cause for rejection. Weld joint defects exceeding requirements of § 178.47-16 shall be cause for rejection.

§ 178.47-16 Radiographic inspection. (a) Required on all welded joints which are subjected to internal pressure, except that at the discretion of the disinterested inspector, openings less than 25 percent of the container diameter need not be subjected to radiographic inspection. Evidence of any defects likely to seriously weaken the container shall be cause for rejection.

(b) Radiographic inspection shall be performed subsequent to hydrostatic test.

§ 178.47-17 Burst test. (a) One container taken at random out of 200 or less shall be hydrostatically tested to destruction. Rupture pressure shall be included as part of the inspector's report.

§ 178.47-18 Flattening test. (a) **Flattening test for spheres.** At the weld between parallel steel plates on a press with welded seam at right angles to the plates, test one sphere taken at random out of each lot of 200 or less after hydrostatic test. Any projecting appurtenances may be cut off (by mechanical means only) prior to crushing.

(b) **Flattening test for cylinders.** Between knife edges, wedge shaped, 60° angle, rounded to ½ inch radius; test one cylinder taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.47-19 Acceptable results for flattening and burst tests. (a) Flattening required to 50 percent of the original outside diameter without cracking.

(b) Burst pressure shall be at least 3 times service pressure.

§ 178.47-20 Rejected containers. (a) Repair of welded seams by welding prior to process treatment authorized; subsequent thereto containers must be heat treated and pass all prescribed tests.

§ 178.47-21 Marking. (a) Marking on each container by stamping plainly and permanently only on a permanent attachment or on a metal nameplate permanently secured to the container by means other than soft solder, as follows:

(1) DOT-4DS followed by the service pressure (for example: DOT-4DS900).

(2) A serial number and an identifying symbol (letters) location of a number to be just below the DOT mark; location of symbol to be just below the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized;

Example: DOT-4DS300
1234
XY

(3) Inspector's official mark, near serial number, date of test (such as 8-61 for August 1961) so placed that dates of subsequent tests can be easily added.

§ 178.47-22 Size of marks. (a) Of sufficient size to be legible.

§ 178.47-23 Inspector's report. (a) Required to be clear legible and in the following form:

(Place) .....
(Date) .....

Gas .....
(spheres-cylinders)

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into .....
(Shoulder-metal plate, § 178.47-21)
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These containers were made by process of .....
.....
.....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers .....
(were—were not)
marked on the material.

All material, such as plates and seamless tubing, was inspected and each container was inspected both before and after closing in the ends; all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the container. The processes of manufacture of containers were supervised and found to be efficient and satisfactory.

The container walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests and other tests, as prescribed in specification No. DOT-4DS were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these containers proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4DS except as follows:

Exceptions .....
.....
.....

(Signed) .....
Inspector

(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CONTAINERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

NOTE: Any omission of analysis by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr

The analyses were made by .....

(Signed) .....

(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CONTAINERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Containers represented by test (Serial Nos.)	Rupture pressure (pounds per square inch)	Flattening test

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CONTAINERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of containers tested arranged numerically	Process pressure (pounds per square inch)	Total expansion at process pressure (cubic centimeters)	Permanent expansion at process pressure (cubic centimeters)	Actual test pressure (pounds per square inch)	Total expansion at test pressure (cubic centimeters)	Permanent expansion at test pressure (cubic centimeters)	Percent ratio of permanent expansion to total expansion	Tare weight (pounds)	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only one out of each lot of 200 or less containers, the check on the others must be indicated by a notation hereon reading: "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

(Signed) .....

§ 178.47-24 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.48 [Reserved]

§ 178.49 [Reserved]

§ 178.50 Specification 4B; welded and brazed steel cylinders.

§ 178.50-1 Compliance. (a) Required in all details.

§ 178.50-2 Type, size, and service pressure. (a) Type and size. Must be welded or brazed type; longitudinal seams must be forge lap-welded or brazed; not over 1,000 pounds water capacity (nominal). Cylinders closed in by spinning process not authorized.

(b) Service pressure:[1] At least 150 lb to not over 500 pounds per square inch.

§ 178.50-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.50-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder, for example, DOT-4B300 indicates the service pressure as 300 pounds per square inch.

§ 178.50-5 Steel. (a) Open-hearth, electric or basic oxygen process steel of uniform quality. Content percent for the following not over: carbon, 0.25; phosphorus, 0.045; sulphur, 0.050.

§ 178.50-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.50-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.50-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. Exposed bottom welds on cylinders over 18" long must be protected by footrings. Seams must be made as follows:

(1) Circumferential seams: By welding or by brazing. Heads attached by brazing must have a driving fit with the shell, unless the shell is crimped, swedged, or curled over the skirt or flange of the head, and be thoroughly brazed until complete penetration by the brazing material of the brazed joint is secured. Depth of brazing from end of shell must be at least four times the thickness of shell metal.

(2) Longitudinal seams in shells: By forged lap welding, by copper brazing, by copper alloy brazing, or by silver alloy brazing. Copper alloy composition must be: Copper, 95 percent minimum; Silicon, 1.5 percent to 3.85 percent, Manganese, 0.25 percent to 1.10 percent. The melting point of the silver alloy brazing material must be in excess of 1000° F. When brazed, the plate edge must be lapped at least eight times the thickness of plate, laps being held in position, substantially metal to metal, by riveting or electric spot-welding; brazing must be done by using a suitable flux and by placing brazing material on one side of seam and applying heat until this material shows uniformly along the seam of the other side.

(b) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.50-9 Welding or brazing. (a) The attachment to the tops and bottoms only of cylinders by welding or brazing of necklings, footrings, handles, bosses, pads, and valve protection rings is authorized: Provided, That such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon content of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure.

§ 178.50-10 Wall thickness. (a) For outside diameters over 6" the minimum wall thickness shall be 0.090 inch. In any case the minimum wall thickness shall be such that calculated wall stress at minimum test pressure (§ 178.50-14(d)) shall not exceed the following values:

(1) 24,000 pounds per square inch for cylinders without longitudinal seam;

(2) 22,800 pounds per square inch for cylinders having copper brazed or silver alloy brazed longitudinal seam;

(3) 18,000 pounds per square inch for cylinders having forged lapped welded longitudinal seam.

(b) Calculation must be made by the formula:

$$S = \frac{(P)(1.3D^2 + 0.4d^2)}{(D^2 - d^2)}$$

where

S = wall stress in pounds per square inch,
P = minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater,
D = outside diameter in inches,
d = inside diameter in inches.

§ 178.50-11 Heat treatment. (a) Body and heads formed by drawing or pressing must be uniformly and properly heat treated prior to tests.

§ 178.50-12 Opening in cylinders. (a) Each opening in cylinders, except those for safety devices, must be provided with a fitting, boss, or pad, securely attached to cylinder by brazing or by welding or by threads. Fitting, boss, or pad must be of steel suitable for the method of attachment employed, and which need not be identified or verified as to analysis, except that if attachment is by welding, carbon content must not exceed 0.25 percent. If threads are used, they must comply with the following:

Note 1: A brass fitting may be brazed to the steel boss or flange on cylinders used as component parts of hand fire extinguishers.

(1) Threads must be clean cut, even, without checks, and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

(b) Closure of fitting, boss, or pad must be adequate to prevent leakage.

§ 178.50-13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d), 173.301(g) and 173.124(a)).

§ 178.50-14 Hydrostatic test. (a) By water-jacket or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less shall be tested as outlined in paragraphs (a), (b), and (c) of this section to at least two times service pressure.

(2) All cylinders not tested as outlined in subparagraph (d)(1) of this section must be examined under pressure of at least two times service pressure and show no defect.

§ 178.50-15 Flattening test. (a) Between knife edges, wedge shaped, 60° angle, rounded to ½" radius; test 1 cylinder[1] taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.50-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1 cylinder, or part thereof heat-treated as required, taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches: Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8–78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversey, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.50-17 Acceptable results for physical and flattening tests. (a) Elongation at least 40 percent for 2 inch gauge length or at least 20 percent in other cases; yield strength not over 73 percent of tensile strength; flattening test not required.

Exception. Flattening test is required, without cracking, to 6 times wall thickness when cylinders are made of lap-welded pipe, in such case rings (loop ends) cut from each end of pipe must be tested with weld 45° or less from point of greatest stress, if a ring fails another from the same end of pipe may be tested.

§ 178.50-18 Rejected cylinders. (a) Reheat treatment authorized; subsequently thereto, acceptable cylinders must pass all prescribed tests. Repair of brazed seams by brazing and welded seams by welding is authorized.

§ 178.50-19 Marking. (a) Marking on each cylinder by stamping as follows:

(1) DOT-4B followed by the service pressure (for example, DOT-4B300, etc.).

(2) A serial number and an identifying symbol of the maker. The symbol must be registered with the Director, OHMT. Duplications are not authorized. Lot numbers, not over 500 cylinders in each lot, in place of serial numbers authorized for cylinders not over 2 inches outside diameter or for cylinders with volumetric capacity not exceeding 60 cubic inches.

(3) Inspector's official mark.

(4) Date of test (such as 6–80 for April 1980).

(5) Additional markings are permitted.

(b) *Sequence of marks.* Serial number shall be just below or immediately following the DOT mark; identifying symbol shall be just below or immediately following the serial number; inspector's official mark shall be near the serial number. Date of test shall be so placed that dates of subsequent test can easily be added. Symbol in front of or following the serial number, with space between, or symbol and serial number stamped into welded or brazed-on valve spud directly above the DOT mark located on head of cylinder are also authorized. Other variations in sequence of marks authorized only when necessitated by lack of space.

(c) *Location of markings.* Markings may be stamped plainly and permanently in the following locations on the cylinder:

(1) On shoulders and top heads when they are not less than 0.087-inch thick.

(2) On side wall adjacent to top head for wide walls which are not less than 0.090 inch thick.

(3) On a cylindrical portion of the shell which extends beyond the recessed bottom of the cylinder, constituting an integral and non-pressure part of the cylinder.

(4) On a metal plate attached to the top of the cylinder or permanent part thereof, sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least 1/4-inch thick and must be attached by welding, or by brazing. The brazing rod is to melt at a temperature of 1100 F. Welding or brazing must be along all the edges of the plate.

(5) On the neck, neckring, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder.

(6) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 25 pounds.

§ 178.50-20 Size of marks. (a) At least ¼" high if space permits.

§ 178.50-21 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....
(Date) .....

Gas Cylinders

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
The ..... permitted in § 178.50-9
(neckrings—footings, etc)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
(heat-purchase order)
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers .....
(were—were not)
marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....
inch. The outside diameter was determined by a close approximation to be .....
inches. The wall stress was calculated to be ..... pounds per square inch
under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-4B were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

[1] For lots of 30 or less, physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4B except as follows:

Exceptions .....

.....

.....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity[3]
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.50-22 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.51 Specification 4BA; welded or brazed steel cylinders made of definitely prescribed steels.

§ 178.51-1 Compliance. (a) Required in all details.

§ 178.51-2 Type, size, and service pressure. (a) *Type.* Cylinders may be spherical or cylindrical in shape. Closures made by the spinning process are not authorized.

(1) Spherical type cylinders must be made from two seamless hemispheres joined by the welding of one circumferential seam.

(2) Cylindrical type cylinders must be of circumferentially welded or brazed construction.

(b) *Size.* The capacity of the cylinder must be 1,000 pounds water capacity or less.

(c) *Service pressure.* The service pressure must be at least 225 and not over 500 pounds per square inch gauge.

§ 178.51-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with §173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with §173.300(b) of this subchapter.

§ 178.51-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements of this specification. For cylinders made by the billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with specification requirements including: markings; condition of inside; tests; threads; heat treatment. Obtain samples for all tests, and check chemical analyses, witness all tests; report volumetric capacity, tare weight (see report form), and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.51-5 Steel. (a) Designations and limiting chemical compositions of steels authorized by this specification shall be as shown in §178.51-20, Table I.

§ 178.51-6 Identification of material. (a) Required: any suitable method except that plates and billets for hot-drawn cylinders shall be marked with the heat number.

§ 178.51-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.51-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings. Seams must be made as follows: Minimum thickness of heads and bottoms shall be not less than 90 percent of the required thickness of the side wall.

(b) Circumferential seams. By welding or by brazing. Heads attached by brazing must have a driving fit with the shell, unless the shell is crimped, swedged, or curled over the skirt or flange of the head, and must be thoroughly brazed until complete penetration by the brazing material of the brazed joint is secured. Depth of brazing from end of shell must be at least four times the thickness of shell metal.

(c) Longitudinal seams in shells: By copper brazing, copper alloy brazing, or by silver alloy brazing. Copper alloy composition must be: Copper 95 percent minimum, Silicon 1.5 percent to 3.85 percent, Manganese 0.25 percent to 1.10 percent. The melting point of the silver alloy brazing material must be in excess of 1000° F. The plate edge must be lapped at least eight times the thickness of plate, laps being held in position, substantially metal to metal, by riveting or by electric spot-welding. Brazing must be done by using a suitable flux and by placing brazing material on one side of seam and applying heat until this material shows uniformly along the seam of the other side.

(1) Strength of longitudinal seam: Copper brazed longitudinal seam must have strength at least 3.2 times the strength of the steel wall.

(d) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.51-9 Welding and brazing. (a) The attachment to the tops and bottoms only of cylinders by welding or brazing of neckrings, footrings, handles, bosses, pads, and valve protection rings is authorized provided that such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon extent of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure.

§ 178.51-10 Wall thickness. (a) For outside diameters over 6" the minimum wall thickness shall be 0.078". In any case the minimum wall thickness shall be such that the calculated wall stress at minimum test pressure (§178.51-14) shall not exceed the lesser value of any of the following:

(1) The value shown in table I, § 178.51-20, for the particular material under consideration;

(2) One-half of the minimum tensile strength of the material determined as required in § 178.51-15;

(3) 35,000 pounds per square inch.

(4) Further provided that wall stress for cylinders having copper brazed longitudinal seams must not exceed 95 percent of any of the above values. Measured wall thickness shall not include galvanizing or other protective coating.

(b) Cylinders that are cylindrical in shape must have the wall stress calculated by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch,
P = minimum test pressure prescribed for water jacket test,
D = outside diameter in inches,
d = inside diameter in inches.

(c) Cylinders that are spherical in shape must have the wall stress calculated by the formula:

$$S = \frac{PD}{4tE}$$

where:

S = wall stress in pounds per square inch,
P = minimum test pressure prescribed for water jacket test,
D = outside diameter in inches,
t = minimum wall thickness in inches,
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zones which zone shall extend a distance of 6 times wall thickness from center line of weld),
E = 1.0 (for all other areas)

(d) For a cylinder with a wall thickness less than 0.100 inch, the ratio of tangential length to outside diameter may not exceed 4.1.

§ 178.51-11 Heat treatment. (a) Each cylinder must be uniformly and properly heat treated prior to test by the applicable method shown in § 178.51-20, table I. Heat treatment must be accomplished after all forming and welding operations, except that when brazed joints are used, heat treatment must follow any forming and welding operations, but may be done before, during or after the brazing operations.

(b) Heat treatment is not required after welding or brazing weldable low carbon parts to attachments of similar material which have been previously welded or brazed to the top or bottom of cylinders and properly heat treated, provided such subsequent welding or brazing does not produce a temperature in excess of 400° F. in any part of the top or bottom material.

§ 178.51-12 Openings in cylinders. (a) Any opening must be placed on other than a cylindrical surface.

(b) Each opening in a spherical type cylinder must be provided with a fitting, boss, or pad of weldable steel securely attached to the container by fusion welding.

(c) Each opening in a cylindrical type cylinder must be provided with a fitting, boss, or pad, securely attached to container by brazing or by welding.

(d) If threads are used, they must comply with the following:

(1) Threads must be clean-cut, even, without checks and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.51-13 Pressure devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's Regulations that apply. (See §§ 173.34(d), 173.124(a), and 173.301(g) and 173.301(k) of this subchapter).

[1] The welded test plate shall be of one of the heats in the lot of 200 or less which it represents, in the same condition and approximately the same thickness as the cylinder wall except that in no case shall it be of lesser thickness than that required for a one-quarter size Charpy impact specimen. The weld must be made by the same procedure and subjected to the same heat treatment as the major weld on the cylinder.

§ 178.51-14 Hydrostatic test. (a) By water jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat treatment and previous to the official test must not exceed 90 percent of the test pressure.

(c) Permanent volumetric expansion must not exceed 10 percent of the total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less shall be tested as outlined in paragraphs (a), (b), and (c) of this section to at least two times service pressure.

(2) All cylinders not tested as outlined in subparagraph (d)(1) of this section must be examined under pressure of at least two times service pressure and show no defect.

§ 178.51-15 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from one cylinder or part thereof having passed the hydrostatic test, and heat-treated as required, taken at random out of each lot of 200 or less. Physical test for spheres required on 2 specimens cut from flat representative sample plate of the same heat taken at random from the steel used to produce the sphere. This flat steel from which 2 specimens are to be cut must receive the same heat treatment as the spheres themselves. Sample plates to be taken for each lot of 200 or less spheres.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches, provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ¾₁₆ inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method on the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load"), corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain reference shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.51-16 Elongation. (a) Physical test specimens must show at least 40 percent for 2-inch gauge length or at least 20 percent in other cases, except that these elongation percentages may be reduced numerically by 2 for 2-inch specimens and by 1 in other cases for each 7,500 pounds per square inch increment of tensile strength above 50,000 pounds per square inch to a maximum of four such increments.

§ 178.51-17 Tests of Welds. (Does not apply to brazed seams.)

(a) **Tests of welds. Tensile test.** A specimen shall be cut from one cylinder of each lot of 200 or less, or welded test plate.[1] The specimen must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3.

Should this specimen fail to meet the requirements, specimens may be taken from two additional cylinders or welded test plates from the same lot and tested. If either of the latter specimens fail to meet the requirements, the entire lot represented shall be rejected.

(b) **Guided bend test.** A "root" bend test specimen shall be cut from the cylinder or welded test plate, used for the tensile test specified in § 178.51-17(b). Specimens must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3.

(c) **Alternate guided-bend test.** This test may be used and must be as required by CGA Pamphlet C-3. The specimen shall be bent until the elongation at the outer surface, adjacent to the root of the weld

For explanation of abbreviations and reference marks, see last page of this tariff.

between the lightly scribed gauge lines—a to be, shall be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 pounds per square inch, as provided in §178.51-16(a).

§ 178.51-18 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair of brazed seams by brazing and welded seams by welding is authorized.

§ 178.51-19 Marking. (a) Marking on each cylinder stamped as follows:

(1) DOT-4BA followed by the service pressure (for example DOT-4BA240, etc.)

(2) A serial number and an identifying symbol of the maker. The symbol must be registered with the Director, OHMT. Duplications unauthorized. Lot numbers in place of serial numbers authorized for cylinders not over 2 inches outside diameter or for cylinders with volumetric capacity not exceeding 60 cubic inches.

(3) Inspector's official mark.

(4) Date of test (such as 4-50 for April 1950).

(5) Additional markings are permitted.

(b) Sequence of marks. Number shall be just below or immediately following the DOT mark; identifying symbol shall be just below or immediately following the number; inspector's official mark shall be near the serial number. Date of test shall be so placed that dates of subsequent test can easily be added. Symbol in front of or following the number, with space between, or symbol and serial number stamped into welded or brazed-on valve spud directly above the DOT mark located on head of cylinder are also authorized. Other variations in sequence of marks authorized only when necessitated by lack of space.

(c) Location of markings. Markings may be stamped plainly and permanently in the following locations on the cylinder:

(1) On shoulders and top heads not less than 0.087 inch thick.

(2) On side wall adjacent to top head for side walls not less than 0.090 inch thick.

(3) On a cylindrical portion of the shell which extends beyond the recessed bottom of the cylinder constituting an integral and non-pressure part of the cylinder.

(4) On a plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least 1/16 inch thick and must be attached by welding, or by brazing at a temperature of at least 1100° F. throughout all edges of the plate.

(d) Size of marks. Space permitting, at least ¼ inch high.

(5) On the neck, necking, valve boss, valve protection sleeve, or similar part permanently attached to the top end of the cylinder.

(6) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 25 pounds.

§ 178.51-20 Authorized steel. (a) As specified in Table I of Appendix A to this part.

§ 178.51-21 Inspector's report. (a) Required to be clear, legible and in following form:

(Place) .....

(Date) .....

Steel Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the ..... of the cylinder are

(location of marking)

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks .....

These cylinders were made by process of .....

.....

.....

The material used was type ..... authorized in table I of Spec. No. 4BA.

The material used was identified by the following .....

(heat-purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto. The heat numbers .....

(were - were not)

marked on the material.

All material was inspected and all that was accepted was found free from seams, cracks, laminations and other injurious defects.

The compliance of cylinders with specification requirements was verified including markings condition of inside, tests, threads, etc. All cylinders with defects which might prove injurious were rejected. The processes of manufacture and heat treatment were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, tensile tests of material, and other tests, as prescribed in specification No. DOT 4BA ..... were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification.

Each cylinder ..... been equipped

(has—has not)

with safety devices as follows .....

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4BA except as follows:

Exceptions .....

.....

.....

.....

(Manufacturer's name)

By .....

(Signed) .....

Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF STEEL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis										
				C	P	S	Si	Mn	Ni	Cr	Mo	Cu	Al	Zr

Steel was manufactured by ..... Company.

The originals of the certified mill test reports are in the files of the manufacturer.

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in inches)	Reduction of area (percent)	Weld tensile test	Weld bend test

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity[3]
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.51-22 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.52 [Reserved]

§ 178.53 Specification 4D; inside containers, welded steel for aircraft use.

§ 178.53-1 Compliance. (a) Required in all details.

§ 178.53-2 Type, size, and service pressure. (a) Type and size. Welded steel spheres (two seamless hemispheres) or circumferentially welded cylinders (two seamless drawn shells) not over 100 pounds water capacity. Cylinders closed in by spinning process not authorized.

(b) Service pressure.[1] At least 300 to not over 500 pounds per square inch.

§ 178.53-3 Inspection by whom and where. Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, and having a water capacity not exceeding 1,100 cubic inches, inspections may be performed by a competent inspector of the manufacturer. Chemical analyses and tests must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with §173.300(b) of this subchapter.

§ 178.53-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analysis; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.53-5 Steel. (a) Open-hearth or electric steel of uniform and weldable quality. Content percent for the following not over: carbon, 0.25; phosphorus, 0.045; sulfur, 0.050, except that the following steels commercially known as 4130X, Type 304, 316, 321, and 347 stainless steels may be used with proper welding procedure and complying with the following analyses:

	4130X	Percent
Carbon		0.25-0.35
Manganese		0.40-0.60
Phosphorus		0.04 max.
Sulfur		0.05 max.
Silicon		0.15-0.35
Chromium		0.80-1.10
Molybdenum		0.15-0.25
Zirconium		
Nickel		

	Stainless steels			
	304 (percent)	316 (percent)	321 (percent)	347 (percent)
Carbon (maximum)	0.08	0.08	0.08	0.08
Manganese (maximum)	2.00	2.00	2.00	2.00
Phosphorus (maximum)	.030	.045	.030	.030
Sulfur (maximum)	.030	.030	.030	.030
Silicon (maximum)	.75	1.00	.75	.75
Nickel	8.0-11.0	10.0-14.0	9.0-13.0	9.0-13.0
Chromium	18.0-20.0	16.0-18.0	17.0-20.0	17.0-20.0
Molybdenum	.....	2.0-3.0	.....	.....
Titanium	.....	.....	[1]	.....
Columbium	.....	.....	.....	[2]

[1] Titanium shall not be less than 5 × C and not more than 0.60 percent.

[2] Columbium shall not be less than 10 × C and not more than 1.0 percent.

Note 1: A heat of steel made under the above specifications, check chemical analysis of which is slightly out of the specified range, is acceptable, if satisfactory in all other respects, provided the tolerances shown in the following table are not exceeded except as approved by the Department.

CHECK ANALYSIS TOLERANCES

Element	Limit or maximum specified (percent)	Tolerance (percent) over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	To 0.15 incl.	0.01	0.01
	Over 0.15 to 0.40 incl.	0.03	0.04
Manganese	To 0.60 incl.	0.03	0.03
	Over 1.15 to 2.50 incl.	0.05	0.05
Phosphorus[1]	All ranges	.....	0.01
Sulphur	All ranges	.....	0.01
Silicon	To 0.30 incl.	0.02	0.03
	Over 0.30 to 1.00 incl.	0.05	0.05
Nickel	Over 5.30 to 10.00 incl.	0.10	0.10
	Over 10.00 to 14.00 incl.	0.15	0.15
Chromium	To 0.90 incl.	0.03	0.03
	Over 0.90 to 2.10 incl.	0.05	0.05
	Over 15.00 to 20.00 incl.	0.20	0.20
Molybdenum	To 0.20 incl.	0.01	0.01
	Over 0.20 to 0.40 incl.	0.02	0.02
	Over 1.75 to 3.00 incl.	0.10	0.10
Titanium	All ranges	0.05	0.05
Columbium	All ranges	0.05	0.05

[1] Rephosphorized steels not subject to check analysis for phosphorus.

§ 178.53-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.53-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.53-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished container appreciably; reasonably smooth and uniform surface finish required.

(b) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.53-9 Wall thickness. (a) The wall stress at minimum test pressure shall not exceed 24,000 pounds per square inch, except where steels commercially known as 4130X, Type 304, 316, 321 and 347 stainless steels are used, stress at test pressures shall not exceed 37,000 pounds per square inch. Minimum wall for any container having a capacity of 1,100 cubic inches or less is 0.04 inch. Minimum wall for any container having a capacity in excess of 1,100 cubic inches is 0.095 inch.

(b) Calculation for a sphere must be made by the formula:

$$S = \frac{PD}{4tE}$$

where:

S = wall stress in pounds per square inch;
P = test pressure prescribed for water jacket test, i.e., at least two times service pressure, in pounds per square inch;
D = outside diameter in inches;
t = minimum wall thickness in inches;
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zones which zone shall extend a distance of 6 times wall thickness from center of weld);
E = 1.0 (for all other areas).

[1] The "service pressure" limits the use of the container. It is shown by marks on container, for example, DOT-4D300 indicates the service pressure as 300 pounds per square inch.

For explanation of abbreviations and reference marks, see last page of this tariff.

(c) Calculation for a cylinder must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where

S = unit stress in pounds per square inch,
P = test pressure prescribed for water jacket test, (i.e., at least two times service pressure, in pounds per square inch,
D = outside diameter in inches,
d = inside diameter in inches.

§ 178.53-10 Heat treatment. (a) The completed cylinder must be uniformly and properly heat-treated prior to tests.

§ 178.53-11 Openings in container. (a) Each opening in container, except those for safety devices, must be provided with a fitting, boss, or pad, securely attached to container by brazing or by welding or by threads. If threads are used, they must comply with the following:

(1) Threads must be clean cut, even, without checks, and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the container; gaskets required, adequate to prevent leakage.

(b) Closure of fitting, boss, or pad must be adequate to prevent leakage.

§ 178.53-12 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Devices must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

§ 178.53-13 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Containers must be tested as follows:

(1) Each container to at least 2 times service pressure, or

(2) One container out of each lot of 200 or less to at least 3 times service pressure. Others must be examined under pressure of 2 times service pressure and show no defects.

§ 178.53-14 Flattening test for spheres and cylinders. (a) **Flattening test for spheres.** Between parallel steel plates on a press with welded seam at right angles to the plates; test one sphere taken at random out of each lot of 200 or less after hydrostatic test. Any projecting appurtenances may be cut off (by mechanical means only) prior to crushing.

(b) **Flattening test for cylinders.** Between knife edges, wedge shaped, 60° angle, rounded to ½ inch radius; test one cylinder[1] taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.53-15 Physical test and specimens for spheres and cylinders. (a) **Physical test for spheres.** Required on 2 specimens cut from flat representative sample plate of the same heat taken at random from the steel used to produce the sphere. This flat steel from which the 2 specimens are to be cut must receive the same heat-treatment as the spheres themselves. Sample plates to be taken for each lot of 200 or less spheres.

(b) **Specimens for spheres.** Specimens must be gauge length 2 inches with width not over 1½ inches; provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when wall of sphere is not over ¾ inch thick.

(c) **Physical test for cylinders.** Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(d) **Specimens for cylinders.** Specimens must be gauge length 8 inches with width not over 1½ inches; or gauge length 2 inches with width not over 1½ inches; provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ¾ inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section. Heating of specimen for any purpose is not authorized.

(e) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(i) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculation shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.53-16 Acceptable results for physical and flattening tests. (a) Elongation at least 40 percent for 2 inch gauge length or at least 20 percent in other cases; yield strength not over 73 percent of tensile strength; flattening test not required.

(b) Elongation at least 20 percent for 2 inch gauge length or 10 percent in other cases; flattening required to 50 percent of the original outside diameter without cracking.

§ 178.53-17 Rejected cylinders. (a) Reheat-treatment authorized; subsequent thereto, acceptable containers must pass all prescribed tests. Repair of welded seams by welding prior to reheat-treatment authorized.

§ 178.53-18 Marking. (a) Marking on each container by stamping plainly and permanently only where the metal is at least 0.09 inch thick, or on a metal name-plate permanently secured to the container by means other than soft solder, or by means that would not reduce the wall thickness, as follows:

(1) DOT-4D followed by the service pressure (for example, DOT-4D300, etc.).

(2) A serial[2] number and an identifying symbol (letters); location[3] of number to be just below or immediately following the DOT mark; location[3] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-4D300 1234 XY — DOT-4D300-1234 XY

(3) Inspector's official mark, near serial number; date of test (such as 8-50 for August 1950), so placed that dates of subsequent tests can be easily added.

§ 178.53-19 Size of marks. (a) Of sufficient size to be legible.

§ 178.53-20 Inspector's report. (a) Required to be clear, legible, and in the following form:

(Place) .....
(Date) .....
Gas .....
(spheres-cylinders)
Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the .....
(shoulder-metal plate, § 178.53-18)
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....

[1] For lots of 30 or less, physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to the same heat treatment as the finished cylinder.

[2] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 60 cubic inches.

[3] Symbol in front of following the number with ample space between is also authorized. Other variation in location authorized only when necessitated by lack of space.

Other marks (if any) .....

These containers were made by process of .....

.....

.....

The material used was identified by the following ..... (heat purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto

The heat numbers ..... (were - were not)

marked on the material

All material, such as plates, billets and seamless tubing, was inspected and each container was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of containers were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....

inch. The outside diameter was determined by a close approximation to be .....

inches. The wall stress was calculated to be ..... pounds per square inch

under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT 4D were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

We do certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4D except as follows:

Exceptions .....

.....

.....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CONTAINERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.53-21 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

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§ 178.54 [Reserved]

§ 178.55 Specification 4B240ET; welded and brazed cylinders made from electric resistance welded tubing.

§ 178.55-1 Compliance. (a) Required in all details.

§ 178.55-2 Type, spinning process, size and service pressure. (a) Type. Cylinders must be of brazed type made from electric resistance welded tubing.

(b) Spinning process. Cylinders closed in by spinning process authorized.

(c) Size. The maximum water capacity of this type shall not exceed 12 pounds or 333 cubic inches. The maximum outside diameter of the shell shall be five inches and maximum length of shell 21 inches.

(d) Service pressure.[1] Must be 240 pounds per square inch.

§ 178.55-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.55-4 Duties of inspector. The inspector shall:

(a) Inspect all material and reject any not meeting the requirements.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.55-5 Steel. (a) Open-hearth, basic oxygen, or electric steel of uniform quality. Plain carbon steel content percent for the following not over: Carbon, 0.25; phosphorus, 0.045; sulfur, 0.050. The addition of other elements for alloying effect is prohibited.

§ 178.55-6 Identification of material. (a) Required; any suitable method.

§ 178.55-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.55-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. Heads may be attached to shells by lap brazing or may be formed integrally. The thickness of the bottom of cylinders welded or formed by spinning is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thicknesses to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position. Seams must be made as follows:

(b) Circumferential seams: By brazing only. Heads attached to shells by the lap brazing method shall overlap not less than four times wall thickness. Brazing material shall have a melting point of not less than 1000° F. Heads must have a driving fit with the shell unless the shell is crimped, swedged, or curled over the skirt or flange of the head and be thoroughly brazed until complete penetration of the joint by the brazing material is secured. Brazed joints may be repaired by brazing.

(c) Longitudinal seams in shell: Electric resistance welded joints only. No repairs to longitudinal joints permitted.

(d) Welding procedures and operators must be qualified in accordance with GCA Pamphlet C-3.

§ 178.55-9 Welding or brazing. (a) The attachment to the tops and bottoms only of cylinders by welding or brazing of neckrings, footrings, handles, bosses, pads, and valve protection rings is authorized provided that such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon content of which must not exceed 0.25 percent.

§ 178.55-10 Wall thickness. (a) The wall stress at two times service pressure shall not exceed 18,000 pounds per square inch. Minimum thickness shall be 0.044 inch.

(b) Calculation must be made by the formula:

$$S = \frac{(P)(1.3D^2 + 0.4d^2)}{(D^2 - d^2)}$$

where—

S = wall stress, pounds per square inch.
P = 2 times service pressure.
D = outside diameter, in inches.
d = inside diameter in inches.

§ 178.55-11 Heat treatment. (a) Heads formed by drawing or pressing must be uniformly and properly heat treated prior to tests.

(b) Cylinders with integral formed heads or bases must be subjected to a normalizing operation. Normalizing and brazing operations may be combined, provided the operation is carried out at a temperature in excess of the upper critical temperature of the steel.

§ 178.55-12 Openings in cylinders. (a) Each opening in cylinders, except those for safety devices, must be provided with a fitting, boss, or pad, securely attached to cylinder by brazing or by welding or by threads. Fitting, boss, or pad must be of steel suitable for the method of attachment employed, and which need not be identified or verified as to analysis, except that if attachment is by welding, carbon content must not exceed 0.25 percent. If threads are used, they must comply with the following:

(1) Threads must be clean cut, even, without checks, and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

(b) Closure of fitting, boss, or pad must be adequate to prevent leakage.

§ 178.55-13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Devices must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

§ 178.55-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less shall be tested as outlined in paragraphs (a), (b), and (c) of this section to at least two times service pressure.

(2) All cylinders not tested as outlined in subparagraph (d)(1) of this section must be examined under pressure of at least two times service pressure and show no defect.

(e) Each 1,000 cylinders or less successively produced each day shall constitute a lot. One cylinder shall be selected from each lot and hydrostatically tested to destruction. If this cylinder bursts below five times the service pressure, then two additional cylinders must be selected and subjected to this test. If either of these cylinders fails by bursting below five times the service pressure, then the entire lot must be rejected. All cylinders constituting a lot shall be of identical size, construction, heat-treatment, finish, and quality.

§ 178.55-15 Flattening test. (a) Between knife edges, wedge shaped, 60° angle, rounded to ½" radius; test 1 cylinder taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.55-16 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from 1 cylinder, or part thereof heat-treated as required, taken at random out of each lot of 200 or less in the case of cylinders of capacity greater than 86 cubic inches and out of each lot of 500 or less for cylinders having a capacity of 86 cubic inches or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches; provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight speci-

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder; for example, DOT-4B240ET indicates the service pressure as 240 pounds per square inch.

mens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.55-17 Acceptable results for physical and flattening tests. (a) Elongation at least 40 percent for 2 inch gauge length or at least 20 percent in other cases; yield strength not over 73 percent of tensile strength; flattening test required, without cracking, to six times wall thickness with weld 90° from direction of applied load. Two rings cut from the ends of length of pipe used in production of a lot may be used for flattening test provided the rings accompany the lot which they represent in all thermal processing operations. At least one of the rings must pass the flattening test.

§ 178.55-18 Leakage test. (a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least 1/16 of the total area of the bottom but not less than ¾" in diameter, including the closure, for at least 1 minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See §178.55-19(a)(1).)

Note 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

Note 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

Note 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.55-19 Rejected cylinders. (a) Repairs authorized. Leakers must be rejected, except that:

(1) Spun cylinders rejected under the provisions of § 178.55-18 may be removed from the spun cylinder category by drilling to remove defective material, tapping, and plugging.

(2) Brazed joints may be rebrazed.

(3) Subsequent to the operations noted above in subparagraphs (1) and (2) of this paragraph, acceptable cylinders must pass all prescribed tests.

§ 178.55-20 Marking. (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, neck or valve protection collar which is permanently attached to the cylinders and forming an integral part thereof, provided that cylinders not less than 0.090 inches thick may be stamped on the side wall adjacent to top head, as follows:

(1) DOT-4B240ET.

(2) A serial[1] number and an identifying symbol (letters); location[2] of number to be just below or immediately following the DOT mark; location[2] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT 4B240ET 1234 XY — DOT 4B240ET-1234 XY

[1] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 170 cubic inches.

[2] Symbol in front of or following the number with ample space between or symbol and serial number stamped into welded or brazed on valve spud directly above the DOT specification mark located on head of cylinder are also authorized. Other variations in location authorized only when necessitated by lack of space.

(3) Inspector's official mark, near serial number, date of test (such as 5-50 for May 1950), so placed that date of subsequent test can be easily added, and word "SPUN" or "PLUG" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process or affected by plugging.

§ 178.55-21 Size of marks. (a) At least ½" high if space permits.

§ 178.55-22 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....
(Date) .....

Gas Cylinders

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The ..... permitted in § 178.55-9
(heckings—footings, etc.)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
(heat-purchase order)
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers .....
(were—were not)
marked on the material.

All material, such as plates, billets and electric resistance welded tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....
inch. The outside diameter was determined by a close approximation to be .....
inches. The wall stress was calculated to be ..... pounds per square inch
under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-4B-ET were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

A certificate of test on the electric resistance tubing has been obtained from the tubing manufacturer. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4B-ET except as follows:
Exceptions .....
.....
.....

(Signed) .....
Inspector
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...
.....	.....	.....	.....	...	...	...	...	...	...	...

The analyses were made by .....
(Signed) .....
(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in inches)	Reduction of area (percent)	Flattening Test	Bursting test (pounds per square inch)
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON CONTAINERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.55-23 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

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§ 178.56 Specification 4AA480; welded steel cylinders made of definitely prescribed steels.

§ 178.56-1 Compliance. (a) Required in all details.

§ 178.56-2 Type, size and service pressure. (a) Must be welded type, having not over 1,000 pounds water capacity (nominal). Closures welded by spinning process not permitted.

(b) Service pressure 480 pounds per square inch.

§ 178.56-3 Inspection by whom and where. (a) Inspections and certifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with §173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with §173.300(b) of this subchapter.

§ 178.56-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements of this specification. For cylinders made by the billet piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with specification requirements including markings, condition of inside, tests, threads, heat treatment. Obtain samples for all tests; check chemical analyses; witness all tests; report volumetric capacity, tare weight (see report form), and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.56-5 Steel. (a) The limiting chemical composition of steel authorized by this specification shall be as shown in §178.56-20, Table I.

§ 178.56-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with the heat number.

§ 178.56-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.56-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings. Minimum thickness of heads and bottoms shall be not less than 90 percent of the required thickness of the side wall. Seams must be made as follows:

(b) Circumferential seams: By welding. Brazing is not authorized.

(c) Longitudinal seams: Not permitted.

(d) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.56-9 Welding. (a) The attachment to the tops and bottoms only of cylinders by welding of necklings, footrings, bosses, pads, and valve protection rings is authorized provided that such attachments are made of weldable steel, the carbon content of which does not exceed 0.25 percent.

§ 178.56-10 Wall thickness. (a) For outside diameters over 5 inches the minimum wall thickness shall be 0.078 inch. In any case the minimum wall thickness shall be such that the calculated wall stress at minimum test pressure (§178.56-14) shall not exceed the lesser value of either of the following:

(1) One-half of the minimum tensile strength of the material determined as required in §178.56-15, or

(2) 35,000 pounds per square inch.

(b) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{(D^2 - d^2)}$$

where—

S = wall stress, pounds per square inch.
P = test pressure, pounds per square inch.
D = outside diameter, inches.
d = $D - 2t$, where t = minimum wall thickness determined by a suitable method

(c) Cylinders with wall thickness less than 0.100 inch, the ratio of tangential length to outside diameter shall not exceed 4.0.

§ 178.56-11 Heat treatment. (a) Each cylinder must be uniformly and properly heat treated prior to test. Any suitable heat treatment in excess of 1100° F., is authorized, except that liquid quenching is not permitted. Heat treatment must be accomplished after all forming and welding operations.

(b) Heat treatment is not required after welding weldable low carbon parts to attachments of similar material which have been previously welded to the top or bottom of cylinders and properly heat treated, provided such subsequent welding does not produce a temperature in excess of 400° F. in any part of the top or bottom material.

§ 178.56-12 Openings in cylinders. (a) All openings must be in the heads or bases.

(b) Each opening in cylinders, except those for safety devices, must be provided with a fitting, boss, or pad, securely attached to cylinder by welding or by threads. If threads are used they must comply with the following:

(1) Threads must be clean-cut, even, without checks and cut to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads having at least 6 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

(c) Closure of fitting, boss or pad must be adequate to prevent leakage.

§ 178.56–13 Safety devices and protection for valves, safety devices, and other connections, if applied. (a) Must be as required by the Department of Transportation's Regulations that apply (see §§ 173.34(d), 173.124(a), and 173.301(g)).

§ 178.56–14 Hydrostatic test. (a) By water jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading to total expansion to accuracy of either 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for at least 30 seconds or sufficiently longer to assure complete expansion. Any internal pressure applied after heat-treatment and before the official test must not exceed 90 percent of the test pressure. If, due to failure of test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is lower.

(c) Permanent volumetric expansion must not exceed 10 percent of the total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less must be tested as described in paragraphs (a), (b), and (c) of this section, to at least two times service pressure. If a selected cylinder fails, then two additional specimens must be selected at random from the same lot and subjected to the prescribed test. If either of these fails the test, then each cylinder in that lot must be so tested; and

(2) Each cylinder not tested as prescribed in subparagraph (1) of this paragraph must be examined under pressure of at least two times service pressure and must show no defect. A cylinder showing a defect must be rejected unless it may be requalified under § 178.56–18(a).

§ 178.56–15 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from one cylinder having passed the hydrostatic test, or part thereof heat-treated as required, taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches, provided, that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ½ inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8–78.

(2) In using the "extension under load" method, the total strain (or "extension under load"), corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain reference shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.56–16 Elongation. (a) Physical test specimens must show at least 40 percent for 2-inch gauge length or at least 20 percent in other cases, except that these elongation percentages may be reduced numerically by 2 for 2-inch specimens and by 1 in other cases for each 7,500 pounds per square inch increment of tensile strength above 50,000 pounds per square inch to a maximum of four such increments.

§ 178.56–17 Tests of welds. (a) Tensile test. A specimen shall be cut from one cylinder of each lot of 200 or less, or welded test plate.[1] The specimens must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C–3. Should this specimen fail to meet the requirements, specimens may be taken from two additional cylinders or welded test plates from the same lot and tested. If either of the latter specimens fail to meet the requirements, the entire lot represented shall be rejected.

(b) Guided bend test. A "root" bend test specimen shall be cut from the cylinder or welded test plate, used for the tensile test specified in § 178.56–17(a). Specimens must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C–3.

(c) Alternate guided-bend test. This test may be used and must be as required by CGA Pamphlet C–3. The specimen shall be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gage lines—a to b, shall be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 pounds per square inch, as provided in § 178.56–16(a).

§ 178.56–18 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair of welded seams by welding is authorized.

§ 178.56–19 Marking. (a) Marking on each cylinder stamped as follows:

(1) DOT–4AA480.

(2) A serial number and an identifying symbol of the maker. The symbol must be registered with the Director, OHMT. Duplications unauthorized.

(3) Inspector's official mark.

(4) Date of test (such as 1–54 for January 1954).

(5) Additional markings are permitted.

(b) Sequence of marks. Number shall be just below or immediately following the DOT mark; identifying symbol shall be just below or immediately following the number; inspector's official mark shall be near the serial number. Date of test shall be so placed that dates of subsequent tests can easily be added. Symbol in front of the number, with space between, or symbol and serial number stamped into welded valve spud directly above the DOT mark located on head of cylinder are also authorized. Other variations in sequence of marks authorized only when necessitated by lack of space.

(c) Location of markings. Markings may be stamped plainly and permanently in the following locations on the cylinder:

(1) On shoulders and top heads not less than 0.087 inch thick.

(2) On neck, valve boss, valve protection sleeve, or similar part permanently attached to top end of cylinder.

(3) On a plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least ⅛ inch thick and must be attached by welding, or by brazing at a temperature of at least 1100° F., throughout all edges of the plate.

(4) Variations in location of markings authorized only when necessitated by lack of space.

(d) Size of marks. Space permitting, at least ⅜ inch high.

§ 178.56–20 Authorized steel. (a) As specified in Table I of Appendix A to this part.

§ 178.56–21 Inspector's report. (a) Required to be clear, legible and in following form:

(Place) .....

(Date) .....

Steel Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the ..... shoulder of the cylinder are

(location of marking)

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks .....

[1] The welded test plate shall be of one of the heats in the lot of 200 or less which it represents in the same condition and approximately the same thickness as the cylinder wall except that in no case shall it be of lesser thickness than that required for a one quarter size Charpy impact specimen. The weld must be made by the same procedure and subjected to the same heat treatment as the major weld on the cylinder.

These cylinders were made by process of .....

.....

.....

The material used was type ..... authorized in table 1 of Spec. No. 4L/4L430.

The material used was identified by the following .....
(heat purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto
The heat numbers .....
(were—were not)
marked on the material.

All material was inspected and all that was accepted was found free from seams, cracks, laminations and other injurious defects.

The compliance of cylinders with specification requirements was verified including markings, condition of inside, tests, threads, etc. All cylinders with defects which might prove injurious were rejected. The processes of manufacture and heat treatment were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....

inch. The outside diameter was determined by a close approximation to be .....

inches. The wall stress was calculated to be ..... pounds per square inch

under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, tensile tests of material, and other tests as prescribed in specification DOT-4L/4L430 were made in the presence of the inspector and all cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

Each cylinder ..... been equipped with safety devices as follows
(has—has not)

.....

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4L/4L430 except as follows:

Exceptions .....

.....

.....

(Manufacturer's name)

(Signed) .....
Inspector

By .....

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis								
				C	P	S	Si	Mn	Ni	Cr	Mo	Zr
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Steel was manufactured by ..... Company. NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Chemical analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength at 0.2 percent offset (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178-22 Report retention. The marker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

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§ 178.57 Specification 4L; welded cylinders insulated.

§ 178.57-1 Compliance. (a) Required in all details.

§ 178.57-2 Type, size, service pressure and design service temperature. (a) Type and size. Must be fusion welded; not over 1,000 pounds water capacity (nominal). For liquefied hydrogen service, the cylinders must be designed to stand on end, with the axis of the cylindrical portion vertical.

(b) The service pressure shall be at least 40 and not more than 500 pounds per square inch. The service pressure limits the use of the cylinder and is shown by markings on the cylinder. For example, DOT-4L200 indicates the authorized pressure is 200 pounds per square inch.

(c) The design service temperature is the coldest temperature for which a cylinder is suitable. The required design service temperatures for each cryogenic liquid is as follows:

Cryogenic liquid	Design service temperature
Argon	Minus 320°F or colder.
Helium	Minus 452°F or colder.
Hydrogen	Minus 423°F or colder.
Neon	Minus 411°F or colder.
Nitrogen	Minus 320°F or colder.
Oxygen	Minus 320°F or colder.

§ 178.57-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.57-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements of this specification.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance with all specification requirements. Obtain samples for all tests. Obtain samples for check chemical analyses.

where required. Witness all tests. Report volumetric capacity, tare weight (see report form), and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.57-5 Material. (a) Intercontainment vessel (cylinder) Designations and limiting chemical compositions of steel authorized by this specification shall be as shown in § 178.57-21(a), Table I.

(b) Outer jacket. Steel or aluminum may be used subject to the requirements of § 178.57-21(b).

§ 178.57-6 Identification of material. (a) Required; by any suitable method.

§ 178.57-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.57-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. The shell portion must be a reasonably true cylinder.

(b) The heads must be a seamless, concave side to the pressure, hemispherical or ellipsoidal in shape with the major diameter not more than twice the minor diameter. Minimum thickness of heads shall be not less than 90 percent of the required thickness of the sidewall. The heads must be reasonably true to shape, shall have no abrupt shape changes and the skirts must be reasonably true to round.

(c) The surface of the cylinder must be insulated. The insulating material must be fire resistant. The insulation on non-evacuated jackets must be covered with a steel jacket not less than 0.060-inch thick or an aluminum jacket not less than 0.070 inch thick, so constructed that moisture cannot come in contact with the insulating material. If a vacuum is maintained in the insulation space, the evacuated jacket must be designed for a minimum collapsing pressure of 30 psi differential whether made of steel or aluminum. The construction must be such that the total heat transfer from the atmosphere at ambient temperature to the contents of the cylinder will not exceed 0.0005 B.t.u. per hour per Fahrenheit degree differential in temperature per pound of water capacity of the cylinder. For hydrogen cryogenic liquid service, the total heat transfer, with a temperature difference of 520 Fahrenheit degrees, may not exceed that required to vent 30 standard SCF of hydrogen gas per hour.

(d) For a cylinder having a design service temperature colder than minus 320°F, a calculation of the maximum weight of contents must be made and that weight must be marked on the cylinder as prescribed in § 178.57-20(a)(4).

(e) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3. In addition, impact test of the weld shall be performed in accordance with § 178.57-17(d) as part of the qualification of each welding procedure and operator.

§ 178.57-9 Welding. (a) All seams of the cylinder must be fusion welded. Means must be provided for accomplishing complete penetration of the joint. Only butt or jogg'le butt joints for the cylinder seams are authorized. All joints in the cylinder must be in reasonably true alignment.

(b) All attachments to the sidewalls and heads of the cylinder must be by fusion welding and must be of a weldable material complying with the impact requirements of § 178.57-17(d).

(c) For welding the cylinder, each procedure and operator must be qualified in accordance with the sections of CGA Pamphlet C-3 that apply. In addition, impact tests of the weld shall be performed in accordance with § 178.57-17(d) as part of the qualification of each welding procedure and operator.

(d) Brazing, soldering and threading are permitted only for joints not made directly to the cylinder body. Threads must comply with § 178.57-12.

§ 178.57-10 Wall thickness. (a) The minimum wall thickness of the cylinder shall be such that the calculated wall stress at minimum required test pressure shall not exceed the least value of the following:

(1) 45,000 pounds per square inch.

(2) One-half of the minimum tensile strength across the welded seam determined as required in § 178.57-17(a).

(3) One-half of the minimum tensile strength of the base metal determined as required in § 178.57-15.

(4) The yield strength of the base metal determined as required in § 178.57-15.

(5) Further provided that wall stress for cylinders having longitudinal seams must not exceed 85 percent of the above value, whichever applies.

(b) Calculation must be made by the formula:

$$S = \frac{(P)(1.3D^2 + 0.4d^2)}{(D^2 - d^2)}$$

where—

S = wall stress, pounds per square inch.
P = minimum test pressure prescribed for pressure test in pounds per square inch.
D = outside diameter, in inches.
d = inside diameter in inches.

§ 178.57-11 Heat treatment. Not permitted.

§ 178.57-12 Openings in cylinder. (a) Openings permitted in heads only. They must be circular and shall not exceed 3 inches diameter or ½ of the cylinder diameter, whichever is less. Each opening in the cylinder must be provided with a fitting, boss or pad, either integral with, or securely attached to the cylinder body by fusion welding. Attachments to a fitting, boss or pad may be made by welding, brazing, mechanical attachment or threading. Threads must comply with following:

(1) Threads must be clean cut, even, without checks and cut to gauge.

(2) Taper threads to be of a length not less than that specified for NPT.

(3) Straight threads must have at least 4 engaged threads, tight fit and calculated shear strength at least 10 times the test pressure of the cylinder. Gaskets, which prevent leakage and are inert to the hazardous material, are required.

§ 178.57-13 Pressure relief devices and pressure control valves. Each cylinder must be equipped with pressure relief devices and pressure control valves as prescribed in § § 173.34(d) and 173.316 of this subchapter.

§ 178.57-14 Pressure test. (a) Each cylinder before insulating and jacketing must be examined under a pressure of at least 2 times the service pressure, maintained for at least 30 seconds without evidence of leakage, visible distortion or other defect. Pressure gauge must permit reading to accuracy of 1 percent.

§ 178.57-15 Physical test. (a) Determine yield strength, tensile strength, and elongation on 2 specimens selected from material of each heat and in the same condition as that in the completed cylinder.

(b) Specimens must be. Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches; or, gauge length at least 24 times thickness with width not over 6 times thickness (authorized when cylinder wall is not over ¾ inch thick). The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load"), corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic expansion of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on the elastic modulus of the material used. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain reference shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

$$S = \frac{(P)(1.3D^2 + 0.4d^2)}{(D^2 - d^2)}$$

where—

S = wall stress, pounds per square inch.
P = minimum test pressure prescribed for pressure test in pounds per square inch.
D = outside diameter, in inches.
d = inside diameter in inches.

§ 178.57-16 Acceptable results for physical tests. (a) Physical properties must meet the limits specified in § 178.57-21(a), Table I, for the particular steel in the annealed condition. The specimens must show at least 20 percent elongation for 2-inch gage length except that the percentage may be reduced numerically by 2 for each 7,500 pounds per square inch increment of tensile strength above 100,000 pounds per square inch to a maximum of 5 such increments. Yield strength and tensile strength must meet the requirements of § 178.57-21(a), Table I.

§ 178.57-17 Tests of welds. (a) **Tensile test.** A specimen shall be cut from one cylinder of each lot of 200 or less, or welded test

plate.[1] The specimen must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C–3. Should this specimen fail to meet the requirements, specimens may be taken from two additional cylinders or welded test plates from the same lot and tested. If either of the latter specimens fail to meet the requirements, the entire lot represented shall be rejected.

(b) Guided bend test. A "root" bend test specimen shall be cut from the cylinder or welded test plate, used for the tensile test specified in § 178.57–17(a) and from any other seam or equivalent welded test plate if the seam is welded by a procedure different from that used for the major seam. Specimens must be taken across the particular seam being tested and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C–3.

(c) Alternate guided-bend test. This test may be used and must be as required by CGA Pamphlet C–3. The specimen shall be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gage lines—a to b, shall be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 100,000 pounds per square inch, as provided in § 178.57–16(a).

(d) Impact tests. One set of three impact test specimens (for each test) shall be prepared and tested for determining the impact properties of the deposited weld metal (1) as part of the qualification of the welding procedure, (2) as part of the qualification of the operators, (3) for each "heat" of welding rod or wire used, and (4) for each 1,000 feet of weld made with the same heat of welding rod or wire.

(1) All impact test specimens shall be of the Charpy type, keyhole or milled U-notch, and shall conform in all respects to Figure 3 of ASTM E–23–60T. Each set of impact specimens shall be taken across the weld and have the notch located in the weld metal. When the cylinder material thickness is 2.5 mm or thicker, impact specimens shall be cut from a cylinder or welded test plate used for the tensile or bend test specimens. The dimension along the axis of the notch shall be reduced to the largest possible of 10 mm, 7.5 mm, 5 mm or 2.5 mm, depending upon cylinder thickness. When the material in the cylinder or welded test plate is not of sufficient thickness to prepare 2.5 mm impact test specimens, 2.5 mm specimens shall be prepared from a welded test plate made from ½ inch thick material meeting the requirements specified in § 178.57–21(a), Table I, and having a carbon analysis of .05 minimum, but not necessarily from one of the heats used in the lot of cylinders. The test piece shall be welded by the same welding procedure as used on the particular cylinder seam being qualified and shall be subjected to the same heat treatment.

(2) Impact test specimens shall be cooled to the design service temperature. The apparatus for testing the specimens must conform to the requirements of ASTM Standard E–23–60T. The test piece, as well as the handling tongs, shall be cooled for a length of time sufficient to reach the service temperature. The temperature of the cooling device shall be maintained within a range of plus or minus 3° F. The specimen shall be quickly transferred from the cooling device to the anvil of the testing machine and broken with a time lapse of not more than six seconds.

(3) The impact properties of each set of impact specimens shall be not less than the values in the following table:

Size of specimen	Minimum impact value required for average of each set of three specimens (ft-lb)	Minimum impact value permitted on one specimen only of a set of three (ft-lb)
10 mm x 10 mm	15	10
10 mm x 7.5 mm	12.5	8.5
10 mm x 5 mm	10	7.0
10 mm x 2.5 mm	5	3.5

(4) When the average value of the three specimens equals or exceeds the minimum value permitted for a single specimen and the value for more than one specimen is below the required average value, or when the value for one specimen is below the minimum value permitted for a single specimen, a retest of three additional specimens shall be made. The value of each of these retest specimens shall equal or exceed the required average value. When an erratic result is caused by a defective specimen, or there is uncertainty in test procedure, a retest is authorized.

§ 178.57–18 Radiographic examination. (a) The techniques and acceptability of radiographic inspection must conform to the standards set forth in CGA Pamphlet C–3.

[1] The welded test plate shall be in the same condition and approximately the same thickness as the cylinder wall and shall be of material from one of the heats used in the lot of cylinders which it represents, except test plates for impact tests shall comply with § 178.57–17(d)(1). The test plate shall be welded by the same welding procedure as used on the particular cylinder seam being qualified and shall be subjected to the same heat treatment.

(b) Cylinders must be examined as follows:

(1) One finished longitudinal seam shall be selected at random from each lot of 100 or less successively produced and be radiographed throughout its entire length. Should the radiographic examination fail to meet the requirements of paragraph (a) of this section, two additional seams of the same lot shall be examined, and if either of these fail to meet the requirements, each cylinder may be examined as outlined above; only those passing are acceptable.

§ 178.57–19 Rejected cylinders. Welds may be repaired by suitable methods of fusion welding; reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests.

§ 178.57–20 Marking. (a) Marking required by stamping plainly and permanently on shoulder or top head of jacket or on a permanently attached plate or head protective ring as follows:

(1) DOT–4L followed by the service pressure (for example, DOT–4L200).

(2) ST followed by design service temperature (for example, ST–423 F) on cylinders having a service temperature of colder than minus 320° F. only. Location to be just below the DOT mark.

(3) Serial number and identifying symbol; location of number to be just below or immediately following the service temperature or DOT mark; location of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

(4) Maximum weight of contents, in pounds (for example, Max. Content 51#), on cylinders having a design service temperature colder than minus 320° F. only. Location to be near symbol.

(5) Examples of required markings are:

Design service temperature minus 320° F. or warmer.	Design service temperature colder than minus 320° F.
DOT–4L 150 1234 XY	DOT–4L 150 ST–423F 1234 XY MAX CONTENT 51#

(6) Inspector's official mark, date of test (such as 10–55 for October 1955), near serial number.

(7) Size of markings at least ¼ inch high if space permits.

(8) Special orientation instructions (for example, THIS END UP), if the cylinder is used in an orientation other than vertical with openings at the top of the cylinder.

(9) If the jacket of the cylinder is constructed of aluminum, add "AL" after the service pressure marking. Example: DOT–4L150 AL.

(b) Except for serial number and jacket material designation, each marking prescribed in paragraph (a) of this section must be duplicated on each cylinder by any suitable means.

§ 178.57–21 Authorized materials of construction. (a) Inner containment vessel (cylinder). Electric furnace steel of uniform quality. Chemical analysis must conform to ASTM A–240, Type 304 Stainless Steel. The following chemical analysis and physical properties are authorized:

TABLE II—AUTHORIZED MATERIALS

Design	Chemical analysis—limits in percent
Carbon[1]	0.08 (maximum)
Manganese	2.00 (maximum)
Phosphorus	0.045 (maximum)
Sulphur	0.030 (maximum)
Silicon	1.00 (maximum)
Nickel	8.00–10.50
Chromium	18.00–20.00
Molybdenum	
Titanium	
Columbium	

[1] The carbon analysis shall be reported to the nearest hundredth of one percent.

	Physical properties (annealed)
Tensile strength, p.s.i. (minimum)	75,000
Yield strength, p.s.i. (minimum)	30,000
Elongation in 2 inch (minimum) percent	30.0
Elongation other permissible gage (lengths) percent	35.0

Note 1: A heat of steel made under the above specification is acceptable, even though its check chemical analysis is slightly out of the specified range, if it is satisfactory in all other respects, provided the tolerances shown in the following table are not exceeded.

CHECK ANALYSIS TOLERANCES

Elements	Limit or maximum specified range	Tolerance over the maximum limit or under the minimum limit
Carbon	To 0.030 inclusive	0.005
Manganese	Over 0.030 to 0.20, inclusive	0.01
	To 1.00 inclusive	0.03
	Over 1.00 to 3.00, inclusive	0.04
Phosphorus[1]	To 0.040, inclusive	0.005
	Over 0.040 to 0.20, inclusive	0.010
Sulfur	To 0.040, inclusive	0.005
Silicon	To 1.00, inclusive	0.05
Chromium	Over 15.00 to 20.00, inclusive	0.20
Nickel	Over 5.00 to 10.00, inclusive	0.10
	Over 10.00 to 20.00, inclusive	0.15

[1] Rephosphorized steels not subject to check analysis of the phosphorus.

(b) Outer Jacket. (1) Nonflammable cryogenic liquids. Cylinders intended for use in the transportation of nonflammable cryogenic liquid must have an outer jacket made of steel or aluminum.

(2) Flammable cryogenic liquids. Cylinders intended for use in the transportation of flammable cryogenic liquid must have an outer jacket made of steel.

§ 178.57-22 Inspector's report. (a) This report is required to be clear, legible and in the following form:

(Place) .....

(Date) .....

Steel Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Cylinders were pressure tested at ..... pounds per square inch and found to be satisfactory

Maximum and minimum weight .....

Maximum and minimum volumetric capacity .....

Jacket material .....

Insulation type .....

Marks stamped into the ..... of the cylinder are:
(Location of marking)

Specification DOT .....

Design Service temperature ..... minus ..... °F

Maximum weight of content ..... (pounds)

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks .....

These cylinders were made by process of .....

.....

.....

The material used was authorized by § 178.57-21(a).

The material used was identified by the following .....
(heat-purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto.

The heat numbers .....
(were—were not)

marked on the material.

RECORD OF CHEMICAL ANALYSIS OF STEEL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis C	P	S	Si	Mn	Ni	Cr	Mo	Cu	Al	Zr

Steel was manufactured by ..... Company.

The originals of the certified mill test reports are in the files of the manufacturer.

NOTE: Any omission of analysis by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Chemical analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

All material was inspected and all that was accepted was found free from seams, cracks, laminations and other injurious defects.

The compliance of cylinders with specification requirements was verified including markings, condition of inside, tests, threads, etc. All cylinders with defects which might prove injurious were rejected. The processes of manufacture and heat treatment were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....

inch. The outside diameter was determined by a close approximation to be .....

inches. The wall stress was calculated to be ..... pounds per square inch

under an internal pressure of ..... pounds per square inch.

Pressure tests, tensile tests of material, and other tests as prescribed in specification No. DOT-4L were made in the presence of the inspector and all cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

Each cylinder ..... been equipped with safety devices as follows:
(has—has not)

.....

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4L, except as follows:

Exceptions .....

.....

.....

(Manufacturer's name)

(By) .....

(Signed) .....
Inspector

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in inches)	Impact test results	Weld tensile test	Weld bend test

(Signed) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... Inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in inches)	Reduction of area (percent)	Weld tensile test	Weld bend test
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

(Signed) .....

§ 178.57-23 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.58 Specification 4DA; inside containers, welded steel for aircraft use.

§ 178.58-1 Compliance. (a) Required in all details.

§ 178.58-2 Type, size, and service pressure. (a) Type and size. Welded steel spheres (two seamless hemispheres) or circumferentially welded cylinders (two seamless drawn shells) not over 100 pounds water capacity.

(b) Service pressure.[1] At least 500 to not over 900 pounds per square inch.

§ 178.58-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.58-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one container out of each lot of 200 or less.

(c) Verify compliance of containers with all requirements including markings; inspect inside before closing; verify heat treatment and welding procedure as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.58-5 Steel. (a) Open-hearth or electric steel of uniform quality. The following chemical analyses are authorized, (see Note 1):

4130	Percent
Carbon	0.28-0.33
Manganese	0.40-0.60
Phosphorus	0.040 max.
Sulfur	0.040 max.
Silicon	0.15-0.35
Chromium	0.80-1.10
Molybdenum	0.15-0.25

Note 1: a heat of steel made under the above specifications, check chemical analysis of which is slightly out of the specified range, is acceptable, if satisfactory in all other respects, provided the tolerances shown in the following table are not exceeded except as approved by the Department.

CHECK ANALYSIS TOLERANCES

Element	Limit or maximum specified (percent)	Tolerance (percent over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	Over 0.15 to 0.40 incl.	0.03	0.04
Manganese	To 0.60 incl.	0.03	0.03
Phosphorus[1]	All ranges	.....	0.01
Sulphur	All ranges	.....	0.01
Silicon	To 0.30 incl.	0.02	0.03
	Over 0.30 to 1.00 incl.	0.05	0.05
Chromium	To 0.90 incl.	0.03	0.03
	Over 0.90 to 2.10 incl.	0.05	0.05
Molybdenum	To 0.20 incl.	0.01	0.01
	Over 0.20 to 0.40 incl.	0.02	0.02

[1] Rephosphorized steels not subject to check analysis for phosphorus.

§ 178.58-6 Identification of material. (a) Required; any suitable method except that plates and billets for hot-drawn containers shall be marked with heat number.

§ 178.58-7 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized. Defects in welded joints shall not exceed the limits specified in § 178.58-17 covering radiographic inspection.

§ 178.58-8 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect is acceptable that is likely to weaken the finished container appreciably. A reasonably smooth and uniform surface finish is required. No abrupt change in wall thickness is permitted. Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

(b) All seams of the sphere or cylinders must be fusion welded. Seams shall be of the butt or joggle butt type and means must be provided for accomplishing complete penetration of the joint.

§ 178.58-9 Welding. (a) Attachments to the container are authorized by fusion welding provided that such attachments are made of weldable steel, the carbon content of which must not exceed 0.25 percent except in the case of 4130 steel.

§ 178.58-10 Wall thickness. (a) The minimum wall thickness shall be such that the wall stress at the minimum specified test pressure shall not exceed 67 percent of the minimum tensile strength of the steel as determined from the physical and burst tests required and shall not be over 70,000 psi. Minimum wall .040 inch for any diameter container.

(b) Calculation for a sphere must be made by the formula:

$$S = \frac{PD}{4Et}$$

where:

S = wall stress in pounds per square inch,
P = test pressure prescribed for water jacket test, i.e., at least two times service pressure, in pounds per square inch,
D = outside diameter in inches,
t = minimum wall thickness in inches,
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zones which zone shall extend a distance of 6 times wall thickness from center of weld); E = 1.0 (for all other areas).

(c) Calculation for a cylinder must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch,
P = test pressure prescribed for water jacket test, i.e., at least two times service pressure, in pounds per square inch,
D = outside diameter in inches,
d = inside diameter in inches.

§ 178.58-11 Heat treatment. (a) The completed containers must be uniformly and properly heat-treated prior to tests. Heat-treatment of containers of the authorized analysis shall be as follows:

(1) All containers must be quenched by oil, or other suitable medium except as provided in subparagraph (4) of this paragraph.

(2) The steel temperature on quenching shall be that recommended for the steel analysis, but in no case shall exceed 1750° F.

(3) The steel shall be tempered at the temperature most suitable for the analysis except that in no case shall the tempering temperature be less than 1000° F.

(4) The steel may be normalized at a temperature of 1650° F. instead of being quenched, and containers so normalized need not be tempered.

(5) Cancelled.

(6) All cylinders, if water quenched or quenched with a liquid producing a cooling rate in excess of 80 percent of the cooling rate of water, must be inspected by the magnetic particle or dye penetrant method to

[1] The "service pressure" limits the use of the container. It is shown by marks on container, for example DOT-4DA500 indicates the service pressure as 500 pounds per square inch.

detect the presence of quenching cracks. Any cylinder found to have a quench crack must be rejected and may not be requalified.

§ 178.58-12 Openings in container. (a) Each opening in the container must be provided with a fitting, boss, or pad of weldable steel securely attached to the container by fusion welding.

(b) Attachments to a fitting, boss, or pad must be adequate to prevent leakage. Threads must comply with the following:

(1) Threads must be clean cut, even, without checks, and tapped to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the container, gaskets required, adequate to prevent leakage.

§ 178.58-13 Safety devices. (a) Safety relief devices must be as required by the Department of Transportation's Regulations. (See § 173.34(d)).

§ 178.58-14 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Each container must be tested to at least 2 times service pressure.

§ 178.58-15 Burst test. (a) One container taken at random out of 200 or less shall be hydrostatically tested to destruction. Rupture pressure shall be included as part of the inspector's report.

§ 178.58-16 Flattening test. (a) **Flattening test for spheres.** At the weld between parallel steel plates on a press with welded seam at right angles to the plates, test one sphere taken at random out of each lot of 200 or less after hydrostatic test. Any projecting appurtenances may be cut off (by mechanical means only) prior to crushing.

(b) **Flattening tests for cylinders.** Between knife edges, wedge shaped, 60° angle, rounded to ½ inch radius; test one cylinder taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.58-17 Radiographic inspection. (a) Required on all welded joints which are subjected to internal pressure, except that at the discretion of the disinterested inspector, openings less than 25 percent of the sphere diameter need not be subjected to radiographic inspection. Evidence of any defects likely to seriously weaken the container shall be cause for rejection.

§ 178.58-18 Physical test and specimens for spheres and cylinders. (a) **Physical test for spheres.** Required on 2 specimens cut from flat representative sample plate of the same heat taken at random from the steel used to produce the sphere. This flat steel from which the 2 specimens are to be cut must receive the same heat-treatment as the spheres themselves. Sample plates to be taken for each lot of 200 or less spheres.

(b) **Specimens for spheres.** Specimens must be gauge length 2 inches with width not over 1½ inches: *Provided*, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when wall of sphere is not over ¾ inch thick.

(c) **Physical test for cylinders.** Required on 2 specimens cut from 1 cylinder taken at random out of each lot of 200 or less.

(d) **Specimens for cylinders.** Specimens must be gauge length 8 inches with width not over 1½ inches; or gauge length 2 inches with width not over 1½ inches: *Provided*, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ¾ inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section. Heating of specimen for any purpose is not authorized.

(e) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.58-19 Acceptable results for physical, flattening, and burst tests. (a) Elongation at least 20 percent for 2 inch gauge length or 10 percent in other cases.

(b) Flattening required to 50 percent of the original outside diameter without cracking.

(c) Burst pressure shall be at least 3 times service pressure.

§ 178.58-20 Rejected containers. (a) Reheat-treatment authorized; subsequent thereto, acceptable containers must pass all prescribed tests. Repair of welded seams by welding prior to reheat-treatment authorized.

§ 178.58-21 Marking. (a) Marking on each container by stamping plainly and permanently only on a permanent attachment or on a metal nameplate permanently secured to the container by means other than soft solder, as follows:

(1) DOT-4DA followed by the service pressure (for example, DOT-4DA900).

(2) A serial[1] number and an identifying symbol (letters); location[2] of number to be just below or immediately following the DOT mark; location[2] of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-4DA300 1234 XY — DOT-4DA300-1234 XY

(4) Inspector's official mark near serial number; date of test (such as 8-50 for August 1950), so placed that dates of subsequent tests can be easily added.

§ 178.58-22 Size of marks. (a) Of sufficient size to be legible.

§ 178.58-23 Inspector's report. (a) Required to be clear, legible, and in the following form:

(Place) .....

(Date) .....

Gas ..... (spheres/cylinders)

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the .....

..... (shoulder/metal plate, § 178.58-21)

Specification DOT .....

Serial numbers ..... to ..... inclusive

Inspector's mark .....

Identifying symbol (registered) .....

Test date .....

Tare weights (yes or no) .....

Other marks (if any) .....

These cylinders were made by process of .....

.....

.....

The material used was identified by the following ..... (heat/purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto.

The heat numbers ..... (were/were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each container was inspected both before and after closing in the ends; all that was accepted was found free

---

[1] Lot numbers not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 60 cubic inches.

[2] Symbol in front or following the number with ample space between is also authorized. Other variation in location authorized only when necessitated by lack of space.

from flaws, cracks, laminations, and other defects which might prove injurious to the strength of the cylinders. The processes of manufacture and heat treatment of containers were supervised and found to be efficient and satisfactory.

The container walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT 4DA were made in the presence of the inspector and all material and containers accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these containers proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4DA except as follows:

Exceptions .....

.....

.....

(Signed) ..... Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CONTAINERS

Numbered ..... to ..... inclusive

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Containers represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CONTAINERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Containers represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CONTAINERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less containers, the check on the others must be indicated by a notation hereon reading: "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

(Signed) .....

§ 178.58-24 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.59 Specification 8; steel cylinders with approved porous filling for acetylene.

§ 178.59-1 Compliance. (a) Required in all details.

§ 178.59-2 Type and service pressure. (a) Type. Seamless except that the following is authorized: Longitudinal seam if forge lap welded, attachment of heads by welding or by brazing by dipping process; welded circumferential body seam if cylinder has no longitudinal seam.

(b) Service pressure.[1] 250 pounds per square inch.

§ 178.59-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

(b) Duties of shell inspector:

(1) Inspect all material and reject any not complying with requirements; for cylinders made by billet piercing process, billets to be inspected after nick and cold break.

(2) Require certified chemical analyses of steel used, signed by manufacturer thereof; also verify by check analyses of samples taken from each heat or from 1 out of each lot of 200 or less plates, shells, or tubes used.

(3) Verify compliance of cylinder shells with all shell requirements; inspect inside before closing in both ends; verify heat treatment as proper; obtain all samples for all tests and for check analyses; witness all tests; verify threads by gauge; report volumetric capacity and minimum thickness of wall noted.

(4) Prepare report on manufacture of steel shells in form prescribed in § 178.59-20(a). Furnish one copy to manufacturer and three copies to the company that is to complete the cylinders.

(c) Duties of inspector of completed cylinders: Determine porosity of filling and tare weights; verify compliance of marking with prescribed requirements; obtain necessary copies of steel shell reports prescribed in paragraph (b) of this section; and furnish complete reports required by this specification to the person who has completed the manufacture of the cylinders and, upon request, to the purchaser. The test reports must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.59-4 Steel. (a) Open-hearth, electric or basic oxygen process steel of uniform quality. Content percent for the following not over: carbon, 0.25; phosphorus, 0.045; sulphur, 0.050.

§ 178.59-5 Identification of steel. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.59-6 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.59-7 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required.

(b) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.59-8 Exposed bottom weld. (a) Exposed bottom welds on cylinders over 18" long must be protected by foot rings.

§ 178.59-9 Heat treatment. (a) Body and heads formed by drawing or pressing must be uniformly and properly heat treated prior to tests.

§ 178.59-10 Openings. (a) Standard taper pipe threads required; length not less than as specified for American Standard pipe threads; tapped to gauge; clean cut, even, and without checks.

[1] Service pressure limits the use of the cylinder to 250 pounds per square inch at 70° F.

§ 178.59-11 Safety devices and protection for valves, safety devices, and other connections. (a) If applied must be as required by the Department of Transportation's regulations that apply. (See §§ 173.34(d) and 173.301(g).)

§ 178.59-12 Hydrostatic test. (a) By water jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) One cylinder out of each lot of 200 or less must be hydrostatically tested to at least 750 pounds per square inch. Cylinders not so tested must be examined under pressure of between 500 and 600 pounds per square inch and show no defect. If hydrostatically tested cylinder fails, each cylinder in the lot may be hydrostatically tested and those passing are acceptable.

§ 178.59-13 Leakage test. (a) By interior air or gas pressure not less than the service pressure; leakers must be rejected. Required only for cylinders with bottoms closed in by spinning.

§ 178.59-14 Physical test. (a) Required on 2 specimens cut longitudinally from 1 cylinder or part thereof taken at random out of each lot of 200 or less, after heat treatment.

(b) Specimens must be: Gauge length 8" with width not over 1½"; or, gauge length 2" with width not over 1½": Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ⅜" thick.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

(d) Yield strength shall not exceed 73 percent of tensile strength. Elongation must be at least 40 percent in 2 inches or 20 percent in other cases.

§ 178.59-15 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding is authorized.

§ 178.59-16 Porous filling. (a) Cylinders must be filled with a porous material in accordance with the following:

(1) The porous material may not disintegrate or sag when wet with solvent or when subjected to normal service;

(2) The porous filling material shall be uniform in quality and free of voids, except that a well drilled into the filling material beneath the valve is authorized if the well is filled with a material of such type that the functions of the filling material are not impaired;

(3) Overall shrinkage of the filling material is authorized if the total clearance between the cylinder shell and filling material, after solvent has been added, does not exceed ½ of 1 percent of the respective diameter or length, but not to exceed ⅛ inch, measured diametrically and longitudinally;

(4) The clearance may not impair the functions of the filling material;

(5) The installed filling material must meet the requirements of CGA Pamphlet C-12; and

(6) Porosity of filling material may not exceed 80 percent except that filling material with a porosity of up to 92 percent may be used when tested with satisfactory results in accordance with CGA Pamphlet C-12.

(b) When the porosity of each cylinder is not known, a cylinder taken at random from a lot of 200 or less must be tested for porosity. If the test cylinder fails, each cylinder in the lot may be tested individually and those cylinders that pass the test are acceptable.

(c) For filling that is molded and dried before insertion in cylinders, porosity test may be made on sample block taken at random from material to be used.

(d) The porosity of the filling material shall be determined; the amount of solvent at 70° F. for a cylinder:

(1) Having shell volumetric capacity above 20 pounds water capacity (nominal), shall not exceed the following:

Percent porosity of filler	Maximum acetone solvent percent shell capacity by volume
90 to 92	43.4
87 to 90	42.0
83 to 87	40.0
80 to 83	38.6
75 to 80	36.2
70 to 75	33.8
65 to 70	31.4

(2) Having volumetric capacity of 20 pounds or less water capacity (nominal), shall not exceed the following:

Percent porosity of filler	Maximum acetone solvent percent shell capacity by volume
90 to 92	41.8
83 to 90	38.5
80 to 83	37.1
75 to 80	34.8
70 to 75	32.5
65 to 70	30.2

§ 178.59-17 Tare weight. (a) Tare weight referred to in §§178.59-1 to 178.59-21 shall be the combined weight of cylinder proper, porous filling, valve, and solvent, but without removable cap.

§ 178.59-18 Marking. (a) Marking on each cylinder by stamping plainly and permanently on or near the shoulder, top head, neck or valve protection collar which is permanently attached to the cylinder and forming an integral part thereof, as follows:

(1) DOT-8.

(2) A serial number and an identifying symbol (letters); grouped[1] above, below, or immediately following the DOT mark. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-8 1234 XY DOT-8-1234 XY

(3) Date of test (such as 5-50 for May 1950), so placed that dates of subsequent tests can be easily added.

(4) Tare weight of cylinder in pounds and ounces.

(5) Cylinders, not completed, when delivered must each be marked for identification of each lot of 200 or less.

§ 178.59-19 Size of marks. (a) At least ⅛" high for cylinders less than 4" inside diameter and at least ¼" high for larger cylinders.

§ 178.59-20 Inspector's report. (a) Report to cover manufacturer of acetylene shells; required to be clear, legible, and in the following form:

(Place) .....

(Date) .....

Acetylene Shells

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company

Location at .....

Consigned to ..... Company

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks stamped into the shoulder of the cylinder are:

Lot number .....

Other marks (if any) .....

These cylinders were made by process of .....

.....

.....

The material used was identified by the following ..... (heat-purchase order)

numbers .....

The material used was verified as to chemical analysis and record thereof is attached hereto. The heat numbers ..... (were—were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

---

[1] Variation in location authorized only when necessitated by lack of space.

The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined by a close approximation to be ..... inches. The wall stress was calculated to be ..... pounds per square inch under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-8 were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 8 except as follows:

Exceptions .....

.....

.....

(Signed) ..... Inspector

(Place) .....

(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....
.....	.....	.....	.....	....	....	....	....	....	....	....

The analyses were made by .....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading. Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect.

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

(b) Inspector's report to cover completed manufacture of acetylene cylinders; required to be clear and legible and in the following form:

(Place) .....

(Date) .....

Final Report.

For completed steel cylinders with approved porous filling for acetylene.

Manufactured for .....

Location at .....

Steel shells manufactured by .....

Location at .....

Cylinders completed by .....

Location at .....

Consigned to .....

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks are stamped into ..... (show location) as follows:

Specification DOT-8.

Serial numbers ..... to ..... inclusive

Identifying symbol (registered) .....

Inspector's mark (if applied) .....

Test date .....

Other marks (if any) .....

.....

Application of prescribed marks, as reported above, and location thereof were verified.

Each cylinder was filled with porous filling material consisting of .....

..... in the form of .....

The porosity of the filling is between ..... and ..... percent as determined by tests by the ..... company whose report has been found satisfactory and is on file.

The tare weight of each cylinder was determined and a record thereof is attached hereto.

Each cylinder has been equipped with safety devices .....

.....

A certified report of manufacture and test of the steel shells is attached hereto.

I hereby certify that, subject to the acceptability of the reports covering the steel shells, all of these cylinders proved satisfactory in every way and comply with the requirements of the Department of Transportation specification No. 8.

(Signed) ..... Inspector

§ 178.59-21 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.60 Specification 8AL; steel cylinders with approved porous filling for acetylene.

§ 178.60-1 Compliance. (a) Required in all details.

§ 178.60-2 Type and service pressure. (a) Type. Seamless except that the following is authorized: Attachment of heads by welding or by brazing by dipping process; welded circumferential body seam. Longitudinal seams not authorized.

(b) Service pressure. 250 pounds per square inch.[1]

[1] Service pressure limits the use of the cylinder to 250 pounds per square inch at 70° F.

§ 178.60-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

(b) Duties of shell inspector. Inspect all material and reject any not complying with requirements; for cylinders made by billet piercing process, billets to be inspected after nick and cold break.

(1) Require certified chemical analyses of steel used, signed by manufacturer thereof; also verify by check analyses of samples taken from each heat or from 1 out of each lot of 200 or less plates, shells, or tubes used.

(2) Verify compliance of cylinder shells with all shell requirements; inspect inside before closing in both ends; verify heat treatment as

proper; obtain all samples for all tests and for check analyses; witness all tests; verify threads by gauge; report volumetric capacity and minimum thickness of wall noted.

(3) Report percentage of each specified alloying element in the steel. Prepare report on manufacture of steel shells in form prescribed in §178.60-24(a). Furnish one copy to manufacturer and three copies to the company that is to complete the cylinders.

(c) Duties of inspector of completed cylinders. Determine porosity of filling and tare weights; verify compliance of marking with prescribed requirements; obtain necessary copies of steel shell reports prescribed in paragraph (b) of this section; and furnish complete test reports required by this specification to the person who has completed the manufacture of the cylinders and, upon request, to the purchaser. The test reports must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.60-4 Authorized steel. (a) As specified in Table I of Appendix A to this part.

§ 178.60-5 Identification of steel. (a) Required; any suitable method except that plates and billets for hot-drawn cylinders shall be marked with heat number.

§ 178.60-6 Defects. (a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.60-7 Manufacture. (a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required.

(b) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.60-8 Footrings. (a) Exposed bottom welds on cylinders over 18" long must be protected by footrings.

§ 178.60-9 Welding or brazing. (a) The attachment to the tops or bottoms only of cylinders by welding or brazing of neckrings, footrings, handles, bosses, pads, and valve protecting rings is authorized provided that such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon content of which must not exceed 0.25 percent.

(b) Heat treatment is not required after welding or brazing weldable low carbon parts to attachments, specified in paragraph (a) of this section, of similar material which have been previously welded or brazed to the top or bottom of cylinders and properly heat treated, provided such subsequent welding or brazing does not produce a temperature in excess of 400° F. in any part of the top or bottom material.

§ 178.60-10 Wall thickness; wall stress. (a) The calculated wall stress at 750 pounds per square inch shall not exceed 35,000 pounds per square inch, or one-half of the minimum ultimate strength of the steel as determined in §178.60-16, whichever value is the smaller. Measured wall thickness shall not include galvanizing or other protective coating.

(1) Calculation of wall stress must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:

S = wall stress in pounds per square inch.
P = 750 pounds per square inch (minimum test pressure).
D = outside diameter in inches.
d = inside diameter in inches.

Either D or d must be calculated from the relation D = d + 2t, where t = minimum wall thickness.

(2) Cylinders with wall thickness less than 0.100 inch, the ratio of straight side wall length to outside diameter shall not exceed 3.5.

(3) For cylinders having outside diameter over 5 inches, the minimum wall thickness shall be 0.087 inch.

§ 178.60-11 Heat-treatment. (a) Each cylinder must be uniformly and properly heat treated, prior to tests, by any suitable method in excess of 1100° F. Heat treatment must be accomplished after all forming and welding operations, except that when brazed joints are used, heat treatment must follow any forming and welding operations but may be done before, during, or after the brazing operations. Liquid quenching not authorized.

§ 178.60-12 Openings. (a) Standard taper pipe threads required; length not less than as specified for American Standard pipe threads; tapped to gauge; clean cut, even, and without checks.

§ 178.60-13 Safety devices and protection for valves, safety devices, and other connections. (a) If applied must be as required by the Department of Transportation's regulations that apply. (See §§ 173.34(d) and 173.301(g).)

§ 178.60-14 Hydrostatic test. (a) By water jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) One cylinder out of each lot of 200 or less must be hydrostatically tested to at least 750 pounds per square inch. Cylinders not so tested must be examined under pressure of between 500 and 600 pounds per square inch and show no defect. If hydrostatically tested cylinder fails, each cylinder in the lot may be hydrostatically tested and those passing are acceptable.

§ 178.60-15 Leakage test. (a) By interior air or gas pressure not less than the service pressure; leakers must be rejected. Required only for cylinders with bottoms closed in by spinning.

§ 178.60-16 Physical test. (a) Required on 2 specimens cut longitudinally from 1 cylinder or part thereof taken at random out of each lot of 200 or less, after heat treatment.

(b) Specimens must be: Gauge length 8" with width not over 1½"; or, gauge length 2" with width not over 1½"; Provided, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ¾" thick.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 offset.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.60-17 Elongation. (a) Physical test specimens must show at least 40 percent for 2 inch gauge length or at least 20 percent in other cases, except that these elongation percentages may be reduced numerically by 2 for 2 inch specimens and 1 in other cases for each 7,500 pounds per square inch increment of tensile strength above 50,000 pounds per square inch to a maximum of our such increments.

§ 178.60-18 Weld tests. (a) Specimens taken across the circumferentially welded seam must be cut from one cylinder taken at random from each lot of 200 or less cylinders after heat treatment and must pass satisfactorily the following tests:

(1) Tensile test. A specimen shall be cut from one cylinder of each lot of 200 or less, or welded test plate.[1] The specimen must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3. Should this specimen fail to meet the requirements, specimens may be taken from two additional cylinders or welded test plates from the same lot and tested. If either of the latter specimens fail to meet the requirements, the entire lot represented shall be rejected.

(2) Guided bend test. A "root" bend test specimen shall be cut from the cylinder or welded test plate, used for the tensile test specified in §178.60-18(a)(1). Specimens must be taken across the major seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3.

(3) Alternate guided-bend test. This test may be used and must be as required by CGA Pamphlet C-3. The specimen shall be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gauge lines—a to b, shall be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 pounds per square inch, as provided in §178.60-17(a).

§ 178.60-19 Rejected cylinders. (a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding is authorized.

§ 178.60-20 Porous filling. (a) Cylinders must be filled with a porous material in accordance with the following:

---

[1] The welded test plate shall be of one of the heats in the lot of 200 or less which it represents, in the same condition and approximately the same thickness as the cylinder wall except that in no case shall it be of lesser thickness than that required for a one quarter size Charpy impact specimen. The weld must be made by the same procedure and subjected to the same heat treatment as the major weld on the cylinder.

(1) The porous material may not disintegrate or sag when wet with solvent or when subjected to normal service;
(2) The filling material shall be uniform in quality and free of voids, except that a well drilled into the filling material beneath the valve is authorized if the well is filled with a material of such type that the functions of the filling material are not impaired;
(3) Overall shrinkage of the filling material is authorized if the total clearance between the cylinder shell and filling material, after solvent has been added, does not exceed ½ of 1 percent of the respective diameter or length but not to exceed ⅛ inch, measured diametrically and longitudinally;
(4) The clearance may not impair the functions of the filling material;
(5) The installed filling material must meet the requirements of CGA Pamphlet C-12; and
(6) Porosity of filling material may not exceed 80 percent except that filling material with a porosity of up to 92 percent may be used when tested with satisfactory results in accordance with CGA Pamphlet C-12.

(b) When the porosity of each cylinder is not known, a cylinder taken at random from a lot of 200 or less must be tested for porosity. If the test cylinder fails, each cylinder in the lot may be tested individually and those cylinders that pass the test are acceptable.

(c) For filling that is molded and dried before insertion in cylinders, porosity test may be made on sample block taken at random from material to be used.

(d) The porosity of the filling material shall be determined; the amount of solvent at 70° F. for a cylinder:

(1) Having shell volumetric capacity above 20 pounds water capacity (nominal), shall not exceed the following:

Percent porosity of filler	Maximum acetone solvent percent shell capacity by volume
90 to 92	43 4
87 to 90	42 0
83 to 87	40 0
80 to 83	38 6
75 to 80	36 2
70 to 75	33 8
65 to 70	31.4

(2) Having volumetric capacity of 20 pounds or less water capacity (nominal), shall not exceed the following:

Percent porosity of filler	Maximum acetone solvent percent shell capacity by volume
90 to 92	41 6
83 to 90	38 5
80 to 83	37.1
75 to 80	34 8
70 to 75	32 5
65 to 70	30 2

§ 178.60-21 Tare weight. (a) Tare weight here referred to shall be the combined weight of cylinder proper, porous filling, valve, and solvent, but without removeable cap.

§ 178.60-22 Marking. (a) Marking on each cylinder as follows:
(1) DOT-8AL.
(2) A serial number and an identifying symbol (letters); grouped above, below, or immediately following the DOT mark. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-8AL 1234 XY 1234XY

(3) Date of test (such as 5-50 for May 1950) so placed that dates of subsequent tests can be easily added.
(4) Tare weight of cylinder in pounds and ounces.
(5) Cylinders, not completed, when delivered must each be marked for identification of each lot of 200 or less.

(b) Markings shall be stamped plainly and permanently in locations in accordance with the following:
(1) On shoulders and top heads not less than 0.087 inch thick, or
(2) On neck, valve boss, valve protection sleeve, or similar part permanently attached to the top end of cylinder, or
(3) On a plate of ferrous material attached to the top of the cylinder or permanent part thereof; the plate must be at least 1/16 inch thick, and must be attached by welding, or by brazing at a temperature of at least 1,100° F. throughout all edges of the plate. Sufficient space must be left on the plate to provide for stamping at least four (4) retest dates.

§ 178.60-23 Size of marks. (a) At least ⅛" high for cylinders less than 4" inside diameter and at least ¼" higher for larger cylinders.

§ 178.60-24 Inspector's report. (a) Report to cover manufacture of acetylene shells; required to be clear, legible, and in the following form:

(Place) .....
(Date) .....

Acetylene shells

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Lot number .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The ..... permitted in § 178.50-9
(neckrings—footrings)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
(heat-purchase order)
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers ..... (were—were not)
marked on the material.

All material, such as plates, billets and seamless tubing was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was .....
inch. The outside diameter was determined by a close approximation to be .....
inches. The wall stress was calculated to be ..... pounds per square inch
under an internal pressure of ..... pounds per square inch.

Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-8AL were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 8AL except as follows:

Exceptions .....
.....
.....

(Signed) .....
Inspector
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF STEEL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis C	P	S	Si	Mn	Ni	Cr	Mo	Cu	Al	Zr

Steel was manufactured by ..... Company
The original's of the certified mill test reports are in the files of the manufacturer.

NOTE: Any omission of analysis by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

The analyses were made by .....

(Signed) .....
(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive.
Size ..... inches outside diameter by ..... inches long

[1] Variation in location authorized only when necessitated by lack of space.

Made by ..... Company

For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Weld tensile test	Weld bend test
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....

(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive.

Size ..... inches outside diameter by ..... inches long

Made by ..... Company

For ..... Company

Serial Nos. of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Volumetric capacity[2]
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

(b) Inspector's report to cover completed manufacture of acetylene cylinders; required to be clear and legible and in the following form:

(Place) .....

(Date) .....

Final Report:

For completed steel cylinders with approved porous filling for acetylene.

Manufactured for .....

Location at .....

Steel shells manufactured by .....

Location at .....

Cylinders completed by .....

Location at .....

Consigned to .....

Location at .....

Quantity .....

Size ..... inches outside diameter by ..... inches long

Marks are stamped into ..... as follows
(show location)

Specification DOT-8AL

Serial numbers ..... to ..... inclusive

Identifying symbol (registered) .....

Inspector's mark (if applied) .....

Test date .....

Other marks (if any) .....

.....

Application of prescribed marks, as reported above, and location thereof were verified.

Each cylinder was filled with porous filling material consisting of .....

..... in the form of .....

The porosity of the filling is between ..... and ..... percent as determined by tests by the ..... company whose report has been found satisfactory and is on files.

The tare weight of each cylinder was determined and a record thereof is attached hereto.

Each cylinder has been equipped with safety devices .....

.....

A certified report of manufacture and test of the steel shells is attached hereto.

I hereby certify that, subject to the acceptability of the reports covering the steel shells, all of these cylinders proved satisfactory in every way and comply with the requirements of the Department of Transportation specification No. 8AL.

(Signed) .....

Inspector

§ 178.60-25 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

§ 178.61 Specification 4BW; welded steel cylinders made of definitely prescribed steels with electric-arc welded longitudinal seam.

§ 178.61-1 Compliance. (a) Required in all details.

§ 178.61-2 Type, size and service pressure. (a) Must be welded type with longitudinal electric-arc welded seam not over 1000 pounds water capacity (nominal); service pressure at least 225 and not over 500 pounds per square inch gauge. Cylinders closed in by spinning process not authorized.

§ 178.61-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.61-4 Duties of inspector. (a) Inspect all material and reject any not complying with requirements of this specification.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, that a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with specification requirements including: markings; condition of inside; tests; threads; heat treatment. Obtain samples for all tests, and check chemical analyses, witness all tests; report volumetric capacity, tare weight (see report form), and minimum thickness of wall noted.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

§ 178.61-5 Authorized steel. (a) As specified in Table I of Appendix A to this part.

(b) Heads. Material for heads shall be the same as paragraph (a) of this section or shall be open hearth, electric or basic oxygen carbon steel of uniform quality. Content percent for the following not over: Carbon, 0.25; manganese, 0.60; phosphorus, .045; sulfur, .050.

(1) Heads shall be hemispherical or ellipsoidal in shape with a maximum ratio of 2:1. If low carbon steel is used thickness of such heads shall be determined by using a maximum wall stress of 24,000 psi in formula § 178.61-10(a).

§ 178.61-6 Identification of material. (a) Required; any suitable method.

§ 178.61-7 Defects. (a) Material with seams, cracks, laminations or other injurious defects, not authorized.

§ 178.61-8 Manufacture. (a) By suitable appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings. Minimum thickness of heads shall be not less than 90 percent of the required thickness of the sidewall. Heads shall be concave to pressure.

(b) Circumferential seams. By electric-arc welding. Joints shall be butt with one member offset (jogg'le butt) or lap with minimum overlap of at least four times nominal sheet thickness.

(c) Longitudinal seams in shells.

(1) Longitudinal electric-arc welded seams shall be of the butt-welded type. Welds must be made by a machine process including automatic feed and welding guidance mechanisms. Longitudinal seams shall have complete joint penetration, and shall be free from undercuts, overlaps or abrupt ridges or valleys. Misalignment of mating butt edges shall not exceed 1/8 of nominal sheet thickness or 1/32 inch whichever is less. All joints with nominal sheet thickness up to and including 1/4 inch shall be tightly butted. When nominal sheet thickness is greater than 1/4 inch, the joint shall be gapped for maximum distance equal to one-half the nominal sheet thickness or 1/32 inch whichever is less. Joint design,

preparation and fit-up shall be such that requirements of § 178.61-8(d) are satisfied.

(2) Maximum joint efficiency shall be 1.0 when each seam is radiographed completely. Maximum joint efficiency shall be 0.90 when one cylinder from each lot of 50 consecutively welded cylinders is spot radiographed. In addition, one out of the first five cylinders welded following a shut down of welding operations exceeding four hours shall be spot radiographed. Spot radiographs, when required, shall be made of a finished welded cylinder and shall include the girth weld for 2 inches in both directions from the intersection of the longitudinal and girth welds and include at least 6 inches of the longitudinal weld. Maximum joint efficiency of 0.75 shall be permissible without radiography.

(d) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.61-9 Welding of attachments. (a) The attachment to the tops and bottoms only of cylinders by welding of neckrings, footrings, handles, bosses, pads and valve protection rings is authorized provided that such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon content of which must not exceed 0.25 percent.

§ 178.61-10 Wall thickness. (a) For outside diameters over 6 inches the minimum wall thickness shall be 0.078 inch. In any case the minimum wall thickness shall be such that the wall stress calculated by the formula (see Note 1):

$$S = \frac{P(1.3D^2 + 0.4d^2)}{E(D^2 - d^2)}$$

Note 1. In the formula above quoted

S = wall stress in pounds per square inch,
P = service pressure, psi;
D = outside diameter, inches;
d = inside diameter, inches
E = joint efficiency of the longitudinal seam (from § 178.61-8(c)(2))

shall not exceed the lesser value of any of the following:

(1) The value shown in Table I, § 178.61-5(a) for the particular material under consideration.

(2) One-half the minimum tensile strength of the material determined as required in § 178.61-15.

(3) 35,000 pounds per square inch.

(b) For a cylinder with wall thickness less than 0.100 inch, the ratio of tangential length to outside diameter may not exceed 4.1.

§ 178.61-11 Heat treatment. (a) Each cylinder must be uniformly and properly heat treated prior to test by the applicable method shown in § 178.61-5(a), Table I. Heat treatment must be accomplished after all forming and welding operations.

(b) Heat treatment is not required after welding or brazing weldable low carbon parts to attachments of similar material which have been previously welded to the top or bottom of cylinders and properly heat treated, provided such subsequent welding or brazing does not produce a temperature in excess of 400° F. in any part of the top or bottom material.

§ 178.61-12 Openings in cylinders. (a) All openings must be in the heads or bases.

(b) Openings in cylinders must be provided with adequate fittings, bosses, or pads, integral with or securely attached to the cylinder by welding.

(c) Threads must comply with the following:

(1) Threads must be clean cut and to gauge.

(2) Taper threads must be of length not less than as specified for American Standard Taper Pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder, gaskets required, adequate to prevent leakage.

(d) Closure of fittings; boss or pads must be adequate to prevent leakage.

§ 178.61-13 Safety relief devices and protection for valves, safety devices and other connections, if applied. (a) Must be as required by the Department of Transportation's Regulations that apply. (See §§ 173.34(d) and 173.301(g).)

§ 178.61-14 Hydrostatic test. (a) By water jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit readings to accuracy of one percent. Pressure gauge must permit readings to accuracy of one percent. Expansion gauge must permit readings of total volumetric expansion to accuracy either of one percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat treatment and previous to the official test must not exceed 90 percent of the test pressure.

(c) Permanent volumetric expansion must not exceed 10 percent of the total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less shall be tested as outlined in paragraphs (a), (b) and (c) of this section to at least two times service pressure.

(2) All cylinders not tested as outlined in subparagraph (d)(1) of this section must be examined under pressure of at least two times service pressure and show no defect.

(e) One finished cylinder selected at random out of each lot of 500 or less successively produced shall be hydrostatically tested to 4 times service pressure without bursting.

§ 178.61-15 Physical test. (a) Specimens must be taken from one cylinder after heat treatment and chosen at random from each lot of 200 or less, as follows:

(1) Body specimen. One specimen must be taken longitudinally from the body section at least 90 degrees away from the weld.

(2) Head specimen. One specimen must be taken from either head on a cylinder when both heads are made of the same material; however—

(i) If the two heads are made of differing materials, a specimen shall be taken from each head; and

(ii) If due to welded attachments on the top head there is insufficient surface from which to take a specimen, it may be taken from a representative head of the same heat treatment as the test cylinder.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or, gauge length 2 inches with width not over 1½ inches, provided that gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over ¼ inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimens for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(2) In using the "extension under load" method, the total strain (or, "extension under load"), corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

(3) For the purpose of strain measurement, the initial strain reference shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.61-16 Elongation. (a) Physical test specimens must show at least 40 percent for 2-inch gauge length or at least 20 percent in other cases, except that these elongation percentages may be reduced numerically by 2 for 2 inch specimens and by one in other cases for each 7,500 pounds per square inch increment of tensile strength above 50,000 pounds per square inch to a maximum of four increments.

§ 178.61-17 Tests of welds. (a) Tensile test. A specimen shall be cut from one cylinder of each lot of 200 or less. The specimen must be taken across the longitudinal seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3. Failure must occur in the parent metal.

(b) Guided bend test. A "root" test specimen shall be cut from the cylinder used for the tensile test specified in § 178.61-17(a). Specimens must be taken across the longitudinal seam and must be prepared and tested in accordance with and must meet the requirements of CGA Pamphlet C-3.

(c) Alternate guided bend test. This test may be used and must be as required by CGA Pamphlet C-3. The specimen shall be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gauge lines a to b, shall be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 pounds per square inch, as provided in § 178.61-16(a).

§ 178.61-18 Radiographic examination. (a) Radiographic inspection must conform to the techniques and acceptability criteria set forth in CGA Pamphlet C-3. When fluoroscopic inspection is used, permanent film records need not be retained.

(b) Should spot radiographic examination fail to meet the requirements of paragraph (a) of this section, two additional welds from the same lot of 50 cylinders or less shall be examined, and if either of these fail to meet the requirements, each cylinder shall be examined as previously outlined, only those passing are acceptable.

§ 178.61-19 Rejected cylinders. (a) Unless otherwise stated, if a sample cylinder or specimen taken from a lot of cylinders fails the prescribed test, then two additional specimens must be selected from the same lot and subjected to the prescribed test. If either of these fail the test then the entire lot must be rejected.

(b) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair of welded seams by welding is authorized provided that all defective metal be cut away and joint be rewelded as prescribed for original welded joints.

§ 178.61-20 Marking. (a) Marking on each cylinder stamped as follows:

(1) DOT-4BW followed by the service pressure (for example, DOT-4BW240, etc.).

(2) A serial number and an identifying symbol of the maker. The symbol must be registered with the Director, OHMT; duplications unauthorized. Lot numbers, not over 500 cylinders in each lot, in place of serial numbers authorized for cylinders not over 2 inches outside diameter or for cylinders with volumetric capacity not exceeding 60 cubic inches.

(3) Inspector's official mark.

(4) Date of test (for example, 12-64, for December 1964).

(5) Additional markings are permitted.

(b) Sequence of marks. Serial number shall be just below or immediately following the DOT mark; identifying symbol shall be just below or immediately following the serial number; inspector's official mark shall be near the serial number. Date of test shall be so placed that dates of subsequent test can easily be added. Symbol in front of or following the serial number, with space between, or symbol and serial number stamped into welded or brazed-on valve spud directly above the DOT mark located on head of cylinder are also authorized. Other variations in sequence of marks authorized only when necessitate by lack of space.

(c) Location of markings. Markings may be stamped plainly and permanently in the following locations on the cylinder:

(1) On shoulders and top heads when they are not less than 0.087-inch thick.

(2) On a metal plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least 1/16-inch thick and must be attached by welding, or by brazing. The brazing rod is to melt at a temperature of 1100 °F. Welding or brazing must be along all the edges of the plate.

(3) On the neck, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder.

(4) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 25 pounds.

(d) Size of marks. Space permitting, at least ¾ inch high.

§ 178.61-21 Inspector's report. (a) Required to be clear, legible and in following form:

(Place) .....
(Date) .....

Steel Gas Cylinders

Manufactured for ..... Company
Location at .....
Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder ..... of the cylinder are:
(location of marking)
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The material used was type ..... authorized in Table I of Spec. 4BW.
The material used was identified by the following ..... (heat purchase order) numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
The heat numbers ..... (were—were not) marked on the material.
All material was inspected and all that was accepted was found free from seams, cracks, laminations and other injurious defects.
Radiography ..... (type and amount)
The compliance of cylinders with specification requirements was verified including markings, condition of inside, tests, threads, etc. All cylinders with defects which might prove injurious were rejected. The processes of manufacture and heat treatment were supervised and found to be efficient and satisfactory.
The cylinder walls were measured and the minimum thickness noted was ..... inch. The outside diameter was determined to be ..... inches. The wall stress was calculated to be ..... pounds per square inch.
Hydrostatic tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-4BW were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.
Each cylinder ..... (has—has not) been equipped with safety devices as follows:
.....
I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4BW except as follows:
Exceptions .....
.....
.....
(Manufacturer's name)
Signed .....
By ..... Inspector
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF STEEL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Heat No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis										
				C	P	S	Si	Mn	Ni	Cr	Mo	Cu	Al	Zr

Steel was manufactured by ..... Company
The originals of the certified mill test reports are in the files of the manufacturer.
NOTE: Any omission of analysis by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.
Chemical analyses were made by .....
(Signed) .....
(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in inches)	Reduction of area (percent)	Weld tensile test	Weld bend test

(Signed) .....
(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS OF CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per sq. inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Permanent ratio of permanent expansion to total expansion[1]	Burst test (pounds per sq. inch)	Tare weight (pounds)[2]	Volumetric capacity[2]

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

For explanation of abbreviations and reference marks, see last page of this tariff.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.
[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.61-22 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

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§ 178.65 Specification 39; non-reusable non-refillable cylinder.

§ 178.65-1 Compliance. Each cylinder must meet the applicable requirements of § 173.24 of this chapter.

§ 178.65-2 Type, size, service pressure, and test pressure. (a) Type: Each cylinder must be of seamless, welded, or brazed construction. Spherical pressure vessels are authorized and covered by references to cylinders in this specification.
(b) Size limitation: Maximum water capacity may not exceed:
(1) 55 pounds (1,526 cubic inches) for a service pressure of 500 p.s.i.g. or less, and
(2) 10 pounds (277 cubic inches) for a service pressure in excess of 500 p.s.i.g.
(c) Service pressure: The marked service pressure may not exceed 80 percent of the test pressure.
(d) Test pressure: The minimum test pressure is the maximum pressure of contents at 130° F. or 180 p.s.i.g. whichever is greater.
(e) The term "pressure of contents" as used in this specification means the total pressure of all the materials to be shipped in the cylinder.

§ 178.65-3 Inspection by whom and where. (a) In the case of cylinders having marked service pressure higher than 900 psig, inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter.
(b) In the case of cylinders having marked service pressures of 900 psig or lower, inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of his subchapter or, in the case of cylinders manufactured in the United States, by a competent inspector of the manufacturer.
(c) Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.65-4 Duties of inspector. (a) The inspector must determine that all material used complies with the requirements of this specification.
(b) The inspector must verify compliance with the requirements of § 178.65-5 by making a chemical analysis of obtaining a certified chemical analysis from the material manufacturer for each heat of material (ladle analysis acceptable). If an analysis is not provided by the material manufacturer, a sample from each coil, sheet, or tube must be analyzed.
(c) The inspector must determine that each cylinder is made and marked in compliance with this specification by:
(1) Complete internal and external inspection (interested inspectors authorized);
(2) Verification of proper heat treatment (if any);
(3) Selection of samples to be tested;
(4) Witnessing all tests; and
(5) By preparation of required report.

§ 178.65-5 Material; steel or aluminum. (a) Steel:
(1) The steel analysis must conform to the following:

	Ladle analysis	Check analysis
Carbon, maximum percent	0.12	0.15
Phosphorus, maximum percent	0.04	0.05
Sulfur, maximum percent	0.05	0.06

(2) For a cylinder made of seamless steel tubing with integrally formed ends, hot drawn, and finished, content percent for the following must not exceed: carbon, 0.55; phosphorus, 0.045; sulfur, 0.050.
(3) For non-heat treated welded steel cylinders, adequately killed deep drawing quality steel is required.
(4) Longitudinal or helical welded cylinders are not authorized for service pressures in excess of 500 p.s.i.g.
(b) Aluminum: Aluminum is not authorized for service pressures in excess of 500 p.s.i.g. The analysis of the aluminum must conform to the Aluminum Association standard for alloys 1060, 1100, 1170, 3003, 5052, 5086, 5154, 6061, and 6063 as specified in its publication entitled "Aluminum Standards and Data" (7th edition dated June 1982).
(c) Material with seams, cracks, laminations, or other injurious defects not permitted.
(d) Material used must be identified by any suitable method.

§ 178.65-6 Manufacture. (a) General manufacturing requirements are as follows:
(1) Dirt and scale must be removed prior to inspection and processing.
(2) The surface finish must be uniform and reasonably smooth.
(3) Inside surfaces must be clean, dry, and free of loose particles.
(4) No defect of any kind is permitted if it is likely to weaken a finished cylinder.
(b) Requirements for seams:
(1) Brazing is not authorized on aluminum cylinders.
(2) Brazing material must have a melting point of not lower than 1,000° F.
(3) Brazed seams must be assembled with proper fit to insure complete penetration of the brazing material throughout the brazed joint.
(4) Minimum width of brazed joints must be at least four times the thickness of the shell wall.
(5) Brazed seams must have design strength equal to or greater than 1.5 times the minimum strength of the shell wall.
(6) Welded seams must be properly aligned and welded by a method that provides clean, uniform joints with adequate penetration.
(7) Welded joints must have strength equal to or greater than the minimum strength of the shell material in the finished cylinder.
(c) Attachments to the cylinder are permitted by any means which will not be detrimental to the integrity of the cylinder. Welding or brazing of attachments to the cylinder must be completed prior to all pressure tests.
(d) Welding procedures and operators must be qualified in accordance with CGA Pamphlet C-3.

§ 178.65-7 Wall thickness. (a) The minimum wall thickness must be such that the wall stress at test pressure does not exceed the yield strength of the materials of the finished cylinder wall.
(b) Calculation of the stress for cylinders must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where:
S = wall stress, in p.s.i.;
P = test pressure,
D = outside diameter, in inches.

(c) Calculation of the stress for spheres must be made by the formula:

$$S = \frac{PD}{4t}$$

where:
S = wall stress, in p.s.i.;
P = test pressure,
D = outside diameter, in inches.

§ 178.65-9 Openings and attachments. (a) Openings and attachments are permitted on heads only.
(b) All openings and their reinforcements must be within an imaginary circle, concentric to the axis of the cylinder. The diameter of the circle may not exceed 80 percent of the outside diameter of the cylinder. The plane of the circle must be parallel to the plane of a circumferential weld and normal to the long axis of the cylinder.
(c) Unless a head has adequate thickness, each opening must be reinforced by a securely attached fitting, boss, pad, collar, or other suitable means.
(d) Material used for welded openings and attachments must be of weldable quality and compatible with the material of the cylinder.

§ 178.65-10 Safety devices. Safety devices must meet the requirements of § 173.34(d) of this chapter.

§ 178.65-11 Pressure tests. (a) Each cylinder must be tested at an internal pressure of at least the test pressure and must be held at that pressure for at least 30 seconds.
(1) The leakage test must be conducted by submersion under water or by some other method that will be equally sensitive.
(2) If the cylinder leaks, evidences visible distortion, or any other defect, while under test, it must be rejected (see § 178.65-13).
(b) One cylinder taken from the beginning of each lot and one from each 1,000 or less successively produced within the lot thereafter, must be hydrostatically tested to destruction. The entire lot must be rejected if (see § 178.65-13):
(1) A failure occurs at a gage pressure less than 2.0 times the test pressure.
(2) A failure initiates in a braze or a weld or the heat affected zone thereof;
(3) A failure is other than in the sidewall of a cylinder longitudinal with its long axis, or
(4) In a sphere, a failure occurs in any opening, reinforcement, or at a point of attachment.
(c) A "lot" is defined as the quantity of cylinders successively produced per production shift (not exceeding 10 hours) having identical size, design, construction, material, heat treatment, finish, and quality.

§ 178.65-12 Flattening tests. (a) One cylinder must be taken from the beginning of production of each lot (as defined above) and subjected to a flattening test.

(1) The flattening test must be made on a cylinder that has been tested at test pressure.

(2) A ring taken from a cylinder may be flattened as an alternative to a test on a complete cylinder. The test ring must not include the heat affected zone or any weld. However, for a sphere, the test ring may include the circumferential weld if it is located at a 45 degree angle to the ring, ± 5 degrees.

(3) The flattening must be between 60 degrees included-angle, wedge shaped knife edges, rounded to a 0.5 inch radius.

(4) Cylinders and test rings must not crack when flattened so that their outer surfaces are not more than six times wall thickness apart when made of steel or not more than ten times wall thickness apart when made of aluminum.

(b) If any cylinder or ring cracks when subjected to the specified flattening test, the lot of cylinders represented by the test must be rejected (see § 178.65-13).

§ 178.65-13 Rejected cylinders. (a) If the cause for rejection of a lot is determinable, and if by test or inspection defective cylinders are eliminated from the lot, the remaining cylinders must be qualified as a new lot under §§ 178.65-11 and 178.65-12.

(b) Repairs to welds are permitted. Following repair, a cylinder must pass the pressure test specified in § 178.65-11(a).

(c) If a cylinder made from seamless steel tubing fails the flattening test described in § 178.65-12, suitable uniform heat treatment must be used on each cylinder in the lot. All prescribed tests must be performed subsequent to this heat treatment.

§ 178.65-14 Marking. (a) The markings required by this section must be durable and waterproof. The requirements of § 173.24(c)(1)(ii) and (iv) of this chapter do not apply to this section.

(b) Required markings are as follows:

(1) DOT-39.

(2) NRC.

(3) The service pressure.

(4) The test pressure.

(5) The registration number (M * * * *) of the manufacturer.

(6) The lot number.

(7) The date of manufacture if the lot number does not establish the date of manufacture.

(8) The following statement: Federal law forbids transportation if refilled—penalty up to $25,000 fine and 5 years imprisonment (49 U.S.C. 1809).

(c) The markings required by paragraph (b)(1) through (5) of this section must be in numbers and letters at least ⅛ inch high and displayed sequentially. For example:

DOT-39 NRC 250 500 M1001.

(d) No person may mark any cylinder with the specification identification "DOT-39" unless (1) it was manufactured in compliance with the requirements of this section and (2) its manufacturer has a registration number (M * * * *) from the Office of Hazardous Materials Transportation, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

§ 178.65-15 Inspector's report. (a) The inspector's report must be retained by the manufacturer for a period of 3 years and must be available for examination by representatives of the Department.

(b) The report must be legible, and contain at least the following information:

INSPECTION REPORT COVERING THE MANUFACTURE OF SPECIFICATION DOT-39 CYLINDERS OR SPHERES.

The cylinders (spheres) covered by this report were manufactured for _____ located at _____. They were manufactured by _____ located at _____ whose Department of Transportation registration number is M_____. The cylinders are _____ inches in diameter (OD) and _____ inches in length. They have a design test pressure of _____ p.s.i.g. and a marked service pressure of _____ p.s.i.g. Each has an internal volume of _____ cubic inches (nominal).

These containers were made by process of _____.

The metal used was identified by heat or analysis numbers as shown on the "Record of Chemical Analysis of Metal" attached hereto.

All material and each cylinder was inspected. All accepted material was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment (if any) were observed and found satisfactory.

My record of tests and inspection for each lot covered by this report is as follows:

Lot No.	Lot quantity	Lot test		All cylinders	
		Burst pressure[1]	Flattening test[2]	Pressure test[2]	Visual inspection[2]
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

[1] Enter the lowest actual failure pressure of all cylinders tested within the lot.
[2] Enter "Pass" or "Fail".

....
Inspector's name (print) Inspector's signature

....
Date Inspector's employer (company name)

§ 178.68 Specification 4E; welded aluminum cylinders.

§ 178.68-1 Compliance. (a) Required in all details.

§ 178.68-2 Type, size and service pressure. (a) Type and size. Must be constructed of not more than two seamless drawn shells with no more than one circumferential weld. The circumferential weld must not be closer to the point of tangency of the cylindrical portion with the shoulder than 20 times the cylinder wall thickness. Cylinders or shells closed in by spinning process and cylinders with longitudinal seams are not authorized. Authorized for not over 1,000 pounds water capacity (nominal).

(b) Service pressure.[1] At least 225 to not over 500 pounds per square inch.

§ 178.68-3 Inspection by whom and where. (a) Inspections and verifications must be performed by an independent inspection agency approved in writing by the Director, OHMT, in accordance with § 173.300(a) of this subchapter or, in the case of cylinders manufactured in the United States, a competent inspector of the manufacturer. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Director, OHMT, in accordance with § 173.300(b) of this subchapter.

§ 178.68-4 Duties of inspector. (a) Inspect all material and reject any material not complying with requirements.

(b) Verify chemical analysis of each lot of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analysis of samples taken from one aluminum cylinder out of each lot of 200 or less.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify properties as proper; obtain samples for all tests and check chemical analysis; witness all tests; verify threads by gauge; report volumetric capacity, tare weight (see report form) and wall thickness as approved.

(d) Furnish complete test reports required by this specification to the maker of the cylinder and, upon request, to the purchaser. The test report must be retained by the inspector for fifteen years from the original test date of the cylinder.

TABLE I—AUTHORIZED MATERIALS

Designation	Chemical analysis—Limits in percent S154[2]
Iron plus silicon	0.45 max.
Copper	0.10 max.
Manganese	0.10 max.
Magnesium	3.1/3.9
Chromium	0.15/0.35
Zinc	0.20 max.
Titanium	0.20 max.
Others, each	0.05 max.
Others, total	0.15 max.
Aluminum	Remainder

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinders, for example DOT-4E240 indicates the service pressure as 240 pounds per square inch.

[2] Analysis shall regularly be made only for the elements specifically mentioned above. If, however, the presence of other elements is indicated in the course of routine analysis, further analysis should be made to determine conformance with the limits specified for other elements.

§ 178.68-5 Aluminum. (a) Shall be of uniform quality. The following chemical analyses are authorized:

§ 178.68-6 Identification of material. (a) Required; any suitable method that will identify the alloy and manufacturer's lot number.

[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinders, for example DOT-4E240 indicates the service pressure as 240 pounds per square inch.

§ 178.68-7 Defects. (a) Material with seams, cracks, laminations or other injurious defects not authorized.

§ 178.68-8 Manufacture. (a) By best processes and methods; dirt and foreign particles to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required; all welding must be by the gas shielded arc process.

§ 178.68-9 Welding. (a) The attachment to the tops and bottoms only of cylinders by welding of neckrings or flanges, footrings, handles, bosses and pads and valve protection rings is authorized. Provided, That such attachments and the portion of the cylinder to which it is attached are made of weldable aluminum alloys.

§ 178.68-10 Wall thickness. (a) The minimum wall thickness of the cylinder shall be 0.140 inch. In any case, the minimum wall thickness shall be such that calculated wall stress at twice service pressure shall not exceed the lesser value of either of the following:

(1) 20,000 pounds per square inch.

(2) One-half of the minimum tensile strength of the material as required in §178.68-15.

(b) Calculation must be made by the formula:

$$S = \frac{P(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

where

S = wall stress in pounds per square inch.
P = minimum test pressure prescribed for water jacket test.
D = outside diameter in inches
d = inside diameter in inches

(c) Minimum thickness of heads and bottoms shall not be less than the minimum required thickness of the side wall.

§ 178.68-11 Opening in cylinder. (a) All openings must be in the heads or bases.

(b) Each opening in cylinders, except those for safety devices, must be provided with a fitting, boss, or pad, securely attached to cylinder by welding by insert gas shielded arc process or by threads. If threads are used, they must comply with the following:

(1) Threads must be clean-cut, even, without checks and cut to gauge.

(2) Taper threads to be of length not less than as specified for American Standard taper pipe threads.

(3) Straight threads, having at least 4 engaged threads, to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

(c) Closure of fitting, boss, or pad must be adequate to prevent leakage.

§ 178.68-12 Safety devices and protection for valves, safety devices, and other connections if applied. (a) Must be as required by the Department of Transportation Regulations that (see §§ 173.34(d), 173.124(a)(2), and 173.301(g)).

§ 178.68-13 Hydrostatic test. (a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure of 2 times service pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent over the pressure otherwise specified.

(c) Permanent volumetric expansion must not exceed 12 percent of total volumetric expansion at test pressure.

(d) Cylinders having a calculated wall stress of 18,000 pounds per square inch or less at test pressure may be tested as follows:

(1) At least one cylinder selected at random out of each lot of 200 or less shall be tested in accordance with paragraphs (a), (b) and (c) of this section.

(2) All cylinders not tested as provided in subparagraph (d)(1) of this section must be examined under pressure of at least two times service pressure and show no defect.

(e) One finished cylinder selected at random out of each lot of 1,000 or less shall be hydrostatically tested to 4 times the service pressure without bursting. Inability to meet this requirement shall result in rejection for the lot.

§ 178.68-14 Flattening test. (a) After hydrostatic testing, a flattening test is required on one section of a cylinder, taken at random out of each lot of 200 or less as follows:

(1) If the weld is not at midlength of the cylinder, the test section must be no less in width than 30 times the cylinder wall thickness. The weld must be in the center of the section. Weld reinforcement must be removed by machining or grinding so that the weld is flush with the exterior of the parent metal. There must be no evidence of cracking in the sample when it is flattened between flat plates to no more than 6 times the wall thickness.

(2) If the weld is at midlength of the cylinder, the test may be made as specified in subparagraph (1) of this paragraph or must be made between wedge shaped knife edges (60° angle) rounded to a ½-inch radius. There must be no evidence of cracking in the sample when it is flattened to no more than 6 times the wall thickness.

§ 178.68-15 Physical test. (a) To determine yield strength, tensile strength, elongation, and reduction of area of material. Required on 2 specimens cut from one cylinder or part thereof taken at random out of each lot of 200 or less.

(b) Specimens must be: Gauge length 8 inches with width not over 1½ inches; or gauge length 2 inches with width not over 1½ inches. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may straightened or flattened cold, by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by the "offset" method as prescribed in ASTM Standard E8-78.

(2) Cross-head speed of the testing machine shall not exceed ½ inch per minute during yield strength determination.

§ 178.68-16 Acceptable results for physical tests. (a) Elongation at least 7 percent; yield strength not over 80 percent of tensile strength.

§ 178.68-17 Weld tests. (a) Reduced section tensile test. A specimen shall be cut from the cylinder used for the physical tests specified in §178.68-15. Specimen shall be taken across the seam, edges shall be parallel for a distance of approximately 2 inches on either side of the weld. The specimen must be fractured in tension. The apparent breaking stress calculated on the minimum wall thickness must be at least equal to 2 times the stress calculated under §178.68-10(b), and in addition must have an actual breaking stress of at least 30,000 pounds per square inch. Should this specimen fail to meet the requirements, specimens may be taken from 2 additional cylinders from the same lot and tested. If either of the latter specimens fails to meet requirements, the entire lot represented shall be rejected.

(b) Guided bend test. A bend test specimen shall be cut from the cylinder used for the physical tests specified in §178.68-15. Specimen shall be taken across the seam, shall be 1½ inches wide, edges shall be parallel and rounded with a file, and back-up strip, if used, shall be removed by machining. The specimen must be bent to refusal in the guided bend test jig illustrated in paragraph 6.10 of CGA Pamphlet C-3. The root of the weld (inside surface of the cylinder) shall be located away from the ram of the jig. No specimen shall show a crack or other open defect exceeding ⅛ inch in any direction upon completion of the test. Should this specimen fail to meet the requirements, specimens may be taken from each of 2 additional cylinders from the same lot and tested. If either of the latter specimens fail to meet requirements, the entire lot represented shall be rejected.

§ 178.68-18 Rejected cylinders. (a) Repair of welded seams is authorized. Acceptable cylinders must pass all prescribed tests.

§ 178.68-19 Marking. (a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, neck or valve protection collar which may be permanently attached to the cylinder and forming an integral part thereof, as follows:

(1) DOT-4E followed by the service pressure (for example, DOT-4E240).

(2) A serial number and an identifying symbol (letters); location of the number to be just below or immediately following the DOT mark; location of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker. The symbol must be registered with the Director, OHMT; duplications are not authorized.

Examples: DOT-4E240 1234 XY — DOT-4E240-1234 XY

(3) Inspector's official mark, near serial number, date of test (such as 5-50 for May 1950), so placed that date of subsequent test can be easily added.

(4) Size of marks. Shall be at least ¼ inch high.

§ 178.68-20 Inspector's report. (a) Required to be clear, legible, and in following form:

(Place) .....

(Date) .....

Gas Cylinders

Manufactured for ..... Company

Location at .....

Manufactured by ..... Company
Location at .....
Consigned to ..... Company
Location at .....
Quantity .....
Size ..... inches outside diameter by ..... inches long
Marks stamped into the shoulder of the cylinder are:
Specification DOT .....
Serial numbers ..... to ..... inclusive
Inspector's mark .....
Identifying symbol (registered) .....
Test date .....
Tare weights (yes or no) .....
Other marks (if any) .....
These cylinders were made by process of .....
.....
.....
The ..... permitted in § 178.68-9
(nockings—footings, etc.)
were attached by process of .....
(welding—brazing)
The material used was identified by the following .....
numbers .....
The material used was verified as to chemical analysis and record thereof is attached hereto.
All material, such as plates, billets and seamless tubing was inspected and each cylinder was inspected both before and after closing in the ends, all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.
The cylinder walls were measured and the minimum thickness noted was .....
inch. The outside diameter was determined by a close approximation to be .....
inches. The wall stress was calculated to be ..... pounds per square inch
under an internal pressure of ..... pounds per square inch.
Hydrostatic tests, flattening tests, tensile tests of material, and other tests, as prescribed in specification No. DOT-4E were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereof are attached hereto.
I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 4E except as follows:
Exceptions .....
.....
.....

(Signed) .....
Inspector
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

NOTE: Any omission of analysis by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file" or by attaching a copy of the certificate.

Test No.	Check analysis No.	Cylinders represented (Serial Nos.)	Chemical analysis							
			Mg	Cr	Ce	Mn	Zn	Ir	Al	Ti
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The analyses were made by .....

(Signed) .....

(Place) .....
(Date) .....

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test	Burst test (pounds per square inch)
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

(Signed) .....

(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Made by ..... Company
For ..... Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Volumetric capacity[3]
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading: "Each cylinder was subjected to a pressure of ..... pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.

[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.

[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) .....

§ 178.68-21 Report retention. The maker of cylinders under this specification must retain the test reports required by this specification for fifteen years from the original test date of the cylinder.

SUBPART D

SPECIFICATIONS FOR METAL BARRELS, DRUMS, KEGS, CASES, TRUNKS AND BOXES

§ 178.80 Specification 5; steel barrels or drums. Removable head containers which will pass all required tests are authorized.

§ 178.80-1 Compliance. (a) Required in all details.

§ 178.80-2 Rated capacity. (a) Rated capacity as marked, see § 178.80-11(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.80-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel. Stainless steel, when used

For explanation of abbreviations and reference marks, see last page of this tariff.

must be, except for rolling hoops and chime reinforcement, an austenitic 18 and 8 chrome nickel alloy with carbon content not over 0.08 percent, or other equivalent grades.

§ 178.80-5 Seams. (a) Body seams welded.

§ 178.80-6 Chime reinforcement. (a) Containers over 25 gallons capacity, with flanged head secured to body, to have chime reinforcement adequate for its protection.

§ 178.80-7 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
		Body sheet	Head sheet	Type[1]	Minimum size (gauge or inch)	Minimum weight (pounds per foot)
5	Straight side	22	22	None		
10	do	20	20	do		
30	do	14	14	do		
30	do	18	18	U	16	
55	do	16	16	U[2]	14	
110	do	14	14	U[2]	12	
30	do	18	18	I-bar	3/8 × 1 1/8	1.25
55	do	16	16	I-bar[3]	3/8 × 1 1/8	1.25
110	do	14	14	I-bar[3]	3/8 × 1 1/8	1.25
30	do	16	16	(1)		
55	do	14	14	(1) (2)		
30	Bilge	14	16	None		
55	do	13	14	do		

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.

[2] Rolled or swedged in hoops.

[3] In addition to the normal rolling hoops, the body of each removable head drum must have a rolled or swedged in hoop the center line of which shall be not more than 3 inches from the top curl.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[4] (inch)	Minimum thickness[4] (inch)
13	0.0897	0.0617
14	0.0747	0.0577
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324
22	0.0299	0.0269

[4] Thickness shall be measured at any point on the sheet not less than ¾ inch from an edge.

§ 178.80-8 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops not permitted. Attachment to drum body by spot welding, except for continuous resistance method, not permitted. Welding of I bar type directly to body of drum in any manner not permitted.

§ 178.80-9 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.7 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug, or cap, must have 3 or more complete threads; two drainage holes of not over 7/64 inch diameter are allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when screwed home with gasket in place.

(d) Full removable head drums over 5 gallons capacity must be closed by means of 12 gauge bolted ring with drop forged lugs, one of which is threaded, and having ⅜ inch bolt and nut for drums not over 30 gallons capacity and ½ inch bolt and nut for drums over 30 gallons capacity. Five gallon drums must be of lug type closure with cover having at least 16 lugs. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.80-10 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.80-11 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footing on drums equipped with footings, or on metal plates securely attached by drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-5.

(2) If the drum is manufactured of stainless steel, the type of steel used in body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of the body indicated first. (For example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.80-12 [Reserved]

§ 178.80-13 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 40 pounds per square inch sustained for 5 minutes; except that full removable head drums must sustain 20 pounds per square inch.

(3) Periodic drop and hydrostatic tests are not required when containers fabricated of stainless steel have satisfactorily withstood prescribed tests at the original start of production. Satisfactory test results must be obtained on samples of subsequent containers that have been altered in design or construction. In instances where manufacturers have suspended production for an interval of 12 months or more, drop and hydrostatic tests must be again conducted as prescribed in subparagraphs (1) and (2) of this paragraph as for original start of production. Samples last tested to be retained until further tests are made or for one year, whichever period is shorter.

§ 178.80-14 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Removable head containers need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

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§ 178.81 Specification 5A; steel barrels or drums. Removable head containers not authorized.

§ 178.81-1 Compliance. (a) Required in all details.

§ 178.81-2 Rated capacity. (a) Rated capacity as marked see § 178.81-11(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity, actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.81-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.81-5 Seams. (a) Body seams welded.
(b) Head and chime seams welded or double-seamed.
(c) Flanges for closures welded in place.

§ 178.81-6 Chime reinforcements. (a) Containers over 25 gallons capacity, with flanged head secured to body, to have chime reinforcement adequate for its protection.

§ 178.81-7 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
		Body sheet	Head sheet	Type[1]	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
19	Straight side	16	16	None		
30	do	16	16	I-bar	3/4 × 1/4	1.25
55	do	14	14	do	1 × 1/4	1.60
110	do	12	12	do	1 × 1/4	1.60
30	Bilge	14	16	None		
55	do	13	14	do		

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
12	0.1046	0.0945
13	0.0897	0.0817
14	0.0747	0.0677
16	0.0598	0.0533

[1] Thickness shall be measured at any point on the sheet not less than ½ inch from an edge.

§ 178.81-8 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops or welding of the rolling hoops directly to the body of the drum in any manner is not permitted.

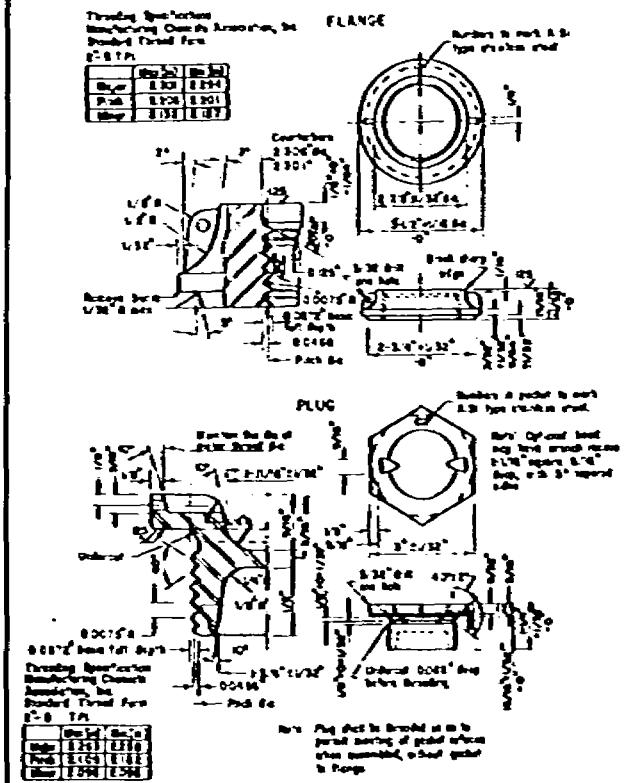
§ 178.81-9 Closures. (a) Adequate to prevent leakage; gasket required. Closure must be of screw-thread type or fastened by screw-thread device. Unthreaded cap is authorized for containers of 12 gallons or less if cap is provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter.

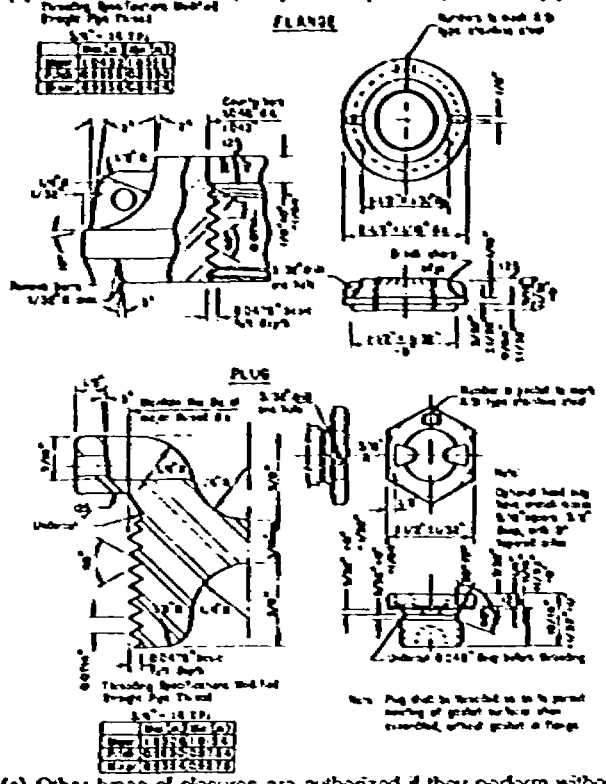
Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug or cap must have 5 or more complete threads; 2 drainage holes of not over 5/16" diameter are allowed in that section of flange which extends inside the drum. Plug or cap must have sufficient length of thread to engage 5 threads when securely tightened with gasket in place.

(d) Openings over 2.3" diameter not permitted. Threads for plug or cap must be 8 or less per inch when over ¾" standard pipe size. Flanges with inside threads and plugs must conform with the thread diameter and thread form shown in the following drawing; other details shown on the drawing are recommended.



(2) Eleven and one-half (11½) threads per inch, standard pipe size.



(e) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.81-10 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.81-11 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-5A.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMIT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18/16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.81-12 [Reserved]

§ 178.81-13 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 80 pounds per square inch sustained for 5 minutes.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 178.81-14 Leakage test. (a) Each container shall be tested with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

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§ 178.82 Specification 5B; steel barrels or drums.

Removable head containers which will pass all required tests are authorized.

§ 178.82-1 Compliance. (a) Required in all details.

§ 178.82-2 Rated capacity. (a) Rated capacity as marked, see § 178.82-11(a)(3). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity plus 5 percent of rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater. Actual capacity of bilge type containers must be not less than rated (marked) capacity, nor greater than rated (marked) capacity plus 2 percent plus 2 quarts.

§ 178.82-3 Composition. (a) Sheets or body and heads to be low carbon, open hearth or electric steel.

§ 178.82-5 Seams. (a) Body seams welded.

§ 178.82-6 Chime reinforcement. (a) Containers, over 25 gallons, capacity, with flanged head secured to body, to have chime reinforcement adequate for its protection.

§ 178.82-7 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
		Body sheet	Head sheet	Type[1]	Minimum size (gauge or inch)	Minimum weight (pounds per foot)
5	Straight side	24	24	None		
10	do	22	22	do		
15	do	20	20	(2)		
33	do	18	18	(2)		
55	do	16	16	(2), (3)		
110	do	13	14	(2), (3)		
33	Bilge	16	16	None		
55	do	14	14	do		

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.
[2] Rolled or swedged in hoops.
[3] Each removable head drum body must have three rolled or swedged in hoops with the center line of one not more than 3 inches from the top curl.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
13	0.0897	0.0617
14	0.0747	0.0677
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324
22	0.0299	0.0269
24	0.0239	0.0209

[1] Thickness shall be measured at any point on the sheet not less than ¾ inch from an edge.

§ 178.82-8 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops or spot welding not permitted.

§ 178.82-9 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal (see paragraph (c) of this section) as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.7 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug, or cap, must have 3 or more complete threads; two drainage holes of not over ⅛ inch diameter are allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when tightened with gasket in place. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

(d) Full removable head drums over 5 gallons capacity must be closed by means of 12 gauge bolted ring with drop forged lugs, one of which is threaded, and having ⅜ inch bolt and nut for drums not over 30 gallons capacity and ½ inch bolt and nut for drums over 30 gallons capacity. Five gallon drums must be of lug type closure with cover having at least 16 lugs. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of such tests is retained during the period the closure is in use.

§ 178.82-10 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.82-11 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-5B.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.82-12 [Reserved]

§ 178.82-13 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam, also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 40 pounds per square inch sustained for 5 minutes; except that full removable head drums must sustain 20 pounds per square inch.

§ 178.82-14 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Removable head containers need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

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§ 178.83 Specification 5C; steel barrels or drums.

Removable head containers not authorized.

§ 178.83-1 Compliance. (a) Required in all details.

§ 178.83-2 Rated capacity. (a) Rated capacity as marked, see § 178.83-11(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.83-3 Composition. (a) Steel must be, except for rolling hoops and chime reinforcement, as follows:

(b) All sheet metal, welding rod, closing devices, and samples taken from the welded portion of the finished container must be of Type 304, 18 chrome 8 nickel alloy with 0.08 percent carbon maximum, 18–20 percent chromium, 8–11 percent nickel, or other types of stainless steel of equivalent corrosion resistance and physical properties.

(c) Type 304 or other grades of equivalent corrosion resistant steels in the as-welded condition are permissible for nitric acid concentrations up to and including 78 percent. For all concentrations of nitric acid the following are permissible:
(1) Type 304 heat-treated (quenches from 1900° F.), or
(2) Stabilized Type 347 in the as-welded condition, or
(3) Stabilized Type 347 stress-relieved (1550°–1650° F.), or
(4) Stabilized Type 347 heat-treated (quenches from 1900° F.), or
(5) Other grades of equivalent corrosion resistance.
(d) All parts of any completed container exposed to lading must comply with the standard 65 percent boiling nitric acid test in that the limit of inches per month penetration in accordance with corrosion test as used in American Society of Testing Materials Standard A-262-44-T shall be 0.0015 inch, this figure to be an average of five 48-hour tests.

§ 178.83-5 Seams. (a) Body seams welded.
(b) Chime seams welded or double-seamed and welded.
(c) Flanges for closures welded in place.

§ 178.83-6 Chime reinforcement. (a) Containers of 10 gallons capacity or over, with flanged head secured to body, to have chime reinforcement adequate for its protection.

§ 178.83-7 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
		Body sheet	Head sheet	Type[1]	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
15	Straight side	20	20	None		
30	do	18	18	I-bar	¾ x 1⅛	1.25
55	do	16	16	do[2]	1 x 1½	1.60
110	do	14	14	do[2]	1 x 1½	1.60
15	Bilge	16	16	None		
30	do	14	16	do		
55	do	13	14	do		

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.
[2] Stainless steel I-bar hoops ¾ x 1⅛ inch, weighing not less than 1.27 pounds per foot, are authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
13	0.0897	0.0817
14	0.0747	0.0677
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324

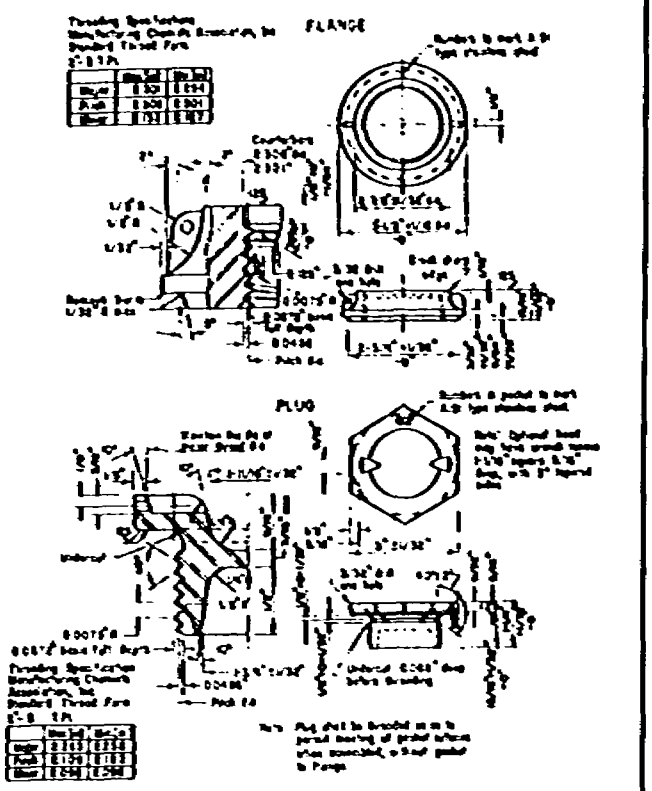
[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.83-8 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops or spot welding not permitted.

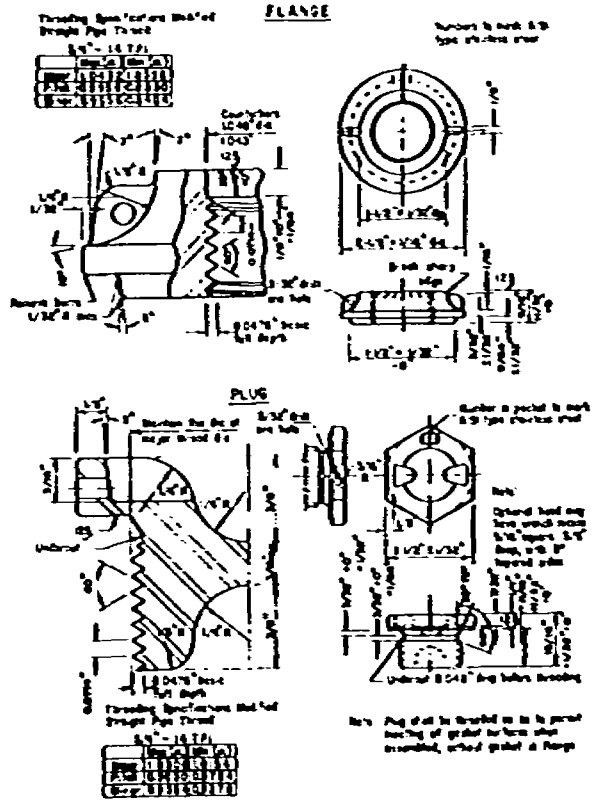
§ 178.83-9 Closures. (a) Adequate to prevent leakage; gaskets required. Closure must be of screw-thread type or fastened by screw-thread device. Unthreaded cap is authorized for containers of 12 gallons or less if cap is provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.
(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug or cap must have 5 or more complete threads; 2 drainage holes of not over 7/16 inch diameter are allowed in that section of flange which extends inside the drum. Plug or cap must have sufficient length of thread to engage 5 threads when securely tightened with gasket in place. Except that for containers not over 15 gallons marked capacity the seat (flange, etc.) for plug or cap may have at least 3 complete threads and plug or cap sufficient length of thread to engage 3 threads when securely tightened with gasket in place.
(d) Openings over 2.3 inches are not permitted. Threads for plug or cap must be 8 or less per inch when over ¾ inch standard pipe size.
(1) Flanges with inside threads and plug must conform with the thread diameter and thread form shown in the following drawing (other details shown on the drawing are recommended):



or (2) Eleven and one-half (11½) threads per inch, standard pipe size.



For explanation of abbreviations and reference marks, see last page of this tariff.

(e) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.83-10 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.83-11 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footing on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-5C.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18 16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.83-12 [Reserved]

§ 178.83-13 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 80 pounds per square inch sustained for 5 minutes.

(3) Periodic drop and hydrostatic tests are not required where container has satisfactorily met prescribed tests at the original start of production. Satisfactory test results must be obtained on samples of subsequent containers that have been altered in design or construction. Samples so tested must be retained until further tests are made or for one year, whichever period is shorter.

§ 178.83-14 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.84 [Reserved]

§ 178.85 [Reserved]

§ 178.87 [Reserved]

§ 178.88 Specification 5K; nickel barrels or drums.

Removable head containers not authorized.

§ 178.88-1 Compliance. (a) Required in all details.

§ 178.88-2 Rated capacity. (a) Rated capacity as marked, see §178.88-10(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.88-3 Composition. (a) Material must be, except for rolling hoops and chime reinforcements, nickel at least 99.0 percent pure.

§ 178.88-4 Seams. (a) Body seams welded.
(b) Head and chime seams welded or double-seamed.
(c) Flanges for closures welded in place.

§ 178.88-5 Chime reinforcement. (a) Containers over 25 gallon capacity, with flanged head secured to body, to have chime reinforcement adequate for its protection.

§ 178.88-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness in the black (gauge, United States standard)		Rolling hoops	
		Body sheet	Head sheet	Type[1]	Minimum size (gauge or inch)
10	Straight side	16	16	None	
30	do	16	16	Bar	¾ × 1½
55	do	14	14	do	1 × 1½
110	do	12	12	do	1 × 1½
30	Bilge	14	16	None	
55	do	13	14	do	

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.

§ 178.88-7 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops or spot welding not permitted.

§ 178.88-8 Closures. (a) Adequate to prevent leakage; gaskets required. Closure must be of screw-thread type or fastened by screw-thread device. Unthreaded cap is authorized for containers of 12 gallons or less if cap is provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

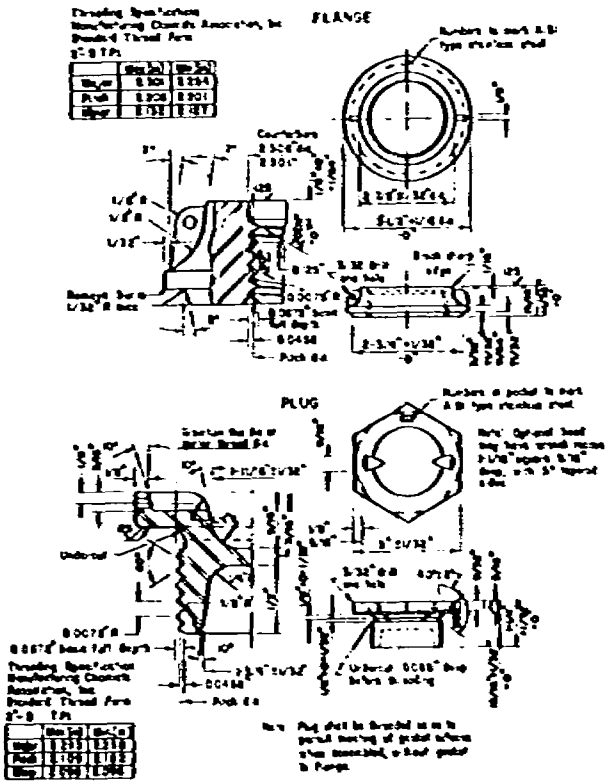
(b) Closing part (plug, cap, plate, etc. see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

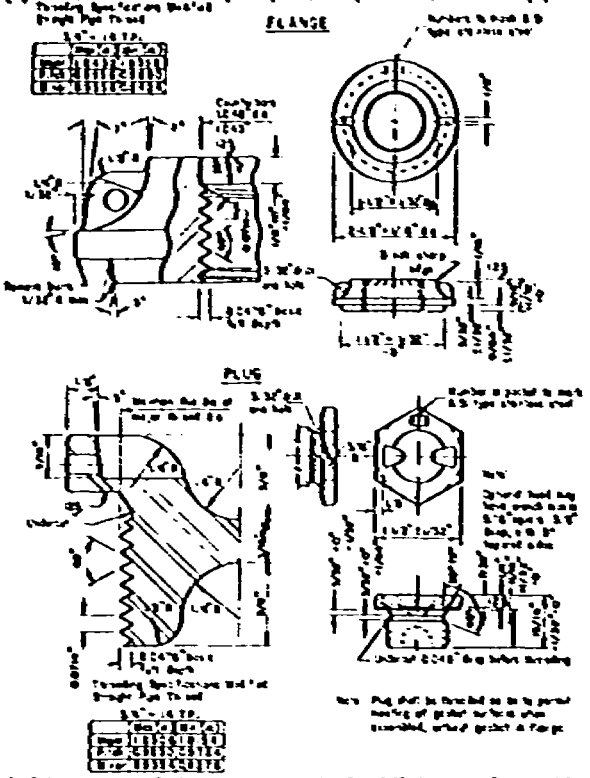
(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug or cap must have 5 or more complete threads; 2 drainage holes of not over 7/64 inch diameter are allowed in that section of flange which extends inside the drum. Plug or cap must have sufficient length of thread to engage 5 threads when securely tightened with gasket in place.

(d) Openings over 2.3 inches in diameter are not permitted. Threads for plug or cap must be 8 or less per inch when over ¾ inch standard pipe size.

(f) Flanges with inside threads and plug must conform with the thread diameter and thread form shown in the following drawing (other details shown on the drawing are recommended):



or (2) Eleven and one half (11½) threads per inch, standard pipe size.



(c) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.88–9 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.88–10 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footing on drums equipped with footings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT–5K.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18–55–83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18 16–55–83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.88–11 [Reserved]

§ 178.88–12 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 12 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 2 years, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 80 pounds per square inch sustained for 5 minutes.

(3) Periodic drop and hydrostatic tests are not required where container has satisfactorily met prescribed tests at the original start of production. Satisfactory test results must be obtained on samples of subsequent containers that have been altered in design or construction. Samples so tested must be retained until further tests are made or for two years, whichever period is shorter.

§ 178.88–13 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.89 Specification 5L; steel barrels or drums. Removable head containers not authorized.

§ 178.89–1 Compliance. (a) Required in all details.

§ 178.89–2 Rated capacity. (a) Rated capacity as marked, see § 178.89–9(a)(3). Actual capacity shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart.

§ 178.89–3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.89–5 Seams. (a) Body seams welded.

(b) Head and chime seams welded or double-seamed.

(c) Flanged spout for filling and emptying container welded in place or attached in a manner approved by the Director, OHMT.

§ 178.89–6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness in the black (gauge, United States standard)		Rolling hoops		
		Body sheet	Head sheet	Type	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
5	Rectangular	20	20	None		

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
20	0.0359	0.034

[1] Thickness shall be measured at any point on the sheet not less than ¾ inch from an edge.

§ 178.89–7 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part must be of sufficient strength to withstand the drop test prescribed in § 178.89–11(a)(1).

(c) Closure must be of screw-thread type or fastened by screw-thread device.

(d) Openings over 2.5 inches diameter not permitted.

§ 178.89–8 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.89–9 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footing on drums equipped with footings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT–5L.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18–55–83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18 16–55–83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.89–10 [Reserved]

§ 178.89–11 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thick-

For explanation of abbreviations and reference marks, see last page of this tariff.

ness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 15 pounds per square inch sustained for 5 minutes.

§ 178.89-12 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 5 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT.

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§ 178.90 Specification 5M; monel drums. Removable head containers not authorized.

§ 178.90-1 Compliance. (a) Required in all details.

§ 178.90-2 Rated capacity. (a) Rated capacity as marked, see § 178.90-10(a)(3). Actual capacity of containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.90-3 Composition. (a) Material must be, except for rolling hoops and chime reinforcements, monel.

§ 178.90-4 Seams. (a) Body seams welded.
(b) Head and chime seams welded or double-seamed.
(c) Flanges for closures welded in place.

§ 178.90-5 Chime reinforcement. (a) Containers to have chime reinforcement adequate for its protection.

§ 178.90-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness in the black (gauge, United States standard)		Rolling hoops		
		Body sheet	Head sheet	Type[1]	Minimum size (gauge or inch)	Minimum weight (pounds per foot)
10	Straight side	14	14	None		
55	do	14	14	Bar	1 × 1½	1.60

[1] Rolling hoops may be of pliable solid rubber, metal or other suitable material provided that equivalent protection to drum integrity is afforded.

§ 178.90-7 Rolling hoops. (a) Separate hoops if used, to have tight fit on shell and be firmly secured in place. Beading under rolling hoops or spot welding not permitted.

§ 178.90-8 Closures. (a) Adequate to prevent leakage. Closure must be of screw-thread type or fastened by screw-thread device. Unthreaded cap is authorized for containers of 12 gallons or less if cap is provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

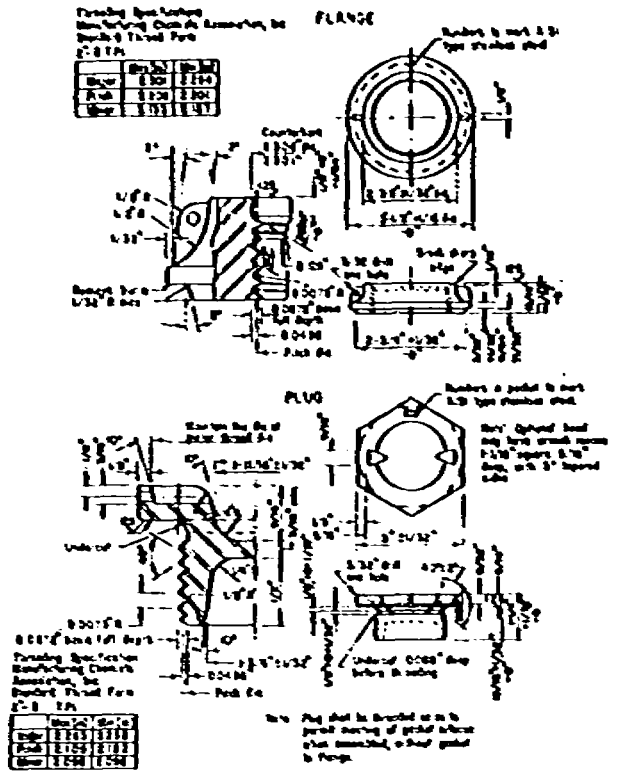
(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

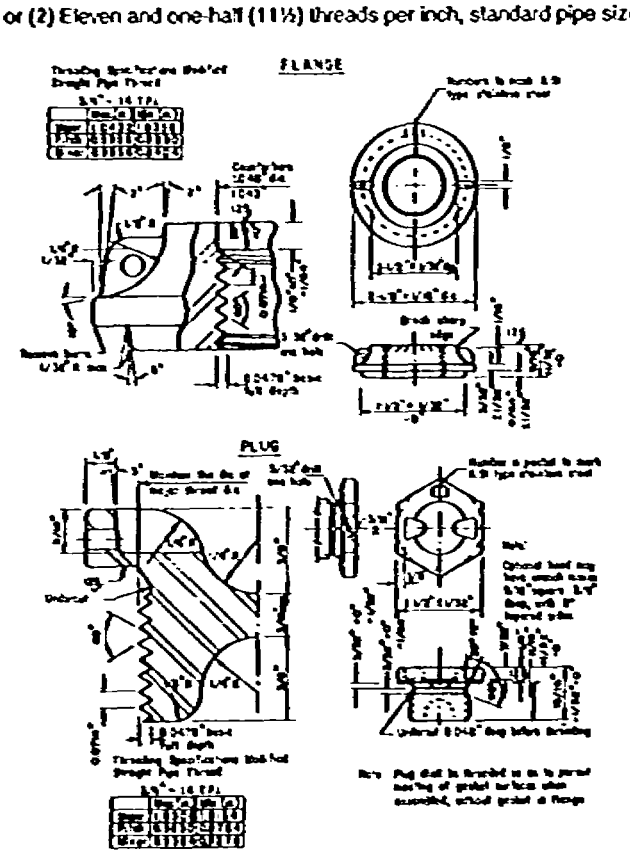
(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug or cap must have 5 or more complete threads; 2 drainage holes of not over 3/16 inch diameter are allowed in that section of flange which extends inside the drum. Plug or cap must have sufficient length of thread to engage 5 threads when securely tightened with gasket in place.

(d) Openings over 2.3 inches diameter are not permitted. Threads for plug or cap must be 8 or less per inch when over 3/4 inch standard pipe size.

(f) Flanges with inside threads and plug must conform with the thread diameter and thread form shown in the following drawing (other details shown on the drawing are recommended):



or (2) Eleven and one-half (11½) threads per inch, standard pipe size.



(e) Other types of closures are authorized if they perform without failure under the test required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.90-9 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.90-10 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-5M.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(3) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between and with the gauge of body indicated first (for example, 18 16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.90-11 [Reserved]

§ 178.90-12 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 12 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 80 pounds per square inch sustained for 5 minutes.

(3) Periodic drop and hydrostatic tests are not required where container has satisfactorily met prescribed tests at the original start of production. Satisfactory test results must be obtained on samples of subsequent containers that have been altered in design or construction. Samples so tested must be retained until further tests are made or for two years, whichever period is shorter.

§ 178.90-13 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.91 [Reserved]

§ 178.92 Specification 5P; lagged steel drums. Removable head containers not authorized.

§ 178.92-1 Compliance. (a) Required in all details.

§ 178.92-2 Rated capacity. (a) Rated capacity not over 61 gallons, see § 178.92-12(a)(3). Actual capacity shall be not less than rated capacity plus two percent nor greater than rated capacity plus two percent plus one and one-half gallons.

§ 178.92-3 Composition. (a) Sheets for body and heads of inside container to be low carbon or austenitic stainless, open hearth or electric steel. Sheets for body and heads of outside shell may be of any weldable steel suitable for the purpose.

§ 178.92-5 Construction. (a) Container shall consist of a straight sided inside steel drum which must be lagged with a suitable fire-resistant lagging material of such insulating properties and thickness that the drum charged with the commodity to be shipped will not rupture in a fire when it is equipped with safety devices as required by § 178.92-9. The entire insulation must be covered with a metal shell so constructed that moisture cannot come in contact with lagging.

(b) Brazing is not permitted.

(c) All seams of drum and shell must be fusion welded.

(d) Flanges or bosses for closures in the inner container must be fusion welded in place to the inside drum and the metal shell.

(e) Means for testing inside drum for leaks must be provided in outside shell.

§ 178.92-6 Parts and dimensions. (a) Parts and dimensions as follows:

(1) Steel sheets used for body and head sheets for inside drum must have nominal thickness of at least 0.0747 inch and minimum thickness of 0.0677 inch, uncoated sheets, which shall be designated 14 gauge.

(2) Steel sheets used for body sheets for outside shell must have nominal thickness of at least 0.1046 inch and minimum thickness of 0.0946 inch, uncoated sheets, which shall be designated 12 gauge.

(3) Steel sheets used for head sheets for outside shell must have nominal thickness of at least 0.0747 inch and minimum thickness of 0.0677 inch, uncoated sheets, which shall be designated 12 gauge.

§ 178.92-7 Rolling hoops. (a) Rolling hoops are required and these may be rolled or swedged in the outside shell or consist of separate hoops having a tight fit on shell and securely held in place.

§ 178.92-8 Closures. (a) All closures must be of screw-thread type adequate to prevent leakage and be of a material which will not react dangerously in contact with the commodity.

(b) All openings in inside drums must be located in the top head.

(c) Openings over 2 3 inches screw thread size not permitted.

(d) Plugs, caps, or other fittings must have sufficient length of thread to engage 5 threads when screwed home with gasket in place.

(e) Gaskets which are not affected by lading are required for closures having straight threads.

§ 178.92-9 Safety devices. (a) Each drum must have safety devices approved as to type and location by the Director, OHMT. See § 173.124(a)(4) of this subchapter.

§ 178.92-10 Closure protection. (a) Construction must be such as to afford adequate protection to valves and safety devices.

§ 178.92-11 Defective containers. (a) Leaks and other defects to be repaired only by processes used in constructing container.

§ 178.92-12 Marking. (a) Each drum must be marked by embossing on a permanent head or by steel stamping on the top head of the outside shell or on a permanently attached head protection ring with clearly legible raised characters as follows:

(1) DOT-5P.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designated on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Associate Director for HMR.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18 16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.92-13 Tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 12 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping filled with water to 98 percent capacity, from height of 4 feet on to solid concrete so as to strike diagonally on chime (foot ring), or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker.

(2) Hydrostatic pressure test of 100 pounds per square inch sustained for five minutes. This test shall be applied to the finished inner container before lagging material and outer shell are assembled.

(3) Samples last tested to be retained until further tests are made.

§ 178.92-14 Leakage test. (a) Each container shall be subjected to a pressure test of at least 125 pounds per square inch sustained for at least 30 seconds. Test shall be applied to inner container before lagging material or outer shell is assembled. Failures shall be rejected or repaired and retested.

Note 1: If air or other gas is the pressurizing medium, the test should be conducted in a pit or equivalent means of safeguarding personnel.

(b) Subsequent to the test specified in paragraph (a) each container shall be tested with seams under water or covered with soapsuds or other suitable material by interior air pressure of at least 75 pounds per square inch. Leakage test shall be applied to finished inner container before lagging or outer shell is assembled. Leakers shall be rejected or repaired and retested.

§ 178.97 [Reserved]

§ 178.98 Specification 6B; steel barrels or drums. Removable head containers which will pass all required tests are authorized.

§ 178.98-1 Compliance. (a) Required in all details.

§ 178.98-2 Rated capacity. (a) Rated capacity as marked, see §178.98-9(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.98-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.98-5 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Authorized gross weight (pounds)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
			Body sheet	Head sheet	Type	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
5 to 10	150	Straight side	18	18	None		
5 to 30	430	do	16	16	U[1]	16	
5 to 55	830	do	14	14	U	12	
5 to 30	430	do	16	16	I-bar[1]	3/4 x 1/16	1.25
5 to 55	880	do	14	14	do	3/4 x 1/16	1.25
5 to 110	1,750	do	12	12	do	1 x 1/16	1.60
5 to 33	430	Bilge	15	16	None		
5 to 55	830	do	13	14	do		

[1] Rolled or swedged in hoops.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
12	0.1046	0.0945
13	0.0897	0.0817
14	0.0747	0.0677
15	0.0673	0.0603
16	0.0598	0.0533
18	0.0478	0.0428

[1] Thickness shall be measured at any point on the sheet not less than 3/8 inch from an edge.

§ 178.98-6 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops not permitted. Attachment to drum body by spot welding, except for continuous resistance method, not permitted. Welding of I bar type directly to body of drum in any manner not permitted.

§ 178.98-7 Closures. (a) Adequate to prevent leakage; gaskets required. Closures must be of screw-thread type or secured by positive fastening.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

§ 178.98-8 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.98-9 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footing on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-6B * * *; stars to be replaced by the authorized gross weight (for example, DOT-6B880, etc.).

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.98-10 [Reserved]

§ 178.98-11 Type tests. (a) Samples taken at random and closed as for use shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 30 pounds per square inch sustained for 5 minutes. Leakage through closure shall not constitute failure.

§ 178.98-12 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Removable head containers need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

§ 178.99 Specification 6C; steel barrels or drums.

Removable head containers which will pass all required tests are authorized.

§ 178.99-1 Compliance. (a) Required in all details.

§ 178.99-2 Rated capacity. (a) Rated capacity as marked, see §178.99-9(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.99-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.99-5 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Authorized gross weight (pounds)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
			Body sheet	Head sheet	Type	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
5	80	Straight side	22	22	None		
5 to 10	160	do	20	20	do		
5 to 30	430	do	18	18	U	16	
5 to 55	830	do	15	16	U	14	
5 to 110	1,760	do	14	14	U	12	
5 to 30	430	do	18	18	I-bar	3/4 x 1/16	1.25
5 to 55	850	do	16	16	do	3/4 x 1/16	1.25
5 to 110	1,760	do	14	14	do	1 x 1/16	1.60
5 to 33	430	Bilge	16	18	None		
5 to 55	830	do	15	16	do		

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
14	0.0747	0.0677
15	0.0673	0.0603
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324
22	0.0299	0.0269

[1] Thickness shall be measured at any point on the sheet not less than 3/8 inch from an edge.

§ 178.99-6 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops not permitted. Attachment to drum body by spot welding, except for continuous resistance method, not permitted. Welding of I bar type directly to body of drum in any manner not permitted.

§ 178.99-7 Closures. (a) Adequate to prevent leakage; gaskets required. Closures must be of screw-thread type or secured by positive fastening.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1 This does not apply to cap seal over a closure which complies with all requirements

§ 178.99-8 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container; not by soldering.

§ 178.99-9 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-6C* * *; stars to be replaced by the authorized gross weight (for example DOT-6C880, etc.).

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.99-10 [Reserved]

§ 178.99-11 Type tests. (a) Samples taken at random and closed as for use, shall withstand prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested to be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 30 pounds per square inch sustained for 5 minutes. Leakage through closure shall not constitute failure.

§ 178.99-12 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Removable head containers need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

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§ 178.100 Specification 6J; steel barrels and drums.

Removable head containers which will pass all required tests are authorized.

§ 178.100-1 Compliance. (a) Required in all details.

§ 178.100-2 Rated capacity. (a) Rated capacity as marked, see § 178.100-9(a)(3). Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.100-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.100-5 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Authorized gross weight (pounds)	Type of container	Minimum (thickness, uncoated sheets (gauge)		Rolling hoops		
			Body sheet	Head sheet	Type	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
5 to 30	260	Straight side	19	19	(1)		
5 to 55	430	do	18	18	(1)		
5 to 55	880	do	15	18	U	14	
5 to 55	880	do	16	16	I bar	3/4 × 1/4	1.25
5 to 33	430	Bilge	16	18	None		
5 to 55	880	do	15	16	do		

[1] Rolled or swedged in hoops

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
15	0.0673	0.0603
16	0.0598	0.0533
18	0.0478	0.0428
19	0.0418	0.0378

[1] Thickness shall be measured at any point on the sheet not less than ½ inch from an edge.

§ 178.100-6 Rolling hoops. (a) Separate hoops to have tight fit on shell and be firmly secured in place. Beading under rolling hoops not permitted. Attachment to drum body by spot welding, except for continuous resistance method, not permitted. Welding of I bar type directly to body of drum in any manner not permitted.

§ 178.100-7 Closures. (a) Adequate to prevent leakage; gaskets required. Closures must be of screw-thread type or secured by positive fastening.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter. If unthreaded cap is used, it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1 This does not apply to cap seal over a closure which complies with all requirements

§ 178.100-8 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.100-9 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-6J* * *; stars to be replaced by the authorized gross weight (for example, DOT-6J880, etc.).

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.100-10 [Reserved]

§ 178.100-11 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

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§ 178.101 [Reserved]

§ 178.102 Specification 6D; cylindrical steel overpack, straight sided, for inside plastic container.

§ 178.102-1 Material requirements. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.102-2 Construction requirements. (a) Construction requirements are as follows:

Rated capacity of inside plastic container not over (gallons)	Minimum thickness, uncoated sheets (gauge)		Body seams	Rolling hoops	Top or bottom head	Closures, when full removable head is used (gaskets not required)
	Body sheet	Head sheet				
5	24	24	Welded	None required	Double seamed or welded	Lug or plain ring seal
15	20	20	Welded	Rolled or swedged	Double seamed or welded	Lug or plain ring seal
30	19	19	Welded	Rolled or swedged	Double seamed or welded	Bolted type ring closure 18 gauge
55	18	18	Welded	Rolled or swedged, or I-Bars, 2½" × 1¼"	Double seamed or welded	Bolted type ring closure 16 gauge

(b) Steel sheets or parts of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
16	0.0598	0.0533
18	0.0478	0.0428
19	0.0418	0.0378
20	0.0359	0.0324
24	0.0239	0.0209

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

(c) Two holes not exceeding ¼ inch each are permitted diametrically opposite each other in the overpack body immediately below the top chime or immediately above the double seam of the bottom chime or three holes not exceeding ¾₁₆ inch in diameter on centers 120 degrees apart in the bottom head.

(1) Overpack interior shall be free of projections, burrs, or any edges that might cause damage to inside plastic container and shall be free of lubricants, oils, or any foreign matter.

(2) Top head may have not more than two holes of suitable size to provide for protruding closures.

(3) Overpack shall be constructed to provide a snug fit for inside plastic container.

§ 178.102-3 Tests. (a) Steel overpack when assembled as for use, shall withstand the tests prescribed in specifications for inside plastic containers as detailed in Part 178 when authorized as combination packages in Part 173. The completed package must withstand these tests without producing a condition of the overpack that could result in potential damage to the inside container.

§ 178.102-4 Markings. (a) Each new steel overpack must be marked by embossing on a permanent head. *Altered drums.* Drums which have been altered to Specification 6D from an all 18-gauge tight head drum may be embossed on the body of the drum, no more than six inches from the top curl. Embossment must be with clearly legible raised characters as follows:

(1) DOT-6D.

(2) If the steel overpack is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge to the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18-16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is revised.

§ 178.103 Specification 6L; metal packaging.

§ 178.103-1 General requirements. Each packaging must meet the applicable requirements of § 173.24 of this subchapter.

§ 178.103-2 Rated capacity. (a) Rated capacity as marked (see § 178.103-6). Not less than 55 gallons nor more than 110 gallons for the outer steel drum. Not more than 17.74 liters for the inner vessel.

(b) The authorized maximum gross weight of the package is 160 kilograms (350 pounds) for sizes not over 210L (55 gallons) or 220 kilograms (480 pounds) for sizes over 210L (55 gallons) but not over 420L (110 gallons).

§ 178.103-3 General construction requirements. (a) The outer shell must be of straight sided steel, with welded body seams and at least 18-gauge body and bottom head sheets, and 14-gauge removable head sheets (unless there are one or more corrugations in the cover near the periphery, in which case 16-gauge is authorized). The shell may be either a single sheet of steel or may be fabricated by welding together two appropriate lengths of 210L (55-gallon) drums, such as a DOT Specification 6J or 17H, with rolled or swedged in hoops as prescribed for either of those specifications. The head must be convex (crowned), not extending beyond the level of the chime, with a minimum convexity of 1 centimeter (⅜-inch). The inside diameter of the shell must be at least 57 centimeters (22.5 inches).

(b) Inner containment vessel must conform to specification 2R (except that cast iron is not authorized), with a maximum usable inside dimension of 13.3 centimeters (5.25 inches) maximum height of 127 centimeters (50 inches) (with caps in place) and minimum wall thickness of 6 millimeters (0.25 inch).

(c) Inner containment vessel must be fixed within the outer shell by one of the following types of centering devices:

(1) At least 8 steel rod spacers, of at least 6 millimeters (0.25-inch) diameter (for packages of 210 liters (55-gallon) capacity) or 1 centimeter (0.375-inch) diameter (for packages with greater than 210 liters (55-gallon) capacity) cold rolled steel, welded to the vessel at each end by minimum 5 centimeter (2-inch) continuous weld. Each rod must be welded to the vessel at radial positions not exceeding 45 degrees as not to interfere with closure of the inner vessel. Each spacer rod must extend at least 5.6 centimeters (2.25 inches) beyond the inner vessel at each end, then radially to the wall of the outer drum (to provide a springlike snug fit) and along the entire length of the wall of the outer drum. For a packaging of more than 210 liters (55-gallon) capacity, each spacer rod must be braced by welding a 6 millimeter (0.25-inch) by 5 centimeter (2-inch) steel plate to the spacer rod and the pipe with a continuous weld at each joint, the joints being located approximately half way along the length of the drum. For containers manufactured prior to March 31, 1975, this requirement is effective December 31, 1975.

(2) At least three steel "spiders," not more than 24 inches apart, with each spider having at least four legs. Each leg must be constructed of materials having dimensions not less than those listed in this subparagraph, welded by continuous weld at each joint to inner and outer steel bands of at least ¼-inch by 1-inch steel. The inner steel band must be welded to the inner vessel by at least six 2-inch welds on both edges of the band. The outer steel band must be welded to the outer drum by at least six 2-inch welds on both edges of the top outer band, such that the inner vessel is at least 2¼ inches from the top and bottom of the drum. Authorized construction materials are:

(i) 2.5 centimeters (1 inch) by 2.5 centimeters (1 inch) by 6 millimeters (¼ inch) steel angle iron.

(ii) 3 centimeters (1¼ inches) by 3 centimeters (1¼ inches) by 5 millimeters (³⁄₁₆ inch) steel angle iron.

(iii) 2.5 centimeters (1 inch) schedule 40 steel pipe.

(3) There must not be less than 2 spacer mechanisms for a packaging of 210 liters (55-gallon) capacity nor less than 3 spacer mechanisms for a packaging greater than 210 liters (55-gallon) capacity. Each spacer mechanism must consist of not less than 6 steel angles, pipe, or rod radial supports of at least 2.7 square-centimeters (0.42 square inch) cross-section. Each radial support must be welded at one end to the containment vessel by a continuous weld or to an inner steel band of at least 6 millimeters (¼-inch) by 2.5 centimeters (1 inch) by a continuous weld at radial positions not exceeding 60 degrees from the center of the package. The inner band, when used, must be welded to the inner containment vessel by at least 6 equally spaced 5 centimeter (2-inch) welds on each edge of the band. The opposite end of the radial support must be welded by a continuous weld to an outer steel band of at least 6 millimeters (¼-inch) by 2.5 centimeters (1 inch). The outer steel band must be welded to the outer shell by at least 6 equally spaced welds on each edge of the top band, such that the inner vessel is fixed at least 5.7 centimeters (2.25 inches) from the top and bottom of the drum. The spacer mechanism must be welded as specified near each end of the containment vessel so as not to interfere with the vessel closure. For a packaging greater than 210L (55-gallon) capacity, the additional spacer mechanism must be located at approximately mid-point along the length of the inner vessel.

(d) The void between the inner containment vessel and the outer shell must be completely filled with bagged or tamped vermiculite (expanded mica), with a density of at least 0.072 g/cc (4.5 pounds per cubic foot). Loose, untamped vermiculite is not authorized.

§ 178.103-4 Welding. Welding must be of material having a melting point in excess of 800°C (1475° F.) except that for packages constructed prior to March 31, 1975, this temperature may be 540°C. (1000° F.), with a joint efficiency of at least 0.85. This requirement applies to welding used in adding spacer rods to comply with § 178.103(3)(c)(1).

§ 178.103-5 Closure. (a) The outer drum closure must be at least a 12-gauge bolted ring with drop forged lugs, one of which is

threaded, and having at least a 1.6 centimeter (⅝-inch) diameter steel bolt and a lock nut, or equivalent device.

(b) The closure device must have a means for the attachment of a tamperproof lock wire and seal, or equivalent.

§ 178.103–6 Markings. (a) Markings on each container, by die stamping on a metal place attached to the outside of the outer container by spot welding, or other equally efficient method, in letters and figures of at least ½ inch in height, as follows:

(1) "DOT–6L".

(2) "FISSILE RADIOACTIVE MATERIAL".

(3) Name or symbol of person making the marks specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.

(4) Gauge of metal of the outer steel drum in the thinnest part, rated capacity of the outer steel drum in gallons, and the year of manufacture of the assembled package (e.g., 18–110–68). When the gauge of the metal in the drum wall differs from that in the head, both must be indicated with a slanting line between, and with the gauge of the body indicated first (e.g., 18.16–110–68 for 18-gauge body and 16-gauge head).

§ 178.104 Specification 6M; metal packaging.

§ 178.104–1 General requirements. (a) Each package must meet the applicable requirements of § 173.24.

§ 178.104–2 Rated capacity. (a) Rated capacity as marked (see § 178.104–5). Not less than 10 gallons nor more than 110 gallons for the outer steel drum. Not less than 1.24 liters for the inner containment vessel.

§ 178.104–3 General construction requirements. (a) The outer shell must be of straight-sided steel, with welded body seams, and may be either a single sheet of steel, or may be fabricated by welding together two appropriate lengths of drums, such as a DOT Specification 6C or 17C, with each length to contain 3 swedged or rolled rolling hoops as prescribed for either of these specifications. A removable head for a packaging of 210 liters (55 gallons) or larger volume must have one or more corrugations in the cover near the periphery. For a packaging exceeding 57 liters (55 gallons) volume, the head must be crowned (convexed), not extending beyond the level of the chime, with a minimum convexity of 1 centimeter (⅜-inch).

(1) The maximum authorized gross weight, metal thickness, and minimum end insulation thickness for the marked volume is as follows:

Marked capacity		Maximum authorized gross weight		Minimum thickness of uncoated sheets and heads (gauge)	Minimum thickness of end insulation	
Gallons not over	Liters	Pounds	Kilograms		Inches	Centimeters
15	57	160	73	20	1.88	4.7
30	114	480	219	18	3.75	9.5
55	210	640	292	16	3.75	9.5
110	420	640	292	16	3.75	9.5

(2) Each drum must have at least four 1.2 centimeter (0.5-inch) diameter vents near the top, each covered with a weatherproof tape or fusible plug; or equivalent device.

(b) Inner containment vessel must conform to specification 2R or equivalent (cast iron or brass are prohibited), with maximum usable inside diameter of 13.3 centimeters (5.25 inches), minimum usable inside diameter of 10 centimeters (4 inches), and minimum height of 15 centimeters (6 inches).

(c) Inner containment vessel must be fixed within the outer shell by one of the following types of solid centering media, with the sides of the inner vessel protected by at least 9.5 centimeters (3.75 inches) of insulation media, and the ends with at least the thickness as prescribed in § 178.104–3(a)(1).

(1) Machined discs and rings made of solid industrial cane fiberboard having a density of at least 0.24 g/cc (15 pounds per cubic foot) fitted such that the radial clearances between the fiberboard, inner vessel, and shell do not exceed 6 millimeters (¼-inch); or

(2) Hardwood or plywood at least 1.2 centimeter (½-inch) thick, having a density of at least 0.45 g/cc (28 pounds per cubic foot). There must be no gap or direct heat path from the shell to the inner vessel.

(d) Any radiation shielding material used must be placed within the inner containment vessel, or must be protected in all directions by at least the thickness of the thermal insulating material prescribed in paragraph (a) of this section.

(e) For a packaging having an authorized gross weight in excess of 219kg (480 pounds), a steel bearing plate, at least 6 millimeters (0.25-inch) thick or a plywood disc, at least 2.5 centimeters (1 inch) thick, and at least 25 centimeters (10 inches) in diameter must be provided at both ends and adjacent to the specification 2R inner containment vessel, to provide additional load-bearing surface against the insulation-centering medium.

§ 178.104–4 Closure. (a) The outer drum closure must be at least 16-gauge bolt-type locking ring having at least a ⅜-inch steel bolt for drum sizes not over 15 gallons, or a 12-gauge bolted ring with drop-forged lugs, one of which is threaded, and a ½-inch steel bolt for drum sizes over 15 gallons. Each bolt must be provided with a lock nut or equivalent device.

(b) The closure device must have means for the attachment of a tamperproof lock wire and seal, or equivalent.

§ 178.104–5 Markings. (a) Marking must be as prescribed in § 173.24.

(b) Marking on the outside of each package must be as follows: "DOT–6M Type B," "Radioactive Materials," or "Fissile Radioactive Materials," as appropriate; and the gauge of metal of the outer drum in the thinnest part, rated capacity of the outer drum in gallons, and year of manufacture (for example, 18–30–69). When the gauge of the metal in the drum wall differs from that in the head, both must be indicated with a slanting line between, and with the gauge of the body indicated first (e.g., 18.16–55–69 for 18-gauge body and 16-gauge head).

§ 178.107 Specification 42B; aluminum drums.

§ 178.107–1 Compliance. (a) Required in all details.

§ 178.107–2 Rated capacity. (a) Rated capacity as marked see § 178.107–9(a)(3). Not less than 5 gallons; actual capacity shall be rated capacity plus at least 2 percent.

§ 178.107–3 Composition. (a) Body and heads of aluminum at least 99 percent pure, or an aluminum base alloy of equivalent corrosion resistance and physical properties.

§ 178.107–4 Outage. (a) Two percent of rated capacity, plus a maximum tolerance of 1 quart.

§ 178.107–5 Seams. (a) Welded, including attachment of flanges for closures and other devices. Circumferential seams at least 3" from top of chime; chime seams not permitted.

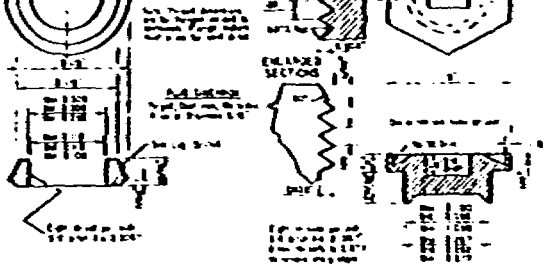
§ 178.107–6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Minimum thickness of material (inch)	Rolling hoops required, type authorized, and minimum dimensions	
		I-bar size (inch)	U-type, aluminum, thickness (inch)
10	0.110	⅜ × 1¼	0.139
30	.154	⅜ × 1¼	.193
55	.187	⅜ × 1¼	.234
110	.230	⅜ × 1¼	.....

(b) Rolling hoops must be firmly secured in place and not over 19 inches apart; beading under hoops not permitted. If welding is employed, the welding must be continuous on each edge of hoop.

§ 178.107–7 Closures. (a) Of screw-thread type or secured by screw-thread device; openings over 2.3" not authorized; suitable gaskets required.

(b) Threaded plugs, or caps, and flanges must be close fitting with gasket surfaces which bear squarely on each other when without gasket; they must have not over 8 threads per inch, with 5 complete threads engaged when gasket is in place, or not over 4 threads per inch, with 2 complete threads similarly engaged; two ¾ inch drainage holes are authorized in flange. Thread form must conform to that shown by drawing below or be of a form that shall provide an equally efficient closure.



§ 178.107-8 Projections. (a) Closing devices and other parts must not project beyond chime or rolling hoops.

§ 178.107-9 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:
(1) DOT-42B.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.
(3) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18/16-55-83 for body 18 gauge and head 16 gauge).
(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.107-10 [Reserved]

§ 178.107-11 Type test. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:
(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional test on any other parts which might be considered weaker than the chime.
(2) Hydrostatic pressure test of 60 pounds per square inch sustained for 5 minutes.

§ 178.107-12 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.107-13 Defective containers. (a) Leaks and other defects shall be repaired by welding, using welding material of the same composition as originally used by the manufacturer of the drum or other approved aluminum base alloy of equal corrosion and strength qualities.

§ 178.108 [Reserved]

§ 178.109 Specification 42D; aluminum drums.

§ 178.109-1 Compliance. (a) Required in all details.

§ 178.109-2 Rated capacity. (a) Rated capacity as marked, see § 178.109-9(a)(3). Not less than 5 gallons; actual capacity shall be rated capacity plus at least 2 percent.

§ 178.109-3 Composition. (a) Body and heads of aluminum at least 99 percent pure, or an aluminum base alloy of equivalent corrosion resistance and physical properties.

§ 178.109-4 Outage. (a) Two percent of rated capacity, plus a maximum tolerance of 1 quart.

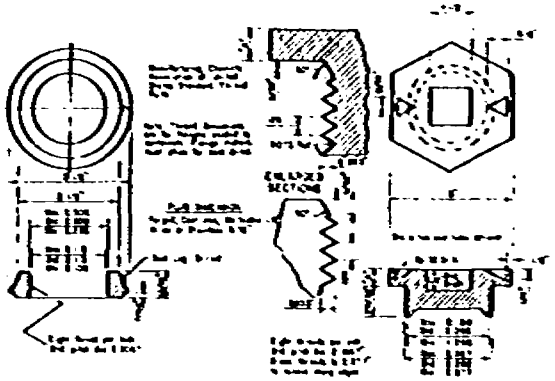
§ 178.109-5 Seams. (a) Welded, including attachment of flanges for closures and other devices. Circumferential seams at least 3" from top of chime; chime seams not permitted.

§ 178.109-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Minimum thickness of material (inch)	Rolling hoops required, type authorized, and minimum dimensions	
		I-bar size (inch)	U-type, aluminum, thickness (inch)
10	0.093	3/4 × 1/4	0.092
30	.102	3/4 × 1/4	.128
55	.123	3/4 × 1/4	.154
110	.154	3/4 × 1/4	.....

(b) Rolling hoops must be firmly secured in place and not over 19 inches apart; beading under hoops not permitted. If welding is employed, the welding must be continuous on each edge of hoop.

§ 178.109-7 Closures. (a) Of screw-thread type or secured by screw-thread device; openings over 2 3" not authorized; suitable gaskets required. Vented closing devices must be approved by the Director, OHMT.
(b) Threaded plugs, or caps, and flanges must be close fitting with gasket surfaces which bear squarely on each other when without gasket, they must have not over 8 threads per inch, with 5 complete threads engaged when gasket is in place, or not over 4 threads per inch, with 2 complete threads similarly engaged; two 9/16 inch drainage holes are authorized in flange. Thread form must conform to that shown by drawing below or be of a form that shall provide an equally efficient closure.



§ 178.109-8 Projections. (a) Closing devices and other parts must not project beyond chime or rolling hoops.

§ 178.109-9 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:
(1) DOT-42D.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.
(3) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18/16-55-83 for body 18 gauge and head 16 gauge).
(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.109-10 [Reserved]

§ 178.109-11 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:
(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional test on any other parts which might be considered weaker than the chime.
(2) Hydrostatic pressure test of 40 pounds per square inch sustained for 5 minutes.

§ 178.109-12 Leakage test. (a) Each drum shall be tested with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 10 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.109-13 Defective containers. (a) Leaks and other defects shall be repaired by welding, using welding material of the same composition as originally used by the manufacturer of the drum or other approved aluminum base alloy of equal corrosion and strength qualities.

§ 178.110 [Reserved]

§ 178.111 [Reserved]

§ 178.112 [Reserved]

§178.115 Specification 17C; steel drums. Single trip container. Removable head containers which will pass all required tests are authorized.

§ 178.115-1 Compliance. (a) Required in all details.

§ 178.115-2 Rated capacity. (a) Rated capacity as marked, see § 178.115-10(a)(3). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.115-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.115-5 Seams. (a) Body seams welded.

§ 178.115-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
				Type	Minimum	
		Body sheet	Head sheet		Size (gauge or inch)	Weight (pounds per foot)
5[3]	Straight side	24[1]	24[1]	None		
10	do	20	20	do		
30	do	18	18	(2)		
55	do	16	16	(2), (2)		

[1] Rolled or swedged in hoops.
[2] Each removable head drum body must have three rolled or swedged in hoops with the center line of one not more than 3 inches from the top curl.
[3] A drum of 5½ gallons marked capacity is authorized for shipment of the commodity specified in § 173.353(d).

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324
24	0.0239	0.0209

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.115-7 Convex heads. (a) Convex (crowned) heads, not extending beyond level of chime, required for drums of 25 gallons capacity or over; minimum convexity of ⅜ inch required.

§ 178.115-8 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.7 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug, or cap, must have 3 or more complete threads; two drainage holes of not over 1/16 inch diameter are allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when tightened with gasket in place. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

(1) (Deleted)

(d) Full removable head drums over 5 gallons capacity must be closed by means of 12 gauge bolted ring with drop forged lugs, one of which is threaded, and having ⅜ inch bolt and nut for drums not over 30 gallons capacity and ⅝ inch bolt and nut for drums over 30 gallons capacity. Five gallon drums must be of lug type closure with cover having at least 16 lugs. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.115-9 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.115-10 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-17C and the letters STC located near the DOT mark to indicate a single-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18/16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.115-11 [Reserved]

§ 178.115-12 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 40 pounds per square inch sustained for 5 minutes; except that full removable head drums must sustain 20 pounds per square inch.

§ 178.115-13 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Removable head containers need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

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§ 178.116 Specification 17E; steel drums. Single trip container. Removable head containers not authorized.

§ 178.116-1 Compliance. (a) Required in all details.

§ 178.116-2 Rated capacity. (a) Rated capacity as marked, see § 178.116-10(a)(3). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.116-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.116-5 Seams. (a) Body seams welded.

§ 178.116-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
				Type	Minimum	
		Body sheet	Head sheet		Size (gauge or inch)	Weight (pounds per foot)
5	Straight side	24	24	None		
10	do	22	22	do		
30	do	[2]19	[2]19	(1)		
55	do	[2]18	18	(1)		

[1] Rolled or swedged in hoops.
[2] 20 gauge authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
18	0.0478	0.0428
19	0.0418	0.0378
20	0.0359	0.0324
22	0.0299	0.0269
24	0.0239	0.0209

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.116-7 Convex heads. (a) Convex (crowned) heads, not extending beyond level of chime, required for drums of 25 gallons capacity or over. Convexity to be minimum of ⅛".

§ 178.116-8 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container: Provided, That thinner metal closures or closures of other material are authorized for containers of 12 gallons capacity or less when opening to be closed is not over 2.7 inches in diameter and closures, except threaded metal closures, are fitted with outside sealing devices which cannot be removed without destroying the closure or sealing device (see paragraph (d) of this section).

Note 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seal (flange, etc.) for plug, or cap, must have 3 or more threads; two drainage holes of not over ⅛ inch diameter are allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when screwed home with gasket in place. Provided, That for containers having a capacity of 12 gallons and less the seal (flange, etc.) for plug, or cap, must have two or more complete threads and plug, or cap, must have sufficient length of thread to engage two threads when screwed home with gasket in place.

(d) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.116-9 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.116-10 Marking. (a) Each barrel or drum must be marked by embossing on a permanent head (or by embossing or die stamping on lootring on drums equipped with lootrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-17E and the letters STC located near the DOT mark to indicate a sing'e-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18 16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.116-11 [Reserved]

§ 178.116-12 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samp'es last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 15 pounds per square inch sustained for 5 minutes.

§ 178.116-13 Leakage test. (a) Each drum shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 7 pounds per square inch for containers over 12 gallons capacity and at least 5 pounds for others. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.117 Specification 17F; steel drums. Single trip container. Removable head containers not authorized.

§ 178.117-1 Compliance. (a) Required in all details.

§ 178.117-2 Rated capacity. (a) Rated capacity as marked see § 178.117-11(a)(3). Actual capacity of containers shall be not less than rated (marked) capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 1 quart, except that for containers over 30 gallons marked capacity actual capacity shall be not less than rated capacity plus 2 percent, nor greater than rated capacity plus 2 percent plus 2 quarts.

§ 178.117-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel. Steel to be as high as practicable in tensile strength, having no loose oxide or scale.

§ 178.117-5 Seams. (a) Body seams welded.
(b) Head and chime seams welded or double-seamed.
(c) Flanges for closures welded in place.

§ 178.117-6 Chime reinforcement. (a) Chime reinforcement required and to be not less than 12 gauge.

§ 178.117-7 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops		
		Body sheet	Head sheet	Type	Minimum Size	Minimum Weight
55	Straight side	16	16	(1)		

[1] Rolled or swedged in hoops authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
12	0.1046	0.0945
16	0.0598	0.0533

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.117-8 Rolling hoops and convex heads. (a) Rolling hoops to be expanded. Alternate use of I-bar hoops authorized.

(b) Convex heads. Convex (crowned) heads; minimum convexity to be ⅜ inch, with minimum chime height of ⅞ inch.

§ 178.117-9 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug, cap, plate, etc., see Note 1) must be of metal as thick as prescribed for head of container; this not required for containers of 12 gallons or less when the opening to be closed is not over 2.3 inches in diameter. If unthreaded cap is used it must be provided with outside sealing devices which cannot be removed without destroying the cap or sealing device.

Note: This does not apply to cap seal over a closure which complies with all requirements.

(c) Closure must be of screw-thread type or fastened by screw-thread device.

(d) One opening not over 2.3 inches and one opening not over ¾ inch allowed; both openings to be welded in one head only. Threads to be standard pipe thread of 11 threads per inch for the larger opening and 14 threads per inch for the ¾-inch opening.

(e) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.117-10 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.117-11 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on lootring on drums equipped with lootrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-17F and the letters STC located near the DOT mark to indicate a sing'e-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.117-12 [Reserved]

§ 178.117-13 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 6 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 80 pounds per square inch sustained for 5 minutes.

§ 178.117-14 Leakage test. (a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 15 pounds per square inch. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure.

§ 178.118 Specification 17H; steel drums. Single trip container. Removable head required.

§ 178.118-1 Compliance. (a) Required in all details.

§ 178.118-2 Rated capacity. (a) Rated capacity as marked, see § 178.118-10(a)(3). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.118-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.118-5 Seams. (a) Body seams welded.

§ 178.118-6 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)			Rolling hoops		
		Body sheet	Bottom head sheet	Removable head sheet	Type	Minimum Size (gauge or inch)	Minimum Weight (pounds per foot)
5	Straight side	24	24	20	None	.....	.....
30	... do ...	18	18	18	[1]	.....	.....
55	... do ...	18	18	[2][3]14	[1]	.....	.....

[1] Rolled or swedged in hoops.

[2] Each drum must have three rolled or swedged in hoops, one to be placed in the body near the top curl.

[3] 16-gauge authorized provided there is at least one corrugation in the removable head near the periphery. 18-gauge authorized provided (1) there are at least two corrugations in the removable head near the periphery, (2) the manufacturer or assembler provides to the Director, OHMO, evidence of satisfactory performance of testing of the complete package design conducted in accordance with this section, and (3) the Director issues a registration number which the manufacturer or assembler concerned durably marks on the removable head and its corresponding ring-closure device.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
14	0.0747	0.0677
16	0.0598	0.0533
18	0.0478	0.0428
20	0.0359	0.0324
24	0.0239	0.0209

[1] Thickness shall be measured at any point on the sheet not less than ¾ inch from an edge.

§ 178.118-7 Convex heads. (a) Convex (crowned) heads, not extending beyond level of chime, required for drums of 25 gallons capacity or over; minimum convexity of ⅜ inch required.

§ 178.118-8 Closures. (a) Adequate to prevent leakage; gaskets required.

(b) Drums over 5 gallons capacity must be closed by means of 12 gauge bolted ring with drop forged lugs, one of which is threaded, and having ⅜ inch bolt and nut for drums not over 30 gallons capacity and ½ inch bolt and nut for drums over 30 gallons capacity. Five gallon drums must be of lug type closure with cover having at least 16 lugs. Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug, or cap, must have 3 or more threads; two drainage holes of not over 1/16 inch diameter allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when screwed home with gasket in place. Provided, That for containers having a capacity of 12 gallons and less the seat (flange, etc.) for plug, or cap, must have two or more complete threads and plug, or cap, must have sufficient length of thread to engage two threads when screwed home with gasket in place.

(1) Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

§ 178.118-9 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.118-10 Marking. (a) Marking requirements for new or altered drums are as follows: *New drums.* Marking on each drum by embossing on the permanent head, with raised marks, or by embossing or die stamping on bodring, (if equipped), or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter. *Altered drums.* Drums which have been altered to Specification 17H from an all 18-gauge tight head drum may be embossed on the body of the drum, no more than six inches from top curl.

(1) DOT-17H and the letters STC located near the DOT mark to indicate single-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in body and head sheets as identified by American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the marks specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.118-11 [Reserved]

§ 178.118-12 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ form the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 15 pounds per square inch sustained for 5 minutes.

§ 178.118-13 Leakage test. (a) Each drum shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 7 pounds per square inch for containers over 12 gallons capacity and at least 5 pounds for others. Equally efficient means of testing may be authorized upon approval by the Director, OHMT. Leakers shall be rejected or repaired and retested without failure. Drums need not be tested with heads in place, except that samples taken at random and closed as for use, of each type and size, must be tested at start of production and repeated every four months. Samples last tested must be retained until further tests are made or for one year.

§ 178.119 [Reserved]

§ 178.120 Specification 20PF; phenolic-foam insulated, metal overpack.

§ 178.120-1 General requirements. (a) Each overpack must meet all of the applicable requirements of § 173.24 of this subchapter.

(b) The maximum gross weight of the package, including the inner cylinder and its contents, must not exceed the following:

(1) Specification 20PF-1 — 138 kilograms (300 pounds).
(2) Specification 20PF-2 — 320 kilograms (700 pounds).
(3) Specification 20PF-3 — 455 kilograms (1000 pounds).

(c) The general configuration of the overpack must be a right cylinder, consisting of an insulated base section, a steel liner lid, and an insulated top section. The inner liner and outer shell must be at least 16-gauge and 18-gauge steel, respectively with the intervening cavity filled with a molded in-place, fire-resistant, phenolic-foam insulation interspersed with wooden members for bracing and support. Wood pieces must be securely attached to both the liner and shell. No hole is permitted in the liner. Each joint between sections must be stepped a minimum of 5 centimeters (2 inches) and gaps between mating surfaces must not exceed 5 millimeters (0.2-inch). Gaps between foam surface of top section and liner lid must not exceed 1 centimeter (0.4-inch) or 5 centimeters (2-inches) where taper is required for mold stripping. For the specification 20PF-1, the top section may consist of a plug of foam insulation and a steel cover. The liner and shell closures must each be gasketed against moisture penetration. The liner must have a bolted flange closure. Shell closure must conform to § 178.118-8(b).

(d) Drawings in CAPE-1662, which include bills of material are a part of this specification.

§ 178.120-2 Materials of construction and other requirements. (a) Phenolic foam insulation must be fire-resistant and fabricated in accordance with USDOE Material and Equipment Specification SP-9, Rev. 1 and Supplement, which is a part of this specification. (Note: Packagings manufactured under USAEC Specification SP-9 and Rev. 1 thereto are authorized for continued manufacture and use.) A 5.4 inch (13.7 centimeter) minimum thickness of foam must be provided over the entire liner except:

(1) Where wood spacers replace the foam; or
(2) At protrusions of liner or shell, such as flanges, baffles, etc., where minimum insulation thickness is 9 centimeters (3.5 inches); or
(3) Where alternate top section (specification 20PF-1) is used. Foam must not interfere with proper seating of screws in inner liner flange assembly. Average density of insulation must be 0.13g/cc (8 pounds per cubic foot (pcf)) minimum for bottom section and 0.16g/cc (10 pcf) minimum for top section, except 0.1g/cc (6.5 pcf) for the specification 20PF-1 top section.

(b) Gaskets must be as follows:

(1) Inner liner flange—Neoprene rubber of 30 to 60 type A durometer hardness or other equivalent gasket material which is compatible with the specific contents.
(2) Outer shell—Synthetic rubber conforming to MIL-R-6855 (available from the Naval Publications Form Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120) class 2, grade 60.
(3) Support and pressure pads for inner liner top and bottom must be sponge rubber or equivalent.

(c) Alternate top section (specification 20PF-1 only). Average insulation density must be 0.16g/cc (10 pcf minimum). Thickness of plug must be 11 centimeters (4.3 inches) minimum, except thickness may be reduced to 10 centimeters (4 inches) to clear bolt heads. A flush mounted top lifting device must be securely fastened to a wood block encapsulated by the foam.

(d) Vent holes 5 millimeters (0.2 inch) diameter must be drilled in the outer shell to provide pressure relief during the insulation foaming and in the event of a fire. These holes, which must be drilled in all areas of the shell which mate with the foam insulation, must be spaced in accordance with CAPE-1662.

(e) Welding must be by a fusion welding process in accordance with American Welding Society Codes B-3.0 and D-1.0. Body seams and joints for the liner or shell must be continuous welds.

(f) Waterproofing—Each screw hole in the outer shell must be sealed with appropriate resin-type sealing material or equivalent during installation of the screw. All exposed foam surfaces, including any vent hole, must be sealed with waterproofing material as prescribed in USDOE Material and Equipment Specification SP-9, Rev. 1, and Supplement or equivalent.

§ 178.120-3 Tests. (a) Leakage test—Each inner liner assembly must be tested for leakage prior to installation. Seam welds of the liner must be covered for a distance of at least 15 centimeters (6 inches) on either side of the seam, with soapsuds, heavy oil, or equivalent material, and interior air pressure applied to at least 776mm Hg (15 p.s.i.g.) above atmospheric pressure must be held for at least 30 seconds. Liners failing to pass this test may not be used until repairs are made, and retests successfully passed.

§ 178.120-4 Required markings. (a) Marking must be as prescribed in § 173.24 of this subchapter.

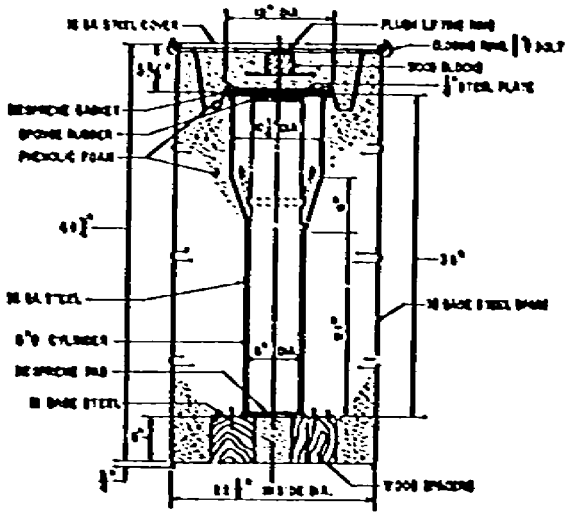
(b) Marking on the outside of each overpack must be as follows:

(1) "USA-DOT-20PF-1" or "-2," as appropriate, and if the entire liner is made of stainless steel, additional marking such as "3041-SS" to indicate the type of stainless steel used.

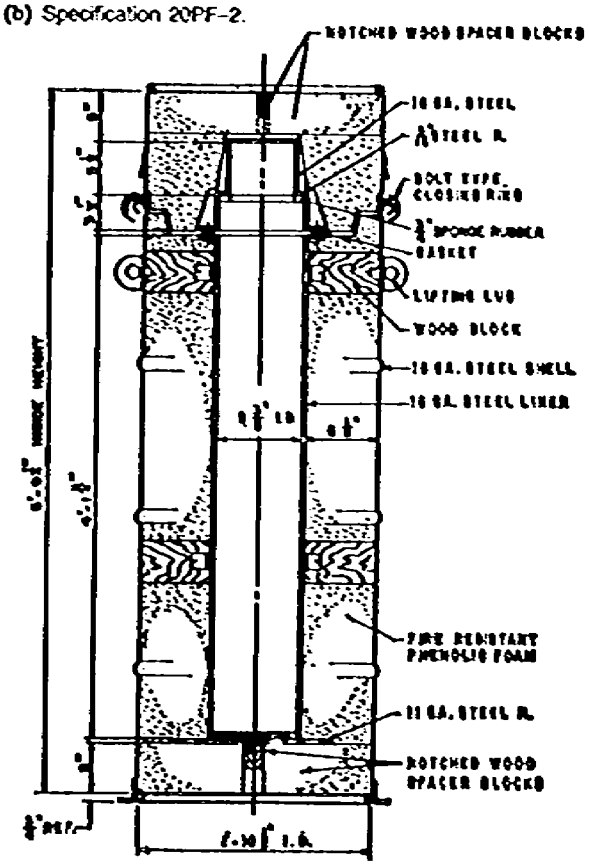
(2) "TARE WT: xxx lbs." where xxx is the tare weight of the assembled overpack without the inner container.

(3) Year of manufacture.

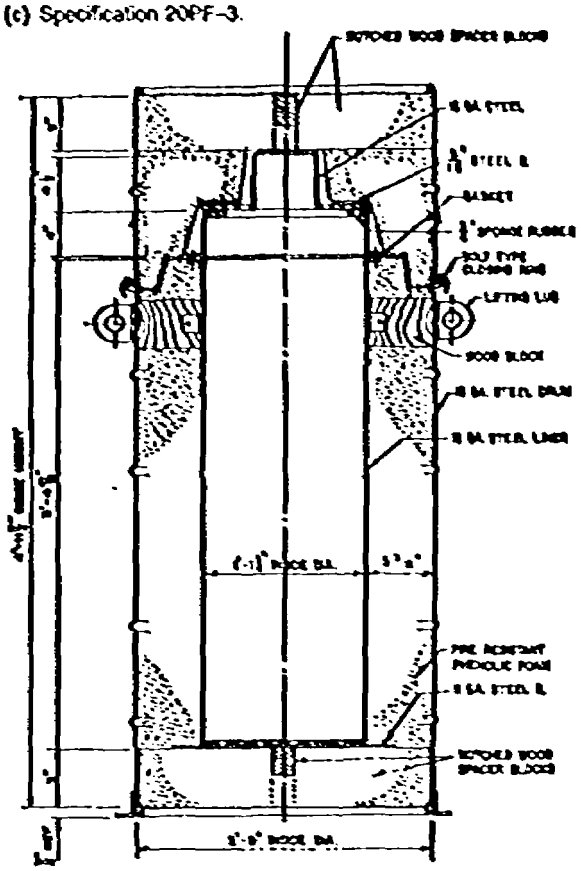
§ 178.120-5 Typical assembly detail. (a) Specification 20PF-1.



(b) Specification 20PF-2.



(c) Specification 20PF-3.



§ 178.121 Specification 21PF; fire and shock resistant, phenolic-foam insulated, metal packover.

§ 178.121-1 General requirements. (a) Each overpack must meet all of the applicable requirements of § 173.24 of this subchapter.

(b) Each overpack is authorized for use in applications where the maximum gross weight of the package, including the inner container and contents does not exceed 3725 kilograms (8200 pounds) (horizontally-loaded specification 21PF-1 unit), or 3900 kilograms (8600 pounds) (end-loaded specification 21PF-2 unit).

(c) The general configuration of the overpack must be a right cylinder, consisting of a steel inner liner (at least 18-gauge) and steel outer shell (at least 14-gauge) with the intervening cavity filled with a molded-in-place, fire-resistant, phenolic foam insulation and interspersed wooden members for bracing and support. Two specific configurations are authorized: a horizontal loading unit (specification 21PF-1) consisting of insulated base and top sections joined in a longitudinal peripheral closure joint; or an end-loading unit (specification 21PF-2), consisting of an insulated main section, a steel plate liner lid, and an insulated end cap. For either type each joint between sections must be stepped at least 1.8 centimeters (0.75 inch) and gaps between mating surfaces may not exceed 5 millimeters (0.2 inch). Bolted closures, which must each be gasketed against moisture penetration, must be in accordance with CAPE-1662. Each bolt must be equipped with a locking device to prevent loosening from vibration. Outer steel bracing and support framework must be attached to the shell to facilitate normal handling.

(d) Drawings in CAPE-1662, which include bills of materials, are a part of this specification.

§ 178.121-2 Materials of construction and other requirements. (a) Phenolic foam insulation must be fire resistant and fabricated in accordance with USDOE Material and Equipment Specification SP-9, Rev. 1, and Supplement which is a part of this specification. (Note: Packagings manufactured under USAEC Specification SP-9, and Rev. 1 thereto are authorized for continued manufacture and use.) A 5.5 inch (14 centimeters) minimum thickness of foam must be provided over the entire liner, except where:

(1) Wood spacers replace the foam material; or

(2) At protrusions of liner or shell, such as flanges, baffles, etc., where the minimum thickness of foam, wood, or a combination of these is 10 centimeters (4 inches).

(3) Solid wood or laminated wood solidly glued may be used to replace the foam between liner and shell (i.e., in ends of overpack). In this case, minimum wood thickness is 10 centimeters (4 inches). Average density of insulation must be 0.1 g/cc (6.75 pounds per cubic foot (pcf) minimum, except that 0.13 g/cc (8 pcf) is required in the removable end cap of the specification 21PF-2, which must have a minimum foam thickness of 12.7 centimeters (5 inches).

(b) Gaskets for inner liner, outer shell, or where otherwise specified in CAPE-1662, must be of vinyl foam tape, single coated, or 6 millimeters (¼-inch) thick expanded rubber, per ASTM D1056 type R or S, grades 41 to 43, with adhesive backing, or equivalent.

(c) Support and pressure pads for the inner liner must be of neoprene, sponge rubber, or equivalent.

(d) Fire retardant (intumescent) paint must be applied to any wood blocking which is located at any joint in the shell.

(e) Vent holes 5 millimeters (0.2 inch) diameter must be drilled in the outer shell to provide pressure relief during the insulation foaming and in the event of a fire. These holes, which must be drilled in all areas of the shell which mate with the foam insulation, must be spaced in accordance with CAPE-1662.

(f) Welding must be by a fusion process in accordance with the American Welding Society Code. Body seams and joints for the liner and shell must be continuous welds.

(g) Waterproofing. Each screw hole in the outer shell must be sealed with appropriate resin-type sealing material or equivalent during installation of the screw. All exposed foam surfaces, including any vent hole, must be sealed with waterproofing material as prescribed in USDOE Material and Equipment Specification SP-9 Rev. 1 and Supplement, or equivalent.

§ 178.121-3 Required markings. (a) Markings must be as prescribed in § 173.24 of this subchapter.

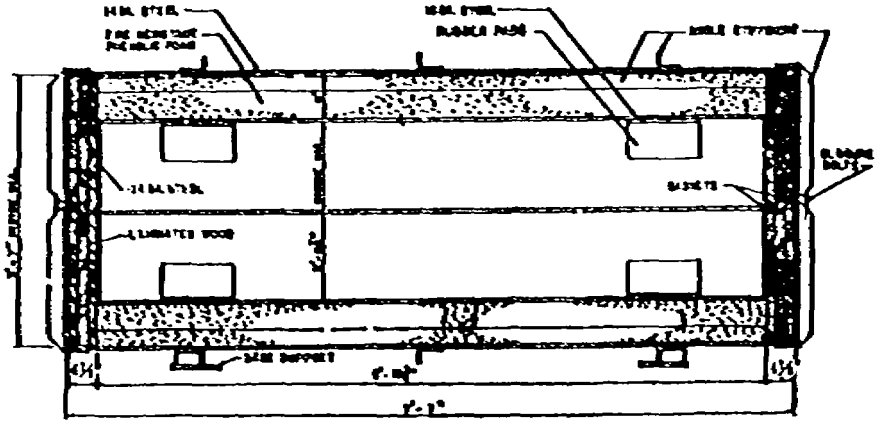
(b) Marking on the outside of each overpack must be as follows:

(1) "USA-DOT-21PF-1" or "2", as appropriate, and, if the inner shell is of stainless steel, additional marking such as "304L-SS" to indicate the type of stainless steel used.

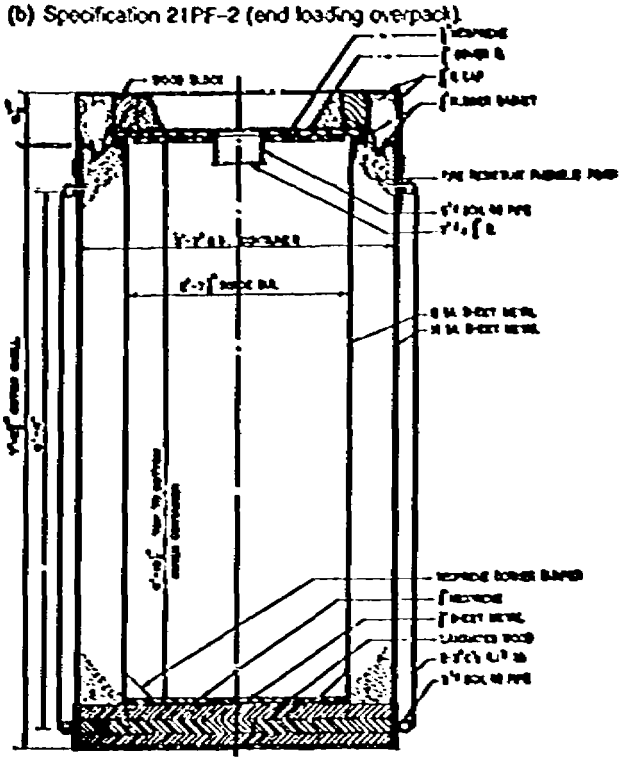
(2) "TARE WT: xxx lbs. (or kg.)" where xxx is the tare weight of the assembled overpack without the inner container.

(3) Year of manufacture.

§ 178.121-4 Typical assembly detail. (a) Specification 21PF-1 (horizontal loading overpack).



(b) Specification 21PF-2 (end loading overpack).



§ 178.130 Specification 37K; steel drums. Single trip container. Removable head containers which will pass all required tests are authorized.

§ 178.130-1 Compliance. (a) Required in all details.

§ 178.130-2 Rated capacity. (a) Rated capacity as marked, see § 178.130-8(a)(3). Actual capacity not less than rated (marked) capacity plus 2 percent, not greater than rated capacity plus 2 percent plus 1 quart.

§ 178.130-3 Composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.130-5 Parts and dimensions. (a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Welded side seam required	Minimum thickness, uncoated sheets (gauge)	
				Body sheet	Head sheet
55	275	Straight side	Yes	22	22

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
22	0.0299	0.0269

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.130-6 Closure required. (a) Adequate to prevent leakage; to be of bolted ring or lever lock ring types only; sponge rubber gaskets required; flowed-in gaskets not permitted.

§ 178.130-7 Defective containers. (a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.130-8 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring or drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT-37K and the letters STC located near the DOT mark to indicate a sing'e-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of the body indicated first (for example, 18-16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.130-9 [Reserved]

§ 178.130-10 Type test. (a) Samples, taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type test is as follows:

(1) Test by dropping, filled with dry, finely powdered material to the authorized gross weight, from height of 4 feet onto solid concrete so as to strike diagonally on top chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

§ 178.131 Specification 37A; steel drums. Sing'e-trip container. Removable head required.

§ 178.131-1 Compliance. (a) Required in all details.

§ 178.131-2 Rated capacity. (a) Rated capacity as marked, see § 178.131-9(a)(2). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent for containers not over 12 gallons capacity. Maximum actual capacity of containers not over 12 gallons capacity shall be not greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater; for others, minimum actual capacity shall be not less than rated (marked) capacity plus 2 percent and maximum actual capacity shall not be greater than rated (marked) capacity plus 3 percent or rated (marked) capacity plus 2 percent plus 1 quart whichever is the greater.

§ 178.131-3 Composition. (a) Sheets for body and heads to be hot-rolled or cold-rolled, low carbon, open-hearth or electric steel of standard commercial quality.

§ 178.131-5 Seams. (a) Side seams must be welded; or locked and soldered when 28-gauge tin plate is used for containers of 2-gallon capacity or less.

§ 178.131-6 Capacities, weights, type, and gauges. (a) Capacities, weights, type, and gauges must be as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Minimum thickness uncoated sheets[1] (gauge)		Minimum ring gauge bolted type[2]
			Body sheet[3]	Head sheet	
2	40	Straight side	28	28	Lug
5	60	do	26	26	Lug or plain ring seal
5	80	do	24	24	
10	150	do	24	24	
55	150	do	26	26	18, plain
55	275	do	24	24	18, plain
55	350	do	24	24	16, 2" overlap
55	450[4]	do	22	22	16, 2" overlap

[1] All gauges specified are minimum except as provided by Part 173. Heavier (but not lighter) gauges may be specified if shipper so desires.

[2] Other types of closures are authorized if they perform without failure under the tests required by this section and a record of the tests is retained during the period the closure is in use.

[3] Containers of 16 gallons capacity and over must have 2 swedged or corrugated rolling hoops of sufficient height to clear the closing device when the drum is rolled.

[4] A gross weight of 490 pounds is authorized when defined by Part 173 (see § 173.164(a)(2)).

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
22	0.0299	0.0269
24	0.0239	0.0209
26	0.0179	0.0159
28	0.0149	0.0129

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.131-7 Closures. (a) Closures of the type specified in the above table adequate to prevent leakage; gaskets required, all closures to be of the full-removable head type. Curl at top of shell for all drums 30 gallons capacity and larger must have a minimum diameter of ¾ inch, and so made as to form a circular section with the under portion substantially in

contact with the vertical shell. The removable head must have a minimum depth of ¾ inch and the cover lab must be large enough to extend to the horizontal center line of the top curl when the drum is sealed with the gasket in place. Drums of less than 30 gallons capacity may be made with an outside curl diameter of ⅜ inch minimum and a head depth of ½ inch minimum; except that for drums less than 16 gallons capacity the outside curl diameter may be 5/16 inch and the cover depth may be ⅜ inch minimum.

(b) The closing ring must be so constructed that the bottom leg will extend well inside the vertical center line of the shell curl but must not touch the shell (recommended clearance is 1/16 inch minimum, 3/16 inch maximum) when sealed for usage. The top leg of the locking ring must have sufficient length to extend well inside the vertical center line of the curl on the shell. Closing rings must have a 2 inch overlap at joint when gross weight of drum exceeds 275 pounds. Overlap is not required for drums of 275 pounds or less gross weight. The clearance between ends of rings without overlap should be a minimum of ⅛ inch and a maximum of ½ inch.

(c) Closures or fittings in the removable head of any type capable of withstanding test prescribed by §178.131-11 are authorized.

§ 178.131-8 Defective containers. (a) Defective containers to be repaired by method used in constructing container. Soldering not authorized, except for tin plated steel as authorized by §178.131-5.

§ 178.131-9 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT–37A * * *. Stars to be replaced by the authorized gross weight, or less, at which the drum was type tested (for example, DOT–37A150, etc.) and the letters STC located near the DOT mark to indicate a single-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18–55–83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18/16–55–83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.131-10 [Reserved]

§ 178.131-11 Type tests. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type test is as follows:

(b) Test by dropping on top chime, or other part considered to be weaker, with drum filled to normal loading depth and to the gross weight at which container is marked with dry powdered material, and topped with at least two inches of a finely divided, dry, free-flowing powder of the following sieve analysis:

% retained on 42 mesh—Trace (max.)
% retained on 50 mesh—3% (max.)
% retained on 100 mesh—88% (min.)

A material such as sodium bicarbonate is recommended. Container shall be dropped from a height of 4 feet onto solid concrete so as to strike diagonally on the chime and so positioned when equipped with bolted ring type closure that crush pattern will terminate at closure joint. Closing devices and other parts projecting beyond chime or rolling hoops must be capable of withstanding this test. No disc or material other than regular gaskets in closure part is permitted for test purposes.

§ 178.132 Specification 37B; steel drums. Single-trip container. Removable head not authorized.

§ 178.132-1 Compliance. (a) Required in all details.

§ 178.132-2 Rated capacity. (a) Rated capacity as marked, see §178.132-9(a)(2). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent for containers not over 12 gallons capacity. Maximum actual capacity of containers not over 12 gallons capacity shall be not greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater; for others, minimum actual capacity shall be not less than rated (marked) capacity plus 2 percent and maximum actual capacity shall not be greater than rated (marked) capacity plus 3 percent or rated (marked) capacity plus 2 percent plus 1 quart whichever is the greater.

§ 178.132-3 Composition. (a) Sheets for body and heads to be hot-rolled or cold-rolled, low carbon, open hearth, or electric steel of standard commercial quality.

§ 178.132-5 Seams. (a) Side seams may be welded, Gordon lock, or other equally efficient construction.

§ 178.132-6 Capacities, weights, type and gauges. (a) Capacities, weights, type and gauges must be as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Minimum thickness, uncoated sheets (gauge)	
			Body sheet[1]	Head sheet
5	50	Straight side	28	28
55	275	do	26	26
55	450	do	24	24
55	650	do	22	22[2]

[1] Containers of 16 gallons capacity and over must have small or series corrugations rolled into the shell or two swedged or corrugated rolling hoops.
[2] Twenty four (24) gauge top head and cover authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
22	0.0299	0.0269
24	0.0239	0.0209
26	0.0179	0.0159
28	0.0149	0.0129

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.132-7 Closures. (a) Closures shall be of any type that will withstand prescribed drop tests without leakage, see §178.132-11 of this section. Openings shall not exceed 9 inches in diameter in containers of 16-gallon capacity and larger nor 6½ inches in diameter in containers less than 16-gallon capacity. Larger openings may be used when approved by the Director, OHMT.

§ 178.132-8 Defective containers. (a) To be repaired by method used in constructing container except that Gordon lock, or other similarly constructed seam must be welded. Soldering not authorized.

§ 178.132-9 Marking. (a) Each drum must be marked by embossing on a permanent head (or by embossing or die stamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter of the plate) with clearly legible raised characters as follows:

(1) DOT–37B * * *. Stars to be replaced by the authorized gross weight, or less, at which the drum was type tested (for example, DOT–37B450, etc.) and the letters STC located near the DOT mark to indicate a single-trip drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18–55–83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18/16–55–83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.132-10 [Reserved]

§ 178.132-11 Type test. (a) Samples taken at random and closed as for use, shall withstand the prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. The type test is as follows:

(b) Test by dropping on top chime, filled with dry finely powdered material to the gross weight at which container is marked, from a height of 4 feet onto solid concrete so as to strike diagonally on the chime and so positioned as to strike, in the case of offset openings, at the point on the chime nearest the opening. Closing devices and other parts projecting beyond chimes must also be capable of withstanding this test.

§ 178.133 Specification 37P; steel drums with polyethylene liner. Nonreusable containers.

§ 178.133-1 Compliance. (a) Required in all details.

§ 178.133-2 Rated capacity of assembled composite containers. (a) Rated capacity as marked, see §178.133-9. Maximum

actual capacity of containers shall be not less than rated (marked) capacity, plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity, plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.133-3 Steel composition. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.133-4 Seams. (a) Side seams welded.
(b) Chime of permanent head, double seamed.

§ 178.133-5 Parts and dimensions for steel drums. (a) Parts and dimensions for steel drums shall be as follows:

Drums for plastic liner of rated capacity not over (gallons)	Type of container[1,2]	Body sheet (gauge)	Bottom head sheet (gauge)	Removable head sheet (gauge)	Type of removable head closure
5	Straight side, single bead[3]	26	26	24	Ring seal, bolted ring, lug cover
6½	Straight side, single bead[3]	24	24	24	Ring seal, bolted ring, lug cover
15	Straight side[3]	22	22	18[4]	Ring seal, bolted ring, lug cover

[1] Drum interior shall be free of projections, burrs, or any edges that will cause damage to liners and shall be free of lubricants, oil, or other foreign matter. Drum shall provide a snug fit for the plastic liner.
[2] One hole not over 1¼ inch in diameter permitted in body or a head, or two ¾ inch holes in bottom head near the chime.
[3] For containers up to 10 gallons capacity a single rolled or swedged bead in body near top curl required, for containers of 10 gallons and greater capacity, 2 rolled or swedged rolling hoops in drum body required.
[4] Twenty (20) gauge authorized.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
18	0.0418	0.0378
20	0.0359	0.0324
22	0.0299	0.0269
24	0.0239	0.0209
26	0.0179	0.0159

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from edge.

§ 178.133-6 Liner. (a) Each metal drum shall contain a contour fitting polyethylene liner having heat-sealed seams or a one-piece seamless molded polyethylene unit, attached to the pour opening in the removable head so as to provide a container that is completely resistant to lading when closed as for use.
(b) Polyethylene liner or molded unit shall be fabricated throughout of virgin polyethylene tubing or mold material, which may include a low percentage of elastomeric polymer having minimum thickness of 0.010 inch and having the following physical properties:
(1) Resin should have a maximum melt index value of 1.8 plus 0.4 per 10 minutes, and shall have a minimum average molecular weight of 21,000.

§ 178.133-7 Closure. (a) Closure shall be resistant to lading and adequate to prevent leakage. Openings in removable head shall not be over 2.85 inches in diameter. Venting closures are permitted when required by Part 173.

§ 178.133-8 Defective containers. (a) Repaired polyethylene liners are not authorized.

§ 178.133-9 Marking. (a) Each drum must be marked by embossing on a permanent head with clearly legible raised characters as follows:
(1) DOT-37P and the letters NRC located near the DOT mark to indicate a nonreusable drum.
(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.
(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.
(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18-16-55-83 for body 18 gauge and head 16 gauge).
(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.133-10 [Reserved]

§ 178.133-11 Type tests. (a) Samples taken at random and closed as for use, shall withstand prescribed tests without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made or for one year, whichever period is shorter. No single container shall be expected to withstand more than one of the following:
(1) Diagonal drop on top chime.
(2) Diagonal drop on bottom chime.
(3) Flat drop on side of drum.
(b) Completely assembled composite containers of each size manufactured, filled to 98 percent of actual capacity with water, shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using vertical double-amplitude (peak-to-peak displacement) of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat steel strap or tape can be passed between the table and the container.

§ 178.133-12 Test. (a) Each assembled container shall be tested by retaining at least 1½ pounds per square inch air pressure at equilibrium without showing pressure drop on a suitable gauge.

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§ 178.134 Specification 37M; cylindrical steel overpack, straight sided for inside plastic container. Nonreusable containers.

§ 178.134-1 Material requirements. (a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.134-2 Construction requirements. (a) Construction requirements are as follows:

Rated capacity of inside plastic container not over (gallons)	Minimum thickness, uncoated sheets (gauge)		Body seams	Rolling hoops	Top or bottom head	Closures, when full removable head is used (gaskets not required)
	Body sheet	Head sheet				
5	26	26	Welded	None required	Double seamed	Lug or plain ring seal
15	24	24	Welded	Rolled or swedged	Double seamed	Lug or plain ring seal
30	24	24	Welded	Rolled or swedged	Double seamed	Bolted type ring closure, 18 gauge
55	24	24	Welded	Rolled or swedged	Double seamed	Bolted type ring closure, 16 gauge

(b) Steel sheets or parts of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
16	0.0598	0.0533
18	0.0478	0.0428
24	0.0239	0.0209
26	0.0179	0.0159

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

(c) Two holes not exceeding ¼ inch each are permitted diametrically opposite each other in the overpack body immediately below the top chime or immediately above the double seam of the bottom chime or three holes not exceeding ¾ inch in a diameter on centers 120 degrees apart in the bottom head.
(1) Overpack interior shall be free of projections, burrs, or any edges that might cause damage to inside plastic container and shall be free of lubricants, oils, or any foreign matter.
(2) Top head may have not more than two holes of suitable size to provide for protruding closures.
(3) Overpack shall be constructed to provide snug fit for inside plastic container.

§ 178.134-3 Tests. (a) Steel overpack when assembled as for use, shall withstand the tests prescribed in specifications for inside plastic containers as detailed in Part 178 when authorized as combination packages in Part 173. The completed package must withstand these tests without producing a condition of the overpack that could result in potential damage to the inside container.

§ 178.134-4 Marking. (a) Each steel overpack must be marked by embossing on a permanent head with clearly legible raised characters as follows:
(1) DOT-37M and the letters NRC located near the DOT mark to indicate a nonreusable overpack.
(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.135 Specification 37C; steel drums. Non-reusable container. Removable head required.

§ 178.135-1 Compliance. (a) Required in all details.

§ 178.135-2 Rated capacity. (a) Rated capacity as marked (see § 178.135-8). Maximum actual capacity of containers shall be not greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.135-3 Composition. (a) Sheets for body and heads to be hot-rolled or cold-rolled, low carbon, open-hearth or electric steel of standard commercial quality.

§ 178.135-4 Seams. (a) Side seams must be welded.

§ 178.135-5 Capacities, weights, type and gauges. (a) Capacities, weights, type and gauges must be as follows:

Marked capacity not over (gallons)	Authorized gross weight not over (pounds)	Type of container	Minimum thickness, uncoated sheets (gauge)		
			Body sheet	Bottom head sheet[1]	Removable head sheet[2,3]
5	80	Straight Side ...	28	28	26

[1] Bottom head must have three inwardly embossed circumferential beads.
[2] Removable head must have two inwardly embossed circumferential beads.
[3] Removable head must have not less than 16 lugs spaced not more than 1¼ inch apart.

(b) Steel sheets of specified gauges shall comply with the following:

Gauge No.	Nominal thickness[1] (inch)	Minimum thickness[1] (inch)
26	0.0179	0.0159
28	0.0149	0.0129

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.135-6 Closures. (a) Closures shall be capable of withstanding test prescribed by § 178.135-10. Removable head may be equipped with leakproof fittings for filling.

§ 178.135-7 Defective containers. (a) Defective containers to be repaired by method used in constructing container.

§ 178.135-8 Marking. (a) Each drum must be marked by embossing on a permanent head with clearly legible raised characters as follows:

(1) DOT-37C*** and the letters NRC, located near the DOT mark to indicate a nonreusable drum. Stars are to be replaced by the authorized gross weight, or less, at which the container was type tested (for example, DOT-37C80).

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of the body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.135-9 [Reserved]

§ 178.135-10 Type test. (a) Samples taken at random and closed as for use, shall withstand the prescribed test without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(b) Test by dropping on top chime, or other part considered to be weaker, with drum filled to normal loading depth and to the gross weight at which container is marked with dry powdered material, and topped with at least two inches of a finely divided, dry, free-flowing powder of the following sieve analysis:

% retained on 42 mesh—Trace (maximum)
% retained on 50 mesh—3% (maximum)
% retained on 100 mesh—68% (minimum)

A material such as sodium bicarbonate is recommended. Container shall be dropped from a height of 4 feet onto solid concrete so as to strike diagonally on the chime. Closing devices and other parts projecting beyond chime or rolling hoops must be capable of withstanding this test. No disc or material other than regular gaskets in closure part is permitted for test purposes.

§ 178.136 [Reserved]

§ 178.137 Specification 37D; steel drum. Non-reusable container. Open-head not authorized.

§ 178.137-1 General requirements. Each drum must meet the applicable requirements of § 173.24.

§ 178.137-2 Rated capacity. (a) Rated capacity is 55 gallons, as marked (see § 178.137-6).

(b) Actual capacity must be the rated capacity plus 4-5 percent.

§ 178.137-3 General construction requirements. (a) Chime reinforcement. The top and bottom chimes must be reinforced with a steel band that is an integral part of the double seam and which provides a chime cross section containing at least eight layers of steel. The reinforcing band must follow and support the knuckle radius of the head with the inside edge upturned so that the edge does not contact the adjacent portions of the head.

(b) Seams. The body side seam must be welded.

(c) Sidewall construction. A continuous series of parallel, geometrically similar circumferential beads must be expanded in the drum sidewall so that the surface length of the steel in the axial direction does not change more than 1 per cent during forming.

(d) Steel thickness. (1) The thickness of the body and heads of the finished drum must be at least 23-gauge.

(2) The chime reinforcement must be made of at least 18-gauge steel.

(e) Heads. Heads must be flat. Openhead drums are not authorized.

§ 178.137-4 Closure. (a) The closing part (plug, cap, plate, etc.) must be of steel at least 23-gauge thickness, or other material of equivalent strength. Gaskets are required. Cap seals may be placed over the closure.

(b) For closures with threaded plug or cap, the seat (e.g., flange) for the plug or cap must have three or more threads. Two drainage holes of not over ⅜-inch diameter are authorized. The plug or cap must have a sufficient length of thread to engage at least three threads when securely tightened with the gasket in place.

(c) The maximum permitted closure opening is 2.7 inches in diameter.

§ 178.137-5 Defective drums. Defects or damage must be repaired by the method used in constructing the drum. Soldering is not authorized.

§ 178.137-6 Marking. (a) Each drum must be marked by embossing on a permanent head with clearly legible raised characters as follows:

(1) DOT-37D and the letters NRC located near the DOT mark to indicate a nonreusable drum.

(2) If the drum is manufactured of stainless steel, the type of steel used in the body and head sheets as identified by the American Iron and Steel Institute type number, and also the letters HT following the steel designation on barrels or drums subjected to stress relieving or heat treatment during manufacture (for example, 304, 316, 304 HT). This mark should be near the DOT mark.

(3) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(4) The gauge of the metal in the thinnest part, the rated capacity in gallons, and the year of manufacture (for example, 18-55-83). When the gauge of the metal in the body differs from that in the heads, both must be indicated with a slanting line between them and with the gauge of the body indicated first (for example, 18.16-55-83 for body 18 gauge and head 16 gauge).

(b) For the purpose of this subchapter, the minimum character size specified in § 173.24(c)(1)(iv) is waived.

§ 178.137-7 Tests. (a) [Reserved]

(b) Samples taken at random and closed as for use, shall withstand the prescribed test without leakage. Each packaging design type must successfully pass the tests before the packaging is used. The tests must be repeated every 4 months. A packaging design type is defined by the design, size, material, thickness, and manner of construction, but may include various surface treatments. A type may also include packagings which differ from the design type only in their lesser design heights. The samples last tested must be retained until further tests are made, or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Drop test. Test by dropping, filled with water to 98 percent capacity, from a height of 4 feet onto a solid unyielding surface (e.g.,

concrete or steel) so as to strike the surface diagonally on the chime. Additional similar drops must be made on any other parts of the drum which might be considered weaker than the chime. Closing devices and other parts projecting beyond the chime or sidewall beads must also be capable of withstanding this test.

(2) **Pressure test.** Hydrostatic pressure test of at least 15 pounds per square inch, sustained without pressure drop for at least 5 minutes.

(c) **Leakage test.** Each drum must be tested for leakage with seams under water, or covered with soapsuds or heavy oil, or equivalent material. Interior air pressure of at least 7 pounds per square inch must be applied, and the seams and chimes examined for evidence of leakage. Leaking drums must be rejected, or repaired (see §178.137-5) and retested.

§ 178.140

§ 178.140 Specification 13; metal kegs.

§ 178.140-1 Compliance. (a) Required in all details.

§ 178.140-2 Composition. (a) To be open-hearth or electric steel, annealed dead soft; carbon not over 0.14 percent.

§ 178.140-3 Parts and dimensions. (a) Parts and dimensions as follows:

	Gross weight of kegs and contents			Over 75 pounds but not over 150 pounds
	Not over 15 pounds	Not over 30 pounds	Over 30 pounds but not over 75 pounds	
Thickness of material				
Body	30 gauge	28 gauge	24 gauge	24 gauge
Head	... do ...	... do ...	26 gauge	26 gauge
Width of lap for side seam[1]	5/16 inch	7/16 inch	7/16 inch	1/2 inch
Number of corrugations in each end of body	3	3	5	7
Minimum depth of corrugations	1/16 inch	3/32 inch	3/32 inch	3/32 inch
Width of laps on body and head seams[1]	3/16 inch	3/16	3/16 inch	5/16
Width of laps on head for head seams[1]	5/16	3/8 inch	3/8 inch	3/4 inch
Head seams	Double lap	Double lap	Double lap	Single lap

[1] Dimension requirements do not apply for kegs manufactured with double seamed, compound-lined chime seams and lapped and soldered side seam.

Note: Dimensions of materials specified are minimum requirements. Corrugations not required in body of kegs for gross weights not over 7 pounds.

§ 178.140-4 Seams. (a) For gross weight over 75 pounds, all seams welded, brazed, soldered, or riveted, rivets at not over 5" centers.

§ 178.140-5 Closures. (a) *Slide type.* Metal holder, for slide, securely fastened to head; washer of suitable material 0.025" thick; metal drop with depression to fit into bunghole and hold washer in place; metal slide to cover the foregoing. Positive fastening required between slide and slide holder to prevent leakage in transit; friction fastening not authorized.

(b) *Cap or plug type.* Metal holder, for cap or plug, securely fastened to head; metal cap or plug, with gasket when necessary to prevent sifting. Positive fastening required between cap, or plug, and holder to prevent leakage in transit; friction fastening not authorized.

§ 178.140-6 Marking. (a) Each metal keg must be marked by embossing on a permanent head with clearly legible raised characters as follows:

(1) DOT-13.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.140-7 [Reserved]

§ 178.140-8 Type test.

(a) Keg filled with fine, dry sand in weight equal to that of shipment must be capable of withstanding, without leakage, four successive drops of 4 feet on the head onto solid concrete. Tests to be made of each type and size by each company manufacturing this type of container and to be repeated every 6 months while in production. If production is discontinued and is resumed, this requirement will also apply if prescribed tests have not been made within the previous 6-month period. Samples last tested to be retained until further tests are made or for 1 year, whichever period is shorter.

§ 178.140-9 Filling with contents.

(a) **Lining.** Cloth bag lining required for a gross weight over 32 pounds; neck of bag to be securely tied.

§ 178.140-10 Additional keg.

(a) **Stove-pipe keg.** Authorized only for shipments loaded by the shipper and to be unloaded by consignee and for a gross weight of not over 30 pounds. Must comply with all requirements, except §178.140-5, and also with the following:

(1) Length to be about 4 times diameter; cap (slip cover) to have snug fit over body with 3" overlap.

(2) Contents to be enclosed in double paper tubes, with pasted seams, not over 2½" diameter and made of tough manila paper weighing at least 50 pounds per 480 sheets 24" x 36"; outside tube to be waxed. Ends of tubes to be folded and tucked between folds of tube to prevent leakage.

§ 178.141 Specification 13A; metal drums.

§ 178.141-1 Compliance. (a) Required in all details.

§ 178.141-2 Type. (a) Straight sided; authorized only for material cast solid and with filling end head applied after material is loaded and closed in the manner prescribed in §178.141-6. No other openings permitted.

§ 178.141-3 Composition. (a) To be low carbon, open-hearth or electric steel.

§ 178.141-4 Heads and body. (a) **Heads.** To be not less than 28 gauge United States standard.

(b) **Body.** To be not less than 28 gauge United States standard.

§ 178.141-5 Seams. (a) Must be welded.

§ 178.141-6 Heads. (a) To be attached by means of double lapped-seam.

§ 178.141-7 Marking. (a) Each drum must be marked by embossing on a permanent head with clearly legible raised characters as follows:

(1) DOT-13A.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section. A symbol, if used, must be registered with the Director, OHMT.

(b) For the purpose of this subchapter, the minimum character size specified in §173.24(c)(1)(iv) is waived.

§ 178.141-8 Type tests. (a) Drum filled and closed as for shipment must be capable of withstanding, without rupture, 4 successive drops of 4 feet on the head onto solid concrete.

(b) Drum must be capable of withstanding hydrostatic pressure test of 30 pounds per square inch, sustained for 5 minutes.

(c) Tests to be made of each type and size by each company manufacturing this type of container and to be repeated every six months while in production. If production is discontinued and is resumed, this requirement will also apply if prescribed tests have not been made within the previous six-month period. Samples last tested to be retained until further tests are made or for one year whichever period is shorter.

§ 178.146 Specification 32A; metal cases, riveted or lock-seamed.

§ 178.146-1 Compliance. (a) Required in all details.

§ 178.146-2 Gauge standards. (a) United States standard for sheet metal; American or Brown and Sharpe for wire.

§ 178.146-3 Covers. (a) To have at least 1" lap on body and to fit with clearance not over 1/32"; lapped corners to be welded.

§ 178.146-4 Edge protection. (a) Open edges of body must be turned or rolled inward, front open edge of cover must be turned or rolled outward. Not required for material at least 20-gauge thick or for "trailer" cases.

§ 178.146-5 Bottom protection. (a) Face on which case will ordinarily rest must be reinforced with continuous angle strips, or be fitted with truck corners, or be double thickness along edges. Not required for cases of at least 20-gauge metal or of not over 1 reel capacity or for "trailer" cases.

§ 178.146-6 Hinges. (a) To be of continuous loop type with loops of steel wire at least 7-gauge, welded; hinge straps at least 18-gauge securely welded or riveted.

§ 178.146-7 Carrying handles. (a) Any type of adequate strength.

§ 178.146-8 Closing devices. (a) To be of sufficient strength and efficiency to prevent injury or unfastening in tests (§178.146-14) or in transit.

§ 178.146-9 Rivets. (a) At least 3/32" diameter; length to furnish efficient heads; split rivets not authorized except for attachment of lining.

§ 178.146-10 Rivet reinforcement. (a) Hinges, fastening devices, and handles, when riveted in place, must have additional inside reinforcement of steel, at least as thick as in case, through which rivets must pass. Not required when case is made of at least 20-gauge material throughout.

§ 178.146-11 Lining. (a) Required throughout; to be hard-surfaced fiberboard at least 0.125" thick and with strength of 800 pounds, Mullen or Cady test, or wooden lining at least 0.25" thick.

§ 178.146-12 Metal partitions. (a) Metal partitions (when used) to be as thick as body of case, permanently fastened to the case, and lined the same as the case.

§ 178.146-13 Protective coating. (a) Steel cases must be of galvanized material or protected from corrosion by paint, lacquer or other adequate coating.

§ 178.146-14 Type tests. (a) Cases completely filled as for shipment must be capable of withstanding 4 successive drops onto solid concrete from a height of 6 feet without rupture of case or permanent damage to or unfastening of closing device. Tests to be made by dropping on cover, seam, or any corner.

§ 178.146-15 Marking. (a) Marking on each container by the maker with plain and permanent marks at least ½" high as follows:
(1) DOT-32A.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.146-16 Cases with capacity (approx.) not over 9,000 feet of 1¾" film. (a) Compliance with §§178.146-1 to 178.146-15 required. Seams to be lockseams or riveted. Material to be steel, at least 20-gauge. 2 hinges, 1 fastening device, and 1 carrying handle required.

§ 178.146-17 Cases with capacity (approx.) not over 8,000 feet of 1¾" film or 4,500 feet of 2½" film. (a) Construction as in §178.146-16, except: 22-gauge material authorized; 1 hinge authorized for single-reel cases.

§ 178.146-18 Cases with capacity not over 1 reel of 10" diameter. (a) Construction as in §178.146-16, except: 24-gauge material and 1 hinge authorized.

§ 178.146-19 Cases with capacity not over 500 feet of film: "Trailer Cases." (a) Construction as in §178.146-16, except, 26-gauge material and 1 hinge of any type authorized.

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§ 178.147 Specification 32B; metal cases, welded or riveted.

§ 178.147-1 Compliance. (a) Required in all details.

§ 178.147-2 Gauge standards. (a) United States standard for sheet metal; American or Brown and Sharpe for wire.

§ 178.147-3 Covers. (a) To have at least 1" lap on body and to fit with clearance not over 5/32"; lapped corners to be welded.

§ 178.147-4 Edge protection. (a) Open edges of body must be turned or rolled inward, front open edge of cover must be turned or rolled outward. Not required for material at least 20-gauge thick or for "trailer" cases.

§ 178.147-5 Bottom protection. (a) Face on which case will ordinarily rest must be reinforced with continuous angle straps, or be fitted with trunk corners, or be double thickness along edges. Not required for cases of at least 20-gauge metal or of not over 1 reel capacity or for "trailer" cases.

§ 178.147-6 Hinges. (a) To be of continuous loop type with loops of steel wire at least 7-gauge, welded; hinge straps at least 18-gauge securely welded or riveted.

§ 178.147-7 Carrying handles. (a) Any type of adequate strength.

§ 178.147-8 Closing devices. (a) To be of sufficient strength and efficiency to prevent injury or unfastening in tests (§178.147-14) or in transit.

§ 178.147-9 Rivets. (a) At least 5/32" diameter; length to furnish efficient heads; split rivets not authorized except for attachment of lining.

§ 178.147-10 Rivet reinforcement. (a) Hinges, fastening devices, and handles, when riveted in place, must have additional inside reinforcement of steel, at least as thick as in case, through which rivets must pass. Not required when case is made of at least 20-gauge material throughout.

§ 178.147-11 Lining. (a) Required throughout; to be hard-surfaced fiberboard at least 0.125" thick and with strength of 800 pounds, Mullen or Cady test, or wooden lining at least 0.25" thick.

§ 178.147-12 Metal partitions. (a) Metal partitions (when used) to be as thick as body of case, permanently fastened to the case, and lined the same as the case.

§ 178.147-13 Protective coating. (a) Steel cases must be of galvanized material or protected from corrosion by paint, lacquer, or other adequate coating.

§ 178.147-14 Type tests. (a) Cases completely filled as for shipment must be capable of withstanding 4 successive drops onto solid concrete from a height of 6 feet without rupture of case or permanent damage to or unfastening of closing device. Tests to be made by dropping on cover, seam, or any corner.

§ 178.147-15 Marking. (a) Marking on each container by the maker with plain and permanent marks at least ½" high as follows:
(1) DOT-32B.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.147-16 Cases with capacity (approximate) not over 12,000 feet of 1¾" film or 6,000 feet of 2½" film. (a) Compliance with §§178.147-1 to 178.147-15 required. Seams to be welded or riveted. Material to be steel, or aluminum-manganese alloy, at least 18-gauge. 2 hinges, 2 fastening devices spaced as for hinges, and 2 carrying handles required.

§ 178.147-17 Cases with capacity (approximate) not over 9,000 feet of 1¾" film. (a) Compliance with §§178.147-1 to 178.147-16, except: 1 fastening device and 1 carrying handle authorized.

§ 178.147-18 Cases with capacity (approximate) not over 8,000 feet of 1¾" film or 4,500 feet of 2½" film. (a) Construction as in §178.147-16, except: 20-gauge material, 1 fastening device, and 1 carrying handle authorized; 1 hinge authorized for single-reel cases. Detachable covers (no hinges) with ¾" lap on body and efficiency to prevent displacement in tests, are authorized. Trailer cases, capacity not over 500 feet of film, no handle required. Cover lap not less than full one-half inch.

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§ 178.148 Specification 32C; metal trunks.

§ 178.148-1 Design. (a) To be designed to contain film in film-reel cans and projecting apparatus only; other articles not authorized therein.

§ 178.148-2 Strength. (a) To be of strength and efficiency to carry contents in ordinary handling without damage to trunk or contents.

§ 178.148-3 Compartments. (a) Separate compartments required for each reel of film and for projecting apparatus; each compartment to be constructed so that, in closing, it will have no cracks or openings.

§ 178.148-4 Compartment linings. (a) Each film compartment to be made of, or lined throughout with, sheet metal; this metal to be protected against contact with film-reel can by a substantial interlining of fiberboard or equivalent.

§ 178.148-5 Marking. (a) Marking on each container by the maker with plain and permanent marks at least ½" high applied on 2" by 4" metal plate securely riveted to top of cover of trunk as follows:
(1) DOT-32C.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.149 Specification 32D; metal boxes for old and worn-out motion-picture film no longer exhibitable.

§ 178.149-1 Compliance. (a) Required in all details.

§ 178.149-2 Gauge standards. (a) United States standard for sheet metal; American or Brown and Sharpe for wire.

§ 178.149-3 Material. (a) Material to be steel; body and bottom at least 16-gauge; cover at least 18-gauge.

§ 178.149-4 Joints and seams. (a) All joints and seams to be welded or riveted.

§ 178.149-5 Cover. (a) Cover must be tight-fitting, to prevent entrance of sparks, with provision for secure fastening to be locked or sealed.

§ 178.149-6 Type tests. (a) Cases completely filled as for shipment must be capable of withstanding 4 successive drops onto solid concrete from a height of 4 feet without rupture of case or permanent damage to or unfastening of closing device. Tests to be made by dropping on cover, seam, or any corner.

§ 178.149-7 Marking. (a) Marking on each container by the maker with plain and permanent marks at least ½" high as follows:
(1) DOT-32D.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.150 Specification 33A; polystyrene cases. Nonreusable containers.

§ 178.150-1 Material requirements. (a) Expandable polystyrene, molded to produce a completely fused closed cell composition having a minimum density of 1.25 pounds per cubic foot.

§ 178.150-2 Design. (a) The case is to consist of two parts, a bottom section with pockets for the inside containers and a top section that covers, and interlocks with, the bottom section. Both the bottom and top sections shall be designed to provide a snug fit for the inside containers.

§ 178.150-3 Construction. (a) The case shall be constructed in accordance with the following minimum thicknesses:

(1) Multiple bottle cases, not more than 4 individual bottles per case:

	Nominal capacity of individual inside containers	
	5 pints	1 gallon
Side wall and bottom, inches	3/4	1
Between inside containers, inches	5/8	5/8
Top, inches (see Note 1)	3/4	1

Note 1: In recess for closure cap for inside container, one fourth inch thickness is permissible; closure cap shall not be in contact with inside of top section.

(2) Single bottle cases:

	Nominal capacity of inside containers			
	Pint	Quart	5 Pints	Gallon
Side wall, inches	5/8	5/8	3/4	1 1/2
Top wall, inches (See Note 1)	3/4	3/4	3/4	1
Bottom wall, inches	1	1	3/4	1 1/2

Note 1: In the recess for the closure cap for the inside container, 1/4 inch thickness is permissible, the closure cap shall not be in contact with the inside of the top wall.

§ 178.150-4 Closing for shipment. (a) Cases shall be closed for shipment with a pressure-sensitive tape having a tensile strength of not less than 55 pounds per inch of width or tape of equivalent strength. The tape shall completely encircle the case, with overlap of not less than one inch, in one direction so as to transverse the joint of the two sections perpendicularly. If the design of the case is such that the tape is subject to abrasion in transportation and handling, tape shall also be applied similarly on the same axis, but at 90°.

(b) Each case shall be closed for shipment with pressure-sensitive tape, non-metallic strapping, or other efficient means if they perform without failure under the tests prescribed by this section.

§ 178.150-5 Gross weight authorized. (a) Multiple bottle case, 60 pounds maximum.

(b) Single bottle case, 20 pounds maximum.

§ 178.150-6 Test for completed package. (a) Cases, with inside containers filled with water enclosed as for shipment, shall be capable of withstanding 4-foot flat drops onto solid concrete without leakage from or breakage of any inside container, and without producing any condition that would result in potential damage to the inside container. A minimum of 4 cases shall be tested, each case not being subjected to more than one test. Each test is to consist of six 4-foot drops once each side, bottom and top.

(b) Tests prescribed by paragraph (a) of this section must be conducted by the shipper assembling the completed package prior to initial use, and each 6 months thereafter. The tests must also be repeated on the change of any components or design of the package. Records of tests and results must be maintained for at least one year.

§ 178.150-7 Marking. (a) Each container must be marked as follows:

(1) DOT-33A.

(2) The letters "NRC", located just above or below the DOT mark, to indicate a nonreusable container.

(3) Name or symbol of person making the other marks specified in this section and located on the same face as those other marks. Symbol, if used, must be registered with the Director, OHMT.

(4) Size or markings: Specification markings prescribed in this section must be at least 1/4 inch high. All markings must be legible.

SUBPART E

SPECIFICATIONS FOR WOODEN BARRELS, KEGS, BOXES, KITS, AND DRUMS

§ 178.156 Specification 10B; wooden barrels and kegs (light).

§ 178.156-1 Compliance. (a) Required in all details.

§ 178.156-2 Staves and headings. (a) To be of white oak, chestnut oak, red oak, black cherry, Douglas fir, beech, sweet birch, yellow birch, sugar (hard) maple, or Scandinavian pine; quarter sawed with the grain, from straight-grained timber, so no annual ring shall slope over half the thickness of stave or head; thoroughly kiln dried, moisture content 7 percent to 11 percent; free from rotten sap, checks, pitch pockets, cat faces, seed and worm holes in excess of 15 in one container, and other defects that show through on both sides.

§ 178.156-3 Hoops. (a) To be of cooperage-grade hoop steel.

§ 178.156-4 Staves. (a) Staves to be sawed evenly and circular; croze center to be within 1/16" of end of stave; stave end to have 1/8" free from bevel.

§ 178.156-5 Heading. (a) Heading of uniform thickness and properly circled; planed on outside and properly jointed and glued, or doweled and flagged; dowel diameter not over 1/3 thickness of head.

§ 178.156-6 The barrel. (a) Stave joints reasonably flush on outside. Lathing is forbidden.

(b) Worm and seed holes to be plugged; over 15 not authorized in one container.

§ 178.156-7 Parts required and dimensions. (a) Parts required and dimensions as follows (10 percent excess capacity authorized):

(1) Staves, when finished on outside:

Capacity of container, not over	Maximum			Minimum	
	Length	Width	Bilge circle	Staves	Thickness
Gallons	Inches	Inches	Inches	Number	Inch
50	34	6	84	19	11/16
30	30	5	74	16	5/8
15	24	4 1/2	54	14	9/16
10	22	4 1/4	50	12	1/2
5	18	4	40	10	1/2

Foregoing thicknesses are of staves finished on one side. One-sixteenth inch must be added for unfinished staves.

Foregoing maximum lengths are authorized to be increased 6 percent or less provided the thickness of stave is increased at least one-sixteenth inch for each increase of 1 inch in length or fraction thereof.

(2) Heading, after planing:

Capacity of container, not over	Maximum		Minimum	
	Pieces	Diameter	Thickness	Width
Gallons	Number	Inches	Inch	Inches
50	6	21	3/4	2 1/2
30	6	18	5/8	2 1/2
15	5	14	9/16	2
10	5	13	1/2	2
5	4	11	1/2	2

NOTE 1: Until further order of the Department, for barrels of not over 50 gallons capacity, maximum number of pieces may be 7 provided they have a minimum thickness of 7/8 inch.

(3) Hoops, number and size:

Capacity of container, not over (gallons)	Minimum number of hoops	Minimum size of hoops (inches in width and Birmingham gauge)							
		Head		First quarter		Second quarter		Bilge	
		Inch	Gauge	Inch	Gauge	Inch	Gauge	Inch	Gauge
50	8[1]	[3] 1¾	[3] 17	1½	18	1½	18	[3] 1¾	[3] 17
30	6	1½	18	1¼	19	.....	.....	1½	18
15	6	1¼	19	1¼	19	.....	.....	1¼	19
10	6	1¼	19	1	19	.....	.....	1¼	19
5	6[2]	1	19	1	19	.....	.....	1	19

[1] Until further order of the Department, the minimum number of hoops is authorized to be reduced to 6 by eliminating second quarter hoops.
[2] Until further order of the Department, the minimum number of hoops is authorized to be reduced to 4 by eliminating first quarter hoops if head and bilge hoops of 1¾ inch by 17 gauge are used.
[3] 2 inch by 18 gauge hoops are also authorized.

§ 178.156-8 Closures. (a) To be such as to prevent leakage in transit. Bung holes in staves must be not over 2" diameter.

§ 178.156-9 Lining. (a) To be as prescribed in Part 173 or otherwise appropriate for the contents.

§ 178.156-10 Type test. (a) Sample container at least 2 days old shall not increase more than 10 percent on diameter of head when all hoops above bilge are removed.

§ 178.156-11 Leakage test. (a) Required for each lined container, by pressure at time of sizing or air pressure of at least 5 pounds per square inch; leakers to be repaired and retested.

§ 178.156-12 Marking. (a) Marking on each container by the maker. By hot branding iron on head as follows:
(1) DOT-10B.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.
(3) Date of manufacture (for example 7-50 for July 1950) located near the maker's mark.

Note 1: Until further order of the Department, date of manufacture may be omitted.

§ 178.156-13 Size of markings. (a) Size of markings (minimum): ¾" high for over 30-gallon size, ½" for others.

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§ 178.165 Specification 14; wooden boxes, nailed.

§ 178.165-1 Compliance. (a) Required in all details.

§ 178.165-2 Lumber. (a) White pine or wood of at least equal strength, well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ½ its length.

§ 178.165-3 Nails. (a) Cement coated, except as otherwise authorized, or screws of equal efficiency.

§ 178.165-4 Ends, sides, tops, and bottoms. (a) Ends, sides, tops, and bottoms, as follows:
(1) Parts of 1-piece.
(2) Parts Linderman-joint glued.
(3) Parts tongued, grooved, and glued.
(4) Parts butt-joint glued, provided the joined surfaces are planed before gluing so as to assure full contact. After immersion in water for 24 hours at 70° F., the part must not fail at the joint when it is broken.
(b) Tongued, grooved and glued joints in uncleated ends must also be fastened with corrugated fasteners not over 8" apart, within 3" of each end of joint and having penetration ⅞ thickness of end.

§ 178.165-5 Cleated ends. (a) Double cleated, 2 vertical and 2 horizontal. Nails staggered at 2" intervals and clinched; cement coating not required.

§ 178.165-6 Sides, tops, and bottoms. (a) Of size to extend out over cleats, if any.

§ 178.165-7 Lock and dovetail corners. (a) Glued.

§ 178.165-8 Parts and dimensions. (a) Parts and dimensions as follows:

Authorized gross weight (maximum) (pounds)	Type of box	Thickness of lumber (minimum)				Nails (minimum size)[4]	
		Ends[1]	Sides	Tops and bottoms[2]	Cleats	Into ends or cleats	Into sides
		Inches	Inch	Inch	Inches	Penny	Penny
35	Lock[3] Corner	⅜	⅜	⅜	.....	5d	5d
65	Lock[3] Corner	½	½	⅜	.....	5d	5d
75	Plain Nailed	⅞	½	½	.....	7d	5d
75	Double Cleat	⅜	⅜	⅜	½ x 1½	5d	
140	Plain Nail	1⅛	⅝	⅝	.....	8d	7d
140	Lock[3] Corner	⅝	⅝	⅝	.....	7d	7d
140	Double Cleat	⅜	⅝	⅝	⅜ x 1⅞	7d	7d

[1] Or dowel.
[2] Tops and bottoms may be made of paper covered veneer board of good quality Douglas fir, or lumber of equal quality, having minimum thickness of ⅛" and free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength. Paper covering shall be at least Kraft untreated linerboard having a basis weight of 42 pounds per 1000 square feet and shall be secured to veneer core by adhesive in such manner as to form a satisfactorily laminated board. Board ends must be provided with such reinforcement as may be necessary to provide strength for nailing.
[3] As provided by § 173.65(a)(1), Note 1, boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1⅝ inches from top edge of end of box.
[4] Coated wire staples are authorized in lieu of nails when used for fastening tops to boxes. Staples must be of such size and spaced and driven as to provide closure efficiency equivalent to that in §§ 178.165-11 and 178.165-12.

§ 178.165-9 Joints in sides and ends. (a) Staggered; except for ends cleated as prescribed.

§ 178.165-10 Tops and bottoms. (a) Must fit evenly on frame of box.

§ 178.165-11 Cleated boxes. (a) Sides, top, and bottom must be secured to ends by nails driven into cleats, not into end boards.

§ 178.165-12 Nails in each nailing edge (minimum number). (a) At least equal to length of edge in inches divided by 2; when number of nails is at least equal to length of edge divided by 1¾, 4d nails are authorized where 5d nails are prescribed.

Exception: Eight inch spacing authorized for nailing tops and bottoms to sides.
Note 1: Until further order of the Department, the following exception is authorized for nailing tops to boxes. When 7d and 8d nails are required by § 178.165-8, 6d nails are authorized if number of nails used is at least equal to length of end edge divided by 1¾ and length of side edge divided by 6.

§ 178.165-13 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-14

(b) Each box must also be marked with the name or symbol of person making the mark specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.168 Specification 15A; wooden boxes, nailed.

§ 178.168-1 Compliance. (a) Required in all details.

§ 178.168-2 Closed[1] box. (a) Parts and pieces to be in close contact.

§ 178.168-3 Ends. (a) One-piece, or equivalent (see § 178.168-5), or cleated as prescribed; joints tongued, grooved, and glued. Style 1 or style 6 boxes may have milled depressions in each end of box for hand-holds, of not more than ⅜ inch in depth and not exceeding one-third of the width of the box, only when ends are of lumber at least ⅞ inch in thickness.
(b) As provided by § 173.65(a)(1), Note 1, wooden boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1⅝ inches from top edge of end of box.

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[1] Openings for filling device of inside container authorized if device is properly protected.

§ 178.168-4 Sides, top, and bottom. (a) Joints tongued, grooved, and glued, or one-piece equivalent, except that boxes for shipment of high explosives may have tops and bottoms made of paper-covered veneer board or good quality Douglas fir, or lumber of equal quality, having minimum thickness of ⅛ inch and free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength. Paper covering shall be at least Kraft untreated linerboard having a basis weight of 42 pounds per 1000 square feet and shall be secured to veneer core by adhesive in such manner as to form a satisfactorily laminated board. Board ends must be provided with such reinforcement as may be necessary to provide strength for nailing, and when used lumber thicknesses specified by § 178.168-12 do not apply.

§ 178.168-5 One-piece equivalents. (a) Parts are considered equivalent to one-piece as follows:

(1) Parts Linderman-joint glued.

(2) Parts at least ½" thick, tongued and grooved and glued, with 2 or more corrugated fasteners on each joint.

(3) Parts butt-joint glued, provided the joined surfaces are planed before gluing, so as to assure full contact. After immersion in water for 24 hours at 70° F. the part must not fail at the joint when it is broken.

(b) Corrugated fasteners (as prescribed for one-piece equivalents): 1" wide; penetration ⅔ thickness of part; within 3" of end of joint and not over 8" apart; for 3 or more, drive alternately into opposite sides of part.

§ 178.168-6 Gluing efficiency. (a) Shall be determined for boxes for gross weight of 150 pounds or less. When filled with sand and sawdust to marked gross weight, the boxes must be able to withstand 8 drops of 12", one on each corner, onto solid concrete without exposure of contents.

§ 178.168-7 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ½ its length.

§ 178.168-8 Nails. (a) Cement coated, unless otherwise authorized herein, of size specified for "sinkers" and "coolers" as generally known to the trade.

§ 178.168-9 Grouping of principal woods. (a) Grouping as follows:

Group 1		
White pine	Sugar pine	Cedar
Norway pine	Cypress	Redwood
Aspen (popple)	Basswood	Butternut
Spruce	Willow	Cucumber
Western (yellow) pine	Noble fir	Alpine fir
Cottonwood	Magnolia	Lodgepole pine
Balsam fir	Buckeye	Jack pine
Yellow poplar	White fir	Mediterranean pine
Chestnut		

Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	

Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black gum	Maple—soft or silver
Sycamore	Black ash	

Group 4		
Hard maple	Hackberry	Hickory
Beech	Birch	White ash
Oak	Rock elm	

§ 178.168-10 Width of pieces. (a) At least 2½".

§ 178.168-11 Width of cleats. (a) Twice the prescribed thickness plus ¾".

§ 178.168-12 Thickness of lumber. (a) Nailed boxes not cleated (Style 1). Authorized gross weight not over 100 pounds, see Note 1. Sides as in Table 1; top and bottom as in Table 1A; ends as in Table 5.

(b) Glued-lock-corner boxes (Style 6). Authorized gross weight not over 150 pounds. Sides as in Table 3; top and bottom as in Table 1A; ends as in Table 3A. Or, sides as in Table 2; top and bottom as in Table 1A; end as in Table 4.

(c) Single-cleated boxes (Style 4 or 5). Authorized gross weight not over 200 pounds, see Note 2. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 3A.

(d) Double-cleated boxes (Style 2, 2½, or 3). Authorized gross weight not over 500 pounds, see Note 3. Sides as in Table 1; top and bottom as in Table 1A; end and cleats as in Table 2A. Or, sides as in Table 1; top and bottom as in Table 1A; cleats as in Table 3B; ends not thinner than thickest side or top.

Note 1: When group II woods are used the gross weight may be increased to 110 pounds.

Note 2: When group II woods are used the gross weight may be increased to 220 pounds.

Note 3: When group II woods are used the gross weight may be increased to 550 pounds.

(e) Tables are as follows (dimensions of materials finished or resawed):

TABLE 1

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/16	1 1/16	1	15/16	7/8	3/4

TABLE 1A

Width of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/16	1 1/16	1	15/16	7/8	3/4

TABLE 2

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	11/32	11/32	11/32	11/32	11/32	11/32
35	3/8	11/32	11/32	11/32	11/32	11/32
45	7/16	3/8	3/8	11/32	11/32	11/32
55	1/2	7/16	3/8	3/8	11/32	11/32
65	1/2	1/2	7/16	3/8	3/8	11/32
75	9/16	1/2	1/2	7/16	3/8	3/8
85	9/16	9/16	1/2	7/16	7/16	3/8
100	5/8	9/16	9/16	1/2	7/16	7/16
125	11/16	5/8	5/8	9/16	1/2	7/16
150	3/4	11/16	11/16	5/8	9/16	1/2
175	13/16	3/4	11/16	11/16	5/8	9/16
200	7/8	13/16	3/4	3/4	11/16	5/8
250	1	15/16	7/8	13/16	3/4	5/8
300	1 1/16	1	15/16	7/8	25/32	11/16
350	1 1/8	1 1/16	1	15/16	7/8	3/4
400	1 3/16	1 1/8	1 1/16	1	15/16	13/16
500	.....	.....	1 1/8	1 1/16	1	7/8

TABLE 2A

Smallest Dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	3/16	3/16	3/16	3/16	3/16	3/16
55	1/4	3/16	3/16	3/16	3/16	3/16
65	1/4	1/4	3/16	3/16	3/16	3/16
75	9/32	1/4	1/4	3/16	3/16	3/16
85	9/32	9/32	1/4	3/16	3/16	3/16
100	5/16	9/32	9/32	1/4	3/16	3/16
125	11/32	5/16	5/16	9/32	1/4	3/16
150	3/8	11/32	11/32	5/16	9/32	1/4
175	13/32	3/8	11/32	5/16	9/32	1/4
200	7/16	13/32	3/8	11/32	5/16	9/32
250	1/2	7/16	7/16	3/8	11/32	5/16
300	11/16	1/2	1/2	7/16	3/8	11/32
350	11/16	11/16	1/2	1/2	7/16	3/8
400	13/16	11/16	11/16	1/2	1/2	7/16
500	.....	.....	11/16	11/16	1/2	7/16

TABLE 3

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	3/8	11/32	11/32	11/32	11/32	11/32
35	7/16	7/16	3/8	11/32	11/32	11/32
45	1/2	1/2	7/16	7/16	3/8	11/32
55	9/16	1/2	1/2	7/16	7/16	3/8
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 3/16	1 1/8	1 1/16	1	15/16	7/8
350	.....	1 3/16	1 1/8	1 1/16	1	15/16
400	.....	.....	.....	1 1/8	1 1/16	1
500	.....	.....	.....	.....	1 1/8	1 1/16

TABLE 3A

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	1/4	3/16	3/16	3/16
55	9/32	9/32	9/32	1/4	3/16	3/16
65	9/32	9/32	9/32	1/4	1/4	3/16
75	5/16	5/16	9/32	1/4	1/4	1/4
85	11/32	11/32	5/16	9/32	1/4	1/4
100	3/8	11/32	11/32	5/16	9/32	1/4
125	13/32	3/8	3/8	11/32	5/16	9/32
150	7/16	7/16	7/16	3/8	11/32	5/16
175	1/2	7/16	7/16	7/16	3/8	11/32
200	1 1/16	1/2	1/2	7/16	7/16	3/8
250	1 1/8	1 1/16	1/2	1/2	7/16	7/16
300	1 3/16	1 1/8	1 1/16	1/2	1/2	7/16
350	.....	1 3/16	1 1/8	1 1/16	1/2	1/2
400	.....	.....	.....	1 1/8	1 1/16	1/2
500	.....	.....	.....	.....	1 1/8	1 1/16

TABLE 3B

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	1/4	3/16	3/16	3/16
55	9/32	1/4	1/4	1/4	3/16	3/16
65	9/32	9/32	1/4	1/4	1/4	3/16
75	5/16	9/32	9/32	1/4	1/4	1/4
85	11/32	5/16	5/16	9/32	1/4	1/4
100	3/8	11/32	11/32	5/16	9/32	1/4
125	13/32	3/8	3/8	11/32	5/16	9/32
150	7/16	7/16	7/16	3/8	11/32	5/16
175	1/2	7/16	7/16	7/16	3/8	11/32
200	1 1/16	1/2	1/2	7/16	7/16	3/8
250	1 1/8	1 1/16	1/2	1/2	7/16	7/16
300	1 3/16	1 1/8	1 1/16	1/2	1/2	7/16
350	.....	1 3/16	1 1/8	1 1/16	1/2	1/2
400	.....	.....	.....	1 1/8	1 1/16	1/2
500	.....	.....	.....	.....	1 1/8	1 1/16

TABLE 3B

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	3/16	3/16	3/16	3/16
55	9/32	1/4	1/4	3/16	3/16	3/16
65	9/32	9/32	1/4	1/4	3/16	3/16
75	5/16	9/32	9/32	1/4	1/4	3/16
85	11/32	5/16	5/16	9/32	1/4	1/4
100	3/8	11/32	11/32	5/16	9/32	1/4
125	13/32	3/8	3/8	11/32	5/16	9/32
150	7/16	7/16	7/16	3/8	11/32	5/16
175	1/2	7/16	7/16	7/16	3/8	11/32
200	1 1/16	1/2	1/2	7/16	7/16	3/8
250	1 1/8	1 1/16	1/2	1/2	7/16	7/16
300	1 3/16	1 1/8	1 1/16	1/2	1/2	7/16
350	.....	1 3/16	1 1/8	1 1/16	1/2	1/2
400	.....	.....	.....	1 1/8	1 1/16	1/2
500	.....	.....	.....	.....	1 1/8	1 1/16

TABLE 4

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	7/16	7/16	7/16	7/16	7/16	7/16
25	7/16	7/16	7/16	7/16	7/16	7/16
35	1/2	1/2	7/16	7/16	7/16	7/16
45	9/16	9/16	1/2	1/2	7/16	7/16
55	5/8	9/16	9/16	1/2	1/2	7/16
65	11/16	5/8	5/8	9/16	1/2	1/2
75	3/4	11/16	5/8	5/8	9/16	1/2
85	25/32	3/4	11/16	5/8	5/8	9/16
100	7/8	13/16	3/4	11/16	5/8	9/16
125	15/16	7/8	13/16	3/4	11/16	5/8
150	1	15/16	15/16	7/8	13/16	11/16

TABLE 5

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	1/2	1/2	1/2	1/2	1/2	1/2
25	1/2	1/2	1/2	1/2	1/2	1/2
35	5/8	9/16	1/2	1/2	1/2	1/2
45	11/16	5/8	9/16	9/16	1/2	1/2
55	3/4	11/16	5/8	5/8	9/16	1/2
65	13/16	3/4	11/16	5/8	5/8	9/16
75	7/8	13/16	3/4	11/16	5/8	9/16
85	15/16	7/8	13/16	3/4	11/16	5/8
100	1	15/16	7/8	13/16	3/4	11/16

§ 178.168-13 Reduced thicknesses. (a) Reduction in thicknesses is authorized as in paragraphs (a) to (d) of this section except that reduced thicknesses must be not less than:

(1) Sides, top, and bottom: Minimum 5/16" for boxes up to 35 pounds authorized gross weight and 3/8" above that weight.

(2) Ends or cleats: Minimum 7/16".

(b) Sides of one-piece or equivalent: 12½ percent.

(c) Any part or cleat of Group 3 or 4 wood: 20 percent.

(d) Sides, top and bottom when to be strapped as per §178.168-19(b): 20 percent for 1 strap; 35 percent for 2 straps.

CONVERSION TABLE

Specified thickness (inches)	Reduced thickness corresponding to percent reduction		
	12½	20	35
1/32	1/16	1/16	1/16
3/64	1/32	1/16	1/16
1/16	3/64	1/32	1/16
3/32	1/16	3/64	1/16
1/8	3/32	1/16	3/32
5/32	1/8	3/32	5/64
3/16	5/32	1/8	3/32
7/32	3/16	5/32	5/64
1/4	7/32	3/16	3/32
9/32	1/4	7/32	3/16
5/16	9/32	1/4	7/32
11/32	5/16	9/32	7/32
3/8	5/16	5/16	1/4
25/32	11/32	5/16	1/4
13/16	11/32	5/16	1/4
7/8	3/8	11/32	9/32
15/16	13/32	3/8	5/16
1	7/8	13/32	5/16
1 1/16	15/16	7/8	11/32
1 1/8	1	7/8	3/8
1 3/16	1 1/16	15/16	25/32
1 1/4	1 1/8	1	13/16
1 5/16	1 1/8	1 1/16	7/8

§ 178.168-14 Assembly. (a) By nailing; screws, hinges and hasp, or other device of equal efficiency are authorized, nails should be driven flush.

§ 178.168-15 Nails and nailing. (a) Cement coated nails of size and with spacing detailed in §§ 178.168-16 and 178.168-17.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to the staggered and clinch 1/16"; uncoated nails authorized.

(d) Nailing tops and bottoms to sides permitted but not required.

§ 178.168-16 Nails; kind and dimensions. (a) Cement[1] coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size[2] in "penny" as follows:

Species of wood holding points of nails	Thickness of material holding points of nails (inches)										
	3/4 or less	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8 or more
Group 1	4	5	5	6	7	7	8	8	8	9	10
Group 2	4	4	5	5	6	6	7	7	7	8	9
Group 3	3	4	4	5	5	6	6	7	7	7	8
Group 4	3	3	4	4	4	5	5	6	6	7	7

§ 178.168-17 Nail spacing[3]. (a) Nail spacing as follows:

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grain
	Inches	Inches
Threepenny	1 1/2	1
Fourpenny	1 1/2	1 1/2
Fivepenny	1 3/4	1 1/2
Sixpenny	2	1 3/4
Sevenpenny	2 1/4	2
Eightpenny	2 1/2	2 1/4
Ninepenny	2 3/4	2 1/2
Tenpenny	3	2 1/2

§ 178.168-18 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-15A***

(1) The stars must be replaced by authorized gross weight (for example, DOT-15A100, etc.).

(b) The words "ONE STRAP", or "TWO STRAPS", etc., when straps are required (see § 178.168-13(d)); this to be placed above or below the rectangle.

(c) Marks may also be applied as follows:

DOT-15A

NO STRAP XXX LBS.
ONE STRAP XXX LBS.
TWO STRAPS XXX LBS.

(d) Each box must also be marked with the name or symbol of person making the other marks specified in this section. Symbol, if used, must be registered with the Director, OHMT.

(1) The "X's" must be replaced by authorized gross weights as authorized for the strapping conditions.

§ 178.168-19 Closing for shipment. (a) Box to be securely closed. Nails, if used, to be as prescribed in §§ 178.168-16 and 178.168-17.

(b) Metal straps, as specified by marks on box, must encircle sides, top and bottom as follows:

(1) One nailless strap: At center of box.

(2) Two or more nailless straps: Outer two about 1/6 of box length from ends and other equally spaced between.

(3) Nailed straps: At ends of sides, top, and bottom; use same size nails as for closing and space not over twice as far apart.

(4) Size of flat straps must be as follows:

Authorized gross weight (pounds)	Cross-section size when number of straps is—		
	1	2	3
	Inch	Inch	Inch
50	1/2 x 0.020	3/8 x 0.015	
100	3/4 x 0.020	1/2 x 0.018	
200	3/4 x 0.023	3/8 x 0.020	1/2 x 0.018
300		5/8 x 0.023	1/2 x 0.020
400		3/4 x 0.020	1/2 x 0.023
500		3/4 x 0.023	5/8 x 0.023

(5) Wires, Washburn and Moen gauge, authorized as follows:

Authorized gross weight (pounds)	Cross-section size when number of straps is—		
	1	2	3
50	12	14	
100	11	12	
200	9	11	12
300		10	11
400		10	11
500		9	10

§ 178.169 Specification 15B; wooden boxes, nailed.

§ 178.169-1 Compliance. (a) Required in all details.

§ 178.169-2 Closed[4] box. (a) Parts and pieces to be in close contact.

§ 178.169-3 Ends. (a) One-piece or equivalent (see § 178.169-5) or cleated as prescribed with joints tongued and grooved.

§ 178.169-4 Sides, top, and bottom. (a) Joints tongued and grooved, or one-piece equivalent.

§ 178.169-5 One-piece equivalents. (a) Parts are considered equivalent to one-piece as follows:

(1) Parts Linderman-joint glued.

(2) Parts at least ½" thick, tongued and grooved and glued, with 2 or more corrugated fasteners on each joint.

(3) Parts at least ½" thick, tongued and grooved and fastened with 3 or more corrugated fasteners on each joint.

(4) Parts butt-joint glued, provided the joined surfaces are planed before gluing, so as to assure full contact. After immersion in water for 24 hours at 70° F. the part must not fail at the joint when it is broken.

(b) Corrugated fasteners (as prescribed for one-piece equivalents): 1" wide; penetration 4/5 thickness of part; within 3" of end of joint and not over 8" apart; for 3 or more, drive alternately into opposite sides of part.

§ 178.169-6 Gluing efficiency. (a) Shall be determined for boxes for gross weight of 150 pounds or less. When filled with sand and sawdust to marked gross weight, the boxes must be able to withstand 8 drops of 12", one on each corner, onto solid concrete without exposure of contents.

[1] Uncoated nails authorized when increased 25 percent in number.

[2] Nails 1-penny smaller authorized when spaced as for 2-penny smaller. Nails 2-penny smaller authorized, but not less than 3-penny, when thickness of material nailed through does not exceed ⅓ of thickness of material holding points of nails.

[3] To determine number of nails, divide length of nailing edge by spacing. Fractions greater than ½ are considered as whole numbers.

[4] Openings for filling device of inside container authorized if device is properly protected.

§ 178.169-7 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ⅓ its length.

§ 178.169-8 Nails. (a) Cement coated, unless otherwise authorized herein, of size specified for "sinkers" and "coolers" as generally known to the trade.

§ 178.169-9 Grouping of principal woods. (a) Grouping as follows:

Group 1

White pine	Sugar pine	Cedar
Norway pine	Cypress	Redwood
Aspen (popple)	Basswood	Butternut
Spruce	Willow	Cucumber
Western (yellow) pine	Noble fir	Alpine fir
Cottonwood	Magnolia	Lodgepole pine
Balsam fir	Buckeye	Jack pine
Yellow poplar	White fir	Mediterranean pine
Chestnut		

Group 2

Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	

Group 3

White Elm	Pumpkin ash	Tupelo
Red gum	Black gum	Maple—soft or silver
Sycamore	Black ash	

Group 4

Hard maple	Hackberry	Hickory
Beech	Birch	White ash
Oak	Rock elm	

§ 178.169-10 Width of pieces. (a) At least 2½".

§ 178.169-11 Width of cleats. (a) Twice the prescribed thickness plus ¾".

§ 178.169-12 Thickness of lumber. (a) Nailed boxes not cleated (Style 1). Authorized gross weight not over 100 pounds, see Note 1. Sides as in Table 1; top and bottom as in Table 1A; ends as in Table 5.

(b) Glued-lock-corner boxes (Style 6): Authorized gross weight not over 150 pounds. Sides as in Table 3; top and bottom as in Table 1A; ends as in Table 3A. Or, sides as in Table 2; top and bottom as in Table 1A; ends as in Table 4.

(c) Single-cleated boxes (Style 4 or 5): Authorized gross weight not over 200 pounds, see Note 2. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 3A.

(d) Double-cleated boxes (Style 2, 2½, or 3): Authorized gross weight not over 500 pounds, see Note 3. Sides as in Table 1; top and bottom as in Table 1A; end and cleats as in Table 2A. Or, sides as in Table 1; top and bottom as in Table 1A; cleats as in Table 3B; ends not thinner than thickest side or top.

Note 1: When group II woods are used the gross weight may be increased to 110 pounds.

Note 2: When group II woods are used the gross weight may be increased to 220 pounds.

Note 3: When group II woods are used the gross weight may be increased to 550 pounds.

(e) Tables are as follows (dimensions of materials finished or resawed).

TABLE 1

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 1A

Width of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 2

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	11/32	11/32	11/32	11/32	11/32	11/32
35	3/8	11/32	11/32	11/32	11/32	11/32
45	7/16	3/8	3/8	11/32	11/32	11/32
55	1/2	7/16	3/8	3/8	11/32	11/32
65	1/2	1/2	7/16	3/8	3/8	11/32
75	9/16	1/2	1/2	7/16	3/8	3/8
85	9/16	9/16	1/2	7/16	7/16	3/8
100	5/8	9/16	9/16	1/2	7/16	7/16
125	11/16	5/8	5/8	9/16	1/2	7/16
150	3/4	11/16	11/16	5/8	9/16	1/2
175	13/16	3/4	11/16	11/16	5/8	9/16
200	7/8	13/16	3/4	3/4	11/16	5/8
250	1	15/16	7/8	13/16	3/4	5/8
300	1 1/16	1	15/16	7/8	25/32	11/16
350	1 1/8	1 1/16	1	15/16	7/8	3/4
400	1 3/16	1 1/8	1 1/16	1	15/16	13/16
500	.....	.....	1 1/8	1 1/16	1	7/8

TABLE 2A

Smallest Dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	7/16	7/16	7/16	7/16	7/16	7/16
55	1/2	7/16	7/16	7/16	7/16	7/16
65	1/2	1/2	7/16	7/16	7/16	7/16
75	9/16	1/2	1/2	7/16	7/16	7/16
85	9/16	9/16	1/2	7/16	7/16	7/16
100	5/8	9/16	9/16	1/2	7/16	7/16
125	11/16	5/8	5/8	9/16	1/2	7/16
150	3/4	11/16	11/16	5/8	9/16	1/2
175	13/16	3/4	11/16	11/16	5/8	9/16
200	7/8	13/16	3/4	3/4	11/16	5/8
250	1	15/16	7/8	13/16	3/4	5/8
300	1 1/16	1	15/16	7/8	25/32	11/16
350	1 1/8	1 1/16	1	15/16	7/8	3/4
400	1 3/16	1 1/8	1 1/16	1	15/16	13/16
500	.....	.....	1 1/8	1 1/16	1	7/8

For explanation of abbreviations and reference marks, see last page of this tariff.

TABLE 3

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	3/8	11/32	11/32	11/32	11/32	11/32
35	7/16	7/16	3/8	11/32	11/32	11/32
45	1/2	1/2	7/16	7/16	3/8	11/32
55	9/16	1/2	1/2	7/16	7/16	3/8
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 5/16	1 3/16	1 1/8	1 1/16	1	15/16
350	.....	1 5/16	1 1/8	1 1/8	1 1/8	1
400	.....	.....	.....	1 1/8	1 1/8	1 1/8
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 3A

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	1/2	1/2	7/16	7/16	7/16	7/16
55	9/16	1/2	1/2	7/16	7/16	7/16
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 5/16	1 3/16	1 1/8	1 1/16	1	15/16
350	.....	1 5/16	1 1/8	1 1/8	1 1/8	1
400	.....	.....	.....	1 1/8	1 1/8	1 1/8
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 3B

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	7/16	7/16	7/16	7/16	7/16	7/16
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	1/2	1/2	7/16	7/16	7/16	7/16
55	9/16	1/2	1/2	7/16	7/16	7/16
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 5/16	1 3/16	1 1/8	1 1/16	1	15/16
350	.....	1 5/16	1 1/8	1 1/8	1 1/8	1
400	.....	.....	.....	1 1/8	1 1/8	1 1/8
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 4

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	7/16	7/16	7/16	7/16	7/16	7/16
25	7/16	7/16	7/16	7/16	7/16	7/16
35	1/2	1/2	7/16	7/16	7/16	7/16
45	9/16	9/16	1/2	1/2	7/16	7/16
55	5/8	9/16	9/16	1/2	1/2	7/16
65	11/16	5/8	5/8	9/16	1/2	1/2
75	3/4	11/16	5/8	5/8	9/16	1/2
85	25/32	3/4	11/16	5/8	5/8	9/16
100	7/8	13/16	3/4	11/16	5/8	5/8
125	15/16	7/8	13/16	3/4	11/16	5/8
150	1	15/16	15/16	7/8	13/16	11/16

TABLE 5

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	1/2	1/2	1/2	1/2	1/2	1/2
25	1/2	1/2	1/2	1/2	1/2	1/2
35	5/8	9/16	1/2	1/2	1/2	1/2
45	11/16	5/8	9/16	9/16	1/2	1/2
55	3/4	11/16	5/8	5/8	9/16	1/2
65	13/16	3/4	11/16	5/8	5/8	9/16
75	7/8	13/16	3/4	11/16	5/8	9/16
85	15/16	7/8	13/16	3/4	11/16	5/8
100	1	15/16	7/8	13/16	3/4	11/16

§ 178.169-13 Reduced thicknesses. (a) Reduction in thicknesses is authorized as in paragraphs (a) to (d) of this section except that reduced thicknesses must be not less than:

(1) Sides, top, and bottom: Minimum 5/16" for boxes up to 35 pounds authorized gross weight and 3/8" above that weight.

(2) Ends or cleats: Minimum 7/16".

(b) Sides of one-piece or equivalent: 12½ percent.

(c) Any part or cleat of Group 3 or 4 wood: 20 percent.

(d) Sides, top, and bottom when to be strapped as per §178.169-19(b): 20 percent for 1 strap; 35 percent for 2 straps.

CONVERSION TABLE

Specified thickness (inches)	Reduced thickness corresponding to percent reduction		
	12½	20	35
5/32	1/8	1/8	1/8
5/16	5/32	1/8	1/8
11/32	5/16	5/32	1/8
3/8	5/16	5/16	1/8
7/16	3/8	11/32	5/32
1/2	7/16	3/8	5/16
9/16	1/2	7/16	3/8
5/8	9/16	1/2	7/16
11/16	5/8	9/16	7/16
3/4	5/8	5/8	1/2
25/32	11/16	5/8	1/2
13/16	11/16	5/8	1/2
7/8	3/4	11/16	9/16
15/16	13/16	3/4	5/8
1	7/8	13/16	5/8
1 1/16	15/16	7/8	11/16
1 1/8	1	7/8	3/4
1 3/16	1 1/16	15/16	25/32
1 1/4	1 1/8	1	13/16
1 5/16	1 1/8	1 1/16	7/8

§ 178.169-14 Assembly. (a) By nailing; screws, hinges and hasp, or other device of equal efficiency are authorized; nails should be driven flush.

§ 178.169-15 Nails and nailing. (a) Cement coated nails of size and with spacing detailed in §§178.169-16 and 178.169-17.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to be staggered and clinch 1/4"; uncoated nails authorized.

(d) Nailing tops and bottoms to sides permitted but not required.

§ 178.169–16 Nails; kind and dimensions. (a) Cement[1] coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size[2] in "penny" as follows:

Species of wood holding points of nails	Thickness of material holding points of nails (inches)										
	½ or less	9/16	⅝	11/16	¾	13/16	⅞	15/16	1	1⅛	1¼ or more
Group 1	4	5	5	6	7	7	8	8	8	9	10
Group 2	4	4	5	5	6	6	7	7	7	8	9
Group 3	3	4	4	5	5	6	6	7	7	7	8
Group 4	3	3	4	4	4	5	5	6	6	7	7

§ 178.169–17 Nail spacing[3]. (a) Nail spacing as follows:

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grain
	Inches	Inches
Threepenny	1½	1
Fourpenny	1½	1½
Fivepenny	1¾	1½
Sixpenny	2	1¾
Sevenpenny	2¼	2
Eightpenny	2½	2¼
Ninepenny	2¾	2½
Tenpenny	3	2½

§ 178.169–18 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT–15B***

(1) The stars must be replaced by authorized gross weight (for example, DOT–15B125, etc.).

(b) The words "ONE STRAP", or "TWO STRAPS", etc., when straps are required (see § 178.169–13(d)); this to be placed above or below the rectangle.

(c) Marks may also be applied as follows:

DOT–15B

NO STRAP XXX LBS.
ONE STRAP XXX LBS.
TWO STRAPS XXX LBS.

(d) Each box must also be marked with the name or symbol of person making the other marks specified in this section. Symbol, if used, must be registered with the Director, OHMT.

(1) The "Xs" must be replaced by authorized gross weights as authorized for the strapping conditions.

§ 178.169–19 Closing for shipment. (a) Box to be securely closed. Nails, if used, to be as prescribed in §§ 178.169–16 and 178.169–17.

(b) Metal straps, as specified by marks on box, must encircle sides, top, and bottom as follows:

(1) One nailless strap: At center of box.

(2) Two or more nailless straps: Outer two about ⅛ of box length from ends and other equally spaced between.

(3) Nailed straps: At ends of sides, top, and bottom; use same size nails as for closing and space not over twice as far apart.

(4) Size of flat straps must be as follows:

Authorized gross weight (pounds)	Cross-section size when number of straps is—		
	1	2	3
	Inch	Inch	Inch
50	½ × 0.020	⅜ × 0.015	
100	⅝ × 0.020	½ × 0.018	
200	¾ × 0.023	⅝ × 0.020	½ × 0.018
300		¾ × 0.023	½ × 0.020
400		¾ × 0.020	½ × 0.023
500		¾ × 0.023	⅝ × 0.023

(5) Wires, Washburn and Moen gauge, authorized as follows:

Authorized gross weight (pounds)	Cross section size when number of straps is—		
	1	2	3
50	12	14	
100	11	12	
200	9	11	12
300		10	11
400		10	11
500		9	10

[1] Uncoated nails authorized when increased 25 percent in number.

[2] Nails 1-penny smaller authorized when spaced as for 2-penny smaller. Nails 2-penny smaller authorized, but not less than 3-penny, when thickness of material nailed through does not exceed ½ of thickness of material holding points of nails.

[3] To determine number of nails, divide length of nailing edge by spacing. Fractions greater than ½ are considered as whole numbers.

§ 178.170 Specification 15C; wooden boxes nailed.

§ 178.170–1 Compliance. (a) Required in all details.

§ 178.170–2 Closed[4] box. (a) Parts and pieces to be in close contact.

§ 178.170–3 Ends. (a) One-piece, or equivalent (see § 178.170–4); or cleated as prescribed.

§ 178.170–4 One-piece equivalents. (a) Parts are considered equivalent to one-piece as follows:

(1) Parts Linderman-joint glued.

(2) Parts at least ½" thick, tongued and grooved and glued, with 2 or more corrugated fasteners on each joint.

(3) Parts at least ½" thick fastened with 3 or more corrugated fasteners on each joint.

(4) Parts butt-joint glued, provided the joined surfaces are planed before gluing, so as to assure full contact. After immersion in water for 24 hours at 70° F. the part must not fail at the joint when it is broken.

(b) Corrugated fasteners (as prescribed for one-piece equivalents): 1" wide; penetration ⅝ thickness of part; within 3" of end of joint and not over 8" apart; for 3 or more, drive alternately into opposite sides of part.

§ 178.170–5 Gluing efficiency. (a) Shall be determined for boxes for gross weight of 150 pounds or less. When filled with sand and sawdust to marked gross weight, the boxes must be able to withstand 8 drops of 12", one on each corner, onto solid concrete without exposure of contents.

§ 178.170–6 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ⅓ its length.

§ 178.170–7 Nails. (a) Cement coated, unless otherwise authorized herein, of size specified for "sinkers" and "coolers" as generally known to the trade.

§ 178.170–8 Grouping of principal woods. (a) Grouping as follows:

Group 1

White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (popple)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine

Group 2

Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	

Group 3

White Elm	Pumpkin ash	Tupelo
Red gum	Black gum	Maple—soft or silver
Sycamore	Black ash	

Group 4

Hard maple	Hackberry	Hickory
Beech	Birch	White ash
Oak	Rock elm	

[4] Openings for filling device of inside container authorized if device is properly protected.

§ 178.170-9 Width of pieces. (a) At least 2½".

§ 178.170-10 Width of cleats. (a) Twice the prescribed thickness plus ¾".

§ 178.170-11 Thickness of lumber. (a) Nailed boxes not cleated (Style 1): Authorized gross weight not over 100 pounds, see Note 1. Sides as in Table 1; top and bottom as in Table 1A; ends as in Table 5.

(b) Glued-lock-corner boxes (Style 6): Authorized gross weight not over 150 pounds. Sides as in Table 3; top and bottom as in Table 1A; ends as in Table 3A. Or, sides as in Table 2; top and bottom as in Table 1A; ends as in Table 4.

(c) Single-cleated boxes (Style 4 or 5): Authorized gross weight not over 200 pounds, see Note 2. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 3A.

(d) Double-cleated boxes (Style 2, 2½, or 3): Authorized gross weight not over 500 pounds, see Note 3. Sides as in Table 1; top and bottom as in Table 1A; end and cleats as in Table 2A. Or, sides as in Table 1; top and bottom as in Table 1A; cleats as in Table 3B; ends not thinner than thickest side or top.

Note 1: When group II woods are used the gross weight may be increased to 110 pounds.

Note 2: When group II woods are used the gross weight may be increased to 220 pounds.

Note 3. When group II woods are used the gross weight may be increased to 550 pounds.

(e) Tables are as follows (dimensions of materials finished or resawed):

TABLE 1

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	½	½	½	½	½	½
25	½	½	½	½	½	½
35	9/16	9/32	9/32	½	½	½
45	11/32	9/16	9/16	9/32	½	½
55	3/8	11/32	11/32	9/16	9/32	½
65	3/8	3/8	11/32	9/16	9/16	9/32
75	7/16	3/8	3/8	11/32	11/32	9/32
85	7/16	7/16	3/8	3/8	11/32	9/16
100	½	7/16	7/16	3/8	3/8	11/32
125	9/16	½	½	7/16	3/8	3/8
150	5/8	9/16	9/16	½	7/16	3/8
175	5/8	5/8	9/16	½	½	7/16
200	11/16	5/8	5/8	9/16	½	7/16
250	25/32	¾	11/16	5/8	9/16	½
300	13/16	13/16	¾	11/16	5/8	9/16
350	15/16	⅞	13/16	¾	11/16	5/8
400	1	15/16	⅞	13/16	¾	11/16
500	1 1/16	1 1/16	1	15/16	⅞	¾

TABLE 1A

Width of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	½	½	½	½	½	½
25	½	½	½	½	½	½
35	9/16	9/32	9/32	½	½	½
45	11/32	9/16	9/16	9/32	½	½
55	3/8	11/32	11/32	9/16	9/32	½
65	3/8	3/8	11/32	9/16	9/16	9/32
75	7/16	3/8	3/8	11/32	11/32	9/32
85	7/16	7/16	3/8	3/8	11/32	9/16
100	½	7/16	7/16	3/8	3/8	11/32
125	9/16	½	½	7/16	3/8	3/8
150	5/8	9/16	9/16	½	7/16	3/8
175	5/8	5/8	9/16	½	½	7/16
200	11/16	5/8	5/8	9/16	½	7/16
250	25/32	¾	11/16	5/8	9/16	½
300	13/16	13/16	¾	11/16	5/8	9/16
350	15/16	⅞	13/16	¾	11/16	5/8
400	1	15/16	⅞	13/16	¾	11/16
500	1 1/16	1 1/16	1	15/16	⅞	¾

TABLE 2

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	9/16	9/32	½	½
25	11/32	11/32	9/16	9/32	½	½
35	3/8	11/32	9/16	9/16	9/32	½
45	7/16	3/8	3/8	11/32	9/16	9/32
55	½	7/16	7/16	3/8	11/32	9/16
65	½	½	½	3/8	3/8	11/32
75	9/16	½	½	7/16	3/8	3/8
85	9/16	9/16	9/16	7/16	7/16	3/8
100	5/8	9/16	9/16	½	7/16	7/16
125	11/16	5/8	½	9/16	½	½
150	¾	11/16	11/16	5/8	9/16	½
175	13/16	¾	¾	11/16	5/8	9/16
200	⅞	13/16	⅞	¾	11/16	5/8
250	1	15/16	⅞	13/16	¾	11/16
300	1 1/16	1	15/16	⅞	13/16	¾
350	1 1/8	1 1/16	1	15/16	⅞	13/16
400	1 3/16	1 1/8	1 1/16	1	15/16	⅞
500	.....	.....	1 1/8	1 1/16	1	⅞

TABLE 2A

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	3/8	3/8	3/8	3/8	3/8	3/8
35	3/8	3/8	3/8	3/8	3/8	3/8
45	3/8	3/8	3/8	3/8	3/8	3/8
55	½	3/8	3/8	3/8	3/8	3/8
65	½	½	3/8	3/8	3/8	3/8
75	9/16	½	½	3/8	3/8	3/8
85	9/16	9/16	½	3/8	3/8	3/8
100	5/8	9/16	9/16	½	3/8	3/8
125	11/16	5/8	5/8	9/16	½	3/8
150	¾	11/16	11/16	5/8	9/16	½
175	13/16	¾	11/16	11/16	5/8	9/16
200	⅞	13/16	¾	¾	11/16	5/8
250	1	15/16	⅞	13/16	¾	11/16
300	1 1/16	1	15/16	⅞	13/16	¾
350	1 1/8	1 1/16	1	15/16	⅞	13/16
400	1 3/16	1 1/8	1 1/16	1	15/16	⅞
500	.....	.....	1 1/8	1 1/16	1	⅞

TABLE 3

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	9/32	9/32	½	½	½	½
25	3/8	11/32	11/32	9/16	9/32	½
35	7/16	7/16	3/8	11/32	11/32	9/32
45	½	½	7/16	7/16	3/8	11/32
55	9/16	½	½	3/8	7/16	3/8
65	9/16	9/16	9/16	½	3/8	7/16
75	5/8	5/8	9/16	½	½	½
85	11/16	11/16	5/8	9/16	½	½
100	¾	11/16	11/16	5/8	9/16	½
125	13/16	¾	¾	11/16	5/8	9/16
150	15/16	⅞	13/16	¾	11/16	5/8
175	1	15/16	⅞	13/16	¾	11/16
200	1 1/16	1	15/16	⅞	25/32	11/16
250	1 1/8	1 1/16	1	15/16	⅞	25/32
300	1 3/16	1 3/16	1 1/8	1 1/16	15/16	⅞
350	.....	1 3/16	1 1/8	1 1/8	1	15/16
400	.....	.....	.....	1 1/8	1 1/8	1
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 3A

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	3/16	3/16	3/16	3/16
55	9/16	1/4	1/4	3/16	3/16	3/16
65	9/16	9/16	9/16	1/4	3/16	3/16
75	5/16	5/16	9/16	1/4	1/4	3/16
85	11/16	11/16	5/16	9/16	1/4	1/4
100	3/4	11/16	11/16	5/16	9/16	1/4
125	13/16	3/4	3/4	11/16	5/16	9/16
150	15/16	7/8	13/16	3/4	11/16	5/16
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 5/16	1 3/16	1 1/8	1 1/16	15/16	7/8
350	.....	1 5/16	1 1/8	1 1/8	1	15/16
400	.....	.....	.....	1 1/8	1 1/8	1
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 3B

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	3/16	3/16	3/16	3/16
55	9/16	1/4	1/4	3/16	3/16	3/16
65	9/16	9/16	9/16	1/4	3/16	3/16
75	5/16	5/16	9/16	1/4	1/4	3/16
85	11/16	11/16	5/16	9/16	1/4	1/4
100	3/4	11/16	11/16	5/16	9/16	1/4
125	13/16	3/4	3/4	11/16	5/16	9/16
150	15/16	7/8	13/16	3/4	11/16	5/16
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	[7E]	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 5/16	1 3/16	1 1/8	1 1/16	15/16	7/8
350	.....	1 5/16	1 1/8	1 1/8	1	15/16
400	.....	.....	.....	1 1/8	1 1/8	1
500	.....	.....	.....	.....	1 1/8	1 1/8

TABLE 4

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	7/16	3/16	3/16	3/16	3/16	3/16
35	1/4	1/4	3/16	3/16	3/16	3/16
45	9/16	9/16	1/4	1/4	3/16	3/16
55	5/16	9/16	9/16	1/4	1/4	3/16
65	11/16	5/16	5/16	9/16	1/4	1/4
75	3/4	11/16	5/16	5/16	9/16	1/4
85	25/32	3/4	11/16	5/16	5/16	9/16
100	7/8	13/16	3/4	11/16	5/16	9/16
125	15/16	7/8	13/16	3/4	11/16	5/16
150	1	15/16	15/16	7/8	13/16	11/16

TABLE 5

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	1/2	1/2	1/2	1/2	1/2	1/2
25	1/2	1/2	1/2	1/2	1/2	1/2
35	5/8	5/8	1/2	1/2	1/2	1/2
45	11/16	5/8	5/8	5/8	1/2	1/2
55	3/4	11/16	5/8	5/8	5/8	1/2
65	13/16	3/4	11/16	5/8	5/8	5/8
75	7/8	13/16	3/4	11/16	5/8	5/8
85	15/16	7/8	13/16	3/4	11/16	5/8
100	1	15/16	7/8	13/16	3/4	11/16

§ 178.170-12 Reduced thicknesses. (a) Reduction in thickness is authorized as in paragraphs (a) to (d) of this section except that reduced thicknesses must be not less than:

(1) Sides, top, and bottom: Minimum ¼" for boxes up to 150 pounds authorized gross weight and ⅜" above that weight.

(2) Ends of cleats: Minimum 7/16".

(b) Sides of one-piece or equivalent: 12½ percent.

(c) Any part or cleat of Group 3 or 4 wood: 20 percent.

(d) Sides, top, and bottom when to be strapped as per §178.170-18(b): 20 percent for 1 strap; 35 percent for 2 straps.

CONVERSION TABLE

Specified thickness (inches)	Reduced thickness corresponding to percent reduction		
	12½	20	35
9/32	1/4	1/4	1/4
5/16	9/32	1/4	1/4
11/32	5/16	9/32	1/4
3/8	5/16	5/16	1/4
7/16	3/8	11/32	9/32
1/2	7/16	3/8	5/16
9/16	1/2	7/16	3/8
5/8	9/16	1/2	7/16
11/16	5/8	9/16	7/16
3/4	5/8	5/8	1/2
25/32	11/16	5/8	1/2
13/16	11/16	5/8	1/2
7/8	3/4	11/16	9/16
15/16	13/16	3/4	5/8
1	7/8	13/16	5/8
1 1/16	15/16	7/8	11/16
1 1/8	1	7/8	3/4
1 3/16	1 1/16	15/16	25/32
1 1/4	1 1/8	1	13/16
1 5/16	1 1/8	1 1/16	7/8

§ 178.170-13 Assembly. (a) By nailing; screws, hinges and hasp, or other device of equal efficiency are authorized; nails should be driven flush.

§ 178.170-14 Nails and nailing. (a) Cement coated nails of size and with spacing detailed in §§178.170-15 and 178.170-16.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to be staggered and clinch ⅛"; uncoated nails authorized.

(d) Nailing tops and bottoms to sides permitted but not required.

§ 178.170-15 Nails; kind and dimensions. (a) Cement[1] coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size[2] in "penny" as follows:

Species of wood holding points of nails	Thickness of material holding points of nails (inches)										
	¾ or less	7/8	1/2	9/16	5/8	11/16	3/4	25/32	13/16	7/8	15/16 or more
Group 1	4	5	5	6	7	7	8	8	8	9	10
Group 2	4	4	5	5	6	6	7	7	7	8	9
Group 3	3	4	4	5	5	6	6	7	7	7	8
Group 4	3	3	4	4	4	5	5	6	6	7	7

[1] Uncoated nails authorized when increased 25 percent in number.

[2] Nails 1 penny smaller authorized when spaced as for 2-penny smaller. Nails 2 penny smaller authorized, but not less than 3-penny, when thickness of material nailed through does not exceed ½ of thickness of material holding points of nails.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 178.170-16 Nail spacing[3]. (a) Nail spacing as follows:

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grains
	Inches	Inches
Threepenny	1½	1
Fourpenny	1½	1½
Fivepenny	1¾	1½
Sixpenny	2	1¾
Sevenpenny	2½	2
Eightpenny	2½	2½
Ninepenny	2¾	2½
Tenpenny	3	2½

§ 178.170-17 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-15C***

(1) The stars must be replaced by authorized gross weight (for example, DOT-15C100, etc.).

(b) The words "ONE STRAP", or "TWO STRAPS", etc., when straps are required (see §178.170-12(d)); this to be placed above or below the rectangle.

(c) Marks may also be applied as follows:

DOT-15C

NO STRAP XXX LBS.
ONE STRAP XXX LBS.
TWO STRAPS XXX LBS.

(d) Each box must also be marked with the name or symbol of person making the other marks specified in this section. Symbol, if used, must be registered with the Director, OHMT.

(1) The "Xs" must be replaced by authorized gross weights as authorized for the strapping conditions.

§ 178.170-18 Closing for shipment. (a) Box to be securely closed. Nails, if used, to be as prescribed in §§178.170-15 and 178.170-16.

(b) Metal straps, as specified by marks on box, must encircle sides, top, and bottom as follows:

(1) One nailless strap: At center of box.

(2) Two or more nailless straps: Outer two about ¼ of box length from ends and other equally spaced between.

(3) Nailed straps: At ends of sides, top, and bottom; use same size nails as for closing and space not over twice as far apart.

(4) Size of flat straps must be as follows:

Authorized gross weight (pounds)	Cross-section size when number of straps is—		
	1	2	3
	Inch	Inch	Inch
50	½ x 0.020	⅜ x 0.015	.....
100	⅝ x 0.020	½ x 0.018	.....
200	¾ x 0.023	⅝ x 0.020	½ x 0.018
300	.....	⅝ x 0.023	½ x 0.020
400	.....	¾ x 0.020	½ x 0.023
500	.....	¾ x 0.023	⅝ x 0.023

(5) Wires, Washburn and Moen gauge, authorized as follows:

Authorized gross weight (pounds)	Gauge of wires when number of straps is—		
	1	2	3
50	12	14	.....
100	11	12	.....
200	9	11	12
300	.....	10	11
400	.....	10	11
500	.....	9	10

§ 178.171 Specification 15D; wooden boxes, nailed.

§ 178.171-1 Compliance. (a) Required in all details.

[3] To determine number of nails, divide length of nailing edge by spacing. Fractions greater than ½ are considered as whole numbers.

§ 178.171-2 Spaces between boards. (a) Space 4" wide authorized except that bottom pieces must be in close contact with each other and with sides and ends.

§ 178.171-3 Ends. (a) One-piece, or equivalent (see §178.171-5); or cleated as prescribed.

§ 178.171-4 Handles. (a) Containers may be provided with suitable handles at discretion of shipper. Handles must be of dimensions specified herein, consisting of horizontal strips or cleats extending across top of each side or each end; handles which do not project 3 inches beyond the vertical edges of the container must be mounted to leave at least ⅛ inch open space between handle and box, or be at least ¾ inch thick, or be of cross section at least equal to cleats required for single-cleated boxes of corresponding size and gross weight. Extension of cleats or side boards is acceptable for projecting handles.

Authorized gross weight, maximum (pounds)	Handles, minimum cross section (inches)
100	½ x 1¾
150	½ x 2¼
200	⅝ x 2½
300	⅝ x 3½
400	13/16 x 3½

§ 178.171-5 One-piece equivalents. (a) Parts are considered equivalent to one-piece as follows:

(1) Parts Linderman-joint glued.

(2) Parts at least ½" thick, tongued and grooved and glued, with 2 or more corrugated fasteners on each joint.

(3) Parts at least ½" thick fastened with 3 or more corrugated fasteners on each joint.

(4) Parts butt-joint glued, provided the joined surfaces are planed before gluing, so as to assure full contact. After immersion in water for 24 hours at 70° F. the part must not fail at the joint when it is broken.

(b) Corrugated fasteners (as prescribed for one-piece equivalents), 1" wide; penetration ⅝ thickness of part; within 3" of end of joint and not over 8" apart; for 3 or more, drive alternately into opposite sides of part.

§ 178.171-6 Gluing efficiency. (a) Shall be determined for boxes for gross weight of 150 pounds or less. When filled with sand and sawdust to marked gross weight, the boxes must be able to withstand 8 drops of 12", one on each corner, onto solid concrete without exposure of contents.

§ 178.171-7 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ½ its length.

§ 178.171-8 Nails. (a) Cement coated, unless otherwise authorized herein, of size specified for "sinkers" and "coolers" as generally known to the trade.

§ 178.171-9 Grouping of principal woods. (a) Grouping as follows:

Group 1		
White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (popple)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine
Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black gum	Maple—soft or silver
Sycamore	Black ash	
Group 4		
Hard maple	Hackberry	Hickory
Beech	Birch	White ash
Oak	Rock elm	

§ 178.171-10 Width of pieces. (a) At least 2½".

§ 178.171-11 Width of cleats. (a) Twice the prescribed thickness plus ¾".

§ 178.171-12 Thickness of lumber. (a) Nailed boxes not cleated (Style 1): Authorized gross weight not over 100 pounds, see Note 1. Sides as in Table 1; top and bottom as in Table 1A; ends as in Table 5.

(b) Glued-lock-corner boxes (Style 6): Authorized gross weight not over 150 pounds. Sides as in Table 3; top and bottom as in Table 1A;

ends as in Table 3A. Or, sides as in Table 2; top and bottom as in Table 1A; ends as in Table 4.

(c) Single-cleated boxes (Style 4 or 5): Authorized gross weight not over 200 pounds for boxes with vertical cleats nor over 400 pounds for boxes with horizontal cleats. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 3A.

(d) Double-cleated boxes (Style 2, 2½, or 3): Authorized gross weight not over 500 pounds. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 2A. Or, sides as in Table 1; top and bottom as in Table 1A, cleats as in Table 3B; ends not thinner than thinnest side or top.

Exception: For containers consisting of an inner wooden crate of at least ½" thickness throughout, with or without top, and an outside double cleated box without the openings permitted by § 178.171-2, the thickness of all parts of the outside box may be reduced to not less than ¾".

(e) Tables are as follows (dimensions of materials finished or resawed).

TABLE 1

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 1A

Width of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 2

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	11/32	11/32	11/32	11/32	11/32	11/32
35	3/8	11/32	11/32	11/32	11/32	11/32
45	7/16	3/8	3/8	11/32	11/32	11/32
55	1/2	7/16	3/8	3/8	11/32	11/32
65	1/2	1/2	7/16	3/8	3/8	11/32
75	9/16	1/2	1/2	7/16	3/8	3/8
85	9/16	9/16	1/2	7/16	7/16	3/8
100	5/8	9/16	9/16	1/2	7/16	7/16
125	11/16	5/8	5/8	9/16	1/2	7/16
150	3/4	11/16	11/16	5/8	9/16	1/2
175	13/16	3/4	11/16	11/16	5/8	9/16
200	7/8	13/16	3/4	3/4	11/16	5/8
250	1	15/16	7/8	13/16	3/4	5/8
300	1 1/16	1	15/16	7/8	25/32	11/16
350	1 1/8	1 1/16	1	15/16	7/8	3/4
400	1 3/16	1 1/8	1 1/16	1	15/16	13/16
500	.....	.....	1 1/8	1 1/16	1	7/8

TABLE 2A

Smallest Dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	7/16	7/16	7/16	7/16	7/16	7/16
55	1/2	7/16	7/16	7/16	7/16	7/16
65	1/2	1/2	7/16	7/16	7/16	7/16
75	9/16	1/2	1/2	7/16	7/16	7/16
85	9/16	9/16	1/2	7/16	7/16	7/16
100	5/8	9/16	9/16	1/2	7/16	7/16
125	11/16	5/8	5/8	9/16	1/2	7/16
150	3/4	11/16	11/16	5/8	9/16	1/2
175	13/16	3/4	11/16	11/16	5/8	9/16
200	7/8	13/16	3/4	3/4	11/16	5/8
250	1	15/16	7/8	13/16	3/4	5/8
300	1 1/16	1	15/16	7/8	25/32	11/16
350	1 1/8	1 1/16	1	15/16	7/8	3/4
400	1 3/16	1 1/8	1 1/16	1	15/16	13/16
500	.....	.....	1 1/8	1 1/16	1	7/8

TABLE 3

Depth of box (inches)	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	5/16	5/16	5/16	5/16	5/16	5/16
25	3/8	11/32	11/32	11/32	11/32	11/32
35	7/16	7/16	3/8	11/32	11/32	11/32
45	1/2	1/2	7/16	7/16	3/8	11/32
55	9/16	1/2	1/2	7/16	7/16	3/8
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	25/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	25/32
300	1 3/16	1 1/16	1 1/8	1 1/16	15/16	7/8
350	.....	1 3/16	1 1/8	1 1/8	1	15/16
400	.....	.....	.....	1 1/8	1 1/8	1
500	.....	.....	.....	.....	1 1/8	1 1/8

For explanation of abbreviations and reference marks, see last page of this tariff.

TABLE 3A

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	11/32	11/32	11/32	11/32	11/32	11/32
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	3/16	3/16	3/16	3/16
55	5/16	1/4	1/4	3/16	3/16	3/16
65	5/16	5/16	5/16	1/4	3/16	3/16
75	5/16	5/16	5/16	1/4	1/4	3/16
85	11/32	11/32	5/16	5/16	1/4	1/4
100	3/8	11/32	11/32	5/16	5/16	1/4
125	13/32	3/8	3/8	11/32	5/16	5/16
150	15/32	7/16	13/32	3/8	11/32	5/16
175	1	15/32	7/16	13/32	3/8	11/32
200	11/32	1	15/32	7/16	25/32	11/32
250	11/16	11/32	1	15/32	7/16	25/32
300	15/32	13/32	11/16	11/32	25/32	7/16
350	.....	15/32	11/16	11/16	1	15/32
400	.....	.....	.....	11/16	11/16	1
500	.....	.....	.....	.....	11/16	11/16

TABLE 3B

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	3/16	3/16	3/16	3/16	3/16	3/16
45	1/4	1/4	3/16	3/16	3/16	3/16
55	5/16	1/4	1/4	3/16	3/16	3/16
65	5/16	5/16	5/16	1/4	3/16	3/16
75	5/16	5/16	5/16	1/4	1/4	3/16
85	11/32	11/32	5/16	5/16	1/4	1/4
100	3/8	11/32	11/32	5/16	5/16	1/4
125	13/32	3/8	3/8	11/32	5/16	5/16
150	15/32	7/16	13/32	3/8	11/32	5/16
175	1	15/32	7/16	13/32	3/8	11/32
200	11/32	1	15/32	7/16	25/32	11/32
250	11/16	11/32	1	15/32	7/16	25/32
300	15/32	13/32	11/16	11/32	25/32	7/16
350	.....	15/32	11/16	11/16	1	15/32
400	.....	.....	.....	11/16	11/16	1
500	.....	.....	.....	.....	11/16	11/16

TABLE 4

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	3/16	3/16	3/16	3/16	3/16	3/16
25	3/16	3/16	3/16	3/16	3/16	3/16
35	1/4	1/4	3/16	3/16	3/16	3/16
45	5/16	5/16	1/4	1/4	3/16	3/16
55	5/16	5/16	5/16	1/4	1/4	3/16
65	11/32	5/16	5/16	5/16	1/4	1/4
75	3/8	11/32	5/16	5/16	5/16	1/4
85	25/32	3/8	11/32	5/16	5/16	5/16
100	7/8	13/32	3/8	11/32	5/16	5/16
125	15/16	7/8	13/32	3/8	11/32	5/16
150	1	15/16	15/16	7/8	13/32	11/32

TABLE 5

Smallest dimension of end	Not over 8"	Not over 9"	Not over 10"	Not over 12"	Not over 14"	Over 14"
Authorized gross weight (pounds)	Minimum thickness of part					
	Inches	Inches	Inch	Inch	Inch	Inch
15	1/4	1/4	1/4	1/4	1/4	1/4
25	1/4	1/4	1/4	1/4	1/4	1/4
35	5/16	5/16	1/4	1/4	1/4	1/4
45	11/32	5/16	5/16	5/16	1/4	1/4
55	3/8	11/32	5/16	5/16	5/16	1/4
65	13/32	3/8	11/32	5/16	5/16	5/16
75	7/8	13/32	3/8	11/32	5/16	5/16
85	15/16	7/8	13/32	3/8	11/32	5/16
100	1	15/16	7/8	13/32	3/8	11/32

§ 178.171-13 Reduced thicknesses. (a) Reduction in thicknesses is authorized as in paragraphs (a) to (d) of this section except that reduced thicknesses must be not less than:

(1) Sides, top, and bottom: Minimum 3/16" for boxes up to 35 pounds authorized gross weight and 1/4" above that weight.

(2) Ends of cleats: Minimum 7/16".

(b) Sides of one-piece or equivalent: 12½ percent. In battery boxes reinforced with separate pieces in the form of extension-handles, not extension of side boards or cleats, having cross section at least equal to cleats required for single-cleated boxes of corresponding size and gross weight, 20 percent in sides or ends so reinforced.

(c) Any part of cleat of Group 3 or 4 wood: 20 percent.

(d) Sides, top, and bottom when to be strapped as per §178.171-18(b): 20 percent for 1 strap; 35 percent for 2 straps.

CONVERSION TABLE

Specified thickness (inches)	Reduced thickness corresponding to percent reduction		
	12½	20	35
9/32	1/4	1/4	1/4
5/16	9/32	1/4	1/4
11/32	5/16	9/32	1/4
3/8	5/16	5/16	1/4
7/16	3/8	11/32	9/32
1/2	7/16	3/8	5/16
9/16	1/2	7/16	3/8
5/8	9/16	1/2	7/16
11/16	5/8	9/16	7/16
3/4	5/8	5/8	1/2
25/32	11/16	5/8	1/2
13/16	11/16	5/8	1/2
7/8	3/4	11/16	9/16
15/16	13/16	3/4	5/8
1	7/8	13/16	5/8
1 1/16	15/16	7/8	11/16
1 1/8	1	7/8	3/4
1 3/16	1 1/16	15/16	25/32
1 1/4	1 1/8	1	13/16
1 5/16	1 1/16	1 1/16	7/8

§ 178.171-14 Nails and nailing. (a) Cement coated nails of size and with spacing detailed in §§ 178.171-15 and 178.171-16.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to be staggered and clinch 1/4"; uncoated nails authorized.

(d) Nailing tops and bottoms to sides permitted but not required.

§ 178.171-15 Nails; kind and dimensions. (a) Cement coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size in "penny" as follows:

Species of wood holding points of nails	Thickness of material holding points of nails (inches)										
	5/8 or less	11/16	3/4	13/16	7/8	15/16	1	25/32	13/16	7/8	15/16 or more
Group 1	4	5	5	6	7	7	8	8	8	9	10
Group 2	4	4	5	5	6	6	7	7	7	8	9
Group 3	3	4	4	5	5	6	6	7	7	7	8
Group 4	3	3	4	4	4	5	5	6	6	7	7

[1] Uncoated nails authorized when increased 25 percent in number.

[2] Nails 1-penny smaller authorized when spaced as for 2-penny smaller. Nails 2-penny smaller authorized, but not less than 3-penny when thickness of material nailed through does not exceed 1/4 of thickness of material holding points of nails.

§ 178.171-16 Nail spacing[3]. (a) Nail spacing as follows:

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grain
	Inches	Inches
Threepenny	1⅛	1
Fourpenny	1½	1⅛
Fivepenny	1¾	1½
Sixpenny	2	1¾
Sevenpenny	2⅛	2
Eightpenny	2½	2⅛
Ninepenny	2¾	2½
Tenpenny	3	2½

§ 178.171-17 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-15D'''

(1) The stars must be replaced by authorized gross weight (for example, DOT-15D125, etc.).

(b) The words "ONE STRAP", or "TWO STRAPS", etc., when straps are required (see § 178.171-13(d)); this to be placed above or below the rectangle.

(c) Marks may also be applied as follows:

DOT-15D

NO STRAP XXX LBS.
ONE STRAP XXX LBS.
TWO STRAPS XXX LBS.

(d) Each box must also be marked with the name or symbol of person making the other marks specified in this section. Symbol, if used, must be registered with the Director, OHMT.

(1) The "Xs" must be replaced by authorized gross weights as authorized for the strapping conditions.

§ 178.171-18 Closing for shipment. (a) Box to be securely closed. Nails, if used, to be as prescribed in §§ 178.171-15 and 178.171-16.

(b) Metal straps, as specified by marks on box, must encircle sides, top, and bottom as follows:

(1) One nailless strap: At center of box.

(2) Two or more nailless straps: Outer two about 1/6 of box length from ends and other equally spaced between.

(3) Nailed straps: At ends of sides, top, and bottom; use same size nails as for closing and space not over twice as far apart.

(4) Size of flat straps must be as follows:

Authorized gross weight (pounds)	Cross-section size when number of straps is—		
	1	2	3
	Inch	Inch	Inch
50	½ × 0.020	⅜ × 0.015	.....
100	⅝ × 0.020	½ × 0.018	.....
200	¾ × 0.023	⅝ × 0.020	½ × 0.018
300	.....	⅝ × 0.023	½ × 0.020
400	.....	¾ × 0.020	½ × 0.023
500	.....	¾ × 0.023	⅝ × 0.023

(5) Wires, Washburn and Moen gauge, authorized as follows:

Authorized gross weight (pounds)	Gauge of wires when number of straps is—		
	1	2	3
50	12	14	.....
100	11	12	.....
200	9	11	12
300	.....	10	11
400	.....	10	11
500	.....	9	10

§ 178.171-19 Boxes for shipment of wet electric storage batteries. (a) Boxes over 500 pounds gross weight are authorized for shipments of wet electric storage batteries when the batteries are contained in a rigid cradle or box, or are securely fastened together so as to form a single unit, and not more than one such cradle, box, or unit is packed in the outside container. Skids required: runners to be at least 2 inches by 4 inches commercial thickness, minimum of three, except that two runners are authorized when width of case does not exceed 24 inches; or two runners may be used, minimum of 4 inches by 4 inches commercial thickness, when case does not exceed 36 inches in width. Runners to be beveled at ends to facilitate use of rollers. Bottom boards, minimum of 1 inch commercial thickness to be nailed across runners; bracing of parts and thickness of lumber to be sufficient to protect contents in transit.

[3] To determine number of nails, divide length of nailing edge by spacing. Fractions greater than ½ are considered as whole numbers.

§ 178.172 Specification 15E; wooden boxes, fiberboard lined.

§ 178.172-1 Compliance. (a) Required in all details.

§ 178.172-2 Closed box. (a) Parts and pieces to be in close contact.

§ 178.172-3 Ends. (a) Butt-joint glued to fiberboard. Plywood not authorized.

§ 178.172-4 Sides, top and bottom. (a) Butt-joint or plywood glued to fiberboard.

§ 178.172-5 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ½ its length.

(b) Plywood, if used, shall be free of knots, decay, and other visible defects that interfere with the nailing. Plywood used must be of good commercial box or sheathing grade veneer.

§ 178.172-6 Grouping of principal woods. (a) Grouping as follows:

Group 1		
White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (popple)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine
Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black gum	Maple—soft or silver
Sycamore	Black ash	
Group 4		
Hard maple	Hackberry	Hickory
Beech	Birch	White ash
Oak	Rock elm	

§ 178.172-7 Width of pieces. (a) At least 2½".

§ 178.172-8 Thickness of wood parts. (a) Thickness as follows:

Authorized gross weight of box not over (pounds)	Style of box (see Notes 2 and 3)	Minimum thickness (see Note 1) of sides, top and bottom in inches		Minimum thickness of ends and cleats in inches		Minimum width of cleats in inches	Size of nails in ends (penny)	
		Group 1 and 2	Group 3 and 4	Group 1 and 2	Group 3 and 4		Group 1 and 2	Group 3 and 4
150	1 2, 2½ 3 or 4	3/16	1/8	1/2	1/2	1¾	4	4
250	2½, 3 or 4	7/32	3/16	5/8	9/16	1⅞	5	4
350	2½ or 3	1/4	7/32	3/4	11/16	2¼	6	5
450	2½ or 3	5/16	1/4	25/32	25/32	2¼	6	5
530	2½ or 3	3/8	5/16	13/16	13/16	2½	7	6

Note 1: Plywood or paper covered wood veneer board of equal thickness and efficiency is permitted. Paper covered veneer board shall be of good quality Douglas fir core of at least 3/16 inch thickness, or lumber of equal quality, and free of breaks, gaps, holes, or knots. Paper covering shall be at least Kraft untreated fiberboard having a basis weight of 42 pounds per 1,000 square feet and shall be secured to veneer core by adhesive in such manner as to form a satisfactorily laminated board.

Note 2: Thickness of ends in style 1 boxes shall be not less than 25/32" and load limit shall be not more than 100 pounds.

Note 3: Style 4 boxes shall have load limit of 200 pounds.

§ 178.172-9 Assembly. (a) By nails, screws, staples or other devices of equal efficiency. Nails, screws and staples must be driven flush.

§ 178.172-10 Nails and nailing. (a) Cement coated nails of size and with spacing detailed in §§178.172-8, 178.172-11 and 178.172-12.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to ends be staggered and clinch ⅛"; uncoated nails authorized.

§ 178.172-11 Nails; kind and dimensions. (a) Cement[1] coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size in penny as prescribed in § 178.172-8.

§ 178.172-12 Nail spacing[SS]2. (a) Nail spacing as follows:

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grain
	Inches	Inches
Fourpenny	1½	1¼
Fivepenny	1¾	1½
Sixpenny	2	1¾
Sevenpenny	2¼	2

§ 178.172-13 Classification of board. (a) Fiberboard is hereby classified by strength[3] of completed board as in first column of the following table; weights specified in the table are the minimum authorized:

Authorized gross weight of box not over (pounds)	Classified strength[3] of completed board	Solid fiberboard minimum combined weight of component plies exclusive of adhesives (pounds per 1,000 sq. ft.)	Facings for corrugated fiberboard double-faced minimum combined weight of facings (pounds per 1,000 sq. ft.)
150	200	130	84
250	275	237	138
350	325	237	138
450	350	283	180
550	375	283	180

§ 178.172-14 Solid fiberboard. (a) To be 3-ply or more; both outer plies water resistant.

§ 178.172-15 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weigh not less than 26 pounds per 1000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.172-16 Test. (a) Acceptable board must have prescribed strength, Mullen, or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.172-17 Assembly. (a) The sheet of fiberboard to which are glued the boards forming the sides, top and bottom box sections, shall be properly scored to form a tube. The joint shall be on a side, top or bottom, near the center of the face, and located under one of the wood boards of the face.

(1) A water resistant glue shall be used to attach the fiberboard to the wood. The glue shall be applied in ribbons (lines) at right angles to the scores of the tube. The ribbons of glue shall be not less than 1¼" wide and shall be spaced sufficiently close so that glue will cover not less than 25 percent of the surface of the fiberboard. The ribbons of glue shall be equally spaced on the length of the box with the outside ribbons flush with the ends of the tube. Glue shall be applied to the fiberboard on the ends of the box in like amount as on the tube.

(2) For styles 2, 2½, and 3, all faces of the tube shall extend over the end boards and cleats. For style 4, all faces shall extend over the end boards, but only the side sections shall extend over the cleats.

(3) The boards between score lines shall butt against each other when placed on the fiberboard, and the combined widths of the boards shall be approximately equal to the inside dimension of the respective box section so that the boards completely cover the fiberboard between the inside edges of adjacent scores.

(4) A sheet of fiberboard shall be attached to each end as provided in paragraph (a)(1) of this section and shall completely cover the inside of the end.

§ 178.172-18 Closing for shipment. (a) Box shall be securely closed. Nails, if used, shall be as prescribed in §§178.172-9, 178.172-10, 178.172-11, and 178.172-12.

§ 178.172-19 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-15E***

(1) The stars must be replaced by authorized gross weight (for example, DOT-15E100, etc.).

(b) Each box must also be marked with the name or symbol of person making the mark specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.176 Specification 15L; wooden boxes with inside containers for desensitized liquid explosives.

§ 178.176-1 Compliance. (a) Required in all details.

§ 178.176-2 Size and capacity. (a) Each outside wooden container shall contain not more than one inside metal container having a capacity not to exceed 10 quarts.

§ 178.176-3 Outside containers. (a) Wooden boxes cleated as prescribed. Parts must be in close contact and completely enclose inside containers. Lumber must be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with assembly, or other defects that materially lessen the strength.

(b) Assembly. Use brass screws throughout. Assemble sides and ends with grain of wood vertical. Fasten bottom securely with edges flush with sides and ends of box. Cleats must extend around entire perimeter of box. Apply top and bottom cleats horizontally. Bottom cleats must be flush with bottom surface of the box. Top cleats must extend above top of box to provide a ¾-inch recess for cover projections (see § 178.176-5). Cover must be flush with outside surface of top cleats and must be cleated on the outside at all edges. Cleats may be mitered but must butt at all corners.

(c) Parts and dimensions as follows:

Minimum dimensions in inches

Thickness, sides, top, bottom, and ends	Top cleats	Bottom cleats	Cover cleats
¾"	⅝" × 3½"	⅝" × 2¾"	¾" × 2"

§ 178.176-4 Inside containers. (a) Inside containers must be as follows:

(1) Metal containers. Double seamed, of copper weighing not less than 16 ounces per square foot, or other non-sparking material of equivalent strength. All seams must be closed by welding, brazing, or soldering so as to be tight against leakage. Handles must be fastened to top of container and be of copper weighing not less than 48 ounces per square foot, or other nonsparking material of equivalent strength. Each side of the container must be strengthened vertically by at least three equally spaced indented crimps. Each container must have two pouring spouts in the top securely closed by rubber stoppers.

(2) Rubber liners. Each inside metal container must be inserted in a two-piece rubber liner or boot, consisting of a cover and body, into which it must fit snugly and which in turn shall fit snugly the outside wooden container. This liner must be watertight and of such size as to fully protect the inside container. Sides of liner must be at least ⅛ inch in thickness and bottom at least ⅛ inch in thickness. Top edge of boot must be flanged to fit the recess provided by the top cleats on the outside wooden container and such flange must be at least ⅜ inch thick exclusive of any channels or indentations necessary to effect satisfactory closure because of projections on cover. Cover must be not less than ⅛ inch in thickness including projections for securing rubber stoppers in metal containers, and must have a formed molding around its entire perimeter to match and tightly fit channels or indentations in the body flange.

(b) Tests. Each inside metal and rubber container must be adequately tested and inspected during manufacture to insure against leakage.

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[1] Uncoated nails authorized when increased 25 percent in number.

[2] To determine number of nails, divide length of nailing edge by spacing; fractions greater than ½ are considered as whole numbers. Each piece of sides, top and bottom shall be nailed to the ends with at least two nails through each end of the piece.

[3] Mullen Cady test (minimum).

§ 178.176–5 Closure. (a) Top of rubber liner must be firmly fastened to wooden cover of outside container so as to fit securely into ¾ inch recess provided by top cleats on box. Top of liner must have projections on the inside which bear directly on rubber stoppers of metal containers to secure them in place. When closure is effected the liner must provide a positive seal against interior leakage. Cover of wooden outside container must be securely fastened to body of container by means of trunk clasps affixed to each face of the box. The trunk clasps must be recessed into cover and top cleats to furnish a smooth bearing surface on all faces of the box.

§ 178.176–6 Marking. (a) Marking on each box with letters and figures at least ½-inch high in rectangle as follows:

DOT–15L

(b) Each box must also be marked with the name or symbol of person making the mark specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.177 Specification 15M; wooden boxes, metal lined, with inside containers for desensitized liquid explosives.

§ 178.177–1 Compliance. (a) Required in all details.

§ 178.177–2 Size and capacity. (a) Each outside wooden container shall contain not more than 6 inside metal containers having nominal capacity of 10 quarts each.

§ 178.177–3 Outside containers. (a) Wooden boxes cleated as prescribed. Parts must be in close contact and completely enclose inside containers. Lumber must be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with assembly, or other defects that materially lessen the strength.

(1) The box shall be lined with copper or other nonsparking metal having suitable strength. All seams must be soldered, welded, or brazed to produce a liquid-tight container having no openings in the bottom, sides, or ends.

(b) Assembly. Use brass screws throughout, countersunk and with heads covered with suitable wood filling compound. Any screw used to secure a metal attachment shall be soldered, welded, or brazed thereto. Metal parts used in the construction of or attached to the box or cover must be of nonsparking type. Fasten bottom securely with edges flush with sides and ends of box. Cleats must extend around entire perimeter of box. Apply top and bottom cleats horizontally. Bottom cleats must be flush with bottom surface of the box. Top cleats must extend above top of box to provide a ¾" recess for cover projections (§178.177–5). Cover must be flush with outside surface of top cleats. Cleats may be mitered but must butt at all corners.

(c) Cellular construction. The interior of the box shall be divided into cells by means of removable, nonmetallic, nonsparking dividers, into which the rubber boots or secondary containers fit snugly. The cells shall be of such size as to extend from the bottom to near the top of the rubber boots or secondary containers.

(d) Parts and dimensions as follows:

Minimum dimensions in inches

Thickness, sides, top, bottom, and ends	Top cleats	Bottom cleats	Cover cleats
¾"	⅝" × 3½"	⅝" × 2¾"	¾" × 2"

§ 178.177–4 Inside containers. (a) Inside containers must be as follows:

(1) Metal containers. The individual inside containers shall be made in a workmanship manner, of copper or other nonsparking material of suitable strength, with all seams soldered, welded, or brazed to be liquid tight. The top shall be fitted with a securely attached carrying handle of copper or other nonsparking material of suitable strength. Each inside container must have a filling and pouring spout in the top, which shall be securely closed with rubber stoppers, paraffin or oil-treated corks or other nonmetallic, nonsparking closures which are resistant to absorption of the contents and which provide a leakproof seal. The closures shall be secured in such manner as to prevent loosening, displacement, and leakage of contents during transit. Each inside container may have sufficient capacity in excess of 10 quarts to provide for outage requirements. Each side of the container must be strengthened vertically by at least 3 equally spaced indented crimps.

(2) Rubber boots or secondary containers. Each inside metal container must be contained in a rubber boot or other similar suitable leakproof, nonmetallic, nonabsorbent outer container, which must fit snugly in cellular structure provided in §178.177–3(c). The rubber boot or secondary container must be liquid tight and shall be so constructed as to have an inside height approximately that of the inside metal container plus closure and otherwise so constructed that the bottom will provide cushioning for the inner container.

(b) Tests. Each inside metal and rubber or secondary container must be adequately tested and inspected during manufacture to insure against leakage.

§ 178.177–5 Closure. (a) The box cover must be securely fastened to the box in a manner to prevent movement of the inside containers. The inner surface of the box cover must be lined with suitable coating material or sheathed with nonsparking metal to provide a nonabsorbent surface. The cover must be secured to the box by means of nylon, or other suitable straps, and be so positioned to furnish a smooth bearing surface on all faces of the box. There shall be no protruding parts on the box or cover which would result in metal-to-metal contact.

§ 178.177–6 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT–15M

(b) Each box must also be marked with the name or symbol of person making the mark specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.181 Specification 15X; wooden boxes for two five-gallon cans.

§ 178.181–1 Compliance. (a) Required in all details.

§ 178.181–2 Closed box. (a) Parts and pieces to be in close contact.

§ 178.181–3 Ends. (a) To be of Group I, II, or III wood not over 2-piece.

§ 178.181–4 Sides, top and bottom. (a) To be of Group I, II, or III wood, not over 3-piece.

§ 178.181–5 Two-piece ends and corrugated fasteners. (a) Two-piece ends. Joints must be fastened with at least 3 corrugated fasteners.

(b) Corrugated fasteners. To be 1" wide and with penetration of ½ inch.

§ 178.181–6 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

§ 178.181–7 Groupings of principal woods. (a) Grouping as follows:

Group I		
White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (poppie)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine
Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—soft or silver
Sycamore	Black gum	
Group 4		
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.181–8 Width of pieces. (a) At least 2" for sides, top and bottom if in two pieces, or 2⅜" for tops and bottom and at least 4" for sides if in three pieces.

§ 178.181–9 Thickness of lumber. (a) Thickness as follows:

(1) Ends. Thickness to be not less than ¾" for Group I or II lumber and 11/16" for Group III lumber.

(2) Side, top and bottom. Thickness to be not less than ⅜".

§ 178.181–10 Assembly. (a) By nailing with either bright or cement-coated nails, size and spacing as follows:

(1) Top to each end: 5 nails (1½" by 12½ gauge).
(2) Bottom to each end: 6 nails (1¾" by 12 gauge).
(3) Sides to each end: 6 nails (1½" by 12½ gauge).

§ 178.181-11 Marking. (a) Marking on each box in letters and figures at least ½" high in a rectangle as follows:

DOT-15X

(b) Each box must also be marked with the name or symbol of person making the mark specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.181-12 Inside can. (a) Size: Approximate dimensions 9 ⅜ x 9⅛ x 13 1/16 inches.
(b) Approximate capacity: 1,188 cu. in.
(c) Top: Embossed.
Seams: Crimped and soldered.
Closure: Airtight and leakproof.
Handles: Wire.
(d) Bottom: Embossed.
Seams: Crimped and soldered.
(e) Body: Paneled on 4 sides.
Two seams: Clinched and soldered.
(f) Material: IC (107 lb.) tin or terne-plate.
(g) Average weight: 2 pounds 8 ounces.
(h) Marking: No specification marking required.

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§ 178.182 Specification 15P; glued plywood, or wooden box for inside containers.

§ 178.182-1 Material requirements. (a) Lumber or plywood must be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength and in accordance with the following:
(1) Lumber must be of good commercial grade.
(2) Plywood sections shall be firmly glued together with waterproof glue. A section of plywood from any part when immersed in water at room temperature for 48 hours shall show no delamination or separation of plies to qualify glue as waterproof.

§ 178.182-2 Construction requirements. (a) Box shall be constructed of wood or of plywood not less than three-ply fabrication and shall be constructed so as to completely and snugly enclose body of the inside container, and so formed that inside container cannot permanently change position and be of sufficiently strong wood or plywood to withstand prescribed tests without serious rupture of or damage to box that would cause failure or lead to impending failure of inside container.

Note 1: Vertical openings not exceeding ⅜ inch in width and extending to a thin 3 inches of top or bottom on two opposite sides of box are permitted.

§ 178.182-3 Tests. (a) One sample, taken at random and with inner container filled to marked capacity with water and closed as for use, shall be capable of withstanding prescribed tests without leakage. Tests shall be made of each size by each company starting production. The type tests are as follows:
(1) Complete package must be capable of withstanding two drops from a height of 4 feet onto solid concrete, the first drop to be made diagonally so top corner will strike the concrete; the second drop onto a 2 inch by 6 inch timber resting on the concrete with the 6 inch leg vertical, the drop being made with the box in a horizontal position and at right angles to the timber so that impact is near the center of the box side-wall.
(2) Additional tests as required by inside container specification.
(b) Records of tests performed under this specification must be retained by the manufacturer for a period of one year following discontinuance of production.

§ 178.182-4 Marking. (a) Each outside container must be plainly marked with letters and figures at least ¾ inch high applied by hot branding iron or dark colored printing ink with pressure dies as follows:
(1) DOT-15P.
(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.185 Specification 16A; plywood or wooden boxes, wire-bound.

§ 178.185-1 Compliance. (a) Required in all details. Authorized tolerances. Cleats, battens, and handles, minus 1/32"; single thickness, veneer, minus 5 percent; resawn boards, 1/64" below specified thickness for boards up to 7/32" thick and 1/32" below specified thickness for boards ¼" or more thick.

§ 178.185-2 Lumber or plywood. (a) Lumber shall be well seasoned and commercially dry; free from decay, objectionable knots, slanting shakes, sharp cross grain, and other defects that materially lessen the strength. Grain of wood in cleats and battens must not cross piece within its length.
(b) Plywood shall be made from veneer which has been rotary cut, sliced, or sawed. Plywood shall be good commercial box or sheathing grade and shall be moisture-resistant; free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength.
(1) Moisture-resistant plywood shall be fabricated with either synthetic or protein type glue. Specimens for testing shall be not less than 5 in number, measuring 6" x 6", and shall withstand 10 cycles of 4 hours immersion in water at room temperature and drying for 20 hours at a temperature not over 100° F. After 10 cycles, 4 of the 5 samples are to show not more than a sum total of 2-inch delamination of the edges, with depth delamination no greater than ⅛ inch.

§ 178.185-3 Wires. (a) Of annealed steel, or other metal of equal strength, Washburn and Moen sizes.

§ 178.185-4 Staples. (a) Wire size, Washburn and Moen.

§ 178.185-5 Grouping of principal woods. (a) Grouping as follows:

Group 1		
White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (popple)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine
Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—soft or silver
Sycamore	Black gum	
Group 4		
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.185-6 Closed box. (a) Parts and pieces with edges in close contact to give completely closed box.

§ 178.185-7 Top, sides, and bottom. (a) Each cleated at both ends; intermediate rows of cleats authorized.

§ 178.185-8 Cleats. (a) Ends mitered or with mortise and tenon joints.
(b) Cleats for plywood boxes shall be Group 4 woods.

§ 178.185-9 Ends. (a) Battened when prescribed. Wired ends authorized provided wires run cross grain and terminate in loops with ends of wire driven through end board and clinched. Grain of wood and outside ply of plywood shall be perpendicular to sides except for wired ends.
(b) As provided by § 173.65(a)(1), Note 1, wooden boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1⅜ inches from top edge of end of box.

§ 178.185-10 Wires. (a) One wire over each row of cleats; intermediate wires as prescribed.

§ 178.185-11 Stapling. (a) Staples for wires over cleats driven through boards into cleats and anchored; others through boards and clinched.

§ 178.185-12 Thickness of boards or plywood (sides, tops, bottoms, and ends). (a) Thickness as follows except that, for thicknesses prescribed as 9/16" or less, resawn boards must be 1/16" thicker for each resawn surface.

Group of wood	Minimum thickness of boards (inch)						
	1/8 (0.125)	9/72 (0.143)	5/32 (0.167)	3/16 (0.188)	7/32 (0.219)	¼ (0.250)	5/16 (0.313)
	Authorized gross weight, box and contents, not over (pounds)						
1	25	35	50	75	100	150	200
2	35	50	75	100	150	200	315
3	50	75	100	150	200	315	400
4	75	100	150	200	315	400	.....

(1) For boxes with 3 or more rows of cleats, boards of the next lower thickness prescribed in the table are acceptable.

(b)

Group of wood	Minimum thickness of plywood (inch)[1]		
	1/8 (0.125)	3/16 (0.150)	3/16 (0.184)
	Authorized gross weight, box and contents, not over (pounds)		
4	150	300	400

[1] Minimum tolerance of 5% permitted for specified thicknesses

§ 178.185-13 Size of cleats. (a) At least 13/16" by 13/16" when thickness required for boards exceeds 1/7"; otherwise at least 9/16" by 13/16".

§ 178.185-14 Binding wires (sides, top, bottom). (a) Spacing not over 8".

Exception: When each binding wire is stapled to a row of cleats, 11" spacing is authorized

(b) Number and size of binding wires as follows:

Number of wires	Minimum gauge of wires, Washburn and Moen				
	16	15	14	13	12
	Authorized gross weight, box and contents (pounds)				
2	35	50	75	100	150
3	50	75	100	150	200
4	75	100	150	200	315
5	100	150	200	315	400
6	.....	200	315	400	.....
7	.....	.....	400	.....	.....

§ 178.185-15 Wires for wired ends. (a) At least 2 wires on each end, size not less than as specified for binding wires in § 178.185-14, and spaced as follows:

Thickness of end (inch)	Maximum spacing	
	Between wires (inch)	Wire to cleats (inch)
0.125	6	4
.143	6	4
.167	6½	4
.187	6½	4
.219	7	4
.250	7	4
.313	7	4

(b) Ends less than 10 inches deep are authorized with 1 wire provided they are reinforced by 2 strips (liners), at least 1½" wide and as thick as ends, securely stapled along edges of the end parallel to the wires.

§ 178.185-16 Staple spacing (approximate) and minimum size. (a) Staples into cleats 16 gauge, Washburn and Moen, and:

(1) One and one-fourth inches long with 1½" spacing, or 1¼" long with 1" spacing, when boards are over ¼" thick.

(2) One and one-eighth inches long with 1½" spacing, for boards ¼" thick or less; except that staples ⅞" long with 1½" spacing are authorized when boards are 1/7" thick or less.

(b) Other staples 18 gauge, Washburn and Moen.

§ 178.185-17 End supporting battens.[1] (a) End supporting battens at least 1⅛" wide and same thickness as cleats; fastened securely across ends parallel to side cleats; required so that unsupported distance between cleats, battens, and between cleats and battens will be not greater than as follows.

Thickness of ends (inch)	Maximum spacing (inches)
0.125	10
0.143	11
0.167	12
0.187	13
0.219	14
0.250	15
0.313	16

§ 178.185-18 Side cleat battens and wired end supports. (a) **Side cleat battens.** At least 13/16" by 13/16"; fastened securely to ends so as to be adjacent to side cleats when box is set up; required, in addition to any other battens, when authorized gross weight exceeds the following:

Group of wood in cleats:	Authorized gross weight, box and contents over (pounds)
1	100
2	150
3	200
4	200

[1] Not required for wired ends less than 20 inches long

(b) **Wired end supports.** Wired ends, for boxes for authorized gross weight exceeding the foregoing, must be reinforced by 2 strips (liners), at least 1¼" wide and as thick as ends, securely stapled along edges of the end parallel to the wires; side cleat battens not required.

§ 178.185-19 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-16A***

(1) Stars must be replaced by maximum authorized gross weight (for example, DOT-16A150, etc.).

(b) The name or symbol of person making the marks specified in paragraph (a) of this section must be located just above, below, or following those marks. Symbol, if used, must be registered with the Director, OHMT.

§ 178.185-20 Setting up and closing. (a) Nail or staple unwired ends to side cleats at intervals not over 2½"; fasten wired ends securely by means of loop fasteners.

(b) Twist ends of binding wires or bend loops to give tight closure.

(c) Nail at least 2 nails through side cleats into each side-cleat batten at not over 4" intervals; nail through top and bottom cleats with one 7-penny nail into each end of end-supporting battens.

§ 178.185-22 Special box authorized only when used in conjunction with Inside spec. 2U polyethylene 5- and 15-gallon cubical containers. (a) The boxes shall comply with spec. 16A requirements using the table for a gross weight of 200 pounds for construction purposes only, except as follows:

(1) The top section of boxes may have a hole not over 4⅛ inches in diameter midway between the cleats, and centered not less than 3⅛ inches from either the back or front edge of boxes.

(2) Five-gallon capacity—ends. Ends may be made from ⅛ inch or thicker veneer and have only one 14-gauge wire across face. One-eighth inch veneer liners, at least 1¼ inches wide, must be stapled across the top and bottom of the ends.

(i) Fifteen-gallon capacity—ends. Ends must be made with same thickness faceboard material as the sides, top, and bottom and must have two liners of the same thickness, at least 3 inches wide, fastened by two rows of staples. Ends may have one 13-gauge wire across face.

(3) Paper overlaid veneer having veneer core of group 3 or 4 wood and completely covered on each side with 42 pound basis weight Kraft paper securely adhered thereto by moisture resistant adhesive, is authorized. Total combined thickness of finished board shall be not less than 0.160 inch.

(4) Wire spacing for 5-gallon capacity containers. Binding wires stapled to a row of cleats may be spaced not more than 13 inches apart.

(b) Wirebound wooden or paper overlaid veneer board boxes must be provided with full size double-faced corrugated liners of at least 125-pound test (Mullen or Cady) for bottom and sides. Full area top pad is required for 5-gallon capacity containers and must be a minimum of 200-pound test (Mullen or Cady). Full area top pad is required for the 15-gallon capacity container and must be a minimum of 275-pound test (Mullen or Cady).

(c) Marking required:

(1) Marking on each box with letters and figures at least ½ inch high in rectangle as follows:

DOT-16A-C

(2) The name or symbol of person making the mark specified in paragraph (c)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.186 Specification 16B; wooden boxes, wirebound.

§ 178.186-1 Compliance. (a) Required in all details. Authorized tolerances: Cleats, battens, and handles, minus 1/32"; single thickness veneer, minus 5 percent; resawn boards, 1/64" below specified thickness for boards up to 3/32" thick and 1/32" below specified thickness for boards ¼" or more thick.

§ 178.186-2 Lumber. (a) Well seasoned and commercially dry; free from decay, objectionable knots, slanting shakes, sharp cross grain, and other defects that materially lessen the strength. Grain of wood in cleats and battens must not cross piece within its length.

§ 178.186-3 Wires. (a) Of annealed steel, or other metal of equal strength, Washburn and Moen sizes.

§ 178.186-4 Staples. (a) Wire size, Washburn and Moen.

§ 178.186-5 Grouping of principal woods. (a) Grouping as follows:

Group 1		
White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (poplar)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine
Group 2		
Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
Group 3		
White Elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—ash or silver
Sycamore	Black gum	
Group 4		
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.186-6 Closed box. (a) Parts and pieces with edges in close contact to give completely closed box except that spaces 1⅛" are authorized between side boards and between top boards when boards are at least 3½" wide.

(b) Handles: Containers may be provided with suitable handles at discretion of shipper. When used, they must be securely fastened along tops of sides under wires and project 3 inches or be mounted on end cleats; extensions of side boards acceptable; dimensions as follows:

Authorized gross weight not over (pounds):	Handles[1] minimum cross section (inches)
150	½ × 2½
200	⅝ × 2½
315	⅝ × 3½
400	11/16 × 3½

[1] Also ridge reinforcing battens when prescribed.

§ 178.186-7 Top, sides, and bottom. (a) Each cleated at both ends; intermediate rows of cleats authorized.

§ 178.186-8 Cleats. (a) Ends mitered or with mortise and tenon joints.

§ 178.186-9 Ends. (a) Battened when prescribed. Wired ends authorized provided wires run cross grain and terminate in loops with ends of wire driven through end board and clinched. Grain of wood perpendicular to sides except for wired ends. Ridge-top containers, authorized as follows:

(1) Ends must be at least 2 times as thick as prescribed in §178.186-12.

(2) Unsupported distance as prescribed in §178.186-17 must not exceed 10" in any case.

(3) Ridge over 30" long must be reinforced on the outside, from end to end, by 2 battens with abutting edges and of cross section as prescribed for handles.

(4) Vertical grain unwired ends are authorized.

§ 178.186-10 Wires. (a) One wire over each row of cleats; intermediate wires as prescribed.

§ 178.186-11 Stapling. (a) Staples for wires over cleats driven through boards into cleats and anchored; others through boards and clinched.

§ 178.186-12 Thickness of boards (sides, tops, bottoms, and ends). (a) Thickness as follows except that, for thicknesses prescribed as 3/16" or less, resawn boards must be 1/64" thicker for each resawn surface:

Group of wood	Minimum thickness of boards (inch)						
	1/8 (0.125)	9/64 (0.143)	3/16 (0.187)	11/64 (0.188)	7/32 (0.219)	1/4 (0.250)	5/16 (0.313)
	Authorized gross weight, box and contents, not over (pounds)						
1	25	35	50	75	100	150	200
2	35	50	75	100	150	200	315
3	50	75	100	150	200	315	400
4	75	100	150	200	315	400	.....

(b) For boxes with 3 or more rows of cleats, boards of the next lower thickness prescribed in the table are acceptable.

§ 178.186-13 Size of cleats. (a) At least 13/16" by 13/16" when thickness required for boards exceeds ½"; otherwise at least 11/16" by 13/16".

§ 178.186-14 Binding wires (sides, top, and bottom). (a) Spacing not over 8".

Exception: When each binding wire is stapled to a row of cleats, 11" spacing is authorized.

(b) Number and size of binding wires as follows:

Number of wires	Minimum gauge of wire, Washburn and Moen				
	18	15	14	13	12
	Authorized gross weight, box and contents (pounds)				
2	35	50	75	100	150
3	50	75	100	150	200
4	75	100	150	200	315
5	100	150	200	315	400
6	.....	200	315	400	.....
7	.....	.....	400	.....	.....

§ 178.186-15 Wires for wired ends. (a) At least 2 wires on each end, size not less than as specified for binding wires in §178.186-14, and spaced as follows:

Thickness of end (inch)	Maximum spacing	
	Between wires (inch)	Wire to cleats (inch)
0.125	6	4
.143	6	4
.187	6½	4
.187	6½	4
.219	7	4
.250	7	4
.313	7	4

(b) Ends less than 10 inches deep are authorized with 1 wire provided they are reinforced by 2 strips (liners), at least 1¼" wide and as thick as ends, securely stapled along edges of the end parallel to the wires.

§ 178.186-16 Staple spacing (approximate) and minimum size. (a) Staples into cleats 16 gauge, Washburn and Moen, and:

(1) One and one-fourth inches long with 1⅛" spacing, or 1⅝" long with 1" spacing, when boards are over ⅛" thick.

(2) One and one-eighth inches long with 1⅛" spacing, for boards ⅛" thick or less; except that staples ⅞" long with 1½" spacing are authorized when boards are 1/7" thick or less.

(b) Other staples 18 gauge, Washburn and Moen.

§ 178.186-17 End supporting battens.[1] (a) At least 1⅛" wide and same thickness as cleats; fastened securely across ends parallel to side cleats; required so that unsupported distance between cleats, battens, and between cleats and battens will be not greater than as follows:

Thickness of ends (inch):	Maximum spacing (inches)
0.125	10
0.143	11
0.167	12
0.187	13
0.219	14
0.250	15
0.313	16

§ 178.186-18 Side cleat battens and wired end supports. (a) **Side cleat battens.** At least 13/16" by 13/16"; fastened securely to ends so as to be adjacent to side cleats when box is set up; required, in addition to any other battens, when authorized gross weight exceeds the following:

Group of wood in cleats:	Authorized gross weight, box and contents over (pounds)
1	100
2	150
3	200
4	200

(b) **Wired end supports.** Wired ends, for boxes for authorized gross weight exceeding the foregoing, must be reinforced by 2 strips (liners), at least 1¼" wide and as thick as ends, securely stapled along edges of the end parallel to the wires; side cleat battens not required.

§ 178.186-19 Marking. (a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-16B***

(1) Stars must be replaced by maximum authorized gross weight (for example, DOT-16B315, etc.).

[1] Not required for wired ends less than 20 inches long.

(b) The name or symbol of person making the marks specified in paragraph (a) of this section must be located just above, below, or following those marks. Symbol, if used, must be registered with the Director, OHMT.

§ 178.186-20 Setting up and closing. (a) Nail or staple unwired ends to side cleats at intervals not over 2½"; fasten wired ends securely by means of loop fasteners. Provided, That ends at least ⅞" thick may be nailed with cement-coated nails through sides, top, and bottom of box into the ends at 3" intervals.

(b) Twist ends of binding wires or bend loops to give tight closure.

(c) Nail at least 2 nails through side cleats into each side-cleat batten at not over 4" intervals; nail through top and bottom cleats with one 7-penny nail into each end of end-supporting battens.

§ 178.186-21 Special box. (a) Gross weight not over 500 pounds. Must comply with this specification except as follows: Sides, top, bottom, and ends, to be of group 2 or 3 wood having minimum thickness of ¼" for boxes not over 315 pounds gross weight, ⅜" for boxes not over 400 pounds gross weight, and ½" for boxes not over 500 pounds gross weight. Side or end cleats must be at least 1⅜" × ⅞" and ends must have horizontal supporting battens at least 1⅜" × 1⅜". One batten is required for boxes not over 200 pounds gross weight and three battens for others. Ends must be held in place by one metal strap at least ⅝" × 0.020" completely around the box stapled to the middle end battens. When size of box will not permit the application of all prescribed binding wires during manufacture, the additional binding wires of prescribed number and size, or metal straps of equal number and strength, must be applied after closing. At least three binding wires must be applied to boxes not over 200 pounds gross weight and at least four to boxes over 200 pounds gross weight by the box manufacturer. Binding wires for boxes over 400 pounds gross weight must be of size and number prescribed for boxes not over 400 pounds gross weight.

§ 178.187 Specification 16D; wooden wirebound overwrap for inside containers.

§ 178.187-1 Material requirements. (a) Lumber shall be as follows:

(1) Lumber shall be well seasoned and commercially dry; free from decay, objectionable knots, slanting shakes, sharp cross grain, and other defects that materially lessen the strength. Grain of wood in cleats and battens must not cross piece within its length.

(2) Authorized tolerances; cleats, battens and handles, minus 1/32 inch; single thickness veneer, minus 5 percent; resawn boards, 1/64 inch below specified thickness for boards up to 7/32 inch thick and 1/32 inch below specified thickness for boards ¼ inch or more thick.

(3) Woods authorized are in the following groups:

	Group 2	
Southern Yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	
	Group 3	
White elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—soft or silver
Sycamore	Black gum	
	Group 4	
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

(b) Binding wires and staples shall be as follows:

(1) Of annealed steel or other material of equal strength, Washburn and Moen sizes.

§ 178.187-2 Construction requirements. (a) Wirebound overwrap for drum type inside container shall be constructed in accordance with the following:

Wirebound containers	Marked capacity of inside containers			
	Not over 5 gallons	Not over 15 gallons	Not over 30 gallons	Not over 55 gallons
Facebard thickness (sides only)				
Group 2 woods	⅛" Veneer	¼" Resawn	⅜" Resawn	⅜" Resawn
Group 3 or 4 woods	⅛" Veneer	¼" Resawn	¼" Resawn	⅜" Resawn
Cleats inlaid outside cleats				
Group 2, 3 or 4 woods	1⅜" × ⅞"	1⅜" × ⅞"	1⅜" × ⅞"	1⅜" × ⅞"
Binding wires				
Number and gauge over outside cleats	2-14 gauge	2-12 gauge	2-11 gauge	2-11 gauge
Number and gauge intermediate wires	1-14 gauge	3-12 gauge	4-12 gauge	3-12 gauge 2-11 gauge
Staples (length, gauge and spacing)				
In outside cleats	1⅛"-16 gauge	1⅛"-16 gauge	1⅛"-16 gauge	1⅛"-16 gauge
Wirebound containers	Marked capacity of inside containers			
	Not over 5 gallons	Not over 15 gallons	Not over 30 gallons	Not over 55 gallons
Over intermediate wires	3½"-18 gauge	3½"-18 gauge	3½"-18 gauge	3½"-18 gauge
Maximum space between staples	13"	13"	13"	13"
Tops and Bases (Groups 2, 3 or 4 woods)				
Facebard thickness	⅛" Resawn	⅜" Resawn	⅜"	½"
Battens (2 required)	1⅜" × 1⅜"	1⅜" × ⅞"	1⅜" × ⅞"	1⅜" × ⅞"
Staples or cement coated nails	1¼"-18 gauge	1¼"-18 gauge	22-43 nails	1¼"-18 gauge

(1) Staples for wires over cleats driven through boards into cleats and anchored; others through boards and clinched.

(2) Container shall be closed with threaded loop fastener with "Z" clinch for all capacities except 5 gallon for which regular clinch is authorized.

(3) Where binding wire closure clinches contact inner container, 1½ inches wide water-resistant fabric cloth with plastic coated backing and pressure-sensitive adhesive or other suitable means shall be applied in a single strip across clinches, or other equally efficient methods may be used.

(b) Wirebound overwrap for bottle-type inside container shall be constructed in accordance with the following:

Wirebound containers	Marked capacity of inside containers		
	Not over 6½ gallons (rectangular overwrap)	Not over 13 gallons (rectangular overwrap)	Not over 13 gallons (cylindrical overwrap)
Facebard thickness (sides only)			
Group 2 woods	⅜"	⅜"	⅜"
Group 3 woods	¼" Resawn	⅜"	⅜"
Group 4 woods	¼" Resawn	⅜"	⅜"
Cleats			
Outside and interrupted cleats	1⅜" × ⅞"	1⅜" × ⅞"	1⅜" × ⅝"
Intermediate cleats	5½" × ⅜"	5½" × ⅜"	Outside cleats only
Binding wires			
Number and gauge over outside cleats	2-13 gauge	2-12 gauge	2-12 gauge
Number and gauge over intermediate cleats (or intermediate wires)	2-14 gauge (not over 5 gallons) 4-14 gauge (not over 6½ gallons)	4-13 gauge	2-12 gauge
Staples			
In outside and interrupted cleats	1⅛"-16 gauge	1¼"-16 gauge	1⅛"-16 gauge
Intermediate cleats	⅞"-16 gauge	⅞"-16 gauge	None
Over intermediate wires	⅞"-18 gauge	1½"-18 gauge	
Note. A 2" gap between staples must be provided in the center of each line of staples over the intermediate cleats			No 2" gap in staples required
Top [1,2]			
Face material thickness	⅜"	½"	⅜"
Battens	1⅜" × ⅜"	1⅜" × 1⅜"	⅞" × 1⅜"
Base			
Face material thickness	⅜"	⅜"	⅜"
Edge Strips	1⅛" × ⅜"	3½" × ⅜"	⅞" × 1⅜"
Center strips	3½" × ⅜"	3½" × ⅜"	(Battens)

[1] A hole of suitable type may be left in top of box to provide for protruding neck of inner container.

[2] Exterior grade plywood ½" thick with no battens is authorized.

(1) Containers shall be closed with threaded loop fasteners using a regular clinch.

§ 178.187-3 Assembly. (a) Overwrap shall be constructed to provide a snug fit for the inside container.

(b) Overwrap inside surfaces shall be reasonably smooth and free from projections which would damage inside container.

§ 178.187-4 Tests. (a) Wirebound overwrap; when assembled as for use, shall withstand the tests prescribed for specified inside containers. The completed package must withstand these tests without serious rupture of the overwrap and without producing a condition of the overwrap that could result in potential damage to the inside container.

§ 178.187-5 Marking authorized. (a) Marking on each overwrap with letters and figures at least ½ inch high in rectangle as follows:

DOT-16D

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) The name or symbol of person making the marks specified in paragraph (a) of this section must be located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.190 Specification 19A; wooden boxes, glued plywood cleated.

§ 178.190-1 Compliance. (a) Required in all details.

§ 178.190-2 Three-way corners. (a) Three-way corners (when specified in §§ 178.190-3 to 178.190-13) shall be of type so nailing will be into edge grain of cleats, unless otherwise specified.

§ 178.190-3 Lumber. (a) Well seasoned and commercially dry; free from decay, loose knots, knots that would interfere with nailing and other defects that would materially lessen the strength. Cleats to be free from knots and grain of wood must not cross cleat in less than one-half its length.

(b) To be at least 3-ply; except for cleats; each ply glued in place with grain at right angles to the one next.

§ 178.190-4 Nails. (a) Cement coated and of size specified for "sinkers", "coolers", and "3-ply-veneer nails" as generally known to the trade.

§ 178.190-5 Grouping of principal woods. (a) Grouping as follows:

Group 1

White pine	Chestnut	White fir
Norway pine	Sugar pine	Cedar
Aspen (popple)	Cypress	Redwood
Spruce	Basswood	Butternut
Western (yellow) pine	Willow	Cucumber
Cottonwood	Noble fir	Alpine fir
Balsam fir	Magnolia	Lodgepole pine
Yellow poplar	Buckeye	Jack pine

Group 2

Southern yellow pine	North Carolina pine	Larch (tamarack)
Hemlock	Douglas fir	

Group 3

White Elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—ash or silver
Sycamore	Black gum	

Group 4

Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.190-6 Three-way corners. (a) Three-way corners required; except for authorized gross weight not over 75 pounds.

§ 178.190-7 Cleats required. (a) Two on each face at opposite edges; others as necessary so that cleats are not over 12" apart. These to extend full length of face.

(b) Others, if necessary, to provide nailing surface at each box edge.

§ 178.190-8 Parts and dimensions. (a) Parts and dimensions as follows:

Authorized gross weight	Plywood minimum thickness[1]	Cleats of group		Cleats of group 3 or 4 woods[1]	
		Minimum thickness	Minimum width	Minimum thickness	Minimum width
Pounds	Inch	Inch	Inches	Inch	Inches
50	3/20	1/2	1 1/2	1/2	1 1/2
75	3/20	9/16	1 11/16	1/2	1 1/2
100	3/16	5/8	1 7/8	1/2	1 1/2
150	3/16	11/16	2 1/16	1/2	1 1/2
200	3/12	3/4	2 1/4	9/16	1 11/16
300	3/12	13/16	2 7/16	5/8	1 7/8
400	3/12	7/8	2 5/8	11/16	2 1/16

[1] Variation authorized of 1/8 prescribed thickness of any part not to exceed 10 percent of its area. Cleats at least 1/2" thick, of cross section equivalent to prescribed cleats are authorized.

§ 178.190-9 Marking. (a) Marking on each container with letters and figures at least 1/2" high in rectangle as follows:

DOT-19A***

(1) The stars must be replaced by authorized gross weight (for example, DOT-19A200).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.190-10 Setting up and closing all boxes. (a) Each edge of each plywood section secured with 3-ply-veneer cement coated nails, or staples, at 3" intervals as follows:

(1) To face of cleat; clinching required; cement coating optional.

(2) To edge of cleat; except when nailing through a cleat in which case nail as in § 178.190-13.

§ 178.190-11 Boxes with 3-way corners. (a) Each cleat forming 3-way corner to be nailed with 2 nails at each end into edge of adjoining cleat.

§ 178.190-12 Boxes without 3-way corners. (a) Each edge cleat to be nailed to cleat on adjoining face.

§ 178.190-13 Nails and nailing under §§ 178.190-11 and 178.190-12. (a) To be cement coated and as follows:

Cleats—thickness (inch)	Nails—cement coated			
	Group 1 or 2 woods		Group 3 or 4 woods	
	Size (penny)	Spacing (inches)	Size (penny)	Spacing (inches)
1/2	5	1 3/4	4	1 1/2
9/16	6	2	5	1 3/4
5/8	6	2	5	1 3/4
11/16	7	2 1/4	6	2
3/4	7	2 1/4	6	2
13/16	8	2 1/2	7	2 1/4
7/8	9	2 3/4	8	2 1/2

§ 178.191 Specification 19B; wooden boxes, glued plywood, nailed.

§ 178.191-1 Compliance. (a) Required in all details.

§ 178.191-2 Authorized gross weight. (a) Authorized gross weight not to exceed 150 pounds.

§ 178.191-3 Plywood. (a) Plywood shall be made from veneer which has been rotary cut, sliced or sawed. It shall be well seasoned and commercially dry; free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength. Plywood shall be of good commercial box or sheathing grade.

(b) Plywood shall be at least 5 ply; each ply alternately glued with the grain at right angles to the one next.

§ 178.191-4 Nails. (a) Cement coated and of size specified for "sinkers" or "coolers" as generally known to the trade.

(b) Nail spacing as follows:

Nails (size) in penny	Maximum spacing when driven into end and corner posts	
	Side grain	End grains
	Inches	Inches
Threepenny	1 1/2	1
Fourpenny	1 1/2	1 1/2
Fivepenny	1 3/4	1 1/2
Sixpenny	2	1 3/4
Sevenpenny	2 1/4	2
Eightpenny	2 1/2	2 1/4
Ninepenny	2 3/4	2 1/2
Tenpenny	3	2 1/2

§ 178.191-5 Corner construction. (a) Boxes exceeding 35 pounds gross weight must have 4 vertical corner posts, or other equally suitable devices or fasteners; nailed lap-joint permitted for others.

§ 178.191-6 Assembly. (a) Assemble with grain of outer plywood face in the direction of the longest faces of the box and securely nail or fasten to corner posts or ends as provided in §§ 178.191-4 and 178.191-5.

§ 178.191-7 Special tests. (a) Samples of each type and size manufactured, taken at random, and filled with dummy contents the shape and size of expected contents, or with sand or sawdust, to the gross weight at which container is marked, closed as for use, must be capable of withstanding the following tests without serious rupture or exposure of contents:

(1) 8 drops from height of 1 foot, one on each corner, onto solid concrete.

§ 178.191–8 Closing for shipment. (a) Box to be securely closed. Nails, if used, must be as prescribed in § 178.191–3; hinges and hasps or other equally efficient device authorized.

§ 178.191–9 Marking. (a) Marking on each container with letters and figures at least ½" high in rectangle as follows:

DOT-19B'''

(1) The stars must be replaced by authorized gross weight (for example DOT–19B150).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.193 Specification 18B; wooden kits.

§ 178.193–1 Compliance. (a) Required in all details.

§ 178.193–2 Tops and bottoms. (a) Pieces to be glued together.

§ 178.193–3 Parts required and dimensions. (a) Parts required and dimensions as follows:

Authorized gross weight (pounds)	Thickness (minimum)		Hoops (minimum)		
	Top and bottom (inch)	Staves inch	Number	Width (inch)	Gauge[1]
25	½	⅜	3	⅝	23
45	½	½	3	⅝	23

[1] Birmingham wire gauge (number).

§ 178.193–4 Middle hoop. (a) Middle hoop of No. 11 gauge wire authorized.

§ 178.193–5 Type test. (a) Sample, filled with dry, finely powdered material to authorized gross weight and closed as for use, shall withstand, without leaking, a drop from height of 4 feet onto solid concrete so as to strike diagonally on top chime.

§ 178.193–6 Marking. (a) Marking on each container plainly as follows:

(1) DOT–18B; followed by the authorized gross weight (for example, DOT–18B25).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.193–7 Size of mark. (a) Size of mark (minimum), ½" high.

§ 178.194 Specification 20WC; wooden protective jacket.

§ 178.194–1 General requirements. (a) Each jacket must meet the applicable requirements of § 173.24 of this subchapter.

(b) Maximum gross weight of the jacket plus the contents may not exceed the following:

(1) Specification 20WC–1: 225 kilograms (500 pounds).
(2) Specification 20 WC–2: 225 kilograms (500 pounds).
(3) Specification 20WC–3: 455 kilograms (1000 pounds).
(4) Specification 20WC–4: 910 kilograms (2000 pounds).
(5) Specification 20WC–5: 1820 kilograms (4000 pounds).
(6) Specification 20WC–6: 2230 kilograms (6000 pounds).

§ 178.194–2 Materials of construction. (a) The general configuration of the wooden protective jacket must be a hollow cylindrical shell constructed of one-piece discs and rings of plywood or solid hardwood reinforced with steel rods.

(1) The specification 20WC–2 must be additionally completely encased, snugly fit, within an 18-gauge steel shell. The steel shell must be provided with at least four 6 millimeter (0.25 inch) diameter vent holes. Each hole must be covered with durable weather-proof tape, or equivalent device.

(2) The specification 20WC–6 jacket must be additionally completely encased, snugly-fit, within a 12-gauge steel shell. The steel shell must be provided with at least twelve 1.2 centimeters (0.5-inch) diameter vent holes, located in 3 rows of 4 holes each, spaced at 90 degree intervals near the top, middle, and bottom of the drum. Each hole must be covered with durable weatherproof tape, or equivalent device.

(b) Plywood must be exterior-grade, void-free, Douglas fir (or equivalent) not more than 2.5 centimeters (1 inch) thick. Solid hardwood is authorized for specification 20WC–2 only.

(c) Discs and rings must be glued together with a strong, shock-resistant adhesive, such as either of the following:

(1) A resorcinol-formaldehyde adhesive, which has been bonded under both heat and pressure; or

(2) A polyvinyl-acetate emulsion, which has been reinforced with cement-coated nails. The nails must be randomly spaced and must be at least 2.5 times as long as the minimum thickness of the plywood discs or rings.

(d) Full-length steel rods are required for reinforcement and lid closure.

(1) The minimum number of rods and the minimum rod diameter are as shown in the following table:

Specification	Minimum number of rods	Minimum rod diameter	
		Inches	Millimeters
20WC-1	8	0.25	6.0
20WC-2	8	.25	6.0
20WC-3	12	.375	9.5
20WC-4	16	.375	9.5
20WC-5	16	.50	12.0
20WC-6	16	.50	12.0

(2) For specifications 20WC–1 and 20WC–2, steel rods must be equally spaced around the circumference to the rings and discs, midway between the O.D. and I.D. of the rings. For specifications 20WC–3 and 20WC–4, bolts may be staggered alternately in two rows, at ± 1.2 centimeters (0.5 inch) from the line midway between the O.D. and I.D. of the rings. For specifications 20WC–5 and 20WC–6, bolts may be staggered alternately in two rows at ± 2.5 centimeters (1 inch) from the line midway between the O.D. and I.D. of the rings.

(3) Rod ends must be threaded and secured with lock nuts and steel washers, or equivalent device, to provide at least a 2.5 centimeters (1 inch) diameter bearing surface on each end. Ends of the rods must terminate 1.4 centimeters (0.75 inch) below the surface of the plywood for specifications 20WC–1 and 20WC–2. For specifications 20WC–3, 20WC–4, 20WC–5 and 20WC–6, the ends of the rods must terminate 3.7 centimeters (1.5 inches) below the surface of the plywood, and that portion of each end disc which extends beyond the rod ends must be further held in place with lag screws at least 10 centimeters (4 inches) long.

(e) Thickness of wooden shell:

(1) Specification 20WC–1: At least 10 centimeters (4 inches) thick.
(2) Specification 20WC–2: At least 7.5 centimeters (3 inches) thick.
(3) Specification 20WC–3: At least 13 centimeters (5 inches) thick for the jacket wall, and at least 15 centimeters (6 inches) thick for the end discs. In addition, at least 3 plywood chines, 5 centimeters (2 inches) wide and protruding 5 centimeters (2 inches) beyond the outer surfaces, must be located at each end and midway along the length of the jacket.
(4) Specification 20WC–4: At least 15 centimeters (6 inches) thick for the jacket wall, and at least 15 centimeters (6 inches) thick for the end discs. In addition, at least 3 plywood chines, 5 centimeters (2 inches) wide and protruding 5 centimeters (2 inches) beyond the outer surfaces, must be located at each end and midway along the length of the jacket.
(5) Specifications 20WC–5 and 20WC–6: At least 15 centimeters (6 inches) thick for the jacket wall, and at least 20 centimeters (8 inches) thick for the end discs. In addition, at least 5 plywood chines, 5 centimeters (2 inches) wide and protruding 5 centimeters (2 inches) beyond the outer surfaces, must be located at each end and equally spaced along the length of the jacket.

§ 178.194–3 Closure. (a) Closure for the wooden protective jacket is provided by the steel reinforcing rods. The end cap (lid) must fit tightly to the body of the jacket to prevent a heat path to the inside of the jacket. The lid joint for specifications 20WC–3, 20WC–4, 20WC–5, and 20WC–6, may not be coplanar with the end of the inner containment vessel.

(b) Specifications 20WC–2 and 20WC–6. Locking ring closure if used, must conform to § 178.104–4. Flanged closure, if used, must have at least 3 steel bolts (at least 6 millimeters (0.25 inch) diameter for 20WC–2 or 1.2 centimeters (0.50 inch) diameter for 20WC–6) and lock nuts (or equivalent device), spaced not more than 13 centimeters (5 inches) between centers.

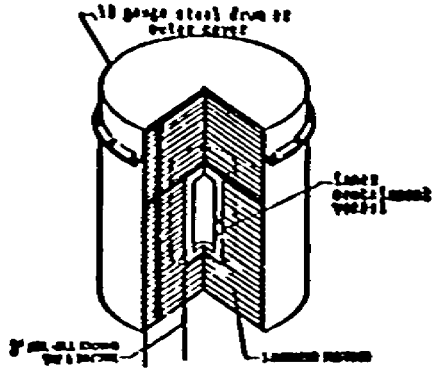
§ 178.194–4 Tests. Prior to each use, each jacket must be visually inspected for defects such as improper bonding, cracking, corrosion of steel rods, and improperly fitting closure lid, or other manufacturing defects. Particular attention must be given to any separation of the plywood discs and rings which would provide a heat path to the inside of the jacket.

§ 178.194–5 Painting. Each jacket (other than 20WC–2 and 20WC–6) must be completely painted with a high quality exterior weather resistant paint.

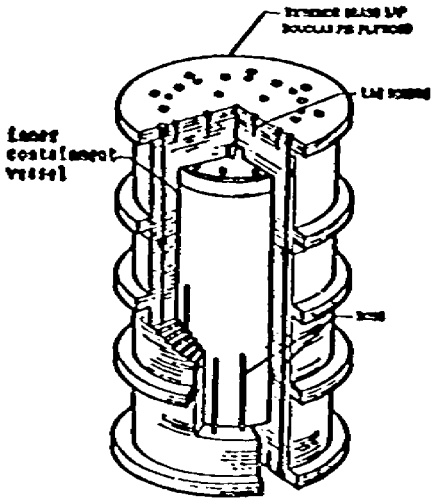
§ 178.194-6 Marking. (a) Each jacket must be marked on the external surface as follows: "USA-DOT-20WC-( ) TYPE B." The appropriate numeral must be inserted in the marking to indicate the appropriate specification 20WC category; e.g., "20WC-2."

(b) Each jacket must also be marked with the name or symbol of person making the marks specified in paragraph (a) of this section. Symbol, if used, must be registered with the Director, OHMT.

§ 178.194-7 Typical assembly sketches. (a) Spec. 20WC-2.



(b) Specification 20WC-5.



§ 178.195 Specification 21WC; wooden-steel protective overpack.

§ 178.195-1 General requirements. (a) Each jacket must meet all the applicable requirements of § 173.24 of this subchapter.

(b) The maximum authorized gross weight of the overpack, including its inner container and contents may not exceed 1360 kilograms (3000 pounds).

§ 178.195-2 Materials of construction and other requirements. (a) The general configuration of the protective overpack must be a combination of two nested plywood boxes, each 2.5 centimeters (1 inch) thick, nested within a third wooden box of nominal 5 centimeters (2 inch) thickness solid hardwood. The three nested boxes must be enclosed within a welded framework constructed of mild steel strap, nominally 1 centimeter (⅜-inch) thick by 8–10 centimeters (3–4 inches) wide. All outer surfaces of each box must be coated with intumescent paint.

(b) Plywood must be exterior-grade, void-free, Douglas fir, or equivalent, at least 2.5 centimeters (1 inch) thick. Solid hardwood must be maple, or equivalent.

(c) All box joints and interior surfaces must be glued with a strong, shock-resistant adhesive such as polyvinyl-acetate emulsion, or equivalent.

(d) All hardwood joints must be mitered, or equivalent, reinforced with No. 10 cement-coated nails spaced on nominal 15 centimeters (6 inch) centers.

(e) All plywood joints must be butt-type, or equivalent, reinforced with No. 10 cement-coated nails spaced on nominal 15 centimeters (6 inch) centers.

(f) The angles and strapping of the metal frame must be spaced such that separation distances do not exceed 15 centimeters (6 inches).

(g) The lid must be of the same material as the box and fabricated in such a manner that closure forms a mitered joint with the hardwood box and 2 stepped-joints with the plywood boxes.

§ 178.195-3 Closure. Closure for the protective overpack must be provided by at least 4 mild steel hinges formed from minimum 2.5 centimeter (1 inch) x 5 millimeter (3/16-inch) bar stock. Hinge pins must be minimum 6 millimeter (¼-inch) diameter by 13.3 centimeters (5¼-inches) long mild steel rod drilled at both ends for cotter pins.

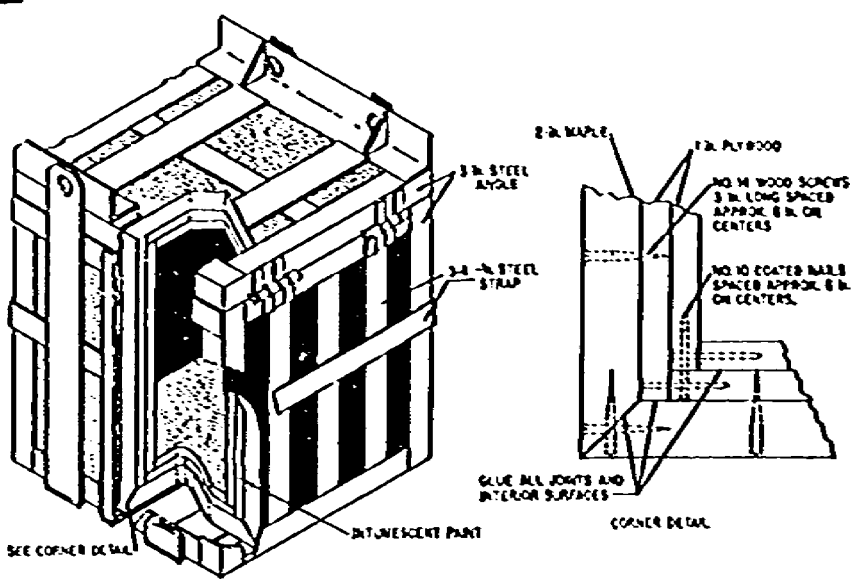
§ 178.195-4 Tests. Prior to each use, each overpack must be visually inspected for defects such as wood checking or splintering, weld cracking, corrosion of steel parts, improper joint bonding, or improperly fitting closure lid.

§ 178.195-5 Required marking. (a) Marking must be as prescribed in § 173.24 of this subchapter.

(b) Marking on the outside of each overpack must include the following:

(1) "USA-DOT 21WC" and "TYPE B" as appropriate.

§ 178.195-6 Typical assembly detail.



RADIOISOTOPE SHIPPING CASK FIRE AND IMPACT SHIELD

§ 178.196 Specification 22A; wooden drums, glued plywood.

§ 178.196-1 Compliance. (a) Required in all details.

§ 178.196-2 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

§ 178.196-3 Woods required for plywood. (a) As follows:

	Group 3	
White elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple - soft or silver
Sycamore	Black gum	
	Group 4	
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.196-4 Plywood. (a) At least 2-ply for body and 3-ply for heads; all plies glued together cross grain.

§ 178.196-5 Hoops and battens. (a) Grain of wood must not cross piece within ½ of its length. Hoops to be of elm.

Exception: Plywood hoops 0.28" thick are authorized.

§ 178.196-6 Parts and dimensions. (a) Parts and dimensions as follows:

Maximum net weights authorized	Thickness (minimum)		Size of hoops (minimum)		Head liners (minimum)
	Body	Heads	Wooden	Metal[1]	
Pounds	Inch	Inch	Inch	Inch	Inch
33	0.16	⅜	⅞ × 2	0.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ⅝
56	.18	⅜	⅞ × 2	.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ⅝
115	.20	⅜	⅞ × 2¼	.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ¾
200	.28	0.43	1⅛ × 3	.028 × 1⅜	1⅛ × ¾

[1] Authorized only when metal hoop is between body of drum and wooden hoop as described in § 178.196-8.

[2] On drums of not over 10½ gallons capacity having authorized maximum net weights not over 115 pounds, additional outside headliners may be used in lieu of metal hoops provided containers will pass prescribed tests. (See § 178.196-14)

§ 178.196-7 Body joints. (a) To be made by steel strip 0.015" x 1½" secured by staples, clinched, at 1⅛" centers, or by other method giving equivalent strength; also to be made siftproof by 2 thicknesses of 3" paper tape 60-pound strength, Mullen or Cady test, or other equivalent protection.

Note 1: Until further order of the Department, tape 2½" wide may be used.

§ 178.196-8 Hoops. (a) One wooden and 1 metal required at each chime; wooden hoops secured by staples, clinched, at 3" centers; metal hoops to be outside wooden hoops and secured by punching, or other equivalent method, at 6" centers.

§ 178.196-9 Head battens. (a) Required for heads over 15" diameter; ¾" x 3", minimum; ends rounded to fit chime.

§ 178.196-10 Head liners. (a) Required inside and outside for full circumference of heads. To be securely fastened by staples or nails, clinched.

§ 178.196-11 Head lining paper. (a) Required for each head; 1 ½" larger than head diameter; of No. 1 Kraft paper 90 pounds per ream (480 sheets 24" x 36") or equivalent.

Note 1: Until further order of the Department, a ream may consist of 500 sheets.

§ 178.196-12 Bung openings. (a) Bung and bunghole authorized provided head lining paper is glued around hole.

§ 178.196-13 Insertion of head. (a) As in § 178.196-16.

§ 178.196-14 Tests. (a) Samples of each type and size taken at random, filled with dry, fine powder to the authorized net weight and closed as for use, must be capable of withstanding, without leakage, 2 drops diagonally on either end chime onto solid concrete from height of 4 feet.

§ 178.196-15 Marking. (a) Marking on each container by marks ½" high, as follows:

(1) DOT-22A, followed by authorized gross weight (authorized net weight plus approximate tare weight, for example, DOT-22A115).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.196-16 Closing for shipment. (a) Closing heads. Insert head lining paper, head, and head liner; nail with 15 gauge nails, clinched, at 2" centers through head liner, body and wooden hoop; equivalent stapling authorized. Nail through steel hoop with two 7-penny nails into each end of head batten, if any.

§ 178.196-17 Bung closures. (a) Bung closures (if any) must be well driven and secured sufficiently to prevent leakage in transit.

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§ 178.197 Specification 22B; wooden drums, glued plywood.

§ 178.197-1 Compliance. (a) Required in all details.

§ 178.197-2 Lumber. (a) To be well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength.

§ 178.197-3 Woods required for plywood. (a) Woods required as follows:

	Group 3	
White elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple - soft or silver
Sycamore	Black gum	
	Group 4	
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

§ 178.197-4 Plywood. (a) At least 2-ply for body and 3-ply for heads; all plies glued together cross grain.

§ 178.197-5 Hoops and battens. (a) Grain of wood must not cross piece within ½ of its length. Hoops to be of elm. Exception: Plywood hoops 0.28" thick are authorized.

§ 178.197-6 Parts and dimensions. (a) Parts and dimensions as follows:

Maximum net weights authorized	Thickness (minimum)		Size of hoops (minimum)		Head liners (minimum)
	Body	Heads	Wooden	Metal[1]	
Pounds	Inch	Inch	Inch	Inch	Inch
33	0.16	⅜	⅞ × 2	0.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ⅝
56	.18	⅜	⅞ × 2	.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ⅝
115	.20	⅜	⅞ × 2¼	.023 × 1⅜ [2]0.015 × 2⅜	⅞ × ¾
200	.28	0.43	1⅛ × 3	.028 × 1⅜	1⅛ × ¾

[1] Authorized only when metal hoop is between body of drum and wooden hoop as described in § 177.196-8.

[2] On drums of not over 10½ gallons capacity having authorized maximum net weights not over 115 pounds, additional outside headliners may be used in lieu of metal hoops provided containers will pass prescribed tests. (See § 178.196-13.)

§ 178.197-7 Body joint. (a) Joint to be made by steel strip 0.015" x 1⅛" secured by staples, clinched, at 1⅛" centers, or by other method giving equivalent strength.

§ 178.197-8 Hoops. (a) One wooden and 1 metal required at each chime; wooden hoops secured by staples, clinched, at 3" centers; metal hoops to be outside wooden hoops and secured by punching, or other equivalent method, at 6" centers.

§ 178.197-9 Head battens. (a) Required for heads over 15" diameter, ¾" x 3", minimum; ends rounded to fit chime.

§ 178.197-10 Head liners. (a) Required inside and outside for full circumference of heads. To be securely fastened by staples or nails, clinched. Inside head liners not required when close fitting inside metal drum or strong container is used.

§ 178.197-11 Bung or other openings in head. (a) Bung and bung hole authorized provided head lining paper is glued around hole. Holes are permitted in heads to provide for closing devices of inside metal drums or other strong inside containers when plywood drum is so equipped.

§ 178.197-12 Insertion of head. (a) As in § 178.197-15.

§ 178.197-13 Tests. (a) Samples of each type and size taken at random, filled with dry, fine powder to the authorized net weight and closed as for use, must be capable of withstanding, without leakage, 2 drops diagonally on either end chime onto solid concrete from height of 4 feet.

§ 178.197-14 Marking. (a) Marking on each container by marks ½" high, as follows:

(1) DOT-22B, followed by authorized gross weight (authorized net weight plus approximate tare weight, for example, DOT-22B235).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.197-15 Closing for shipment. (a) Closing heads. Insert head lining paper, head, and head liner; nail with 15 gauge nails, clinched, at 2" centers through head liner, body and wooden hoop; equivalent stapling authorized. Nail through steel hoop with two 7-penny nails into each end of head batten, if any.

§ 178.197-16 Bung closures. (a) Bung closures (if any) must be well driven and secured sufficiently to prevent leakage in transit.

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§ 178.198 Specification 22C; plywood drum for plastic inside container.

§ 178.198-1 Material requirements. (a) Plywood shall be as follows:

(1) Plywood for body and heads shall be of good commercial or sheathing grade hardwood veneer. Veneer plies shall be firmly glued together with waterproof glue. A section of plywood from any part when immersed in water at room temperature for 48 hours shall show no delamination or separation of plies to qualify glue as waterproof.

(2) Plywood shall be well seasoned, commercially dry, and free from decay, loose knots that interfere with assembly, and other defects that would materially lessen the strength.

§ 178.198-2 Construction requirements. (a) Plywood drum shall completely and snugly enclose body of inside container, or shall completely and snugly enclose body and neck of inside container. Top head of drum may have a hole of suitable size to provide for protruding neck of plastic container; bottom head may have drainage holes of suitable size. The following are required:

(1) Body shall be constructed of 2 shells, (see Note 1), butt-jointed, telescoped one within the other; outer shell shall be fastened on the outside with wire staples of not less than 17-gauge metal driven through a metal strip not less than 28-gauge by 1½ inches width and each side of body joint. Staples shall be spaced not more than 1½ inches apart and clinched on the inside. The grain of outside ply shall be paralleled and the grain of inner ply shall be vertical to plane of the heads.

Note 1: Each shell shall be of two-ply construction having minimum wall thickness of ⅛ inch for inside container not over 6½ gallons marked capacity and ¼ inch for inside container not over 14 gallons marked capacity.

(2) Body heads shall be of at least three-ply construction with grain of alternate plies at right angles, circled to fit snugly within the body shell. Each head shall have a minimum thickness of ⅜ inch for inside container not over 6½ gallons marked capacity and ⅞ inch for inside container not over 14 gallons marked capacity. As an alternate, ½ inch thick pine bottom heads are authorized.

(3) Hoops shall be of at least three-ply construction with grain of alternate plies at right angles. Hoops shall be fastened to body shell so that ends butt or slightly gap by driving wire staples of at least 17-gauge metal through hoop and body and be clinched on the inside; staples spaced on not less than 3 inch centers. Each hoop shall be not less than ⅝ inch thickness by 2½ inches width for inside container not over 6½ gallons marked capacity, and not less than ⅜ inch thickness by 3 inches width for inside container not over 14 gallons marked capacity.

(4) Head retaining rings shall be of hardwood veneer not less than ¼ inch thickness by ⅝ inch width for inside container not over 6½ gallons marked capacity, and not less than ¼ inch thickness by ¾ inch width for inside container not over 14 gallons marked capacity. The head retaining rings shall be fastened to the body shell with wire staples clinched on the inside of not less than 17-gauge metal spaced on 3 inch centers, except that bottom ring may be fastened by 14-gauge wire staples spaced on 4 inch centers.

(b) Plywood drum for plastic inside container not over 5 gallons marked capacity shall comply with requirements of §178.198-1(a)(1) and (2) and §178.198-2(a).

(1) Body shells shall be of two-ply construction having a minimum thickness of ⅜ inch and with grain of outside ply parallel and grain of inner ply vertical to plane of the heads. Body shall be butt-jointed and fastened on the outside with wire staples of not less than 17-gauge metal driven through a metal strip not less than 28-gauge by 1½ inches width and each side of body joint. Staples shall be spaced not more than 1½ inches apart and clinched on the inside.

(2) Body heads shall be of at least three-ply construction with grain of alternate plies at right angles circled to fit snugly within the body shell. Each head shall have a minimum thickness of ⅜ inch.

(3) Hoops shall be of hardwood veneer, not less than 2¼ inches wide by ⅛ inch thick. Hoops shall be fastened to the body by 17-gauge staples on not less than three-inch centers and shall be overlapped not less than 3 inches.

(4) Head retaining rings shall be of hardwood veneer of ¼ inch thickness by ⅝ inch width except bottom rings may be two thicknesses, each ⅛ inch thickness by 1¾ inches width. Rings shall be fastened to body shell with wire staples of 17-gauge metal on not less than 3-inch centers and clinched on inner surface.

§ 178.198-3 Tests. (a) Samples taken at random with inner plastic container filled to marked capacity with water and closed as for use, shall be capable of withstanding prescribed tests without leakage from inside container or breakage of outside container that would be of such a nature as to contribute to potential failure of inner container. Tests shall be made of each size by each company starting production. The type test is as follows:

(1) One 4-foot drop onto solid concrete so as to strike diagonally on either chime.

(2) Additional tests as required by inside container specification.

§ 178.198-4 Marking on outside container. (a) Each outside container must be plainly marked with letters and figures at least ½ inch high applied by hot branding iron or dark colored printing ink with high pressure dies as follows:

(1) DOT-22C.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

SUBPART F

SPECIFICATIONS FOR FIBERBOARD BOXES, DRUMS, AND MAILING TUBES

§ 178.205 Specification 12B; fiberboard boxes.

§ 178.205-1 Compliance. (a) Required in all details.

§ 178.205-2 Definitions. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box, except recessed flanged heads, are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.205-3 Classification of board. (a) Fiberboard is hereby classified by strength[1] of completed board as in first column of the following table; weights specified in the table are the minimums authorized.

Classified strength[1] of completed board	Solid fiberboard—Minimum combined weight of component plies exclusive of adhesives (pounds per 1,000 sq. ft.)	Facings for corrugated fiberboard	
		Double-faced—Minimum combined weight of facings (pounds per 1,000 sq. ft.)	Double-wall—Minimum combined weight of facings including center liner (pounds per 1,000 sq. ft.)
175	143	75	
200	190	84	92
275	237	138	110
325	237	138	110
350	283	180	126
375	283	180	180
400	283	180	180
450	283	180	180

[1] Mullen or Cady test (minimum).

§ 178.205-4 Solid fiberboard. (a) To be 3-ply or more; both outer plies water resistant.

§ 178.205-5 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weigh not less than 26 pounds per 1000 square feet, all parts must be securely glued together throughout all contact areas.

§ 178.205-6 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples ⅝ x 0.019 inch in a cross section and not less than 7/16 inch wide.

§ 178.205-7 Tape. (a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the woof, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape, except as provided in § 178.205-11(d). Other tapes of equal strength and efficiency are authorized.

(b) Tape for closure of slotted containers complying with the following requirements is authorized when applied as prescribed in § 178.205-17(a)(3):

(1) Tape must be not less than 3 inches wide and shall be made of two sheets of 100 percent sulfate Kraft each not less than 30 pounds basis weight, reinforced with glass, sisal, or rayon fiber, combined with a laminant of asphalt or other material not affected by temperature extremes any more than would standard 180° F. to 200° F. softening point asphalt.

(2) Tape must be reinforced by lengthwise fibers spaced not more than an average of ½ inch apart, and by crosswise fibers spaced not less than an average of 2 per inch except that when a diamond pattern is employed for crosswise reinforcement, the spacing between the parallel sides of the diamond measured in the machine direction must be not more than 1 inch.

(3) Glass or sisal reinforced tape must have a minimum tensile strength in the machine direction of 75 pounds per inch of width and a minimum tensile strength in the cross direction of 45 pounds per inch of width; rayon reinforced tape must have a minimum tensile strength in the machine direction of 57 pounds per inch of width and a minimum tensile strength in the cross direction of 27 pounds per inch of width with elongation not exceeding 15 percent. Tensile tests on the finished product shall be made on a 3-inch width sample.

§ 178.205-8 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.205-9 Types authorized. (a) To be of solid or corrugated fiberboard of the following types, or as specifically provided for in § 178.205-19 to § 178.205-37.

(1) Slotted box; three-piece box without recessed ends; three-piece box of solid fiberboard with recessed ends; double-slide box; triple-slide box; telescope box, with sections of equal depth, or with covers, top or bottom or both, with 3 inches overlap. (See § 178.205-14(d) for boxes with single-flap closures.)

§ 178.205-10 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.205-11 Joints. (a) For solid and corrugated fiberboard slotted containers: Lapped 1½" from center of scoreline except as in § 178.205-12; stitched at 2½" intervals and within 1" of each end of joint; body joint must be double-stitched (2 parallel stitches) at each end of joint over 18" long.

(b) For corrugated fiberboard slotted containers only: One butt joint taped (see § 178.205-7) is authorized; 3 inch tape required for boxes over 30 pounds authorized gross weight and 2 inch tape for others.

(c) For triple and double slide boxes: Joints of all sides must be taped (see 178.205-7) or stitched; 3-inch tape required for boxes over 30 pounds authorized gross weight and 2-inch for others.

(d) For corrugated fiberboard only: One butt joint taped inside and outside with strips of one thickness of sulphate paper not less than 2 inches wide extending entire length of joint and firmly glued to box. For boxes not exceeding 65 pounds gross weight, outside strip of sulphate paper to be of basis weight not less than 60 pounds testing not less than 60 pounds and inside strip of sulphate paper to be of basis weight not less than 40 pounds testing not less than 40 pounds. For boxes exceeding 65 pounds gross weight, outside and inside with strips of sulphate paper which must each be of basis weight not less than 90 pounds testing not less than 90 pounds. Basis weight of paper shown is for 500 sheets, 24 x 36 inches.

(1) For glued lap joint, the sides of box forming joint must lap not less than 1½" and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

§ 178.205-12 Flanged heads. (a) Must have 4 flanges, at least 1" long above fillet, on each head. Recessed flanged heads not authorized for boxes of corrugated fiberboard.

§ 178.205-13 Seams which are to be stitched. (a) Overlap, if any, required to be at least 1½" from center of scoreline except as in § 178.205-12.

§ 178.205-14 Flap closures. (a) Fill-in pieces, of the same type fiberboard as used in construction of the container, are required where it is necessary to prevent an opening between the inner flaps, unless otherwise provided by paragraphs (b) and (c) of this section or by Part 173.

(b) If to be closed by adhesive, each inner flap must cover at least ⅓ of face; inner flaps must butt or have full overlap, or fill-in pieces must be used, unless otherwise provided by Part 173, except that fill-in pieces are not required when outer flaps have full overlap. Outer flaps must butt or have full overlap.

(c) In lieu of fill-in pieces between inner flaps which do not butt, the following is authorized when linings are not prescribed in § 178.205-16:

(1) Top and bottom pads the same dimensions as interior of container of solid or corrugated fiberboard at least 125 pound test (Mullen or Cady).

(2) Minimum combined weight of facings for corrugated fiberboard pads must be at least 52 pounds per thousand square feet.

(3) Minimum combined weight of component plies for solid fiberboard pads must be at least 114 pounds per thousand square feet, exclusive of adhesives.

(4) Complete inner box or boxes.

(d) Single-flap closures are authorized for boxes with one dimension not over 2"; each flap must be scored and form one of the small faces of the box and lap at least 5" on one of the largest faces.

§ 178.205-15 Linings (when prescribed by § 178.205-16). (a) Of 1-piece to extend around 4 faces with joint at center of 1 face and with 4 flanges, at least 1½" long, on each end (corners may be mitered) to bend over the other 2 faces; also 2 pads to cover the other 2 faces. Pads may be omitted if closing flaps afford 3 thicknesses throughout face. For boxes with 1 dimension not over 3", one of the widest flanges may be lengthened to cover entire face and lap 6" on the adjoining face and the other flanges and the pads may then be omitted.

§ 178.205-16 Authorized gross weight and parts required. (a) The authorized gross weight (when packed) and the parts required are as follows:

Authorized gross weight (pounds)	Strength of fiberboard (minimum) Mullen or Cady test						
	Solid board			Double-faced corrugated		Double-wall corrugated	
	Box	Lining[2]	Heads[1]	Box	Lining[2]	Box	Lining[2]
15	175	.....	[3]	175	.....	200	.....
30	200	.....	275	200	.....	200	.....
40	275	.....	350	275	.....	200	.....
	.....	.....	.....	200	175	.....	.....
55	325	.....	[3]	325	.....	275	.....
65[4]	375	.....	[3]	375	.....	.....	.....
	.....	.....	.....	275	175	275	.....
	275	175	350	200	200	.....	.....

[1] For recessed heads when used. In other cases same as for box.
[2] As prescribed in § 178.205-15. A complete box is acceptable in place of the lining.
[3] Recessed heads are not authorized.
[4] Except as otherwise authorized herein or by Part 173 of this chapter.

(b) Triple slide boxes authorized for gross weights as follows: Of board at least 175-pound test for 40 pounds; of board at least 200-pound test for 65 pounds.

§ 178.205-17 Closing for shipment. (a) Slotted container, by coating with adhesive the entire contact surfaces of closing flaps and fill-in pieces where required or as prescribed in subparagraphs (1), (2), or (3) of this paragraph.

(1) By stitching with staples as prescribed by § 178.205-6 at 2½" intervals along all seams (one 5" space allowed when necessary to permit use of stitching device); or with staples made of flat wire of hardness not less than equivalent of Rockwell B90, and not less than .037 inch thick and not less than .074 inch wide, with not less than 1¼ inch crown, may be spaced not more than 5 inches apart. Such staples may be used across center seam where outside flaps meet in lieu of on

For explanation of abbreviations and reference marks, see last page of this tariff.

both sides of center seam but need only be used where outside flaps overlay inner flaps; or staples made of acuate wire of hardness not less than equivalent of Rockwell B90, and not less than .027 inch thick and not less than .095 inch wide, with not less than 1 inch crown, may be spaced not more than 5 inches apart. Such stitches when spaced not more than 2½ inches apart may be used across center seam where outside flaps meet in lieu of on both sides of center seam but need only be used where outside flaps overlay inner flaps.

(2) For fiberboard boxes containing not more than 1 inside metal can not exceeding 1 gallon nominal capacity, and as otherwise authorized by Part 173, by application of 2 strips of pressure-sensitive tape not less than ½ inch in width, 1 strip to be placed approximately equal distance over the seam of abutting outer flaps, the other at a right angle to the first and spaced approximately equal distance on the closure face; strips must be of sufficient length to extend not less than 1 inch beyond score lines on side and end panels. Tape shall have a minimum tensile strength of 160 pounds per inch of width, minimum adhesion value of 18 ounces per inch of width; and minimum elongation of 12 percent at break, or having a minimum longitudinal tensile strength of not less than 240 pounds per inch of width, minimum adhesion value of 18 ounces per inch of width and a minimum elongation of 3 percent at break.

(3) For slotted containers only, reinforced tape complying with the requirements of § 178.205-7(b) is authorized for application over the center seam only. Tape must extend over the ends of box not less than 2 ½ inches.

(4) All closing flaps may be firmly glued with a hot-melt adhesive of 100 percent solid content of thermoplastic material which will maintain bond at temperature ranging from 20° F. below zero to 165° F. above zero. Adhesive must be applied in not less than eight stripes (except as specified below) on each inner flap, each stripe having a minimum width of 1/16-inch after compression. Stripes may not be more than 1½ inches apart and not less than four stripes must be applied on each side of center seam on each inner flap for full length of flap overlap area with one stripe not more than ½-inch from each side of center seam. If less than eight such stripes are applied on each inner flap, adhesive must cover and securely bond not less than 25 percent of flap contact area with bonded areas extending to within ½-inch or less of center seam.

(5) For regular slotted containers, pressure-sensitive tape is authorized for application over the center seams only and extending not less than two inches over the ends of the box. Tape must be not less than 2 inches wide and have a plastic film backing of polyester, polypropylene, or equivalent material. Tape must have a minimum tensile strength of 45 pounds per inch of width in the machine direction and not less than 55 pounds per inch of width in the cross direction and may not be affected by temperature extremes normally encountered during transportation. Boxes closed by means of this pressure-sensitive tape must be capable of passing performance tests prescribed in § 178.210-10.

(b) Double side boxes or triple side boxes, by coating the inner sides with adhesive, or by closing with reinforced tape capable of withstanding test prescribed by subparagraph (1) of this paragraph; for single-flap closures as authorized for boxes with one dimension not over 2 inches, the flaps must be fastened to the body with adhesive.

(1) Boxes selected at random, containing dummy contents similar to that to be shipped and packed to authorized gross weight, closed with reinforced tape across the ends and onto opposite side panels at least 2 inches, must be capable of withstanding a drop of each end from a height of 4 feet onto solid concrete without closure failure.

(c) Fiberboard boxes with covers extending over sides but not to bottom, covers resting on walls of box, or telescope boxes of equal depth section, covers extending to bottom, must be secured by one of the following methods:

(1) By not less than three metal straps, one length wise and others at right angles thereto.

(2) When cover extends not less than 3" over the walls of the box, by coating with adhesive the entire contact area of the cover.

(3) Telescope boxes having equal depth sections may be closed by application of reinforced water activated tape or pressure sensitive tape under conditions and for commodities as prescribed in Part 173.

(d) When metal straps are specified, boxes must be strapped with the required number; size at least ⅝" x 0.015".

§ 178.205-18 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-12B***

(1) Stars to be replaced by authorized gross weight (for example DOT-12B40, etc.).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) When metal straps are prescribed, boxes must be marked "..... (number) METAL STRAPS REQUIRED" just above or below the mark specified in paragraph (a)(1) of this section.

(4) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.205-18 must be at least ½" high; other markings must be legible.

§ 178.205-19 Special box; authorized only for contents in 1-gallon rectangular metal cans or cylindrical metal cans of 26 gauge material. (a) Must comply with this specification except as follows: Must be 1-piece type, of double-wall corrugated fiberboard at least 400-pound test with all three facings at least 135-pound test; to be marked "FOR 1-GAL. CYLINDRICAL OR RECTANGULAR CANS ONLY" near the D.O.T. specification mark; authorized gross weight 84 pounds.

§ 178.205-20 Special box; authorized only for pyroxylin in sheets, rods, or tubes. (a) Must comply with this specification except as follows: Must be of board at least 275-pound test with lining at least 200-pound test, all being double-faced corrugated fiberboard, 3 metal straps required (see §§ 178.205-17 and 178.205-18); authorized gross weight 90 pounds.

§ 178.205-21 Special box; authorized only for pyroxylin in sheets, rods, or tubes. (a) Must comply with this specification except as follows: Must be telescope type with wooden frame between the parts that telescope; authorized gross weight 90 pounds.

(b) Frame of group 3 or 4 wood ⅞" thick with lock corners glued.

	Group 3	
White elm	Pumpkin ash	Tupelo
Red gum	Black ash	Maple—soft or silver
Sycamore	Blackgum	
	Group 4	
Hard maple	Hackberry	White ash
Beech	Birch	Hickory
Oak	Rock elm	

(c) Telescoping parts of double-faced corrugated fiberboard at least 400-pound test with facings at least 180 pound per thousand square feet; each part of same depth as frame; outer part to have corners overlapped and securely fastened.

(d) Four metal straps required. Glued or stitched closure not required. (See §§ 178.205-17 and 178.205-18.)

§ 178.205-22 Special box; authorized only for motion-picture film in metal cans or strong cardboard or fiberboard boxes each containing not over 2,000 feet (approx.) of film. (a) Must comply with this specification except as follows:

(1) For one inside container. Must be of board at least 275-pound test for a 2,000-foot film and of board at least 200-pound test for a 1,000-foot film; lining and pads not required; closure by taping with strong paper tape authorized.

(2) For more than one inside container. Must be of 1-piece type; authorized gross weight 55 pounds when made of 325-pound test board, 65 pounds when made of 375-pound test board, and 75 pounds when made of 450-pound test board; interior packing required, of fiberboard at least 175-pound test, adequate to support inside containers in center of outside container; lining and top and bottom pads not required.

§ 178.205-23 Special box; authorized only for poisonous solids, class B, in 1-gallon metal cans. (a) Must comply with this specification except as follows: Must be 1-piece type, of double-wall corrugated fiberboard at least 400-pound test with all three facings at least 135-pound test; authorized gross weight 84 pounds.

§ 178.205-24 Special box; authorized only for fusees. (a) Must comply with the specification except that the box must be constructed of double faced corrugated fiberboard at least 400-pound test or solid fiberboard of same strength. Lining and pads are not required. Authorized gross weight is 75 pounds. For fusees equipped with spikes, box-end protection as required in § 173.154a(a)(2) of this chapter must be provided.

§ 178.205-25 Special box; authorized only for wet electric storage batteries of the glass cell type or synthetic resin (plastic) type. (a) Must comply with this specification except as follows: Must be one-piece type of double wall corrugated fiberboard at least 275-pound test; must have linings to extend around four faces with joint in center of or at end of one face but at no time may joint of box and joint of liner coincide; lining to be of sufficient height to support vertical scorings of box; lining to be made of double wall corrugated board with minimum test of 275 pounds, top of battery or batteries to be protected by trays or scored sheets of corrugated fiberboard having minimum test of 200 pounds; bottom of batteries to be protected by minimum of one excelsior pad or one double wall corrugated fiberboard pad; when one or more batteries are packed in same carton, batteries must be separated by a minimum of one thickness of double wall corrugated fiberboard having minimum test of 275 pounds; authorized gross weight 95 pounds.

§ 178.205-26 Special box; authorized only for one 5-gallon rectangular metal can, spec. 2F; gross weight not to exceed 65 pounds. (a) Must comply with this specification except as follows: Must be 1-piece type of double-wall corrugated fiberboard at least 350-

pound test, must have top and bottom pads of double-wall corrugated fiberboard at least 350-pound test, pads to be double-flanged with flanges extending down the inside of carton at least four inches.

§ 178.205-27 Special box; authorized only for not more than two square inside metal cans each containing not over 200 feet (approx.) motion-picture film; gross weight not to exceed 15 pounds. (a) Must comply with this specification except as follows: Must be double-slide type, both sides of double-faced corrugated fiberboard at least 200-pound test, closure by taping with strong paper tape authorized.

§ 178.205-28 Special box; authorized only for wet electric storage batteries of aluminum-case type, asphaltum composition impregnated rubber, synthetic resin (plastic), or wooden-battery-box type, having a net weight greater than 75 pounds. (a) Must comply with this specification except as follows: Must be one-piece type of double wall corrugated fiberboard at least 400-pound test, or solid fiberboard testing at least 400 pounds; boxes may or may not have hand holes provided for in ends of box provided same will not materially weaken box; top of battery to be protected by wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 200 pounds, top protection must bear evenly on connectors of battery to facilitate stacking of batteries; bottom of batteries to be protected by minimum of one excelsior pad or double wall corrugated fiberboard pad; sides and ends to be cushioned between batteries and walls of box; combined thickness of cushioning material and walls of box must be not less than ½", cushioning to be of excelsior pads, corrugated fiberboard or other suitable cushioning material; no more than one battery to be packed per box, authorized gross weight 190 pounds.

§ 178.205-29 Special box; authorized only for ship distress signals in inside metal containers of not less than 24 gauge metal. (a) Must comply with this specification except as follows: Must be one-piece type of double faced corrugated board at least 350-pound test, with top and bottom pads of the same material. Gross weight not to exceed 95 pounds.

§ 178.205-30 Special box; authorized only for toy torpedoes. (a) Must comply with this specification and the following: Must be one-piece type fabricated of double-wall corrugated fiberboard having minimum strength of 350 pounds per square inch, Mullen or Cady test. Box shall be provided with double-face lining on all sides and top and bottom pads. Gross weight not to exceed 25 pounds.

§ 178.205-31 Special box; authorized only for commodities where spec. 12B is prescribed in Part 173. (a) Box shall have not more than 1 inside glass container having screw cap closure or metal container not exceeding 32 ounces or 2 pounds net weight, which must fit snugly or be adequately cushioned to prevent movement. Box shall comply with this specification and be of one-piece folder type, so designed as to form double thickness of corrugated board on top, bottom, and ends. Fiberboard used in construction of the box shall have a minimum strength of 200 pounds per square inch, but for gross weight exceeding 8 pounds, the box must be constructed of at least 275-pound per square inch test fiberboard (Mullen or Cady). Closure must be equal in efficiency to that prescribed in § 178.205-17.

§ 178.205-32 Special box; authorized only for electrolyte (acid), corrosive battery fluid, hydrochloric acid mixtures of not over 28 percent strength, or cleaning compounds, liquid, containing not over 28 percent hydrochloric (muriatic) acid. (a) Box shall have not more than 12 inside glass bottles, with acid-proof closures, of not over 32 ounces capacity each. Box shall comply with this specification and be constructed of at least 275-pound test (Mullen or Cady) double-wall corrugated fiberboard and be equipped with at least 125-pound test (Mullen or Cady) double-faced corrugated fiberboard scored sheets so designed as to provide two thicknesses of corrugated fiberboard between each bottle and one thickness between bottles and sides and ends of box. Top and bottom pads of the same size as the top and bottom area of the box and of at least 125-pound test (Mullen or Cady) double-faced corrugated board are required or box shall comply with this specification and be constructed of at least 325-pound test (Mullen or Cady) double-faced corrugated board and be equipped with at least 200-pound test (Mullen or Cady) corrugated fiberboard ½ inch extended cell slotted partitions so designed as to provide a void space between the ends and sides of outside box and the inside cell partition and shall be provided with top and bottom pads, of the same area as the box, of at least 200-pound test (Mullen or Cady) double-faced corrugated fiberboard.

§ 178.205-33 Special box; authorized only for electrolyte (acid) and alkaline corrosive battery fluid packed with storage batteries. (a) Box shall be constructed of corrugated fiberboard having strength of not less than 200 pounds per square inch, Mullen or Cady test for maximum authorized gross weight not over 65 pounds. Top and bottom pads and fill-in pieces are not required when inner flaps do not meet. Box must otherwise comply with this specification. (See § 173.258(a)(3).)

§ 178.205-34 Special box; authorized only for a polyethylene, or other suitable plastic, tight-fitting inside container having a minimum wall thickness of 0.015 inch and so designed as to maintain its configuration when standing empty and open. (a) Box shall comply with this specification except that top of box shall be closed by means of slotted flaps so arranged as to provide protection for the neck of the inside container and be fitted with fill-in pieces as necessary; equally efficient closures and container neck protectors are authorized. Complete package, closed as for shipment with inside container filled to rated capacity with water, must be capable of withstanding 2 drops from a height of 4 feet onto solid concrete without leakage or serious rupture of box. Authorized gross weight not over 65 pounds.

§ 178.205-35 Special box; authorized only for aircraft type wet electric storage batteries. (a) Box shall comply with this specification and shall be constructed of at least 275-pound test double-faced corrugated fiberboard. Inside corrugated fiberboard cushioning shall be provided as necessary to prevent short-circuits, breakage under normal conditions of transportation, and superimposed weights on tanks, covers, or other parts weaker than the battery case. Not more than one wet electric storage battery shall be packed in a box and gross weight shall not exceed 85 pounds.

§ 178.205-36 Special box; authorized only for an inside polyethylene container, spec. DOT-2U, not over 5 gallons capacity. (a) Box shall comply with this specification except as provided herein, and shall have glued closure flaps only. Inner and outer top closure flaps may have suitably sized holes for access to the closure of the polyethylene container. The diameter of these holes must be less than the diameter of a metal plate inserted between the flaps to which polyethylene closure shall be attached.

§ 178.205-37 Special box; authorized polyethylene or other suitable plastic bags for packaging of electrolyte (acid) or alkaline corrosive battery fluid only. (a) Box must comply with this specification except as follows: Box must be one-piece construction of slotted style and may have die-cut areas of minimum size to provide access to an inside closure part. Box must contain one multiwall bag made of polyethylene or other suitable plastic of sufficient size and capacity to be capable of coming into contact with all of the interior surfaces of the box when filled. Each ply of the bag must be formed from virgin film not less than 0.003 inch thick. Joints must be heat sealed and not less than ¼-inch wide.

(b) Boxes must be center special slotted style, or regular slotted style. If any metal is used in the box construction, full liners and top and bottom pads are required. Any metal closure for a discharge tube must be installed so as to prevent contact with the polyethylene bag. Discharge tubes must be plugged or heat sealed. Maximum volumetric capacity must not exceed 5 gallons (nominal).

(1) For boxes having capacities of 6 quarts (nominal) or less, fiberboard of at least 200-pound test is required for construction.

(2) For boxes having capacities in excess of 6 quarts, fiberboard of at least 350-pound test is required. Pads are required for regular slotted style boxes and must be of fiberboard of at least 350-pound test or other material that will provide equivalent protection.

(c) Representative samples of completely assembled boxes, with all parts closed as for shipment, must be capable of withstanding the following tests without leakage or serious damage to boxes. No one box shall be expected to withstand more than one of the following tests:

(1) Box with inside container filled to shipping capacity with a solution which is compatible with the plastic bags must be dropped twice from a height of 4 feet onto concrete, one drop to be made with the box positioned so as to strike flat on the box bottom, the other drop to be made so box will strike flat on the largest face.

(2) Box with inside container filled to shipping capacity with a solution which is compatible with the plastic bags, and remains liquid at 0° F. or lower shall be dropped once from a height of 4 feet onto concrete, when container and contents are at or below 0° F. Box shall be positioned so as to strike flat on the box bottom.

(3) Box with inside container filled as prescribed in paragraph (c)(1) of this section shall be capable of withstanding a vibration test by placing the container on the vibration table anchored in such a manner that all horizontal motion shall be restricted and only vertical motion allowed. The test shall be performed for one hour using an amplitude of one inch at a frequency that causes the test container to be raised from the floor of the table to such a degree that a piece of paper or flat strap or tape can be passed between the table and the container.

(d) Tests to be conducted by or for each plant assembling and filling boxes at the initial start of production and at intervals of four months thereafter. Samples last tested must be dated with date of test and must be retained until further tests are made.

§ 178.206 Specification 12C; fiberboard boxes.

§ 178.206-1 Compliance. (a) Required in all details.

§ 178.206-2 Definitions. (a) Terms such as "200-pound test" means minimum strength, Mullen or Cady test.

For explanation of abbreviations and reference marks, see last page of this tariff.

(b) "Joints" are where edges of parts of box, except recessed flanged heads, are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.206-3 Classification of board. (a) Fiberboard is hereby classified as strength of completed board as in first column of the following table; weights specified in the table are the minimums authorized.

Classified strength[1] of completed board	Solid fiberboard—Minimum combined weight of component plies exclusive of adhesives (pounds per 1,000 sq. ft.)	Facings for corrugated fiberboard	
		Double-faced—Minimum combined weight of facings (pounds per 1,000 sq. ft.)	Double wall—Minimum combined weight of facings including center liner (pounds per 1,000 sq. ft.)
175	143	75	.....
200	190	84	92
275	237	138	110
350	283	190	126

[1] Mullen or Cady test (minimum).

§ 178.206-4 Solid fiberboard. (a) To be 3-ply or more; both outer plies water resistant.

§ 178.206-5 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weight not less than 26 pounds per 1000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.206-6 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat sheet staples 3/32 x 0.019 inch in cross section and not less than 7/16-inch wide.

§ 178.206-7 Tape. (a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24 x 36 inches); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape, except as provided in § 178.206-11(d).

(b) Tape for closure of slotted containers complying with the following requirements is authorized when applied as prescribed in § 178.206-17(a)(3):

(1) Tape must be not less than 3 inches wide and shall be made of two sheets of 100 percent sulphate Kraft each not less than 30 pounds basis weight, reinforced with glass, sisal, or rayon fiber, combined with a laminant of asphalt or other material not affected by temperature extremes any more than would standard 180° to 200° softening point asphalt.

(2) Tape must be reinforced by lengthwise fibers spaced not more than an average of ½ inch apart, and by crosswise fibers spaced not less than an average of 2 per inch except that when a diamond pattern is employed for crosswise reinforcement, the spacing between the parallel sides of the diamond measured in the machine direction must be not more than 1 inch.

(3) Glass or sisal reinforced tape must have a minimum tensile strength in the machine direction of 75 pounds per inch of width and a minimum tensile strength in the cross direction of 45 pounds per inch of width; rayon reinforced tape must have a minimum tensile strength in the machine direction of 57 pounds per inch of width and a minimum tensile strength in the cross direction of 27 pounds per inch of width with elongation not exceeding 15 percent. Tensile tests on the finished product shall be made on a 3-inch width sample.

§ 178.206-8 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.206-9 Types authorized. (a) To be of solid or corrugated fiberboard of the following types:

(1) Slotted box; three-piece box without recessed ends; three-piece box of solid fiberboard with recessed ends; double-slide box; triple-slide box; telescope box, with sections of equal depth, or with covers lap or bottom or both, with 3-inch overlap. (See § 178.206-14(d) for boxes with single-flap closures.)

§ 178.206-10 Forming. (a) Parts must be cut true to size, and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.206-11 Joints. (a) For solid and corrugated fiberboard slotted containers: Lapped 1½" from center of scoreline except as in § 178.206-12, stitched at 2½" intervals and within 1" of each end of joint; body joint must be double-stitched (2 parallel stitches) at each end of joint over 18" long.

(b) For corrugated fiberboard slotted containers only: One butt joint taped (see § 178.206-7) is authorized, 3 inch tape required for boxes over 30 pounds authorized gross weight and 2 inch tape for others.

(c) For triple and double slide boxes: Joints of all sides must be taped (see § 178.206-7) or stitched.

(d) For corrugated fiberboard only: One butt joint taped inside and outside with strips of one thickness of sulphate paper not less than 2 inches wide extending entire length of joint and firmly glued to box. For boxes not exceeding 65 pounds gross weight, outside strip of sulphate paper to be of basis weight not less than 60 pounds testing not less than 60 pounds and inside strip of sulphate paper to be of basis weight not less than 40 pounds testing not less than 40 pounds. For boxes exceeding 65 pounds gross weight, outside and inside with strips of sulphate paper which must each be of basis weight not less than 90 pounds testing not less than 90 pounds. Basis weight of paper shown is 500 sheets, 24 x 36 inches.

(1) For glued lap joint, the sides of box forming joint must lap not less than 1¼" and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

§ 178.206-12 Flanged heads. (a) Must have 4 flanges, at least 1" long above fillet, on each head. Recessed flanged heads not authorized for boxes of corrugated fiberboard.

§ 178.206-13 Seams which are to be stitched. (a) Overlap, if any, required to be at least 1½" from center of scoreline except as in § 178.206-12.

§ 178.206-14 Flap closures. (a) Fill-in pieces, of the same type fiberboard as used in construction of the container, are required where it is necessary to prevent an opening between the inner flaps, unless otherwise provided by Part 173.

(b) If to be closed by adhesive, each inner flap must cover at least ⅓ of face; inner flaps must butt or have full overlap, or fill-in pieces must be used, unless otherwise provided by Part 173, except that fill-in pieces are not required when outer flaps have full overlap. Outer flaps must be reasonably close together at the center seam or have full overlap.

(c) In lieu of fill-in pieces between inner flaps which do not butt, the following is authorized when linings are not prescribed in § 178.206-16:

(1) Top and bottom pads the same dimensions as interior of container of solid or corrugated fiberboard at least 125 pound test (Mullen or Cady).

(2) Minimum combined weight of facings for corrugated fiberboard pads must be at least 52 pounds per thousand square feet.

(3) Minimum combined weight of component plies for solid fiberboard pads must be at least 114 pounds per thousand square feet, exclusive of adhesives.

(4) Complete inner box or boxes.

(d) Single-flap closures are authorized for boxes with one dimension not over 2"; each flap must be scored and form one of the small faces of the box and lap at least 5" on one of the largest faces.

§ 178.206-15 Linings (when prescribed). (a) Of 1-piece to extend around 4 faces with joint at center of 1 face and with 4 flanges, at least 1½" long, on each end (corners may be mitered) to bend over the other 2 faces; also 2 pads to cover the other 2 faces. Pads may be omitted if closing flaps afford 3 thicknesses throughout face. For boxes with 1 dimension not over 3", one of the widest flanges may be lengthened to cover entire face and lap 6" on the adjoining face and the other flanges and the pads may then be omitted.

§ 178.206-16 Authorized gross weight and parts required. (a) Authorized gross weight (when packed) and parts required as follows:

Authorized gross weight (pounds)	Strength of fiberboard (minimum) Mullen or Cady test						
	Solid board		Heads[1]	Double-faced corrugated		Double-wall corrugated	
	Box	Lining[2]		Box	Lining[2]	Box	Lining[2]
30	175	.....	200	175	.....	200	.....
40	200	.....	275	200	.....	200	.....
65[4]	275	.....	350	275 200	 175	275	.....

[1] For recessed heads when used. In other cases same as for box.

[2] As prescribed in § 178.206-15. A complete box is acceptable in place of the lining.

[3] Facings at least 138 pounds per thousand square feet or inner facing at least 42 pounds and outer facing at least 90 pounds per thousand square feet.

[4] Except as otherwise authorized by Part 173.

(b) Triple slide boxes of double-faced corrugated fiberboard of at least 175-pound test are also authorized for 65 pounds gross weight.

§ 178.206-17 Closing for shipment. (a) Slotted container, by coating with adhesive the entire contact surfaces of closing flaps and fill-in pieces where required or as prescribed in subparagraphs (1), (2), or (3) of this paragraph.

(1) By stitching with staples as prescribed by § 178.206-6 at 2½" intervals along all seams (one 5" space allowed when necessary to permit use of stitching device); or with staples made of flat wire of hardness not less than equivalent of Rockwell B90, and not less than .037 inch thick and not less than .074 inch wide, with not less than 1⅛ inch crown, may be spaced not more than 5 inches apart. Such staples may be used across center seam where outside flaps meet in lieu of on both sides of center seam but need only be used where outside flaps overlay inner flaps; or staples made of accurate wire of hardness not less than equivalent of Rockwell B90, and not less than .027 inch thick and not less than .095 inch wide, with not less than 1 inch crown, may be spaced not more than 5 inches apart. Such stitches when spaced not more than 2½ inches apart may be used across center seam where outside flaps meet in lieu of on both sides of center seam but need only be used where outside flaps overlay inner flaps.

(2) For fiberboard boxes containing not more than 1 inside metal can not exceeding 1 gallon nominal capacity, by application of 2 strips of pressure-sensitive tape not less than ½ inch in width, 1 strip to be placed approximately equal distance over the seam of abutting outer flaps, the other at a right angle to the first and spaced approximately equal distance on the closure face; strips must be of sufficient length to extend not less than 1 inch beyond score lines on side and end panels. Tape shall have a minimum tensile strength of 160 pounds per inch of width; minimum adhesion value of 18 ounces per inch of width; and minimum elongation of 12 percent at break, or having a minimum longitudinal tensile strength of not less than 240 pounds per inch of width; minimum adhesion value of 18 ounces per inch of width and a minimum elongation of 3 percent at break.

(3) For slotted containers only, reinforced tape complying with the requirements of § 178.206-7(b) is authorized for application over the center seam only. Tape must extend over the ends of box not less than 2 ½ inches.

(b) Double slide boxes or triple slide boxes, by coating with adhesive the inner sides; for single-flap closures as authorized for boxes with one dimension not over 2", the flaps must be fastened to the body with adhesive.

(c) Fiberboard boxes with covers extending over sides but not to bottom, covers resting on walls of box, or telescope boxes of equal depth section, covers extending to bottom, must be secured by one of the following methods:

(1) By not less than three metal straps, one lengthwise and others at right angles thereto.

(2) When cover extends not less than 3" over the walls of the box, by coating with adhesive the entire contact area of the cover.

(d) When metal straps are specified, boxes must be strapped with the required number, size at least ⅝" x 0.015".

§ 178.206-18 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-12C***

(1) Stars to be replaced by authorized gross weight (for example, DOT-12C65, etc.).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) When metal straps are prescribed, boxes must be marked "..... (number) **METAL STRAPS REQUIRED**" just above or below the mark specified in (a)(1) of this section.

(4) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.206-18 must be at least ½" high; other markings must be legible.

§ 178.206-19 Special box; authorized only for polyethylene, or other suitable plastic, tight-fitting inside containers having minimum wall thickness of 0.015 inch and so designed as to maintain their configuration when standing empty and open. (a) Box shall comply with this specification except that top of box shall be closed by means of slotted flaps so arranged as to provide protection for the neck of the inside container and be filled with fill-in pieces as necessary. Top may have die-cut area of suitable size to provide for easy opening. Complete package, closed as for shipment, with inside container filled to rated capacity with water, must be capable of withstanding 2 drops from a height of 4 feet onto solid concrete without leakage or serious rupture of box. Authorized gross weight not over 65 pounds. (See § 173.257(a)(6).)

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§ 178.207 Specification 12D; fiberboard boxes.

§ 178.207-1 Compliance. (a) Required in all details.

§ 178.207-2 Definitions. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of the box are visible, except joints, when box is closed.

§ 178.207-3 Classification of board. (a) Fiberboard is hereby classified by strength of completed board as in first column of the following table; weights specified in the table are the minimums authorized.

Classified strength[1] of completed board	Facings for double-wall corrugated fiberboard—Minimum combined weight of facings including center liner (pounds per 1,000 sq ft)
275	110
350	126

[1] Mullen or Cady test (minimum).

§ 178.207-4 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets at least 0.009" thick and weigh not less than 26 pounds per 1000 square feet; all parts securely glued together throughout all contact areas.

§ 178.207-5 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples ⅜₂ × 0.019 inch in cross section and not less than 7/16 inch wide.

§ 178.207-6 Tape. (a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" × 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape, except as provided in § 178.207-10 (d).

(b) Tape for closure of slotted containers complying with the following requirements is authorized when applied as prescribed in § 178.207-17 (a)(3):

(1) Tape must be not less than 3 inches wide and shall be made of two sheets of 100 percent sulfate Kraft each not less than 30 pounds basis weight, reinforced with glass, sisal, or rayon fiber, combined with a laminant of asphalt or other material not affected by temperature extremes any more than would standard 180° to 200° softening point asphalt.

(2) Tape must be reinforced by lengthwise fibers spaced not more than an average of ½ inch apart, and by crosswise fibers spaced not less than an average of 2 per inch except that when a diamond pattern is employed for crosswise reinforcement, the spacing between the parallel sides of the diamond measured in the machine direction must be not more than 1 inch.

(3) Glass or sisal reinforced tape must have a minimum tensile strength in the machine direction of 75 pounds per inch of width and a minimum tensile strength in the cross direction of 45 pounds per inch of width; rayon reinforced tape must have a minimum tensile strength in the machine direction of 57 pounds per inch of width and a minimum tensile strength in the cross direction of 27 pounds per inch of width with elongation not exceeding 15 percent. Tensile tests on the finished product shall be made on a 3-inch width sample.

§ 178.207-7 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side, when all results but 4 show prescribed strength the board is acceptable.

(4) Double-pop tests may be disregarded.

§ 178.207-8 Types authorized. (a) To be of double-wall corrugated fiberboard of the following types:

(1) Slotted box; three piece box without recessed ends; double-slide box; triple-slide box; telescope box, with sections of equal depth, or with covers, top or bottom or both, with 3 inch overlap.

§ 178.207-9 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.207-10 Joints. (a) For slotted containers: Lapped 1½" from center of scoreline except as in § 178.207-11; stitched at 2½" intervals and within 1" of each end of joint; body joint must be double-stitched (2 parallel stitches) at each end of joint over 18" long.

(b) For slotted containers only: One butt joint taped (see § 178.207-6) is authorized; 3 inch tape required.

(c) For triple and double side boxes: Joints of all sides must be taped (see § 178.207-6) or stitched.

(d) One butt joint taped inside and outside with strips of one thickness of sulphate paper not less than 2 inches wide extending entire length of joint and firmly glued to box. For boxes not exceeding 65 pounds gross weight, outside strip of sulphate paper to be of basis weight not less than 60 pounds testing not less than 60 pounds and inside strip of sulphate paper to be of basis weight not less than 40 pounds testing not less than 40 pounds. For boxes exceeding 65 pounds gross weight, outside and inside with strips of sulphate paper which must each be of basis weight not less than 90 pounds testing not less than 90 pounds. Basis weight of paper shown is for 500 sheets, 24 × 36 inches.

(1) For glued lap joint, the sides of box forming joint must lap not less than 1¼" and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

§ 178.207-11 Flanged heads. (a) Must have 4 flanges, at least 1" long above fillet, on each head. Recessed flanged heads not authorized.

§ 178.207-12 Seams which are to be stitched. (a) Overlap, if any, required to be at least 1½" from center of scoreline except as in § 178.207-11.

§ 178.207-13 Flap closures. (a) Fill-in pieces, of the same type fiberboard as used in construction of the container, are required where it is necessary to prevent an opening between the inner flaps.

(b) If to be closed by adhesive, each inner flap must cover at least ⅓ of face; inner flaps must butt or have full over-lap, or fill-in pieces must be used, except that fill-in pieces are not required when outer flaps have full overlap. Outer flaps must butt or have full overlap.

§ 178.207-14 Linings (when prescribed). (a) Of 1 piece to extend around 4 faces with joint at center of 1 face and with 4 flanges, at least 1½" long, on each end (corners may be mitered) to bend over the other 2 faces; also 2 pads to cover the other 2 faces. Pads may be omitted if closing flaps afford 3 thicknesses throughout face. For boxes with 1 dimension not over 3", one of the widest flanges may be lengthened to cover entire face and lap 6" on the adjoining face and the other flanges and the pads may then be omitted.

§ 178.207-15 Authorized gross weight and parts required. (a) Authorized gross weight (when packed) and parts required as follows:

(1) For authorized gross weight not over 25 pounds, box must be constructed of at least 275-pound test double-wall corrugated fiberboard with liners and top and bottom pads, or a complete inner box, of same material.

(2) For authorized gross weight over 25 pounds but not exceeding 75 pounds, inside containers must be packed in boxes of at least 275-pound test double-wall corrugated fiberboard and these packages packed in an outside box of at least 350-pound test double-wall corrugated fiberboard.

§ 178.207-16 Test for completed package. (a) The completed package closed as for shipment must be capable of withstanding a drop of 4 feet to solid concrete without breakage of the inside containers.

§ 178.207-17 Closing for shipment. (a) Slotted container, by coating with adhesive the entire contact surfaces of closing flaps and fill-in pieces, or as prescribed in subparagraphs (1), (2), or (3) of this paragraph.

(1) By stitching at 2½" intervals along all seams (one 5" space allowed when necessary to permit use of stitching device).

(2) For fiberboard boxes containing not more than 1 inside metal can not exceeding 1 gallon nominal capacity, by application of 2 strips of pressure-sensitive tape not less than ½ inch in width, 1 strip to be placed approximately equal distance over the seam of abutting outer flaps, the other at a right angle to the first and spaced approximately equal distance on the closure face; strips must be of sufficient length to extend not less than 1 inch beyond score lines on side and end panels. Tape shall have a minimum tensile strength of 160 pounds per inch of width; minimum adhesion value of 18 ounces per inch of width; and minimum elongation of 12 percent at break, or having a minimum longitudinal tensile strength of not less than 240 pounds per inch of width; minimum adhesion value of 18 ounces per inch of width and a minimum elongation of 3 percent at break.

(3) For slotted containers only, reinforced tape complying with the requirements of § 178.207-6(b) is authorized for application over the center seam only. Tape must extend over the ends of box not less than 2 ½ inches.

(b) Double side boxes or triple side boxes, by coating with adhesive the inner sides; for single-flap closures as authorized for boxes with one dimension not over 2", the flaps must be fastened to the body with adhesive.

(c) Fiberboard boxes with covers extending over sides but not to bottom, covers resting on walls of box, or telescope boxes of equal depth section, covers extending to bottom, must be secured by one of the following methods:

(1) By not less than three metal straps, one lengthwise and others at right angles thereto.

(2) When cover extends not less than 3" over the walls of the box, by coating with adhesive the entire contact area of the cover.

(d) When metal straps are specified, boxes must be strapped with the required number; size at least ½" × 0.015".

§ 178.207-18 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-12D***

(1) Stars to be replaced by authorized gross weight (for example, DOT-12D65, etc.).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) When metal straps are prescribed, boxes must be marked "..... (number) METAL STRAPS REQUIRED" just above or below the mark specified in paragraph (a)(1) of this section.

(4) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.207-18 must be at least ½" high; other markings must be legible.

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§ 178.208 Specification 12E; fiberboard boxes.

§ 178.208-1 Compliance. (a) Required in all details.

§ 178.208-2 Definitions. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box, except recessed flanged heads, are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.208-3 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weigh not less than 26 pounds per 1000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.208-4 Tape. (a) Coated with glue at least equal to No. 1¼ Peter Cooper standard. Cloth tape of strength, across woof, at least 70 units, Eimendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24 × 36 inches); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.208-5 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) Double-pop tests may be disregarded.

§ 178.208-6 Type authorized. (a) Corrugated fiberboard with one-piece body with separate flanged heads. Box is authorized only for 1 or 2 rectangular metal inside containers of not over 5 gallons capacity each.

§ 178.208-7 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.208-8 Joints. (a) Body. Each end of body must have four flanges, creased to bend over outside of body, at least 2½" long beyond crease.

(b) Butt joint. One butt joint taped is authorized; 3-inch tape required.

§ 178.208–9 Flanged heads. (a) Each head must have four flanges, one on each edge, creased to bend over outside body of the box and then under the body flanges, of length at least 5 inches exclusive of creases.

§ 178.208–10 Authorized gross weight (when packed) and parts required. (a) Board for outside container must be corrugated fiberboard at least 400–pound test, minimum combined weight of component plies, exclusive of adhesives, 180 pounds per 1000 square feet; body must be double-wall board; heads may be double-faced board. Authorized gross weight 110 pounds.

§ 178.208–11 Closing for shipment. (a) Boxes must be closed by applying heads with head-flanges tucked under body-flanges and then fastening each head in place with a flat steel strap, at least ⅝" x 0.015", extending around the 4 sides of the body and securely sealed.

§ 178.208–12 Marking. (a) Each box must be marked as follows:

(1) DOT–12E110.

(i) This marking shall be enclosed by a rectangle.

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) When metal straps are prescribed, boxes must be marked "..... (number) Metal Straps Required" just above or below the mark specified in paragraph (a)(1) of this section.

(4) Size of markings: Specification markings specified in paragraph (a)(1) of this section must be at least ½ inch high. All markings must be legible.

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§ 178.209 Specification 12H; fiberboard boxes.

§ 178.209–1 Compliance. (a) Required in all details.

§ 178.209–2 Definitions. (a) Terms such as "200–pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.209–3 Classification of board. (a) Fiberboard is hereby classified by strength[1] of completed board as in first column of the following table; weights specified in the table are the minimum authorized.

Classified strength[1] of completed board	Facings for corrugated fiberboard	
	Double-faced—Minimum combined weight of facings (pounds for 1,000 sq. ft.)	Double-wall—Minimum combined weight of facings including center liner (pounds per 1,000 sq. ft.)
275	138	110
325	138	110
350	180	126
375	180	180
400	180	180
450	180	180

[1] Mullen or Cady test (minimum).

§ 178.209–4 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weight not less than 26 pounds per 1000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.209–5 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples 3/32 x 0.019 inch in cross section and not less than 7/16 inch wide. Materials used must be at least equivalent to copper coated steel in nonsparking quality.

§ 178.209–6 Tape. (a) Used for manufacturers' joints must be coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.209–7 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength, the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.209–8 Type authorized. (a) Shall be corrugated fiberboard, telescoping type, 1–piece, 2–piece or 3–piece construction without recessed heads, as follows:

(1) Box to consist of top and bottom sections divided equally or unequally and inner lining tube. The lining tube must be staple stitched to the lower section of the box to give in effect a 2–piece box. (See § 178.209–11.)

(2) Box is to consist of full depth top and bottom sections completely telescoping. No inner lining tube is required. Four variations are authorized, the first is with the bottom slotted on the ends and the cover slotted on the sides; the second, with both the cover and bottom slotted on the sides; the third, with the bottom slotted on the sides and the cover slotted on the ends; and the fourth, with the sides and ends (both covers and bottom) not slotted, manufacturer's joint a side lap glued or stapled to end, closing flaps to form top and bottom of box with side closing flaps cut and overlapping.

Note 1: Hand-holes oval in shape, not more than 1 inch in width by 3 inches in length, and horizontal with top score line, are authorized in the ends of the top section of the boxes.

(3) Box to consist of 1–piece, 2–piece or 3–piece, without recessed heads, fitted with lining tube as prescribed in § 178.209–11, except that lining tube is not required for boxes used for shipment of electric blasting caps packed in accordance with § 173.66(g)(1). When outer flaps butt, inner flaps must also butt, except 1–piece with tube or 2–piece fully telescoping ¼ slotted style may have outer flaps that overlap a minimum of 2 inches to and including full overlap, and inner flaps may be of same length as outer flaps.

(4) Three–piece box without recessed ends. Outer flap may be full lap style with a 3–inch or longer tuck. With the full lap style, the inner end flaps must have a minimum length of 4 inches with or without hand holes.

§ 178.209–9 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.209–10 Joints. (a) Lapped 1¼" and stitched at 2½" intervals and within 1" of each end of joint; except for full depth telescope style boxes, body joints must be double-stitched (two parallel rows of stitches).

(b) For glued lap joint, the sides of box forming joint must lap not less than 1¼" and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

(c) For lining tubes only, one butt joint taped (see § 178.209–6) tape not less than 3" wide is authorized.

§ 178.209–11 Authorized gross weight and parts required. (a) Box shall be corrugated fiberboard at least 275 pound test. Tubes, when required, shall be of solid fiberboard at least 200–pound test, or of corrugated fiberboard of at least 275–pound test, with adjoining edges stitched, taped, or glued.

(b) Authorized gross weight is 65 pounds.

§ 178.209–12 Closing for shipment. (a) By any method capable of withstanding tests prescribed by § 178.209–16 without failure.

§ 178.209–13 Marking. (a) On each container. Symbol in rectangle as follows:

DOT–12H**

(1) Stars to be replaced by authorized gross weight (for example DOT–12H65).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.209–13 must be at least ½" high; other markings must be legible.

§ 178.209–14 Special Tests. (a) By whom and when. By or for each plant making the boxes, at beginning of manufacture and at six-month intervals thereafter, on the largest size by weight. Smaller sizes need not be tested if they have the same or equivalent construction.

§ 178.209–15 Material. (a) Box material must comply with requirements of §§ 178.209–3, 178.209–4, 178.209–7, 178.209–11, and the following:

(b) Box material must have test strength and moisture content not over 30 percent as follows:

(1) Box material must test at least 200 pounds per square inch immediately after exposure for 3 days to 90 percent relative humidity at not less than 70° nor more than 75° F.

(2) Box material must test at least 100 pounds per square inch immediately after it has been in contact with water for 3 hours under 3" head at not less than 70° nor more than 75° F.

Note: The test shall be conducted on a sample no greater than 6 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3 inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6 inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable).

§ 178.209-16 Completed container. (a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent relative humidity at not less than 70° nor more than 75° F; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in the same manner as for shipment.

(1) Three loaded samples to be tested. Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½".

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of the two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.

(7) A flatwise drop on one of the medium faces (usually side 2 or 4).

(8) A flatwise drop on the opposite medium face.

(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).

(10) A flatwise drop on the opposite large face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner on which the first drop was made, on corner 3–4–6. Commence the third cycle of ten drops with corner 1–4–5. Each loaded container must withstand 3 cycles without spilling or sifting of contents.

§ 178.210 Specification 12A; fiberboard boxes. Nonreusable containers.

§ 178.210-1 Compliance. (a) Required in all details.

§ 178.210-2 Definitions. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box, except recessed flanged heads, are connected together in setting up the box. Generally done by box maker.

§ 178.210-3 Classification of board. (a) Fiberboard is hereby classified by strength[1] of completed board as in first column of the following table; weights specified in the table are the minimums authorized.

Classified strength[1] of completed board	Facings for corrugated fiberboard	
	Double-faced—Minimum combined weight of facings (pounds for 1,000 sq. ft.)	Double-wall—Minimum combined weight of facings including center liner (pounds per 1,000 sq. ft.)
200	84	92
275	138	110

[1] Mullen or Cady test (minimum).

§ 178.210-4 Corrugated fiberboard. (a) Both outer facings water resistant, corrugated sheets must be at least 0.009 inch thick and weight not less than 26 pounds per 1,000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.210-5 Tests. (a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (40 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side, when all results but 4 show prescribed strength the board is acceptable.

(4) Double-pop tests may be disregarded.

§ 178.210-6 Boxes authorized. (a) Corrugated fiberboard boxes having gross weight not over 80 pounds of the following strengths are authorized:

Gross weight not over (pounds)	Corrugated fiberboard strength (Mullen or Cady test) minimum	
	Double-faced	Double wall
20	200	200
50	275	200
80		275

§ 178.210-7 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.210-8 Joints. (a) For slotted containers: Lapped 1½" from center of scoreline except as in § 178.210-8(b)(2); stitched at 2-½" intervals and within 1" of each end of joint; body joint must be double-stitched (2 parallel stitches) at each end of joint over 18" long.

(b) Joints as provided for by the following are authorized provided resulting joint is capable of withstanding the tests prescribed by § 178.210-10:

(1) For slotted containers only; one butt joint, taped, is authorized.

(2) For glued lap joint, the sides of box forming joint must lap not less than 1½ inches and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

(3) For triple and double side boxes; joints of all sides must be taped or stitched.

§ 178.210-9 Inside cushioning. (a) Sufficient inside cushioning shall be required for protection of inside containers so that completed packages as offered for shipment shall be capable of withstanding test prescribed by § 178.210-10.

§ 178.210-10 Test for completed package. (a) A minimum of 4 boxes with inside containers filled with water, and box closed as for shipment, shall be capable of withstanding the following drop tests from the prescribed heights onto solid concrete without leakage from or breakage of any inside container or rupture of the outside fiberboard box; each box shall be subjected to not more than one of the series of tests:

(1) Box No. 1. Flat drop on bottom from height of 4 feet.

(2) Box No. 2. Flat drop on side from height of 4 feet.

(3) Box No. 3. Flat drop on end from height of 4 feet.

(4) Box No. 4. Flat drop on top from height of 2 feet.

(b) Tests prescribed by paragraph (a) of this section must be conducted prior to initial use of the package and shall be repeated on the change of any components of the package.

§ 178.210-11 Closing for shipment. (a) By any method capable of withstanding tests prescribed by § 178.210-10.

§ 178.210-12 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-12A**

(1) Stars to be replaced by authorized gross weight (for example, DOT-12A75). The letters NRC, located just above or below that DOT mark, to indicate a nonreuseable container.

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below those marks. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.210-12 must be at least ½" high; other markings must be legible.

§ 178.211 Specification 12P; fiberboard boxes.

Nonreusable containers for inside plastic containers greater than 1-gallon capacity, as prescribed in Part 173 of this subchapter.

§ 178.211-1 Material requirements. (a) Boxes shall be of corrugated fiberboard, except as otherwise authorized in this specification, having both outer facings water resistant; corrugating medium shall be at least 0.009 inch thick and weigh not less than 26 pounds per 1,000 square feet; all parts shall be securely glued together throughout all contact areas.

(b) Solid fiberboard is authorized when of strength equal to corrugated fiberboard and in conformance with paragraph (c) of this section.

(c) Fiberboard required and tests as follows:

(1) Fiberboard is hereby classified by strength[1] of completed board as in first column of the following table; weights specified in the table are the minimums authorized.

Classified strength of completed board[1]	Solid fiberboard—Minimum combined weight of component plies exclusive of adhesives (pounds per 1,000 sq. ft.)	Single-wall—Minimum combined weight of facings (pounds per 1,000 sq. ft.)	Double-wall—Minimum combined weight of facings including center facings (pounds per 1,000 sq. ft.)
175	149	75	.....
200	190	84	92
275	237	138	110
325	237	138	110
350	283	180	126
375	283	180	180
400	283	180	180
450	283	180	180
500	330	.....	222

[1] Mullen or Cady Test (minimum).

(2) Tests of acceptable completed board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity) under test, as follows:

(i) Clamp board firmly in machine and turn wheel at constant speed of approximately 2 revolutions per second.

(ii) Six bursts required, 3 from each side; all results but one must show prescribed strength.

(iii) Board failing may be retested by making 24 bursts, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(iv) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.211-2 Construction requirements. (a) Corrugated or solid fiberboard boxes of any type capable of withstanding tests prescribed by § 178.211-5 authorized when constructed in accordance with requirements of this section.

(b) Corrugated or solid fiberboard boxes in accordance with the following table are authorized.

Gross weight not over (pounds)	Strength of fiberboard (minimum) Mullen or Cady Test		
	Solid board	Single-wall corrugated	Double-wall corrugated
20	200	200	200
60	350	350	275
80	500	450	350

(c) All parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding. Box must provide snug fit for inside plastic container.

(d) Joints (manufacturer's). The joint is defined as that part of the box where the ends of the sheet are joined together by taping, stitching or glueing.

(1) For glued or stitched lap joint, the sides of box forming joint must lap not less than 1¼ inches. Glued joints must be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after film application has dried.

(2) Butt-joints, taped, are authorized providing resulting joints are capable of withstanding tests prescribed by § 178.211-5.

§ 178.211-3 Design limitations. (a) Design limitations are as follows:

(1) Permitted when perforated or die-cut areas remain intact following tests prescribed for box by § 178.211-5.

(i) Outer closing flaps may have perforated areas of no greater size than is necessary to provide access to closure of plastic container; inner flaps may have die-cut areas of similar type.

(ii) Die-cut holes in outer and inner closing flaps when closure for plastic container is attached to a metal plate inserted between the inner and outer flaps or when closure area is protected by means of a plug-in or screw cap or similar device. The diameter of these holes shall be less than the diameter of the metal plate.

(iii) Inside facing of fiberboard closure flaps may be cut or perforated for opening. A tear strip may be incorporated in the body wall of fiberboard boxes provided it is above the shoulder area of the plastic container and this may be accompanied by a nominal thumb-notch in the manufacturer's joint or in a side panel of the box.

(iv) Handholes, by perforation or other means, in any part of the box providing the face having the handhole is backed up by a fiberboard sheet of equal strength of box in full height and width of that face or that handholes are above the neck area of the plastic container. No more than one handhole in any face nor more than two per box.

(v) Other perforated or die cut areas of a size and location may be used when approved by the Director, OHMT.

(2) Not permitted.

(i) Stitched manufacturer's joint or stitched closures when any such stitch (staple) is in direct contact with the inside plastic container.

§ 178.211-4 Closure. (a) Closure of any type is authorized provided representative boxes are capable of withstanding tests prescribed by § 178.211-5.

§ 178.211-5 Tests. (a) Representative samples of the completed composite container assembled, filled and closed as for use must be capable of withstanding tests prescribed in the specification for the inside plastic container without rupture of the fiber board boxes that produces a condition of the box that could result in potential damage to the inside container.

§ 178.211-6 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-12P**

(1) Stars to be replaced by authorized gross weight for which box was constructed (for example, DOT-12P80). The letters NRC, located just above or below the DOT mark, to indicate a nonreusable container.

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below those marks. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings: Specification markings as prescribed in paragraph (a)(1) of this section must be at least ½ inch high; other markings must be legible.

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§ 178.212 Specification 12R; paper-faced expanded polystyrene board boxes.

Nonreusable containers.

§ 178.212-1 Material requirements; (a) The board shall consist of completely fused closed cell expanded polystyrene with tightly adhered natural kraft paper facings for which detailed requirements are as follows:

(1) Basis weight of each facing, minimum, 42 pounds per 1,000 square feet. (Basis weight of combined facings, minimum, 84 pounds per 1,000 square feet.)

(2) Basis weight of board, minimum, 123 pounds per 1,000 square feet.

(3) Thickness of board, minimum, 0.21 inch.

(4) Moisture absorption, maximum, 25 grams weight gain per square foot with sample completely immersed in water. For one hour sample to be preconditioned to a constant weight at least 73° F. and 50 percent relative humidity prior to immersion.

(5) Adhesion of facings; no delamination after 24 hours with sample completely immersed in water. Sample shall be not less than one square foot.

§ 178.212-2 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely in position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.212-3 Joints. (a) Definition. The seam where the two edges of the box blank are joined by the box manufacturer.

(b) The joints shall be made by precrushing the lap area of the board to a minimum combined thickness of 0.28 inch, and then securing by either stitching or gluing as follows:

(1) By lapping 1½ inches from center of score line and stitching at 2½ inch intervals and within 1 inch of each end joint; body joint over 18 inches long must be double stitched (2 parallel stitches) at each end of joint.

(2) By lapping 1½ inches from center of score line and firm gluing throughout entire area of contact with an adhesive which cannot be dissolved in water after the adhesive applied has dried.

§ 178.212-4 Inside cushioning. (a) Sufficient inside cushioning shall be required for protection of inside containers so that com-

pleted packages as offered for shipment shall be capable of withstanding test prescribed by § 178.212-6.

(b) The cushioning shall be either paper-faced expanded polystyrene board meeting the requirements of § 178.212-1 or equally efficient performed completely fused closed cell expanded polystyrene.

§ 178.212-5 Gross weight authorized. (a) Seventy-five pounds maximum.

§ 178.212-6 Tests for completed package. (a) A minimum of 4 boxes with inside containers filled with water, and box closed as for shipment shall be capable of withstanding either of the following tests without leakage from or breakage of any inside container or rupture of the outside containers:

(1) Drop test onto solid concrete; each box should be subjected to not more than one of the series of tests:

Box No. 1—Flat drop on bottom from height of 4 feet.
Box No. 2—Flat drop on side from height of 4 feet.
Box No. 3—Flat drop on end from height of 4 feet.
Box No. 4—Flat drop on top from height of 2 feet.

(2) Swing test on boxed glass swing test apparatus as prescribed by spec. 1A (§178.1); each box shall be swung from 75 inches distance once on each of the six faces.

(b) Tests prescribed by paragraph (a) of this subsection must be conducted prior to initial use of the package and shall be repeated on the change of any components of the package.

§ 178.212-7 Closing for shipment. (a) By any method capable of withstanding tests prescribed by § 178.212-6.

§ 178.212-8 Markings. (a) On each container. Symbol in rectangle as follows:

DOT-12R***

(1) Stars to be replaced by authorized gross weight (for example, DOT-12R75). The letters NRC, located just above or below the DOT mark, to indicate a nonreusable container.

(2) Name or symbol of person making the other marks specified in this section and located on the same face as those other marks. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings. Specification markings prescribed in paragraph (a)(1) of this subsection must be at least ½ inch high; other markings must be legible.

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§ 178.214 Specification 23F; fiberboard boxes.

§ 178.214-1 Compliance. (a) Required in all details.

§ 178.214-2 Definitions. (a) Terms such as "200 pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.214-3 Solid fiberboard. (a) To be 3-ply or more; both outer plies waterproofed.

§ 178.214-4 Corrugated fiberboard. (a) Both outer facings water resistant; corrugated sheets at least 0.009" thick; all parts securely glued together throughout all contact areas; minimum combined weight of facings not less than 84 pounds per 1,000 square feet, except when only one lining tube is used as provided by § 178.214-15(b), minimum combined weight of facings must be not less than 138 pounds per 1,000 square feet.

§ 178.214-5 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples 3/32 x 0.019 inch in cross section and not less than 7/16 inch wide. Material used must be at least equivalent to copper coated steel in non-sparking quality.

§ 178.214-6 Tape. (a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.214-7 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) For corrugated fiberboard, double pop tests may be disregarded.

§ 178.214-8 Type authorized. (a) Of solid fiberboard; 1-piece, or 3-piece without recessed heads, fitted with lining tube or lining tubes as prescribed in § 178.214-15, except that lining tubes are not required for boxes used for shipments of high explosives packed in accordance with § 173.63(a)(3) or electric blasting caps packed in accordance with § 173.66(g)(1), or when box is constructed of 1-piece of not less than 600-pound test board weighing not less than 300 pounds per 1,000 square feet. Boxes having handholes may be used when approved by the Director, OHMT.

§ 178.214-9 Inside packing and size limits. (a) As prescribed in § 178.214-15.

§ 178.214-10 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.214-11 Joints. (a) Lapped, 1½" from center of scoreline except as in § 178.214-12, stitched at 2½" intervals and within 1" of each end of joint; double-stitched (2 parallel stitches) at each end of joint over 18" long; or lapped not less than 1¼" and firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

§ 178.214-12 Flanged heads. (a) Must have 4 flanges, at least 1" long above fillet, on each head. Recessed flanged heads not authorized.

§ 178.214-13 Seams which are to be stitched. (a) Overlap, if any, required to be at least 1½" from center of scoreline except as in § 178.214-12.

§ 178.214-14 Flap closures. (a) Flaps must butt or have full overlap excepting that inner flaps may overlap ½ inch.

§ 178.214-15 Authorized gross weight (when packed) and parts required. (a) Box to be of solid fiberboard, special waterproofed, at least 300-pound test, and weighing at least 250 pounds per thousand square feet. Tubes to be of solid or corrugated fiberboard at least 200-pound test and of 1-piece, or as provided in subparagraph (1), with adjoining edges stitched, taped, or glued. Glued or stitched lap not less than 1¼". Lap must be firmly glued throughout entire area of contact with glue or adhesive which cannot be dissolved in water after the film application has dried.

(1) Or, box shall have one tube liner of solid fiberboard weighing at least 283 pounds per 1,000 square feet with joint or joints either stitched or glued as prescribed in paragraph (a). One end of the tube may have a handhole approximately ¾" deep located at the center of the top and a perforation with a minimum of ⅛" cuts and ⅛" webs extending from the handhole to the bottom.

(b) Authorized gross weight: 65 pounds when 2 or more lining tubes are used to divide the box into 2 or more compartments; 65 pounds when 1 or more lining tubes are used and contents will consist of 1 cartridge only or of black powder in bags; 65 pounds when boxes without lining tubes are used for shipments of high explosives packed in accordance with § 173.63(a)(3) or electric blasting caps packed in accordance with § 173.66(g)(1); 35 pounds in all other cases except that boxes having a single solid fiberboard lining tube, the fiberboard weighing at least 283 pounds per 1,000 square feet, or corrugated fiberboard lining tube as prescribed in § 178.214-4(a), are authorized for 65 pounds gross weight.

§ 178.214-16 Closing for shipment. (a) By any method capable of withstanding tests prescribed by § 178.214-20 without failure.

§ 178.214-17 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-23F***

(1) Stars to be replaced by authorized gross weight (for example DOT-23F35 or DOT-23F65).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings: Specification markings prescribed in paragraph (a)(1) in § 178.214-17 must be at least ½" high; other markings must be legible.

§ 178.214-18 Special tests. (a) By whom and when. By or for each plant making the boxes, at beginning of manufacture and at six-

month intervals thereafter, on the largest size by weight. Smaller sizes need not be tested if they have the same or equivalent construction.

§ 178.214-19 Material. (a) Box material (special waterproofed board) must be 300-pound test board and weigh at least 250 pounds per thousand square feet when commercially dry.

(b) Box material must also have 200-pound test strength and moisture content not over 30 percent as follows:

(1) Immediately after exposure for 3 days to 90 percent humidity at 75° F.

(2) Immediately after it has been contact in with water for 3 hours under 3" head at 75° F.

NOTE: The test shall be conducted on a sample no greater than 8 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3 inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6- inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable.)

§ 178.214-20 Completed containers. (a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent humidity at 75° F; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in same manner as for shipment:

(1) Three loaded samples to be tested. Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½".

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of the two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.

(7) A flatwise drop on one of the medium faces (usually side 2 or 4).

(8) A flatwise drop on the opposite medium face.

(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).

(10) A flatwise drop on the opposite large face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner on which the first drop was made, on corner 3–4–6. Commence the third cycle of ten drops with corner 1–4–5. Each loaded container must withstand 3 cycles without spilling or sifting of contents.

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§ 178.218 Specification 23G; special cylindrical fiberboard box for high explosives.

§ 178.218-1 Compliance. (a) Required in all details.

§ 178.218-2 Definition. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

§ 178.218-3 Side walls, ends, and interior. (a) Side walls. To be not less than four-ply of continuous fiber sheets convolutely or spirally wound; combined strength to be not less than 300 pounds, dry; combined thickness to be not less than 0.050" for containers not exceeding 10 pounds gross weight and not less than 0.060" for containers over 10 pounds gross weight.

(b) Ends. To be of one or more plies of fiberboard sufficiently strong to withstand prescribed tests. Wax or plastic material with fiberboard inserts authorized provided the completed container will withstand the prescribed tests at temperature from zero to one hundred thirty degrees F.

(c) Interior of the container must be lined or so treated as to prevent penetration by the commodity with which the container is filled for shipping.

§ 178.218-4 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples 7/32 x 0.019 inch in cross section and not less than 7/16 inch wide. Material used must be at least equivalent to copper coated steel in non-sparking quality.

§ 178.218-5 Tape. (a) Coated with animal glue at least equal to No. 1¾ Peter Cooper standard or other adhesive equivalent in tensile properties and resistance to deterioration. Cloth tape of strength, across the wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (480 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.218-6 Test of board. (a) Acceptable board must have prescribed strength, Mullen or Cady test, under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing must be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

§ 178.218-7 Type of container authorized. (a) One cylindrical tube or;

(b) Two cylindrical tubes butted together and taped or glued completely around circumference at points to make positive closure.

(c) Open ends to be closed in such a manner as to give complete closure which will withstand prescribed tests.

§ 178.218-8 (Deleted)

§ 178.218-9 Authorized size and weight limit. (a) Maximum authorized outside diameter of container is 12".

(b) Maximum authorized gross weight of container is 65 pounds.

§ 178.218-10 Marking. (a) On each container by symbol as follows:

DOT-23G***

(1) Stars to be replaced by authorized gross weight (for example, DOT-23G40, DOT-23G65, etc.).

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings. Specification markings prescribed in paragraph (a)(1) in § 178.218-10 must be at least ½" high; other markings must be legible.

§ 178.218-11 Special tests. (a) By whom and when. By or for each plant making the boxes, at beginning of manufacture and at 6-month intervals thereafter, on the largest size by weight. Smaller sizes need not be tested if they have the same or equivalent construction.

§ 178.218-12 Material. (a) Box material must be not less than 300 pound test board when commercially dry.

(b) Box material must also have 200-pound test strength, moisture content not over 30 percent and puncture strength not less than 200 units, as determined by General Electric Puncture Tester using an average obtained from a series of five tests, as follows:

(c) Immediately after exposure for 3 days under either of the following conditions:

(1) 70 percent humidity at 100° F.

(2) 90 percent humidity at 75° F.

§ 178.218-13 Completed containers. (a) Samples must pass the following tests immediately after exposure for 2 weeks to 90 percent humidity at 75° F. or 70 percent humidity at 100° F.; loaded containers shall contain dummy contents of shape and weight same as expected contents.

(1) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½"; speed of compression tester to be ½" per minute plus ¼" minus ¼" per minute.

(2) Three loaded samples to be tested. Each must withstand side to side pressure of at least 500 pounds without deflection of over ½"; except that for boxes with fluted crimped ends the deflection shall not exceed ¾"; speed of compression tester to be ½" per minute plus ¼" minus ¼" per minute.

(3) Three loaded samples to be tested. Each must withstand, without rupture, four 4-foot drops diagonally on the end more likely to cause rupture on impact.

(4) Three loaded samples to be tested. Each must be dropped once, flat on its side, across another similar package lying flat upon the ground with its longitudinal axis at right angles to container dropped. Drops must be made from a height four feet above the topmost part of the container on the ground.

(b) As an alternate to compression test requirements of paragraphs (a)(1) and (a)(2) of this section, samples must pass the following tests immediately after exposure for 2 weeks to 90 percent humidity at 75° F. or 70 percent humidity at 100° F., loaded containers shall contain dummy contents of shape and weight same as expected contents. Static loading tests as specified herein must be conducted with the prescribed weight in place for at least 60 minutes, with deflection of container not in excess of the following:

(1) Three loaded samples to be tested. Each container must be capable of withstanding end-to-end pressure of at least 375 pounds without deflection over 1½ inches.

(2) Three loaded samples to be tested. Each container must be capable of withstanding side-to-side pressure of at least 350 pounds without deflection over ½ inch.

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§ 178.219 Specification 23H; fiberboard boxes.

§ 178.219-1 Compliance. (a) Required in all details.

§ 178.219-2 Definitions. (a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up box.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.219-3 Solid fiberboard. (a) To be 3-ply or more; both outer plies waterproofed.

§ 178.219-4 Stitching staples. Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples 3/32 × 0.019 inch in cross section and not less than 7/16-inch wide. Material used must be at least equivalent to copper coated steel in nonsparking quality.

§ 178.219-5 Tape. (a) Coated with glue at least equal to No. 1½ Peter Cooper standard. Cloth tape of strength, across the wool, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" × 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.219-6 Test. (a) Acceptable board must have prescribed strength, Mullen or Cady test, under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

§ 178.219-7 Type authorized. (a) Of solid fiberboard, telescoping type construction without recessed heads. Box to consist of top and bottom sections, divided equally or unequally, and inner lining tube or full depth cover 2-piece telescope type in which case the lining tube may be omitted. The lining tube, when required, must be staple stitched to the lower section of the box to give in effect a 2-piece box.

(b) Hand-holes oval in shape, not more than 1 inch in width by 3 inches in length and horizontal with top score line, are authorized in ends of top section of full depth cover telescope type boxes.

§ 178.219-8 Inside packing and size limits. (a) As prescribed in §178.219-11.

§ 178.219-9 Forming. (a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.219-10 Joints. (a) Lapped at least 1½" from center of scoreline; staple stitched at 2½" intervals and within 1" of each end of joint; 2 banks of staple stitches in each joint.

§ 178.219-11 Authorized gross weight (when packed) and parts required. (a) Box to be of solid fiberboard, special waterproofed at least 300-pound test, and weighing at least 250 pounds per thousand square feet. Tubes to be of solid fiberboard at least 200-pound test and of 1 piece with adjoining edges staple stitched or taped.

(b) Authorized gross weight: 65 pounds when 2 or more lining tubes are used to divide the box into 2 or more compartments; 65 pounds when 1 or more lining tubes are used and contents will consist of 1 cartridge only or of black powder in bags; 35 pounds in all other cases except that boxes having a single solid fiberboard lining tube, the fiberboard weighing at least 283 pounds per 1,000 square feet, are authorized for 65 pounds gross weight. Boxes of 2-piece telescope type having full depth cover are authorized for 65 pounds gross weight.

§ 178.219-12 Closing for shipment. (a) By any method capable of withstanding tests prescribed by § 178.219-16 without failure.

§ 178.219-13 Marking. (a) On each container. Symbol in rectangle as follows:

DOT-23H***

(1) Stars to be replaced by authorized gross weight (for example, DOT-23H35 or DOT-23H65).

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

(3) Size of markings. Specification markings prescribed in paragraph (a)(1) of this section must be at least ½" high; other markings must be legible.

§ 178.219-14 Special tests. (a) By whom and when. By or for each plant making the boxes, at beginning of manufacture and at six-month intervals thereafter, on the largest size by weight. Smaller sizes need not be tested if they have the same or equivalent construction.

§ 178.219-15 Material. (a) Box material (special waterproofed board) must be 300-pound test board and weigh at least 250 pounds per thousand square feet when commercially dry.

(b) Box material must also have 200-pound test strength and moisture content not over 30 percent as follows:

(1) Immediately after exposure for 3 days to 90 percent humidity at 75° F.

(2) Immediately after it has been in contact with water for 3 hours under 3" head at 75° F.

NOTE: The test shall be conducted on a sample no greater than 6 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3 inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6 inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable.)

§ 178.219-16 Completed containers. (a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent humidity at 75° F; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in same manner as for shipment.

(1) Three loaded samples to be tested. Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½".

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of the two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.

(7) A flatwise drop on one of the medium faces (usually side 2 or 4).

(8) A flatwise drop on the opposite medium face.

(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).

(10) A flatwise drop on the opposite large face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner

on which the first drop was made, on corner 3-4-6. Commence the third cycle of ten drops with corner 1-4-5. Each loaded container must withstand 3 cycles without spilling or sifting of contents.

§ 178.224 Specification 21C; fiber drum.

§ 178.224-1 Construction requirements. (a) Parts and dimensions as follows:

(1) Drums for dry products; minimum requirements unless otherwise stated.

Net weight of contents (pounds) (not over)	Capacity, maximum (gallons) (not over)	Diameter, inside maximum (inches)	Sidewall strength (pounds)[1] [2]	Tops and Bottoms				
				Fiber[3]		Steel	Wood (Thickness, Inches)	
				Thickness (inches)	Strength[1]	(U.S. gauge)	Solid[4] [5] [6]	Plywood, at least 3-ply construction
60	5	11¼	500	.090	600	28	⅞	⅜
60	20	18½	600	.120	800	28	⅞	⅜
115	20	18½	700	.120	800	26	⅞	⅜
115	55	23	800	.150	1100	26	⅞	⅝
250	55	23	900	.200	1200	24	⅞	⅝
400	75	23	1000	.220	1300	24	⅞	⅝

[1] Mullen or Cady Test. Either of the following test methods may be used. When more than single ply, test shall be determined from the summation of the tests of individual plies, or, when test is made on a complete drum, the punctures shall be made from the exterior to the interior surface, in which case the values for sidewall shall be not less than 80 percent of the value in the above table and the values for fiber tops and bottoms shall be not less than the value in the above table. There shall be a minimum of six tests and the average shall be not less than the prescribed minimum requirements.

[2] Sidewalls. Sidewalls to be convolutely wound of fiberboard at least .012 inch thick, the plies being secured together with adhesives, or may consist of an outer shell and an inner tube each convolutely wound with each fiberboard ply not less than .012 inch thick and secured together with adhesive. Drums may contain barrier or lining material.

[3] When made of 2 or more discs, the discs must be fastened together with adhesive.

[4] Joints in head must be Linderman joints, glued, except as specified in Footnote 5.

[5] Wooden heads at least one-half inch thick having kraft paper glued on both sides at all contact areas with waterresistant adhesive are authorized provided, tests prescribed in § 178.224-2 are successful. Joints of any type are authorized.

[6] Minimum thickness may be reduced to ⅞ inch for lumber dressed two sides.

§ 178.224-2 Type tests. (a) Conditioning. Prior to testing, drums shall be conditioned at 50 percent relative humidity plus or minus 2 percent and 75° F. plus or minus 3° F. for at least 48 hours.

(b) Drop tests. Samples taken at random filled with dry finely powdered material to authorized net weight and closed as for use must withstand the following four foot-drop tests on the part specified without leakage or serious rupture. No single drum shall be subjected to more than one of the following tests. Drums with wood heads shall be dropped with grain of wood in cover parallel to concrete surface.

(1) Top chime, diagonally onto solid concrete.

(2) Bottom chime, diagonally onto solid concrete.

(3) Sidewall, over a 2-inch x 6-inch timber resting on solid concrete with 6-inch leg vertical; drop to be made with drum in horizontal position at right angles to the timber.

(4) The closure or on any other part which may be considered weaker onto solid concrete.

(c) Compression test. An empty drum shall withstand either of the following compression tests, in accordance with the following table, without buckling of the sidewalls sufficient to cause damage to its expected contents; but in no case shall the maximum deflection be more than one inch.

Maximum net weight	Maximum capacity (gallons)	Maximum inside diameter (inches)	Compression (pounds)	
			Static[1]	Dynamic[2]
60	5	11¼	1200	1600
60	20	18½	1200	1600
115	20	18½	1200	1600
115	55	23	1500	2000
250	55	23	1800	2400
400	75	23	2100	2900

[1] Static test. Compression as specified must be applied to full area of top cover of drum for period of 48 hours.

[2] Dynamic Test. Compression as specified must be applied end to end. Speed of compression tester to be one-half inch plus or minus one fourth inch per minute.

(d) The tests described above must be made by any company starting production, for each plant location of manufacture, on samples taken at random of each type and diameter of container and must be repeated every 4 months or less during production. Samples last tested must be retained until further tests are made. The tests and procedure described may be conducted at one central laboratory when testing facilities are not available at all plants.

§ 178.224-3 [Deleted]

§ 178.224-4 Marking. (a) On each container as follows:

(1) Drums must be marked DOT-21C followed by the authorized net weight to which drum was constructed, for example, DOT-21C115.

(2) Name or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above, below, or following those marks. Symbol, if used, must be registered with the Director, OHMT.

§ 178.225 Specification 21P; fiber drum overpack for inside plastic container.

§ 178.225-1 Compliance. (a) Required in all details.

§ 178.225-2 Construction requirements. (a) Fiber drum overpack for inside plastic containers as prescribed in Part 173. Fit of fiber drum overpack shall provide support for inside plastic container in such manner as to avoid wrinkling, buckling, or suspension of inside plastic container by any closure protruding through top head.

(b) Fiber sidewalls shall consist of one or more multiple-ply shells or tubes, convolutely wound of fiberboard at least 0.012 inch thickness with plies of each component secured together with adhesive; steel parts used shall be of low carbon, open-hearth, or electric steels; drum overpack shall be of tight-head or full removable cover type, straight sided, with top and bottom heading secured to sidewall by an efficient means in accordance with the following detailed minimum requirements:

Marked[1] (rated) capacity of inside plastic container not over (gallons)	Authorized maximum net weight of liquid contents not over (pounds)	Fiber drum overpack parts[1] [2]								
		Sidewall	Top heads and bottom heads				Combination fiber-steel bottoms			
			All fiber[3]		All steel		Fiber component		Steel component	
		Strength[2] pounds	Thickness (inch)	Strength[2] (pounds)	Gauge	Thickness (inch)	Thickness (inch)	Strength[2] (pounds)	Gauge	Thickness[4] (inch)
5½	105	600	0.120	800	28	0.0129	.....	.....	.....	.....
15	245	700	0.150	1100	26	0.0159	0.090	600	28	0.0129
30	350	900	0.200	1200	24	0.0209	0.120	800	26	0.0159
30	450	1000	0.220	1300	24	0.0209	0.150	1100	26	0.0159
55	600	1200	0.240	1500	24	0.0209	0.150	1100	26	0.0159

[1] For capacity tolerances refer to applicable specifications of inside plastic containers.

[2] Mullen or Cady test. Either of the following test methods may be used. When more than single ply, test shall be determined from the summation of the tests of individual plies, or when test is made on a complete drum, the punctures shall be made from the exterior to the interior surface, in which case the values for sidewall shall be not less than 80 percent of the value in the above table and the values for fiber tops and bottoms shall be not less than the value in the above table. There shall be a minimum of six tests and the average shall be not less than the prescribed minimum requirements.

[3] When made of 2 or more discs, the discs must be bonded together with adhesive.

[4] Thickness shall be measured at any point on the steel part not less than ¾ inch from an edge.

[5] Two holes not exceeding 1¼ inch each are permitted diametrically opposite each other in the overpack body and three holes not exceeding ¾ inch in diameter on centers 120 degrees apart in the bottom head. Top head may have not more than two holes of suitable size to provide for protruding closures. Closures shall not protrude above plane of top chime.

[6] Overpack interior shall be free of projections, burrs, or any edges that might cause damage to inside plastic container.

§ 178.225-3 Marking. (a) Maker of overpack and assembler of the composite container shall place a marking on side of container by printing, lithography or stamping with weather resistant ink in letters not less than ½ inch high as follows:

(1) Marking by maker of overpack.

(i) DOT-21P***; stars to be replaced by the authorized net weight for liquid products for which drum was constructed, for example, DOT-21P.450.

(ii) Name or symbol of maker must be registered with the Director, OHMT and be located just above, below, or following the mark specified in subparagraph (a)(1)(i) of this section.

(2) Marking by assembler of composite container.

(i) Maker or other party assuming responsibility for compliance with specification requirements shall add a marking to the overpack maker's marking as specified by subparagraph (a)(1)(i) of this section identifying the inside plastic container specification number. For example, DOT-21P.450 2SL. "STC" shall be added to the marking when inside container is authorized only for single trip service. For example, DOT-21P.450 2U STC.

(ii) The name or symbol of the assembler to be located near the marking specified in subparagraph (a)(2)(i) of this section; symbol must be registered with the Director, OHMT.

§ 178.225-4 Compression test. (a) Prior to testing, drums shall be conditioned at 50 percent plus or minus 2 percent relative humidity and 75° F. plus or minus 3° F. for at least 48 hours.

(b) An empty fiber drum overpack shall withstand either of the following compression tests without buckling of the sidewall sufficient to cause

damage, but in no case shall the maximum top to bottom deflection be more than ½ inch:

Fiber drum overpack for plastic inside container of marked (rated) capacity	Compression	
Not over (gallons)	Static[1] (pounds)	Dynamic[2] (pounds)
15	1125	1500
30	1800	2400
55	2400	3200

(c) Test to be made at start of production and repeated at 4-month intervals for each size of each type drum overpack manufactured. Record of test results shall be maintained in current status by each manufacturer at each producing plant.

§ 178.225-5 Assembly and testing of composite container. (a) The method employed for assembly shall be such as not to cause damage to either component.

(b) The party doing assembly shall be responsible for compliance with § 178.225-2(a) and for compliance with test requirements specified by applicable inside plastic container specifications in Part 178.

§ 178.226 Specification 29; mailing tubes.

§ 178.226-1 Compliance. (a) Required in all details.

§ 178.226-2 Cushioning. (a) Inside containers, if any, must fit closely in tube or be properly cushioned.

§ 178.226-3 Construction. (a) Of fiber at least ⅛" thick; metal bottom and metal screw-cap top, or telescope type with fixed metal ends.

§ 178.226-4 Marking. (a) Each container must be marked to show:

(1) DOT-29.

(2) The name or symbol of person making the mark specified in paragraph (a)(1) of this section. Symbol, if used, must be registered with the Director, OHMT.

SUBPART G

SPECIFICATIONS FOR BAGS, CLOTH, BURLAP, PAPER OR PLASTIC

§ 178.230 Specification 36A; lined cloth bags (triplex).

§ 178.230-1 Compliance. (a) Required in all details.

§ 178.230-2 Capacity. (a) Not over 100 pounds, net.

§ 178.230-3 Cloth. (a) Osnaburg cotton cloth at least 8½ ounces per square yard.

Note 1. Until further order of the Department, cloth of 40 inch width, 2.11 yards per pound, may be used, provided creped paper is of two way stretch construction.

§ 178.230-4 Paper. (a) Shipping sack Kraft, creped. A "ream" as used herein means 500 sheets 24" × 36" before creping.

§ 178.230-5 Assembly. (a) Either of the following:

(1) Single bag. Cloth-lined with 2 sheets of creped paper, each at least 35 pounds per ream, cemented together and to cloth. Combined tensile strength at least 100 pounds, warp and fill.

(2) Triple Bag. Outer of cloth; intermediate of 2 thicknesses of creped paper, each at least 30 pounds per ream, cemented together with asphalt so as to weigh 90 pounds per ream; inner of creped paper at least 45 pounds per ream.

§ 178.230-6 Seams. (a) To be dust-tight.

§ 178.230-7 Test. (a) The finished container, filled and closed as for shipment, must be capable of withstanding drop test of 4 feet without sifting.

§ 178.230-8 Marking. (a) Marking on each container by marks at least 1" high as follows:

(1) DOT-36A.

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.230-9 Closing for shipment. (a) By double tying with steel wires at least No. 16 Birmingham wire gauge; inner bags, if any, to have edges rolled in before outer bag is tied.

§ 178.233 Specification 36B; burlap bags, lined.

§ 178.233-1 Compliance. (a) Required in all details.

§ 178.233-2 Capacity. (a) Not over 100 pounds, net.

§ 178.233-3 Burlap. (a) At least equal in quality and strength to 10-oz., 40" (10'40), Calcutta A and/or B mill grade. Thread count at least 11 per 37.40", porter, and 12 per inch, shot; this to be an average of 6 counts.

§ 178.233-4 Paper. (a) Shipping sack Kraft, creped; at least 25 pounds per ream (500 sheets 24" × 36") before creping.

§ 178.233-5 Assembly. (a) Burlap to be lined with 2 sheets of creped paper cemented together and to burlap.

(b) Adhesive between paper sheets to be asphalt, melting point 150° F., at minimum rate of 100 pounds per ream.

(c) Adhesive between paper and burlap to be either:

(1) Curing rubber latex at minimum rate of 40 pounds, dry weight, per ream.

(2) Asphalt, any desirable type, at minimum rate of 110 pounds per ream.

§ 178.233-6 Stretch of paper lining. (a) At least equal to that of burlap in direction of warp and fill and equal to 10 percent in diagonal direction.

§ 178.233-7 Seams. (a) By cementing or taping to give seam strength at least equal to that of bag material and prevent sifting.

§ 178.233-8 Test. (a) The finished container, filled and closed as for shipment, must be capable of withstanding drop test of 4 feet on the butt without sifting or rupture of burlap or liners.

§ 178.233-9 Marking. (a) Marking on each container by marks at least 1" high as follows:

(1) DOT-36B.

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.233-10 Closing for shipment. (a) As specified for seams, § 178.233-7; or, by tying with 2 steel wires of at least No. 16 Birmingham wire gauge.

§ 178.234 Specification 36C; burlap bags, paper lined.

§ 178.234-1 Compliance. (a) Required in all details.

§ 178.234-2 Capacity. (a) Not over 100 pounds, net.

§ 178.234-3 Burlap. (a) At least equal in quality and strength to 7½ ounce, 40 inch (7½'40) Calcutta A and/or B mill grade. Thread count at least 9 per 37.40 inch, porter, and 9 per inch, shot; this to be an average of 6 counts.

§ 178.234-4 Paper. (a) Shipping sack Kraft, creped; at least 30 pounds per ream (500 sheets 24" × 36") before creping.

§ 178.234-5 Assembly. (a) Burlap to be lined with 1 sheet of creped paper cemented to burlap.

(b) Adhesive between paper and burlap to be asphalt, any desirable type, at a minimum rate of 110 pounds per ream.

§ 178.234-6 Stretch of paper lining. (a) At least equal to that of burlap in direction of warp and fill and equal to 10 percent in diagonal direction.

§ 178.234-7 Seams. (a) By cementing or taping to give seam strength at least equal to that of bag material and prevent sifting.

§ 178.234-8 Test. (a) The finished container, filled and closed as for shipment, must be capable of withstanding drop test of 4 feet on the butt without sifting or rupture of burlap liners.

§ 178.234-9 Marking. (a) Marking on each container by marks at least 1" high as follows:

(1) DOT-36C

(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.234-10 Closing for shipment. (a) As specified for seams, § 178.234-7; or, by tying with 2 steel wires of at least No. 16 Birmingham wire gauge, or any other type of equal efficiency that will be sift-proof and insure equal strength to body of bag.

§ 178.236 Specification 44B; multiwall paper bags.

§ 178.236-1 Compliance. (a) Required in all details.

§ 178.236-2 Paper. (a) Shipping sack kraft paper, plain, or extensible plain, shall conform to the average requirements specified in paragraphs (a)(1) or (a)(2) of this section.

(1) Shipping sack, kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3]	Total C.D. plus M.D.[3]
Pounds	Grams	Grams	Pounds	Pounds
40	88	188	14	41
50	110	235	19	53
60	132	282	23	64
70	154	329	27	74

[1] Shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing and shall comply with the requirements in paragraph (a) (1) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of plain shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi-wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

(2) Shipping sack, extensible kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum dry tearing strength		Minimum tensile energy absorption, ft.-lbs. per square foot of paper[3]	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3,4]	Total C.D. plus M.D.[3,4]
Pounds	Grams	Grams		
40	88	188	4.5	14.0
50	110	235	5.6	17.0
60	132	282	7.0	23.0
70	154	329	8.0	23.0
80	176	376	9.0	26.0

[1] Extensible shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing and shall comply with the requirements in paragraph (a) (2) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of extensible shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi-wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] Variations in cross-direction tensile energy absorption of not more than 0.5 units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the machine-direction tearing strength in the ratio of twenty units of tearing strength to one unit of tensile energy absorption, and variations in total tensile energy absorption of not more than one unit below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tearing strength in the same ratio. Similarly, variations in machine-direction tearing strength of not more than ten units below minimum requirements will be permitted, provided variations are compensated by an increase in cross-direction tensile energy absorption in the ratio of one unit of tensile energy absorption to twenty units of tearing strength, and variations in total tearing strength of not more than twenty units below the minimum requirements will be permitted provided the variations are compensated by an increase in the total tensile energy absorption in the same ratio. Conformance with the requirements of table shall be established by comparing the sum of the basis weights and tests for all of the plies specified in the construction of the bag with the sum of the specified basis weights and tests for the respective papers comprising the different plies. All requirements in this table are for a paper conditioned to a relative humidity of 50 percent at a temperature of 23°C (73°F).

(b) Asphalt laminated or polyethylene coated shipping sack kraft paper when used shall comply with the following requirements:

Type paper	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width		Heat resistance hours at 150° F. without impairing function of sack	Maximum average water vapor permeability from both sides at 50 percent R.H. and 73° F. g/m. 2 24 hours	
	M.D.	Total M.D. plus C.D.	C.D.	Total C.D. plus M.D.		Uncreased	Creased[1]
	Grams	Grams	Pounds	Pounds			
Asphalt laminated[2,4]	110	235	19	53	5	90	150
10PE-50							
150-10PE[3]	110	235	19	53	5	70	120
15PE-50							
150-15PE[3]	110	235	19	53	5	45	75

[1] Creasing at 40° F.

[2] Asphalt laminated kraft paper when used as a wall in fabricated sacks, shall conform to the requirements of paragraph (b) of this section and shall consist of kraft paper, the total basis weight of the two paper plies not less than 50 pounds per ream (500 sheets, 24" × 36"), continuously and uniformly laminated together with an average of not less than 25 pounds of asphalt per ream (500 sheets, 24" × 36"). Tolerance of minus 5 percent will be allowed on individual components. The total basis weight of the finished combination shall not exceed 100 pounds per ream (500 sheets, 24" × 36"). An asphalt laminated kraft wall meeting these requirements may be substituted for a plain kraft wall of 50 pounds basis or less, provided it meets the specification.

[3] Polyethylene coated shipping sack kraft paper. The polyethylene coated kraft paper when used as walls in fabricated sacks shall meet the heat resistance and water vapor permeability requirements as specified in the table. A tolerance of minus 10 percent will be allowed for the lot sample average coating weight of polyethylene on shipping sack kraft paper. Minimum samples for testing shall comprise not less than 3 specimens 16 square inches each selected representatively from each polyethylene coated wall of each sack in the lot sample. Where barrier sheets are based on extensible kraft the weight of the barrier material shall be in addition to the basis weight of the paper.

[4] Asphalt laminated extensible kraft paper must consist of two sheets of extensible kraft paper, the total basis weight of the paper in the finished combination being not less than 50 pounds per ream (24" × 36"—500) with neither sheet weighing less than 23 pounds continuously and uniformly laminated together with an average of not less than 25 pounds of asphalt per ream (24" × 36"—500). In determining the basis weight and test conformance of bags containing an asphalt laminated extensible kraft wall, the asphalt laminated extensible kraft wall shall be treated as if it were a single extensible kraft wall or combination of walls of 10 pounds lower total paper basis weight than the sum of the nominal basis weight in the asphalt laminated wall, but in no case shall be treated as less than the equivalent of a 50 pounds basis weight wall.

(c) Laminating materials. Any laminant other than asphalt or other water-vapor barrier walls may be used provided they meet the requirements in paragraph (b) of this section.

(d) All values in paragraphs (a) and (b) of this section are for paper having a moisture content in equilibrium with an atmosphere having a relative humidity of 50 percent plus or minus 2 percent at a temperature of 73° F. plus or minus 3.5° F. following preconditioning of the test specimens to a moisture content between 3 and 5.5 percent by exposure to relatively dry air having a temperature no greater than 140° F.

(e) Conformance of sacks with paper strength requirements shall be established by comparing the sums of the test values for all the walls of the new and unused sack with the sums of the respective strength values specified in paragraphs (a) and (b) of this section for the different walls of the sack.

(1) Variation in cross direction dry tensile strength of not more than 2 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall of the sack, provided the variation is compensated for by a machine direction tearing strength test value in excess of the minimum requirement obtained from the tables, in the ratio of 5 units of tearing strength for each unit of dry tensile strength test below the minimum requirement; and variation in combined dry tensile strength of not more than 4 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall used provided the variation is compensated for by a combined tearing strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of combined tearing strength for each unit of dry tensile strength test below the minimum requirement. Similarly, variation in machine direction tearing strength of not more than 10 units below the minimum requirement will be permitted for each wall, provided the variation is compensated for by a cross direction dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 1 unit of dry tensile strength for each 5 units of tearing strength test below the minimum requirement; and variation in combined tearing strength of not more than 20 units below the minimum

requirement obtained from the tables will be permitted for each wall provided the variation is compensated for by a combined dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of tearing strength for each unit of dry tensil strength below the minimum requirement.

§ 178.236-3 Construction. (a) Bags must be at least 4 thicknesses of paper; this must be heavy duty shipping sack kraft paper, conforming to the requirements of § 178.236-2 paragraphs (a) and (b) or equivalent, with a minimum total basis weight of 200 pounds of paper (500 sheets, 24" × 36"). Outer sheet must be of water-resistant stock and at least 60 pounds basis weight, inner sheets not less than 40 pounds basis weight. Bags to be of "satchel bottom" construction; bottoms to be reinforced with a kraft paper patch at least 30 pounds basis weight. Other bottoms of equal efficiency are authorized.

(b) Or, bags must be at least 2 thicknesses of paper; this must be heavy duty shipping sack kraft paper, or equivalent, with a minimum total basis weight of 110 pounds (500 sheets, 24" × 36"), fastened together with waterproof composition reinforced with jute, sisal, cotton, or other yarn or cord imbedded in the composition and criss-crossed at intervals of not over ½", approximately, so as to give approximately the same tensile strength for both width and length. Bags to be of "satchel bottom" construction. Other bottoms of equal efficiency are authorized.

(c) Moistureproof barrier sheets of paper, if used, must meet the requirements of § 178.236-2(b) and shall be considered as one thickness of paper and shall be counted as 50 pounds basis weight (500 sheets, 24" × 36").

§ 178.236-4 Adhesive. (a) Moisture resistant adhesive must be used on all seams, joints, and bottom patch, if any.

§ 178.236-5 Closure. (a) For 4-ply bags: Inner (fourth) ply to be diamond folded loose; the third ply to be diamond folded and sifcated across all its overlapping folds; the two outer plies to be diamond folded, and cross sealed, front to back and side to side, with gummed tape extending at least 2 inches down sides of bag; sealing tape must be 4" wide, of No. 1 Kraft paper, 90 pounds basis weight (500 sheets, 24" × 36"), or equivalent, and having a Mullen or Cady test, of not less than 90 percent of basis weight. Other closures of equal efficiency are authorized.

(b) For all bags: Any closure for the top which is equal in efficiency to that of the bottom, is authorized.

§ 178.236-6 Tests for shipment. (a) Bags as prepared for shipment must be able to withstand four 4-foot drops, one on each end and one each on opposite sides, without sifting or rupture.

§ 178.236-7 Marking. (a) Marking on each bag with letters and figures at least ½" high in rectangle as follows:

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(b) Each bag must also be marked with the name and address or symbol of the person making the mark specified in paragraph (a) of this section and be located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.237 Specification 44C; multiwall paper bags.

§ 178.237-1 Compliance. (a) Required in all details.

§ 178.237-2 Paper. (a) Shipping sack kraft paper, plain, or extensible plain, shall conform to the average requirements specified in paragraphs (a)(1) or (a)(2) of this section.

(1) Shipping sack, kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3]	Total C.D. plus M.D.[3]
Pounds	Grams	Grams	Pounds	Pounds
40	88	158	14	41
50	110	235	19	53
60	132	282	23	64
70	154	329	27	74

[1] Shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating, or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing, and shall comply with the requirements in paragraph (a) (1) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of plain shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi-wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

(2) Shipping sack, extensible kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum dry tearing strength		Minimum tensile energy absorption, ft.lbs. per square foot of paper	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3,4]	Total C.D. plus M.D.[3,4]
Pounds	Grams	Grams		
40	88	158	4.5	14.0
50	110	235	5.6	17.0
60	132	282	7.0	20.0
70	154	329	8.0	23.0
80	176	376	9.0	26.0

[1] Extensible shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing, and shall comply with the requirements in paragraph (a) (2) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of extensible shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi-wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] Variations in cross-direction tensile energy absorption of not more than 0.5 units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the machine direction tearing strength in the ratio of twenty units of tearing strength to one unit of tensile energy absorption, and variations in total tensile energy absorption of not more than one unit below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tearing strength in the same ratio. Similarly, variations in machine direction tearing strength of not more than ten units below minimum requirements will be permitted, provided variations are compensated by an increase in cross-direction tensile energy absorption in the ratio of one unit of tensile energy absorption to twenty units of tearing strength, and variations in total tearing strength of not more than twenty units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tensile energy absorption in the same ratio. Conformance with the requirements of table shall be established by comparing the sum of the basis weights and tests for all of the plies specified in the construction of the bag, with the sum of the specified basis weights and tests for the respective papers comprising the different plies. All requirements in this table are for a paper conditioned to a relative humidity of 50 percent at a temperature of 23 C (73 F).

(b) Asphalt laminated or polyethylene coated shipping sack kraft paper when used shall comply with the following requirements:

Type paper	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width		Heat resistance hours at 150° F. without impairing function of sack	Maximum average water-vapor permeability from both sides at 50 percent R.H. and 73° F. g/m. 2 24 hours	
	M.D.	Total M.D. plus C.D.	C.D.	Total C.D. plus M.D.		Uncreased	Creased[1]
	Grams	Grams	Pounds	Pounds			
Asphalt laminated[2,4]	110	235	19	53	5	90	150
10PE-50 :50-10PE[3]	110	235	19	53	5	70	120
15PE-50 150-15PE[3]	110	235	19	53	5	45	75

[1] Creasing at 40 E.

[2] Asphalt laminated kraft paper when used as a wall in fabricated sacks, shall conform to the requirements of paragraph (b) of this section and shall consist of kraft paper, the total basis weight of the two paper plies not less than 50 pounds per ream (500 sheets, 24" × 36"), continuously and uniformly laminated together with an average of not less than 25 pounds of asphalt per ream (500 sheets, 24" × 36"). Tolerance of minus 5 percent will be allowed on individual components. The total basis weight of the finished combination shall not exceed 100 pounds per ream (500 sheets, 24" × 36"). An asphalt laminated kraft wall meeting these requirements may be substituted for a plain kraft wall of 50 pounds basis or less, provided it meets the specification.

[3] Polyethylene coated shipping sack kraft paper. The polyethylene-coated kraft paper when used as walls in fabricated sacks shall meet the heat resistance and water vapor permeability requirements as specified in the table. A tolerance of minus 10 percent will be allowed for the lot sample average coating weight of polyethylene on shipping sack kraft paper. Minimum samples for testing shall comprise not less than 3 specimens 16 square inches each selected representatively from each polyethylene coated wall of each sack in the lot sample. Where barrier sheets are based on extensible kraft the weight of the barrier material shall be in addition to the basis weight of the paper.

[4] Asphalt laminated extensible kraft paper must consist of two sheets of extensible kraft paper, the total basis weight of the paper in the finished combination being not less than 50 pounds per ream (24" × 36"—500) with neither sheet weighing less than 23 pounds continuously and uniformly laminated together, with an average of not less than 25 pounds of asphalt per ream (24" × 36"—500). In determining the basis weight and test conformance of bags containing an asphalt laminated extensible kraft wall, the asphalt laminated extensible kraft wall shall be treated as if it were a single extensible kraft wall or combination of walls of 10 pounds lower total paper basis weight than the sum of the nominal basis weight in the asphalt laminated wall, but in no case shall be treated as less than the equivalent of a 50 pounds basis weight wall.

(c) Laminating materials. Any laminant other than asphalt or other water-vapor barrier wall may be used provided they meet the requirements in paragraph (b) of this section.

(d) All values in paragraphs (a) and (b) of this section are for paper having a moisture content in equilibrium with an atmosphere having a relative humidity of 50 percent plus or minus 2 percent at a temperature of 73° F. plus or minus 3.5° F. following preconditioning of the test specimens to a moisture content between 3 and 5.5 percent by exposure to relatively dry air having a temperature no greater than 140° F.

(e) Conformance of sacks with paper strength requirements shall be established by comparing the sums of the test values for all the walls of the new and unused sack with the sums of the respective strength values specified in paragraphs (a) and (b) of this section for the respective papers specified for the different walls of the sack.

(f) Variation in cross direction dry tensile strength of not more than 2 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall of the sack, provided the variation is compensated for by a machine direction tearing strength test value in excess of the minimum requirement obtained from the tables, in the ratio of 5 units of tearing strength for each unit of dry tensile strength test below the minimum requirement; and variation in combined dry tensile strength of not more than 4 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall used provided the variation is compensated for by a combined tearing strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of combined tearing strength for each unit of dry tensile strength test below the minimum requirement. Similarly, variation in machine direction tearing strength of not more than 10 units below the minimum requirement will be permitted for each wall, provided the variation is compensated for by a cross direction dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 1 unit of dry tensile strength for each 5 units of tearing strength test below the minimum requirement; and variation in combined tearing strength of not more than 20 units below the minimum requirement obtained from the tables will be permitted for each wall provided the variation is compensated for by a combined dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of tearing strength for each unit of dry tensile strength below the minimum requirement.

§ 178.237-3 Construction. (a) Bags must be at least 4 thicknesses of paper unless otherwise specified in part 173 of this subchapter; this must be heavy duty shipping sack kraft paper conforming to the requirements of § 178.237-2 paragraphs (a) and (b), or equivalent, with a minimum total basis weight of 250 pounds of paper (500 sheets, 24" x 36"). Outer sheet must be of water resistant stock at least 60 pounds basis weight, inner sheets not less than 40 pounds basis weight. Bags to be of sewn, siftproof bottom construction. Other bottoms of equal efficiency authorized.

(b) Moistureproof barrier sheets of paper, if used, must meet the requirements of § 178.237-2(b) and shall be considered as one thickness of paper and shall be counted as 50 pounds basis weight (500 sheets, 24" x 36").

§ 178.237-4 Adhesive. (a) Moisture resistant adhesive must be used on all seams, joints, and bottom patch, if any.

§ 178.237-5 Closure. (a) For all bags: Any closure for the top which is equal in efficiency to that of the bottom, is authorized.

§ 178.237-6 Tests for shipment. (a) Bags as prepared for shipment must be able to withstand four 4-foot drops, one on each end and one each on opposite sides, without sifting or rupture.

§ 178.237-7 Marking. (a) On each bag with letters and figures at least ½ inch high in rectangle as follows:

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(b) Each bag must also be marked with the name and address or symbol of the person making the mark specified in paragraph (a) of this section and be located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.238 Specification 44D; multiwall paper bags.

§ 178.238-1 Compliance. (a) Required in all details.

§ 178.238-2 Paper. (a) Shipping sack kraft paper, plain, or extensible plain shall conform to the average requirements specified in subparagraphs (a)(1) and (a)(2) of this paragraph.

(1) Shipping sack, kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" x 36")[2]	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3]	Total C.D. plus M.D.[3]
Pounds	Grams	Grams	Pounds	Pounds
40	88	189	14	41
50	110	235	19	53
60	132	282	23	64
70	154	329	27	76

[1] Shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing and shall comply with the requirements in paragraph (a) (1) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of plain shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] A bleached sulphate kraft outer wall of 70 pounds basis weight will be permitted provided the combined test values of all of the 5 walls of the completed multi wall sack are in conformance with paragraph (e) of this section and § 178.238-3.

(2) Shipping sack, extensible kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" x 36")[2]	Minimum dry tearing strength		Minimum tensile energy absorption, ft. lbs. per square foot of paper	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3,4]	Total C.D. plus M.D.[3,4]
Pounds	Grams	Grams		
40	88	158	4.5	14.0
50	110	235	5.6	17.0
60	132	282	7.0	20.0
70	154	329	8.0	23.0
80	176	376	9.0	26.0

[1] Extensible shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing and shall comply with the requirements in paragraph (a) (2) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of extensible shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multi wall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] Variations in cross direction tensile energy absorption of not more than 0.5 units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the machine direction tearing strength in the ratio of twenty units of tearing strength to one unit of tensile energy absorption, and variations in total tensile energy absorption of not more than one unit below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tearing strength in the same ratio. Similarly, variations in machine direction tearing strength of not more than ten units below minimum requirements will be permitted, provided variations are compensated by an increase in cross-direction tensile energy absorption in the ratio of one unit of tensile energy absorption to twenty units of tearing strength, and variations in total tearing strength of not more than twenty units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tensile energy absorption in the same ratio. Conformance with the requirements of table shall be established by comparing the sum of the basis weights and tests for all of the plies specified in the construction of the bag with the sum of the specified basis weights and tests for the respective papers comprising the different plies. All requirements in this table are for a paper conditioned to a relative humidity of 50 percent at a temperature of 23 C (73 F).

(b) Asphalt laminated or polyethylene coated shipping sack kraft paper when used shall comply with the following requirements:

Type paper	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width		Heat resistance hours at 150° F. without impairing function of sack	Maximum average water-vapor permeability from both sides at 50 percent R.H. and 73° F. g/m. 2 24 hours	
	M.D.	Total M.D. plus C.D.	C.D.	Total C.D. plus M.D.		Uncreased	Creased[1]
	Grams	Grams	Pounds	Pounds			
Asphalt laminated[2,4]	110	235	19	53	5	9.0	15.0
10PE-50 150-10PE[3]	110	235	19	53	5	7.0	12.0
15PE-50 150-15PE[3]	110	235	19	53	5	4.5	7.5

[1] Creasing at 40 E.

[2] Asphalt laminated kraft paper when used as a wall in fabricated sacks, shall conform to the requirements of paragraph (b) of this section and shall consist of kraft paper, the total basis

weight of the two paper plies not less than 50 pounds per ream (500 sheets, 24" × 36"), continuously and uniformly laminated together with an average of not less than 25 pounds of asphalt per ream (500 sheets, 24" × 36"). Tolerance of minus 5 percent will be allowed on individual components. The total basis weight of the finished combination shall not exceed 100 pounds per ream (500 sheets, 24" × 36"). An asphalt laminated kraft wall meeting these requirements may be substituted for a plain kraft wall of 50 pounds basis or less, provided it meets the specification.

[3] Polyethylene coated shipping sack kraft paper. The polyethylene coated kraft paper when used as walls in fabricated sacks shall meet the heat resistance and water vapor permeability requirements as specified in the table. A tolerance of minus 10 percent will be allowed for the lot sample average coating weight of polyethylene on shipping sack kraft paper. Minimum samples for testing shall comprise not less than 3 specimens 16 square inches each selected representatively from each polyethylene coated wall of each sack in the lot sample. Where barrier sheets are based on extensible kraft the weight of the barrier material shall be in addition to the basis weight of the paper.

[4] Asphalt laminated extensible kraft paper must consist of two sheets of extensible kraft paper, the total basis weight of the paper in the finished combination being not less than 50 pounds per ream (24" × 36"—500) with neither sheet weighing less than 23 pounds continuously and uniformly laminated together, with an average of not less than 25 pounds of asphalt per ream (24" × 36"—500). In determining the basis weight and test conformance of bags containing an asphalt laminated extensible kraft wall, the asphalt laminated extensible kraft wall shall be treated as if it were a single extensible kraft wall or combination of walls of 10 pounds lower total paper basis weight than the sum of the nominal basis weight in the asphalt laminated wall, but in no case shall be treated as less than the equivalent of a 50 pounds basis weight wall.

(c) Laminating materials. Any laminant other than asphalt or other water-vapor barrier walls may be used provided they meet the strength requirements in paragraph (b) of this section.

(d) All values in paragraphs (a) and (b) of this section are for paper having a moisture content in equilibrium with an atmosphere having a relative humidity of 50 percent plus or minus 2 percent at a temperature of 73° F. plus or minus 3.5° F. following preconditioning of the test specimens to a moisture content between 3 and 5.5 percent by exposure to relatively dry air having a temperature no greater than 140° F.

(e) Conformance of sacks with paper strength requirements shall be established by comparing the sums of the test values for all the walls of the new and unused sack with the sums of the respective strength values specified in paragraphs (a) and (b) of this section for the respective papers specified for the different walls of the sack.

(1) Variation in cross direction dry tensile strength of not more than 2 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall of the sack, provided the variation is compensated for by a machine direction tearing strength test value in excess of the minimum requirement obtained from the tables, in the ratio of 5 units of tearing strength for each unit of dry tensile strength test below the minimum requirement; and variation in combined dry tensile strength of not more than 4 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall used provided the variation is compensated for by a combined tearing strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of combined tearing strength for each unit of dry tensile strength test below the minimum requirement. Similarly, variation in machine direction tearing strength of not more than 10 units below the minimum requirement will be permitted for each wall, provided the variation is compensated for by a cross direction dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 1 unit of dry tensile strength for each 5 units of tearing strength test below the minimum requirement; and variation in combined tearing strength of not more than 20 units below the minimum requirement obtained from the tables will be permitted for each wall provided the variation is compensated for by a combined dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of tearing strength for each unit of dry tensile strength below the minimum requirement.

§ 178.238–3 Construction. (a) Bags must be at least 5 thicknesses of paper; this must be heavy duty shipping sack kraft paper, conforming to the requirements of § 178.238–2 paragraphs (a) and (b), or equivalent, with a minimum total basis weight of 320 pounds of paper (500 sheets 24" × 36"). Outer sheet must be of water resistant stock and at least 70 pounds basis weight, inner sheets not less than 50 pounds basis weight. Bags to be of sewn, sift-proof bottom construction. Other bottoms of equal efficiency authorized.

Note 1: Exceptions to these construction requirements are authorized in §§ 173.367(a)(5) and 173.377(i).

(b) Moistureproof barrier sheets of paper, if used, must meet the strength requirements of § 178.238–2(b) and shall be counted as 50 pounds basis weight (500 sheets, 24 × 36 inches).

§ 178.238–4 Adhesive. (a) Moisture resistant adhesive must be used on all seams, joints, and bottom patch, if any.

§ 178.238–5 Closure. (a) For all bags: Any closure for the top which is equal in efficiency to that of the bottom, is authorized.

§ 178.238–6 Tests for shipment. (a) Bags as prepared for shipment must be able to withstand four 4-foot drops, one on each end and one each on opposite sides, without sifting or rupture.

§ 178.238–7 Marking. (a) On each bag with letters and figures at least ½ inch high in rectangle as follows:

DOT-44D

(b) Each bag must also be marked with the name and address or symbol of the person making the mark specified in paragraph (a) of this section and be located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.239 Specification 44E; multiwall paper bags.

§ 178.239–1 Compliance. (a) Required in all details.

§ 178.239–2 Paper. (a) Shipping sack kraft paper, plain, or extensible plain, shall conform to the average requirements specified in paragraphs (a)(1) or (a)(2) of this section.

(1) Shipping sack, kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3]	Total C.D. plus M.D.[3]
Pounds	Grams	Grams	Pounds	Pounds
40	88	188	14	41
50	110	235	19	53
60	132	282	23	64
70	154	329	27	74

[1] Shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing and shall comply with the requirements in paragraph (a) (1) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of plain shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multiwall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] A bleached sulphate extensible kraft outer sheet of not less than 50 pounds basis weight is authorized providing the combined test values of all the sheets of the bag are in conformance with paragraph (e) of this section and § 178.239–3.

(2) Shipping sack, extensible kraft paper, plain:[1]

Nominal basis weight (500 sheets, 24" × 36")[2]	Minimum dry tearing strength		Minimum tensile energy absorption, ft.-lbs. per square foot of paper	
	M.D.[3]	Total M.D. plus C.D.[3]	C.D.[3,4]	Total C.D. plus M.D.[3,4]
Pounds	Grams	Grams		
40	88	188	4.5	14.0
50	110	235	5.6	17.0
60	132	282	7.0	20.0
70	154	329	8.0	23.0
80	176	376	9.0	26.0

[1] Extensible shipping sack kraft paper, plain, is paper that consists of all sulphate pulp and no other fiber, and which has not been treated by coloring, bleaching, creping, coating, spraying, laminating or impregnating for special qualities. Paper shall have a degree of water resistance as secured by normal rosin sizing, and shall comply with the requirements in paragraph (a) (2) of this section.

[2] A tolerance of minus 10 percent of the basis weight of individual plies of extensible shipping sack kraft paper will be permitted, an average tolerance of minus 5 percent will be permitted in the sum total basis weight of all plies in multiwall constructions. Variations in excess of specified basis weights will not be considered a defect or deviation. The basis weight of paper means the basis weight as produced by the paper machine, not including finish subsequently applied, such as coating or printing.

[3] M.D. means machine direction. C.D. means cross direction.

[4] A bleached sulphate kraft outer sheet of not less than 50 pounds basis weight is authorized providing the combined test values of all the sheets of the bag in conformance with paragraph (e) of this section and § 178.239–3.

[5] Variations in cross-direction tensile energy absorption of not more than 0.5 units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the machine-direction tearing strength in the ratio of twenty units of tearing strength to one unit of tensile energy absorption, and variations in total tensile energy absorption of not more than one unit below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tearing strength in the same ratio. Similarly, variations in machine-direction tearing strength of not more than ten units below minimum requirements will be permitted, provided variations are compensated by an increase in cross-direction tensile energy absorption in the ratio of one unit of tensile energy absorption to twenty units of tearing strength; and variations in total tearing strength of not more than twenty units below the minimum requirements will be permitted, provided the variations are compensated by an increase in the total tensile energy absorption in the same ratio. Conformance with the requirements of table shall be established by comparing the sum of the basis weights and tests for all of the plies specified in the construction of the bag, with the sum of the specified basis weights and tests for the respective papers comprising the different plies. All requirements in this table are for a paper conditioned to a relative humidity of 50 percent at a temperature of 23°C (73°F).

(b) Asphalt laminated or polyethylene coated shipping sack kraft paper when used shall comply with the following requirements:

Type paper	Minimum average dry tearing strength		Minimum average dry tensile strength per inch width		Heat resistance hours at 150° F. without impairing function of sack	Maximum average water-vapor permeability from both sides at 50 percent R.H. and 73° F. g/m. 24 hours	
	M.D.	Total M.D. plus C.D.	C.D.	Total C.D. plus M.D.		Uncreased	Creased[1]
	Grams	Grams	Pounds	Pounds			
Asphalt laminated[2 4]	110	235	19	53	5	90	150
10PE-50							
150-10PE[3]	110	235	19	53	5	70	120
15PE-50							
150-15PE[3]	110	235	19	53	5	45	75

[1] Creasing at 40° F.

[2] Asphalt laminated kraft paper when used as a wall in fabricated sacks, shall conform to the requirements of paragraph (b) of this section and shall consist of kraft paper, the total basis weight of the two paper plies not less than 50 pounds per ream (500 sheets, 24" × 36"), continuously and uniformly laminated together with an average of not less than 25 pounds of asphalt per ream (500 sheets, 24" × 36"). Tolerance of minus 5 percent will be allowed on individual components. The total basis weight of the finished combination shall not exceed 100 pounds per ream (500 sheets, 24" × 36"). An asphalt laminated kraft wall meeting these requirements may be substituted for a plain kraft wall of 50 pounds basis or less, provided it meets the specification.

[3] Polyethylene coated shipping sack kraft paper. The polyethylene coated kraft paper when used as walls in fabricated sacks shall meet the heat resistance and water vapor permeability requirements as specified in the table. A tolerance of minus 10 percent will be allowed for the lot sample average coating weight of polyethylene on shipping sack kraft paper. Minimum samples for testing shall comprise not less than 3 specimens 16 square inches each selected representatively from each polyethylene coated wall of each sack in the lot sample. Where barrier sheets are based on extensible kraft the weight of the barrier material shall be in addition to the basis weight of the paper.

[4] Asphalt laminated extensible kraft paper must consist of two sheets of extensible kraft paper, the total basis weight of the paper in the finished combination being not less than 50 pounds per ream (24" × 36"—500) with neither sheet weighing less than 23 pounds continuously and uniformly laminated together, with an average of not less than 25 pounds of asphalt per ream (24" × 36"—500). In determining the basis weight and test conformance of bags containing an asphalt laminated extensible kraft wall, the asphalt laminated extensible kraft wall shall be treated as if it were a single extensible kraft wall or combination of walls of 10 pounds lower total paper basis weight than the sum of the nominal basis weight in the asphalt laminated wall, but in no case shall be treated as less than the equivalent of a 50 pounds basis weight wall.

(c) **Laminating materials.** Any laminant other than asphalt or other water-vapor barrier walls may be used provided they meet the requirements in paragraph (b) of this section.

(d) All values in paragraphs (a) and (b) of this section are for paper having a moisture content in equilibrium with an atmosphere having a relative humidity of 50 percent plus or minus 2 percent at a temperature of 73° F. plus or minus 3.5° F. following preconditioning of the test specimens to a moisture content between 3 and 5.5 percent by exposure to relatively dry air having a temperature no greater than 140° F.

(e) Conformance of sacks with paper strength requirements shall be established by comparing the sums of the test values for all the walls of the new and unused sack with the sums of the respective strength values specified in paragraphs (a) and (b) of this section for the respective papers specified for the different walls of the sack.

(1) Variation in cross direction dry tensile strength of not more than 2 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall of the sack, provided the variation is compensated for by a machine direction tearing strength test value in excess of the minimum requirement obtained from the tables, in the ratio of 5 units of tearing strength for each unit of dry tensile strength test below the minimum requirement; and variation in combined dry tensile strength of not more than 4 units below the minimum requirement based on paragraphs (a) and (b) of this section will be permitted for each wall used provided the variation is compensated for by a combined tearing strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of combined tearing strength for each unit of dry tensile strength test below the minimum requirement. Similarly, variation in machine direction tearing strength of not more than 10 units below the minimum requirement will be permitted for each wall, provided the variation is compensated for by a cross direction dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 1 unit of dry tensile strength for each 5 units of tearing strength test below the minimum requirement; and variation in combined tearing strength of not more than 20 units below the minimum requirement obtained from the tables will be permitted for each wall provided the variation is compensated for by a combined dry tensile strength test value in excess of the minimum requirement obtained from the tables in the ratio of 5 units of tearing strength for each unit of dry tensile strength below the minimum requirement.

§ 178.239-3 Construction and capacity. (a) Bags must be at least 3 thicknesses of paper; this must be heavy duty shipping sack kraft paper conforming to the requirements of § 178.239-2 paragraphs (a) and (b), or equivalent, with a minimum total basis weight of 130 pounds of paper (500 sheets, 24" × 36"). Outer sheet must be of water-resistant stock and at least 50 pounds basis weight, inner sheets not less than 40 pounds basis weight. Bags to be of sewn and taped, cemented, taped, stachel bottom or other construction of equal efficiency to form a sift-proof and reasonably air-tight container. Authorized for not over 50 pounds net weight, except that bags having a minimum total basis weight of 160 pounds of paper (500 sheets, 24" × 36") with outer sheet of water-resistant stock and at least 60 pounds basis weight inner sheets not less than 50 pounds basis weight, are authorized for not to exceed 100 pounds net weight of contents.

(b) Moistureproof barrier sheets of paper, if used, must meet the requirements of § 178.239-2(b) and shall be considered as one thickness of paper and shall be counted as 50 pounds basis weight (500 sheets, 24" × 36").

§ 178.239-4 Adhesive. (a) Moisture resistant adhesive must be used on all seams, joints, and bottom patch, if any.

§ 178.239-5 Closure. (a) For all bags: Any closure for the top which is equal in efficiency to that of the bottom, is authorized.

§ 178.239-6 Tests for shipment. (a) Bags as prepared for shipment must be able to withstand four 4-foot drops, one on each end and one each on opposite sides, without sifting or rupture.

§ 178.239-7 Marking. (a) On each bag with letters and figures at least ½ inch high in rectangle as follows:

DOT-44E

(b) Each bag must also be marked with the name and address or symbol of the person making the mark specified in paragraph (a) of this section and be located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

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§ 178.240 Specification 45B; bags, cloth and paper, lined.

§ 178.240-1 Compliance. (a) Required in all details.

§ 178.240-2 Capacity. (a) Not over 100 pounds net.

§ 178.240-3 Assembly. (a) Bags shall consist of cloth and paper parts all cemented together with curing rubber latex or asphalt, thus making a waterproofed bag as follows:

(1) Inside lining sheet.
(2) Cloth sheet.
(3) Intermediate sheet.
(4) Outside paper sheet.

§ 178.240-4 Inside lining sheet and intermediate sheet. (a) Inside lining sheet and intermediate sheet must be regenerated cellulose film at least 0.0012 inch thick or polyvinyl alcohol film at least 0.001 inch thick or other material of equal thickness and equivalent efficiency.

§ 178.240-5 Cloth sheet. (a) Cloth sheet must be burlap at least 8-ounce, 40-inch Calcutta A or B mill grade or Osnaburg cotton cloth at least 8½ ounces per square yard.

§ 178.240-6 Paper. (a) Paper must be shipping sack Kraft, creped, at least 45 pounds per ream (500 sheets 24" × 36") before creping.

§ 178.240-7 Latex and asphalt. (a) Latex and asphalt must be in sufficient quantity to form a secure bond between the parts of the bags.

§ 178.240-8 Seams. (a) Seams must be dust-tight and made by cementing or by sewing and taping with impregnated cloth tape to give seam strength at least equal to that of bag material and prevent sifting.

§ 178.240-9 Test. (a) The finished container, filled and closed as for shipment, must be capable of withstanding 2 drop tests of 6 feet on the butt and 2 drop tests of 6 feet on the side without sifting or rupture of burlap or liner.

§ 178.240-10 Marking. (a) Marking on each container by marks at least 1 inch high as follows:

(1) DOT-45B
(2) Name and address or symbol of person making the mark specified in paragraph (a)(1) of this section and located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

§ 178.240-11 Closing for shipment. (a) By sewing and taping with impregnated cloth tape to give seam strength at least equal to that of bag material and prevent sifting.

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§ 178.241 Specification 44P; all-plastic bags.

§ 178.241-1 Compliance. (a) Required in all details.

§ 178.241-2 Plastic. (a) Plastic film shall be low density polyethylene having a melt index of 0.6 maximum, conforming to the minimum requirements specified in subparagraph (a)(1) of this section.

(1) Plastic film:

Nominal gauge (mils)[1]	Drop dart (grams)[2]	Pounds per sq. inch tensile[3]	Percent elongation[3]	Tear (Grams)[4]
5	210	2100	350	200
6	250	2100	350	240
7	295	2100	350	280
8	340	2100	350	350

[1] Gauge as measured by ASTM D 374-57T, tolerance ± 10 percent.

[2] Drop dart as measured by the drop dart method (ASTM D 1709-62T Method B). Under this method a polished steel dart having a diameter of 2 inches in the hemispherical head is suspended by an electro-magnet at a height sufficient to provide a drop of 60 inches to the surface of the test specimen. The test specimen must be placed over the bottom part of a two-piece annular clamp having an inside diameter of 5 inches, so as to be uniformly flat and free of folds. Test specimen must cover the clamp at all points. Not less than 10 specimens, not more than one drop per specimen, must be tested. If one half or more of the specimens tested resist failure the film shall be deemed to meet the requirements. Failure is defined as any break through the film.

[3] Tensile and percent elongation as measured by ASTM D 882-61T Method A.

[4] Tear as measured by ASTM D 1922-61T.

§ 178.241-3 Construction and capacity. (a) Bags must be constructed of plastic film conforming to the requirements of § 178.241-2. Bags having heat-sealed ends must be capable of withstanding static loads of 1¼ pounds per mil per inch of seal as measured in the following manner. Three one-inch wide samples must be cut from the top seal and three one-inch wide samples must be cut from the bottom seal of each bag to be tested. Samples must be cut perpendicular to the seal, one from the center of the seal and one each approximately 4 inches in each direction from the center of the seal. (The preferred method of cutting the samples is to place a one-inch wide die on the flat bag so that both film layers and the seal area can be cut simultaneously.) Samples must be cut of sufficient length to permit wrapping each film end around a ¼-inch diameter metal rod and to permit clamping each end one inch from heat seal. Clamp used (such as laboratory tubing clamp) must be one that will exert even pressure across a one-inch wide strip. Clamps must be carefully positioned on strips parallel to the heat seals. One clamp must be mounted to a support, permitting the sample strip to hang vertically, and a weight must be attached to the other clamp hanging free at the lower end of the assembly. The total weight exerted on the seal must be 1¼ pounds for each mil of gauge of the film. The test must be conducted at room temperature (approximately 73° F.). All samples tested must resist failure. Failure is defined as total seal separation occurring within 10 minutes after the test has begun. Other end closures of equal efficiency authorized. Bags of not less than 5 mil construction authorized for contents not to exceed 51 pounds net weight. Bags of not less than 7 mil construction authorized for contents not to exceed 81 pounds net weight.

§ 178.241-4 Tests for shipment. (a) Bags as prepared for shipment must be able to withstand six drops from a height of 4 feet onto a solid surface, one drop on each end, one drop on each face, and one drop on each side (edge), without sifting or rupture.

§ 178.241-5 Marking. (a) Each bag must be marked with letters and figures at least ½ inch high in rectangle as follows:

(1) DOT-44P.

(2) This marking shall be enclosed by a rectangle.

(b) Each bag must also be marked with the name and address or symbol of the person making the mark specified in paragraph (a) of this section and be located just above or below that mark. Symbol, if used, must be registered with the Director, OHMT.

SUBPART H

SPECIFICATIONS FOR PORTABLE TANKS

§ 178.245 Specification 51; steel portable tanks.

§ 178.245-1 Requirements for design and construction. (a) Tanks must be seamless or welded steel construction or combination of both and have a water capacity in excess of 1,000 pounds. Fusion welded tanks must be postweld heat treated and radiographed as prescribed in the ASME Code except that each tank constructed in accordance with Part UHT of the ASME Code must be postweld heat treated. Where postweld heat treatment is required, the tank must be treated as a unit after completion of all the welds in and to the shell and heads. The method must be as prescribed in the ASME Code. Welded attachments to pads may be made after postweld heat treatment is made. A tank used for anhydrous ammonia must be postweld heat treated. The postweld heat treatment must be as prescribed in the ASME Code, but in no event at less than 1050° F. tank metal temperature. Additionally, tanks constructed in accordance with Part UHT of the ASME Code must conform to the following requirements:

(1) Welding procedure and welder performance tests must be made annually in accordance with section IX of the ASME Code. In addition to the essential variables named therein the following must be considered to be essential variables: Number of passes, thickness of plate, heat input per pass, and manufacturer's identification of rod and flux. The number of passes, thickness of plate and heat input per pass may not vary more than 25 percent from the Procedure qualification. Records of the qualification must be retained for at least 5 years by the tank manufacturer and made available to duly identified representatives of the Department of Transportation or the owner of the tank.

(2) Impact tests must be made on a lot basis. A lot is defined as 100 tons or less of the same heat and having a thickness variation no greater than plus or minus 25 percent. The minimum impact required for full-sized specimens shall be 20 foot-pounds (or 10 foot-pounds for half-sized specimens) at 0° F. Charpy V-Notch in both the longitudinal and transverse direction. If the lot test does not pass this requirement, individual plates may be accepted if they individually meet this impact requirement.

(b) Except as noted below, all openings in the tank shall be grouped in one location, either at the top of the tank or at one end of the tank.

Exceptions: (1) The openings for liquid level gauging devices, or for safety devices, may be installed separately at the other location or in the side of the shell, (2) one plugged opening of 2-inch National Pipe Thread or less provided for maintenance purposes may be located elsewhere, (3) an opening of 3-inch National Pipe Size or less may be provided at another location, when necessary to facilitate installation of condensing coils.

(c) Each uninsulated tank used for the transportation of compressed gas, as defined in § 173.300 of this subchapter, must have an exterior surface finish that is significantly reflective such as a light reflecting color is painted, or a bright reflective metal or other material if unpainted.

§ 178.245-2 Material. (a) All material used for the construction of the tank and appurtenances shall be suitable for use with the commodity to be transported therein.

(b) A material of thickness less than 3/16 inch shall not be used for the shells and heads.

§ 178.245-3 Design pressure. (a) The design pressure of a tank authorized under this specification shall be not less than the vapor pressure of the commodity contained therein at 115° F., or as prescribed for a particular commodity by Part 173, except that in no case shall the design pressure of any container be less than 100 psig nor more than 500 psig. When corrosion factor is prescribed by these regulations, the wall thickness of the tank calculated in accordance with the "Code" (see § 178.245-1(a)) shall be increased by 20 percent or 0.10 inch, whichever is less.

Note 1: The term "design pressure" as used in this specification is identical to the term "maximum allowable working pressure" as used in the "Code" (see § 178.245-1(a)).

§ 178.245-4 Tank mountings. (a) Tanks shall be designed and fabricated with mountings to provide a secure base in transit. "Skids" or similar devices shall be deemed to comply with this requirement.

(b) All tank mountings such as skids, fastenings, brackets, cradles, lifting lugs, etc., intended to carry loadings shall be permanently secured to tanks in accordance with the requirements of the Code under which the tanks were fabricated and shall be designed to withstand static loadings in any direction equal to twice the weight of the tank and attachments when filled with the lading using a safety factor of not less than four, based on the ultimate strength of the material to be used. The specific gravity used in determining the static loadings shall be shown on the marking required by § 178.245-6(a) and on the report required by § 178.245-7(a).

(c) Lifting lugs or hold-down lugs may be added to either the tank or tank mountings. If lifting lugs and hold-down lugs are added directly to the tank, they shall be secured to doubling plates welded to the tank and located at points of support, except that lifting lugs or hold-down lugs

with integral bases serving as doubling plates may be welded directly to the tank. Each lifting lug and hold-down lug shall be designed to withstand static loadings in any direction equal to twice the weight of the tank and attachments when filled with the lading using a safety factor of not less than four, based on the ultimate strength of the material to be used.

(d) All tank mountings shall be designed so as to prevent the concentration of excessive loads on the tank shell.

§ 178.245-5 Protection of valves and accessories. (a) All valves, fittings, accessories, safety devices, gaging devices, and the like shall be adequately protected against mechanical damage.

(b) The protective device or housing shall comply with the requirements under which the tanks are fabricated with respect to design and construction, and shall be designed to withstand static loadings in any direction equal to twice the weight of the tank, and attachments when filled with the lading using a safety factor of not less than four, based on the ultimate strength of the material to be used.

(c) Requirements concerning types of valves, retesting, and qualification of portable tanks contained in §§ 173.32 and 173.315 must be observed.

§ 178.245-6 Name plate. (a) In addition to the markings required by the Code (see § 178.245-1(a)) under which tanks were constructed, they shall have permanently affixed, on one of the heads of the tank, a metal plate. This plate shall be permanently affixed by means of soldering, brazing, or welding around its complete perimeter. Neither the plate itself nor the means of attachment to the tank shall be subject to destructive attack by the contents of tank. Upon such plate shall be plainly marked by stamping, embossing, or other means of forming letters into or onto the metal plate itself the following information in characters at least ⅛ inch high:

Manufacturer's name ..... Serial No. .....
Owner's serial number .....
D O T. Specification number .....
Water capacity (pounds) .....
Tare weight (pounds) .....
Design pressure (psig) .....
Design specific gravity .....
Original test date .....
Tank retested at ..... (psig) on .....

(b) All tank outlets and inlets, except safety relief valves, shall be marked to designate whether they communicate with vapor or liquid when the tank is filled to the maximum permitted filling density.

§ 178.245-7 Report. (a) A copy of the manufacturer's data report required by the Code (see § 178.245-1(a)) under which the tank is fabricated shall be furnished to the owner for each new tank.

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§ 178.251 General design and construction requirements applicable to specifications 56 (§ 178.252) and 57 portable tanks (§ 178.253).

§ 178.251-1 General requirements. (a) These specifications apply to tanks of any shape (cylindrical, conical, cubical, or other).

(b) The rated gross weight of the tank must not exceed the values used during the design qualification vibration and drop tests.

(c) Each tank must be in compliance with all applicable requirements of §§ 173.24 and 173.32 of this chapter.

§ 178.251-2 Materials of construction. (a) Except for gaskets, pressure relief devices, valve seats, liners, and linings, all construction material must be metal.

(b) Hardware for handling and securing, fitting protection, outlet piping, valves, relief devices, and closures must be made of material that is electrolytically compatible with, or suitably protected from electrolytic action when joined to the product retention components of the tank.

(c) Any material used must not be susceptible to stress corrosion cracking.

(d) Material specification: All sheet, plate, and extruded material for shell, heads, bulkheads, and baffles for portable tanks must meet the following minimum requirements:

(1) Aluminum alloys. Aluminum alloys must be suitable for fusion welding and must meet the following requirements:

Minimum yield strength ..... 24,000 p.s.i.
Minimum ultimate strength ..... 30,000 p.s.i.
Minimum elongation of standard 2 inch gage length ..... 8 percent

(2) Steel. Steel must meet the following requirements:

	Mild steel	Low alloy low carbon	Stainless
Minimum yield strength, p.s.i.	25,000	45,0000	25,000
Minimum ultimate strength, p.s.i.	45,000	60,0000	70,000
Minimum elongation of standard 2 inch gage length (percent)	20	25	30

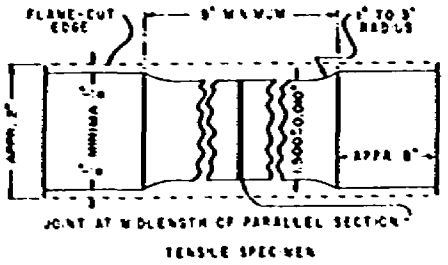
(3) Magnesium alloys. Magnesium alloy must conform to ASTM B-90-69, Grade ZE-10A.

§ 178.251-3 General construction requirements. (a) Method of joining. All joints between tank shells, heads, baffles (for baffle attaching rings), and bulkheads must be welded in accordance with the requirements of this section.

(b) Strength of joints (Aluminum Alloy (AL), Magnesium Alloy (MG)). All welded joints must be made in accordance with recognized good practice. The efficiency of a joint must not be less than 85 percent of the mechanical properties of the adjacent material. Each alloy must be joined by an inert gas arc welding process using filler metals which are consistent with material suppliers recommendations.

(c) Strength of joints (Mild Steel (MS), High Strength Low Alloy (HSLA), Austenitic Stainless Steel (SS)). Joints must be welded in accordance with recognized good practice. The efficiency of any joint must not be less than 85 percent of the mechanical properties of the adjacent material.

(d) Compliance test. Compliance with the requirements contained in paragraph (b) or (c) of this section for the welded joints must be determined by preparing two test specimens from materials and fabrication techniques representative of those to be used in each tank. Each specimen must be tested to failure under tension. Each test specimen must be prepared and tested in accordance with ASTM Standard E8-81 for metallic materials and ASTM Standard B557-81 for aluminum and magnesium-alloy products. As a minimum, one pair of representative test specimens, consisting of the minimum and maximum thickness for each type of material used may represent all the related tanks manufactured in the same shop within 12 months after the tests on the samples have been successfully completed. The butt welded specimens tested may be considered as qualifying other types or combinations of types of welds using the same filler material and welding process as long as parent metals are the same.



§ 178.251-4 Stacking, mounting, and tie-down provisions. (a) Load support devices. Each tank designed to be stacked in storage must be provided with load support devices. There may be no significant permanent deformation of the load support devices or the tank under either of the following stress conditions:

(1) Tanks loaded to their maximum authorized gross weight and stacked at least 18 feet high.

(2) A load on the support devices at least three times the maximum authorized gross weight of the tank.

(b) Base mounting. Each tank must be constructed with mountings to provide a secure base during transportation. The mounting may be in the form of a skid or similar structure.

(c) Tie-down system. If there are tie-down devices that are a structural part of the tank, the tie-down system must be capable of withstanding the following static loading without significant deformation to the tank. The static loading applied must have, with respect to the center of gravity of the tank a vertical component of at least two times the maximum authorized gross weight of the tank.

(1) If the design of the tank necessitates specific front and side orientation when loaded on a transportation vehicle, the static loading applied must have two horizontal components at right angles to each other, one direction at a time as follows:

(i) A longitudinal component at least seven times the maximum authorized gross weight of the tank in the direction of travel of the vehicle, and

(ii) A component of five times the maximum authorized gross weight of the tank in the transverse direction, or

(2) If the desing of the tank does not necessitate specific front and side orientation when loaded on a transportation vehicle, the static loading applied must have two horizontal components at right angles to each other, one direction at a time, of at least seven times the maximum authorized gross weight of the tank.

(d) If there is a structural part of the tank that could be used to tie the tank down and which is not in compliance with paragraph (c) of this section, it must be securely covered or locked during transportation to prevent its use as a tie-down.

§ 178.251-5 Testing. (a) **Design qualification testing.** Design qualification tests prescribed in this paragraph must be made on at least one of each design and size tank, except that a set of tests, when made on a tank of one size, may serve to qualify smaller tanks made of same kind and thickness of material, by the same fabrication technique, and with identical supports, and equivalent closures, and other appurtenances. Tests must be performed sequentially on a single tank in the order listed in this section. Additional tests must be made if there is any increase in design size of the tank, any reduction in thickness of material, or any change in material, or in fabrication technique. Test samples must be retained for 1 year.

(1) **Vibration and drop tests.** See applicable specification, §178 252-3(a) or §178 253-5(a).

(2) **Structural integrity tests.** (i) **Lifting devices.** If there is a system of lifting devices that is a structural part of the tank or is permanently attached thereto or to the support structure, the system must be capable of supporting at least three times the maximum gross weight of the tank, and each individual lifting device must be capable of supporting at least the maximum gross weight of the tank, without significant permanent deformation in either the lifting device system or in any part of the tank.

(ii) **Shipment support structure.** If the tank supports are a structural part of the tank, the supports must be capable of absorbing a force equal to the maximum gross weight of the tank or breaking without significant permanent deformation to the product retention component of the tank. The force must be applied to the supports at ground level from at least two horizontal directions at right angles to each other, one direction at a time.

(iii) **Stacking support devices.** If stacking support devices are a structural part of the tank, there must be no significant permanent deformation of any device or the tank under either of the following stress conditions:

(a) Tanks loaded to their maximum authorized gross weight and stacked at least 18 feet high.

(b) A load on the stacking support devices of at least three times the maximum authorized gross weight of the tank.

(iv) **Fittings and protective devices.** Each fitting (or its protective device) subject to this test requirement must be capable of withstanding a force at least two times the maximum authorized gross weight of the tank without resultant damage to the fitting. The force must be applied to the fitting or its protective device in at least two horizontal directions at right angles to each other, one direction at a time, and in alinement with the fitting.

(b) **Production quality control, testing and inspection.** See applicable specification, §178 252-3(b) or §178 253-5(b).

§ 178.251-6 Rejected tanks. No tanks which fail to pass any of the prescribed tests may be placed in service until suitable repairs have been made and satisfactory re-tests results have been obtained.

§ 178.251-7 Identification and marking. (a) A metal certification plate must be permanently affixed to each tank and must be readily accessible for inspection. The plate must be marked in letters and numerals at least ⅛-inch high by stamping, embossing, or other means of forming letters into or onto the metal plate itself. The marking must contain at least the following information:

Tank manufacturer	
Specification identification: Spec 56 or Spec 57	
Design pressure (for specification 57 only)	p.s.i.g.
Test pressure (for specification 56 only)	p.s.i.g.
Serial number	
Original test date	
Tare weight	lbs.
Rated gross weight[1]	lbs.
Volumetric capacity	U.S. gal (or cu. ft.)
Material's of construction[2]	

[1] The rated (permitted) gross weight may not exceed that weight used during the design qualification tests involving vibration and drop.

[2] E.g., AL for aluminum, MG for magnesium alloy, MS for mild steel, HSLA for high strength low alloy, SS for austenitic stainless steel, including ASTM or ASME reference.

(b) Unless the tank has been designed for stacking and meets the appropriate stacking integrity requirements of this specification, it must also be marked in letters at least 2 inches high in contrasting colors "Do Not Stack" and "Do Not Place Other Freight On Top Of This Tank", on at least two sides of the tank. These instructions must also appear on the certification plate. Plate markings are required to meet the requirements of paragraph (a) of this section and need not be in contrasting color.

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§ 178.252 Specification 56; metal portable tank.

§ 178.252-1 General requirements. (a) Each tank must be in compliance with the general design and construction requirements in §178 251 in addition to the specific requirements of this section.

(b) Each tank may not exceed a rated gross weight of 7,700 pounds.

§ 178.252-2 Openings. (a) Each fill and discharge opening must be equipped with a closure and locking device.

(b) A drum-type locking ring closure is authorized for openings not exceeding 23 inches in diameter. A drum-type locking ring closure must be at least a 12-gage bolted ring with forged lugs having at least a ⅝-inch steel bolt tapped into one of the lugs. The locking ring must be equipped with a lock nut or equivalent device.

(c) For a tank that incorporates a hopper-type product discharge opening, the closure device must be constructed to retain product under the test conditions outlined in §§178 251-5 and 178 252-3(a). Closures for those openings must be designed with positive mechanical locking and sealing devices to prevent leakage during normal conditions incident to transportation.

§ 178.252-3 Testing. (a) **Design qualification testing.** In addition to the testing prescribed in §178 251-5(a), a vibration and a drop test are also required on each design. For these tests, the tank must be filled with a fine, dry powered material having a density that results in the tank having a gross weight not less than the rated gross weight of the tank.

(1) **Vibration test.** This test must be performed for 1 hour using a minimum double amplitude of 1 inch at a frequency that causes the test tank to be raised from the floor of the testing table so a piece of flat steel strap may be passed between the tank and the table. The tank must be restrained so that all horizontal motion is restricted and only vertical motion is permitted.

(2) **Drop test.** The tank must be capable of withstanding without leakage of contents a 2-foot free drop onto a flat unyielding horizontal surface, striking the target surface in the position and attitude from which maximum damage to the tank (including closures) is expected.

(b) **Production quality control, testing, and inspection.** (1) **Leakage test.** Each tank must be tested by a minimum air or hydrostatic pressure of at least 2 pounds per square inch gage applied to the entire tank. If the air pressure is used, the entire surface of all joints under pressure must be coated with, or immersed in, a solution of soap and water, or other material suitable for the purpose of detecting leaks. If the hydrostatic pressure test is used it must be carried out by using water or other liquid having a similar viscosity, the temperature of which may not exceed 100° F. and all joints under pressure must be inspected for leaks. For either test, the pressure must be held for a period of time sufficiently long to assure detection of leaks. All closures must be in place during the test. Any tank that has detectable leakage or significant permanent deformation does not meet the requirements of this specification.

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§ 178.253 Specification 57; metal portable tank.

§ 178.253-1 General requirements. (a) Each tank must be in compliance with the general design and construction requirements in §178 251 in addition to the specific requirements of this section.

(b) Each tank must have a capacity of at least 110 gallons but not more than 660 gallons.

§ 178.253-2 Openings. (a) Each fill and discharge opening must be equipped with a closure device that meets the following requirements:

(1) Any closure for a fill opening in excess of 20 square inches must be equipped with a device to prevent the closure from fully opening without first relieving internal pressure.

(2) Any product discharge valve, if used, must be provided with a leak tight device, such as a cap or plug.

(3) Each closure must be vapor tight.

(b) A drum-type locking ring closure is authorized for any opening less than 23 inches in diameter. A drum-type locking ring closure must be at least a 12-gage bolted ring with forged lugs having at least a ⅝-inch steel bolt tapped into one of the lugs. The locking ring must be equipped with a lock nut or equivalent device.

§ 178.253-3 Protection of fittings. Each fitting which could be damaged sufficiently to result in leakage of tank contents must be protected by suitable guards or protective housings. The term "fitting" includes valves, closure devices, safety relief devices, and other accessories through which contents could leak from the tank. Each fitting or fitting protection device must be capable of withstanding the fitting protection test specified in §178 251-5.

§ 178.253-4 Vents. (a) Each tank must be equipped with at least one pressure relief device such as a spring-loaded valve, frangible disc or fusible plug.

(b) Each pressure relief device must communicate with the vapor space of the tank when the tank is in a normal transportation attitude. Shutoff valves must not be installed between the tank opening and any pressure relief device. Pressure relief devices must be mounted, shielded, or drained to prevent the accumulation of any material that could impair the operation or discharge capability of the device.

(c) The total emergency venting capacity (cu. ft./hr.) of each portable tank must be at least that determined from the following table.

Total surface area square feet[1][2]:	Cubic feet free air per hour
20	15,800
30	23,700
40	31,600
50	39,500
60	47,400
70	55,300
80	63,300
90	71,200
100	79,100
120	94,900
140	110,700
160	126,500

[1] Interpolate for intermediate sizes.
[2] Surface area excludes area of legs.

(1) The pressure operated relief device must open at not less than 3 pounds per square inch gage and at not over the design test pressure of the tank. The minimum venting capacity for pressure activated vents must be 6,000 cubic feet of free air per hour (measured at 14.7 p s i a. and 60° F) at not more than 5 pounds per square inch gage.

(2) If a frangible device is used for relieving pressure, the device must have a minimum area of 1.25 square inches and must be rated at less than the design test pressure of the tank.

(3) If a fusible device is used for relieving pressure, the device must have a minimum area of 1.25 square inches. The device must function at a temperature between 220° F. and 300° F. and at a pressure less than the design test pressure of the tank, unless this latter function is accomplished by a separate device.

(d) No relief device may be used which would release flammable vapors under normal conditions of transportation (temperature up to and including 130° F.).

§ 178.253-5 Testing.

(a) Design qualification testing. In addition to the testing prescribed in § 178.251-5, a vibration test, a drop test, and a pressure test are also required on each design. For the vibration and drop tests, the tank must be filled with a liquid to not less than the rated gross weight.

(1) Vibration test. This test must be performed for 1 hour using a minimum double amplitude of 1 inch at a frequency that causes the test tank to be raised from the floor of the testing table so a piece of flat steel strap may be passed between the tank and the table. The tank must be restrained so that all horizontal motion is restricted and only vertical motion is permitted.

(2) Drop test. The tank must be capable of withstanding without leakage of contents a 2-foot free drop onto a flat unyielding horizontal surface, striking the target surface in the position and attitude from which maximum damage to the tank (including piping and fittings) is expected.

(3) Pressure test. The tank must be capable of maintaining, under hydrostatic test for at least 5 minutes, at least one and one-half times the design pressure prescribed in this paragraph, without detectable leakage or significant permanent deformation. The pressure must be measured at the top of the tank. Each closure must be in place and blocked if necessary as for shipment. Each closure must be standard, except that tapping for pressurizing and gaging is permitted. Design pressure must be determined as follows:

$$P = \frac{hd}{115} + 3$$

Where:

P = Design pressure in psig;
h = Inside height of tank in inches;
d = Maximum allowable density in pounds per gallon;
115 = Number of cubic inches in 1 gallon (231) divided by a safety factor of two.

(b) **Production quality control, testing and inspection.** (1) **Leakage test.** Each tank must be leak tested by a minimum sustained air pressure of at least three pounds per square inch gage applied to the entire tank. The entire surface of all joints under pressure must be coated with or immersed in a solution of soap and water or other material suitable for the purpose of detecting leaks. The pressure must be held for a period of time sufficiently long to assure detection of leaks. All closures must be in place during the test, but safety relief devices may be removed and such openings plugged. Any tank that has detectable leakage or significant permanent deformation does not meet the requirements of this specification.

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§ 178.255 Specification 60; steel portable tanks.

§ 178.255-1 General requirements. (a) Tanks must be of fusion welded construction, cylindrical in shape with seamless heads concave to the pressure. Tank shells may be of seamless construction.

(b) Tanks must be designed and constructed in accordance with and fulfill all the requirements of the ASME Code.

(c) Tanks including all permanent attachments must be postweld heat treated as a unit.

(d) Requirements concerning types of valves, retesting, and qualification of portable tanks contained in §§ 173.32 and 173.315 must be observed.

§ 178.255-2 Material. (a) Material used in the tank must be steel of good weldable quality and conform with the requirements of the ASME Code.

(b) The minimum thickness of metal, exclusive of lining material, for shell and heads of tanks shall be as follows:

Tank capacity:	Minimum thickness (inch)
Not more than 1,200 gallons	1/4
Over 1,200 to 1,800 gallons	5/16
Over 1,800 gallons	3/8

§ 178.255-3 Expansion domes. (a) Expansion domes, if applied, must have a minimum capacity of one percent of the combined capacity of the tank and dome.

§ 178.255-4 Closures for manholes and domes. (a) The manhole cover shall be designed to provide a secure closure of the manhole. All covers, not hinged to the tanks shall be attached to the outside of the dome by at least ¼ inch chain or its equivalent. Closure shall be made tight against leakage of vapor and liquid by use of gaskets of suitable material.

§ 178.255-5 Bottom discharge outlets. (a) Bottom discharge outlets prohibited, except on tanks used for shipments of sludge acid and alkaline corrosive liquids.

(b) If installed, bottom outlets or bottom washout chambers shall be of metal not subject to rapid deterioration by the lading, and each shall be provided with a valve or plug at its upper end and liquid-tight closure at its lower end. Every such valve or plug shall be designed to insure against unseating due to stresses or shocks incident to transportation. Bottom outlets shall be adequately protected against handling damage and outlet equipment must not extend to within less than one inch of the bottom bearing surface of the skids or tank mounting.

§ 178.255-6 Loading and unloading accessories. (a) When installed, gauging, loading and air inlet devices, including their valves, shall be provided with adequate means for their secure closure; and means shall also be provided for the closing of pipe connections of valves.

(b) Interior heater coils, if installed, must be extra heavy pipe and so constructed that breaking off of exterior connections will not cause leakage of tanks.

§ 178.255-7 Protection of valves and accessories. (a) All valves, fittings, accessories, safety devices, gauging devices, and the like shall be adequately protected against mechanical damage by a housing closed with a cover plate.

(b) Protective housing shall comply with the requirements under which the tanks are fabricated with respect to design and construction, and shall be designed with a minimum factor of safety of four to withstand loadings in any direction equal to two times the weight of the tank and attachments when filled with water.

§ 178.255-8 Safety devices. (a) See §173.315(i) of this subchapter.

§ 178.255-9 Compartments. (a) When the interior of the tank is divided into compartments, each compartment shall be designed, constructed and tested as a separate tank. Thickness of shell and compartment heads shall be determined on the basis of total tank capacity.

§ 178.255-10 Lining. (a) If a lining is required, the material used for lining the tank shall be homogeneous, nonporous, imperforate when applied, not less elastic than the metal of the tank proper. It shall be of substantially uniform thickness, not less than 1/32 inch thick if metallic, and not less than 1/16 inch thick if nonmetallic, and shall be directly bonded or attached by other equally satisfactory means. Rubber lining shall be not less than 1/16 inch thick. Joints and seams in the lining shall be made by fusing the material together or by other equally satisfactory means. The interior of the tank shall be free from scale, oxidation, moisture and all foreign matter during the lining operation.

§ 178.255-11 Tank mountings. (a) Tanks shall be designed and fabricated with mountings to provide a secure base in transit. "Skids" or similar devices shall be deemed to comply with this requirement.

(b) All tank mountings such as skids, fastenings, brackets, cradles, lifting lugs, etc., intended to carry loadings shall be permanently secured to tanks in accordance with the requirements under which the tanks are fabricated, and shall be designed with a factor of safety of four, and built to withstand loadings in any direction equal to two times the weight of the tanks and attachments when filled to the maximum permissible loaded weight.

(c) Lifting lugs or side hold down lugs shall be provided on the tank mountings in manner suitable for attaching lifting gear and hold-down

devices. Lifting lugs and hold-down lugs welded directly to the tank shall be of the pad eye type. Doubling plates welded to the tank and located at the points of support shall be deemed to comply with this requirement.

(d) All tank mountings shall be so designed as to prevent the concentration of excessive loads on the tank shell.

§ 178.255-12 Pressure test. (a) Each completed portable tank prior to application of lining shall be tested before being put into transportation service by completely filling the tank with water or other liquid having a similar viscosity, the temperature of which shall not exceed 100° F. during the test, and applying a pressure of 60 pounds per square inch gauge. The tank shall be capable of holding the prescribed pressure for at least 10 minutes without leakage, evidence of impending failure, or failure. All closures shall be in place while the test is made and the pressure shall be gauged at the top of the tank. Safety devices and/or vents shall be plugged during this test.

§ 178.255-13 Repair of tanks. (a) Tanks failing to meet the test may be repaired and retested, provided that repairs are made in complete compliance with the requirements of this specification.

§ 178.255-14 Marking. (a) In addition to marking required by the American Society of Mechanical Engineers Code, every tank shall bear permanent marks at least ¼ inch high stamped into the metal near the center of one of the tank heads or stamped into a plate permanently attached to the tank by means of brazing or welding or other suitable means as follows:

Manufacturer's name ..... Serial No .....
DOT specification .....
Nominal capacity ..... (gallons)
Tare weight ..... (pounds)
Date of manufacture .....

§ 178.255-15 Report. (a) A copy of the manufacturer's data report required by the Code (see § 178.245-1(a)) under which the tank is fabricated must be furnished to the owner for each new tank.

Place .....

Date .....

Portable Tank
Manufactured for ..... Company
Location .....
Manufactured by ..... Company
Location .....
Consigned to ..... Company
Location .....
Size ..... feet outside diameter by ..... long

Marks on tank as prescribed by § 178.255-14 of this specification are as follows:
Manufacturer's name .....
Serial number .....
Owner's serial number .....
DOT specification .....
ASME Code Symbol (par U-201) .....
Date of manufacture .....
Nominal capacity ..... (gallons)

It is hereby certified that this tank is in complete compliance with the requirements of DOT Specification No. 60.

(Signed) .....
Manufacturer or owner

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§ 178.270 Specification IM 101 and IM 102; steel portable tanks; general design and construction requirements.

§ 178.270-1 Specification requirements for IM 101 and IM 102 steel portable tanks. (a) Each IM portable tank must meet the requirements of this section in addition to the requirements of § 178.271 (IM 101) or § 178.272 (IM 102). These requirements apply to IM portable tanks of diameters no greater than 2438 mm (96 inches) that are designed to carry liquids having a vapor pressure of less than 2.97 bar absolute (43 psia) at a temperature of 50°C. (122°F).

§ 178.270-2 General. (a) Each tank, including attachments and service and structural equipment, must be designed to withstand, without loss of contents, the maximum internal pressure that can be anticipated to result from the contents and the static and dynamic stresses incurred in normal handling and transportation.

(b) For the purpose of this subchapter and the IM tank table "maximum allowable working pressure" or MAWP is the maximum pressure that an IM portable tank may experience during any normal operation (including loading and unloading). The only exception to this limitation is hydrostatic testing.

(c) Each portable tank must have a cross-sectional design that is capable of being stress analyzed either mathematically or by the experimental method contained in UG-101 of the ASME Code, or other method acceptable to the Director, OHMT.

(d) Each portable tank must be designed so that the center of gravity of the filled tank is approximately centered within the points of attachment for lifting devices.

(e) When credit is taken for insulation to reduce the required emergency venting capacity of safety relief devices, the insulation must be jacketed or otherwise protected from the accumulation of moisture or foreign matter that would decrease its efficiency or corrode the tank.

(f) Each portable tank that has a lining must have a lining material that meets the following requirements:

(1) The material used to line the tank must be—
(i) Substantially immune to attack by the hazardous material transported;
(ii) Homogeneous;
(iii) Nonporous;
(iv) Imperforated when applied;
(v) At least as elastic as the material of the tank shell; and
(vi) Have thermal expansion characteristics compatible with the tank shell.

(2) The lining of the tank, tank fitting and piping must be—
(i) Attached by bonding or other satisfactory means;
(ii) Continuous; and
(iii) Extended around the face of any flange.

(3) Joints and seams in the lining must be made by fusing the material together or by other equally effective means.

§ 178.270-3 Materials of construction. (a) Each portable tank must be constructed of carbon or alloy steels. Materials included in Part UHT of the ASME Code or equivalent materials are not authorized. Any materials used in the tank shell must conform to a recognized national standard and must be suitable for the external environments in which the tank will be carried. The minimum elongation for any material must be 20 percent or greater.

(b) The maximum stress allowed for a material shall be determined using one of the following methods:

(1) 1.5 times the specified values for the material at 93°C (200°F) in Section VIII, Division 1 of the ASME Code;

(2) Derived by test for the actual yield and tensile strengths at 93°C (200°F) for the actual group of plates used to fabricate the tank using the methods described in § 178.270-3(d); or

(3) Derived from the minimum yield and tensile strengths at 93°C (200°F) specified by the national standard to which the material is manufactured using the methods described in § 178.270-3(d).

(c) Maximum allowable stress values, derived for an actual group of plates, that are based on actual tensile and yield strengths of the material at 93° C. (200°F) shall not be greater than 120 percent of the specified minimum yield and tensile strength specified in the national standard to which the material is manufactured.

(d) The maximum allowable stress values must be derived from the following criteria:

(1) For austenitic steels,
(i) When the yield strength is determined using the 0.2 percent offset, 93.75 percent of the yield strength.
(ii) When the yield strength is determined using the 1.0 percent offset, 75 percent of the yield strength.

(2) For carbon and low alloy steels, the yield strength is determined using the 0.2 percent offset. The maximum allowable stress value is the lower of 93.75 percent of the yield strength or 37.5 percent of the tensile strength.

(e) For purposes of these specifications, tensile strength, yield strength and elongation must be determined using a specimen having a gauge length:

$$L_o = 5.65(S_o)^{1/2}$$

where:

L_o = the gauge length of the specimen—millimeters (inches); and
S_o = the cross sectional area of the specimen—square millimeters (square inches).

Tensile tests and analysis of results must be in accordance with "ISO 82-1974(e) Steels-Tensile Testing." The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the guage length, except that for high alloy austenitic steels the yield strength shall be the stress corresponding to a permanent strain of 0.2 or 1.0 percent of the gauge length as appropriate. The elongation must be at least 20 percent.

(f) If maximum allowable stress values or minimum tank wall thicknesses are based on the actual yield strength, the actual tensile strength, or the actual elongation for the material used to fabricate the tank, the test records or certification of test results by the material producer or tank manufacturer must be approved by the approval agency, retained by the tank manufacturer for a period not less than 15 years, and made available to any duly identified representative of the Department or the owner of the tank.

§ 178.270-4 Structural integrity. (a) *Maximum stress values.* The maximum calculated stress value in a tank at the Test Pressure must be less than or equal to that specified for the material of construction at 93° C. (200 F) in § 178.270-3 of this part.

(b) *Tank shell loadings.* Tank shells, heads, and their fastenings shall be designed to prevent stresses in excess of two thirds those specified in § 178.270-3 of this part. The design calculations must include the forces imposed by each of the following loads:

(1) An internal pressure equal to the maximum allowable working pressure less 1 bar (14.5 psig) in combination with the simultaneously applied loadings of 3W vertically downward, 2W longitudinally, and 1W laterally acting through the center of the tank (W is the maximum permissible weight of the loaded tank and its attachments), and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(2) An internal pressure equal to the maximum allowable working pressure less 1 bar (14.5 psig), in combination with the simultaneously applied loadings of 1W vertically upward, 2W longitudinally, and 1W laterally acting through the center of the tank (W is the maximum permissible weight of the loaded tank and its attachment), and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(3) The load on the tank head resulting from an internal pressure equal to the maximum allowable working pressure, less 1 bar (14.5 psig), in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g", and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(4) Loads resulting from any discontinuities between tank shell and heads;

(5) Superimposed loads such as operating equipment, insulation, linings and piping; and

(6) Reactions of supporting lugs and saddles or other supports.

(c) The shell thickness used in calculating the resulting stress levels in a tank shall be exclusive of any corrosion allowance.

§ 178.270-5 Minimum thickness of shells and heads. (a) For the purposes of this section, mild steel is steel with a guaranteed minimum tensile strength of 37 deka newtons per square millimeter (53,650 p.s.i.) and a guaranteed elongation of 27 percent or greater.

(b) Except as otherwise provided in this subchapter, the shell and heads of each portable tank constructed of reference mild steel—

(1) With a maximum cross-sectional dimension of 1.8 meters (5.9 feet) or less, shall be at least 5mm (0.197 inches) thick; or,

(2) With a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet), shall be at least 6.35mm (0.250 inches) thick.

(c) The minimum thickness of the shell and heads of each portable tank constructed of a steel other than the reference mild steel, shall be obtained from the following formula:

Formula for metric units

$$e_1 = (10e_0)(Rm_1A_1)^{1/3}$$

Formula for nonmetric units

$$e_1 = (112.3e_0)(Rm_1A_1)^{1/3}$$

where:

e_0 = Required thickness of the reference steel from § 178.270-5(b)—millimeters (inches);
e_1 = Equivalent thickness of the steel used—millimeters (inches);
Rm_1 = Specified minimum tensile strength of the steel used—deka newtons per square millimeter (p.s.i.); and
A_1 = Specified minimum percentage elongation of the steel used—percent times 100 (i.e., if 20% use 20.0).

(d) When other than the standard minimum thickness for the reference mild steel is specified for a tank in the IM Tank Table, the specified minimum shell and head thickness must be at least equal to the larger of the thicknesses calculated from the formula given in § 178.270-5(c) and the following formula:

Formula for metric units

$$3_1 = (10e_0d_1)/1.8(Rm_1A_1)^{1/3}$$

Formula for nonmetric units

$$e_1 = (112.3e_0d_1)/5.9(Rm_1A_1)^{1/3}$$

where:

e_1 = Equivalent thickness of the steel used—millimeters (inches);
e_0 = The specified minimum shell and head thickness of the reference mild steel specified in the IM Tank Table—millimeters (inches);
d_1 = Actual outside diameter of the tank—meters (feet);
Rm_1 = Specified minimum tensile strength of the steel used—deka newtons per square millimeter (p.s.i.); and
A_1 = Specified minimum percentage elongation of the steel used—percent times 100 (i.e., if 20% use 20.0).

Note.—For paragraph (c) and (d) of this section the actual values for the tensile strength and percent elongation for the steel, as determined through tests on specimens from the group of plates to be used in the fabrication of the tank, may be substituted for the specified minimum values in the calculation prescribed in this paragraph (See § 178.270-3 of this part). Test records or certification of test results by the material producer or tank manufacturer must be retained by the tank manufacturer for a period not less than 15 years and must be made available to the Department or the owner of the tank.

§ 178.270-6 Tank supports, frameworks and lifting attachments. (a) Each portable tank must be constructed with a permanent support structure that provides a secure base in transport. Skids, frameworks, cradles, or similar devices are acceptable. The calculated stress in tank supports, frameworks, and lifting attachments must not exceed 60 percent of the specified minimum yield strength of the material of construction under the applicable loading conditions specified in § 178.270-4(b).

(b) An IM portable tank that meets the definition of "container" in § 450.3(a)(3) must meet the requirements of Parts 450 through 453 of this title, in addition to the requirements of this subchapter.

§ 178.270-7 Joints in tank shells. Joints in tank shells must be made by fusion welding. Such joints and their efficiencies must be as required by the ASME Code. Weld procedures and welder performance must be ASME Code qualified or must be qualified by the approval agency in accordance with the procedures in the ASME Code, Section IX, Welding and Brazing Qualifications. A record of each qualification must be retained by the manufacturer for the period prescribed in ASME Code, Section VIII, Pressure Vessels, and must be made available to any duly identified representative of the Department and the owner of the tank.

§ 178.270-8 Protection of valves and accessories. Each valve, fitting, accessory, safety device, gauging device, and other appurtenance shall be adequately protected against mechanical damage.

§ 178.270-9 Inspection openings. Each portable tank must be fitted with a manhole or other inspection opening sited above the maximum liquid level to allow for complete internal inspection and adequate access for maintenance and repair of the interior. Each portable tank with a capacity of more than 1893 liters (500 gallons) must be fitted with an elliptical or obround manhole at least 279 × 381 millimeters (11 × 15 inches), or 254 × 406 millimeters (10 × 16 inches), or with a circular manhole at least 381 millimeters (15 inches) in diameter. Any inspection opening and closure must be designed and reinforced as required by the ASME Code.

§ 178.270-10 External design pressure. (a) Each portable tank not fitted with vacuum relief devices must be designed to withstand a positive external pressure differential of at least 0.4 bar > (6 p.s.i.).

(b) Each portable tank fitted with vacuum relief devices must be designed to withstand a positive external pressure differential not less than the set pressure of the vacuum relief device and in any case at least 0.21 bar (3 p.s.i.).

§ 178.270-11 Pressure and vacuum relief devices. (a) *Relief devices required.* Each portable tank, or each independent compartment of a portable tank, must be fitted with pressure relief devices in accordance with the following:

(1) Each portable tank, or each independent compartment of a portable tank, with a capacity of more than 1893 liters (500 gallons), must be provided with a primary pressure relief device consisting of a spring-loaded pressure relief valve and, in addition, may have one or more emergency pressure relief devices that may be a spring-loaded pressure relief valve, a frangible disc or fusible element in parallel with the primary pressure relief device.

(2) Each portable tank, or each independent compartment of a portable tank, with a capacity of 1893 liters (500 gallons) or less, must be fitted with a primary pressure relief device that may either be a frangible disc or a spring-loaded pressure relief valve.

(3) If a frangible disc is inserted in series with required pressure relief valve, the space between the frangible disc and the pressure relief valve must be provided with a suitable tell-tale indicator to permit detection, prior to and during shipment, of disc rupture, pinholing, or leakage which could cause a malfunction of the pressure relief system. The frangible disc must rupture at a tank pressure within the range specified in § 178.270-11(c)(1).

(b) *Location and construction of relief devices.*

(1) Pressure relief devices must be spring-loaded valves, frangible discs, or fusible elements. Vacuum relief devices must be capable of reclosing in any attitude. Each pressure relief device inlet must be situated in the vapor space of the tank. The discharge from any device must be unrestricted and directed to prevent impingement upon the tank

shell or structural framework. Protective devices which deflect the flow of vapor are permissible provided the required vent capacity is maintained. Pressure and vacuum relief devices including their inlets must be sited on the top of the tank in a position as near as possible to the longitudinal and transverse center of the tank within the following limitation:

(i) Longitudinally on the tank within 1.07 m (3½ feet) or ⅛ the tank length, whichever is less, from the top center of the tank; and

(ii) Transversely within 12 degrees of the tank top.

(2) Except for a relief device installed in a piping system, each relief device must provide unrestricted venting under all conditions. Each pressure relief system, including any piping, must provide a venting capacity at least equal to the venting capacity specified in § 178.270-11(d) for the tank on which the system is installed.

(3) Fusible elements, when installed, must not be protected from direct communication with external heat sources.

(4) Spring-loaded pressure relief valves must be constructed in a manner to prevent unauthorized adjustment of the relief setting.

(c) *Pressure settings of relief devices.*—(1) *Primary pressure relief devices.* The primary relief device required by paragraph (a) of this section must be set to function in a range of no less than 100 percent and no greater than 125 percent of the maximum allowable working pressure (MAWP) for tanks having a MAWP below 44 psig. For tanks having a MAWP of 44 psig or greater, the primary pressure relief device must be set to function in a range of no less than 100 percent and no greater than 110 percent of the MAWP. Spring-loaded pressure relief valves must close after discharge at a pressure not less than 90 percent of the start-to-discharge pressure and remain closed at all lesser pressures.

(2) *Emergency pressure relief devices.* Each frangible disc, other than those used as a primary relief device in accordance with paragraph (b)(2) of this section, must be designed to burst at a pressure greater than 125 percent and less than or equal to 150 percent of the MAWP. Each spring loaded pressure relief valve used as an emergency pressure relief device must be set to operate at no less than 125 percent of the MAWP and be fully open at 150 percent of the MAWP.

(3) *Fusible elements.* Fusible elements must have a nominal yield temperature greater than the highest tank operating temperature and less than or equal to 121°C. (250°F). The pressure developed in the tank at the fusible element yield temperature must be below the test pressure of the tank.

(4) *Vacuum relief devices.* Vacuum relief devices, when used, must be designed to provide total containment of product under normal and accident conditions and must be set to open at a nominal external overpressure of not less than 0.21 bar (3 pounds per square inch) but not greater than the external pressure for which the tank is designed. Each vacuum relief device must have a minimum cross sectional flow area of 2.84 cm^2 (0.44 square inches).

(d) *Venting capacity of pressure relief devices.*—(1) *Pressure relief valves (spring-loaded).* Each pressure relief valve must have a minimum vent capacity of at least 170 standard cubic meters per hour (SCMH) (6,000 standard cubic feet per hour (SCFH)). The minimum total pressure relief valve vent capacity for each tank shall be 340 SCMH (12,000 SCFH) per 32.5 m^2 (350 square feet) of exposed tank area, but in any case at least 340 SCMH (12,000 SCFH).

(2) *Total tank vent capacity.* The total vent capacity of all pressure relief devices installed on each portable tank must be sufficient with all devices operating to limit the pressure in the tank or less than or equal to the test pressure. Except as provided in paragraph (d)(3) or (d)(4) of this section, the total vent capacity must be at least equal to that shown in the following Table:

Table I.—*Minimum total vent capacity*

[Metric units table in cubic meters of air per hour at atmospheric pressure and 15°C.]

Exposed area square meters	Cubic meters free air per hour	Exposed area square meters	Cubic meters free air per hour
2	841	37.5	9,306
3	1,172	40	9,810
4	1,455	42.5	10,308
5	1,783	45	10,806
6	2,069	47.5	11,392
7	2,348	50	11,778
8	2,621	52.5	12,258
9	2,821	55	12,732
10	3,145	57.5	13,206
12	3,655	60	13,674
14	4,146	62.5	14,142
16	4,625	65	14,604
18	5,092	67.5	15,066
20	5,556	70	15,516
22.5	6,120	75	16,422
25	6,672	80	17,316
27.5	7,212	85	18,198
30	7,746	90	19,074
32.5	8,268	95	19,938
35	8,790	100	20,790

[Nonmetric units in cubic feet of air per hour at atmospheric pressure and 59°F]

Exposed area square feet	Cubic feet free air per hour	Exposed area square feet	Cubic feet free air per hour
20	27,600	275	237,000
30	38,500	300	256,000
40	48,600	350	289,500
50	58,600	400	322,100
60	67,700	450	355,900
70	77,000	500	391,000
80	85,500	550	417,500
90	94,800	600	450,000
100	104,000	650	479,000
120	121,000	700	512,000
140	136,200	750	540,000
150	152,100	800	569,000
180	168,200	850	597,000
200	184,000	900	621,000
225	199,000	950	656,000
250	213,500	1,000	686,000

Note.—Interpolate for intermediate sizes

(3) Notwithstanding the minimum total vent capacity shown in Table I, of paragraph (d)(2), a tank in dedicated service may have a lesser total vent capacity provided the approval certificate required by § 173.32a of this subchapter specifies the hazardous materials for which the tank is suitable. The lesser total vent capacity must be determined in accordance with the following formula:

Formula for metric units

$$Q = 5{,}660{,}000\ A^{0.82}(ZT)^{0.5}(LC)(M)^{0.5}$$

Formula for nonmetric units

$$Q = 37{,}980{,}000\ A^{0.82}(ZT)^{0.5}(LC)(M)^{0.5}$$

where:

Q = The total required venting capacity, in cubic meters of air per hour at standard conditions of 15.6°C. and 1 atm (cubic feet of air per hour at standard conditions of 60°F. and 14.7 psia);
T = The absolute temperature of the vapor at the venting conditions—degrees Kelvin (°C + 273) [degrees Rankine (°F + 460)];
A = The exposed surface area of tank shell—square meters (square feet);
L = The latent heat of vaporization of the lading—calories per gram (BTU/lb);
Z = The compressibility factor for the vapor (if this factor is unknown, let Z equal 1.0);
M = The molecular weight of vapor;
C = A constant derived from (K), the ratio of specific heats of the vapor. If (K) is unknown, let C = 315.

$$C = 520\sqrt{K\left(\frac{2}{K+1}\right)^{\frac{K+1}{K-1}}}$$

where:

K = C_p/C_v
C_p = The specific heat at constant pressure, in calories per gram degree centigrade (BTU/lb°F); and
C_v = The specific heat at constant volume, in calories per gram degree centigrade (BTU/lb°F).

(4) The required total venting capacity determined by using Table I or paragraph (d)(3) of this section may be reduced for insulated tanks to Q_i by the following formula:

$$Q_i = FQ$$

where:

Q = The total required venting capacity of the insulated tank;
Q_i = The total venting capacity required for an uninsulated tank according to Table I or paragraph (d)(3) of this section;
F = A coefficient with a value greater than or equal to 0.25 according to the following formula:

Formula for metric units

$$F = \frac{8U(649-t)}{93.5\times10^6}$$

Formula for nonmetric units

$$F = \frac{8U(1200-t)}{34{,}500}$$

where:

U = The thermal conductance of the insulation system taken at 38°C. (100°F.), in gram calories per hour sq. meter °C. (BTU per hour sq. feet °F); and
t = The actual temperature of the substance at loading, in °C. (°F).

(5) Insulation systems approved for this purpose must:
(i) Remain effective at all temperatures up to 649°C. (1200°F.); and
(ii) Be jacketed with a material having a melting point of 649°C. (1200°F.) or greater.

(6) The flow capacity rating of any pressure relief device must be certified by the manufacturer to be in accordance with the applicable provisions of the ASME Code with the following exceptions:
(i) The ASME Code stamp is not required; and
(ii) The flow capacity certification test for spring loaded pressure relief valves may be conducted at a pressure not to exceed 120% of the set pressure provided the stamped flow capacity rating is not greater than 83% of the average capacity of the valves tested.

(e) *Markings on pressure and vacuum relief devices.* The following information shall be plainly displayed on each pressure relief device:
(1) The pressure or, when appropriate, the temperature at which the device is set to function;
(2) Except for vacuum relief devices, the rated flow capacity of air discharged per minute at 15°C. (59°F) and atmospheric pressure, at;
(i) The set pressure for frangible discs;
(ii) No greater than 20% above the start to discharge pressure for spring-loaded relief devices; or,
(iii) The fusing temperature for fusible elements.
(3) The manufacturer's name and catalog number; and
(4) The allowable tolerances at the start to discharge pressure and the allowable tolerances at the discharge temperature.

§ 178.270-12 Valves, nozzles, piping, and gauging devices. (a) All tank nozzles, except for those provided for relief devices, thermometer wells, and inspection openings, must be fitted with manually operated stop valves located as near the shell as practicable either internal or external to the shell. A tank nozzle installed for a pressure relief device must not be provided with a stop valve that restricts the flow from the tank to the pressure relief device (see §178.270-11(b)(2)). A tank nozzle installed in the vapor space to provide a filling or cleaning opening, which is closed by a blank flange or other suitable means, need not be provided with a manually operated stop valve. A tank nozzle installed for a thermometer well or inspection opening need not be provided with a manually operated stop valve.

(b) Each valve must be designed and constructed to a rated pressure not less than the maximum allowable working pressure of the tank. Each stop valve with a screwed spindle must be closed by a clockwise motion of the handwheel. All valves must be constructed to prevent unintentional opening.

(c) Each internal discharge valve shall be self-closing, located inside the tank, within the welded flange or within its companion flange.

(d) A shear section must be located outboard of each internal discharge valve seat and within 10.2 cm (4 inches) of the vessel. The shear section must break under strain without affecting the product retention capabilities of the tank and any attachments.

(e) All piping must be of suitable material. Welded joints must be used wherever practicable. The bursting strength of all piping and pipe fittings must be at least 4 times the maximum allowable working pressure of the tank. Piping must be supported in such a manner as to prevent damage due to thermal stresses, jarring or vibration.

(f) All nozzles and tank shell penetrations for nozzles shall be designed and constructed in accordance with the ASME Code.

(g) Glass liquid level gauges, or gauges of other easily destructible material, which are in direct communication with the contents of the tank are prohibited.

§ 178.270-13 Testing. (a) *Hydrostatic test.* Each portable tank and all piping, valves, and other attachments which are subject to the pressure of the contents of the tank, except pressure relief devices, must be hydrostatically tested by completely filling the tank (including domes, if any) with water or other liquid having a similar density and viscosity and applying a pressure of at least 150 percent of the maximum allowable working pressure. The pressure shall be maintained for at least 10 minutes. While under pressure, the tank shall be inspected for leakage, undue distortion, or other conditions which indicate weakness or which might render the tank unsafe for transportation service. Failure to successfully meet the test criteria shall be deemed evidence of failure to meet the requirements of this specification. Tanks failing to pass the test shall be suitably repaired and must successfully pass the prescribed tests prior to use for transporting any hazardous material.

(b) *Testing of internal coils.* Internal coils, if installed, must be hydrostatically tested to an internal pressure of 13.8 bar (200 psig) or 150 percent of the rated pressure of the coils, whichever is greater.

(d) *Tank container qualification test.* For each tank design, a prototype tank, using a framework for containerized transport, must fulfill the requirements of Parts 450—453 of this title for compliance with the requirements of Annex II of the International Convention for Safe Containers. In addition, the following tests must be completed without leakage or deformation that would render the tank unsuitable for use:
(1) *Longitudinal inertia.* The tank loaded to its maximum gross weight must be positioned with its longitudinal axis vertical. It shall be held in this position for five minutes by support at the lower end of the base structure providing vertical and lateral restraint and by support at the upper end of the base structure providing lateral restraint only.
(2) *Lateral inertia.* The tank loaded to its maximum gross weight must be positioned for five minutes with its transverse axis vertical. It shall be held in this position for five minutes by support at the lower side of the base structure providing vertical and lateral restraint and by support at the upper side of the base structure providing lateral restraint only.

(d) *Approval of smaller tanks of the same design.* Design approval must include the prototype testing of at least one tank of each design and each size; however, a set of tests made on a tank of one size may serve for the approval of smaller tanks with equal or lesser diameter and length) made of the same material and thickness by the same fabrication technique and with identical supports and equivalent closures and other appurtenances.

(e) *Pressure and vacuum relief devices.* Each spring loaded relief device must be tested for the accuracy of the setting prior to installation on a tank and must be effectively sealed to maintain the required setting.

§ 178.270-14 Marking of tanks. (a) *General.* Each tank must bear a corrosion resistant metal identification plate that is permanently attached to the portable tank and readily accessible for inspection. The information required in paragraph (b), and, when appropriate, paragraph (c) of this section must be stamped, embossed or otherwise marked by an equally durable method on the plate in characters at least 3 mm (0.118 inches) high. The plate must not be painted.

(b) *Required information.* At least the following information must appear on the metal identification plate for each tank:
(1) US DOT Specification number.
(2) Country of manufacture.
(3) Manufacturer's name.
(4) Date of manufacture.
(5) Manufacturer's serial number.
(6) Identification of USA DOT approval agency and approval number.
(7) Maximum allowable working pressure, in bar or psig.
(8) Test pressure, in bar or psig.
(9) Total measured water capacity at 20°C. (68°F), in liters or gallons.
(10) Maximum allowable gross weight, in kg or lbs.
(11) Equivalent minimum shell thickness in mild steel, in mm or inches.
(12) Tank material and specification number.
(13) Metallurgical design temperature range, in °C. and °F.

(c) *Additional information.* The following additional information must appear on the metal identification plate when applicable:
(1) Lining material.
(2) Heating coil maximum allowable working pressure in bar and psig.
(3) Corrosion allowance, in mm or in.

(d) In addition to the markings required above, each tank used in international transport must have a Safety Approval Plate containing the information required in §§ 451.21 through 451.25 of this title.

(e) Nothing in this section shall be deemed to preclude the display of other pertinent information on the required metal identification plate.

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§ 178.271 Specification IM 101; steel portable tanks.

§ 178.271-1 General requirements. (a) Specification IM 101 portable tanks must comply with the general design and construction requirements in §178.270 of this subpart in addition to the specific design requirements contained in this section.

(b) The maximum allowable working pressure of each tank shall be equal to or greater than 1.75 bar (25.4 psig) and less than 6.8 bar (100 psig).

(c) Each tank shall be designed and constructed in accordance with the requirements of Section VIII, Division 1, of the ASME Code except as limited or modified in this section or in §178.270 of this subpart. ASME certification or stamp is not required.

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§ 178.272 Specification IM 102; steel portable tanks.

§ 178.272-1 General requirements. (a) Specification IM 102 portable tanks must comply with the general design and construction requirements in §178.270 of this subpart in addition to the specific design requirements contained in this section.

(b) The maximum allowable working pressure of each tank shall be less than 1.75 bar (25.4 psig) but at least 1.0 bar (14.5 psig).

(c) Each tank shall be designed and constructed in accordance with the requirements of Section VIII, Division 1, of the ASME Code except as limited or modified in this section or in §178.270 of this subpart. ASME certification or stamp is not required.

§ 178.272-2 Minimum thickness of shells and heads. (a) The approval agency may authorize a minimum thickness less than that required by §178.270-5 of this subpart where additional protection against tank puncture provides equal integrity.

(b) The shell and head thickness of a tank must be at least:
(1) 3.18 mm (0.125 inches) for a tank with a maximum cross-sectional dimension of 1.8 meters (5.9 feet) or less; or

(2) 4 mm (0.157 inches) for a tank constructed of the reference mild steel having a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet). For tanks having a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet) constructed of other steels, an equivalent head and shell thickness calculated in accordance with § 178.270-5(c) of this subpart may be used, subject to an absolute minimum of 3.18 mm (0.125 inches).

(c) The following additional puncture protection systems are authorized.

(1) An overall external structural protection, such as a jacket, which is rigidly secured to the tank with a layer of cushioning material installed between the external structural protection and the tank; or

(2) A complete framework surrounding the tank including both longitudinal and transverse structural members.

SUBPART J

SPECIFICATIONS FOR CONTAINERS FOR MOTOR VEHICLE TRANSPORTATION

§ 178.315 Specification MC 200; containers for liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate.

§ 178.315-1 Motor vehicle body. (a) Every motor vehicle used for the transportation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, other than desensitized liquid explosives, as defined in § 173.53(e), shall have a body constructed as set forth below, which body shall have component parts as specified hereinafter.

§ 178.315-2 Body proper. (a) The motor-vehicle body proper shall have a hinged cover. Both the body and the cover shall be well and strongly built of wood or other nonsparking material of equal strength, thoroughly waterproofed, having no end or side openings, and lined with copper or other nonsparking sheet metal having all seams made tight against leakage of nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate by welding, brazing, or soldering. No metal of such character as to be capable of producing a spark when struck may be exposed on the inside or the top of the body, nor on the nether side or any edge of the cover, the top of which shall be covered with metal. The body shall be of such dimensions that it will contain only a single tier of individual containers and of such approximate height that the felt pads will securely constrain all inside containers from vertical motion with respect to the body, and shall be securely and firmly attached to the chassis of the motor vehicle. The total load shall not exceed nine hundred (900) quarts liquid measure of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate.

§ 178.315-3 Cellular construction. (a) In the motor-vehicle body specified in § 178.315-2 shall be inserted suitable wooden or other nonmetallic, nonsparking cellular construction, the dimensions of each cell of which shall be such that the rubber "boot" or secondary container for the primary container of the nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, both of which are specified hereinafter, shall snugly fit. The cellular construction shall extend from near the top to near the bottom of the full height of each "boot" to be fitted therein, and shall rest upon and be covered by at least one-half (½) inch of felt padding or other material affording equivalent shock-absorbing protection. The cellular construction shall be of such strength as to provide suitable restraint under all conditions of loading to prevent relative motion of inside containers to be inserted or carried therein.

§ 178.315-4 Inside containers and boots. (a) Inside containers. Individual containers shall be made of copper or other nonsparking metal of equivalent strength, with all seams closed by welding, brazing or soldering, and shall be tight against leakage of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate. No individual container shall exceed ten (10) quarts (liquid measure) capacity of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate.

(b) Boots, rubber containers for individual containers. Each individual container of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate shall be contained in a rubber boot or outer container into which it shall snugly fit, and which, in turn, shall snugly fit into any cell of the cellular construction specified in § 178.315-3. This boot shall be watertight throughout and at least of such volume as to contain all of the liquid content of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate of any inside container inserted in it. It shall be provided with V-shaped grooves at suitable spacings throughout its inside surface, extending from top to bottom in such manner as to prevent the entrapment of air therein upon insertion of the inside container of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate. The inside height of the rubber boot shall approximate the height of the insider container (including stopper) as shipped.

§ 178.315-5 Marking. Each container must be marked as prescribed in § 173.24 of this subchapter.

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§ 178.318 Specification MC 201; container for detonators and percussion caps.

§ 178.318-1 Scope. (a) This specification pertains to a container to be used for the transportation of detonators and percussion caps in connection with the transportation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, where any or all of such types of caps may be used for the detonation of liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate in blasting operations. This specification is not intended to take the place of any shipping or packing requirements of this Department where the caps in question are themselves articles of commerce.

§ 178.318-2 Container. (a) Every container for detonators and percussion caps coming within the scope of this specification shall be constructed entirely of hard rubber, phenolresinous or other resinous material, or other nonmetallic, nonsparking material, except that metal parts may be used in such locations as not in any event to come in contact with any of the caps. Space shall be provided so that each detonator of whatever nature may be inserted in an individual cell in the body of the container, into which each such cap shall snugly fit. There shall be provided no more than twenty (20) such cellular spaces. Space may be provided into which a plurality of percussion caps may be carried, provided that such space may be closed with a screw cap, and further provided that each or any such space is entirely separate from any space provided for any detonator. Each cellular space into which a detonator is to be inserted and carried shall be capable of being covered by a rotary cover so arranged as to expose not more than one cell at any time, and capable of rotation to such a place that all cells will be covered at the same time, at which place means shall be provided to lock the cover in place. Means shall be provided to lock in place the cover for the cells provided for the carrying of detonators. The requirement that not more than one cell be exposed at one time need not apply in the case of detonators, although spaces for such caps and blasting caps shall be separate. Sufficient annular space shall be provided inside the cover for such detonators that, when the cover is closed, there will be sufficient space to accommodate the wires customarily attached to such caps. If the material is of such nature as to require treatment to prevent the absorption of moisture, such treatment shall be applied as shall be necessary in order to provide against the penetration of water by permeation. A suitable carrying handle shall be provided, except for which handle no part of the container may project beyond the exterior of the body.

(b) Exhibited in plates I and II are line drawings of a container for detonators and percussion caps, illustrative of the requirements set forth in § 178.318-2(a). These plates shall not be construed as a part of this specification.

§ 178.318-3 Marking. Each container must be marked as prescribed in § 173.24 of this subchapter.

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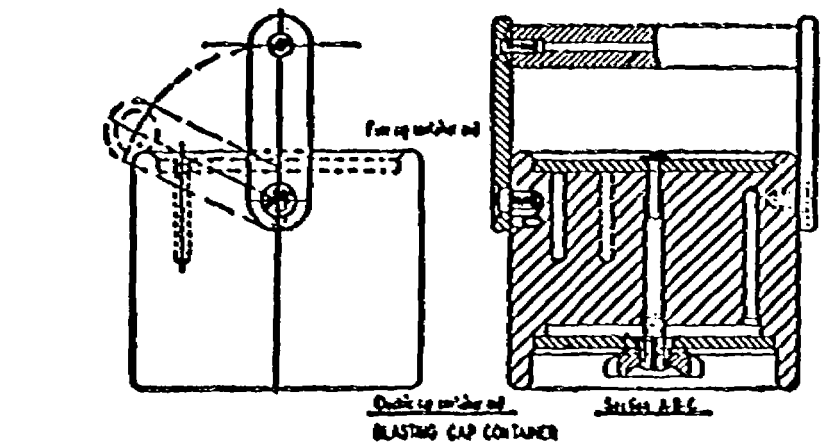
§ 178.337 Specification MC 331; cargo tanks constructed of steel, primarily for transportation of compressed gases as defined in the Compressed Gas Section.

§ 178.337-1 General requirements. (a) ASME Code construction. Tanks must be—(1) Seamless or welded construction or a combination of both; (2) Designed and constructed in accordance with the ASME Code.

(3) Made of steel or aluminum; however, if aluminum is used, the cargo tank must be insulated and the hazardous material to be transported must be compatible with the aluminum (see §§ 173.33(i), 173.315(a) Table Note 11, and 178.337-2(a)(1) of this subchapter); and

(4) Covered with a steel jacket if the cargo tank is insulated and used to transport a flammable gas (see § 173.315(a) Table Note 11 of this subchapter).



BLASTING CAP CONTAINER

PLATE I

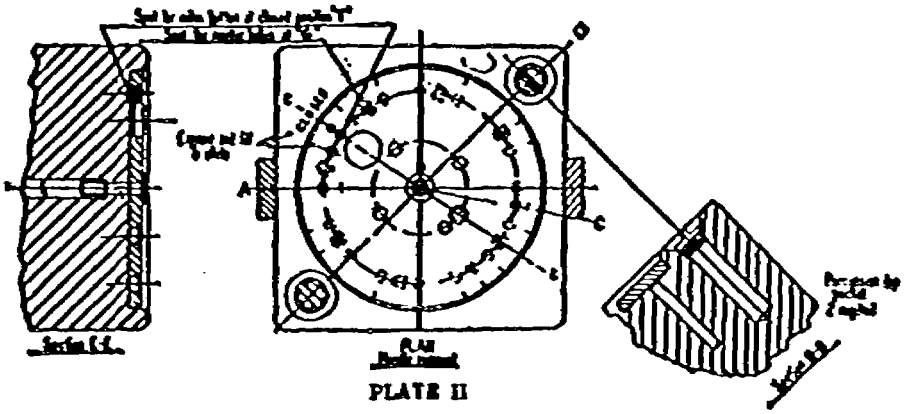


PLATE II

(b) **Design pressure.** The design pressure of a tank authorized under this specification shall be not less than the vapor pressure of the commodity contained therein at 115 degrees F or as prescribed for a particular commodity in § 173.315(a)(1), except that in no case shall the design pressure of any tank be less than 100 psig. nor more than 500 psig.

Note: The term "design pressure" as used in this specification, is identical to the term "maximum allowable working pressure" as used in the ASME Code.

(c) **Openings.** (1) Excess pressure relief valves shall be located in the top of the tank or heads.

(2) A chlorine tank shall have only one opening. That opening shall be in the top of the tank and shall be fitted with a nozzle that meets the following requirements:

(i) On a tank manufactured on or before December 31, 1974, the nozzle shall be protected by a dome cover plate which conforms to either the standard of The Chlorine Institute, Inc., Dwg. 103–3, dated January 23, 1958, or to the standard specified in paragraph (c)(2)(ii) of this section.

(ii) On a tank manufactured on or after January 1, 1975, the nozzle shall be protected by a manway cover which conforms to the standard of The Chlorine Institute, Inc., Dwg. 103–4, dated September 1, 1971.

(d) **Reflective design.** Every uninsulated tank permanently attached to a tank motor vehicle shall, unless it be covered with a jacket made of aluminum, stainless steel, or other bright nontarnishing metal, be painted a white, aluminum or similar reflecting color on the upper two-thirds of area of the tank.

(e) **Insulation.** Compliance with the requirements for use and performance of insulation is required (see §§ 173.33(i), 173.315(a) Table Note 11, and 178.337-1(a)(3) of this subchapter).

(f) **Postweld heat treatment.** Postweld heat treatment must be as prescribed in the ASME Code except that each tank constructed in accordance with Part UHT of the ASME Code must be postweld heat treated. Each chlorine tank must be fully radiographed and postweld heat treated in accordance with the provisions of the ASME Code under which it is constructed. Where postweld heat treatment is required, the tank must be treated as a unit after completion of all the welds in and/or to the shells and heads. The method must be as prescribed in the ASME Code. Welded attachments to pads may be made after postweld heat treatment. A tank used for anhydrous ammonia must be post-weld heat treated. The post-weld heat treatment must be as prescribed in the ASME Code, but in no event at less than 1050° F. tank metal temperature.

§ 178.337-2 **Material.** (a) **General.** (1) All material used for construction of the tank and appurtenances must be suitable for use with the commodities to be transported therein and must comply with the requirements of the ASME Code and/or requirements of the American Society for Testing and Materials in all respects.

(2) Impact tests are required on steel used in fabrication of each tank constructed in accordance with Part UHT of the ASME Code. The tests must be made on a lot basis. A lot is defined as 100 tons or less of the same heat treatment processing lot having a thickness variation no greater than plus or minus 25 percent. The minimum impact required for full size specimens must be 20 foot-pounds in the longitudinal direction at −30° F., Charpy V-Notch and 15 foot-pounds in the transverse direction at −30° F., Charpy V-Notch. The required values for subsize specimens must be reduced in direct proportion to the cross-sectional area of the specimen beneath the notch. If a lot does not meet this requirement, individual plates may be accepted if they individually meet this requirement.

(3) The fabricator shall record the heat, and slab numbers, and the certified Charpy impact values, where required, of each plate used in each tank on a sketch showing the location of each plate in the shell and heads of the tank. Copies of each sketch shall be provided to the owner and retained for at least five years by the fabricator and made available to duly identified representatives of the Department of Transportation.

(4) The direction of final rolling of the shell material shall be the circumferential orientation of the tank shell.

(b) **For a chlorine tank.** Plates, the manway nozzle, and anchorage shall be made of carbon steel which meets the following requirements.

(1) For a tank manufactured on or before December 31, 1974—

(i) Material shall conform to ASTM Specification A–3000–58, titled "Steel Plates for Pressure Vessels for Service at Low Temperatures";

(ii) Material shall be Class 1, Grade A, flange or firebox quality;

(iii) Plate impact test specimens, as required under paragraph (a) of this section, shall be of the Charpy keyhole notch type; and

(iv) Plate impact test specimens shall meet the impact test requirements in paragraph (a) of this section in both the longitudinal and transverse directions of rolling at a temperature of minus 45.5° C. (−50° F).

(2) For a tank manufactured on or after January 1, 1975—

(i) Material shall conform to ASTM Specification A–612–72a, Grade B or A–516–72, Grade 65 or 70;

For explanation of abbreviations and reference marks, see last page of this tariff.

(ii) Material shall meet the Charpy V-notch test requirements of ASTM Specification A-20-72a; and

(iii) Plate impact test specimens shall meet the impact test requirements in paragraph (a) of this section in both the longitudinal and transverse directions of rolling at a temperature of minus 40° C. (−40° F).

(c) For ammonia. See §173.33(g)(1) of this subchapter.

§ 178.337-3 Thickness of tank metal. (a) Tank metal thickness must be as required by the ASME Code and paragraph (b) of this section, except that metal of thickness less than three-sixteenths inch may not be used for the shell or heads. A corrosion allowance of 20 percent or 0.10 inch, whichever is less, must be added to the thickness otherwise required for sulfur dioxide and chlorine tank material. In chlorine tanks the wall thickness must be at least five-eighths inch, including corrosion allowance.

(b) The minimum thickness of metal in the tank shell must be such that at no point therein will the stress on a plane normal to the cylindrical axis exceed 25 percent of the minimum specified tensile strength of the metal. For purposes of this requirement, calculation must be made by the formula:

$$S = \left(\frac{T}{2}\right) + \left[\left(\frac{T}{4}\right)^2 + S_s^2\right]^{1/2}$$

where, at any given point under consideration and for the worst combination of loadings:

S = Effective stress as limited by this requirement.

T = The sum of the longitudinal tensile stresses due to internal pressure and other causes including direct tensile stress due to a rearward accelerative force equal to twice the static weight, tensile stress due to the bending moment of a rearward accelerative force equal to twice the static weight, applied at the road surface, and tensile flexure stress due to three times the static weight in vertical loading; and

S_s = The vectoral sum of the shear stresses in the plane in question, including direct vertical shear due to three times the static vertical loading, direct lateral shear due to a lateral accelerative force of twice the static weight, and torsional shear due to a lateral accelerative force equal to twice the static weight, applied at the road surface. Maximum concentrated stresses which might be created at pads and cradles due to shear, bending, and torsion shall also be calculated in accordance with appendix G of the ASME Code 1962 edition.

Note 1: The forces, loads, and stresses concerned in the foregoing requirement relate to the weight of the tank itself, its contents, and articles supported by the tank, not including the weight of structures supporting the tank in normal operating condition. The stresses involved are not all uniform through the length of the tank shell.

(c) Where any tank support is attached to any part of a tank head, the stresses imposed upon the head shall be as required in paragraph (b) of this section with respect to maximum concentrated stresses at pads and cradles.

§ 178.337-4 Joints. (a) Joints shall be as required by the ASME Code, with all undercutting in shell and head material repaired as specified therein.

(b) Welding procedure and welder performance tests must be made annually in accordance with Section IX of the ASME Code. In addition to the essential variables named therein, the following must be considered as essential variables: number of passes; thickness of plate; heat input per pass; and manufacturer's identification of rod and flux. When fabrication is done in accordance with Part UHT of the ASME Code, filler material containing more than 0.08 percent vanadium must not be used. The number of passes, thickness of plate, and heat input per pass may not vary more than 25 percent from the procedure or welder qualifications. Records of the qualifications must be retained for at least 5 years by the tank manufacturer and must be made available to duly identified representatives of the Department and the owner of the tank.

(c) All longitudinal shell welds shall be located in the upper half of the tank.

(d) Edge preparation of shell and head components may be by machine heat processes, provided such surfaces are remelted in the subsequent welding process. Where there will be no subsequent remelting of the prepared surface as in a tapered section, the final 0.050 inch of material shall be removed by mechanical means.

(e) The maximum tolerance for misalignment and butting up shall be in accordance with the ASME Code.

(f) Substructures shall be properly fitted before attachment, and the welding sequence shall be such as to minimize stresses due to shrinkage of welds.

§ 178.337-5 Bulkheads, baffles and ring stiffeners. (a) Not a specification requirement.

§ 178.337-6 Closure for manhole. (a) Each tank constructed in accordance with Part UHT of the ASME Code and other tanks above 3,500 gallons water capacity must be provided with a manhole conforming to paragraph UG-46(g)(1) and other requirements of the ASME Code.

(b) The manhole assembly of cargo tanks constructed after June 30, 1979, may not be located on the front head of the tank.

§ 178.337-7 Overturn protection. (a) See §178.337-10.

§ 178.337-8 Outlets. (a) Outlets generally.

(1) An opening shall be provided on each tank used for the transportation of liquefied materials to afford complete drainage.

(2) With the exception of gauging devices, thermometer wells, and safety relief valves, every opening in every tank used for the transportation of compressed gases other than carbon dioxide shall be (1) closed with a plug, cap, bolted flange, or plate or (2) protected with an excess flow valve or back flow check valve (see §178.337-11(a)) or (3) be fitted with a remote control valve as specified in §178.337-11(c).

(b) Chlorine tank valves. See §173.33(f)(9), (h)(4), and (5) of this subchapter. Regarding chlorine tank outlets, see also §178.337-1(c)(2) of this part.

§ 178.337-9 Safety relief devices, valves and connections. (a) Safety relief valves. (1) See §173.315(i) of this subchapter.

(2) On tanks for carbon dioxide or nitrous oxide see §173.315(i)(9) and (i)(10) of this subchapter.

(3) Each valve must be designed, constructed, and marked for a rated pressure not less than the tank design pressure at the temperature expected to be encountered.

(b) Piping valves, and fittings. (1) See §173.33(f)(1) and (3) of this subchapter.

(2) Piping and fittings must be in conformance with §173.33(f) of this subchapter and must be protected from damage as required by §173.337-10 of this section.

(c) Marking inlets and outlets. All tank inlets and outlets, except safety relief valves, shall be marked to designate whether they communicate with vapor or liquid when the tank is filled to the maximum permitted filling density.

(d) Refrigeration and heating coils.

(1) Refrigeration and heating coils, when installed in any tank, shall be securely anchored, with provision for thermal expansion. They shall be tested externally to at least the tank test pressure, and internally to at least the tank test pressure or at least twice the working pressure of the heating or refrigeration system, if higher, and the tank shall not be placed in or returned to transportation service if any leakage or other evidence of damage is found in these tests. The refrigerant or heating medium to be circulated through the coils must be such as to cause no adverse chemical reaction with the tank or tank contents in case of leakage.

(2) Where any liquid susceptible to freezing, or the vapor of any such liquid, is used for heating or refrigeration, the heating or refrigeration system shall be arranged to permit complete drainage.

§ 178.337-10 Protection of fittings. (a) All valves, fittings, safety relief devices and other accessories to the tank proper shall be protected in accordance with §178.337-10(b) against such damage as could be caused by collision with other vehicles or objects, jack-knifing and overturning. In addition, safety relief valves shall be so protected that in the event of overturn of the vehicle on to a hard surface, their opening will not be prevented and their discharge will not be restricted.

(b) The protective devices or housing must be designed to withstand static loading in any direction equal to twice the weight of the tank and attachments when filled with the lading, using a safety factor of not less than four, based on the ultimate strength of the material to be used, without damage to the fittings protected, and must be made of metal at least ⅜-inch thick.

(c) For chlorine tanks. There shall be a protective housing and manway cover to permit the use of standard emergency kits for controlling leaks in fittings on the dome cover plate. The housing and manway cover must conform to the Chlorine Institute's standards as follows:

(1) Tanks manufactured on or before December 31, 1974: DAG 137-1, dated November 7, 1962, or DAG 137-2, dated September 1, 1971.

(2) Tanks manufactured on or after January 1, 1975: DAG 137-2 dated September 1, 1971.

(d) Each cargo tank shall be provided with at least one rear bumper designed to protect the tank and piping in the event of a rear end collision and minimize the possibility of any part of the colliding vehicle striking the tank. The design shall be such as to transmit the force of a rear end collision in a horizontal line to the chassis of the vehicle. The bumper shall be designed to withstand the impact of the fully loaded vehicle with a deceleration of 2 "g", using a safety factor of four based on the ultimate strength of the bumper material. The bumpers shall conform dimensionally to §393.86, Chapter III of this title.

§ 178.337-11 Emergency discharge control. (a) Excess flow valves and back flow check valves.

(1) Where used as required in §178.337-8(a)(2) excess flow valves or back flow check valves shall be located inside the tank or inside a welded nozzle which is an integral part of the tank.

(2) Excess flow valves must be in conformance with §173.33(h) of this subchapter.

(3) Chlorine tanks. See §173.33(h)(4) of this subchapter.

(b) Shut-off valves. See §173.33(h)(3) of this subchapter.

(c) Liquid or vapor discharge openings. Each liquid or vapor discharge opening in a tank intended to be used for a flammable liquid; flammable compressed gas; hydrogen chloride, refrigerated liquid; or anhydrous ammonia, must be equipped with a remotely controlled internal shut-off valve. However, on any liquid or vapor discharge opening of less than 1¼-inches NPT, an excess flow valve together with a manually operated external valve may be used in place of a remotely controlled internal shut-off valve. The requirements of this paragraph do no apply to a liquid or vapor discharge opening 1¼ inch NPT equipped with an excess flow valve together with a manually operated external

valve before October 1, 1984, or to an engine fuel line on a truck-mounted tank of not over ¾ inch NPT and equipped with a valve having an integral excess flow valve. Each remotely controlled internal valve must comply with the following requirements:

(1) The seat of the valve shall be inside the tank, or in the opening nozzle or flange or in a companion flange bolted to the nozzle or flange.

(2) All parts of the valve inside the tank, nozzle, or companion flange, shall be made of material not subject to corrosion or other deterioration in the presence of the lading.

(3) The arrangement of parts shall be such that damage to parts exterior to the tank will not prevent effective seating of the valve.

(4) The valve may be operated normally by mechanical means, by hydraulic means, or by air, or gas pressure.

(5) On a tank over 3,500 gallons water capacity, each internal shut-off valve must be provided with remote means of automatic closure, both mechanical and thermal, that are installed at the ends of the tank in at least two, diagonally opposite locations. If the discharge connection at the tank is not in the general vicinity of one of the two locations specified above, one additional fusible element must be installed so that heat from a fire in that area will activate the emergency control system. Fusible elements may not have a melting point exceeding 250° F.

(6) On a tank of 3,500 gallons water capacity or less, each internal shut-off valve must be provided with at least one remote control station, and the actuating means may be mechanical. This station must be at one end of the tank, away from the discharge connection area.

§ 178.337-12 Shear section. (a) Design or installation of valves specified in § 178.337-8(a)(2) shall provide adjacent to and outboard of such valves a section which will break under undue strain.

§ 178.337-13 Supporting and anchoring. (a) A cargo tank that is not permanently attached to or integral with a vehicle chassis must be secured by turnbuckles or equally efficient securing devices for drawing the tank down tight on the frame. Anchors, stops, or other means must be provided to prevent relative motion between the tank and the vehicle chassis when the vehicle is in operation.

(b) A tank motor vehicle designed and constructed so that the cargo tank constitutes in whole or in part the stress member used in place of a frame must have the tank supported by external cradles. A cargo tank mounted on a frame must be supported by external cradles or longitudinal members. The cradles, where used, must subtend at least 120 degrees of the shell circumference. The design calculations for the supports must include beam stress, shear stress, torsion stress, bending moment, and acceleration stress, for the loaded vehicle as a unit, using a factor of safety of 4, based on the ultimate strength of the material and on a 2 "g" longitudinal and lateral loading and 3 times the static weight in vertical loading (see Appendix G of the ASME Code).

(c) Where any tank support is attached to any part of a tank head, the stresses imposed upon the head shall be provided for as required in § 178.337-13(b).

(d) No tank support or bumper may be welded directly to the tank. All supports and bumpers shall be attached by means of pads of the same material as the tank. The pad thickness shall be no less than ¼ inch, or the thickness of the shell material if less, and no greater than the shell material. Each pad shall extend at least 4 times its thickness, in each direction, beyond the weld attaching the support or bumper. Each pad shall be preformed to an inside radius no greater than the outside radius of the tank at the place of attachment. Each pad corner shall be rounded to a radius at least ¼ the width of the pad, and no greater than ½ the width of the pad. Weep holes and telltale holes, if used shall be drilled or punched before the pads are attached to the tank. Each pad shall be attached to the tank by continuous fillet welding using filler material having properties conforming to the recommendations of the maker of the shell and head material.

§ 178.337-14 Gauging devices. (a) **Liquid level gauging devices.** See § 173.315(h) of this subchapter.

(b) **Pressure gauges.** See §§ 173.33(f)(7) and 173.315(h) of this subchapter.

(c) **Orifices.** See § 173.315(h)(3) and (4) of this subchapter.

§ 178.337-15 Pumps and compressors. See § 173.33(f)(6) and (10) of this subchapter.

§ 178.337-16 Testing. (a) **Inspection and tests.** Inspection of materials of construction of the tank and its appurtenances and original test and inspection of the finished tank and its appurtenances must be as required by the ASME Code and as further required by this specification except that for tanks constructed in accordance with Part UHT of the ASME Code the original test pressure must be at least twice the tank design pressure.

(b) **Weld testing and inspection.**

(1) Each tank constructed in accordance with Part UHT of the ASME Code must be subjected, after postweld heat treatment and hydrostatic tests, to a wet fluorescent magnetic particle inspection to be made on all welds in or on the tank shell and heads both inside and out. The method of inspection must conform to Appendix VI of the ASME Code, paragraph UA-70 through UA-72 except that permanent magnets shall not be used.

(2) On tanks of over 3,500 gallons water capacity other than those described in subparagraph (1) of this paragraph unless fully radiographed, a test must be made of all welds in or on the shell and heads both inside and outside by either the wet fluorescent magnetic particle method conforming to Appendix VI of the ASME Code, liquid dye penetrant method, or ultrasonic testing in accordance with Appendix U of the ASME Code. Permanent magnets must not be used to perform the magnetic particle inspection.

(c) All defects found shall be repaired, the tanks shall then again be postweld heat treated, if such heat treatment was previously performed, and the repaired areas shall again be tested.

§ 178.337-17 Marking. (a) **Metal identification plate.** Each tank built after July 1, 1985 shall have a corrosion resistant metal plate permanently affixed by brazing or welding around its perimeter, on the left side (on the right side prior to July 1, 1985) near the front, in a place readily accessible for inspection. It must be maintained in a legible condition. On multitank vehicles plates shall be attached to each tank at the front in a place readily accessible for inspection. Each insulated tank shall have an additional plate, as described, affixed to the jacket in the location specified. Neither the plate itself nor the means of attachment to the tank or jacket may be subject to attack by the tank contents. If the plate is attached directly to the tank by welding it shall be welded thereto before the tank is postweld heat treated. The plate shall be plainly marked by stamping, embossing, or other means of forming letters into the metal of the plate, with the following information in addition to that required by the ASME Code, in characters at least ⅜ inch high.

Vehicle Manufacturer
Vehicle Manufacturer's Serial Number
D.O.T. Specification Number MC-331
Vessel Material Specification Number
Water Capacity in Pounds (see Note 1)
Original Test Date

Note 1. See § 173.315(a) regarding water capacity.

(b) Each cargo tank must also be marked as required by § 177.328 of this subchapter.

§ 178.337-18 Certification. (a) For each tank the tank vehicle manufacturer shall supply and the owner shall obtain the tank manufacturer's data report required by the ASME Code, and a certificate stating that the completed tank vehicle is in complete compliance in all respects with specification MC 331 including the ASME Code. The certificate must be signed by a responsible official of the fabricating firm. The certificate must state whether or not it includes certification that all valves, piping, and protective devices comply with the requirements of the specification. If it does not so certify, the installer of any such valve, piping, or device shall supply and the owner shall obtain a certificate asserting complete compliance with these specifications for such devices. The certificate, or certificates, will include sufficient sketches, drawings, and other information to indicate the location, make, model, and size of each valve and the arrangement of all piping associated with the tank.

(1) The certificate must contain a statement indicating whether or not the cargo tank was post-weld heat treated for anhydrous ammonia as specified in § 178.337-1(f).

(b) The owner shall retain the copy of the data report and certificates and related papers in his files throughout his ownership of the tank and for at least one year thereafter; and in the event of change in ownership, retention by the prior owner of nonfading photographically reproduced copies will be deemed to satisfy this requirement. Each motor carrier using the tank, if not the owner thereof, shall obtain a copy of the data report and certificate and retain them in his files during the time he uses the tank and for at least one year thereafter.

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§ 178.338 Specification 338; insulated cargo tank.

§ 178.338-1 General requirements.

(a) For the purposes of this section—

(1) "Design pressure" means the "maximum allowable working pressure" as used in the ASME Code, and is the gauge pressure at the top of the tank.

(2) "Design service temperature" means the coldest temperature for which the tank is suitable (see §§ 173.318(a)(1) and (f) of this subchapter).

(b) Each cargo tank must consist of a suitably supported welded inner vessel enclosed within an outer shell or jacket, with insulation between the inner vessel and outer shell or jacket, and having piping, valves, supports and other appurtenances as specified in this subchapter. For the purpose of this specification, "tank" means inner vessel and "jacket" means either the outer shell or insulation cover.

(c) Each tank must be designed and constructed to meet the requirements of the ASME Code.

(1) The design pressure of the tank must be at least 25.3 psig but not more than 500 psig. To determine the required thicknesses of the parts of the tank, the static head of the lading shall be added to the design pressure. If the jacket is evacuated, the tank must be designed for a pressure of 14.7 psi, plus the lading static head, higher than its "design pressure." The jacket must be designed in accordance with paragraph (e) or (f) of this section, as appropriate.

(2) The design service temperature of the tank, piping and valves may not be warmer than the liquefaction temperature at one atmosphere of the lading to be transported (see §§ 173.318(a)(1) and (f) of this subchapter).

(3) Design and construction details of the tank interior may not allow collection and retention of cleaning material's or contaminants. To preclude the entrapment of foreign material, the design and construction of the tank must allow washing of all interior surfaces by the normal surging of the lading during transporation.

(d) The exterior surface of the tank must be insulated with a material compatible with the lading.

(1) Each cargo tank must have an insulation system that will prevent the tank pressure from exceeding the pressure relief valve set pressure within the specified holding time when the tank is loaded with the specific cryogenic liquid at the design conditions of—

(i) The specified temperature and pressure of the cryogenic liquid, and

(ii) The exposure of the filled cargo tank to an average ambient temperature of 85° F.

(2) For a cargo tank used to transport oxygen, the insulation may not sustain combustion in a 99.5 percent oxygen atmosphere at atmospheric pressure when contacted with a continuously heated glowing platinum wire. The cargo tank must be marked in accordance with § 178.338-18(b)(7).

(3) Each vacuum-insulated cargo tank must be provided with a connection for a vacuum gauge to indicate the absolute pressure within the insulation space.

(e) The insulation must be completely covered by a metal jacket. The jacket or the insulation must be so constructed and sealed as to prevent moisture from coming into contact with the insulation (see § 173.318(a)(3) of this subchapter). Minimum metal thicknesses are as follows:

Type metal	Jacket evacuated		Jacket not evacuated	
	Gauge	Inches	Gauge	Inches
Stainless steel	18	0.0428	22	0.0269
Low Carbon Mild Steel	12	0.0946	14	0.0677
Aluminum		0.125		0.1000

(f) An evacuated jacket must be in compliance with the following requirements:

(1) The jacket must be designed to sustain critical collapsing pressure of 30 psi.

(2) If the jacket also supports additional loads, such as the weight of the tank and lading, the combined stress, computed according to the formula in § 178.338-3(b), may not exceed 25 percent of the minimum specified tensile strength.

§ 178.338-2 Material.

(a) All material used in the construction of a tank and its appurtenances that may come in contact with the lading must be compatible with the lading to be transported. All material used for tank pressure parts must conform to the requirements of the ASME Code. All material used for evacuated jacket pressure parts must conform to the chemistry and steelmaking practices of one of the material specifications of Section II of the ASME Code or the following ASTM Specifications: A 242, A 441, A 514, A 572, A 588, A 606, A 607, A 633, A 715.

(b) All tie-rods, mountings, and other appurtenances within the jacket and all piping, fittings and valves must be of material suitable for use at the lowest temperature to be encountered.

(c) Impact tests are required on all tank materials, except aluminum, and must be performed using the procedure prescribed in the ASME Code.

(d) The direction of final rolling of the shell material must be the circumferential orientation of the tank shell.

(e) Each tank constructed in accordance with Part UHT of the ASME Code must be postweld heat treated as a unit after completion of all welds to the shell and heads. Other tanks must be postweld heat treated as required by the ASME Code. For all tanks the method must be as prescribed in the ASME Code. Welded attachments to pads may be made after postweld heat treatment.

(f) The fabricator shall record the heat and slab numbers and the certified Charpy impact values of each plate used in the tank on a sketch showing the location of each plate in the shell and heads of the tank. A copy of the sketch must be provided to the owner of the cargo tank and a copy must be retained by the fabricator for at least five years and made available, upon request, to any duly identified representative of the Department.

§ 178.338-3 Metal thickness.

(a) The metal thickness of the tank must be as prescribed in the ASME Code and paragraph (b) of this section. Metal less than 0.187 inch thick may not be used for the shell or heads of a tank unless the tank is enclosed in an evacuated or load-bearing jacket. Metal less than 0.110 inch thick may not be used for the shell or heads of the tank under any circumstances.

(b) The minimum thickness of metal in the shell (cylindrical portion) of the tank must be such that at no point will the stress on a plane normal to the longitudinal axis exceed 25 percent of the minimum specified tensile strength of the metal. The forces, loads, and stresses considered in this requirement must take into account the weight of the tank itself, its maximum weight of contents, and articles supported by the tank, not including the weight of structures supporting the tank in normal conditions. The stresses involved are not all uniform through the length of the tank. For purposes of this requirement, calculation must be made by the following formula:

$$S = (T^2 + 4(T^2 + S_v^2))^{0.5}$$

where at any point under consideration and for the worst combination of loadings

S = Effective stress as limited by this requirement, in psi;

T = The sum of the longitudinal tensile stresses due to external vacuum and internal pressure and other causes, including direct tensile stress due to a rearward acceleration force, tensile stress due to the bending moment of a rearward acceleration force applied at the road surface, and tensile flexure stress using applicable static loadings specified in paragraphs (b), (e) and (f) of § 178.338-13, in psi; and

S_v = The vectorial sum of the shear stresses in the plane in question, including direct vertical shear due to the static vertical loading, direct lateral shear due to a lateral accelerative force, and torsional shear due to a lateral accelerative force, applied at the road surface using applicable static loadings specified in paragraphs (b), (e) and (f) of § 178.338-13, in psi.

(c) Maximum stress concentrations that may be created at supports due to shear, bending, and torsion must be calculated in accordance with Appendix G of the ASME Code.

(d) Where a tank support is attached to any part of a tank head, the stresses imposed on the head must be in accordance with the requirements in paragraph (c) of this section.

§ 178.338-4 Joints

(a) All joints in the tank, and in the jacket if evacuated, must be as prescribed in the ASME Code, except that a butt weld with one plate edge offset is not authorized.

(b) Welding procedure and welder performance tests must be made in accordance with Section IX of the ASME Code. Records of the qualification must be retained by the tank manufacturer for at least five years and must be made available, upon request, to any duly identified representative of the Department, or the owner of the cargo tank.

(c) All longitudinal welds in tanks and load bearing jackets must be located so as not to intersect nozzles or supports other than load rings and stiffening rings.

(d) Substructures must be properly fitted before attachment and the welding sequence must minimize stresses due to shrinkage of welds.

(e) Filler material containing more than 0.05 percent vanadium may not be used with quenched and tempered steel.

(f) All tank nozzle-to-shell and nozzle-to-head welds must be full penetration welds.

§ 178.338-5 Stiffening rings.

(a) A tank is not required to be provided with stiffening rings, except as prescribed in the ASME Code.

(b) If a jacket is evacuated, it must be constructed in compliance with § 178.338-1(f). Stiffening rings may be used to meet these requirements.

§ 178.338-6 Manholes.

(a) Each tank in oxygen service must be provided with a manhole as prescribed in the ASME Code.

(b) EAch tank having a manhole must be provided with a means of entrance and exit through the jacket, or the jacket must be marked to indicate the manway location on the tank.

(c) A manhole with a bolted closure may not be located on the front head of the tank.

§ 178.338-7 Openings.

(a) The inlet to the liquid product discharge opening of each tank intended for flammable ladings must be at the bottom centerline of the tank.

(b) If the leakage of a single valve, except a pressure relief valve, pressure control valve, fill hydrock or gas phase manual vent valve, would permit loss of flammable material, an additional closure that is leak tight at the tank design pressure must be provided outboard of such valve.

§ 178.338-8 Pressure relief devices, piping, valves, and fittings.

(a) Pressure relief devices. Each tank pressure relief device must be designed, constructed, and marked in accordance with § 173.318(b) of this subchapter.

(b) Piping, valves, and fittings.

(1) All piping, valves, and fittings shall be as required by §§ 173.33(f) and 173.318(b) of this subchapter.

(2) Each valve must be suitable for the tank design pressure at the tank design service temperature.

(3) All fittings must be rated for the maximum tank pressure and suitable for the coldest temperature to which they will be subjected in actual service.

(4) All piping, valves and fittings must be grouped as protected from damage as required by § 178.338-10.

(5) When a pressure-building coil is used on a tank designed to handle oxygen or flammable ladings, the vapor connection to the coil must be provided with a valve or check valve as close to the tank as practicable to prevent the loss of vapor from the tank in case of damage to the coil. The liquid connection to that coil must also be provided with a valve.

§ 178.338-9 Holding time.

(a) "Holding time" is the time, as determined by testing, that will elapse from loading until the pressure of the contents, under equilibrium conditions, reaches the level of the lowest pressure control valve or pressure relief valve setting.

(b) Holding time test.

(1) The test to determine holding time must be performed by charging the tank with a cryogenic liquid having a boiling point, at a pressure of one atmosphere, absolute, no lower than the design service temperature of the tank. The tank must be charged to its maximum permitted filling density with that liquid and stabilized to the lowest practical pressure, which must be equal to or less than the pressure to be used for loading. The cargo tank together with its contents must then be exposed to ambient temperature.

(2) The tank pressure and ambient temperature must be recorded at 3-hour intervals until the pressure level of the contents reaches the set-to-discharge pressure of the pressure control valve or pressure relief valve with the lowest setting. This total time lapse in hours represents the measured holding time at the actual average ambient temperature. This measured holding time for the test cryogenic liquid must be adjusted to an equivalent holding time for each cryogenic liquid that is to be identified on or adjacent to the specification plate, at an average ambient temperature of 85° F. This is the rated holding time (RHT). The marked rated holding time (MRHT) displayed on or adjacent to the specification plate (see § 178.338(b)(9)) may not exceed this RHT.

(c) Optional test regimen.

(1) If more than one cargo tank is made to the same design, only one cargo tank must be subjected to the full holding time test at the time of manufacture. However, each subsequent cargo tank made to the same design must be performance tested during its first trip. The holding time determined in this test may not be less than 90 percent of the marked rated holding time. This test must be performed in accordance with §§ 173.33(d)(1)(ii) and 177.840(h) of this subchapter, regardless of the classification of the cryogenic liquid.

(2) Same design. The term "same design" as used in this section means cryogenic cargo tanks made—

(i) By the same manufacturer;
(ii) To the same engineering drawings, and calculations;
(iii) To the same dimensions of length, diameter, and volume;
(iv) Of the same materials of construction; and
(v) With the same insulation system.

(3) For a cargo tank used in nonflammable cryogenic liquid service, in place of the holding time tests prescribed in paragraph (b) of this section, the marked rated holding time (MRHT) may be determined as follows:

(i) While the cargo tank is stationary, the heat transfer rate must be determined by measuring the normal evaporation rate (NER) of the test cryogenic liquid (preferably the lading, where feasible) maintained at approximately one atmosphere. The calculated heat transfer rate must be determined from:

$$q = [n(\Delta h)(65 - t_l)]/[t_s - t_l]$$

Where:

q = calculated heat transfer rate to cargo tank with lading, Btu/hr.
n = normal evaporation rate (NER), which is the rate of evaporation, determined by the test of a test cryogenic liquid in a cargo tank maintained at a pressure of approximately one atmosphere, absolute, lb/hr.
Δh = latent heat of vaporization of test fluid at test pressure, Btu/lb.
t_s = average temperature of outer shell during test, °F.
t_l = equilibrium temperature of lading at maximum loading pressure, °F.
t_l = equilibrium temperature of test fluid at one atmosphere, °F.

(ii) The rated holding time (RHT) must be calculated as follows:

$$RHT = [(U_2 - U_1)W]/q$$

Where:

RHT = rated holding time, in hours.
U_2 and U_1 = internal energy for the combined liquid and vapor lading at the pressure offered for transportation, and the set pressure of the applicable pressure control valve or pressure relief valve, respectively, Btu/lb.
W = total weight of the combined liquid and vapor lading in the cargo tank, pounds.
q = calculated heat transfer rate to cargo tank with lading, Btu/hr.

(iii) The MRHT (see § 178.338-18(b)(9) of this subchapter) may not exceed the RHT.

§ 178.338-10 Collision damage protection.

(a) All valves, fittings, pressure relief devices and other accessories to the tank proper, which are not isolated from the tank by closed intervening shut-off valves or check valves, must be installed within the motor vehicle framework or within a suitable collision resistant guard or housing, and appropriate ventilation must be provided. Each pressure relief device must be protected so that in the event of the upset of the vehicle onto a hard surface, the device's opening will not be prevented and its discharge will not be restricted.

(b) Each protective device or housing, and its attachment to the vehicle structure, must be designed to withstand static loading in any direction that it may be loaded as a result of front, rear, side, or sideswipe collision, or the overturn of the vehicle. The static loading shall equal twice the loaded weight of the tank and attachments. A safety factor of four, based on the tensile strength of the material, shall be used. The protective device or the housing must be made of steel at least ¼-inch thick, or other material of equivalent strength.

(c) Each tank motor vehicle must be provided with at least one rear bumper designed to protect the cargo tank and piping in the event of a rear end collision. The bumper design must transmit the force of the collision directly to the chassis of the vehicle. The rear bumper and its attachments to the chassis must be designed to withstand a load equal to twice the weight of the loaded cargo tank and attachments, using a safety factor of four based on the tensile strength of the materials used, with such load being applied horizontally and parallel to the major axis of the cargo tank, or within 30 horizontal degrees thereof. The rear bumper dimensions must meet the requirements of § 393.86 of this title and extend vertically to a height adequate to protect all valves and fittings located at the rear of the cargo tank from damage that could result in loss of lading.

(d) Every part of the loaded cargo tank, and any associated valve, pipe, enclosure, or protective device or structure (exclusive of wheel assemblies), must be at least 14 inches above level ground.

§ 178.338-11 Discharge control devices.

(a) Excess-flow valves are not required.

(b) Each liquid filling and liquid discharge line must be provided with a shut-off valve located as close to the tank as practicable. Unless this valve is manually operable at the valve, the line must also have a manual shut-off valve.

(c) Each liquid filling and liquid discharge line on a cargo tank intended for service transporting a flammable lading must be provided with a remotely controlled shut-off valve. If pressure from a reservoir or from an engine driven pump or compressor is used to open this valve, the control must be of fail-safe design, spring-biased to stop the admission of such pressure. If the jacket is not evacuated, the seat of the valve must be inside the tank, in the opening nozzle or flange, or in a companion flange bolted to the nozzle. If the jacket is evacuated, the remotely controlled valve must be located as close to the tank as practicable.

(1) On a cargo tank with a capacity in excess of 3,500 gallons of water, each remotely controlled shut-off valve must be provided with remote means of automatic closure, both mechanical and thermal, installed at the ends of the cargo tank in at least two diagonally opposite locations. The thermal means shall consist of fusible elements actuated at a temperature not exceeding 250° F., or equivalent devices. One means may be used to close more than one remotely controlled valve.

(2) On a cargo tank with a capacity of 3,500 gallons of water or less, each remotely controlled shut-off valve must be provided with at least one remote control station on the end of the cargo tank opposite the main control station. The remote control station must contain a manual means of closure. In addition, it may contain fusible elements actuated at a temperature not exceeding 250° F., or equivalent devices. One means may be used to close more than one remotely controlled valve.

§ 178.338-12 Shear section.

Unless the valve is located in a rear cabinet forward of and protected by the bumper (see § 178.338-10(c)) and the design installation of each valve, damage to which could result in loss of liquid or vapor, must incorporate a shear section or breakage groove adjacent to, and outboard of, the valve. The shear section or breakage groove must yield or break under strain without damage to the valve that would allow the loss of liquid or vapor. The protection specified in § 178.338-10 is not a substitute for a shear section or breakage groove.

§ 178.338-13 Supports and anchoring.

(a) All attachments of supports and bumpers to tanks and to load-bearing jackets must be made by means of pads of material similar to that of the tank or jacket, by load rings, or by bosses designed or gusseted to distribute the load. The pad must be at least ¼-inch thick, or as thick as the tank or jacket material, if less, but shall in no case be thicker than the tank or jacket material. Each pad must extend at least four times its thickness, in each direction, beyond the weld attaching the support or bumper. Each pad must be performed to an inside radius no greater than the outside radius of the tank or jacket at the place of attachment. Each pad corner must be rounded to a radius at least one-fourth the width of the pad and no greater than one-half the width of the pad. If weep holes or telltale holes are used, they must be drilled or punched before the pads are attached. Each pad must be attached to the tank or jacket by continuous fillet welding using filler material having properties conforming to the recommendations of the manufacturer of the tank or jacket material. Any fillet weld discontinuity may only be for the purpose of preventing an intersection between the fillet weld and a tank or jacket seam weld.

(b) A tank motor vehicle constructed so that the cargo tank constitutes in whole or in part the structural member used in place of a motor vehicle frame must have the tank or the jacket supported by external cradles or by load rings. A cargo tank mounted on a motor vehicle frame must have the tank or jacket supported by external cradles, load rings, or longitudinal members. If cradles are used, they must subtend at least 120 degrees of the cargo tank circumference. The design calculations for the supports and load bearing tank or jacket, and the support attachments must include beam stress, shear stress, torsion stress, bending moment, and acceleration stress for the loaded vehicle as a unit, using a safety factor of four, based on the tensile strength of the material, and static loadings that take into consideration the weight of the cargo tank and its attachments when filled to the design weight of the lading (see Appendix G of the ASME Code). The effects of fatigue must also be considered in the calculations. Minimum static loadings must be as follows:

(1) For a vacuum insulted cargo tank—
(i) Vertically downward of 2;
(ii) Vertically upward of 2;
(iii) Longitudinally of 2, and
(iv) Laterally of 2.
(2) For a nonvacuum-insulated cargo tank—
(i) Vertically downward of 3;
(ii) Vertically upward of 2,
(iii) Longitudinally of 2; and
(iv) Laterally of 2.

(c) When a loaded tank is supported within the vacuum jacket by structural members, the design calculations for the tank and its structural members must be based on a safety factor of four and the tensile strength of the material at ambient temperature. The enhanced tensile strength of the material at actual operating temperature may be substituted for the tensile strength at ambient temperature to the extent recognized in the ASME Code for static loadings. Static loadings must take into consideration the weight of the tank and the structural members when the tank is filled to the design weight of lading (see Appendix G of the ASME Code). When load rings in the jacket are used for supporting the tank they must be designed to carry the fully loaded tank at the specified static loadings, plus external pressure. Minimum static loadings must be as follows:

(1) Vertically downward of 2;
(2) Vertically upward of 1½;
(3) Longitudinally of 1½; and,
(4) Laterally of 1½.

§ 178.338-14 Gauging devices.

(a) Liquid level gauging devices.

(1) Unless a cargo tank is intended to be filled by weight, it must be equipped with one or more gauging devices, which accurately indicate the maximum permitted liquid level at the loading pressure, in order to provide a minimum of two percent outage below the inlet of the pressure control valve or pressure relief valve at the condition of incipient opening of that valve. A fixed-length dip tube, a fixed trycock line, or a differential pressure liquid level gauge must be used as the primary control for filling. Other gauging devices, except gauge glasses, may be used, but not as the primary control for filling.

(2) The design pressure of each liquid level gauging device must be at least that of the tank.

(3) If a fixed length dip tube or trycock line gauging device is used, it must consist of a pipe or tube of small diameter equipped with a valve at or near the jacket and extending into the cargo tank to a specified filling height. The fixed height at which the tube ends in the cargo tank must be such that the device will function when the liquid reaches the maximum level permitted in loading.

(4) The liquid level gauging device used as a primary control for filling must be designed and installed to accurately indicate the maximum filling level at the point midway of the tank both longitudinally and laterally.

(b) Pressure gauges. Each cargo tank must be provided with a suitable pressure gauge indicating the lading pressure and located on the front of the jacket so it can be read by the driver in the rear view mirror. Each gauge must have a reference mark at the cargo tank design pressure or the set pressure of the pressure relief valve or pressure control valve, whichever is lowest.

(c) Orifices. All openings for dip tube gauging devices, trycock lines, and pressure gauges must be restricted at or inside the jacket by orifices no larger than 0.060-inch diameter.

§ 178.338-15 Cleanliness.

A cargo tank constructed for oxygen service must be thoroughly cleaned to remove all foreign material in accordance with CGA Pamphlet G-4.1. All loose particles from fabrication, such as weld beads, dirt, grinding wheel debris, and other loose materials, must be removed prior to the final closure of the manhole of the tank. Chemical or solvent cleaning with a material compatible with the intending lading must be performed to remove any contaminants likely to react with the lading.

§ 178.338-16 Inspection and testing.

(a) General. The material of construction of a tank and its appurtenances must be inspected for conformance to the ASME Code. The tank must be subjected to either a hydrostatic or pneumatic test. The test pressure must be one and one-half times the sum of the design pressure, plus static head of lading, plus 14.7 psi if subjected to external vacuum, except that for tanks constructed in accordance with Part UHT of the ASME Code the test pressure must be twice the design pressure.

(b) Additional requirements for pneumatic test. A pneumatic test may be used in place of the hydrostatic test. Due regard for protection of all personnel should be taken because of the potential hazard involved in a pneumatic test. The pneumatic test pressure in the tank must be reached by gradually increasing the pressure to one-half of the test pressure. Thereafter, the test pressure must be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. Then the pressure must be reduced to a value equal to four-fifths of the test pressure and held for a sufficient time to permit inspection of the cargo tank for leaks.

(c) Weld inspection. All tank shell or head welds subject to pressure shall be radiographed in accordance with the ASME Code. A tank which has been subjected to inspection by the magnetic particle method, the liquid penetrant method, or any method involving a material deposit on the interior tank surface, must be cleaned to remove any such residue by scrubbing or equally effective means, and all such residue and cleaning solution must be removed from the tank prior to final closure of the tank.

(d) Defect repair. All cracks and other defects must be repaired as prescribed by the ASME Code. The welder and the welding procedure must be qualified in accordance with the ASME Code. After repair, the tank must again be postweld heat-treated, if such heat treatment was previously performed, and the repaired areas must be retested.

(e) Verification must be made of the interior cleanliness of a tank constructed for oxygen service by means that assure that all contaminants that are likely to react with the lading have been removed as required by §178.338-15.

§ 178.338-17 Pumps.

See §§173.33(f) and 173.318(a)(4) of this subchapter.

§ 178.338-18 Marking.

(a) Nameplate. Each tank built after July 1, 1985 shall have a corrosion resistant metal plate permanently affixed by brazing or welding around its perimeter, on the left side (on the right side prior to July 1, 1985) near the front. If this nameplate is attached by welding, it must be welded before the tank is postweld heat-treated. The nameplate must be plainly marked by stamping, embossing, or other means of forming letters into the metal of the plate, in characters at least ⅜-inches high. The following information, in addition to that required by the ASME Code, must be included (parenthetical abbreviations may be used):

(1) DOT Specification number MC-338 (DOT MC-338);
(2) Material specification number (Mat. Spec. No.);
(3) Maximum density of lading for which the tank is designed (Max. Dens. of Lading);
(4) Water capacity, in pounds net at 60° F, with the tank at its coldest operating temperature, after deduction for the volume above the inlet to the pressure relief device or pressure control valve, structure members, baffles, piping, and other appurtenances inside the tank (W. Cap.); and
(5) Original test date (Orig. Test Date);

(b) Specification plate. Each tank built after July 1, 1985 shall have an additional plate, in the form specified in paragraph (a) of this section. It must be welded, brazed, or riveted to the jacket on the left side (on the right side prior to July 1, 1985) near the front, or at the control station, in a position readily legible to operating personnel. It must be marked with the information specified in paragraph (a) of this section and in addition, in characters at least ⅜-inches high, the following (parenthetical abbreviations may be used):

(1) Vehicle manufacturer (Veh. Mfr.);
(2) Manufacturer's vehicle serial number (Veh. No.);
(3) Lining material, if any (Lining);
(4) Date of manufacture (Date of Mfr.);
(5) Certificate date (Cert. Date);
(6) Design service temperature (Design Serv. Temp.);
(7) "Insulation for Oxygen Service" or "Not Authorized for Oxygen Service," as appropriate;
(8) Maximum weight of lading for which the cargo tank is designed, in pounds (Max. Net Wgt.——lbs.);
(9) Marked rated holding time for at least one cryogenic liquid, in hours, and the name of the cryogenic liquid (MRHT-hrs., name of cryogenic liquid). MRHT markings for additional cryogenic liquids may be displayed on or adjacent to the specification plate.

(c) The design weight of lading used in determining the loading in §§178.338-3(b), 178.339-10 (b) and (c), and 178.338-13 (b) and (c) must be shown as the maximum weight of lading marking required by paragraph (b) of this section.

§ 178.338-19 Certification.

(a) The manufacturer of a cargo tank vehicle shall furnish to the owner of the completed vehicle, at or before the time of delivery, the following:

(1) the tank manufacturer's data report required by the ASME Code.
(2) a photograph, pencil rub, or other facsimile of the plates required by paragraphs (a) and (b) of §178.338-18, and
(3) a certificate bearing the manufacturer's vehicle serial number stating that the completed cargo tank vehicle conforms to all applicable requirements of Specification MC-338, including the ASME Code, in effect on the date (month, year) of certification.

(b) In the case of a cargo tank vehicle manufactured in two or more stages, each manufacturer who performs a manufacturing operation on the incomplete vehicle or portion thereof shall furnish to the succeeding manufacturer, at or before the time of delivery, a certificate covering the particular operation performed by that manufacturer and any certificates received from previous manufacturers. The certificates must include sufficient sketches, drawings, and other information to indicate the location, make, model and size of each valve and the arrangement of all piping associated with the tank. Each certificate must be signed by an official of the manufacturing firm responsible for the portion of the complete cargo tank vehicle represented thereby, such as basic tank fabrication, insulation, jacket, or piping. The final manufacturer shall furnish the owner with all certificates, as well as the documents required by paragraph (a) of the section.

(c) The owner shall retain the data report, certificates, and related papers throughout his ownership of the cargo tank. In the event of change of ownership, the prior owner shall retain non-fading photographically reproduced copies of these documents for at least one year. Each operator using the cargo tank vehicle, if not the owner thereof, shall obtain a copy of the data report and the certificate or certificates and retain them during the time he uses the cargo tank and for at least one year thereafter.

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§ 178.340 General design and construction requirements applicable to specifications MC 306 (§178.341), MC 307 (§178.342), and MC 312 (§178.343) cargo tanks.

§ 178.340-1 Specification requirements for MC 306, MC 307 and MC 312 cargo tanks. (a) Specification MC 306, MC 307 and MC 312 cargo tanks constructed on or after December 1, 1967, for the bulk transportation of hazardous commodities must meet the requirements contained in this section in addition to the requirements of each applicable specification as contained in §178.341 (MC 306), §178.342 (MC 307) and §178.343 (MC 312).

(b) All of these specification requirements are minimum requirements.

§ 178.340-2 General requirements. (a) Every cargo tank and vessel shall be designed and constructed in accordance with the best known and available practices in addition to the other applicable cargo tank specification requirements.

(b) Those requirements relating to parts and accessories applicable to all motor vehicles engaged in interstate commerce as contained in Part 393 of this Title of the Motor Carrier Safety Regulations are an integral part of this specification.

(c) Where applicable the additional requirements prescribed in Part 173 to accommodate specific commodities are considered an integral part of these specifications.

(d) Multi-purpose cargo tank.

(1) A single cargo tank may be divided into compartments of different specification construction. Each such compartment shall conform to specification requirements concerned.

(2) A single cargo tank may be physically altered to comply with another cargo tank specification in these regulations; or altered to accommodate a commodity not requiring a DOT specification tank.

§ 178.340-3 Material. (a) All sheet and plate material for shell, heads, bulkheads and baffles for cargo tanks which are not required to be constructed in accordance with the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code shall meet the following minimum applicable requirements:

(1) **ALUMINUM ALLOYS (AL).** Only aluminum alloy material suitable for fusion welding and in compliance with one of the following ASTM specifications shall be used:

ASTM B-209 Alloy 5052	ASTM B-209 Alloy 5254
ASTM B-209 Alloy 5086	ASTM B-209 Alloy 5454
ASTM B-209 Alloy 5154	ASTM B-209 Alloy 5652

All heads, bulkheads, baffles, and ring stiffeners may use O temper (annealed) or stronger tempers. All shells shall be made of materials with properties equivalent to H 32 or H 34 tempers, except that lower ultimate strength tempers may be used if the minimum shell thicknesses in Table II in §§178.341-2, 178.342-2, or 178.343-2 are increased in inverse proportion to the lesser ultimate strength.

(2) STEEL.

	Mild steel (MS)	High strength low alloy steel (HSLA)	Austenitic stainless steel (SS)
Yield	25,000 psi	45,000 psi	25,000 psi
Ultimate strength	45,000 psi	60,000 psi	70,000 psi
Elongation, 2 inch samples	20%	25%	30%

§ 178.340-4 Structural integrity. (a) **Maximum stress values.** The maximum calculated stress value must not exceed 20 percent of the minimum ultimate strength of the material as authorized in §178.340-3, except when ASME Code pressure vessel design requirements apply.

(b) **Loadings.** Cargo tanks shall be provided with additional structural elements as necessary to prevent resulting stresses in excess of those permitted in paragraph (a) of this subsection. Consideration shall be given to forces imposed by each of the following loads individually, and where applicable a vector summation of any combination thereof:

(1) Dynamic loading under all product load configurations.

(2) Internal pressure.

(3) Superimposed loads such as operating equipment, insulation, linings, hose tubes, cabinets and piping.

(4) Reactions of supporting lugs and saddles or other supports.

(5) Effect of temperature gradients resulting from product and ambient temperature extremes. Thermal coefficients of dissimilar materials where used should be accommodated.

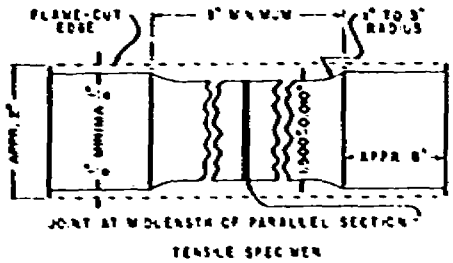
§ 178.340-5 Joints. (a) **Method of joining.** All joints between tank shells, heads, baffles (or baffle attaching rings), and bulkheads shall be welded in accordance with the requirements contained in this section.

(b) **Strength of joints (Aluminum Alloy (AL)).** All welded aluminum alloy joints shall be made in accordance with recognized good practice, and the efficiency of a joint shall be not less than 85 percent of the properties of the adjacent material. Aluminum alloys shall be joined by an inert gas arc welding process using aluminum-magnesium type of filler metals which are consistent with the material suppliers recommendations.

(c) **Strength of joints (Mild Steel (MS), High Strength Low Alloy (HSLA), Austenitic Stainless Steel (SS)).** Joints shall be welded in accordance with recognized good practice and the efficiency of any joint shall be not less than 85 percent of the mechanical properties of the adjacent metal in the tank.

(1) Combinations of mild steel (MS), high strength low alloy (HSLA) and or austenitic stainless steel (SS) may be used in the construction of a single tank, provided that each material, where used, shall comply with the minimum requirements specified in §178.340-3(a) for the material used in the construction of that section of the tank. Whenever stainless steel sheets are used in combination with sheets of other types of steel, joints made by welding shall be formed by the use of stainless steel electrodes or filler rods and the stainless steel electrodes or filler rods used in the welding shall be suitable for use with the grade of stainless steel concerned, according to the recommendations of the manufacturer of the stainless steel electrodes or filler rods.

(d) **Compliance test.** Compliance with the requirements contained in paragraph (b) or (c) of this subsection for the welded joints indicated in paragraph (a) of this subsection shall be determined by preparing from materials representative of those to be used in tanks subject to this specification and by the same technique of fabrication, 2 test specimens conforming to figure as shown below and testing them to failure in tension. One pair of test specimens may represent all the tanks to be made of the same combination of materials by the same technique of fabrication, and in the same shop, within six months after the tests of such samples have been completed. The butt welded specimens tested shall be considered qualifying other types or combinations of types of weld using the same filler material and welding process as long as parent metals are of the same types of material.



§ 178.340-6 Supports and anchoring. (a) Cargo tanks with frames not made integral with the tank as by welding, shall be provided with restraining devices to eliminate any relative motion between the tank and frame which may result from the stopping, starting or turning of the vehicle. Such restraining devices shall be readily accessible for inspection and maintenance, except that insulation and jacketing are permitted to cover the restraining devices.

(b) Any cargo tank designed and constructed so that it constitutes in whole or in part the structural member used in lieu of a frame, shall be supported in such a manner that the resulting stress levels in the cargo tank do not exceed those specified in §178.340-4(a). The design calculations of the support elements shall include loadings imposed by stopping, starting and turning in addition to those imposed as indicated in §178.340-4(b) using 20% of the minimum ultimate strength of the support material.

§ 178.340-7 Circumferential reinforcement. (a) Tanks with shell thicknesses less than ¾ of an inch shall in addition to the tank heads be circumferentially reinforced with either bulkheads, baffles, or ring stiffeners. It is permissible to use any combination of the aforementioned reinforcements in a single cargo tank.

(1) **Location.** Such reinforcement shall be located in such a manner that the maximum unreinforced portion of the shell be as specified in Table II of the applicable specification and in no case more than 60 inches. Additionally such circumferential reinforcement shall be located within one inch of points where discontinuity in longitudinal shell sheet alignment exceeds 10 degrees unless otherwise reinforced with structural members capable of maintaining shell sheet stress levels permitted in §178.340-4(a).

(b) **Baffles.** Baffles or baffle attaching rings if used as reinforcement members shall be circumferentially welded to the tank shell. The

welding must not be less than 50% of the total circumference of the vessel and the maximum unwelded space on this joint shall not exceed 40 times the shell thickness.

(c) **Double bulkheads.** Tanks designed to transport different commodities which if combined during transit will cause a dangerous condition or evolution of heat or gas shall be provided with compartments separated by an air space. This air space shall be vented and be equipped with drainage facilities which shall be kept operative at all times.

(d) **Ring stiffeners.** Ring stiffeners when used to comply with this section shall be continuous around the circumference of the tank shell have a section modulus about the neutral axis of the ring section parallel to the shell at least equal to that determined by the following formula:

$$\frac{I}{C} \text{ (Min)} = 0.00027\ WL \text{ (MS, HSLA \& SS) Steel}$$

$$\frac{I}{C} \text{ (Min)} = 0.000457\ WL \text{ (AL) Aluminum Alloy}$$

where:

$\frac{I}{C}$ = section modulus (inches)^3;

W = tank width or diameter (inches);

L = ring spacing (inches); i.e., the maximum distance from the midpoint of the unsupported shell on one side of the ring stiffener to the midpoint of the unsupported shell on the opposite side of the ring stiffener.

(1) If a ring stiffener is welded to the tank shell (with each circumferential weld not less than 50% of the total circumference of the vessel and the maximum unwelded space on this joint not exceeding 40 times the shell thickness) a portion of the shell may be considered as part of the ring section for purposes of computing the ring section modulus. The maximum portion of the shell to be used in these calculations is as follows:

Circumferential ring stiffener to tank shell welds	Distance between parallel circumferential ring stiffener to shell welds	Shell section credit
1	.....	20t
2	Less than 20t	20t + W
2	20t or more	40t

where:

t = shell thickness;

W = distance between parallel circumferential ring stiffener to shell welds.

(2) If configuration of internal or external ring stiffener encloses an air space, this air space shall be arranged for venting and be equipped with drainage facilities which shall be kept operative at all times.

§ 178.340-8 Accident damage protection. (a) **Appurtenances:** The term "appurtenance" means any cargo tank accessory attachment that has no liquid product retention or other liquid containment function, and provides no structural support to the tank.

(1) The design, construction, and installation of any appurtenance to the shell or head of the cargo tank must be such as to minimize the possibility of appurtenance damage or failure adversely affecting the product integrity of the tank.

(2) Structural members, such as the suspension subframe, overturn protection and external rings, when practicable, should be utilized as sites for attachment of appurtenances and any other accessories to a cargo tank.

(3) Except as prescribed in subparagraph (5) of this paragraph, the welding of any appurtenance to a shell or head must be made by attachment to a mounting pad. The thickness of a mounting pad must not be less than that of the shell or head to which it is attached. A pad must extend at least 2 inches in each direction from any point of attachment of an appurtenance. Pads must have rounded corners or otherwise be shaped in a manner to preclude stress concentrations on the shell or head. The mounting pad must be attached by a continuous weld around the pad.

(4) The appurtenance must be attached to the mounting pad so there will be no adverse affect upon the product-retention integrity of the tank if any force is applied to the appurtenance, in any direction, except normal to the tank, or within 45° of normal.

(5) Skirting structures, conduit clips, brakeline clips, and similar lightweight attachments, which are of a metal thickness, construction, or material, appreciably less strong but no more than 72 percent of the thickness of the tank shell or head to which such a device is attached, may be secured directly to the tank shell or head if each device is so designed and installed that damage to it will not affect the product retention integrity of the tank. These lightweight attachments must be secured to the tank shell by continuous weld or in such manner as to preclude formation of pockets, which may become sites for incipient corrosion.

(b) **Rear bumpers.** Every cargo tank shall be provided with a rear bumper to protect the tank and piping in the event of a rear end collision and minimize the possibility of any part of the colliding vehicle striking the tank. The bumper shall be located at least 6 inches to the rear of any vehicle component which is used for loading or unloading purposes or may at any time contain lading while in transit. Dimensionally, the bumper shall conform to § 393.86 of this Title. Structurally, the bumper shall be designed to successfully absorb (no damage which will cause leakage of product) the impact of the vehicle with rated payload, with a deceleration of 2 "g" using a factor of safety of two based on the ultimate strength of the bumper material. For purposes of the regulations in this part such impact shall be considered uniformly distributed and applied horizontally (parallel to the ground) from any direction at an angle not exceeding 30° to the longitudinal axis of the vehicle.

(c) **Overturn protection.** All closures for filling, manhole or inspection openings shall be protected from damage which will result in leakage of lading in the event of overturning of the vehicle by being enclosed within the body of the tank or dome attached to the tank or by guards.

(1) When guards are required, they shall be designed and installed to withstand a vertical load of twice the weight of the loaded tank and a horizontal load in any direction equivalent to one-half the weight of the loaded tank. These design loads may be considered independently. Ultimate strength of the material shall be used as a calculation base. If more than one guard is used each shall carry its proportionate share of the load. If protection other than guards are considered the same design load criteria is applicable.

(2) Except for pressure actuated vents no overturn protection is required for non-operating nozzles or fittings less than five inches in diameter (which do not contain product while in transit) that project a distance less than the inside diameter of the fitting. This projected distance may be measured either from the shell or the top of an adjacent ring stiffener provided such stiffener is within 30 inches of the center of the nozzle or fitting.

(3) If the overturn protection is so constructed as to permit accumulation of liquid on the top of the tank, it shall be provided with drainage facilities directed to a safe point of discharge.

(d) **Piping.**

(1) Product discharge piping shall be provided with protection in such a manner as to reasonably assure against the accidental escape of contents. Such protection may be provided by:

(i) A shear section located outboard of each emergency valve seat and within 4 inches of the vessel which will break under strain and leave the emergency valve seat and its attachment to the vessel and the valve head intact and capable of retaining product. The shear section shall be machined in such a manner as to abruptly reduce the wall thickness of the adjacent piping (or valve) material by at least 20%; or

(ii) By suitable guards capable of successfully absorbing a concentrated horizontal force of at least 8000 pounds applied from any horizontal direction, without damage to the discharge piping which will adversely affect the product retention integrity of the discharge valve.

(2) **Minimum road clearance.** The minimum allowable road clearance of any cargo tank component or protection device located between any two adjacent axles on a vehicle or vehicle combination shall be at least ½ inch for each foot separating such axles and in no case less than 12 inches.

(3) **Strength of piping, fittings, hose and hose couplings.** Hose, piping and fittings for tanks to be unloaded by pressure shall be designed for a bursting pressure of at least 100 psig and not less than four times the pressure to which, in any instance, it may be subjected in service by the action of any vehicle mounted pump or other device (not including safety relief valves), the action of which may be to subject certain portions of the tank piping and hose to pressures greater than the design pressure of the tank. Any coupling used on hose to make connections shall be designed for a working pressure not less than 20% in excess of the design pressure of the hose and shall be so designed that there will be no leakage when connected.

(4) **Provision for expansion and vibration.** Suitable provisions shall be made in every case to allow for and prevent damage due to expansion, contraction, jarring and vibration of all pipe. Slip joints shall not be used for this purpose.

(5) **Heater coils.** Heater coils, when installed, shall be so constructed that the breaking-off of their external connections will not cause leakage of contents of tank.

(6) **Gauging, loading, and air-inlet devices.** Gauging, loading and air-inlet devices, including their valves, shall be provided with adequate means for their secure closure, and means shall also be provided for the closing of pipe connections of valves.

§ 178.340-9 Pumps. (a) Loading or unloading pumps mounted on tractor or trailer, if used, shall be provided with automatic means to prevent the pressure from exceeding the design pressure of the tank mounted equipment.

§ 178.340-10 Certification. (a) Certification as required in paragraphs (b) and (c) of this subsection shall indicate that such cargo tank has been designed, constructed and tested in accordance with the

applicable specification MC 306, MC 307, or MC 312 (§178.341, 178.342 or 178.343).

(1) **Multi-purpose tanks.** If a cargo tank is divided into compartments and each compartment is constructed in accordance with the requirements of a different MC Specification, there shall be a metal plate required in paragraph (b) of this subsection, located on the right side, near the front of each compartment, in a place readily accessible for inspection. Details pertaining to the multipurpose configuration shall also be clearly indicated on the manufacturer's certificate required in paragraph (c) of this subsection.

(i) If a cargo tank is constructed in accordance with the requirements of one specification and may be physically altered to meet another cargo tank specification in this part, or physically altered to accommodate a commodity not requiring a specification tank, such alterations shall be clearly indicated on the manufacturer's certificate required in paragraph (c) of this subsection and the tank mounted multi-purpose plate required in paragraph (b)(2) of this subsection.

(2) **Specification shortages.** If a cargo tank is manufactured which does not meet all of the applicable specification requirements, thereby requiring subsequent manufacturing involving the installation of additional components, parts, appurtenances or accessories, it is permissible for the original manufacturer to affix the metal certification plate required in paragraph (b) of this subsection. The specification requirements not complied with shall be indicated on the manufacturer's certificate required in paragraph (c) of this subsection. When the cargo tank is finally brought into complete compliance, the date such compliance is accomplished shall be stamped on the metal certification plate. The certificate shall indicate the pertinent details, date and concern (manufacturer or carrier) accomplishing complete compliance.

(b) **Metal certification plate.** After July 1, 1985, each cargo tank, or tank compartment if constructed to a different specification, must have a metal certification plate attached to its shell or to an integral supporting structure. The certification plate shall not be subject to corrosion, and must be located on the left side (on the right side prior to July 1, 1985) near the front in a place readily accessible for inspection. Each plate shall be permanently affixed by means of brazing, welding, soldering, riveting, or other equally suitable means. The plate must be marked in characters at least 3/16-inch high by stamping, embossing, or other means of forming letters into or on the metal of the plate itself at least the information prescribed in paragraphs (b)(1) and (b)(2) of this section. The plate may not be painted as to obscure the marking thereon. A combination ASME-DOT certification plate is authorized.

(1) If a cargo tank is to be physically altered to meet another specification (or to accommodate a commodity not requiring a specification tank) such combinations shall be indicated beside Specification Identification. Additionally the metal multi-purpose plates required in subparagraph (2) of this paragraph are required.

Vehicle manufacturer .....
Manufacturer's serial number .....
Specification identification[1] .....
DOT MC 306; or MC 307; or MC 312 .....
Date of manufacture .....
Original test date .....
Certification date .....
Design pressure ..... PSIG
Test pressure ..... PSIG
Head material .....
Shell material .....
Weld material .....
Lining material .....
Nominal tank capacity by compartment (front to rear) ..... US Gal.
Maximum product load ..... lbs.
Loading limits ..... GPM and or PSIG
Unloading limits ..... GPM and or PSIG

[1] The following material designations (or combinations thereof) must be added: Aluminum Alloy (AL), Mild Steel (MS), High Strength Low Alloy (HSLA), Austenitic Stainless Steel (SS). For example "DOT MC 306-AL" for cargo tanks made of aluminum. A multi-purpose cargo tank example would be "Combination MC 306 SS-307 SS."

(2) **Metal multi-purpose plate.** If a cargo tank is to be physically altered, metal multi-purpose plates shall be mounted adjacent to the metal certification plate readily accessible for inspection. The mounting of the plates shall be such that only the plate identifying the applicable specification is legible at all times the cargo tank is in complete compliance with such specifications. The mounting of the plates (or plate assembly) shall be secured in such a manner as to be capable of retaining the plate when subjected to normal operating conditions. The same marking size and method used on the certification plate shall be used. The plate shall contain at least the information contained below:

SPECIFICATION IDENTIFICATION MC _____
EQUIPMENT NECESSARY

Vents	Quantity[1]
Pressure actuated	
Fusible	
Frangible	
Product discharge	
Top	
Bottom	
Pressure unloading fitting	
Covers	
Manhole	
Fill opening	

[1] The number required to meet applicable specification. If no physical change is required the letters NC shall follow the number required. If cargo tank is not so equipped the word "NONE" shall be inserted.

(i) Color coding: Those parts which must be changed or added to meet the applicable specification requirements and the appropriate multi-purpose plate shall be identified using the following colors:

MC 306 RED
MC 307 GREEN
MC 312 YELLOW
Non Spec. BLUE

Additionally those parts to be changed or added shall be stamped with appropriate MC Spec. Number _____.

(c) **Manufacturer's certificate.** A certificate signed by a responsible official of the manufacturer of the cargo tank, or from a competent testing agency, certifying that each such cargo tank is designed, constructed and tested in accordance and complies with the requirements contained in the applicable specification shall be procured, and such certificate shall be retained in the files of the carrier during the time that such cargo tank is employed by him plus one year. In lieu of this certificate, if the motor carrier himself elects to ascertain that any such tank fulfills the requirements of the specification by his own test, he shall similarly retain the test data.

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§ 178.341 Specification MC 306; cargo tanks.

§ 178.341-1 General requirements. (a) Specification MC 306 cargo tanks must comply with the general design and construction requirements in § 178.340 in addition to the specific requirements contained in this section.

(b) **Design pressure.** The design pressure of each cargo tank shall not be less than that pressure exerted by the static head of the fully loaded tank in the upright position.

§ 178.341-2 Thickness of shells, heads, bulkheads and baffles. (a) **Material thickness.** The minimum thicknesses of tank material authorized in § 178.340-3 shall be predicated on not exceeding the maximum allowable stress level (§ 178.340-4(a)) but in no case less than those indicated in Tables I and II below:

Maximum Shell Radius

Maximum Shell Radius

TABLE II—MINIMUM THICKNESS OF HEADS, BULKHEADS AND BAFFLES
(Mild Steel (MS), High Strength Low Alloy Steel (HSLA), Austenitic Stainless Steel (SS) in United States Standard Gauge—Aluminum Alloy (AL)—expressed in decimals of an inch)

	Volume Capacity in Gallons Per Inch											
	10 or less			Over 10 to 14			14 TO 18			18 and Over		
	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
Thickness	14	15	.096	13	14	.109	12	13	.130	11	12	.151

TABLE II—MINIMUM THICKNESS OF SHELL SHEETS
(Mild Steel (MS), High Strength Low Alloy Steel (HSLA), Austenitic Stainless Steel (SS) in United States Standard Gauge—Aluminum Alloy (AL)—expressed in decimals of an inch)

	Distance Between Bulkheads, Baffles or Ring Stiffeners	Volume Capacity in Gallons Per Inch											
		10 or less			Over 10 to 14			14 to 18			18 and Over		
		MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
Less than 78"	36" or Less	14	16	087	14	16	087	14	15	096	13	14	.109
	Over 36"-54"	14	16	087	14	15	096	13	14	.109	12	13	.130
	54" Thru 60"	14	16	096	13	14	.109	12	13	.130	11	12	.151
78" or More Less than 90"	36" or Less	14	15	087	14	15	096	13	14	.109	12	13	.130
	Over 36"-54"	14	15	096	13	14	.109	12	13	.130	11	12	.151
	54" Thru 60"	13	14	.109	12	13	.130	11	12	.151	10	11	.173
90" or more Less than 125"	36" or Less	14	15	096	13	14	.109	12	13	.130	11	12	.151
	Over 36"-54"	13	14	.109	12	13	.130	11	12	.151	10	11	.173
	54" Thru 60"	12	13	.130	11	12	.151	10	11	.173	9	10	.194
125" or more	36" or Less	13	14	.109	12	13	.130	11	12	.151	10	11	.173
	Over 36"-54"	12	13	.130	11	12	.151	10	11	.173	9	10	.194
	54" Thru 60"	11	12	.151	10	11	.173	9	10	.194	8	9	216

(l) Product density. The material thicknesses contained in Tables I and II are minimums based on a maximum 7.2 pounds per gallon product weight. If the tank is designed to haul products weighing more than 7.2 pounds per gallon, the gallon per inch value used to determine the minimum thickness of heads, bulkheads, baffles or shell sheets shall be the actual section capacity required in gallons per inch multiplied by the actual product density in pounds per gallon divided by 7.2.

§ 178.341-3 Closures for fill openings and manholes. (a) Each compartment in excess of 2500 gallons capacity shall be accessible through a manhole of at least 11 inches x 15 inches. Manhole and or fill opening covers shall be designed to provide secure closure of the openings. They shall have structural capability of withstanding internal fluid pressures of 9 psig without permanent deformation. Safety devices to prevent the manhole and or fill cover from opening fully when internal pressure is present shall be provided.

§ 178.341-4 Vents. (a) Each cargo tank compartment shall be provided with safety relief devices in accordance with the requirements contained in this paragraph. All of such devices shall communicate with the vapor space. Shut-off values shall not be installed between the tank opening and any safety device. Safety relief devices shall be so mounted, shielded or drained as to eliminate the accumulation of water, the freezing of which could impair the operation or discharge capability of the device.

(b) Normal venting. Each cargo tank compartment shall be provided with pressure and vacuum vents having a minimum through area of 0.44 square inch. All pressure vents shall be set to open at no more than 1 psig and all vacuum vents at no more than 6 ounces. Pressure and vacuum vents shall be designed to prevent loss of liquid through the vent in case of vehicle overturn.

(c) Loading and unloading venting protection. If the tank is designed to be loaded or unloaded with the dome cover closed, the vent or vents as described in paragraph (b) of this subsection or additional vents shall limit the vacuum to one psi and the tank pressure to 3 psig based on maximum product transfer rate to be included on the metal certification plate § 178.340-10(b). Unless effective protection against overfilling is made, the pressure vent shall also have sufficient liquid capacity to prevent the pressure from exceeding 3 psig in case of accidental overfilling. This pressure vent may be pressure operated or interlocked with the tank loading device, and shall be designed to prevent loss of liquid through the vent under any condition of vehicle rollover attitude.

(d) Emergency venting for fire exposure.

(1) Total capacity. The total emergency venting capacity (cu. ft/hr) of each cargo tank compartment shall be not less than that determined from Table III.

(2) Pressure-actuated venting. Each cargo tank compartment shall be equipped with pressure-actuated vent or vents set to open at not less than 3 psig and close when pressure drops to 3 psig or below. The minimum venting capacity for pressure actuated vents shall be 6,000 cubic feet of free air per hour (14.7 psia and 60° F) from a tank pressure of 5 psig. Pressure-actuated devices shall be designed so as to prevent leakage of liquid past the device in case of surge or vehicle upset, except that they shall function in case of pressure rise under any condition of vehicle rollover attitude.

(3) Fusible venting. If the pressure-actuated venting required by paragraph (d)(2) of this subsection does not provide the total venting capacity required by paragraph (d)(1) of this subsection additional capacity shall be provided by adding fusible venting devices each having a minimum area of 1.25 square inches, such fusible elements shall be so located as to not be in contact with the tank lading under normal operating conditions. The fusible vent or vents shall be actuated by elements which operate at a temperature not exceeding 250° F. The venting capacity of these devices shall be rated at not more than 5 psig.

TABLE III
MINIMUM EMERGENCY VENT CAPACITY IN CUBIC FEET FREE AIR/HOUR (14.7 PSIA and 60°F)

Exposed area square feet	Cubic feet free air per hour	Exposed area square feet	Cubic feet per air per hour
20	15,800	275	214,300
30	23,700	300	225,100
40	31,600	350	245,700
50	39,500	400	265,000
60	47,400	450	283,200
70	55,300	500	300,600
80	63,300	550	317,300
90	71,200	600	333,300
100	79,100	650	348,800
120	94,900	700	363,700
140	110,700	750	378,200
150	126,500	800	392,200
180	142,300	850	405,900
200	158,100	900	419,300
225	191,300	950	432,300
250	203,100	1,000	445,000

Note 1: Interpolate for intermediate sizes.

(e) Flow testing and marking of vents. Each type and size of venting devices shall be flow tested in the ranges specified in the applicable preceding paragraphs. The actual rated flow capacity of the vent in cubic feet of free air per hour at the pressure in psig at which the flow capacity is determined shall be stamped on the device. The fusible vent or vents shall have their flow rating determined at 5 psig differential.

(f) These flow tests may be conducted by the manufacturer or may be delegated to a certified outside agency.

§ 178.341-5 Emergency flow control. (a) Each product discharge opening shall be equipped with a self-closing shut off valve, designed, installed, and protected in accordance with § 178.340-8(d) and operated so as to assure against the accidental escape of contents. These valves shall be located inside the tank or at a point outside the tank where the line enters or leaves the tank. The valve seat shall be located inside the tank or within the welded flange, its companion flange, nozzle, or coupling. Such product discharge valves (outflow) shall, in addition to normal means, be closed by (1) an automatic heat actuated means which will become effective at a temperature not over 250° F., (2) a secondary closing means, remote from tank filling or discharge openings, for operation in event of fire or other accident.

§ 178.341-6 Gauging devices. (a) No applicable provisions.

§ 178.341-7 Method of test. (a) Test for leaks. Every cargo tank shall be tested by a minimum air or hydrostatic pressure of 3 psig or at least equal to the tank design pressure of § 178.341-1(b) whichever is greater applied to the whole tank and dome if it be non-compartmented. If compartmented each individual compartment shall be similarly tested with adjacent compartments empty and at atmospheric pressure. Air pressure, if used, shall be held for a period of at least five minutes during which the entire surface of all joints under pressure shall be coated with a solution of soap and water, heavy oil, or other material suitable for the purpose, foaming or bubbling of which indicates the presence of leaks. Hydrostatic pressure, if used, shall be done by using water or other liquid having a similar viscosity, the temperature of which shall not exceed 100° F. during the test, and applying pressure as prescribed above,

gauged at the top of the tank, at which time all joints under pressure shall be inspected for the issuance of liquid to indicate leaks. All closures shall be in place while test by either method is made. During these tests, operative relief devices shall be clamped, plugged, or otherwise rendered inoperative; such clamps, plugs, and similar devices shall be removed immediately after the test is finished. Any leakage discovered by either of the methods above described, or by any other method, shall be deemed evidence of failure to meet the requirements of this specification. Tanks failing to pass this test shall be suitably repaired, and the above described tests shall be continued until no leaks are discovered, before any cargo tank is put into service.

(b) **Test for distortion or failure.** Every cargo tank shall be tested by pressures prescribed in paragraph (a) of this section and shall withstand such pressure without undue distortion, evidence of impending failure or failure. Failure to meet this requirement shall be deemed as sufficient cause for rejection under this specification. If there is undue distortion, or if failure impends or occurs, the cargo tank shall not be placed in or returned to service unless an adequate repair is made. The adequacy of the repair shall be determined by the same method of test.

§ 178.342 Specification MC 307; cargo tanks.

§ 178.342-1 General requirements. (a) Specification MC 307 cargo tanks must comply with the general design and construction requirements in § 178.340, in addition to the specific design requirements contained in this section.

(b) The design pressure (maximum allowable working pressure) of each cargo tank shall be not less than 25 psig. For working pressures in excess of 50 p.s.i.g. the tank must be designed in accordance with the requirements of the ASME Code.

(c) Tanks shall be of circular cross-section.

§ 178.342-2 Thickness of shell, heads, bulkheads, and baffles. (a) **Material thickness.** The minimum thicknesses of tank material authorized in § 178.340-3 shall be not less than those obtained by applying the following formulas nor less than those specified in Tables I and II below:

$$\text{Thickness of shell} = T_s = \frac{PD}{2SE_s}$$

$$\text{Thickness of heads} = T_h = \frac{.0885PL}{SE_h} \text{ (for pressure on concave side only)}$$

where:

T_s = Minimum thickness of shell material, exclusive of allowance for corrosion or other loadings;
T_h = Minimum thickness of head material, after forming, exclusive of allowance for corrosion and other loadings;
P = Design pressure, pounds per square inch;
D = Inside diameter of shell, inches;
L = Inside crown radius of head, inches;
S = Maximum allowable stress value, pounds per square inch equals one-fourth of specified minimum ultimate tensile strength. (One-fourth of aluminum alloy's annealed minimum ultimate strength.);
E_s = Lowest efficiency of any longitudinal joint in shell. (85% max.);
E_h = Lowest efficiency of any joint in head. (85% max.).

TABLE I—MINIMUM THICKNESS OF HEADS, BULKHEADS, AND BAFFLES
Mild Steel (MS), High Strength Low Alloy (HSLA) and Austenitic Stainless Steel (SS) Expressed in U.S. Gauge; Aluminum Alloy (AL) in Decimals of an Inch

	Volume Capacity of Tank in Gallons Per Inch																				
	18 or Less			Over 18 to 14			14 to 18			18 to 22			22 to 26			26 to 30			30 and Over		
	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
Thickness	14	15	.109	13	14	.130	12	13	.151	11	12	.173	10	11	.194	9	10	.216	8	9	.237

TABLE II—MINIMUM THICKNESS OF SHELL SHEETS
Mild Steel (MS), High Strength Low Alloy (HSLA) and Austenitic Stainless Steel (SS) Expressed in U.S. Gauge; Aluminum Alloy (AL) in Decimals of an Inch

Distance Between Bulkheads, Baffles or other Shell Stiffeners	Volume Capacity of Tank in Gallons Per Inch																				
	18 or Less			Over 18 to 14			14 to 18			18 to 22			22 to 26			26 to 30			30 and Over		
	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
36" or Less	14	15	.109	14	16	.109	14	15	.109	13	14	.130	12	13	.151	11	12	.173	10	11	.194
Over 36" to 54"	14	16	.109	14	15	.109	13	14	.130	12	13	.151	11	12	.173	10	11	.194	9	10	.216
54" thru 60"	14	15	.109	13	14	.130	12	13	.151	11	12	.173	10	11	.194	9	10	.216	8	9	.237

(1) The knuckle radius of the head shall not be less than three times the material thickness. The straight flange shall not be less than three times the material thickness for butt-welded heads.

(2) For heads with pressure on the convex side, the material thickness as obtained by the above formula shall be increased by 67% unless such heads are adequately braced to prevent excessive distortion.

(b) **Corrosion allowance.** Vessels or part of vessels subject to thinning by corrosion, erosion or mechanical abrasion, shall have provision made to withstand the intended life and service by a suitable increase in the thickness of the material over that determined by the design formulas, or by using some other suitable method of protection. Material added for these purposes need not be of the same thickness for all parts of the vessel if different rates of attack are expected for the various parts.

§ 178.342-3 Closures for manholes. (a) Each compartment shall be accessible through a 15 inch minimum inside diameter manhole. The manhole cover shall be designed to provide a secure closure of the manhole. All joints between manhole covers and their seats shall be made tight against leakage of vapor and liquid. Gaskets, if used, shall be of suitable material not subject to attack by lading.

(1) Closures shall have structural capability of withstanding internal fluid pressures of 40 psig or one and one-half times the design pressure of the tank whichever is greater without permanent deformation. Safety devices to prevent the manhole and/or fill cover from opening fully when internal pressure is present shall be provided.

§ 178.342-4 Vents. (a) Each cargo tank compartment shall be provided with safety relief devices in accordance with the requirements contained in this paragraph. All of such devices shall communicate with the vapor space. Shut-off valves shall not be installed between the tank opening and any safety device. Safety relief devices shall be so mounted, shielded or drained as to eliminate the accumulation of water, the freezing of which could impair the operation or discharge capability of the device.

(b) **Total capacity.** Every cargo tank compartment shall be provided with one or more devices with sufficient capacity to limit the tank internal pressure to a maximum of 130% of the tank design pressure. This total venting capacity shall be not less than that determined from Table III, using the external surface of the cargo tank or tank compartment as the exposed area.

(c) **Pressure-actuated venting (spring loaded).** Every cargo tank compartment shall be equipped with pressure-actuated vent or vents set to open at not less than the tank design pressure. The minimum venting capacity for pressure actuated vents shall be 12,000 cubic feet of free air per hour (14.7 psia and 60° F.) per compartment or 12,000 cubic feet of free air per hour (14.7 psia and 60° F.) for each 350 square feet of exposed tank area, whichever is greater. This minimum capacity shall be measured at a pressure of 130% of the tank design pressure. Pressure actuated devices shall be designed to function in case of pressure rise when in any condition of roll over attitude. If pressure (maximum limits to be included on the metal certification plate § 178.340-10(b)) unloading devices are provided, the relief valve shall have sufficient capacity to limit the tank internal pressure to 130% of design pressure.

(d) **Fusible and frangible venting.** If the pressure-actuated venting required by paragraph (c) of this subsection does not provide the total venting capacity required by paragraph (b) of this subsection, additional capacity shall be provided by adding fusible and/or frangible venting devices. Each fusible device shall have a minimum area of 1.25 square inches and shall be actuated by elements which operate at a temperature not exceeding 250° F. when the tank pressure is between

the tank design pressure and 130% of the tank design pressure. Such fusible elements shall be so located as to not be in contact with the lading under normal operating conditions. The bursting pressure of frangible devices shall be not less than 130% nor more than 150% of the tank design pressure.

TABLE III

MINIMUM EMERGENCY VENT CAPACITY IN CUBIC FEET FREE AIR HOUR (14.7 PSIA and 60°F)

Exposed area square feet	Cubic feet free air per hour	Exposed area square feet	Cubic feet free air per hour
20	15,900	275	214,300
30	23,700	300	225,100
40	31,600	350	245,700
50	39,500	400	265,000
60	47,400	450	283,200
70	55,300	500	300,500
80	63,300	550	317,300
90	71,200	600	333,300
100	79,100	650	348,900
120	94,900	700	363,700
140	110,700	750	378,200
150	126,500	800	392,200
160	142,300	850	405,900
200	158,100	900	419,300
225	191,300	950	432,300
250	203,100	1,000	445,000

Note 1. Interpolate for intermediate sizes

(e) **Flow testing and marking of vents.** Each type and size of venting devices shall be flow tested in the ranges specified in the applicable preceding paragraphs. The actual rated flow capacity of the vent in cubic feet of free air per hour at the pressure in psig at which the flow capacity is determined shall be stamped on the device.

(1) These flow tests may be conducted by the manufacturer or may be delegated to a certified agency.

§ 178.342-5 Outlets. (a) Each product discharge opening shall be equipped with a self-closing shut off valve, designed, installed, and protected in accordance with § 178.340-8(d) and operated so as to assure against the accidental escape of contents. These valves shall be located inside the tank or within the welded flange, its companion flange, nozzle, or coupling. Such product discharge valves (outflow) shall, in addition to normal means, be closed by (1) an automatic heat actuated means which will become effective at a temperature not over 250° F, (2) a secondary closing means, remote from tank filling or discharge openings, for operation in event of fire or other accident.

(b) Vapor return lines, if used, may be equipped with an excess flow valve at the tank connection if a positive shut-off valve is provided between the excess-flow valve and the hose connection.

§ 178.342-6 Gauging devices. (a) **Gauge device design.** Every tank compartment except tanks filled by weight, shall be equipped with one or more gauging device which shall indicate accurately the maximum permitted liquid level in each compartment. Additional gauging devices may be installed but may not be used as primary controls for filling of cargo tanks at pressures above atmospheric. Acceptable gauging devices for use at pressures above atmospheric are the rotary tube, the adjustable slip tube and the fixed length dip tube. Gauge glasses are not permitted to be installed on any cargo tank.

(b) **Fixed level indicators.** All liquid level gauging devices, except those on tanks provided with fixed maximum level indicators, shall be legibly and permanently marked in increments of not more than 20° F. to indicate the maximum levels to which the tank may be filled with liquid at temperatures above 20° F. In the event that it is impractical to put these markings on the gauging device, this information shall be marked on a suitable plate affixed to the tank in a location adjacent to the gauging device.

(c) **Dip tubes.** A fixed length dip tube gauging device, when used, shall consist of a dip pipe of small diameter equipped with a valve at the outer end, and extending into the tank to a specified fixed length. On horizontally-mounted cylindrical tanks, the fixed length to which the tube extends into the tank shall be such that the device will function to indicate when the liquid reaches the maximum level permitted by these regulations.

§ 178.342-7 Method of test. (a) **Test pressure.** The standard test pressure for each required test shall be 40 psig or a minimum of 1.5 times design pressure whichever is greater.

(b) **Method of test.** Every cargo tank shall be tested by complete filling (including domes if any) with water or other liquid having a similar viscosity and applying a pressure of not less than the standard test pressure specified in paragraph (a) of this subsection. The pressure shall be gauged at the top of the tank. The tank shall hold the prescribed pressure for at least 10 minutes. All tank accessories shall be leakage tested after installation and proved tight at not less than the design pressure of the tank, except that hose used on such tanks may be tested either before or after installation. Failure to successfully meet the test criteria shall be deemed evidence of failure to meet the requirements of this specification. Tanks failing to pass this test shall be suitably repaired. The suitability of the repair shall be determined by the same method of test.

(i) **When divided into compartments.** When the interior of the tank is divided into compartments, each compartment shall be tested as a separate tank with adjacent compartments empty and at atmospheric pressure.

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§ 178.343 Specification MC 312; cargo tanks.

§ 178.343-1 General requirements. (a) Specification MC 312 cargo tanks must comply with the general design and construction requirements in § 178.340 in addition to the specific requirements contained in this section.

(b) **Tank design.** Cargo tanks built under this specification that are unloaded by pressure in excess of 15 p.s.i.g. must be designed and constructed in accordance with and fulfill all requirements of the ASME Code. No tank shall have head, bulkhead, and baffle or shell thicknesses less than that specified in § 178.343-2, Tables I and II, nor shall the spacing of bulkheads, baffles or shell stiffeners exceed that specified in § 178.340-7.

(c) Design pressure shall be not less than pressure used for unloading.

§ 178.343-2 Thickness of shell, heads, bulkheads and baffles of non-ASME Code tanks. (a) **Material thickness.** The minimum thicknesses of tank material authorized in § 178.340-3 shall be predicated on not exceeding the maximum allowable stress level in § 178.340-4(a) but in no case less than those indicated in Tables I and II listed below, or the accompanying aluminum alloy formula:

TABLE I—MINIMUM THICKNESS OF HEADS, BULKHEADS, AND BAFFLES

(Mild Steel (MS), High Strength Low Alloy Steel (HSLA), Austenitic Stainless Steel (SS) in United States Standard Gauge—unless otherwise expressed in fractions of an inch)

	Volume Capacity in Gallons Per Inch											
	10 or less			Over 10 to 14			14 to 18			18 and Over		
	Product Weight in Pounds Per Gallon at 60° F.											
	15 lbs. and Less	Over 10 to 13 lbs.	13 lbs. to 18	10 lbs. and Less	Over 10 to 13 lbs.	13 lbs. to 16	10 lbs. and Less	Over 10 to 13 lbs.	13 lbs. to 16	10 lbs. and Less	Over 10 to 13 lbs.	13 lbs. to 16
Thickness	12	10	8	10	8	3/16	8	3/16	11	8	11	11

TABLE B—MINIMUM THICKNESS OF SHELL SHEETS

(Mild Steel (MS), High Strength Low Alloy Steel (HSLA), Austenitic Stainless Steel (SS) in United States Standard Gauge—unless otherwise expressed in fractions of an inch)

	Distance Between Bulkheads, Baffles or Ring Stiffeners	Volume Capacity in Gallons Per Inch											
		18 or less			Over 18 to 14			14 to 18			18 and Over		
		Product Weight in Pounds Per Gallon at 60° F.											
		10 lbs. and Less	Over 10 to 13 lbs.	13 lbs to 18	10 lbs. and Less	Over 10 to 13 lbs.	13 lbs to 18	10 lbs and Less	Over 10 to 13 lbs.	13 lbs to 18	10 lbs. and Less	Over 10 to 13 lbs.	13 lbs to 18
Less than 78°	36" or Less	12	10	8	12	10	8	12	10	8	10	8	3/16
	Over 36"-54"	12	10	8	12	10	8	10	8	3/16	9	3/16	1/4
	54" Thru 60"	12	10	8	10	8	3/16	9	3/16	1/4	8	1/4	1/4
78° or more Less than 90°	36" or Less	12	10	8	12	10	8	10	8	3/16	9	3/16	1/4
	36"-54"	12	10	8	10	8	3/16	9	3/16	1/4	8	1/4	1/4
	54" Thru 60"	10	8	3/16	9	3/16	1/4	8	1/4	1/4	3/16	1/4	5/16
90° or more Less than 125°	36" or Less	12	10	8	10	8	3/16	9	3/16	1/4	1/4	8	1/4
	36"-54"	10	8	3/16	9	3/16	1/4	8	1/4	1/4	3/16	1/4	5/16
	54" Thru 60"	9	3/16	1/4	8	1/4	1/4	3/16	1/4	1/4	3/16	1/4	5/16
125° or more	36" or Less	10	8	3/16	9	3/16	1/4	8	1/4	1/4	3/16	1/4	5/16
	36"-54"	9	3/16	1/4	8	1/4	1/4	3/16	1/4	5/16	3/16	1/4	5/16
	54" Thru 60"	8	1/4	1/4	3/16	1/4	5/16	3/16	1/4	5/16	1/4	5/16	3/8

$$\text{Thickness of Aluminum Alloy Materials} = \text{Thickness of Steel from Tables I \& II} \times \frac{3 \times 10^7}{E}$$

Where E = Modulus of Elasticity of the material to be used.

(b) Lining. Except as provided in paragraph (c) of this subsection, cargo tanks shall be lined and the material used for lining each cargo tank subject to this specification shall be homogenous, nonporous, imperforate when applied, not less elastic than the metal of the tank proper, and substantially immune to attack by the commodities to be transported therein. It shall be directly bonded or attached by other equally satisfactory means. Joints and seams in the lining shall be made by fusing the material together, or by other equally satisfactory means.

(c) Conditions under which tanks need not be lined. Tanks need not be lined as provided in paragraph (b) of this subsection, if:

(1) The material of the tank is substantially immune to attack by the materials to be transported therein; or,

(2) The material of the tank is thick enough to withstand 10 years normal service without being reduced at any point to less thickness than that specified in paragraph (a) of this subsection corresponding to its type; or,

(3) The chemical reaction between the material of the tank and the commodity to be transported therein is such as to allow the tank to be properly passivated or neutralized and if the tank is not frequently cleaned and not used in the transportation of other commodities.

§ 178.343-3 Closure for manholes. (a) Each compartment shall be accessible through a manhole conforming to paragraph UG-46(g)(1) of the ASME Code. The manhole cover shall be designed to provide a secure closure of the manhole. All joints between manhole covers and their seats shall be tight against leakage of vapor and liquid. Gaskets, if used, shall be of suitable material not subject to attack by lading.

(1) The manhole cover shall have structural capability of withstanding internal fluid pressures equal to one and one-half times the design pressure of the tank and in no case less than 15 psig without permanent deformation. Safety devices to prevent the manhole and or fill cover from opening fully when internal pressure is present shall be provided.

§ 178.343-4 Vents. (a) Safety vent. Every cargo tank compartment shall be equipped with suitable pressure relief devices as required by the ASME Code, or shall be fitted with suitable rupture discs in lieu of mechanical pressure relief valves. Such discs shall be designed to rupture at not to exceed one and one-half times the design pressure of the tank. If air inlet devices are provided a relief valve shall have adequate capacity to limit tank pressure to 130% of design pressure at maximum inlet flow rate. Such maximum limits to be included on the metal certification plate § 178.340-10(b) Air inlet lines if permanently connected to an air source shall be equipped with a check valve. Shut-off valves between the tank and relief valve or rupture disc are prohibited.

§ 178.343-5 Outlets. (a) Each outlet at or near the top of a tank, used for discharge of lading, must be equipped with a shutoff valve located as close as practical to the point of outlet from the tank. Each such outlet having its discharge end below the top liquid level in the tank must be equipped with an additional shutoff valve, blank flange, or sealing cap at the discharge end of the outlet.

(b) Except as provided in paragraphs (c) and (d), of this section; each bottom outlet must be equipped with a shutoff valve designed, installed, and protected as follows:

(1) Product piping must be protected in such a manner as to reasonably assure against the accidental escape of contents. Such protection must be provided by:

(i) A shear section located out-board of each valve seat and within 4 inches of the vessel which will break under strain and leave the valve seat and its attachment to the vessel and the valve head intact and capable of retaining product. The shear action shall be machined in such a manner as to abruptly reduce the wall thickness of the adjacent piping (or valve) material by at least 20 percent; or

(ii) By suitable guards capable of absorbing a concentrated horizontal force of at least 8,000 pounds applied from any horizontal direction, without damage to the discharge piping which will adversely affect the product retention integrity of the discharge valve.

(2) Each bottom outlet valve must be located inside the tank or immediately adjacent at the outlet point outside the tank.

(i) The valve seat must be located inside the tank or within the welded flange, its companion flange, nozzle, or coupling at the point of outlet from the tank.

(ii) Each bottom discharge valve must be equipped with a remote means to activate a valve closure manually from a point no less than 10 feet away.

(3) In addition, a blank flange, sealing cap, or shutoff valve is required at the discharge end of the outlet.

(c) A bottom opening for purposes other than lading discharge may be closed by a bolted blank flange at the tank shell. If any piping extends from such an opening, it must be fitted with a shutoff valve designed, installed, and protected as described in paragraph (b)(1) of this section. In addition a supplemental closure is required at the discharge end of this piping.

(d) Bottom outlet valves need not meet subparagraph (b)(2)(ii) of this section when the cargo tank is transporting a corrosive liquid containing solids in suspension in sufficient quantity that settling may form a layer of solid material that may interfere with seating of the valve seat.

§ 178.343-6 Gauging devices. (a) No applicable requirement.

§ 178.343-7 Method of test. (a) Test for leaks. Every cargo tank shall be tested by completely filling the tank and dome with water or other liquid having a similar viscosity, the temperature of which shall not exceed 100° F during the test, and applying a pressure of one and one-half times the design pressure but not less than 3 psig. The pressure shall be gauged at the top of the tank. The tank shall hold the prescribed pressure for at least ten minutes without failure, undue distortion, leakage or evidence of impending failure. All closures shall be in place while test is made. During these tests, operative relief devices shall be clamped, plugged or otherwise rendered inoperative; such clamps, plugs and similar devices shall be removed immediately after the test is finished.

(b) Test for distortion or failure. Every cargo tank shall be tested by the pressures prescribed in paragraph (a) of this subsection and shall withstand such pressures without undue distortion or other indication of

impending failure. If there is undue distortion, or if failure impends or occurs, the cargo tank shall not be placed in or returned to service unless an adequate repair is made. The adequacy of the repair shall be determined by the same method of test.

(c) Test of heating system. After an interior heating system consisting of coil piping is installed, and before the tanks to which they are fitted are placed in service, the heating system shall be tested. Systems employing media such as steam or hot water under pressure for heating the contents of cargo tanks shall be tested with hydrostatic pressure and proved to be tight at 200 psig.

SUBPART K

SPECIFICATIONS FOR GENERAL PACKAGINGS

§ 178.350 Specification 7A; general packaging Type A.

§ 178.350-1 General requirements. (a) Each packaging must meet all applicable requirements of § 173.24.

§ 178.350-2 Specific requirements. (a) Each packaging must be so designed and constructed that it meets the standards for Type A packaging (see §§ 173.403 and 173.465.

§ 178.350-3 Marking. (a) Marking on the outside of each packaging as follows: "USA DOT-7A Type A" and "Radioactive Material."

(b) The letter and number size and additional marking requirements of § 173.24 of this subchapter must be complied with.

APPENDICES TO PART 178

Appendix A—Specifications for Steel

Table 1

Open hearth, basic oxygen, or electric steel of uniform quality
The following chemical composition limits are based on ladle analysis

Designation	Chemical composition, percent ladle analysis		
	Grade 1[1]	Grade 2 [2,3]	Grade 3[2,4]
Carbon	0.10-0.20	0.24 maximum	0.22 maximum
Manganese	1.10-1.60	0.50-1.00	1.25 maximum
Phosphorus, maximum	0.04	0.04	0.045[5]
Sulfur, maximum	0.05	0.05	0.05
Silicon	0.15-0.30	0.30 maximum	
Copper, maximum	0.40		
Columbium		0.01-0.04	
Heat treatment authorized	(6)	(6)	(3)
Maximum stress (p.s.i.)	35,000	35,000	35,000

[1] Addition of other elements to obtain alloying effect is not authorized.
[2] Ferritic grain size 6 or finer according to ASTM E112-63.
[3] Any suitable heat treatment in excess of 1,100° F., except that liquid quenching is not permitted.
[4] Other alloying elements may be added and shall be reported.
[5] For compositions with a maximum carbon content of 0.15 percent on ladle analysis, the maximum limit for manganese on ladle analysis may be 1.40 percent.
[6] Rephosphorized Grade 3 steels containing no more than 0.15 percent phosphorus are permitted if carbon content does not exceed 0.15 percent and manganese does not exceed 1 percent.

Check Analysis Tolerances

A heat of steel made under any of the above grades, the ladle analysis of which is slightly out of the specified range, is acceptable if the check analysis is with the following variations:

Element	Limit or maximum specified (percent)	Tolerance (percent) over the maximum limit or under the minimum limit	
		Under minimum limit	Over maximum limit
Carbon	To 0.15 inclusive	0.02	0.03
	Over 0.15 to 0.40 inclusive	0.03	0.04
Manganese	To 0.60 inclusive	0.03	0.03
	Over 0.60 to 1.5 inclusive	0.04	0.04
	Over 1.15 to 2.50 inclusive	0.05	0.05
Phosphorus[7]	All ranges		0.01
Sulfur	All ranges		0.01
Silicon	To 0.30 inclusive	0.02	0.03
	Over 0.30 to 1.00 inclusive	0.05	0.05
Copper	To 1.00 inclusive	0.03	0.03
	Over 1.00 to 2.00 inclusive	0.05	0.05
Nickel	To 1.00 inclusive	0.03	0.03
	Over 1.00 to 2.00 inclusive	0.05	0.05
Chromium	To 0.90 inclusive	0.03	0.03
	Over 0.90 to 2.10 inclusive	0.05	0.05
Molybdenum	To 0.20 inclusive	0.01	0.01
	Over 0.20 to 0.40 inclusive	0.02	0.02
Zirconium	All ranges	0.01	0.05
Columbium	To 0.04 inclusive	0.005	0.01
Aluminum	Over 0.10 to 0.20 inclusive	0.04	0.04
	Over 0.20 to 0.30 inclusive	0.05	0.05

[7] Rephosphorized steels not subject to check analysis for phosphorus.

PART 179—SPECIFICATIONS FOR TANK CARS

SUBPART A

INTRODUCTION, APPROVALS AND REPORTS

§ 179.1 General. (a) This part prescribes the specifications for tanks that are to be mounted on or form part of a tank car and which are used for the transportation of hazardous materials in commerce.

(b) Except as provided in paragraph (c) of this section, tanks to which this part is applicable, must be built to the specifications prescribed in this part.

(c) Tanks built to specifications predating those in this part may continue in use as provided in §173.31 of this subchapter.

(d) Any person who performs a function prescribed in this part, shall perform that function in accordance with this part.

(e) When this part requires a tank to be marked with a DOT specification (for example, DOT-105A100W), compliance with that requirement is the responsibility of the tank builder. Marking the tank with the DOT specification shall be understood to certify compliance by the builder that the functions performed by the builder, as prescribed in this part, have been performed in compliance with this part.

(f) The tank builder should inform each person to whom that tank is transferred of any specification requirements which have not been met at time of transfer.

§ 179.2 Definitions and abbreviations. (a) The following apply in Part 179:

(1) "AAR" means Association of American Railroads.
(2) "Approved" means approval by the AAR Committee on Tank Cars.
(3) "ASTM" means American Society for Testing and Materials.
(4) "DOT" and "Department" means Department of Transportation.
(5) Definitions in Part 173 of this chapter also apply.
(6) "F" means degrees Fahrenheit.
(7) "NGT" means National Gas Taper Threads.
(8) "NPT" means American Standard Taper Pipe Thread.
(9) "Psi" means pounds per square inch gauge.
(10) "Tanks" means tank car tanks.

§ 179.3 Procedure for securing approval. (a) Application for approval of designs, materials and construction, conversion or alteration of tank car tanks under these specifications, complete with detailed prints, shall be submitted in prescribed form to the Secretary, Mechanical Division, AAR, for consideration by its Committee on Tank Cars and other appropriate committees. Approvals or rejections of applications, based on appropriate committee action, shall be issued by said Secretary.

(b) When, in the opinion of the Committee, such tanks or equipment therefor are in compliance with effective regulations and specifications of the Department, the application will be approved.

(c) When, in the opinion of the Committee, such tanks or equipment therefor are not in compliance with effective regulations and specifications of the Department, the Committee may recommend service trials to determine the merits of a change in specifications. Such service trials may be authorized by the Department under the terms of exemptions.

§ 179.4 Changes in specifications for tank cars. (a) Proposed changes in or additions to specifications for tanks shall be submitted to the Secretary, Mechanical Division, AAR, for consideration by its Committee on Tank Cars. An application for construction of tanks to any new specification may be submitted with proposed specification. Construction should not be started until the specification has been approved or exemptions has been issued. When proposing a new specification, the applicant shall furnish information to justify a new specification. This data should include the properties of the lading and the method of loading and unloading.

(b) The Subcommittee on Specifications of the Committee on Tank Cars shall review the proposed specifications at its earliest convenience and report its recommendations to the Committee on Tank Cars for prompt consideration. The Committee on Tank Cars shall report its recommendations through said Secretary to the Department; such reports may be submitted to the Bureau of Explosives for its recommendation before action by the Department. Expert opinion thus obtained will be given due consideration by the Department in determining appropriate action.

§ 179.5 Certificate of construction. (a) Except as provided in paragraph (b) of this section, before a tank car is placed in service, the party assembling the completed car shall furnish a Certificate of Construction, Form AAR 4-2 to the owner, the Bureau of Explosives (as required by §179.5(d)), and the Secretary, Mechanical Division, AAR, certifying that the tank, equipment, and car completed comply with all the requirements of the specification.

(b) Before a tank of Class DOT-106A, 107A, or 110A is placed in service, the builder must furnish a Certificate of Construction, Form AAR 4-2 to the owner, the Bureau of Explosives (as required by paragraph (d) of this section), and the Secretary, Mechanical Division, AAR, in addition to a Certificate of Inspector's Report as required in §179.300-20 and §179.500-18 in prescribed form certifying that the tank and appurtenances comply with all the requirements of the specifications.

(c) If the owner elects to furnish the appurtenances such as valves and safety devices, the owner shall furnish to the Bureau of Explosives, and to the Secretary, Mechanical Division, AAR, a report in prescribed form, certifying that the appurtenances comply with all the requirements of the specifications.

(d) When cars or tanks which are covered on one application and are identical in all details are built in series, one certificate shall suffice for each series when submitted to the Secretary. One copy of the Certificate of Construction must be furnished to the Bureau of Explosives for each car number of consecutively numbered group or groups covered by the original application.

§ 179.6 Repairs and alterations. For procedure to be followed in making repairs or alterations, see Appendix R of the AAR Specifications for Tank Cars.

[1] Use of existing tank cars authorized, but new construction not authorized.

SUBPART B

GENERAL DESIGN REQUIREMENTS

§ 179.10 Tank mounting. (a) The manner in which tanks are attached to the car structure shall be approved. The use of rivets to secure anchors to tanks prohibited.

§ 179.11 Welding certification. (a) Welding procedures, welders and fabricators shall be approved.

§ 179.12 Interior heater systems.

§ 179.12-1 General. (a) Interior heater systems shall be of approved design and materials. If a tank is divided into compartments, a separate system shall be provided for each compartment.

§ 179.12-2 Materials and dimensions. (a) Interior heater systems and plug flanges, if welded to tank or dome, shall be cast, forged or fabricated metal, and be of good weldable quality in conjunction with metal of tank or dome.

(b) Piping must be not less than 2 inches IPS. Tubing must be not less than 2⅜ inches outside diameter and the wall thickness must be at least equivalent to the corresponding pipe size. Material specifications and nominal wall thickness must be as follows:

Material	Nominal thickness minimum[1]		Specifications ASTM
	2 inches	Over 2 inches	
Carbon steel	0.175	Schedule 40	A-53-69a, A-192-69, A-178-70
Alloy steel	Schedule 40S	Schedule 40S	A-312-70, A-269-69
Aluminum	Schedule 80	Schedule 80	B-241-69, B-210-70, B-221-69
Nickel	Schedule 40	Schedule 40	B-161-70

[1] Thickness must be increased 25 percent or to next higher schedule, whichever is less, when threaded joints are used.

(c) Systems may be fabricated of other materials and of other than circular cross section, if approved.

§ 179.12-3 Joints and fittings. (a) Welded butt joints are preferable. Bolted joints with flange welded to piping may be used if welding is not feasible or to facilitate tank cleaning or application of linings. Return bends shall be forged or made by bending the pipe. Cast, forged or fabricated manifolds of approved design may be used.

(b) Inlets and outlets of heater systems shall be equipped with valve cock, cap or plug. Caps and plugs shall be secured by chain.

§ 179.12-4 Application to tank. (a) Interior heater systems shall be so constructed that the breaking off of their external connections will not cause leakage of contents of tank.

(b) Inlets and outlets may be located in any portion of dome, shell, heads, or stream jacketed outlet provided proper drainage of heater system is accomplished.

(c) If ends of coils are not attached to a manifold or steam jacketed outlet, they shall be attached to pads or reinforcements. Such reinforcements must be attached to tank in compliance with the requirements of the tank specification.

(1) Outside pipe connections to steam coils shall not be an integral part of the interior coils and shall be screwed or welded, or both, into outside of pads or reinforcements.

(d) All piping shall be secured so as to permit necessary expansion and contraction.

§ 179.12-5 Tests. (a) Each interior heater system shall be hydrostatically tested at not less than 200 psi. and shall hold the pressure for 10 minutes without leakage or evidence of distress.

§ 179.12-6 Reports. (a) The Certificate of Construction for the completed car shall indicate installation of interior heater system and date of initial hydrostatic test.

§ 179.12-7 Stenciling. (a) To indicate that tank is equipped with interior heater system, the tank, or the jacket if tank is insulated, shall be stenciled in compliance with the applicable requirements of AAR Specifications for Tank Cars, Appendix C.

§ 179.13 Tank car capacity and gross weight limitation. Tank cars built after November 30, 1970, must not exceed 34,500 gallons capacity or 263,000 pounds gross weight on rail. Existing tank cars may not be converted to exceed 34,500 gallons capacity or 263,000 pounds gross weight on rail.

§ 179.14 Tank car couplers. (a) All tank cars built after January 1, 1971, must be equipped with interlocking automatic couplers that will resist car telescoping and jackknifing in derailments and in emergency stops, and that have been approved by the Federal Railroad Administrator.

(1) Effective November 9, 1977, couplers designated by the Association of American Railroads Catalog Nos. SE60CHT, SE60CHTE, SF70CHT and SF70CHTE are approved.

(2) Effective January 1, 1978, couplers designated by the Association of American Railroads' Catalog Nos. SE67BHT, SE67BHTE, SE68BHT, SE68BHTE, SF73AHT, SF73AHTE, SF79CHT, and SF79CHTE are approved.

SUBPART C

SPECIFICATIONS FOR PRESSURE TANK CAR TANKS (CLASSES DOT-105, 109, 112, AND 114)

§ 179.100 General specifications applicable to pressure tank car tanks.

§ 179.100-1 Tanks built under these specifications shall comply with the requirements of § 179.100, § 179.101, and when applicable, §§ 179.102, 179.103, and 179.104.

§ 179.100-2 Approval. (a) For procedure for securing approval see § 179 3.

§ 179.100-3 Type. (a) Tanks built under this specification shall be fusion-welded with heads designed convex outward. Except as provided in § 179.103 or 179.104, they shall be circular in cross section, shall be provided with a manway nozzle on top of the tank of sufficient size to permit access to the interior, a manway cover to provide for the mounting of all valves, measuring and sampling devices, and a protective housing. Other openings in the tank are prohibited, except as provided in Part 173 of this chapter, §§ 179.100-14, 179.101-1(a) Table Note 10, 179.102 or 179.103.

§ 179.100-4 Insulation. (a) If insulation is applied, the tank shell and manway nozzle must be insulated with an approved material. The entire insulation must be covered with a metal jacket of a thickness not less than 11 gage (0.1196 inch) nominal (Manufacturers' Standard Gage) and flashed around all openings so as to be weathertight. The exterior surface of a carbon steel tank, and the inside surface of a carbon steel jacket must be given a protective coating except that a protective coating is not required when foam-in-place insulation that adheres to the tank or jacket is applied.

(b) If insulation is a specification requirement, it shall be of sufficient thickness so that the thermal conductance at 60° F. is not more than 0.075 Btu. per hour, per square foot, per degree F. temperature differential. If exterior heaters are attached to tank, the thickness of the insulation over each heater element may be reduced to one-half that required for the shell.

§ 179.100-5 Bursting pressure. (a) The minimum required bursting pressure is listed in § 179.101.

§ 179.100-6 Thickness of plate. (a) The wall thickness after forming of the tank shell and heads must not be less than that specified in § 179.101, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:

d = inside diameter in inches

E = 1.0 welded joint efficiency, except for heads with seams = 0.9;

P = Minimum required bursting pressure in p.s.i.;

S = Minimum tensile strength of plate material in p.s.i., as prescribed in § 179.100-7;

t = Minimum thickness of plate in inches after forming.

(b) If plates are clad with material having tensile strength properties at least equal to the base plate, the cladding may be considered a part of the base plate when determining thickness. If cladding material does not have tensile strength at least equal to the base plate, the base plate alone shall meet the thickness requirement.

(c) When aluminum plate is used, the minimum width of bottom sheet of tank shall be 60 inches, measured on the arc, but in all cases the width shall be sufficient to bring the entire width of the longitudinal welded joint, including welds, above the bolster.

§ 179.100-7 Materials. (a) Steel plate: Steel plate materials used to fabricate tank shell and manway nozzle must comply with one of the following specifications with the indicated minimum tensile strength and elongation in the welded condition. The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon greater than this amount. The plates may be clad with other approved materials.

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 515-70, Gr. 55	55,000	28
ASTM A 515-70, Gr. 60	60,000	25
ASTM A 515-70, Gr. 65	65,000	20
ASTM A 515-70, Gr. 70	70,000	20
ASTM A 285-70a, Gr. A	45,000	29
ASTM A 285-70a, Gr. B	50,000	20
ASTM A 285-70a, Gr. C	55,000	20
ASTM A 516-70a, Gr. 55	55,000	28
ASTM A 516-70a, Gr. 60	60,000	25
ASTM A 516-70a, Gr. 65	65,000	20
ASTM A 516-70a, Gr. 70	70,000	20
AAR TC128-70, Gr. A and B	81,000	19
ASTM A 537-80, Class 1	70,000	23
ASTM A 302-70a, Gr. B	80,000	20

[1] Maximum stresses to be used in calculations.

(b) Aluminum alloy plate: Aluminum alloy plate material used to fabricate tank shell and manway nozzle must be suitable for fusion welding and must comply with one of the following specifications with its indicated minimum tensile strength and elongation in the welded condition.

Specifications	Minimum tensile strength (p.s.i.) 0 temper, welded condition[2][3]	Minimum elongation in 2 inches (percent) 0 temper, welded condition (longitudinal)
ASTM B 209-70, Alloy 5052[1] ...	25,000	18
ASTM B 209-70, Alloy 5083[2] ...	38,000	16
ASTM B 209-70, Alloy 5086[1] ...	35,000	14
ASTM B 209-70, Alloy 5154[1] ...	30,000	18
ASTM B 209-70, Alloy 5254[1] ...	30,000	18
ASTM B 209-70, Alloy 5454[1] ...	31,000	18
ASTM B 209-70, Alloy 5652[1] ...	25,000	18
ASTM B 209-70, Alloy 6061[4] ...	[5] 24,000	[5] 5

[1] For fabrication, the parent plate material may be 0, H112, or H32 temper, but design calculations must be based on minimum tensile strength shown.
[2] 0 temper only.
[3] Weld filler metal 5556 must not be used.
[4] Not authorized for tank shells, manways or domes.
[5] T6 temper only.
[6] Maximum stress to be used in calculations.

(c) All attachments welded to tank shell must be of approved material which is suitable for welding to the tank.

§ 179.100-8 Tank heads. (a) The tank head shape shall be an ellipsoid of revolution in which the major axis shall equal the diameter of the shell adjacent to the head and the minor axis shall be one-half the major axis.

(b) Each tank head made from steel which is required to be "fine grain" by the material specification, which is hot formed at a temperature exceeding 1700° F., must be normalized after forming by heating to a temperature between 1550° and 1700° F. by holding at that temperature for at least 1 hour per inch of thickness (30-minute minimum), and then by cooling in air. If the material specification requires quenching and tempering, the treatment specified in that specification must be used instead of the one specified above.

§ 179.100-9 Welding. (a) All joints shall be fusion-welded in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W. Welding procedures, welders and fabricators shall be approved. Also see § 179.104.

§ 179.100-10 Postweld heat treatment. (a) After welding is complete, steel tanks and all attachments welded thereto must be postweld heat treated as a unit in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W.

(b) For aluminum tanks, postweld heat treatment is prohibited.

§ 179.100-11 Tank mounting. (a) See §§ 179.10 and 179.104-3.

§ 179.100-12 Manway nozzle, cover and protective housing. (a) Manway nozzles must be of approved design of forged or rolled steel for steel tanks or of fabricated aluminum alloy for aluminum tanks, with access opening at least 18 inches inside diameter, or at least 14 inches by 18 inches around or oval. Nozzle must be welded to the tank and the opening reinforced in an approved manner in compliance with the requirements of AAR Specifications for Tank Cars, Appendix E, Figure E-10.

(b) Manway cover shall be machined to approved dimensions and be of forged or rolled carbon or alloy steel, rolled aluminum alloy or nickel when required by the lading. Minimum thickness is listed in § 179.101. Manway cover shall be attached to manway nozzle by through or stud bolts not entering tank, except as provided in § 179.103-2(a).

(c) Except as provided in § 179.103, protective housing of cast, forged or fabricated approved material must be bolted to manway cover with not less than twenty ¾-inch studs. The shearing value of the bolts attaching protective housing to manway cover must not exceed 70 percent of the shearing value of bolts attaching manway cover to manway nozzle. Housing must have steel sidewalls not less than three-fourths inch in thickness and must be equipped with a metal cover not less than one-fourth inch in thickness that can be securely closed. Housing cover must have suitable stop to prevent cover striking loading and unloading connections and be hinged on one side only with approved riveted pin or rod with nuts and cotters. Openings in wall of housing must be equipped with screw plugs or other closures.

§ 179.100-13 Venting, loading and unloading valves, measuring and sampling devices. (a) Venting, loading and unloading valves shall be of approved design, made of metal not subject to rapid deterioration by the lading, and must withstand the tank test pressure without leakage. The valves shall be bolted to seatings on the manway cover, except as provided in § 179.103. Valve outlets shall be closed with approved screw plugs or other closures fastened to prevent misplacement.

(b) The interior pipes of the loading and unloading valves shall be anchored and, except as prescribed in § 179.102, or § 179.103, may be equipped with excess flow valves of approved design.

(c) Gaging device, sampling valve and thermometer well are not specification requirements. When used, they shall be of approved design, made of metal not subject to rapid deterioration by the lading, and shall withstand the tank test pressure without leakage. Interior pipes of the gaging device and sampling valve, except as prescribed in § 179.102, or § 179.103, may be equipped with excess flow valves of approved design. Interior pipe of the thermometer well shall be anchored in an approved manner to prevent breakage due to vibration. The thermometer well shall be closed by an approved valve attached close to the manway cover, or other approved location, and closed by a screw plug. Other approved arrangements that permit testing thermometer well for leaks without complete removal of the closure may be used.

(d) An excess flow valve as referred to in this specification, is a device which closes automatically against the outward flow of the contents of the tank such as may be encountered in case the external closure valve is broken off or removed during transit. Excess flow valves may be designed with a by-pass to allow the equalization of pressures.

(e) Bottom of tank shell may be equipped with a sump or siphon bowl, or both, welded or pressed into the shell. Such sumps or siphon bowls, if applied, are not limited in size and must be made of cast, forged or fabricated metal. Each sump or siphon bowl must be of good welding quality in conjunction with the metal of the tank shell. When the sump or siphon bowl is pressed in the bottom of the tank shell, the wall thickness of the pressed section must not be less than that specified for the shell. The section of a circular cross section tank to which a sump or siphon bowl is attached need not comply with the out-of-roundness requirement specified in AAR Specifications for Tank Cars, Appendix W, W14.06. Any portion of a sump or siphon bowl not forming a part of cylinder of revolution must have walls of such thickness and be so reinforced that the stresses in the walls caused by a given internal pressure are no greater than the circumferential stress which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with § 179.100-6(a). In no case less than that specified in § 179.101-1(a).

§ 179.100-14 Bottom outlets. (a) Bottom outlets for discharge of lading is prohibited, except as provided in § 179.103-3. If indicated in § 179.101, tank may be equipped with a bottom washout of approved construction. If applied, bottom washout shall be in accordance with the following requirements:

(1) The extreme projection of the bottom washout equipment may not be more than that allowed by Appendix E of the AAR Specifications for Tank Cars.

(2) Bottom washout shall be of cast, forged or fabricated metal and shall be fusion-welded to the tank. It shall be of good weldable quality in conjunction with metal of tank.

(3) If the bottom washout nozzle extends 6 inches or more from shell of tank, a V-shaped breakage groove shall be cut (not cast) in the upper part of the outlet nozzle at a point immediately below the lowest part of the inside closure seat or plug. In no case may the nozzle wall thickness at the root of the "V" be more than ¼-inch. Where the nozzle is not a single piece, provision shall be made for the equivalent of the breakage groove. The nozzle must be of a thickness to insure that accidental breakage will occur at or below the "V" groove or its equivalent. On cars without continuous center sills, the breakage groove or its equivalent may not be more than 15 inches below the tank shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(4) The closure plug and seal shall be readily accessible or removable for repairs.

(5) The closure of the washout nozzle must be equipped with a ¾-inch solid screw plug. Plug must be attached by at least a ¼-inch chain.

(6) Joints between closures and their seats may be gasketed with suitable material.

§ 179.100-15 Safety relief valves. (a) The tank must be equipped with one or more safety relief valves of approved design, made of metal not subject to rapid deterioration by the lading. The safety relief valve, or valves, must be mounted on manway cover, except as provided in § 179.103. The total valve discharge capacity must be sufficient to prevent building up pressure in tank in excess of 82½ percent of the tank test pressure or 10 p.s.i. above the start-to-discharge pressure, whichever is higher. The start-to-discharge and vapor-tight pressures must comply with § 179.101 and must not be affected by any auxiliary closure or other combination. For certain commodities, alternate pressures are permitted (see § 179.102-11). See AAR Specifications for Tank Cars, Appendix A, for formula for calculating discharge capacity.

(b) When a safety relief valve is used in combination with a breaking pin device, the breaking pin device must be designed to fail at a pressure

[1] The use of existing tanks authorized but new construction not authorized.

of 75 percent of the tank test pressure and safety relief valve must be set for a start-to-discharge pressure of 71 percent of the tank test pressure. However, for spec. DOT-105A500-W tanks, the start-to-discharge pressure must be 360 p.s.i. For certain commodities, alternate pressures are permitted (see § 179.102-11).

(c) When a safety relief valve is used in combination with a frangible disc, the frangible disc must be designed to burst at a pressure of 75 percent of the tank test pressure and the safety relief valve must be set for a start-to-discharge pressure of 71 percent of the tank test pressure, as prescribed in § 179.101. Provisions must be made to prevent any accumulation of pressure between the frangible disc and safety relief valve. For certain commodities, alternate pressures are permitted (see § 179.102-11).

§ 179.100-16 Attachments. (a) Reinforcing pads must be used between external brackets and shells if the attachment welds exceed 6 linear inches of ¼-inch fillet or equivalent weld per bracket or bracket leg. When reinforcing pads are used, they must not be less than one-fourth inch in thickness, have each corner rounded to a 1 inch minimum radius, and be attached to the tank by continuous fillet welds except for venting provisions. The ultimate shear strength of the bracket-to-reinforcing pad weld must not exceed 85 percent of the ultimate shear strength of the reinforcing pad-to-tank weld.

§ 179.100-17 Closures for openings. (a) Closures shall be of approved design and made of metal not subject to rapid deterioration by the lading. Plugs, if used, shall be solid, with NPT threads, and shall be of a length which will screw at least six threads inside the face of fitting or tank.

§ 179.100-18 Tests of tanks. (a) Each tank shall be tested by completely filling tank and manway nozzle with water or other liquid having similar viscosity, at a temperature which shall not exceed 100° F. during the test, and applying the pressure prescribed in § 179.101. The tank shall hold the prescribed pressure for at least 10 minutes without leakage or evidence of distress.

(b) Insulated tanks shall be tested before insulation is applied.

(c) Caulking of welded joints to stop leaks developed during the foregoing test is prohibited. Repairs in welded joints shall be made as prescribed in AAR Specifications for Tank Cars, Appendix W.

(d) Testing of exterior heaters is not a specification requirement.

§ 179.100-19 Tests of safety relief valves. (a) Each valve shall be tested by air or gas for compliance with § 179.101 before being put into service.

§ 179.100-20 Stamping. (a) To certify that the tank complies with all specification requirements, each tank shall be plainly and permanently stamped in letters and figures at least ⅜ inch high into the metal near the center of both outside heads as follows:

	Example of required stamping
SPECIFICATION	DOT-105A100-W
MATERIAL	ASTM A515-70
CLADDING MATERIAL (if any)	ASTM A240-304 Clad
TANK BUILDERS INITIALS	ABC
DATE OF ORIGINAL TEST	00-0000
CAR ASSEMBLER (if other than tank builder)	DEF
WATER CAPACITY	00000 LBS.

§ 179.100-21 Stenciling. (a) The tank or the jacket if tank is insulated, shall be stenciled in compliance with the requirements of AAR Specifications for Tank Cars, Appendix C.

(b) Water capacity stencil is required.

§ 179.100-22 Certificate of construction. (a) See § 179.5.

§ 179.100-23 Alternative requirements for tank head puncture resistance systems. (a) Tank cars required to have puncture resistance systems in accordance with § 179.105-5 may, as an alternative, be equipped with a head shield at each end of the car in accordance with the requirements of this section. The shield must be:

(1) At least ½-inch thick, and made from steel produced in accordance with specifications ASTM A242, A572-GR50, A515-70, A516-GR70, or AAR TC-128B.

(2) In the shape and size of the lower half of the head of the tank car or in the shape of a trapezoid with the following dimensions:

(i) A minimum width at the top of the center sill of four feet six inches, measured in a straight line between extreme edges;

(ii) A minimum width at the top of shield of nine feet measured in a straight line between the extreme edges; (For cars with diameters less than nine feet, the width of the head shield must not extend beyond outermost portion of the head and be not less than three inches from the outermost point of the head.)

(iii) The top corners of the shield rounded to a minimum radius of 9 inches;

(iv) The bottom corners of the shield rounded to a minimum radius of 3 inches;

(v) All inside edges of the shield chamfered to a minimum of ⅛-inch;

(vi) A minimum height of four feet six inches, and

(vii) Located so that the bottom of the shield touches the top of the center sill.

(3) Shaped to the contour of the tank shell head, utilizing a minimum of three vertical bend lines; and

(4) The head protection device must meet the impact test requirements of paragraph AAR. 24-5 in the "Specifications for Tank Cars" Standard, effective October 1, 1972. The impact test acceptance criterion is that the device and its supporting structure does not sustain visible permanent damage or deformation such as fractures, cracks, bends and dents. The object of this requirement is to assure that the head shield has adequate strength to remain attached and functionally unimpaired during normal operations.

The head protection device must meet all of the workmanship requirements of the "AAR Specifications for Design, Fabrication and Construction of Freight Cars, dated September 1, 1964."

§ 179.101 Individual specification requirements applicable to pressure tank car tanks.

§ 179.101-1 Individual specification requirements. (a) In addition to § 179.100 the individual specification requirements are as follows:

DOT SPECIFICATION	105A100ALW	105A100W	105A200ALW	105A200F	105A200W	105A300ALW	105A300W	105A400W	105A500W	105A600W
Material (see 179.100-7)	Al alloy	Steel	Al alloy	Steel	Steel	Al alloy	Steel	Steel	Steel	Steel
Insulation (see 179.100-4)	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required
Bursting pressure, p.s.i. (see 179.100-5)	500	500	500	.....	500	750	750	1,000	1,250	1,500
Minimum plate thickness, inches, shell and heads	7/16	9/16[2,3]	7/16	9/16[3]	9/16[3,1]	7/16	11/16[1]	11/16[1]	11/16[1]	11/16[1]
Test pressure, p.s.i. (see 179.100-18)	100	100	200	See 179.104	200	300	300	400	500	600
Safety relief valves, p.s.i.:[6]										
Start-to-discharge pressure, p.s.i.	75	75	150	150	150	225	225	300	375	450
Start-to-discharge tolerance, p.s.i.	±3.0	±3.0	±4.5	±4.5	±4.5	±6.75	±6.75	±9.0	±11.25	±13.5
Vapor tight (minimum) pressure, p.s.i.	60	60	120	120	120	180	180	240	300	360
Valve flow rating pressure (maximum p.s.i.)	85	85	165	165	165	247.5	247.5	330	412.5	495
Manway cover, thickness, inches (minimum)	2 1/2[4]	2 1/2	2 1/2[4]	2 1/4	2 1/4	2 3/4[4]	2 1/4[5]	2 1/4[5]	2 1/4	2 1/4
Special references	179.102-3	179.102-3	179.102-3	179.102-3	179.102-3	179.102-3	179.102-2	179.102-3	179.102-1	179.102-1
	.....	179.102-6	.....	179.102-17	179.102-6	.....	179.102-3	179.102-17	179.102-2	179.102-3
	.....	179.102-12	.....	179.104	179.102-17	.....	179.102-5	.....	179.102-3	179.102-4
	.....	179.102-17	.....	.....	.....	.....	179.102-6	.....	179.102-9	179.102-9
	.....	179.102-20	.....	.....	.....	.....	179.102-7	.....	179.102-10	179.102-10
	.....	.....	.....	.....	.....	.....	179.102-8	.....	179.102-14	179.102-17
	.....	.....	.....	.....	.....	.....	179.102-11	.....	.....	.....
	.....	.....	.....	.....	.....	.....	179.102-13	.....	.....	.....
	.....	.....	.....	.....	.....	.....	179.102-15	.....	.....	.....
	.....	.....	.....	.....	.....	.....	179.102-16	.....	.....	.....
	.....	.....	.....	.....	.....	.....	179.102-17	.....	.....	.....
Bottom washout	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

DOT SPECIFICATION	106A100ALW	106A200ALW	106A300ALW	106A300W	112A200W[12]	112A340W[12]	112A400F[11,12]	112A400W[12]	112A500W[12]	114A340W[12]	114A400W[12]
Material (see 179.100-7)	Al alloy	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Insulation (see 179.100-4)	Optional	Optional	Optional	Optional	None[4]	None[4]	.....	None[4]	None[4]	None[4]	None[4]
Bursting pressure, p.s.i. (see 179.100-5)	500	500	750	750	500	650	.....	1,000	1,250	850	1,000
Minimum plate thickness, inches, shell and heads	7/16	7/16	7/16	11/16[1]	9/16[3,9,1]	11/16[1]	.....	11/16[1]	11/16[1]	11/16[1]	11/16[1]
Test pressure, p.s.i. (see 179.100-18)	100	200	300	300	200	340	.....	400	500	340	400
Safety relief valves, p.s.i.:[6]											
Start-to-discharge pressure, p.s.i.	75	150	225	225	150	255	.....	300	375	255	300
Start-to-discharge tolerance, p.s.i.	±3.0	±4.5	±6.75	±6.75	±4.5	±7.65	.....	±9.0	±11.25	±7.65	±9.0
Vapor tight (minimum) pressure, p.s.i.	60	120	180	180	120	204	.....	240	300	204	240
Valve flow rating pressure (maximum p.s.i.)	85	165	247.5	247.5	165	280.5	.....	330	412.5	280.5	330
Manway cover, thickness, inches (minimum)	2 1/2[4]	2 1/2[4]	2 3/4[4]	2 1/4	2 1/4	2 1/4	.....	2 1/4	2 1/4	(7)	(7)
Special references	.....	.....	.....	.....	179.102-3[10]	179.102-3[10]	.....	179.102-3[10]	179.102-3[10]	179.102-11	179.102-11
	.....	.....	.....	.....	179.102-17	179.102-11	.....	179.102-6	179.102-17	179.102-17	179.102-13
	.....	.....	.....	.....	.....	179.102-17	.....	179.102-11	.....	179.103	179.102-17
	.....	.....	.....	.....	.....	.....	.....	179.102-13	.....	.....	179.103
	.....	.....	.....	.....	.....	.....	.....	179.102-17	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
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	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bottom washout	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional

[1] When steel of 65,000 to 81,000 p.s.i. minimum tensile strength is used, the thickness of plates shall be not less than 7/16 inch, and when steel of 81,000 p.s.i. minimum tensile strength is used, the minimum thickness of plate shall be not less than 11/16 inch.

[2] When approved material other than aluminum alloys are used, the thickness shall be not less than 2 1/4 inches.

[3] When steel of 65,000 p.s.i. minimum tensile strength is used, minimum thickness of plates shall be not less than 1/2 inch.

[4] At least the upper two-thirds of the exterior of the tank manway nozzle and all appurtenances in contact with the area of the tank shall have a finish coat of white paint; except that tanks used for hydrogen fluoride may have a dark colored band not exceeding 14 feet wide around the center of the tank in the top platform and fitting area.

[5] For inside diameter of 87 inches or less, the thickness of plates shall be not less than 1/2 inch.

[6] See 179.102-11 for optional setting for certain commodities.

[7] See AAR specifications for tank cars, appendix E, E4.01 and 179.103-2.

[8] Purposely left blank.

[9] When the use of nickel is required by the lading, the thickness shall not be less than 2 inches.

[10] Each tank head may be equipped with not more than one opening for use in purging tank interior.

[11] Tanks converted to DOT-112A400F from existing forge-welded specification DOT-105A500 tanks by modification using conversion details complying with DOT-112A400W specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

[12] When tank car head shields meeting the requirements of § 179.100 have been applied, an "S" must be substituted for the "A" in the specification marking.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 179.102 Special commodity requirements for pressure tank car tanks. (a) In addition to §§179.100 and 179.101 the following requirements are applicable:

§ 179.102-1 Carbon dioxide, refrigerated liquid. (a) Tank cars used to transport carbon dioxide, refrigerated liquid must comply with the following special requirements:

(1) All plates for tank, manway nozzle and anchorage of tanks must be made of carbon steel complying with ASTM Specification A516-79b, Grades 55, 60, 65, or 70, or AAR Specification TC128-78, Grade B. The ASTM A516 plate must also meet the Charpy V-Notch test requirements of ASTM A20-79b (see Table 16) in the longitudinal direction of rolling. The TC128 plate must also meet the Charpy V-Notch energy absorption requirements of 15 ft-lb minimum average for 3 specimens and 10 ft-lb minimum for one specimen at minus 50° F in the longitudinal direction of rolling in accord with ASTM Specification A370-77. Production-welded test plates prepared as required by W4.00 of AAR Specifications for Tank Cars, Appendix W, must include impact test specimens of weld metal and heat-affected zone. As an alternate, anchor legs may be fabricated of stainless steel, ASTM Specification A240-79 Types 304, 304L, 316 or 316L for which impact tests are not required.

(2) Tank shall be insulated with an approved material of sufficient thickness so that the thermal conductance at 60° F is not more than 0.03 Btu per hour per square foot per degree F. temperature differential; except that in order to permit an anchorage which shall not exceed seven inches from top of center sills to bottom of tank, the insulation thickness directly over the sills may be reduced to give thermal conductance not exceeding 0.04 Btu per hour per square foot per degree F. temperature differential.

(3) Tank shall be equipped with one safety relief valve set for the start-to-discharge pressure listed in §179.101, and one safety vent of approved design, set to function at a pressure less than the tank test pressure, and not less than 75 percent of tank test pressure. The discharge capacity of each of these safety relief devices shall be sufficient to prevent building up pressure in tank in excess of 82½ percent of the tank test pressure.

(4) Tank shall be equipped with two pressure-regulating valves of approved design, set to open at a pressure not exceeding 350 psi. on spec. 105A500-W tanks or 400 psi. on spec. 105A600-W tanks.

(5) Each regulating valve and safety relief device shall have its final discharge piped to the outside of the protective housing.

(6) Tank anchor-to-tank shell fillets welds must be examined by a suitable nondestructive testing method to ensure that welds are free from cracks or other detrimental defects.

§ 179.102-2 Chlorine. (a) Each tank car used to transport chlorine must comply with all of the following:

(1) Each tank must be constructed in compliance with spec. DOT-105A500W. A tank car must be operated and the jacket stenciled either DOT-105A300W or DOT105A500W, and each tank must be equipped with the safety relief valve required by the stenciled specification.

(2) Interior pipes of liquid discharge valves must be equipped with excess flow valves of approved design.

(3) Insulation must be 4 inches minimum thickness of corkboard or of polyurethane foam or must be 2 inches minimum thickness of 4 pounds per cubic foot minimum density ceramic fiber covered by 2 inches minimum thickness of glass fiber.

(4) Tanks must be fabricated from carbon steel complying with ASTM Specification A-516-70a Grade 70, or AAR Specification TC-128-70, Grade A or B.

§ 179.102-3 Liquefied flammable gases. (a) Any authorized tank car used to transport liquefied flammable gases must comply with the following special requirements.

(1) The interior pipes of the loading and unloading valves and sampling valves, also the gaging device when it provides a means for passage of the lading from the interior to the exterior of the tank, must be equipped with excess flow valves of an approved design. If the opening for passage of lading through the gaging device is not more than 0.060-inch diameter, an excess flow valve is not required.

(2) The protective housing cover must be provided with an opening above each safety relief valve which must be concentric with the discharge of the valve and have an area at least equal to the valve outlet area. Each opening must be provided with a weatherproof cover designed for vertical discharge.

(3) Gaskets for manway cover plates and for mounting of fittings must be asbestos type or approved high-temperature resistant equivalent.

§ 179.102-4 Vinyl fluoride, inhibited.

Each tank used to transport vinyl fluoride, inhibited, must comply with the following special requirements:

(a) The tank must conform with specification DOT-105A600W and must be designed for loading at minus 50° F. or colder. After December 31, 1986, each tank built before September 1, 1981, having a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons and used for the transportation of vinyl fluoride, inhibited must conform to class DOT-105J.

(b) All plates for the tank must be fabricated of material listed in paragraph (b)(2) of this section, and appurtenances must be fabricated of material listed in paragraph (b)(1) or (b)(2) of this section.

(1) Stainless steel, ASTM Specification A240, Type 304, 304L, 316 or 316L, in which case impact tests are not required, or

(2) Steel complying with ASTM Specification A516, Grade 70; ASTM Specification A537, Class 1; or AAR Specification TC128, Grade B, in which case impact tests must be performed as follows:

(i) ASTM Specification A516 and A537 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling, of ASTM Specification A20.

(ii) AAR Specification TC128 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling, of 15 ft. lb. minimum average for 3 specimens, with a 10 ft. lb. minimum for any one specimen, at minus 50° F. or colder, in accordance with ASTM Specification A370.

(iii) Production welded test plates must—

(A) Be prepared in accordance with AAR Specifications for Tank Cars, Appendix W, W4.00;

(B) Include impact specimens of weld metal and heat affected zone prepared and tested in accordance with AAR Specifications for Tank Cars, Appendix W, W9.00; and

(C) Meet the same impact requirements as the plate material.

(c) Insulation must be of approved material.

(d) The tank must be equipped with at least one safety relief valve, set for the start-to-discharge pressure listed in §179.101-1. The discharge capacity of each safety relief device must be sufficient to prevent the build up of pressure in the tank in excess of 82½ percent of the tank test pressure. The discharge from each safety relief device must be directed outside the protective housing.

(e) Excess flow valves must be installed under all liquid and vapor valves, except safety relief valves.

(f) A thermometer well may be installed.

(g) Only an approved gaging device may be installed.

(h) A pressure gage may be installed.

(i) Aluminum, copper, silver, zinc, or an alloy containing any of these metals may not be used in the tank construction, or in fittings in contact with the lading.

(j) The jacket must be stenciled, adjacent to the water capacity stencil, "MINIMUM OPERATING TEMPERATURE——° F."

(k) The tank car and insulation must be designed to prevent the vapor pressure of the lading from increasing from the pressure at the maximum allowable filling density to the start-to-discharge pressure of the safety relief valve within 30 days, at an ambient temperature of 90° F.

(l) Tank anchor-to-tank shell fillets welds must be examined by a suitable nondestructive testing method to ensure that welds are free from cracks or other detrimental defects.

§ 179.102-5 Nitrosyl chloride. (a) Tank cars used to transport nitrosyl chloride must comply with the following special requirements:

(1) Tanks shall be made of or clad with a metal not subject to rapid deterioration by the lading; all appurtenances such as manway covers, venting, loading and unloading valves, safety relief valves, excess flow valves, and eduction pipes, shall be made of metal not subject to rapid deterioration by the lading; cork shall be used as an insulating material.

§ 179.102-6 Vinyl chloride or vinyl methyl ether, inhibited.

(a) Tank cars used to transport vinyl chloride, or vinyl methyl ether, inhibited, must comply with the following special requirements:

(1) All parts of valves and safety relief devices in contact with the lading must be of a metal or other material suitably treated, if necessary, which will not cause formation of any acetylides.

(2) The interior pipes of the loading and unloading valves and sampling valve, also the gaging device when it provides a means for passage of the lading from the interior to the exterior of the tank, must be equipped with excess flow valves of an approved design. If the opening for passage of lading through the gaging device is not more than 0.060 inch diameter, an excess flow valve is not required.

(3) [Reserved]

(4) For alternate safety relief valve settings, see §179.102-11.

(5) For gasket requirements, see §179.102-11(b).

§ 179.102-7 Bromine. (a) Tank cars used to transport bromine must comply with the following special requirements:

(1) The tank shall be nickel clad at least 20 percent or shall be lined with lead at least 1/16 inch thick; openings in tank heads to facilitate application of lead lining are authorized if closed in an approved manner; all closures and appurtenances in contact with the lading shall be lead lined or shall be made of metal not subject to rapid deterioration by the lading; all interior welds in nickel clad tanks shall be protected by pure nickel butt straps to eliminate iron contamination. Except as otherwise provided herein, the water weight capacity of the tank shall not exceed 20,400 pounds. When tanks are equipped with manway cover plates, safety relief valves, venting, loading and unloading valves in accordance with spec. 105A300-W, and tank jackets are stenciled spec. 105A300-W, but in all other respects are constructed and maintained in full compliance with spec. 105A500-W, the water weight capacity of the tank shall not exceed 37,400 pounds.

§ 179.102-8 Motor fuel antiknock compound. (a) Tank cars used to transport motor fuel antiknock compounds must comply with the following special requirements:

(1) Openings in tank heads to facilitate application of nickel lining are authorized if closed in an approved manner.

§ 179.102-9 Nitrogen tetroxide or Nitrogen tetroxide-nitric oxide mixtures. (a) Tank cars used to transport nitrogen tetroxide or nitrogen tetroxide nitric oxide mixtures must comply with the following special requirements.

(1) Tanks must be insulated with not less than four inches of cork-board. All valves and fittings must be protected by the securely attached cover made of metal not subject to rapid deterioration by the lading, and all valve openings, except the safety relief valves, must be fitted with screw plugs or caps to prevent leakage in the event of valve failure. Safety relief valve must be equipped with an approved stainless steel or platinum frangible disc. Written procedures covering details of tank car appurtenances, manway fittings and safety relief devices, and marking, loading, handling, inspection and testing practices, must be filed with and approved by the Bureau of Explosives before any tank car is offered for transportation of these commodities.

§ 179.102-10 Hydrocyanic acid. (a) Tank cars used to transport hydrocyanic acid must comply with the following special requirements:

(1) Each tank car must be registered and the jacket stenciled "DOT 105-A300-W" and be equipped with the safety relief valves required by that specification. Tanks must be insulated with not less than 4 inches of cork-board. Written procedures covering details of tank car appurtenances, manway fittings and safety relief devices, and marking, loading, handling, inspection and testing practices, must be filed with and approved by the Bureau of Explosives before any tank car is offered for transportation of hydrocyanic acid.

§ 179.102-11 Liquefied petroleum gas, butadiene, anhydrous ammonia, methylacetylene-propadiene, stabilized, chlorodifluoromethane, or vinyl chloride. (a) Tank cars used to transport liquefied petroleum gas, butadiene, anhydrous ammonia, methylacetylene-propadiene, stabilized, chlorodifluoromethane, or vinyl chloride may, as an alternate, conform with the following special requirements:

(1) Safety relief valves may be set to the following pressures, provided the total valve discharge capacity is sufficient to prevent building up pressure in the tank in excess of 90 percent of the tank test pressure.

Safety relief valves, p.s.i.	DOT Specifications		
	105A300W	112A340W, 114A340W	112A400W, 114A400W
Start-to-discharge pressure	247.5	280.5	330
Start-to-discharge tolerance	±7.5	±8.4	±10
Vapor tight pressure (minimum)	196	224	264
Flow rating pressure	270	306	360

(b) Gaskets for manway covers and for mounting of fittings must be asbestos type or approved high-temperature resistant equivalent.

§ 179.102-12 Ethylene oxide. (a) Each tank car used to transport ethylene oxide must be constructed to be in compliance with the following special requirements:

(1) The tank must be constructed in accordance with DOT-105A * * * W specification, and its jacket stenciled "DOT-105A-100W."

(2) Each safety relief valve must be in compliance with the requirements specified in the DOT-105A100W tank car specification. Each safety relief valve must have its discharge piped to the top of the manway bonnet assembly. Vapor exit from the assembly must be provided through a full opening weather cap located directly above the safety valve vent pipe.

(3) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part or appurtenance is normally in contact with ethylene oxide liquid or vapor.

(4) Interior pipes of liquid discharge valves, vapor lines, gaging devices (when the device provides a means for passage of the lading from the interior to the exterior of the tank) and sampling lines must be equipped with excess flow valves of an approved design.

(5) Each tank must be equipped with a thermometer well.

(6) Each tank must be insulated with glass fiber except tank cars built before January 31, 1975, are authorized in this service when insulated with cork.

(7) The manway protective housing and cover must be insulated with glass fiber or other material that will provide protection against heat deterioration of the valves and any resilient material contained within the housing. Compliance with this provision is required after January 31, 1975, except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by July 31, 1976.

(8) Neoprene, natural rubber, and asbestos gaskets are prohibited. All O-rings, packings and gaskets must be constructed of materials which do not react spontaneously with or lower the autoignition temperature of ethylene oxide.

(9) Each tank built after August 31, 1981, shall be constructed in accordance with class 105J, except that the safety relief valve requirements of § 179.106-2(c)(4) shall not apply. Each tank built after February 29, 1984, shall be constructed in accordance with class 105J.

(10) After December 31, 1986, each tank built before September 1, 1981, having a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons and used for the transportation of ethylene oxide shall conform to class DOT-105J.

§ 179.102-13 Hydrofluoric acid, anhydrous. (a) Tank cars used to transport hydrofluoric acid, anhydrous, must comply with the following special requirements:

(1) Tanks must be equipped with valves and appurtenances approved for this particular service, made of metal not subject to rapid deterioration by the lading. For safety relief valves, see § 179.100-15(b) and (c).

(2) For spec. DOT-114A400W tanks, valves and fittings must be located on the top of the tank.

(3) Bottom opening in tank prohibited.

§ 179.102-14 Acrolein inhibited. Each tank car used to transport acrolein inhibited must be a specification DOT-105A300W or higher rated tank, registered and the jacket stenciled "DOT-105A200W" and be equipped with the safety relief valve required by that specification.

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§ 179.102-15 Sodium, metallic. Tank cars used to transport metallic sodium must have exterior heater coils fusion welded to tank shell.

§ 179.102-16 Sulfur trioxide stabilized. Tank cars used to transport sulfur trioxide stabilized must be equipped with safety relief valves of approved design. Tanks equipped with interior heating coils not permitted.

§ 179.102-17 Hydrogen chloride, refrigerated liquid. Each tank car used to transport hydrogen chloride, refrigerated liquid must comply with the following special requirements:

(a) The tank car must comply with Specification DOT-105A500W and be designed for loading at minus 50° F. or colder.

(b) All plates for the tank must be fabricated of material listed in paragraph (b)(2) of this section, and appurtenances must be fabricated of material listed in paragraph (b)(1) or (b)(2) of this section.

(1) Stainless steel, ASTM Specification A240, Type 304, 304L, 316, or 316L, in which case impact tests are not required; or

(2) Steel complying with ASTM Specification A516, Grade 70; ASTM Specification A537, Class 1; or AAR Specification TC128, Grade B, in which case impact tests must be performed as follows:

(i) ASTM Specification A516 and A537 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling, of ASTM Specification A20.

(ii) AAR Specification TC128 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling of 15 ft.-lb. minimum average for 3 specimens, with a 10 ft.-lb. minimum for any one specimen, at minus 50° F. or colder, in accordance with ASTM Specification A370.

(iii) Production welded test plates must—

(A) Be prepared in accordance with AAR Specifications for Tank Cars, Appendix W, W4.00;

(B) include impact test specimens of weld metal and heat affected zone prepared and tested in accordance with AAR Specifications for Tank Cars, Appendix W, W9.00; and

(C) meet the same impact requirements as the plate material.

(c) Insulation must be of approved material.

(d) Safety relief valves must be trimmed with monel or other approved material and equipped with a frangible disc of silver, polytetrafluoroethylene coated monel, or tantalum. Each safety relief device shall have the space between the frangible disc and the relief valve vented with a suitable auxiliary valve. The discharge from each safety relief valve must be directed outside the protective housing.

(e) Loading and unloading valves must be trimmed with Hastelloy B or C, monel, or other approved material, and identified as "Vapor" or "Liquid". Excess flow valves must be installed under all liquid and vapor valves, except safety relief valves.

(f) A thermometer well may be installed.

(g) Only an approved gaging device may be installed.

(h) A sump must be installed in the bottom of the tank under the liquid pipes.

(i) All gaskets must be made of, or coated with, polytetrafluoroethylene or other approved material.

(j) The tank car tank may be equipped with exterior cooling coils on top of the tank car shell.

(k) The jacket must be stenciled, adjacent to the water capacity stencil, "MINIMUM OPERATING TEMPERATURE——° F."

(l) The tank car and insulation must be designed to prevent the pressure of the lading from increasing from the pressure at the maximum allowable filling density to the start-to-discharge pressure of the safety relief valve within 30 days, at an ambient temperature of 90° F.

(m) Tank anchor-to-tank shell fillets welds must be examined by a suitable nondestructive testing method to ensure that welds are free from cracks or other detrimental defects.

§ 179.102-20 Dimethyl hydrazine unsymmetrical. Class

DOT-105AW tank cars used to transport dimethyl hydrazine unsymmetrical must be stenciled DOT-105A100W. Tanks must be equipped with steel or stainless steel safety relief valves of the type and size used on specification DOT-105A100W tank cars.

§ 179.103 Special requirements for class 114A * * * tank car tanks. (a) In addition to the applicable requirements of §§179.100 and 179.101 the following requirements shall be complied with:

§ 179.103-1 Type. (a) Tanks built under this section may be of any approved cross section.

(b) Any portion of the tank shell not circular in cross section shall have walls of such thickness and be so reinforced that the stresses in the walls caused by a given internal pressure are no greater than the circumferential stresses which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with paragraphs §179.100-6(a) and (b), but in no case shall the wall thickness be less than that specified in §179.101.

(c) Manway and cover may be located other than at the top of the tank.

(d) Valves and fittings need not be mounted on the manway cover.

(e) One opening may be provided in each head for use in purging the tank interior.

§ 179.103-2 Manway cover. (a) Manway cover may be of the internal self-energizing type and shall be of approved design.

(b) If no valves or measuring and sampling devices are mounted on manway cover, no protective housing is required.

§ 179.103-3 Venting, loading and unloading valves, measuring and sampling devices. (a) Venting, loading and unloading valves, measuring and sampling devices, when used, shall be attached to a nozzle or nozzles on the tank shell or heads.

(b) These valves and appurtenances must be grouped in one location and, except as provided in §179.103-5, must be equipped with a protective housing with cover, or may be recessed into tank shell with cover. An additional set grouped in another location may be provided. Protective housing with cover, when used, must have steel sidewalls not less than three-fourths inch in thickness and a metal cover not less than one-fourth inch in thickness that can be securely closed. Underframe sills are an acceptable alternate to the protective housing cover, provided the arrangement is of approved design. For fittings recessed into tank shell, protective cover must be metal and not less than one-fourth inch in thickness.

(c) When tank car is used to transport liquefied flammable gases, the interior pipes of the loading, unloading, and sampling valves must be equipped with excess flow valves of approved design except when quick closing internal valves of approved design are used. When the interior pipe of the gaging device provides a means of the passage of lading from the interior to the exterior of the tank, it must be equipped with an excess flow valve of approved design or with an orifice not exceeding 0.060 inch.

§ 179.103-4 Safety relief devices and pressure regulators.

(a) Safety relief devices and pressure regulators must be located on top of the tank near the center of the car on a nozzle, mounting plate or recess in the shell. Through or stud bolts, if used, must not enter the tank.

(b) Metal guard of approved design must be provided to protect safety relief devices and pressure regulators from damage.

§ 179.103-5 Bottom outlets. (a) In addition to or in place of the venting, loading and unloading valves, measuring and sampling devices as prescribed in §179.103-3, tanks may be equipped with approved bottom outlet valves. If applied, bottom outlet valves must meet the following requirements:

(1) When external bottom outlet valve without interior pipes is used in liquefied flammable gas service, the valve opening must be closed with an internal bolted or self-energizing closure of approved design. Protective housing is not required. On cars with center sills, a ball valve may be welded to the outside bottom of the tank or mounted on a pad or nozzle with a tongue and groove or male and female flange attachment, but in no case shall the breakage groove or equivalent extend below the bottom flange of the center sill. On cars without continuous center sills, a ball valve may be welded to the outside bottom of the tank or mounted with a tongue and groove or male and female flange attachment on a pad attached to the outside bottom of the tank. The mounting pad must have a maximum thickness of 2½ inches measured on the longitudinal centerline of the tank. The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transit.

(2) When internal bottom outlet valve is used in liquefied flammable gas service, the outlet of the valve must be equipped with an excess flow valve of approved design, except when a quick-closing internal valve of approved design is used. Protective housing is not required.

(3) Bottom outlet valve must be equipped with a liquid tight closure at its lower end.

(b) Bottom outlet equipment must be of approved design and must meet the following requirements:

(1) The extreme projection of the bottom outlet equipment may not be more than allowed by Appendix E of the AAR Specifications for Tank Cars. All bottom outlet reducers and closures and their attachments shall be secured to car by at least ⅜-inch chain, or its equivalent, except that bottom outlet closure plugs may be attached by ¼-inch chain. When the bottom outlet closure is of the combination cap and valve type, the pipe connection to the valve shall be closed by a plug, cap, or approved quick coupling device. The bottom outlet equipment should include only the valve, reducers and closures that are necessary for the attachment of unloading fixtures. The permanent attachment of supplementary exterior fittings must be approved by the AAR Committee on Tank Cars.

(2) Bottom outlet must be provided with a liquid tight closure at its lowest end.

(3) The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transit.

(4) If the outlet nozzle extends 6 inches or more from shell of tank, a V-shaped breakage groove shall be cut (not cast) in the upper part of the outlet nozzle at a point immediately below the lowest part of valve closet to the tank. In no case may the nozzle wall thickness at the roof of the "V" be more than ¼-inch. On cars without continuous center sills, the breakage groove or its equivalent may not be more than 15 inches below the tank shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(5) The valve body must be of a thickness which will insure that accidental breakage of the outlet nozzle will occur at or below the "V" groove, or its equivalent, and will not cause distortion of the valve seat or valve.

§ 179.104 Special requirements for spec. 105A200-F tank car tanks.

§ 179.104-1 Tanks built under these specifications must meet the requirements of §§179.100, 179.101, and when applicable, §179.102 and §179.104.

§ 179.104-2 Type. (a) Tanks built under this specification shall be fabricated by conversion from existing forge-welded steel tanks complying with specs. 105A300, 105A400, 105A500 or 105A600.

§ 179.104-3 Tank mounting. (a) The use of rivets as a means of attaching anchor to tank is permitted.

§ 179.104-4 Welding. (a) All joints shall be lap welded by the water gas process, hammered or rolled or other lap welded, hammered or rolled process which investigation and laboratory tests by the Mechanical Division of the AAR have proved will produce satisfactory results.

§ 179.105 Special requirements for Specifications 112 and 114 tank cars.

§ 179.105-1 General. (a) In addition to the requirements of this section, each tank car built under specification 112 and 114 must meet the applicable requirements of §§179.100, 179.101, 179.102, and 179.103.

(b) Notwithstanding the provisions of §§179.3, 179.4, and 179.6, AAR approval is not required for changes in or additions to specifications 112 and 114 tank cars necessary to comply with this section.

(c) Notwithstanding the provisions of §173.12a of this subchapter, no 112 and 114 tank car manufactured to specifications promulgated by the Canadian Transport Commission may be used

(1) After March 31, 1979, to transport hazardous materials in the United States unless it is equipped with a coupler vertical restraint system under § 179.105-6, except that an "empty" tank car (paragraph 172.510(c) of this subchapter) may be returned to Canada without a coupler vertical restraint system until July 1, 1979; nor

(2) After December 31, 1980, to transport flammable gases in the United States unless it is equipped with thermal protection under § 179.105-4 and tank head puncture resistance under § 179.105-5; and, to transport anhydrous ammonia in the United States unless it is equipped with tank head puncture resistance under § 179.105-5.

(d) As used in this section 179.105, "tank car owner" means a person whose reporting mark appears on any specification 112 or 114 tank car.

§ 179.105-2 New cars. (a) Each specification 112A and 114A tank car built after December 31, 1977, shall be equipped with a coupler restraint system that meets the requirements of §179.105-6.

(b) Each specification 112S and 114S tank car built after December 31, 1977, shall be equipped with:

(1) A coupler restraint system that meets the requirements of §179.105-6; and

(2) A tank head puncture resistance system that meets the requirements of §179.105-5.

(c) Each specification 112T and 112J, 114T, and 114J tank car built after December 31, 1977, shall be equipped with:

(1) A coupler restraint system that meets the requirements of §179.105-6;

(2) A tank head puncture resistance system that meets the requirements of §179.105-5;
(3) A thermal protection system that meets the requirements of §179.105-4; and
(4) A safety relief valve that meets the requirements of §179.105-7.
(d) Each specification 112 and 114 tank car shall be stenciled as prescribed in §179.105-8.

§ 179.105-3 Previously built cars. (a) After December 31, 1978, each specification 112 and 114 tank car built before January 1, 1978, shall be equipped with a coupler restraint system that meets the requirements of §179.105-6.
(b) Each tank car built before January 1, 1978, required to meet specification 112S and 114S, shall be equipped with a tank head puncture resistance system in accordance with the requirements of paragraph (d) of this section and §179.105-5, and be stenciled as prescribed in §179.105-8.
(c) Each tank car built before January 1, 1978, required to meet specification 112J, 112T, 114J, and 114T, shall:
(1) Be equipped with a thermal protective system that meets the requirements of §179.105-4;
(2) Be equipped with a tank head puncture resistance system that meets the requirements of §179.105-5;
(3) Be equipped with a safety relief valve that meets the requirements of §179.105-7; and
(4) Comply with paragraph (d) of this section.
(5) Be stenciled as prescribed in §179.105-8.
(d) Each tank car owner shall equip its tank cars which are subject to paragraphs (b) and (c) of this section in accordance with the following schedule:
(1) Each tank car which is being retrofitted in accordance with paragraph (b) shall be retrofitted not later than December 31, 1979.
(2) Each tank car which is being retrofitted in accordance with paragraph (c) of this section with a nonjacketed thermal protective system and a separate tank head puncture resistance system (112T/114T) shall be retrofitted:
(i) With the tank head puncture resistance system not later than December 31, 1979; and
(ii) With thermal protection not later than December 31, 1980.
(3) All tank cars being retrofitted in accordance with paragraph (c) of this section with a thermal protective system enclosed in a metal jacket (112J 114J) shall be retrofitted such that—
(i) At least 20 percent of those cars owned on December 31, 1978, are so equipped by not later than that date;
(ii) At least 65 percent of those cars owned on December 31, 1979, are so equipped by not later than that date; and
(iii) All of those cars owned on December 31, 1980, are so equipped by not later than that date.

§ 179.105-4 Thermal protection. (a) *Performance standard.* Each specification 112T, 112J, 114T, and 114J tank car shall be equipped with a thermal protection system that prevents the release of any of the car's contents (except release through the safety relief valve) when subjected to:
(1) A pool fire for 100 minutes; and
(2) A torch fire for 30 minutes.
(b) *Test verification.* Except as provided in paragraph (c) of this section, compliance with the requirements of paragraph (a) of this section shall be verified by testing and analyzing the thermal protection system in accordance with paragraphs (d), (e), and (f) of this section. A complete record of each test verification shall be made, retained and, upon request, made available for inspection and copying by authorized representatives of the Department.
(c) *Excepted systems.* The Department maintains a list of thermal protection systems which comply with the requirements of paragraphs (d) and (e) of this section and which are excepted from the test verification requirement of paragraph (b) of this section. Information necessary to equip tank cars with one of these systems is available in the Dockets Branch, Room 8426 of the Nassif Building, 400 Seventh Street SW, Washington, D.C. 20590, between the hours of 8:30 a.m. and 5:00 p.m., Monday through Friday.
(d) *Simulated pool fire test.* (1) A pool fire environment shall be simulated in the following manner:
(i) The source of the simulated pool fire shall be a hydrocarbon fuel. The flame temperature from the simulated pool fire shall be at 1,600° F. plus-or-minus 100° F. throughout the duration of the test.
(ii) An uninsulated square steel plate with thermal properties equivalent to tank car steel shall be used. The plate dimensions shall be not less than one foot by one foot by nominal ⅜-inch thick. The plate shall be instrumented with not less than nine thermocouples to record the thermal response of the plate. The thermocouples shall be attached to the surface not exposed to the simulated pool fire, and shall be divided into nine equal squares with a thermocouple placed in the center of each square.
(iii) The pool fire simulator shall be constructed in a manner that results in total flame engulfment of the front surface of the bare plate. The apex of the flame shall be directed at the center of the plate.
(iv) The steel plate holder shall be constructed in such a manner that the only heat transfer to the back side of the plate is by heat conduction through the plate and not be other heat paths.
(v) Before the plate is exposed to the simulation pool fire, none of the temperature recording devices shall indicate the plate temperature in excess of 100° F. nor less than 32° F.
(vi) A minimum of two thermocouples devices shall indicate 800° F. after not less than 12 minutes nor more than 14 minutes of simulated pool fire exposure.
(2) A thermal insulation system shall be tested in the simulated pool fire environment described in paragraph (d) (1) of this section in the following manner:
(i) The thermal insulation system shall cover one side of a steel plate identical to that used to simulate a pool fire under paragraph (d) (1) (ii) of this section.
(ii) The uninsulated side of the steel plate shall be instrumented with not less than nine thermocouples placed as described in paragraph (d) (1) (ii) of this section to record the thermal response of the steel plate.
(iii) Before exposure to the pool fire simulation, none of the thermocouples on the thermal insulation system steel plate configuration shall indicate a plate temperature in excess of 100° F. nor less than 32° F.
(iv) The entire insulated surface of the thermal insulation system shall be exposed to the simulated pool fire.
(v) A pool fire simulation test shall run for a minimum of 100 minutes. The thermal insulation system shall retard the heat flow to the steel plate so that none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 800° F.
(vi) A minimum of three consecutive successful simulation fire tests shall be performed for each thermal insulation system.
(e) *Simulated torch fire test.* (1) A torch fire environment shall be simulated in the following manner:
(i) The source of the simulated torch shall be a hydrocarbon fuel. The flame temperature from the simulated torch shall be 2,200° F. plus-or-minus 100° F. throughout the duration of the test. Torch velocities shall be 40 miles per hour plus-or-minus 10 miles per hour throughout the duration of the test.
(ii) An uninsulated square steel plate with thermal properties equivalent to tank car steel shall be used. The plate dimensions shall be not less than four feet by four feet by nominal ⅜-inch thick. The plate shall be instrumented with not less than nine thermocouples to record the thermal response of the plate. The thermocouples shall be attached to the surface not exposed to the simulated torch, and shall be divided into nine equal squares with a thermocouple placed in the center of each square.
(iii) The steel-plate holder shall be constructed in such a manner that the only heat transfer to the back side of the plate is by heat conduction through the plate and not by other heat paths. The apex of the flame shall be directed at the center of the plate.
(iv) Before exposure to the simulated torch, none of the temperature recording devices shall indicate a plate temperature in excess of 100° F. or less than 32° F.
(v) A minimum of two thermocouples shall indicate 800° F. in a time of 4.0 plus-or-minus 0.5 minutes of torch simulation exposure.
(2) A thermal insulation system shall be tested in the simulated torch fire environment described in paragraph (e) (1) of this section in the following manner:
(i) The thermal insulation system shall cover one side of a steel plate identical to that used to simulate a torch fire under paragraph (e) (1) (ii) of this section.
(ii) The back of the steel plate shall be instrumented with not less than nine thermocouples placed as described in paragraph (e) (1) (ii) of this section to record the thermal response of the steel.
(iii) Before exposure to the simulated torch, none of the thermocouples on the thermal insulation system steel plate configuration shall indicate a plate temperature in excess of 100° F. nor less than 32° F.
(iv) The entire outside surface of the thermal insulation system shall be exposed to the simulated torch fire environment.
(v) A torch simulation test shall be run for a minimum of 30 minutes. The thermal insulation system shall retard the heat flow to the steel plate so that none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 800° F.
(vi) A minimum of two consecutive successful torch simulation tests shall be performed for each thermal insulation system.
(f) *Analysis.* The analysis required by paragraph (b) of this section must verify that the entire surface of the tank car, including discontinuous structures (e.g., stub sills, protective housings, etc.), complies with the requirements of paragraph (a) of this section.
(g) *Exterior tank color.* Notwithstanding the provisions of §179.101-1(a) Table, Note 4, each specification 112 and 114 tank car equipped with thermal protection that complies with the requirements of paragraph (a) of this section need not be painted white.

§ 179.105-5 Tank head puncture resistance. (a) *Performance standard.* Each specification 112S, 112T, 112J, 114S, 114T, and

114J tank car shall be capable of sustaining, without loss of contents, coupler-to-tank head impacts within the area of the tank head described in § 179.100-23 at relative car speeds of 18 miles per hour when:

(1) The weight of the impact car is at least 263,000 pounds.

(2) The impacted tank car is coupled to one or more "backup" cars which have a total weight of at least 480,000 pounds and the hand brakes are applied on the first car; and

(3) The impacted tank car is pressurized to at least 100 psi.

(b) *Test verification.* Compliance with the requirements of paragraph (a) of this section shall be verified by full scale testing or by the alternate test procedures prescribed in paragraph (c) of this section. However, protective head shields that meet the requirements of § 179.100-23 or full tank head jackets that are at least ½-inch thick and made from steels specified in § 179.100-23 (a) (1) need not be verified by testing.

(c) *Tank head puncture resistance test.* A tank head resistance system shall be tested under the following conditions.

(1) The ram car used shall weigh at least 263,000 pounds, be equipped with a coupler, and duplicate the condition of a conventional draft sill including the draft yoke and draft gear. The coupler shall protrude from the end of the ram car so that it is the leading location of perpendicular contact with the standing tank car.

(2) The impacted test car shall be loaded with water at six percent outage with internal pressure of at least 100 psi and coupled to one or more "backup" cars which have a total weight of 480,000 pounds with hand brakes applied on the first car.

(3) At least two separate tests shall be conducted with the coupler on the vertical centerline of the ram car. One test shall be conducted with the coupler at a height of 21 inches, plus-or-minus one-inch, above the top of the sill; the other test shall be conducted with the coupler height at 31 inches, plus-or-minus one-inch above the top of the sill. If the combined thickness of the tank head and any additional shielding material at any position over the area described in § 179.100-23 is less than the combined thickness on the vertical centerline of the car, a third test shall be conducted with the coupler positioned so as to strike the thinnest point.

(4) One of the following test procedures shall be applied:

Minimum weight of ram car plus attached cars (in pounds):	Minimum velocity of impact (in miles per hour)	Restriction
263,000	18	1 ram car only
343,000	16	1 ram car or 1 ram car plus 1 rigidly attached car
586,000	14	1 ram car plus 1 or more rigidly attached cars

(5) A test is successful if there is no visible leak from the standing tank car within one hour after impact.

§ 179.105-6 Coupler vertical restraint system. (a) *Performance standard.* Each specification 112 and 114 tank car shall be equipped with couplers capable of sustaining, without disengagement or material failure, vertical loads of at least 200,000 pounds applied in upward and downward directions in combination with buff loads of 2,000 pounds, when coupled to cars equipped with couplers that do have this vertical restraint capability, and cars equipped with couplers that do not have this vertical restraint capability.

(b) *Test verification and approval.* Except as provided in paragraph (d) of this section, compliance with the requirements of paragraph (a) of this section shall be achieved by verification testing of the coupler vertical restraint system in accordance with paragraph (c) of this section, and approval of the Federal Railroad Administrator.

(c) *Coupler vertical restraint tests.* A coupler vertical restraint system shall be tested under the following conditions:

(1) The test coupler shall be tested with: A mating coupler (or simulated coupler) having only frictional vertical force resistance at the mating interface; a mating coupler (or simulated coupler) having the capabilities described in paragraph (a) of this section.

(2) The testing apparatus shall simulate the vertical coupler performance at the mating interface and may not interfere with coupler failure or otherwise inhibit failure due to force applications and reactions.

(3) The test shall be conducted as follows:

(i) A minimum of 200,000 pounds vertical downward load shall be applied continuously for at least five minutes to the test coupler head simultaneously with the application of a nominal 2,000-pound buff load;

(ii) The procedures prescribed in paragraph (c) (3) (i) of this section shall be repeated with a minimum vertical upward load of 200,000 pounds;

(iii) A minimum of three consecutive successful tests shall be performed for each load combination prescribed in paragraphs (c) (3) (i) and (c) (3) (ii) of this section. A test is successful when a vertical disengagement or material failure does not occur during any of the prescribed load combinations.

(d) *Listing of approved couplers.* The following classes of couplers have been approved by the Federal Railroad Administrator and need not be verified by the testing requirements of paragraph (c) of this section:

(1) E top and bottom shelf couplers designated by the Association of American Railroads' Catalog No. SE60CHT, SE60CHTE, SE67BHT, SE67BHTE, SE68BHT or SE68BHTE; or

(2) F top shelf couplers designated by the Association of American Railroads' Catalog No. SF70CHT, SF70CHTE, SF73AHT, SF73AHTE, SF79CHT or SF79CHTE.

§ 179.105-7 Safety relief valves. (a) Notwithstanding the provisions of § 179.105-4, each 112 and 114 tank car shall be equipped with safety relief valves that meet the requirements of Appendix A of the AAR Specifications for Tank Cars. However, the relieving or discharge capacity shall be calculated in accordance with the formula prescribed in § A8.02 of Appendix A applicable to compressed gases in noninsulated tanks.

(b) The references in paragraph (a) of this section to Appendix A of the AAR Specifications for Tank Cars are to the 1976 edition of that publication.

(c) Notwithstanding paragraph (a) of this section, § 179.100-15, and § 179.200-18, the relieving or discharge capacity of the safety relief valve on a specification 105 or 111 tank car built to transport ethylene oxide may be as low as 1100 scfm at 85 psi if—

(1) The tank is equipped with a thermal protection system in accordance with § 179.105-4; and

(2) In all of the three consecutive simulation pool fire tests required by paragraph (d) of § 179.105-4, none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 505°F.

(d) Notwithstanding paragraph (a) of this section, and §§ 179.100-15, 179.102-11, and 179.200-18, a specification 105 or 111 tank car built before March 1, 1984 to transport any flammable gas may use the currently installed safety relief valves, if—

(1) The tank car is equipped with a thermal protection system in accordance with § 179.105-4; and

(2) In all of the three consecutive simulation pool fire tests required by paragraph (d) of § 179.105-4, none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 550°F.

§ 179.105-8 Stenciling. (a) Each 112 and 114 tank car that is equipped with a tank puncture resistance system as specified in § 179.105-5 shall have the letter "S" substituted for the "A" in the specification marking.

(b) Each 112 and 114 tank car that is equipped with a thermal protection system enclosed in a metal jacket shall have the letter "J" substituted for the "A" and "S" in the specification marking.

(c) Each 112 and 114 tank car that is equipped with a non-jacketed thermal protection system shall have the letter "T" substituted for the "A" and "S" in the specification marking.

§ 179.105-9 [Reserved]

§ 179.106 Special requirements for Specification 105 tank cars.

§ 179.106-1 General. (a) In addition to the requirements of this section, each tank car built under Specification 105 shall meet the applicable requirements of §§ 179.100, 179.101, 179.102 and 179.104.

(b) Notwithstanding the provisions of §§ 179.3, 179.4, and 179.6, AAR approval is not required for changes in or additions to Specification 105 tank cars in order to comply with this section.

(c) Notwithstanding the provisions of § 173.12a of this subchapter, no Specification 105 tank car manufactured to specifications promulgated by the Canadian Transport Commission may be used after February 28, 1982, to transport hazardous materials in the United States unless it is equipped with a coupler vertical restraint system that meets the requirements of § 179.105-6.

(d) Notwithstanding the provisions of § 173.12a of this subchapter, no Specification 105 tank car manufactured after August 31, 1981, to specifications promulgated by the Canadian Transport Commission, may be used to transport hazardous materials in the United States unless it is equipped in accordance with § 179.106-2.

(e) Notwithstanding the provisions of § 173.12a of this subchapter, no specification 105 tank car manufactured before September 1, 1981, to specifications promulgated by the Canadian Transport Commission having a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons may be used after December 31, 1986, to transport hazardous materials unless it is equipped in accordance with § 179.106-3.

§ 179.106-2 New cars. (a) Each Specification 105A tank car built after February 28, 1981, shall be equipped with a coupler restraint system that meets the requirements of § 179.105-6.

(b) Each Specification 105S tank car built after August 31, 1981, shall be equipped with:

(1) A coupler restraint system that meets the requirements of § 179.105-6; and

(2) A tank head puncture resistance system that meets the requirements of §179.105-5.

(c) Each Specification 105J tank car built after August 31, 1981, shall be equipped with:

(1) A coupler restraint system that meets the requirements of §179.105-6;

(2) A tank head puncture resistance system that meets the requirements of §179.105-5;

(3) A thermal protection system that meets the requirements of §179.105-4; and

(4) A safety relief valve that meets the requirements of §179.105-7.

(d) Each Specification 105 tank car shall be stenciled as prescribed in §179.106-4.

§ 179.106-3 Previously built cars.

(a) Each specification 105A tank car built before March 1, 1931, shall be equipped with a coupler restraint system that meets the requirements of §179.105-6.

(b) Each specification 105S tank car built before September 1, 1931, shall be equipped with:

(1) A coupler restraint system that meets the requirements of §179.105-6; and

(2) A tank head puncture resistance system that meets the requirements of §179.105-5.

(c) Each specification 105J tank car built before September 1, 1981, shall be equipped with:

(1) A coupler restraint system that meets the requirements of §179.105-6;

(2) A thermal protection system that meets the requirements of §179.105-4;

(3) A safety relief valve that meets the requirements of §179.105-7; and

(4) A tank head puncture resistance system that meets the requirements of §179.105-5.

§ 179.106-4 Stenciling. (a) Each Specification 105 tank car that is equipped with a coupler restraint system that meets the requirements of §179.105-6 and a tank head puncture resistance system that meets the requirements of §179.105-5 shall be stenciled by having the letter "S" substituted for the letter "A" in the specification marking.

(b) Each Specification 105 tank car that is equipped with a coupler restraint system that meets the requirements of §179.105-6, a tank head puncture resistance system that meets the requirements of §179.105-5, a thermal protection system that meets the requirements of §179.105-6, and a safety relief valve that meets the requirements of §179.105-7, shall be stenciled by having the letter "J" substituted for the letter "A" in the specification marking.

SUBPART D

SPECIFICATIONS FOR NON-PRESSURE TANK CAR TANKS (CLASSES DOT-103, 104, 111AF, 111AW, AND 115AW)

§ 179.200 General specifications applicable to nonpressure tank car tanks (Classes DOT-103, 104, and 111).

§ 179.200-1 Tanks built under these specifications must meet the requirements of §§179.200, 179.201, and when applicable §179.202.

§ 179.200-2 Approval. (a) For procedure for securing approval, see §179.3.

§ 179.200-3 Type. (a) Tank built under these specifications must be circular in cross section, with formed heads designed convex outward. When specified in §179.201-1, the tank must have at least one manway or one expansion dome with manway, and such other external projections as are prescribed herein. When the tank is divided into compartments, each compartment must be treated as a separate tank.

§ 179.200-4 Insulation. (a) If insulation is applied, the tank shell and expansion dome when used must be insulated with an approved material. The entire insulation must be covered with a metal jacket of a thickness not less than 11 gage (0.1196 inch) nominal (Manufacturer's Standard Gage) and flashed around all openings so as to be weather tight. The exterior surface of a carbon steel tank and the inside surface of a carbon steel jacket must be given a protection coating, except that protective coating is not required when foam-in-place insulation that adheres to the tank or jacket is applied.

(b) If insulation is a specification requirement, it shall be of sufficient thickness so that the thermal conductance at 60° F. is not more than 0.225 Btu. per hour, per square foot, per degree F. temperature differential, unless otherwise provided in §179.201-1. If exterior heaters are attached to tank, the thickness of the insulation over each heater element may be reduced to one-half that required for the shell.

§ 179.200-5 Bursting pressure. (a) The minimum required bursting pressure is listed in §179.201-1.

§ 179.200-6 Thickness of plates. (a) The wall thickness after forming of the tank shell, dome shell, and of 2:1 ellipsoidal heads must be not less than specified in §179.201-1, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:

d = Inside diameter in inches;
E = 0.9 Welded joint efficiency; except E = 1.0 for seamless heads;
P = Minimum required bursting pressure in p.s.i.;
S = Minimum tensile strength of plate material in p.s.i. as prescribed in §179.200-7;
t = Minimum thickness of plate in inches after forming.

(b) The wall thickness after forming of 3:1 ellipsoidal heads must be not less than specified in §179.201-1, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE} \times 1.83$$

where:

d = Inside diameter in inches;
E = 0.9 Welded joint efficiency; except E = 1.0 for seamless heads;
P = Minimum required bursting pressure in p.s.i.;
S = Minimum tensile strength of plate material in p.s.i. as prescribed in §179.200-7;
t = Minimum thickness of plate in inches after forming.

(c) The wall thickness after forming of a flanged and dished head must be not less than specified in §179.201-1, nor that calculated by the following formula:

$$t = \frac{5PL}{6SE}$$

where:

E = 0.9 Welded joint efficiency; except E = 1.0 for seamless heads;
L = Main inside radius to which head is dished, measured on concave side in inches;
P = Minimum required bursting pressure in p.s.i.;
S = Minimum tensile strength of plate material in p.s.i. as prescribed in §179.200-7;
t = minimum thickness of plate in inches after forming.

(d) If plates are clad with material having tensile strength properties at least equal to the base plate, the cladding may be considered a part of the base plate when determining thickness. If cladding material does not have tensile strength at least equal to the base plate, the base plate alone must meet the thickness requirements.

(e) For a tank constructed of longitudinal sections, the minimum width of bottom sheet of the tank must be 60 inches measured on the arc, but in all cases the width must be sufficient to bring the entire width of the longitudinal welded joint, including welds, above the bolster.

(f) For a tank built of one piece cylindrical sections the thickness specified for bottom sheet must apply to the entire cylindrical section.

(g) See §179.200-9 for thickness requirements for a compartmented tank.

§ 179.200-7 Materials. (a) Plate material used to fabricate the tank and, when used, expansion dome or manway nozzle material, must meet one of the following specifications with the indicated minimum tensile strength and elongation in the welded condition.

(b) Carbon steel plate: The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A 515-70, Gr. 55	55,000	28
ASTM A 515-70, Gr. 60	60,000	25
ASTM A 515-70, Gr. 65	65,000	20
ASTM A 515-70, Gr. 70	70,000	20
ASTM A 285-70a, Gr. A	45,000	29
ASTM A 285-70a, Gr. B	50,000	20
ASTM A 285-70a, Gr. C	55,000	20
ASTM A 516-70a, Gr. 55	55,000	28
ASTM A 515-70a, Gr. 60	60,000	25
ASTM A 516-70a, Gr. 65	65,000	20
ASTM A 516-70a, Gr. 70	70,000	20
AAR TC128-70, Gr. A and B	81,000	13

[1] Maximum stresses to be used in calculations.

(c) Aluminum alloy plate: Aluminum alloy plate must be suitable for welding and comply with one of the following specifications:

Specifications	Minimum tensile strength (p.s.i.) welded condition[2][3]	Minimum elongation in 2 inches (percent) 0 temper weld metal (longitudinal)
ASTM B 209-70, Alloy 5052[1]	25,000	18
ASTM B 209-70, Alloy 5083[2]	38,000	16
ASTM B 209-70, Alloy 5086[1]	35,000	14
ASTM B 209-70, Alloy 5154[1]	30,000	18
ASTM B 209-70, Alloy 5254[1]	30,000	18
ASTM B 209-70, Alloy 5454[1]	31,000	18
ASTM B 209-70, Alloy 5652[1]	25,000	18
ASTM B 209-70, Alloy 6061[4]	24,000	5[5]

[1] For fabrication, the parent plate material may be 0, H112, or H32 temper, but design calculations must be based on minimum tensile strength shown.
[2] 0 temper only.
[3] Weld filler metal 5556 must not be used.
[4] Not authorized for tank shells, manways or domes.
[5] 6 temper only.
[6] Maximum stress to be used in calculations.

(d) High alloy steel plate: High alloy steel plate must comply with one of the following specifications:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A240-70, Type 304	75,000	30
ASTM A240-70, Type 304L	70,000	30
ASTM A240-70, Type 316	75,000	30
ASTM A240-70, Type 316L	70,000	30

[1] Maximum stresses to be used in calculations.
[2] High alloy steel materials used to fabricate tank and expansion dome, when used, must be tested in accordance with the following procedures in ASTM Specification A262-68 titled, "Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steels," and must exhibit corrosion rates not exceeding the following:

Test procedures	Material	Corrosion rate i.p.m.
Practice B	Types 304, 304L, 316, and 316L	0.0040
Practice C	Type 304L	.0020

Type 304L and Type 316L test specimens must be given a sensitizing treatment prior to testing. (A typical sensitizing treatment is 1 hour at 1,250 F).

(e) Nickel plate: Nickel plate must comply with the following specification:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM B162-69[2]	40,000	20

[1] Maximum stresses to be used in calculations.
[2] When used as cladding for carbon steel plate, low carbon nickel is required.

(f) Manganese-molybdenum steel plate: Manganese-molybdenum steel plate must be suitable for fusion welding and comply with the following specification:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A302-69a Gr. B	80,000	20

[1] Maximum stresses to be used in calculations.

(g) All parts and items of construction in contact with the lading must be made of material compatible with plate material and not subject to rapid deterioration by the lading, or be coated or lined with suitable corrosion resistant material.

(h) All external projections which may be in contact with the lading and all castings, forgings, or fabrications used for fittings or attachments to tank and expansion dome, when used, in contact with lading must be made of material to an approved specification. See AAR Specifications for Tank Cars, Appendix M, M-1.05 for approved material specifications for castings for fittings.

§ 179.200-8 Tank heads. (a) All external tank heads must be an ellipsoid of revolution in which the major axis must equal the diameter of the shell and the minor axis must be one-half the major axis.

(b) Internal compartment tank heads may be 2:1 ellipsoidal, 3:1 ellipsoidal, or flanged and dished to thicknesses as specified in § 179.200-6. Flanged and dished heads must have main inside radius not exceeding 10 feet, and inside knuckle radius must not be less than 3 ¾ inches for steel, alloy steel, or nickel tanks, and not less than 5 inches for aluminum alloy tanks.

§ 179.200-9 Compartment tanks. (a) When a tank is divided into compartments, by inserting interior heads, interior heads must be inserted in accordance with AAR Specifications for Tank Cars, Appendix E, E-7.00, and must comply with the requirements specified in § 179.201-1. Voids between compartment heads must be provided with at least one tapped drain hole at their lowest point, and a tapped hole at the top of the tank. Top hole must be closed, and the bottom hole may be closed, with not less than three-fourths inch nor more than 1½ inches solid pipe plugs having NPT threads.

(b) When the tank is divided into compartments by constructing each compartment as a separate tank, these tanks shall be joined together by a cylinder made of plate, having a thickness not less than that required for the tank shell and applied to the outside surface of tank head flanges. The cylinder shall fit the straight flange portion of the compartment tank head tightly. The cylinder shall contact the head flange for a distance of at least two times the plate thickness, or a minimum of 1 inch, whichever is greater. The cylinder shall be joined to the head flange by a full fillet weld. Distance from head seam to cylinder shall not be less than 1½ inches or three times the plate thickness, whichever is greater. Voids created by the space between heads of tanks joined together to form a compartment tank shall be provided with a tapped drain hole at their lowest point and a tapped hole at top of tank. The top hole shall be closed and the bottom hole may be closed with solid pipe plugs not less than ¾ inch nor more than 1½ inches having NPT threads.

§ 179.200-10 Welding. (a) All joints shall be fusion-welded in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W. Welding procedures, welders and fabricators shall be approved.

(b) Welding is not permitted on or to ductile iron or malleable iron fittings.

§ 179.200-11 Postweld heat treatment. After welding is complete, postweld heat treatment must be in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W, when specified in § 179.201-1.

§ 179.200-12 Tank mounting. See § 179.10.

§ 179.200-13 Manway ring or flange, safety relief device flange, bottom outlet nozzle flange, bottom washout nozzle flange and other attachments and openings. (a) These attachments shall be fusion welded to the tank and reinforced in an approved manner in compliance with the requirements of Appendix E, figure 10, of the AAR Specifications for Tank Cars.

(b) The opening in the manway ring must be at least 16 inches in diameter except that acid resistant lined manways must be at least 18 inches in diameter before lining.

(c) The manway ring or flange, shall be made of cast, forged or fabricated metal. The metal of the dome, tank, or nozzle must be compatible with the manway ring or flange, so that they may be welded together.

(d) The openings for the manway or other fittings shall be reinforced in an approved manner.

§ 179.200-14 Expansion capacity. (a) Tanks shall have expansion capacity as prescribed in § 179.201-1. This capacity shall be provided in the tank for Class DOT-111A cars, or in a dome for Class DOT-103 and 104 type cars.

(b) The capacity of the expansion dome, when used, shall be at least the percentage specified in § 179.201-1 of the total capacity of the tank and dome combined. The capacity of the dome shall be measured from the inside top of shell of tank to the inside top of dome or bottom of any vent pipe projecting inside of dome, except that when safety relief device is applied to side of dome, the effective capacity of the dome shall be measured from top of safety relief device opening inside of dome to inside top of shell of tank.

(c) The opening in the tank shell within the dome shall be at least 29 inches in diameter. When the opening in the tank shell exceeds 30

inches in diameter, the opening shall be reinforced in an approved manner. This additional reinforcement may be accomplished by the use of a dome opening of the flued-type as shown in Appendix E, Figure E 10C of the AAR Specifications for Tank Cars or by the use of reinforcing as outlined in Appendix E, E3 04 and Figures E10K and E10L. When the opening in the tank shell is less than the inside diameter of the dome, and the dome pocket is not closed off in an approved manner, dome pocket drain holes shall be provided in the tank shell with nipples projecting inside the tank at least 1 inch.

(d) The dome head shall be of approved contour and shall be designed for pressure on concave side.

(e) Aluminum alloy domes:

(1) The dome shell thickness shall be calculated by the formula in §179.200-6(a).

(2) The dome head may be an ellipsoid of revolution in which the major axis shall be equal to the diameter of the dome shell and the minor axis shall be one-half the major axis. The thickness in this case shall be determined by using formula in §179.200-6(a).

(3) The dome head, if dished, must be dished to a radius not exceeding 96 inches. Thickness of dished dome head must be calculated by the formula in §179.200-6(c).

(4) Tank shell shall be reinforced by the addition of a plate equal to or greater than shell in thickness and the cross sectional area shall exceed metal removed for dome opening, or tank shell shall be reinforced by a seamless saddle plate equal to or greater than shell in thickness and butt welded to tank shell. The reinforcing saddle plate shall be provided with a fluid opening having a vertical flange of the diameter of the dome for butt welding shell of dome to the flange. The reinforcing saddle plate shall extend about the dome a distance measured along shell of tank at least equal to the extension at top of tank. Other approved designs may be used.

(f) For thickness of carbon or alloy steel domes, see §179.201-2.

§ 179.200-15 Closures for manways. (a) Manway covers must be of approved type.

(b) Manway covers shall be designed to provide a secure closure of the manway.

(c) Manway covers must be of approved cast, forged, or fabricated metals. Malleable iron, if used, must comply with ASTM A47-68, Grade 35018. Cast iron manway covers must not be used.

(d) All joints between manway covers and their seats shall be made tight against leakage of vapor and liquid by use of gaskets of suitable material.

(e) For other manway cover requirements see §179.201-1.

§ 179.200-16 Gaging devices, top loading and unloading devices venting and air inlet devices. (a) When installed, these devices shall be of an approved design which will prevent interchange with any other fixture, and be tightly closed. Unloading pipes shall be securely anchored within the tank. Each tank or compartment may be equipped with one separate air connection.

(b) When the characteristics of the commodity for which the car is authorized are such that these devices must be equipped with valves or fittings to permit the loading and unloading of the contents, these devices, including valves, shall be of an approved design, and be provided with a protective housing except when plug or ball type valves with operating handles removed are used. Provision shall be made for closing pipe connections of valves.

(c) A tank may be equipped with a vacuum relief valve of an approved design. Protective housing is not required.

(d) When gaging device is required in §179.201-1, an outage scale visible through manway opening shall be provided. If loading devices are applied to permit tank loading with cover closed, a telltale pipe may be provided. Telltale pipe shall be capable of determining that required outage is provided. Pipe shall be equipped with ¼ inch minimum NPT control valve mounted outside tank and enclosed within a housing. Other approved devices may be used in lieu of outage scale or telltale pipe.

(e) Bottom of tank shell may be equipped with a sump or siphon bowl, or both, welded or pressed into the shell. Such sumps or siphon bowls, if applied, are not limited in size and must be made of cast, forged, or fabricated metal. Each sump or siphon bowl must be of good welding quality in conjunction with the metal of the tank shell. When sump or siphon bowl is pressed in the bottom of the tank shell, the wall thickness of the pressed section must not be less than that specified for the shell. The section of a circular cross section tank to which a sump or siphon bowl is attached need not comply with the out-of-roundness requirement specified in Appendix W, W14.06, of the AAR Specifications for Tank Cars. Any portion of a sump or siphon bowl not forming a part of a cylinder of revolution must have walls of such thickness and be so reinforced that the stresses in the walls caused by a given internal pressure are not greater than the circumferential stress which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with §179.200-6(a) and (d). In no case shall the wall thickness be less than that specified in §179.201-1(a).

(f) When top loading and discharge devices, or venting and air inlet devices are installed with exposed piping to a removed location, shutoff valves must be applied directly to reinforcing pads or nozzles at their communication through the tank shell, and must be enclosed in a protective housing with provision for a seal. The piping must include breakage grooves, and suitable bracing. Relief valves must be applied to liquid lines for protection in case lading is trapped. Provision must be made to insure closure of the valves while the car is in transit.

(g) Protective housing, when required, must be fabricated of approved material and have cover and sidewalls not less than 0.119 inch in thickness.

§ 179.200-17 Bottom outlets. (a) If indicated in §179.201-1, tank may be equipped with bottom outlet. Bottom outlet, if applied, must comply with the following requirements:

(1) The extreme projection of the bottom outlet equipment may not be more than that allowed by Appendix E of the AAR Specifications for Tank Cars. All bottom outlet reducers and closures and their attachments shall be secured to the car by at least ⅜-inch chain, or its equivalent, except that the bottom outlet closure plugs may be attached by ¼-inch chain. When the bottom outlet closure is of the combination cap and valve type, the pipe connection to the valve shall be closed by a plug, cap, or approved quick coupling device. The bottom outlet equipment should include only the valve, reducers and closures that are necessary for the attachment of unloading fixtures. The permanent attachment of supplementary exterior fittings shall be approved by the AAR Committee on Tank Cars.

(2) Bottom outlet must be of approved construction, and be provided with a liquid-tight closure at its lower end.

(3) On cars with center sills, a ball valve may be welded to the outside bottom of the tank or mounted on a pad or nozzle with a longue and groove or male and female flange attachment. In no case shall the breakage groove or equivalent extend below the bottom flange of the center sill. On cars without continuous center sills, a ball valve may be welded to the outside bottom of the tank or mounted with a longue and groove or male and female flange attachment on a pad attached to the outside bottom of the tank. The mounting pad must have a maximum thickness of 2½ inches measured on the longitudinal centerline of the tank. The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transit.

(4) The valve operating mechanism for valves applied to the interior of the tank, and outlet nozzle construction, must insure against the unseating of the valve due to stresses or shocks incident to transportation.

(5) Bottom outlet nozzle of interior valves and the valve body of exterior valves, must be of cast, fabricated, or forged metal. If welded to tank, they must be of good weldable quality in conjunction with metal of tank.

(6) To provide for the attachment of unloading connections, the discharge end of the bottom outlet nozzle or reducer, the valve body of the exterior valve, or some fixed attachment thereto, shall be provided with one of the following arrangements or an approved modification thereof. (See Appendix E, Fig. E17 of the AAR Specifications for Tank Cars for illustrations of some of the possible arrangements.)

(i) A bolted flange closure arrangement including a minimum 1-inch NPT pipe plug (see Fig. E17.1) or including an auxiliary valve with a threaded closure.

(ii) A threaded cap closure arrangement including a minimum 1-inch NPT pipe plug (see Fig. E17.2) or including an auxiliary valve with a threaded closure.

(iii) A quick-coupling device using a threaded plug closure of at least 1-inch NPT or having a threaded cap closure with a minimum 1-inch NPT pipe plug (see Fig. E17.3 through E17.5). A minimum 1-inch auxiliary test valve with a threaded closure may be substituted for the 1-inch pipe plug (see Fig. E17.6). If the threaded cap closure does not have a pipe plug or integral auxiliary test valve, a minimum 1-inch NPT pipe plug shall be installed in the outlet nozzle above the closure (see Fig. E17.7).

(iv) A two-piece quick-coupling device using a clamped dust cap must include an in-line auxiliary valve, either integral with the quick-coupling device or located between the primary bottom outlet valve and the quick-coupling device. The quick-coupling device closure dust cap or outlet nozzle shall be fitted with a minimum 1-inch NPT closure (see Fig. E17.8 and E17.9).

(7) If the outlet nozzle extends 6 inches or more from the shell of the tank, a V-shaped breakage groove shall be cut (not cast) in the upper part of the outlet nozzle at a point immediately below the lowest part of valve closet to the tank. In no case may the nozzle wall thickness at the root of the "V" be more than ¼ inch. The outlet nozzle on interior valves or the valve body on exterior valves may be steam jacketed, in which case the breakage groove or its equivalent must be below the steam chamber but above the bottom of center sill construction. If the outlet nozzle is not a single piece, or if exterior valves are applied, provisions shall be made for the equivalent of the breakage groove. On cars without continuous center sills, the breakage groove or its equivalent must be no more than 15 inches below the tank shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(3) The flange on the outlet nozzle or the valve body of exterior valves must be of a thickness which will prevent distortion of the valve seat or valve by any change in contour of the shell resulting from expansion of lading, or other causes, and which will insure that accidental breakage of the outlet nozzle will occur at or below the "V" groove, or its equivalent.

(9) The valve must have no wings or stem projecting below the "V" groove or its equivalent. The valve and seal must be readily accessible or removable for repairs, including grinding.

(10) The valve operating mechanism on interior valves must have means for compensating for variation in the vertical diameter of the tank produced by expansion, weight of the liquid contents, or other causes, and may operate from the interior of the tank, but in the event the rod is carried through the dome, or tank shell, leakage must be prevented by packing in stuffing box or other suitable seals and a cap.

(b) If indicated in § 179.201-1, tank may be equipped with bottom washout of approved construction. If applied, bottom washout shall be in accordance with the following requirements:

(1) The extreme projection of the bottom washout equipment may not be more than that allowed by Appendix E of the AAR Specifications for Tank Cars.

(2) Bottom washout shall be of cast, forged or fabricated metal. If welded to tank, they shall be of good weldable quality in conjunction with metal of tank.

(3) If the washout nozzle extends 6 inches or more from the shell of the tank, a V-shaped breakage groove shall be cut (not cast) in the upper part of the nozzle at a point immediately below the lowest part of the inside closure seat or plug. In no case may the nozzle wall thickness at the root of the "V" be more than ¼ inch. Where the nozzle is not a single piece, provisions shall be made for the equivalent of the breakage groove. The nozzle must be of a thickness to insure that accidental breakage will occur at or below the "V" groove or its equivalent. On cars without continuous center sills, the breakage groove or its equivalent may not be more than 15 inches below the outer shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(4) The closure plug and seat must be readily accessible or removable for repairs, including grinding.

(5) The closure of the washout nozzle must be equipped with a ¾-inch solid screw plug. Plug must be attached by at least a ¼-inch chain.

(6) Joints between closures and their seats may be gasketed with suitable material.

§ 179.200-18 Safety relief devices. (a) Safety relief valves.

(1) When permitted in § 179.201-1, each tank or compartment shall be equipped with one or more safety relief valves of approved design, made of metal not subject to rapid deterioration by the lading, and mounted on expansion dome of Class DOT-103 or 104 cars or top of tank shell of Class DOT-111A cars. Total valve discharge capacity shall be sufficient to prevent building up of pressure in the tank to more than 10 psi. above start-to-discharge pressure. See AAR Specifications for Tank Cars, Appendix A, for formula for calculating discharge capacity.

(2) The start-to-discharge pressures and vapor tight pressures shall comply with § 179.201-1.

(b) Safety vents:

(1) When permitted in § 179.201-1, each tank or compartment used for the transportation of corrosive liquids, flammable solids, oxidizing materials, or poisonous liquids or solids, Class B, need not be equipped with safety relief valves, but if not so equipped, shall have one safety vent at least 1¼ inches inside diameter, of an approved design which will prevent interchange with fixtures prescribed in § 179.200-16(a), and closed with a frangible disc of lead or other approved material of a thickness that will rupture at not more than 100 percent of tank test pressure. Means for holding disc in place shall be such as to prevent distortion or damage to disc when applied. Safety vent closure shall be chained or otherwise fastened to prevent misplacement. All tanks equipped with vents shall be stenciled "NOT FOR FLAMMABLE LIQUIDS."

§ 179.200-19 Reinforcements, when used, and appurtenances not otherwise specified. (a) All attachments to tank and dome shall be applied by approved means. Rivets if used shall be caulked inside and outside.

(b) Reinforcing pads must be used between external brackets and shells if the attachment welds exceed 6 lineal inches of ¼-inch fillet or equivalent weld per bracket or bracket leg. When reinforcing pads are used, they must not be less than one-fourth inch in thickness, have each corner rounded to a 1 inch minimum radius, and be attached to the tank by continuous fillet welds except for venting provisions. The ultimate shear strength of the bracket to reinforcing pad weld must not exceed 65 percent of the ultimate shear strength of the reinforcing pad to tank weld.

§ 179.200-20 Interior heater systems. (a) See § 179.12.

§ 179.200-21 Closures for openings. (a) All plugs shall be solid, with NPT threads, and shall be of a length which will screw at least 6 threads inside the face of fitting or tank. Plugs, when inserted from the outside of tank heads, shall have the letter "S" at least ⅜ inch in size stamped with steel stamp or cast on the outside surface to indicate the plug is solid.

§ 179.200-22 Test of tanks. (a) Each tank shall be tested by completely filling the tank and dome or nozzles with water, or other liquid having similar viscosity, of a temperature which shall not exceed 100° F. during the test; and applying the pressure prescribed in § 179.201-1. Tank shall hold the prescribed pressure for at least 10 minutes without leakage or evidence of distress. All rivets and closures, except safety relief valves or safety vents, shall be in place when test is made.

(b) Insulated tanks shall be tested before insulation is applied.

(c) Rubber-lined tanks shall be tested before rubber lining is applied.

(d) Caulking of welded joints to stop leaks developed during the foregoing tests is prohibited. Repairs in welded joints shall be made as prescribed in AAR Specifications for Tank Cars, Appendix W.

§ 179.200-23 Tests of safety relief valves. (a) Each valve shall be tested by air or gas for compliance with § 179.201-1 before being put in service.

§ 179.200-24 Stamping. (a) To certify that the tank complies with all specification requirements, each tank shall be plainly and permanently stamped in letters and figures at least ⅜ inch high into the metal near the center of both outside heads as follows:

	Example of required stamping
SPECIFICATION	DOT-103-W
MATERIAL	ASTM A285 C
CLADDING MATERIAL (if any)	ASTM A240-304 Clad
TANK BUILDER'S INITIALS	ABC
DATE OF ORIGINAL TEST	00-0000
CAR ASSEMBLER (if other than tank builder)	DEF

(b) On Class DOT-111 tank cars, the last numeral of the specification number may be omitted from the stamping; for example, DOT-111A100W.

§ 179.200-25 Stenciling. (a) The tank, or the jacket if tank is insulated, shall be stenciled in compliance with the requirements of AAR Specifications for Tank Cars, Appendix C.

§ 179.200-26 Certificate of construction. (a) See § 179.5.

§ 179.200-27 Alternative requirements for tank head puncture resistance systems.

Class DOT 111 tank cars required to have puncture resistance systems in accordance with § 179.105-5 may, as an alternative, be equipped with a head shield at each end of the car conforming to the requirements of § 179.100-23.

§ 179.201 Individual specification requirements applicable to non-pressure tank car tanks.

§ 179.201-1 Individual specification requirements. (a) In addition to § 179.200 the individual specification requirements are as follows:

DOT SPECIFICATIONS	103A-ALW	103AW	103ALW	103ANW	103BW	103CW	103DW	103EW
Material (see §179.200-7)	Al alloy	Steel	Al alloy	Nickel	Steel	Alloy steel	Alloy steel	Alloy steel
Insulation (see §179.200-4)	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Bursting pressure p.s.i. (see §179.200-5)	240	240	240	240	240	240	240	240
Minimum Plate thickness inches								
Shell (see §179.200-6)	½	179.201-2	½	179.201-2	179.201-2	179.201-2	179.201-2	179.201-2
Heads (see §179.200-6 and §179.200-8)	½	179.201-2	½	179.201-2	179.201-2	179.201-2	179.201-2	179.201-2
Dome	Required	Required	Required	Required	Required	Required	Required	Required
Minimum expansion capacity (see §179.200-14)	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome
Test pressure p.s.i. (see §179.200-22)	60	60	60	60	60	60	60	60
Safety relief devices (see §179.200-18)	Valve or vent	179.201-7	Valve or vent	179.201-7	Valve or vent	Valve	Valve or vent	Valve or vent
Valve start-to-discharge pressure p.s.i. (±3 p.s.i.)	35	35	35	35		35	35	35
Valve vapor tight pressure (minimum p.s.i.)	28	28	28	28		28	28	28
Valve flow rating pressure (maximum p.s.i.)	45	45	45	45		45	45	45
Vent bursting pressure (p.s.i.)	60	60	60	60	60	Prohibited	60	60
Gaging devices (see §179.200-16)	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Top loading and unloading devices (see § 179.200-16)	Required (valves optional)	Required (valves optional)	Optional	Required (valves optional)	Required (valves optional)	Required (valves optional)	Optional	Required (valves optional)
Bottom outlet (see §179.200-17(a))	Prohibited	Prohibited	Optional	Prohibited	Prohibited	Prohibited	Optional	Prohibited
Bottom washout (see §179.200-17(b))	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional	Optional
Closure for manway (see §179.200-15)			179.201-6(a)	179.201-6(d)	179.201-6(b)	179.201-6(c)	179.201-6(a), 179.201-6(c)	179.201-6(c)
Postweld heat treatment (HT) (see §179.200-11)	Prohibited	HT 179.202-6	Prohibited	Not required	HT	HT 179.201-5	HT 179.201-5	HT 179.201-5
Special references	179.202-10	179.202-7	179.202-21	179.202-8	179.201-3	179.201-4	179.201-4	179.201-4
	179.202-14	179.202-8		179.202-11	179.202-9	179.202-14		179.202-11
	179.202-21	179.202-11		179.202-16	179.202-12	179.202-15		179.202-15
		179.202-12		179.202-17		179.202-19		
		179.202-13				179.202-21		
		179.202-16						
		179.202-17						
		179.202-20						
		179.202-22						

DOT SPECIFICATIONS	103W	104W	111ASCALW1	111ASCALW2	111ASCW1[1]	111ASCW2	111ASCW5	111ASCW7
Material (see §179.200-7)	Steel	Steel	Al alloy	Al alloy	Steel	Steel	Steel	Alloy steel
Insulation (see §179.200-4)	Optional	Required	Optional	Optional	Optional	Optional	Optional	Optional
Bursting pressure p.s.i. (see §179.200-5)	240	240	240	240	240	240	240	240
Minimum plate thickness inches:								
Shell (see §179.200-6)	179.201-2	179.201-2	½	½	7/16	7/16	7/16	7/16
Heads (see §179.200-6 and §179.200-8)	179.201-2	179.201-2	½	½	7/16	7/16	7/16	7/16
Dome	Required	Required	None	None	None	None	None	None
Minimum expansion capacity (see §179.200-14)	2 percent in dome	2 percent in dome	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank
Test pressure p.s.i. (see §179.200-22)	60	60	60	60	60	60	60	60
Safety relief devices (see §179.200-18)	Valve or vent	Valve or vent	Valve or vent	Valve or vent	Valve or vent	179.201-7	Valve or vent	Valve or vent
Valve start-to-discharge pressure p.s.i. (±3 p.s.i.)	35	35	35	35	35	35		35
Valve vapor tight pressure (minimum p.s.i.)	28	28	28	28	28	28		28
Valve flow rating pressure (maximum p.s.i.)	45	45	45	45	45	45		45
Vent bursting pressure (p.s.i.)	60	60	60	50	60	60	60	60
Gaging devices (see §179.200-16)	Optional	Optional	Required	Required	Required	Required	Required	Optional
Top loading and unloading devices (see § 179.200-16)	Optional	Optional	Optional	Required (valves optional)	Optional	Required (valves optional)	Required (valves optional)	Required (valves optional)
Bottom outlet (see §179.200-17(a))	Optional	Optional	Optional	Prohibited	Optional	Prohibited	Prohibited	Prohibited
Bottom washout (see §179.200-17(b))	Optional	Optional	Optional	Optional	Optional	Optional	Prohibited	Prohibited
Closure for manway (see §179.200-15)	179.201-6(a)	179.201-6(a)	179.201-6(a)		179.201-6(a)		179.201-6(b)	179.201-6(c)
Postweld heat treatment (HT) (see §179.200-11)	HT	HT	Prohibited	Prohibited	HT	HT	HT	HT 179.201-5
Special references	179.202-2			179.202-21	179.202-2		179.201-3	179.201-4
	179.202-3				179.202-3			179.202-21
	179.202-4				179.202-5			
	179.202-5				179.202-6			
	179.202-6							
	179.202-19							

[1] Tanks converted to DOT-111A series from existing forge welded specification, DOT-105A300, 400 or 500 tanks, by modification using conversion details complying with DOT-111A specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

DOT SPECIFICATIONS	111A100ALW1	111A100ALW2	111A100W1[1]	111A100W2[1]	111A100W3	111A100W4	111A100W5	111A100W6	111A50F3,[1] 111A100F1,[1] 111A100F2,[1]
Material (see § 179.200-7)	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Alloy steel	
Insulation (see § 179.200-4)	Optional	Optional	Optional	Optional	Required	Required (179.201-11)	Optional	Optional	
Bursting pressure p.s.i. (see § 179.200-5)	500	500	500	500	500	500	500	500	
Minimum plate thickness inches									
Shell (see § 179.200-6)	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	
Heads (see § 179.200-6 and § 179.200-8)	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	
Dome	None	None	None	None	None	None	None	None	
Minimum expansion capacity (see § 179.200-14)	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	2 percent in tank	Footnote 2	2 percent in tank	2 percent in tank	
Test pressure p.s.i. (see § 179.200-22)	100	100	100	100	100	100	100	100	
Safety relief devices (see § 179.200-18)	Valve or vent	Valve or vent	Valve or vent	179.201-7	Valve or vent	Valve	Valve or vent	Valve or vent	
Valve start-to-discharge pressure p.s.i. (±3 p.s.i.)	75	75	75	75	75	75		75	
Valve vapor tight pressure (minimum p.s.i.)	60	60	60	60	60	60		60	
Valve flow rating pressure (maximum p.s.i.)	85	85	85	85	85	85		85	
Vent bursting pressure (p.s.i.)	100	100	100	100	100	Prohibited	100	100	
Gaging devices (see § 179.200-16)	Required	Required	Required	Required	Required	Required (179.201-9)	Required	Required	
Top loading and unloading device (see § 179.200-16)	Optional	Required (valves optional)	Optional	Required (valves optional)	Optional (if used, valves required)	Required (valves required)	Required (valves optional)	Optional (if used, valves required)	
Bottom outlet (see § 179.200-17(a))	Optional	Prohibited	Optional	Prohibited	Optional	Prohibited	Prohibited	Optional	
Bottom washout (see § 179.200-17(b))	Optional	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional	
Closure for manway (see § 179.200-15)	179.201-6(a)		179.201-6(a)		179.201-6(a)	179.201-6(a)	179.201-6(b)	179.201-6(a), 179.201-6(c)	
Postweld heat treatment (HT) (see § 179.200-11)	Prohibited	Prohibited	HT	HT	HT	HT	HT	HT 179.201-5	
Special references		179.202-21	179.202-2 179.202-5 179.202-6	179.202-6 179.202-7 179.202-8 179.202-11 179.202-12 179.202-13 179.202-17 179.202-20 179.202-22		179.201-8 179.201-10 179.202-18 179.202-19 179.202-20	179.201-3 179.202-9 179.202-12	179.201-4 179.202-14	

[1] Tanks converted to DOT-111A series from existing forge welded specification DOT-105A300, 400, or 500 tanks, by modification using conversion details complying with DOT-111A specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

[2] See § 173.314(c) of this subchapter for compressed gases and § 173.118 of this subchapter for flammable liquids, unless otherwise specified in Part 173, Subpart C.

§ 179.201-2 Minimum plate thickness. (a) The minimum plate thickness after forming must be as follows:

Inside diameter of tanks	Bottom sheets (inch)	Shell sheets (inch)	Expansion dome sheets (inch)	2:1 Ellipsoidal heads (inch)	3:1 Ellipsoidal and dished tank heads (inch)	Expansion dome heads (inch)	Interior compartment heads (inch)
60 inches or under	7/16	1/2	5/16	7/16	1/2	5/16	5/16
Over 60 to 78 inches	7/16	9/16	5/16	7/16	1/2	5/16	5/16
Over 78 to 96 inches	1/2[1]	5/8	5/16	7/16	1/2	5/16	3/8
Over 96 to 112 inches	1/2[1]	7/16	5/16	7/16	9/16	5/16	7/16
Over 112 to 122 inches	1/2	1/2	5/16	1/2	5/8	5/16	1/2

[1] May be reduced to 7/16 inch when approved steels having tensile strength of 65,000 psi or higher are used.

§ 179.201-3 Lined tanks. (a) Rubber-lined tanks.

(1) Each tank or each compartment thereof must be lined with acid-resistant rubber or other approved rubber compound vulcanized or bonded directly to the metal tank, to provide a non-porous laminated lining, at least 5/32-inch thick, except over all rivets and seams formed by riveted attachments in the lining must be double thickness. The rubber lining must overlap at least 1½ inches at all edges which must be straight and be beveled to an angle of approximately 45°, or butted edges of lining must be sealed with a 3-inch minimum strip of lining having 45° beveled edges.

(2) As an alternate method, the lining may be joined with a skived butt seam then capped with a separate strip of lining 3 inches wide having 45° beveled edges. An additional rubber reinforcing pad at least 4½ feet square and at least 1/8-inch thick must be applied by vulcanizing to the lining on bottom of tank directly under the manway opening. The edges of the rubber pad must be beveled to angle of approximately 45°. An opening in this pad for sump is permitted. No lining must be under tension when applied except due to conformation over rivet heads. Interior of tank must be free from scale, oxidation, moisture, and all foreign matter during the lining operation.

(3) Other approved lining materials may be used provided the material is resistant to the corrosive or solvent action of the lading in the liquid or gas phase and is suitable for the service temperatures.

(b) Before a tank car tank is lined with rubber, or other rubber compound, a report certifying that the tank and its equipment have been brought into compliance with spec. DOT-103B, 103B-W, 111A60W-5, or 111A100W-5 must be furnished by car owner to the party who is to apply the lining. A copy of this report in approved form, certifying that tank has been lined in compliance with all requirements of one of the above specifications, must be furnished by party lining tank to car owner. Reports of the latest lining application must be retained by the car owner until the next relining has been accomplished and recorded.

(c) All rivet heads on inside of tank must be buttonhead, or similar shape, and of uniform size. The under surface of heads must be driven tight against the plate. All plates, castings and rivet heads on the inside of the tank must be caulked. All projecting edges of plates, castings and rivet heads on the inside of the tank must be rounded and free from fins and other irregular projections. Castings must be free from porosity.

(d) All surfaces of attachments or fittings and their closures exposed to the lading must be covered with at least 1/8-inch acid resistant material. Attachments made of metal not affected by the lading need not be covered with rubber or other acid resistant material.

(e) Hard rubber or polyvinyl chloride may be used for pressure retaining parts of safety vents provided the material is resistant to the corrosive or solvent action of the lading in the liquid or gas phase and is suitable for the service temperatures.

(f) Polyvinyl chloride lined tanks. Tank car tanks or each compartment thereof may be lined with elastomeric polyvinyl chloride having a minimum lining thickness of three thirty-seconds inch.

(g) Polyurethane lined tanks. Tank car tanks or each compartment thereof may be lined with elastomeric polyurethane having a minimum lining thickness of one-sixteenth inch.

§ 179.201-4 Material. All fittings, tubes, and castings and all projections and their closures, except for protective housing, must also meet the requirements specified in AAR Specifications for Tank Cars, Appendix M, M3.03(b) and M4.05(d).

§ 179.201-5 Postweld heat treatment and corrosion resistance. (a) Tanks and attachments welded directly thereto must be postweld heat treated as a unit at the proper temperature except as indicated below. Tanks and attachments welded directly thereto fabricated from ASTM A240-70 Type 430A, Type 304 and Type 316 materials must be postweld heat treated as a unit and must be tested to demonstrate that they possess the corrosion resistance specified in § 179.200-7(d), Footnote 2. Tanks and attachments welded directly thereto, fabricated from ASTM A 240-70 Type 304L or Type 316L materials are not required to be postweld heat treated.

(b) Tanks and attachments welded directly thereto, fabricated from ASTM A240-70 Type 304L and Type 316 materials must be tested to demonstrate that they possess the corrosion resistance specified in § 179.200-7(d), Footnote 2.

§ 179.201-6 Manways and manway closures. (a) The manway cover for spec. DOT-103ALW, 103DW, 103W, 104W,

111A60ALW1, 111A60W1, 111A100ALW1, 111A100W1, 111A100W3, or 111A100W5 must be designed to make it impossible to remove the cover while the interior of the tank is subjected to pressure.

(b) The manway cover for spec. DOT-103BW, 111A60W5, or 111A100W5 must be made of a suitable metal. The top, bottom and edge of manway cover must be acid resistant material covered as prescribed in §179.201-3. Through-bolt holes must be lined with acid resistant material at least one-eighth inch in thickness. Cover made of metal not affected by the lading need not be acid resistant material covered.

(c) The manway ring and cover for spec. DOT-103CW, 103DW, 103EW, 111A60W7, or 111A100W6 must be made of the metal and have the same inspection procedures specified in AAR Specifications for Tank Cars Appendix M, M3.03.

(d) The manway ring for DOT-103 AW must be made of cast, forged or fabricated nickel and be a good weldable quality in conjunction with the metal of the dome. Manway cover must be made of nickel.

§ 179.201-7 Safety relief devices. (a) Each tank or compartment must be equipped with a safety vent unless characteristics of the lading require a safety relief valve. These devices must comply with §179.200-18.

(b) Safety vents, if used, shall be of approved design, at least 1¼ inches inside diameter, made of material not subject to rapid deterioration by the lading, and closed with a frangible disc of lead or other approved material of a thickness that will burst at not more than 100 percent of tank test pressure. Means for holding the disc in place shall be such as to prevent distortion or damage to the disc when applied. The safety vent closure shall be chained or otherwise fastened to prevent misplacement.

(c) Safety relief valves, if used, shall be of approved design, made of metal not subject to rapid deterioration by the lading, and mounted on expansion dome of Class DOT-103 and 104 type tanks, or top of tank shell for Class DOT-111A type tanks.

§ 179.201-8 Sampling device and thermometer well. (a) Sampling valve and thermometer well are not specification requirements. When used, they must be of approved design, made of metal not subject to rapid deterioration by lading, and must withstand a pressure of 100 pounds per square inch without leakage. Interior pipes of the sampling valve must be equipped with excess flow valves of an approved design. Interior pipe of thermometer well must be closed by an approved valve attached close to fitting where it passes through the tank and closed by a screw plug. Other approved arrangements that permit testing thermometer well for leaks without complete removal of the closure may be used.

§ 179.201-9 Gaging device. A gaging device of an approved design must be applied to permit determining the liquid level of the lading. The gaging device must be made of materials not subject to rapid deterioration by the lading. When the interior pipe of the gaging device provides a means for passage of the lading from the interior to the exterior of the tank, it must be equipped with an excess flow valve of an approved design. If the opening for passage of lading through the gaging device is not more than 0.060 inch diameter an excess flow valve is not required. The gaging device must be provided with a protective housing.

§ 179.201-10 Water capacity marking. (a) Water capacity of the tank in pounds stamped plainly and permanently in letters and figures at least ⅜ inch high into the metal of the tank immediately below the stamped marks specified in §179.200-24(a). This mark shall also be stenciled on the jacket immediately below the dome platform and directly behind or within 3 feet of the right or left side of the ladder, or ladders, if there is a ladder on each side of the tank, in letters and figures at least 1½ inches high as follows:

WATER CAPACITY
000000 Pounds

§ 179.201-11 Insulation. (a) Insulation shall be of sufficient thickness so that the thermal conductance at 60° F. is not more than 0.075 Btu. per hour, per square foot, per degree F. temperature differential.

§ 179.202 Special commodity requirements for non-pressure tank car tanks. (a) In addition to §§179.200 and 179.201 the following requirements are applicable:

§ 179.202-1 Flammable liquids not specifically provided for. Tank cars used to transport flammable liquids not specifically provided for must have manway closures so designed that pressure will be released automatically by starting the operation of removing the manway cover.

§ 179.202-2 Dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, vinyl trichlorosilane, methyl dichlorosilane and trichlorosilane. Tank cars used to transport dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, vinyl trichlorosilane, methyl dichlorosilane, and trichlorosilane, must not be equipped with bottom discharge outlet.

§ 179.202-3 Amyl mercaptan, Butyl mercaptan, Ethyl mercaptan, Isopropyl mercaptan, Propyl mercaptan, and Aliphatic mercaptan mixtures. Tank cars used to transport amyl mercaptan, butyl mercaptan, ethyl mercaptan, isopropyl mercaptan, propyl mercaptan, and aliphatic mercaptan mixtures must have bottom outlets effectively sealed. Bottom washout permitted.

§ 179.202-4 Potassium nitrate mixed (fused) with Sodium nitrite. Tank cars used to transport Potassium nitrate mixed (fused) with Sodium nitrite shall be specially designed, equipped and approved for this service, without bottom discharge outlet and with heavier plate thicknesses than the minimum prescribed for cars built under this specification. For spec. 103-W tank cars made of plates having the minimum prescribed thicknesses, internal reinforcement of the upper sheets of tank in the region of the dome and reinforcing plates attached to the bottom sheet of the tank which rests on bolsters is required, and these tanks shall be equipped with baffle plates. Heater pipes shall be of welded construction designed for a test pressure of 500 pounds per square inch. A one inch woven asbestos lining shall be placed between bolster stabbing and bottom of tank to prevent heat transmission. Safety vents of the frangible disc type may be used and if used the frangible discs shall be perforated with ⅛ inch hole. If safety relief valves are used, a vacuum relief valve shall be installed on the dome.

§ 179.202-5 Phosphorus, white or yellow. Tank cars used to transport phosphorus, white or yellow, must be equipped with approved dome fittings, external heater systems and with insulation at least 4 inches in thickness, except that thickness of insulation may be reduced to 2 inches over external heater coils. Bottom washout nozzle of approved design may be applied. Bottom outlet for discharge of lading prohibited.

§ 179.202-6 Cumene hydroperoxide, Diisopropylbenzine hydroperoxide and Paramenthane hydroperoxide. Tank cars used to transport cumene hydroperoxide of strength not exceeding 90 percent in a nonvolatile solvent. Paramenthane hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent and diisopropylbenzene hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent, must have bottom outlets effectively sealed from the inside.

§ 179.202-7 Titanium tetrachloride, anhydrous. Tank cars used to transport titanium tetrachloride, anhydrous, must be equipped with safety relief valves. Safety vents not permitted.

§ 179.202-8 Chloracetyl chloride. Tank cars used to transport chloracetyl chloride must have a nickel cladding with a minimum thickness of 1/16 inch. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162-60. Specification DOT-103AW tank car tanks used to transport chloracetyl chloride shall be fabricated or solid nickel at least 95 percent pure and containing not more than 1 percent iron. Metal test coupons for welding procedure qualification must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of 96.7 percent.

§ 179.202-9 Hydrochloric (muriatic) acid, hydrochloric (muriatic) acid mixtures, hydrochloric (muriatic) acid solution, inhibited; sodium chlorite solution (not exceeding 42 percent sodium chlorite), and cleaning compounds, liquid, containing hydrochloric (muriatic) acid. (a) For acids not over 38 percent strength by weight, except hydrochloric (muriatic) acid of not over 22° Baume strength, tank cars may be equipped with safety vent of approved design having a frangible disc with ⅛-inch breather hole in the center, or a safety vent of approved design using carbon discs permitting continuous venting.

(b) Sodium chlorite solution. Specification DOT-103C-W tank cars having tanks of Type 304L stainless steel authorized for sodium chlorite solution not exceeding 42 percent sodium chlorite only.

§ 179.202-10 Hydrogen peroxide solution in water exceeding 52 percent by weight. Tank cars used to transport hydrogen peroxide solution in water exceeding 52 percent by weight, must be equipped with a venting arrangement approved by the Bureau of Explosives.

§ 179.202-11 Phosphorus oxybromide, Phosphorus oxychloride, Phosphorus trichloride, and Thiophosphoryl chloride. Specification DOT-103ANW tank cars used to transport phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride, shall be fabricated of solid nickel at least 95 percent pure and containing not more than 1 percent iron. Metal test coupon for welding procedure qualification must contain not more than 1 percent iron. All cast metal parts of the tank in contact with the lading must have a minimum nickel content of approximately 96.7 percent. Specification 103A tank cars used to transport phosphorus oxybromide, phosphorus oxychloride, thiophosphoryl chloride must be lead-lined steel, or made of steel with a nickel cladding of at least 10 percent of the shell thickness. Specifications DOT-103AW, 111A100F2, or 111A60W2 tank cars used to transport phosphorus oxybromide, phosphorus oxychloride, thiophosphoryl chloride must be lead-lined steel or made of steel with a minimum thickness of nickel cladding of 1/8-inch. Nickel cladding must be low carbon nickel in accordance with ASTM B162-80. Specification 103EW tank cars used to transport phosphorus trichloride and thiophosphoryl chloride must have tanks fabricated from Type 316 stainless steel. Unlined Specification 103A, 103AW, 111A100F2, or 111A100W2 tank cars are authorized for phosphorus trichloride only.

§ 179.202-12 Sulfuric acid of concentrations 65.25 percent (approximately 1.559 specific gravity) (52° Baume) or greater. (a) Specifications DOT-103A, 103A-W, 111A100F2 or 111A100W2 tank cars used for this service may be equipped with safety vent of approved design having a frangible disc with 1/8-inch breather hole in the center.

(b) Specifications DOT-103A, 103A-W, 111A100F2 or 111A100W2 tank cars used in oleum and other fuming acids must be equipped with safety vent of approved design. Breather hole in frangible disc prohibited. Safety valve prohibited.

§ 179.202-13 Sulfur trioxide, stabilized. Tank cars used to transport sulfur trioxide, stabilized must be equipped with safety relief valves of approved design. Tanks equipped with interior heating coils are not permitted. Specification 103AW tank cars may be equipped with standpipe electrical heaters approved by the AAR Committee on Tank Cars.

§ 179.202-14 Anhydrous hydrazine and Hydrazine solution containing 50 percent or less of water. (a) Tank cars used to transport Anhydrous hydrazine or Hydrazine solutions containing 50 percent or less water, must have tanks fabricated of Type 304L stainless steel with molybdenum content not exceeding one-half of 1 percent. Specification DOT-111A100W6 tanks must not be equipped with bottom outlet.

(b) Safety relief valves for specification DOT-103C-W tank cars may have a start-to-discharge pressure of 45 p.s.i. with a tolerance of plus or minus 3 p.s.i. and a vapor tight pressure of 36 p.s.i. Refer to AAR Specifications for Tank Cars, Appendix A, A8.05.

(c) Specification 103A-ALW tank cars authorized for transporting Anhydrous hydrazine only, may have tanks equipped with a safety relief valve having start-to-discharge pressure of not more than 45 p.s.i. with a tolerance of plus or minus 3 p.s.i. and a vapor tight pressure of 36 p.s.i. Refer to AAR Specifications for Tank Cars, Appendix A, A8.05.

§ 179.202-15 Formic acid and Formic acid solutions. If a specification DOT-103EW tank car tank is used, it must be fabricated from Type 316 stainless steel.

§ 179.202-16 Monochloroacetic acid, liquid. (a) Tank cars used to transport chloroacetic acid, liquid, must have tanks with nickel cladding of at least 20 percent of the shell thickness. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162-80.

(b) Chloroacetic acid, anhydrous, when shipped as a liquid, shall be shipped in Specification 103ANW tank car tanks fabricated of nickel containing not more than 1 percent iron, or in Specification 103AW or 111A60W2 tank car tanks with nickel cladding of at least 20 percent of the shell thickness, or be provided with a suitable corrosion resistant coating or lining. Metal test coupons for welding procedure qualification must contain not more than 1 percent iron. Nickel cladding in tanks must be low carbon nickel in accordance with ASTM B162-80.

§ 179.202-17 Benzyl chloride. Specification DOT-103ANW tank cars used to transport Benzyl chloride must have all cast metal parts in contact with the lading made from metal having a minimum nickel content of 96.7 percent.

§ 179.202-18 Ethylene oxide. (a) Each tank car used to transport ethylene oxide must be constructed to be in compliance with the following special requirements:

(1) The tank must be constructed in accordance with the DOT-111A100W4 specification.

(2) The safety relief valve, if not located on the manway nozzle, must be protected by an approved and insulated protective housing. Each safety relief valve must have its discharge piped to the top of the manway bonnet assembly or protective housing. Vapor exit from the manway bonnet assembly or protective housing must be provided through a full opening weather cap located directly above the safety valve vent pipe. Compliance with this provision is required after January 31, 1975, except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by July 31, 1976.

(3) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part or appurtenance is normally in contact with ethylene oxide liquid or vapor.

(4) Interior pipes of liquid discharge valves, vapor lines, gaging devices (when the device provides a means for passage of the lading from the interior to the exterior of the tank) and sampling lines must be equipped with excess flow valves of an approved design.

(5) Each tank must be equipped with a thermometer well.

(6) Each tank must be insulated with glass fiber except tank cars built before January 31, 1975, are authorized in this service when insulated with cork.

(7) Manway nozzle, cover plate, and protective housing must be of approved design. The manway protective housing and cover must be insulated with glass fiber or other material that will provide protection against heat deterioration of the valves and any resilient material contained within the housing. Compliance with this provision is mandatory after January 31, 1975, except that tank cars which are in compliance and were built before January 31, 1975, must be in compliance by July 31, 1976.

(8) Neoprene, natural rubber, and asbestos gaskets are prohibited. All valve stem packings, O-rings, and gaskets must be constructed of materials which do not react spontaneously with or lower the autoignition temperature of ethylene oxide.

(9) Vacuum relief valves are prohibited.

(10) After December 31, 1986, each tank built with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J.

(11) Specification 111 tank cars built after March 1, 1984, are not authorized for the transportation of ethylene oxide.

§ 179.202-19 Dimethylhydrazine, unsymmetrical. Tank cars used to transport Dimethylhydrazine, unsymmetrical, must be equipped with steel safety valves of approved design. Specification DOT-103-W tank cars must not be equipped with bottom outlets.

§ 179.202-20 Hydrofluoric acid. Breather hole in frangible disc prohibited.

§ 179.202-21 Nitric acid. (a) Tank cars used to transport Nitric acid must comply with the following requirements:

(1) Bottom washout or bottom outlet is prohibited unless effectively sealed with an approved arrangement to prevent use during loading and unloading of acid.

(2) Safety vent is prohibited.

§ 179.202-22 Mixed acid (nitric and sulfuric acid) (nitrating acid). Specifications DOT-103A, 103AW, 111A100F1 or 111A100W2 tank cars used in nitrating and other fuming acids service must be equipped with safety vent of approved design. Breather hole in frangible disc prohibited. Safety valve prohibited.

§ 179.203 Special requirements for specification 111 tank cars.

§ 179.203-1 General.

(a) In addition to the requirements of this section, each tank car built under specification 111 shall meet the applicable requirements of §§ 179.200, 179.201, and 179.202.

(b) Notwithstanding the provisions of §§ 179.3, 179.4, and 179.6, AAR approval is not required for changes in or additions to specification 111 tank cars in order to comply with this section.

(c) Notwithstanding the provisions of § 173.8 of this subchapter, no specification 111 tank car manufactured to specifications promulgated by the Canadian Transport Commission may be used after February 28, 1985, to transport hazardous materials in the United States unless it is equipped with a coupler vertical restraint system that meets the requirements of § 179.105-6.

(d) Notwithstanding the provisions of § 173.9 of this subchapter, no specification 111 tank car manufactured to specifications promulgated by the Canadian Transport Commission and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, may be used after December 31, 1986, to transport flammable gases or ethylene oxide unless it is equipped in accordance with § 179.203-2.

(e) Specification 111 tank cars built after March 1, 1984 are not permitted for the transportation of flammable gases or ethylene oxide.

§ 179.203-2 Previously built cars.

(a) Each specification 111J tank car built before March 1, 1984, shall be equipped with:

(1) A coupler vertical restraint system that meets the requirements of § 179.105-6;

(2) A thermal protection system that meets the requirements of § 179.105-4;

(3) A safety relief valve that meets the requirements of § 179.105-7; and

(4) A tank head puncture resistance system that meets the requirements of § 179.105-5.

§ 179.203-3 Stenciling.
Each specification 111 tank car built before March 1, 1984 that is equipped as prescribed in § 179.203-2(a) shall be stenciled by having the letter "J" substituted for the letter "A" in the specification marking.

§ 179.220 General specifications applicable to nonpressure tank car tanks consisting of an inner container supported within an outer shell (class DOT-115).

§ 179.220-1 Tanks built under these specifications must meet the requirements of § 179.220, § 179.221 and § 179.222.

§ 179.220-2 Approval. For procedures in securing approval, see § 179.3.

§ 179.220-3 Type. (a) Tanks built under these specifications must consist of an inner container, a support system for the inner container, and an outer shell.
(b) The inner container must be a fusion welded tank of circular cross section with formed heads designed convex outward and must have a manway on top of the tank as prescribed herein. When the inner container is divided into compartments, each compartment must be considered a separate container.
(c) The outer shell must be a fusion welded tank with formed heads designed convex outward.

§ 179.220-4 Insulation. The annular space between the inner container and the outer shell must contain an approved insulation material.

§ 179.220-5 Bursting pressure. The minimum required bursting pressure of the inner container is listed in § 179.221-1.

§ 179.220-6 Thickness of plates. (a) The wall thickness, after forming of the inner container shell and 2:1 ellipsoidal heads must be not less than specified in § 179.221-1, or not less than that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:
d = Inside diameter in inches;
E = 0.9 welded joint efficiency; except E = 1.0 for seamless heads;
P = Minimum required bursting pressure in p.s.i.;
S = Minimum tensile strength of plate material in p.s.i. as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M1;
t = Minimum thickness of plate in inches after forming.
(b) The wall thickness after forming of the inner container heads, if flanged and dished, must be not less than specified in § 179.221-1, or not less than that calculated by the following formula:

$$t = \frac{5PL}{6SE}$$

where:
E = 0.9 welded joint efficiency; except E = 1.0 for seamless heads;
L = Main inside radius to which head is dished, measured on concave side in inches;
P = Minimum required bursting pressure in p.s.i.;
S = Minimum tensile strength of plate material in p.s.i. as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M1;
t = Minimum thickness of plate in inches after forming.
(c) The wall thickness after forming of the cylindrical section and heads of the outershell must be not less than seven-sixteenths inch.
(d) See § 179.220-9 for plate thickness requirements for inner container when divided into compartments.

§ 179.220-7 Materials. (a) The plate material used to fabricate the inner container and nozzles must meet one of the following specifications and with the indicated minimum tensile strength and elongation in the welded condition.
(b) Carbon steel plate: The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials.

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A 515-70, Gr. 55	55,000	28
ASTM A 515-70, Gr. 60	60,000	25
ASTM A 515-70, Gr. 65	65,000	20
ASTM A 515-70, Gr. 70	70,000	20
ASTM A 285-70a, Gr. A	45,000	29
ASTM A 285-70a, Gr. B	50,000	20
ASTM A 285-70a, Gr. C	55,000	20
ASTM A 516-70a, Gr. 55	55,000	28
ASTM A 516-70a, Gr. 60	60,000	25
ASTM A 516-70a, Gr. 65	65,000	20
ASTM A 516-70a, Gr. 70	70,000	20
AAR TC128-70, Gr. A and B	81,000	19

[1] Maximum stresses to be used in calculations.

(c) Aluminum alloy plate: Aluminum alloy plate must be suitable for welding and comply with one of the following specifications:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1][2]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM B 209-70, Alloy 5052[3]	25,000	18
ASTM B 209-70, Alloy 5083[3]	38,000	16
ASTM B 209-70, Alloy 5086[3]	35,000	14
ASTM B 209-70, Alloy 5154[3]	30,000	18
ASTM B 209-70, Alloy 5254[3]	30,000	18
ASTM B 209-70, Alloy 5454[3]	31,000	18
ASTM B 209-70, Alloy 5652[3]	25,000	18
ASTM B 209-70, Alloy 6061[4]	24,000[5]	5[5]

[1] For fabrication, the parent plate material may be 0, H112, or H32 temper, but design calculations must be based on minimum tensile strength shown.
[2] 0 temper only.
[3] Weld filler metal 5556 must not be used.
[4] Not authorized for tank shells, manways or domes.
[5] T6 temper only.
[6] Maximum stress to be used in calculations.

(d) High alloy steel plate: High alloy steel plate must comply with one of the following specifications:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A240-70, Type 304	75,000	30
ASTM A240-70, Type 304L	70,000	30
ASTM A240-70, Type 316	75,000	30
ASTM A240-70, Type 316L	70,000	30

[1] Maximum stresses to be used in calculations.

(e) Manganese-molybdenum steel plate: Manganese-molybdenum steel plate must be suitable for fusion welding and must comply with the following specification:

Specifications	Minimum tensile strength (p.s.i.) welded condition[1]	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A302-70a, Gr. B	80,000	20

[1] Maximum stresses to be used in calculations.

(f) Plate materials used to fabricate the outer shell and heads must be those listed in paragraphs (b), (c), (d), or (e) of this section. The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials.
(g) All appurtenances on the inner container in contact with the lading must be made of approved material compatible with the plate material of the inner container. These appurtenances must not be subject to rapid deterioration by the lading, or must be coated or lined with suitable corrosion resistant material. See AAR Specifications for Tank Cars, Appendix M, M4.05 for approved material specifications for castings for fittings.

§ 179.220-8 Tank heads. (a) Tank heads of the inner container, inner container compartments and outer shell must be of approved contour, and may be flanged and dished or ellipsoidal for pressure on concave side.
(b) Flanged and dished heads must have main inside radius not exceeding 10 feet and inside knuckle radius must be not less than 3¾ inches for steel and alloy steel tanks nor less than 5 inches for aluminum alloy tanks.
(c) Ellipsoidal heads must be ellipsoid of revolution in which the major axis must equal the diameter of the shell and the minor axis must be one-half the major axis.

§ 179.220-9 Compartment tanks. (a) The inner container may be divided into compartments by inserting interior heads, or by fabricating each compartment as a separate container and joining with a cylinder, or by fabricating each compartment as a separate tank without a joining cylinder. Each compartment must be capable of withstanding, without evidence of yielding or leakage, the required test pressure applied in each compartment separately, or in any combination of compartments.
(b) When the inner container is divided into compartments by fabricating each compartment as a separate container and joining with a cylinder, the cylinder must have a plate thickness not less than that required for the inner container shell and must be applied to the outside surface of the straight flange portion of the container head. The cylinder must fit the straight flange tightly for a distance of at least two times the plate thickness, or 1 inch, whichever is greater and must be joined to the straight flange by a full fillet weld. Distance from fillet weld seam to container head seam must be not less than 1½ inches or three times the plate thickness, whichever is greater.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 179.220-10 Welding. (a) All joints must be fusion-welded in compliance with AAR Specifications for Tank Cars, Appendix W. Welding procedures, welders, and fabricators shall be approved.

(b) Radioscopy of the outer shell is not a specification requirement.

(c) Welding is not permitted on or to ductile iron or malleable iron fittings.

§ 179.220-11 Postweld heat treatment. (a) Postweld heat treatment of the inner container is not a specification requirement.

(b) Postweld heat treatment of the cylindrical portions of the outer shell to which the anchorage or draft sills are attached must comply with AAR Specifications for Tank Cars, Appendix W.

(c) When cold formed heads are used on the outer shell they must be heat treated before welding to shell if postweld heat treatment is not practicable due to assembly procedures.

§ 179.220-12 Tank mounting. See § 179.10

§ 179.220-13 Inner container manway nozzle and cover. (a) Inner container manway nozzle must be of approved design with access opening at least 18 inches inside diameter, or at least 14 inches by 18 inches obround or oval.

(b) Manway covers must be of approved type. Design must provide a secure closure of the manway and must make it impossible to remove the cover while the tank interior is under pressure.

(c) All joints between manway covers and their seats must be made tight against leakage of vapor and liquid by use of suitable gaskets.

(d) Manway covers must be cast, forged, or fabricated metal complying with subsection § 179.220-7(g) of this section.

(e) A seal must be provided between the inner container manway nozzle and the opening in the outer shell.

§ 179.220-14 Openings in the tanks. Openings in the inner container and the outer shell must be reinforced in compliance with AAR Specifications for Tank Cars, Appendix E. In determining the required reinforcement area for openings in the outer shell, *t* shall be one-fourth inch.

§ 179.220-15 Support system for inner container. (a) The inner container must be supported within the outer shell by a support system of adequate strength and ductility at its operating temperature to support the inner container when filled with liquid lading to any level. The support system must be designed to support, without yielding, impact loads producing accelerations of the following magnitudes and directions when the inner container is loaded so that the car is at its rail load limit, and the car is equipped with a conventional AAR Specification M-901 draft gear.

Longitudinal	7G
Transverse	3G
Vertical	3G

(b) The longitudinal acceleration may be reduced to 3G where a cushioning device of approved design, which has been tested to demonstrate its ability to limit body forces of 400,000 pounds maximum at a 10 miles per hour impact, is used between the coupler and the tank structure. The support system must be of approved design and the inner container must be thermally isolated from the outer shell to the best practical extent. The inner container and outer shell must be permanently bonded to each other electrically either by the support system used, piping, or by a separate electrical connection of approved design.

§ 179.220-16 Expansion capacity. Expansion capacity must be provided in the shell of the inner container as prescribed in § 179.221-1.

§ 179.220-17 Gaging devices, top loading and unloading devices, venting and air inlet devices. (a) When installed, each device must be of approved design which will prevent interchange with any other fixture and must be tightly closed. Each unloading pipe must be securely anchored within the inner container. Each inner container or compartment thereof may be equipped with one separate air connection.

(b) When the characteristics of the commodity for which the car is authorized require these devices to be equipped with valves or fittings to permit the loading and unloading of the contents, these devices including valves, shall be provided with a protective housing except when plug or ball-type valves with operating handles removed are used. Provision must be made for closing pipe connections of valves.

(c) Inner container may be equipped with a vacuum relief valve of approved design. Protective housing is not required.

(d) When a gaging device is required in § 179.221-1, an outage scale visible through the manway opening and must be provided. If loading devices are applied permit tank loading with cover closed, a tell tale pipe may be provided. The telltale pipe must be capable of determining that required outage is provided. The pipe must be equipped with ¼-inch maximum, NPT control valve mounted outside tank and enclosed within a protective housing. Other approved devices may be used in place of an outage scale or a telltale pipe.

(e) The bottom of the tank shell may be equipped with a sump or siphon bowl, or both, welded or pressed into the shell. These sumps or siphon bowls, if applied, are not limited in size and must be made of cast, forged, or fabricated metal. Each sump or siphon bowl must be of good welding quality in conjunction with the metal of the tank shell. When the sump or siphon bowl is pressed in the bottom of the tank shell, the wall thickness of the pressed section must not be less than that specified for the shell. The section of a circular cross section tank to which a sump or siphon bowl is attached need not comply with the out of roundness requirement specified in Appendix W, W14.06 of the AAR Specifications for Tank Cars. Any portion of a sump or siphon bowl not forming a part of a cylinder of revolution must have walls of such thickness and must be so reinforced that the stresses in the walls caused by a given internal pressure are not greater than the circumferential stress which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with §§ 179.220-6(a) and 179.220-9. In no case shall the wall thickness be less than that specified in § 179.221-1(a).

(f) Protective housing, when required, must be of approved material and must have cover and sidewalls not less than 0.119 inch in thickness.

§ 179.220-18 Bottom outlets. (a) The inner container may be equipped with a bottom outlet of approved design and an opening provided in the outer shell for its access. If applied, the bottom outlet must comply with the following requirements:

(1) The extreme projection of the bottom outlet equipment may not be more than that allowed by Appendix E of the AAR Specifications for Tank Cars. All bottom outlet reducers and closures and their attachments shall be secured to car by at least ⅜-inch chain, or its equivalent, except that bottom outlet closure plugs may be attached by ¼-inch chain. When the bottom outlet closure is of the combination cap and valve type, the pipe connection to the valve shall be closed by a plug, or cap. The bottom outlet equipment should include only the valve, reducers and closures that are necessary for the attachment of unloading fixtures. The permanent attachment of supplementary exterior fittings shall be approved by the AAR Committee on Tank Cars.

(2) Each bottom outlet must be provided with a liquid tight closure at its lower end.

(3) The valve and its operating mechanism must be applied to the outside bottom of the inner container. The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transportation.

(4) Valve outlet nozzle and valve body must be of cast, fabricated or forged metal. If welded to inner container, they must be of good weldable quality in conjunction with metal of tank.

(5) To provide for the attachment of unloading connections, the bottom of the main portion of the outlet nozzle or valve body, or some fixed attachment thereto, must be provided with threaded cap closure arrangement or bolted flange closure arrangement having minimum 1-inch threaded pipe plug.

(6) If outlet nozzle and its closure extends below the bottom of the outer shell, a V-shaped breakage groove shall be cut (not cast) in the upper part of the outlet nozzle at a point immediately below the lowest part of the valve closest to the tank. In no case may the nozzle wall thickness at the root of the "V" be more than ¼-inch. The outlet nozzle or the valve body may be steam jacketed, in which case the breakage groove or its equivalent must be below the steam chamber but above the bottom of the center sill construction. If the outlet nozzle is not a single piece or its exterior valves are applied, provision shall be made for the equivalent of the breakage groove. On cars without continuous center sills, the breakage groove or its equivalent may not be more than 15 inches below the outer shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(7) The valve body must be of a thickness which will prevent distortion of the valve seat or valve by any change in contour of the shell resulting from expansion of lading, or other causes, and which will insure that accidental breakage of the outlet nozzle will occur at or below the "V" groove, or its equivalent.

(8) The valve must have no wings or stem projection below the "V" groove or its equivalent. The valve and seat must be readily accessible or removable for repairs, including grinding.

(b) Inner container may be equipped with bottom washout of approved design. If applied, bottom washout must comply the following requirements:

(1) The extreme projection of the bottom washout equipment may not be more than that allowed by Appendix E of the AAR Specifications for Tank Cars.

(2) Bottom washout must be of cast, forged or fabricated metals. If it is welded to the inner container, it must be of good weldable quality in conjunction with metal of tank.

(3) If washout nozzle extends below the bottom of the outer shell, a V-shaped breakage groove shall be cut (not cast) in the upper part of the nozzle at a point immediately below the lowest part of the inside closure seat or plug. In no case may the nozzle wall thickness at the root of the "V" be more than ¼-inch. Where the nozzle is not a single piece, provisions shall be made for the equivalent of the breakage groove. The nozzle must be of a thickness to insure that accidental breakage will occur at or below the "V" groove or its equivalent. On cars without a continuous center sill, the breakage groove or its equivalent may not be more than 15 inches below the outer shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(4) The closure plug and seat must be readily accessible or removable for repairs.

(5) The closure of the washout nozzle must be equipped with a ¼-inch solid screw plug. Plug must be attached by at least a ¼-inch chain.

(6) Joints between closures and their seats may be gasketed with suitable material.

§ 179.220-19 Safety relief devices. (a) Each inner container or compartment must be equipped with safety relief devices of approved design as prescribed in § 179.221-1.

(b) When used, each safety relief valve must be made of metal not subject to rapid deterioration by the lading, and mounted on the top of the inner container. Total valve discharge capacity must be sufficient to prevent building up of pressure in the inner container to more than 10 p.s.i. above the start-to-discharge pressure. See AAR Specifications for Tank Cars, Appendix A, for formula for calculating discharge capacity. The start-to-discharge pressures and vapor tight pressures must comply with § 179.221-1.

(c) Each inner container or compartment used for the transportation of a corrosive liquid, a flammable solid, an oxidizing material, or a poisonous liquid or solid Class B, need not be equipped with a safety relief valve, but if not so equipped, it must have one safety vent at least 1 ¼ inches in inside diameter made of material not subject to rapid deterioration by the lading. Each safety vent must be mounted on the top of the inner container. This vent must be of an approved design which will prevent interchange with fixtures prescribed in § 179.220-17. It must be closed with a frangible disc of lead or other approved material. Vent bursting pressure must comply with § 179.221-1. Except for tanks for chloroprene (see § 179.222-1), tanks equipped with vents shall be stenciled "Not for flammable liquids".

§ 179.220-20 Reinforcements, when used, and appurtenances not otherwise specified. All attachments to inner container and outer shell must be applied by approved means.

§ 179.220-21 Interior heating system. For heater system inside of inner container see § 179.12.

§ 179.220-22 Closure for openings. (a) All plugs must be solid, with NPT threads, and must be of a length which will screw at least six threads inside the face of fitting or tank. Plugs, when inserted from the outside of the outer shell tank heads, must have the letter "S" at least three-eighths inch in size stamped with steel stamp or cast on the outside surface to indicate the plug is solid.

(b) Openings in the outer shell used during construction for installation must be closed in an approved manner.

§ 179.220-23 Test of tanks. (a) Each inner container or compartment must be tested hydrostatically to the pressure specified in § 179.221-1. The temperature of the pressurizing medium must not exceed 100° F. during the test. The container must hold the prescribed pressure for at least 10 minutes without leakage or evidence of distress. Safety relief devices must not be in place when the test is made.

(b) The inner container must be pressure tested before installation within the outer shell. Items which, because of assembly sequence, must be welded to inner container after its installation within outer shell must have their attachment welds thoroughly inspected by a non-destructive dye penetrant method or its equivalent.

(c) Pressure testing of outer shell is not a specification requirement.

§ 179.220-24 Tests of safety relief valves. Each safety relief valve must be tested by air or gas for compliance with § 179.221-1 before being put into service.

§ 179.220-25 Stamping. To certify that the tank complies with all specification requirements, each outer shell must be plainly and permanently stamped in letters and figures at least ⅛-inch high into the metal near the center of both outside heads as follows:

	Example of required stamping
Specifications	DOT-115A60W8
Inner container.	
Material	ASTM A240-316L
Shell thickness	Shell 0.187 in.
Head thickness	Head 0.150 in.
Tank builders initials	ABC
Date of original test	00-0000
Outer shell.	
Material	ASTM A285 C
Tank builders initials	WYZ
Car assembler (if other than inner container or outer shell builders)	DEF

§ 179.220-26 Stenciling. (a) The outer shell, or the jacket if the outer shell is insulated, must be stenciled in compliance with AAR Specifications for Tank Cars, Appendix C.

(b) Stenciling must be applied on both sides of the outer shell or jacket near the center in letters and figures at least 1½ inches high to indicate the safe upper temperature limit, if applicable, for the inner tank, insulation, and support system.

§ 179.220-27 Certificate of construction. See § 179.5.

§ 179.221 Individual specification requirements applicable to tank car tanks consisting of an inner container supported within an outer shell.

§ 179.221-1 Individual specification requirements. In addition to § 179.220, the individual specification requirements for the inner container are as follows:

Specifications	115A60W1	115A60AL/W	115A60W8
Inner container material (see § 179.220-7)	Steel	Al. Alloy	Alloy steel
Bursting pressure, p.s.i. (see § 179.220-5)	240	240	240
Minimum plate thickness, shell and heads, inches (see § 179.220-6)	⅛	3/16	⅛
Minimum expansion capacity (see § 179.220-16)	2 percent in tank	2 percent in tank	2 percent in tank
Test pressure, p.s.i. (see § 179.220-23)	60	60	60
Safety relief device (see § 179.220-19)	Valve or vent	Valve or vent	Valve or vent
Valve start-to-discharge pressure, p.s.i. (±3 p.s.i.)	35	35	35
Valve vapor tight pressure (minimum, p.s.i.)	28	28	28
Valve flow rating pressure (maximum, p.s.i.)	45	45	45
Vent rupture pressure (maximum, p.s.i.)	45	45	45
Gaging devices (see § 179.220-17)	Required	Required	Required
Top loading and unloading devices (see § 179.220-17)	Optional	Optional	Optional
Special reference	§ 179.222-1		§ 179.222-1

§ 179.222 Special commodity requirements for DOT 115A tank car tanks. In addition to § 179.220 and § 179.221 the following requirements are applicable.

§ 179.222-1 Chloroprene. DOT 115A tank car tanks used to transport chloroprene shall be equipped with a safety vent of a diameter not less than 12 inches complying with § 179.221-1 instead of a safety relief valve. The outer shell shall be stenciled "CHLOROPRENE" on both sides in letters not less than four inches high.

SUBPART E

SPECIFICATIONS FOR MULTI-UNIT TANK CAR TANKS

(Classes DOT 106A and 110AW)

§ 179.300 General specifications applicable to multiunit tank car tanks designed to be removed from car structure for filling and emptying (Classes DOT-106A and 110A-W).

§ 179.300-1 Tanks built under these specifications shall meet the requirements of § 179.300, § 179.301 and when applicable, § 179.302.

§ 179.300-2 Approval. (a) For procedure for securing approval, see § 179.3.

§ 179.300-3 Type and general requirements. (a) Tanks built under this specification shall be cylindrical, circular in cross section, and shall have heads of approved design. All openings shall be located in the heads.

(b) Each tank shall have a water capacity of at least 1500 pounds and not more than 2600 pounds.

(c) For tanks made in foreign countries, a chemical analysis of materials and all tests as specified shall be carried out within the limits of the United States under the supervision of a competent and impartial inspector.

§ 179.300-4 Insulation. (a) Tanks shall not be insulated.

§ 179.300-5 Bursting pressure. (a) The minimum required bursting pressure is listed in § 179.301.

§ 179.300-6 Thickness of plates. (a) For class DOT-110A tanks the wall thickness after forming of the cylindrical portion of the tank

must not be less than that specified in § 179.301 nor that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:
d = inside diameter in inches;
E = 1.0 welded joint efficiency;
P = minimum required bursting pressure in psi;
S = minimum tensile strength of plate material in psi, as prescribed in § 179.300-7;
t = minimum thickness of plate material in inches after forming.

(b) For Class DOT-106A tanks, the wall thickness of the cylindrical portion of the tank shall not be less than that specified in § 179.301 and shall be such that at the tank test pressure the maximum fiber stress in the wall of the tank will not exceed 15,750 psi, as calculated by the following formula:

$$s = \frac{p(1.3D^2 + 0.4d2)}{D^2 - d^2}$$

where:
d = inside diameter in inches;
D = outside diameter in inches;
p = tank test pressure in psi;
s = wall stress in psi.

(c) If plates are clad with material having tensile strength at least equal to the base plate, the cladding may be considered a part of the base plate when determining the thickness. If cladding material does not have tensile strength at least equal to the base plate, the base plate alone shall meet the thickness requirements.

§ 179.300-7 Materials. (a) Carbon steel plate material used to fabricate tanks having heads fusion welded to tank shell must comply with the following specifications with the indicated minimum tensile strength and elongation in the welded condition. The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials.

Specifications	Minimum tensile strength (psi) welded condition[1]	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 285-69 Gr. A	45,000	29
ASTM A 285-69 Gr. B	50,000	20
ASTM A 285-69 Gr. C	55,000	20
ASTM A 515-69 Gr. 65	65,000	20
ASTM A 515-69 Gr. 70	70,000	20

[1] Maximum stresses to be used in calculations.

(b) Carbon steel plate material used to fabricate tanks with forge welded heads must comply with the following specifications:

Specifications	Minimum tensile strength (psi) welded condition[1]	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 285-69 Gr. A	45,000	29

[1] Maximum stresses to be used in calculations.

(c) All plates must have their heat number and the name or brand of the manufacturer legibly stamped on them at the rolling mill.

§ 179.300-8 Tank heads. (a) Class DOT-110A tanks shall have fusion-welded heads formed concave to pressure. Heads for fusion welding shall be an ellipsoid of revolution 2:1 ratio of major to minor axis. They shall be one piece, hot formed in one heat so as to provide a straight flange at least 1½ inches long. The thickness shall not be less than that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where symbols are as defined in § 179.300-6(a).

(b) Class DOT-106A tanks must have forged-welded heads, formed convex to pressure. Heads for forge welding must be torispherical with an inside radius not greater than the inside diameter of the shell. They must be one piece, hot formed in one heat so as to provide a straight flange at least 4 inches long. They must have snug drive fit into the shell for forge welding. The wall thickness after forming must be sufficient to meet the test requirements of § 179.300-16 and to provide for adequate threading of openings.

§ 179.300-9 Welding. (a) Longitudinal joints must be fusion welded. Head-to-shell joints must be forge welded on class DOT-106A tanks and fusion welded on class DOT-110A tanks. Welding procedures, welders and fabricators must be approved in accordance with AAR Specifications for Tank Cars, Appendix W.

(b) Fusion-welded joints must be in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W, except that circumferential welds in tanks less than 36 inches inside diameter need not be radiotaped.

(c) Forge-welded joints shall be thoroughly hammered or rolled to insure sound welds. The flanges of the heads shall be forge lapwelded to the shell and then crimped inwardly toward the center line at least one inch on the radius. Welding and crimping must be accomplished in one heat.

§ 179.300-10 Postweld heat treatment. After welding is complete, steel tanks and all attachments welded thereto, must be postweld heat treated as a unit in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W.

§ 179.300-11 Tank mounting. (a) For tank mounting, see § 179.10.

§ 179.300-12 Protection of fittings. (a) Tanks shall be of such design as will afford maximum protection to any fittings or attachment to the head including the housing referred to in § 179.300-12(b). Tank ends shall slope or curve inward toward the axis so that the diameter at each end is at least 2 inches less than the maximum diameter.

(b) Loading and unloading valves shall be protected by a detachable protective housing of approved design which shall not project beyond the end of the tank and shall be securely fastened to the tank head. Safety relief devices shall not be covered by the housing.

§ 179.300-13 Venting, loading and unloading valves. (a) Valves shall be of approved type, made of metal not subject to rapid deterioration by lading, and shall withstand tank test pressure without leakage. The valves shall be screwed directly into or attached by other approved methods to one tank head. Provision shall be made for closing outlet connections of the valves.

(b) Threads for openings shall be National Gas Taper Threads (NGT) tapped to gage, clean cut, even and without checks.

§ 179.300-14 Attachments not otherwise specified. Siphon pipes and their couplings on the inside of the tank head and lugs on the outside of the tank head for attaching the valves protective housing must be fusion-welded in place prior to postweld heat treatment. All other fixtures and appurtenances, except as specifically provided for, are prohibited.

§ 179.300-15 Safety relief devices. (a) Unless prohibited in § 179.302, or in Part 173, tanks shall be equipped with one or more safety relief devices of approved type, made of metal not subject to rapid deterioration by the lading and screwed directly into tank heads or attached to tank heads by other approved methods. The total discharge capacity shall be sufficient to prevent building up pressure in tank in excess of 82.5 percent of the tank test pressure. When safety relief devices of the fusible plug type are used, the required discharge capacity shall be available in each head. See AAR Specifications for Tank Cars, Appendix A, for formula for calculating discharge capacity.

(b) Threads for openings shall be National Gas Taper Thread (NGT) tapped to gage, clean cut, even and without checks.

(c) Safety relief valves shall be set for start-to-discharge and frangible discs shall burst at a pressure not exceeding that specified in § 179.301.

(d) Fusible plugs shall function at a temperature not exceeding 175° F. and shall be vapor-tight at a temperature of not less than 130° F.

§ 179.300-16 Tests of tanks. (a) After stress relieving, tanks shall be subjected to hydrostatic expansion test in a water jacket, or by other approved methods. No tank shall have been subjected previously to internal pressure within 100 pounds of the test pressure. Each tank shall be tested to the pressure prescribed in § 179.301. Pressure shall be maintained for 30 seconds and sufficiently longer to insure complete expansion of tank. Pressure gage shall permit reading to accuracy of one percent. Expansion gage shall permit reading of total expansion to accuracy of one percent. Expansion shall be recorded in cubic centimeters.

(1) No leaks shall appear and permanent volumetric expansion shall not exceed 10 percent of total volumetric expansion at test pressure.

(b) After all fittings have been installed, each tank shall be subjected to interior air pressure test of at least 100 psi, under conditions favorable to detection of any leakage. No leaks shall appear.

(c) Repairs of leaks detected in manufacture or in foregoing tests shall be made by the same process as employed in manufacture of tank. Caulking, soldering, or similar repairing is prohibited.

§ 179.300-17 Tests of safety relief devices. (a) Each valve shall be tested by air or gas before being put into service. The valve shall open and be vapor-tight at the pressures prescribed in § 179.301.

(b) Frangible discs of safety vents must be tested as prescribed in AAR Specifications for Tank Cars, Appendix A, A5.03.

(c) For safety relief devices of the fusible plug type, a sample of the plug used shall function at the temperatures prescribed in § 179.300-15.

(d) The start-to-discharge and vapor-tight pressures shall not be affected by any auxiliary closure or other combination.

§ 179.300-18 Stamping. (a) To certify that the tank complies with all specification requirements, each tank shall be plainly and permanently stamped in letters and figures ⅜ inch high into the metal of valve end chime as follows:

(1) DOT Specification number.

(2) Material and cladding material if any (immediately below the specification number).

(3) Owner's or builder's identifying symbol and serial number (immediately below the material identification). The symbol shall be registered with the Bureau of Explosives, duplications are not authorized.

(4) Inspector's official mark (immediately below the owner's or builder's symbol).

(5) Date of original tank test (month and year, such as 1-64 for January 1964). This should be so placed that dates of subsequent tests may easily be added thereto.

(6) Water capacity—0000 pounds.

(b) A copy of the above stamping in letters and figures of the prescribed size stamped on a brass plate secured to one of the tank heads is authorized.

§ 179.300-19 Inspection. (a) Tank shall be inspected within the United States and Canada by a competent and impartial inspector acceptable to the Bureau of Explosives. For tanks made outside the United States and Canada, the specified inspection shall be made within the United States.

(b) The inspector shall carefully inspect all plates from which tanks are to be made and secure records certifying that plates comply with the specification. Plates which do not comply with § 179.300-7 shall be rejected.

(c) The inspector shall make such inspection as may be necessary to see that all the requirements of this specification, including markings, are fully complied with; shall see that the finished tanks are properly stress relieved and tested.

(d) The inspector shall stamp his official mark on each accepted tank as required in § 179.300-18, and render the report required in § 179.300-20.

§ 179.300-20 Reports. (a) Before a tank is placed in service, the inspector shall furnish to the builder, tank owner, Bureau of Explosives and the Secretary, Mechanical Division, Association of American Railroads, a report in approved form certifying that the tank and its equipment comply with all the requirements of this specification.

(b) For builder's Certificate of Construction, see § 179.5(b), (c), and (d).

§ 179.301 Individual specification requirements for multi-unit tank car tanks. (a) In addition to § 179.300 the individual specification requirements are as follows:

DOT Specifications	106A500X	106A800X	110A500W	110A600W	110A800W	110A1000W
Bursting pressure psi (see § 179.300-5)	(1)	(1)	1250	1500	2000	2500
Minimum thickness shell, inches	13/32	11/16	11/32	3/8	15/32	19/32
Test pressure psi (see § 179.300-16)	500	800	500	600	800	1000
Safety relief devices psi (see § 179.300-15)	......	......	......	......	......	......
Start-to-discharge or burst maximum psi	375	600	375	450	600	750
Vapor tight minimum psi	300	480	300	360	480	600

[1] None specified

§ 179.302 Special commodity requirements for multi-unit tank car tanks. (a) In addition to §§ 179.300 and 179.301, the following requirements are applicable:

Commodity	Safety relief device	Valve protective housing	Miscellaneous
Chlorine trifluoride	Prohibited[1]		
Chlorpicrin	Prohibited[1]	Gas tight[2]	
Hydrofluoric acid	Prohibited[1]	Gas tight[2]	
Hydrogen sulfide	Fusible plugs required[7]	Required[6]	(3)
Methyl mercaptan	Prohibited[1]		
Nitric oxide	Prohibited[1]	Gas tight[2]	
Nitrogen dioxide liquid	Prohibited[1]	Gas tight[2]	
Nitrogen peroxide liquid	Prohibited[1]	Gas tight[2]	
Nitrogen tetroxide liquid	Prohibited[1]	Gas tight[2]	
Nitrogen tetroxide-nitric oxide mixtures	Prohibited[1]	Gas tight[2]	
Nitrosyl chloride	Fusible plugs required		(4)
Phosgene	Prohibited[1]	Gas tight[2]	
Titanium tetrachloride (anhydrous)	Prohibited[1]		
Vinyl chloride			(5)
Vinyl methyl ether			(5)

[1] When safety relief devices are prohibited, containers may be equipped with solid steel plugs in the safety device openings.

[2] The detachable protective housing for the loading and unloading valves must withstand tank test pressure without leakage and must be approved by the Bureau of Explosives.

[3] All parts of valves and safety relief devices in contact with the lading must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides.

[4] Tanks for nitrosyl chloride must be nickel-clad.

[5] Each valve outlet must be sealed by a threaded cap or a threaded solid plug.

[6] Valves must be protected by a metal cover.

[7] Safety relief devices for hydrogen sulfide must be of the fusible plug type utilizing a fusible alloy with yield temperature not over 170° F, nor less than 157° F. Each device must be resistant to extrusion of the fusible alloy and leak tight at 130° F.

SUBPART F

SPECIFICATIONS FOR CRYOGENIC LIQUID TANK CAR TANKS AND SEAMLESS STEEL TANKS (CLASS DOT-113 AND 107A)

§ 179.400 General specifications applicable to cryogenic liquid tank car tanks.

§ 179.400-1 General.
A tank built to specifications must comply with §§ 179.400 and 179.401.

§ 179.400-2 Approval.
See § 179.3 for approval procedure.

§ 179.400-3 Type.

(a) A tank built to this specification must—

(1) Consist of an inner tank of circular cross section supported essentially concentric within an outer jacket of circular cross section, with the out of roundness of both the inner tank and outer jacket limited in accordance with Section VIII, Division I, Paragraph UG-80 of the ASME Code;

(2) Have the annular space evacuated after filling the annular space with an approved insulating material;

(3) Have the inner tank heads designed concave to pressure; and

(4) Have the outer jacket heads designed convex to pressure.

(b) The tank must be equipped with piping systems for vapor venting and transfer of lading, and with pressure relief devices, controls, gages and valves, as prescribed herein.

§ 179.400-4 Insulation system and performance standard.

(a) For the purposes of this specification—

(1) **Standard Heat Transfer Rate** (SHTR), expressed in Btu/day/lb. of water capacity, means the rate of heat transfer used for determining the satisfactory performance of the insulation system of a cryogenic tank car tank in cryogenic liquid service (see § 179.401-1 Table).

(2) **Test cryogenic liquid** means the cryogenic liquid, which may be different from the lading intended to be shipped in the tank, being used during the performance tests of the insulation system.

(3) **Normal evaporation rate** (NER), expressed in lbs. (of the cryogenic liquid)/day, means the rate of evaporation, determined by test of a test cryogenic liquid in a tank maintained at a pressure of approximately one atmosphere, absolute. This determination of the NER is the NER test.

(4) **Stabilization period** means the elapsed time after a tank car tank is filled with the test cryogenic liquid until the NER has stabilized, or 24 hours has passed, whichever is greater.

(5) **Calculated heat transfer rate.** The calculated heat transfer rate (CHTR) is determined by the use of test data obtained during the NER test in the formula:

$$q = [N \Delta h (90 - t_\ell)] / [V(8.32828)(t_s - t_\ell)]$$

Where:

q = CHTR, in Btu/day/lb., of water capacity;
N = NER, determined by NER test, in lbs./day;
Δh = latent heat of vaporization of the test cryogenic liquid at the NER test pressure of approximately one atmosphere, absolute, in Btu/lb.;
90 = ambient temperature at 90° F.;
V = gross water volume at 60° F. of the inner tank, in gallons;
t_ℓ = equilibrium temperature of intended lading at maximum shipping pressure, in °F.;
8.32828 = constant for converting gallons of water at 60° F. to lbs. of water at 60° F., in lbs./gallon.

For explanation of abbreviations and reference marks, see last page of this tariff.

t_a = average temperature of outer jacket, determined by averaging jacket temperatures at various locations on the jacket at regular intervals during the NER test in °F;
t_b = equilibrium temperature of the test cryogenic liquid at the NER test pressure of approximately one atmosphere, absolute, in °F.

(b) DOT-113A60W tank cars must—
(1) Be filled with hydrogen, cryogenic liquid to the maximum permitted fill density specified in § 173.319(d)(2) Table of this subchapter prior to performing the NER test; and
(2) Have a CHTR equal to or less than the SHTR specified in § 179.401-1 table for a DOT-113A60W tank car.
(c) DOT-113C120W tank cars must—
(1) Be filled with ethylene, cryogenic liquid to the maximum permitted fill density specified in § 173.319(d)(2) Table of this subchapter prior to performing the NER test, or be filled with nitrogen, cryogenic liquid to 90 percent of the volumetric capacity of the inner tank prior to performing the NER test; and
(2) Have a CHTR equal to or less than 75 percent of the SHTR specified in § 179.401-1 Table for a DOT-113C120W tank car.
(d) Insulating materials must be approved.
(e) If the insulation consists of a powder having a tendency to settle, the entire top of the cylindrical portion of the inner tank must be insulated with a layer of glass fiber insulation at least one-inch nominal thickness, or equivalent, suitably held in position and covering an area extending 25 degrees to each side of the top center line of the inner tank.
(f) The outer jacket must be provided with fittings to permit effective evacuation of the annular space between the outer jacket and the inner tank.
(g) A device to measure the absolute pressure in the annular space must be provided. The device must be portable with an easily accessible connection or permanently positioned where it is readily visible to the operator.

§ 179.400-5 Materials.

(a) Stainless steel of ASTM Specification A240, Type 304 or 304L must be used for the inner tank and its appurtenances, as specified in AAR Specifications for Tank Cars, Appendix M, and must be—
(1) In the annealed condition prior to fabrication, forming and fusion welding;
(2) Suitable for use at the temperature of the lading; and
(3) Compatible with the lading.
(b) Any steel casting, steel forging, steel structural shape or carbon steel plate used to fabricate the outer jacket or heads must be as specified in AAR Specifications for Tank Cars, Appendix M.
(c) Impact tests must be—
(1) Conducted in accordance with AAR Specifications for Tank Cars, Appendix W, W-9.01;
(2) Performed on logitudinal specimens of the material;
(3) Conducted at the tank design service temperature or colder; and
(4) Performed on test plate welds and materials used for inner tanks and appurtenances and which will be subjected to cryogenic temperatures.
(d) Impact test values must be equal to or greater than those specified in AAR Specifications for Tank Cars, Appendix W. The report of impact tests must include the test values and lateral expansion data.

§ 179.400-6 Bursting and buckling pressure.

(a) The inner tank shall have a bursting pressure no less than that listed in § 179.401-1.
(b) The outer jacket of the required evacuated insulation system must be designed in accordance with § 179.400-7(d) and in addition must comply with the design loads specified in Section 6.2 of the AAR Specifications for Tank Cars. The designs and calculations must provide for the loadings transferred to the outer jacket through the support system.

§ 179.400-7 Tank heads.

(a) Tank heads of the inner tank and outer jacket must be flanged and dished, or ellipsoidal.
(b) Flanged and dished heads must have—
(1) A main inside dish radius not greater than the outside diameter of the straight flange;
(2) An inside knuckle radius of not less than 6 percent of the outside diameter of the straight flange; and
(3) An inside knuckle radius of at least three-times the head thickness.

§ 179.400-8 Thickness of plates.

(a) The minimum wall thickness, after forming, of the inner shell and any 2:1 ellipsoidal head for the inner tank must be that specified in § 179.401-1, or that calculated by the following formula, whichever is greater:

$$t = Pd/2SE$$

Where:
t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure, in psi;
d = inside diameter, in inches;
S = minimum tensile strength of the plate material, as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M-1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, $E = 1.0$.

(b) The minimum wall thickness, after forming, of any 3:1 ellipsoidal head for the inner tank must be that specified in § 179.401-1, or that calculated by the following formula, whichever is greater:

$$t = 1.83\,Pd/2SE$$

Where:
t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure, in psi;
d = inside diameter, in inches;
S = minimum tensile strength of the plate material, as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M-1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, $E = 1.0$.

(c) The minimum wall thickness, after forming, of a flanged and dished head for the inner tank must be that specified in § 179.401-1, or that calculated by the following formula, whichever is greater:

$$t = [PL(3 + \sqrt{(L/r)})]/(8SE)$$

Where:
t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure, in psi;
L = main inside radius of dished head, in inches;
r = inside knuckle radius, in inches;
S = minimum tensile strength of plate material, as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M-1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, $E = 1.0$.

(d) The minimum wall thickness, after forming, of the outer jacket shell may not be less than 7/16 inch. The minimum wall thickness, after forming, of the outer jacket heads may not be less than 1/2 inch and they must be made from steel specified in § 179.100-23(a)(1). The annular space is to be evacuated, and the cylindrical portion of the outer jacket between heads, or between stiffening rings if used, must be designed to withstand an external pressure of 37.5 psi (critical collapsing pressure), as determined by the following formula:

$$P_c = [2.6E(t/D^{5/3})]/[L/D) - 0.45(t/D)^{5/2}]$$

Where:
P_c = Critical collapsing pressure (37.5 psi minimum), in psi;
e = modulus of elasticity of jacket material, in psi;
t = minimum thickness of jacket material, after forming, in inches;
O = outside diameter of jacket, in inches;
L = distance between stiffening ring centers in inches. (The heads may be considered as stiffening rings located 1/3 of the head depth from the head tangent line.)

§ 179.400-9 Stiffening rings.

(a) If stiffening rings are used in designing the cylindrical portion of the outer jacket for external pressure, they must be attached to the jacket by means of fillet welds. Outside stiffening ring attachment welds must be continuous on each side of the ring. Inside stiffening ring attachment welds may be intermittent welds on each side of the ring with the total length of weld on each side not less than one-third of the circumference of the tank. The maximum space between welds may not exceed eight times the outer jacket wall thickness.
(b) A portion of the outer jacket may be included when calculating the moment of inertia of the ring. The effective width of jacket plate on each side of the attachment of the stiffening ring is given by the following formula:

$$W = 0.78\sqrt{Rt^3}$$

Where:
W = width of jacket effective on each side of the stiffening ring, in inches;
R = outside radius of the outer jacket, in inches;
t = plate thickness of the outer jacket, after forming, in inches.

(c) Where a stiffening ring is used that consists of a closed section having two webs attached to the outer jacket, the jacket plate between the webs may be included up to the limit of twice the value of "W", as defined in paragraph (B) of this section. The outer flange of the closed section, if not a steel structural shape, is subject to the same limitations with "W" based on the "R" and "t" values of the flange. Where two separate members such as two angles, are located less than "2W" apart they may be treated as a single stiffening ring member. (The maximum length of plate which may be considered effective is 4W.) The closed section between an external ring and the outer jacket must be provided with a drain opening.
(d) The stiffening ring must have a moment of inertia large enough to support the critical collapsing pressure, as determined by either of the following formulas:

$$I = [0.035D^2L_sP_c]/E, \text{ or}$$
$$I = [0.046D^2L_sP_c]/E$$

Where:
I = required moment of inertia of stiffening ring about the centroidal axis parallel to the vessel axis, in inches to the fourth power;
I' = required moment of inertia of combined section of stiffening ring and effective width of jacket plate about the centroidal axis parallel to the vessel axis, in inches to the fourth power;

D = outside diameter of the outer jacket, in inches;
L = one half of the distance from the centerline of the stiffening ring to the next line of support on one side, plus one half of the distance from the centerline to the next line of support on the other side of stiffening ring. Both distances are measured parallel to the axis of the vessel, in inches. (A line of support is
(1) A stiffening ring which meets the requirements of this paragraph, or
(2) A circumferential line of a head at one third the depth of the head from the tangent line);
P_c = critical collapsing pressure (37.5 psi minimum), in psi;
E = modulus of elasticity of stiffening ring material, in psi

(e) Where loads are applied to the outer jacket or to stiffening rings from the system used to support the inner tank within the outer jacket, additional stiffening rings, or an increased moment of inertia of the stiffening rings designed for the external pressure, must be provided to carry the support loads.

§ 179.400-10 Sump or siphon bowl.

A sump or siphon bowl may be in the bottom of the inner tank shell if—
(a) It is formed directly into the inner tank shell, or is formed and welded to the inner tank shell and is of weldable quality metal that is compatible with the inner tank shell;
(b) The stress in an orientation under any condition does not exceed the circumferential stress in the inner tank shell; and
(c) The wall thickness is not less than that specified in § 179.401-1.

§ 179.400-11 Welding.

(a) Except for closure of openings and a maximum of two circumferential closing joints in the cylindrical portion of the outer jacket, each joint of an inner tank and the outer jacket must be a fusion double welded butt joint.
(b) The closure for openings and the circumferential closing joints in the cylindrical portion of the outer jacket, including head to shell joints, may be a single welded butt joint using a backing strip on the inside of the joint.
(c) Each joint must be welded in accordance with the requirements of AAR Specifications for Tank Cars, Appendix W.
(d) Each welding procedure, welder, and fabricator must be approved.

§ 179.400-12 Postweld heat treatment.

(a) Postweld heat treatment of the inner tank is not required.
(b) The cylindrical portion of the outer jacket, with the exception of the circumferential closing seams, must be postweld heat treated as prescribed in AAR Specifications for Tank Cars, Appendix W. Any item to be welded to this portion of the outer jacket must be attached before postweld heat treatment. Welds securing the following need not be postweld heat treated when it is not practical due to final assembly procedures:
(1) the inner tank support system to the outer jacket,
(2) connections at piping penetrations,
(3) closures for access openings, and
(4) circumferential closing joints of head to shell joints.
(c) When cold formed heads are used on the outer jacket they must be heat treated before welding to the jacket shell if postweld heat treatment is not practical due to assembly procedures.

§ 179.400-13 Support system for inner tank.

(a) The inner tank must be supported within the outer jacket by a support system of approved design. The system and its areas of attachment to the outer jacket must have adequate strength and ductility at operating temperatures to support the inner tank when filled with the lading to any level incident to transportion.
(b) The support system must be designed to support, without yielding, impact loads producing accelerations of the following magnitudes and directions when the inner tank is fully loaded and the car is equipped with a conventional draft gear:

Longitudinal	7"g"
Transverse	3"g"
Vertical	3"g"

The longitudinal acceleration may be reduced to 3"g" where a cushioning device of approved design, which has been tested to demonstrate its ability to limit body forces to 400,000 pounds maximum at 10 miles per hour, is used between the coupler and the tank structure.
(c) The inner tank and outer jacket must be permanently bonded to each other electrically, by either the support system, piping, or a separate electrical connection of approved design.

§ 179.400-14 Cleaning of inner tank.

The interior of the inner tank and all connecting lines must be thoroughly cleaned and dried prior to use. Proper precautions must be taken to avoid contamination of the system after cleaning.

§ 179.400-15 Radioscopy.

Each longitudinal and circumferential joint of the inner tank, and each longitudinal and circumferential double welded butt joint of the outer jacket, must be examined along its entire length in accordance with the requirements of AAR Specifications for Tank Cars, Appendix W.

§ 179.400-16 Access to inner tank.

(a) The inner tank must be provided with a means of access having a minimum inside diameter of 16 inches. Reinforcement of the access opening must be made of the same material used in the inner tank. The access closure must be of an approved material and design.
(b) If a welded closure is used, it must be designed to allow it to be reopened by grinding or chipping and to be closed again by rewelding, preferably without a need for new parts. A cutting torch may not be used.

§ 179.400-17 Inner tank piping.

(a) **Product lines.** The piping system for vapor and liquid phase transfer and venting must be made for material compatible with the product and having satisfactory properties at the lading temperature. The outlets of all vapor phase and liquid phase lines must be located so that accidental discharge from these lines will not impinge on any metal of the outer jacket, car structures, trucks or safety appliances. Suitable provision must be made to allow for thermal expansion and contraction.
(1) loading and unloading line.
A liquid phase transfer line must be provided and it must have a manually operated shut-off valve located as close as practicable to the outer jacket, plus a secondary closure that is liquid and gas tight. This secondary closure must permit any trapped pressure to bleed off before the closure can be removed completely. A vapor trap must be incorporated in the line and located as close as practicable to the inner tank. On a DOT-113A60W tank car, any loading and unloading line must be vacuum jacketed between the outer jacket and the shut-off valve and the shut-off valve must also be vacuum jacketed.
(2) Vapor phase line.
A vapor phase line must connect to the inner tank and must be of sufficient size to permit the pressure relief devices specified in § 179.400-20 and connected to this line to operate at their design capacity without excessive pressure build-up in the tank. The vapor phase line must have a manually operated shut-off valve located as close as practicable to the outer jacket, plus a secondary closure that is liquid and gas tight. This secondary closure must permit any trapped pressure to bleed off before the closure can be removed completely.
(3) **Vapor phase blowdown line.** A blowdown line must be provided. It must be attached to the vapor phase line specified in paragraph (a)(2) of this section, upstream of the shut-off valve in that line. A by-pass line with a manually operated shut-off valve must be provided to permit reduction of the inner tank pressure when the vapor phase line is connected to a closed system. The discharge from this line must be outside the housing and must be directed upward and away from operating personnel.
(b) Any pressure building system provided for the purpose of pressurizing the vapor space of the inner tank to facilitate unloading the liquid lading must be approved.

§ 179.400-18 Test of inner tank.

(a) After all items to be welded to the inner tank have been welded in place, the inner tank must be pressure tested at the test pressure prescribed in § 179.401-1. The temperature of the pressurizing medium may not exceed 100° F. during the test. The inner tank must hold the prescribed pressure for a period of not less than ten minutes without leakage or distortion. In a pneumatic test, due regard for the protection of all personnel should be taken because of the potential hazard involved. After a hydrostatic test the container and piping must be emptied of all water and purged of all water vapor.
(b) Caulking of welded joints to stop leaks developed during the test is prohibited. Repairs to welded joints must be made as prescribed in AAR Specifications for Tank Cars, Appendix W.

179.400-19 Valves and gages.

(a) **Valves.** Manually operated shut-off valves and control valves must be provided wherever needed for control of vapor phase pressure, vapor phase venting, liquid transfer and liquid flow rates. All valves must be made from approved materials compatible with the lading and having satisfactory properties at the lading temperature.
(1) Liquid control valves must be of extended stem design.
(2) Packing, if used, must be satisfactory for use in contact with the lading and of approved materials that will effectively seal the valve stem without causing difficulty of operation.
(3) Each control valve and shut-off valve must be readily operable. These valves must be mounted so that their operation will not transmit excessive forces to the piping system.
(b) **Gages.** Gages, except portable units, must be securely mounted within suitable protective housings. A liquid level gage and a vapor phase pressure gage must be provided as follows:
(1) Liquid level gage.
(i) A gage of approved design to indicate the quantity of liquefied lading within the inner tank, mounted where it will be readily visible to an operator during transfer operations or storage, or a portable gage with a readily accessible connection, or
(ii) A fixed length dip tube, with a manually operated shut-off valve

located as close as practicable to the outer jacket. The dip tube must indicate the maximum liquid level for the allowable filling density. The inner end of the dip tube must be located on the longitudinal centerline of the inner tank and within four feet of the transverse centerline of the inner tank.

(2) Vapor phase pressure gage. A vapor phase pressure gage of approved design, with a manually operated shut-off valve located as close as practicable to the outer jacket. The gage must indicate the vapor pressure within the inner tank and must be mounted where it will be readily visible to an operator. An additional fitting for use of a test gage must be provided.

§ 179.400-20 Pressure relief devices.

(a) The tank must be provided with pressure relief devices for the protection of the tank assembly and piping system. The discharge from these devices must be directed away from operating personnel, principal load bearing members of the outer jacket, car structure, trucks and safety appliances. Vent or weep holes in pressure relief devices are prohibited. All main pressure relief devices must discharge to the outside of the protective housings in which they are located, except that this requirement does not apply to pressure relief valves installed to protect isolated sections of lines between the final valve and end closure.

(b) Materials. Materials used in pressure relief devices must be suitable for use at the temperature of the lading and otherwise compatible with the lading in both the liquid and vapor phases.

(c) Inner tank. Pressure relief devices for the inner tank must be attached to vapor phase piping and mounted so as to remain at ambient temperature prior to operation. The inner tank must be equipped with one or more pressure relief valves and one or more safety vents (except as noted in paragraph (c)(3)(iv) of this section), and installed without an intervening shut-off valve (except as noted in paragraph (c)(3)(iii) of this section). Additional requirements are as follows:

(1) Safety vent. The safety vent shall function at the pressure specified in §179.401-1. The safety vent must be flow rated in accordance with the applicable provisions of AAR Specifications for Tank Cars, Appendix A, and provide sufficient capacity to meet the requirements of AAR Specifications for Tanks Cars, Appendix A, A8.07(a).

(2) Pressure relief valve. The pressure relief valve must:

(i) be set to start-to-discharge at the pressure specified in §179.401-1, and

(ii) meet the requirements of AAR Specifications for Tank Cars, Appendix A, A8.07(b).

(3) Installation of safety vent and pressure relief valve.

(i) Inlet piping.

(A) The opening through all piping and fittings between the inner tank and its pressure relief devices must have a cross-sectional area at least equal to that of the pressure relief device inlet, and the flow characteristics of this upstream system must be such that the pressure drop will not adversely affect the relieving capacity or the proper operation of the pressure relief device.

(B) When the required relief capacity is met by the use of multiple pressure relief device placed on one connection, the inlet internal cross-sectional area of this connection must be sufficient to provide the required flow capacity for the proper operation of the pressure relief device system.

(ii) Outlet piping.

(A) The opening through the discharge lines must have a cross-sectional area at least equal to that of the pressure relief device outlet and may not reduce the relieving capacity below that required to properly protect the inner tank.

(B) When the required relieving capacity is met by use of multiple pressure relief devices placed on a common discharge manifold, the manifold outlet internal cross-sectional area must be at least equal to the combined outlet areas of the pressure relief devices.

(iii) Duplicate pressure relief devices may be used when an approved 3-way selector valve is installed to provide for relief through either duplicate pressure relief device. The 3-way valve must be included in the mounting prescribed by AAR Specifications for Tank Cars, Appendix A, A6.02(g), when conducting the flow capacity test on the safety vent prescribed by AAR Specifications for Tank Cars, Appendix A, A6.01. Flow capacity tests must be performed with the 3-way valve at both of the extreme positions as well as at the mid-position and the flow capacity must be in accordance with AAR Specifications for Tank CArs, Appendix A, A8.07(a).

(iv) An alternate pressure relief valve, set as required in §179.401-1, may be used in lieu of the safety vent, provided it meets the flow capacity prescribed in AAR Specifications for Tank Cars, Appendix A at a flow rating pressure of 110 percent of its start-to-discharge pressure. Installation must—

(A) Prevent moisture accumulation at the seat by providing drainage away from the area,

(B) Permit periodic drainage of the vent piping, and

(C) Prevent accumulation of foreign material in the vent system.

(4) Evaporation control. The routine release of vaporized lading may be controlled with a pressure controlling and mixing device, except that a pressure controlling and mixing device is required on each DOT-113A60W car. Any pressure controlling and mixing device must—

(i) Be set to start-to-discharge at a pressure not greater than that specified in §179.401-1;

(ii) Have sufficient capacity to limit the pressure within the inner tank to that pressure specified in §179.401-1, when the discharge is equal to twice the normal venting rate during transportation, with normal vacuum and the outer shell at 130° F; and

(iii) Prevent the discharge of a gas mixture exceeding 50% of the lower flammability limit to the atmosphere under normal conditions of storage or transportation.

(5) Safety interlock. If a safety interlock is provided for the purpose of allowing transfer of lading at a pressure higher than the pressure control valve setting but less than the pressure relief valve setting, the design must be such that the safety interlock will not affect the discharge path of the pressure relief valve or safety vent at any time. The safety interlock must automatically provide an unrestricted discharge path for the pressure control device at all times when the tank car is in transport service.

(d) Outer jacket. The outer jacket must be provided with a suitable system to prevent buildup of annular space pressure in excess of 16 psig or the external pressure for which the inner tank was designed, whichever is less. The total relief area provided by the system must be a minimum of 25 square inches, and means must be provided to prevent clogging of any system opening, as well as to ensure adequate communication to all areas of the insulation space. If a safety vent is a part of the system, it must be designed to prevent distortion of the frangible disc when the annular space is evacuated.

(e) Piping system. Where a piping circuit can be isolated by closing a valve, means for pressure relief must be provided.

§ 179.400-21 Test of pressure relief valves.

Each valve must be tested with air or gas for compliance with §179.401-1 before being put into service.

§ 179.400-22 Protective housings.

Each valve, gage, closure and pressure relief device, with the exception of secondary relief valves for the protection of isolated piping, must be enclosed within a protective housing. The protective housing must be adequate to protect the enclosed components from direct solar radiation, mud, sand, adverse environmental exposure and mechanical damage incident to normal operation of the tank car. It must be designed to provide reasonable access to the enclosed components for operation, inspection and maintenance and so that vapor concentrations cannot build up to a dangerous level inside the housing in the event of valve leakage or pressure relief valve operation. All equipment within the protective housing must be operable by personnel wearing heavy gloves and must incorporate provisions for locks or seals. A protective housing and its cover must be constructed of metal not less than 0.119 inch thick.

§ 179.400-23 Operating instructions.

All valves and gages must be clearly identified with corrosion-resistant nameplates. A plate of corrosion-resistant material bearing precautionary instructions for the safe operation of the equipment during storage and transfer operations must be securely mounted so as to be readily visible to an operator. The instruction plate must be mounted in each housing containing operating equipment and controls for product handling. These instructions must include a diagram of the tank and its piping system with the various gages, control valves and pressure relief devices clearly identified and located.

§ 179.400-24 Stamping.

(a) A tank that complies with all specification requirements must have the following information plainly and permanently stamped into the metal near the center of the head of the outer jacket at the "B" end of the car, in letters and figures at least ⅜-inch high, in the following order:

	Example of required stamping
Specification	DOT-113A60W
Design service temperature	Minus 423 F
Inner tank	Inner Tank
Material	ASTM A240-304
Shell thickness	Shell 7/16 inch
Head thickness	Head 7/16 inch
Inside diameter	ID 107 inch
Inner tank builder's initials	ABC
Date of original test (month and year) and initials of person conducting original test	00-0000GHK
Water capacity	00000 lbs
Outer jacket	Outer jacket
Material	ASTM A515-70
Outer jacket builder's initials	DEF
Car assembler's initials (if other than inner tank or outer jacket builder)	XYZ

(b) Any stamping on the shell or heads of the inner tank is prohibited.

(c) In lieu of the stamping required by paragraph (a) of this section, the specified markings may be incorporated on a data plate of corrosion-

resistant metal, fillet welded in place on the head of the outer jacket at the "B" end of the car.

§ 179.400-25 Stenciling.

Each tank car must be stenciled in compliance with the provisions of the AAR Specifications for Tank Cars, Appendix C. The stenciling must also include the following:

(a) The date on which the frangible disc was last replaced and the initials of the person making the replacement, on the outer jacket in letters and figures at least 1½ inches high.

(b) The design service temperature and maximum lading weight, in letters and figures at least 1½ inches high adjacent to the hazardous material stencil.

(c) The water capacity, in pounds net at 60° F., with the tank at its coldest operating temperature, after deduction for the volume above the inlet to the pressure relief device or pressure control valve, structural members, baffles, piping, and other appurtenances inside the tank, in letters and figurs at least 1½ inches high.

(d) Both sides of the tank car, in letters at least 1½ inches high, with the statement "Do Not Hump or Cut Off While in Motion."

(e) The outer jacket, below the tank classification stencil, in letters at least 1½ inches high, with the statement, "Vacuum jacketed."

§ 179.400-26 Certificate of construction.

See §179.5.

§ 179.401 Individual specification requirements applicable to inner tanks for cryogenic liquid tank car tanks.

§ 179.401-1 Individual specification requirements.

In addition to §179.400, the individual specification requirements for the inner tank and its appurtenances are as follows:

DOT specification	113A60W	113C120W
Design service temperature, °F.	-423	-260
Material	§179.400-5	§179.400-5.
Impact test (weld and plate material)	§179.400-5(c)	§179.400-5(c).
Impact test values	§179.400-5(d)	§179.400-5(d).
Standard heat transfer rate: (Btu per day per lb. of water capacity, max.) (see §179.400-4)	0.097	0.4121.
Bursting pressure, min. psi	240	300
Minimum plate thickness shell, inches (see §179.400-7(a))	7/16	7/16.
Minimum head thickness, inches (see §179.400-7 (a), (b), and (c))	7/16	7/16.
Test pressure, psi (see §179.400-16)	60	120
Safety vent bursting pressure, max. psi	60	120.
Pressure relief valve start-to-discharge pressure, psi (± 3 psi)	30	75.
Pressure relief valve vapor tight pressure, min. psi	24	60
Pressure relief valve flow rating pressure, max. psi	40	85
Alternate pressure relief valve start-to-discharge pressure, psi (± 3 psi)		90
Alternate pressure relief valve vapor tight pressure, min. psi		72
Alternate pressure relief valve flow rating pressure, max. psi		100
Pressure control valve	17	Not required
Start-to-vent, max. psi (see §179.400-20(c)(4).)		
Relief device discharge restrictors	§179.400-20	§179.400-20
Transfer line insulation	§179.400-17	Not required.

§ 179.500 Specification DOT-107A* * * * seamless steel tank car tanks.

§ 179.500-1 Tanks built under these specifications shall meet the requirements of §179.500.

§ 179.500-2 Approval. (a) For procedure for securing approval, see §179.3.

§ 179.500-3 Type and general requirements. (a) Tanks built under this specification shall be hollow forged or drawn in one piece. Forged tanks must be machined inside and outside before ends are necked-down and, after necking-down, the ends must be machined to size on the ends and outside diameter. Machining not neccessary on inside or outside of seamless steel tubing, but required on ends after necking-down.

(b) For tanks made in foreign countries, chemical analysis of material and all tests as specified must be carried out within the limits of the United States under supervision of a competent and disinterested inspector; in addition to which, provisions in §179.500 and §179.500-18(c) must be carried out at the point of manufacture by a recognized inspection bureau with principal office in the United States.

(c) The terms "marked end" and "marked test pressure" used throughout this specification are defined as follows:

(1) "Marked end" is that end of the tank on which marks prescribed in §179.500-17 are stamped.

(2) "Marked test pressure" is that pressure in pounds per square inch which is indicated by the figures substituted for the * * * * in the marking DOT-107A * * * * stamped on the marked end of tank.

(d) The gas pressure at 130° F. in the tank shall not exceed 7/10 of the marked test pressure of the tank.

§ 179.500-4 Thickness of wall. (a) Minimum thickness of wall of each finished tank shall be such that at a pressure equal to 7/10 of the marked test pressure of the tank, the calculated fiber stress in pounds per square inch at inner wall of tank multiplied by 3.0 will not exceed the tensile strength of any specimen taken from the tank and tested as prescribed in §179.500-7(b). Minimum wall thickness shall be ¼ inch.

(b) Calculations to determine the maximum marked test pressure permitted to be marked on the tank shall be made by the formula:

$$P = \frac{10S\,(D^2 - d^2)}{7\,(D^2 + d^2)}$$

where:

P = Maximum marked test pressure permitted;

$S = \frac{U}{3.0}$

where:

U = Tensile strength of that specimen which shows the lower tensile strength of the two specimens taken from the tank, and tested as prescribed in §179.500-7(b).

3 = Factor of safety

$\frac{D^2 - d^2}{D^2 + d^2}$ = The smaller value obtained for this factor by the operations specified in §179.500-4(c).

(c) Measure at one end, in a plane perpendicular to the longitudinal axis of the tank and at least 18 inches form that end before necking-down:

d = Maximum inside diameter (inches) for the location under consideration; to be determined by direct measurement to an accuracy of 0.05 inch.

t = Minimum thickness of wall for the location under consideration; to be determined by direct measurement to an accuracy of 0.001 inch.

Take D = d + 2t.

Calculate the value of $\frac{D^2 - d^2}{D^2 + d^2}$

(1) Make similar measurements and calculation for a corresponding location at the other end of the tank.

(2) Use the smaller result obtained, from the foregoing, in making calculations prescribed in paragraph (b) of this section.

§ 179.500-5 Material. (a) Tanks shall be made from openhearth or electric steel of uniform quality. Material must be free from seams, cracks, laminations, or other defects injurious to finished tank. If not free from such defects, the surface may be machined or ground to eliminate these defects. Forgings and seamless tubing for bodies of tanks must be stamped with heat numbers.

(b) Steel (see Note 1) must conform to the following requirements as to chemical composition:

Designation	Class I (percent)	Class II (percent)	Class III (percent)
Carbon, maximum	0.50	0.50	0.53
Manganese, maximum	1.65	1.65	1.85
Phosphorus, maximum	.05	.05	.05
Sulphur, maximum	.06	.05	.05
Silicon, maximum	.35	.30	.37
Molybdenum, maximum	....	.25	.30
Chromium, maximum	....	.30	.30
Sum of manganese and carbon not over	2.10	2.10	....

Note 1: Alternate steel containing other alloying elements may be used if approved

(1) For instructions as to the obtaining and checking of chemical analysis, see §179.500-18(b)(3).

§ 179.500-6 Heat treatment. (a) Each necked-down tank shall be uniformly heat treated. Heat treatment shall consist of annealing or normalizing and tempering for Class I, Class II and Class III steel or oil quenching and tempering for Class III steel. Tempering temperatures shall not be less than 1000 F. Heat treatment of alternate steels must be approved. All scale must be removed from outside of tank to an extent sufficient to allow proper inspection.

(b) To check uniformity of heat treatment, Brinnel hardness tests shall be made at 18 inch intervals on the entire longitudinal axis. The hardness must not vary more than 35 points in the length of the tank. No hardness tests need be taken within 12 inches from point of head to shell tangency.

(c) A magnetic particle inspection shall be performed after heat treatment on all tanks subjected to a quench and temper treatment to detect the presence of quenching cracks. Cracks shall be removed to sound metal by grinding and the surface exposed shall be blended smoothly into the surrounding area. A wall thickness check shall then be made of the affected area by ultrasonic equipment or other suitable

means acceptable to the inspector and if the remaining wall thickness is less than the minimum recorded thickness as determined by § 179.500-4(b) it shall be used for making the calculation prescribed in § 179.500-6(b).

§ 179.500-7 Physical tests. (a) Physical tests shall be made on 2 test specimens 0.505 inch in diameter within 2-inch gage length, taken 180 degrees apart, 1 from each ring section cut from each end of each forged or drawn tube before necking-down, or 1 from each prolongation at each end of each necked-down tank. These test specimen ring sections or prolongations must be heat treated with the necked-down tank which they represent. The width of the test specimen ring section must be at least its wall thickness. Only when diameters and wall thickness will not permit removal of 0.505 by 2-inch tensile test bar, laid in the transverse direction, may test bar cut in the longitudinal direction be substituted. When the thickness will not permit obtaining a 0.505 specimen, then the largest diameter specimen obtainable in the longitudinal direction shall be used. Specimens shall have bright surface and a reduced section. When 0.505 specimen is not used the gage length shall be a ratio of 4 to 1 length to diameter.

(b) Elastic limit as determined by extensometer, shall not exceed 70 percent of tensile strength for Class I steel or 65 percent of tensile strength for Class II and Class III steel. Determination shall be made at cross head speed of not more than 0.125 inch per minute with an extensometer reading to 0.0002 inch. The extensometer shall be read at increments of stress not exceeding 5,000 pounds per square inch. The stress at which the strain first exceeds.

$$\frac{\text{stress (pounds per square inch)}}{30{,}000{,}000 \text{ (pounds per square inch)}} + 0.005 \text{ (inches per inch)}$$

shall be recorded as the elastic limit.

(1) Elongation shall be at least 18 percent and reduction of area at least 35 percent.

Note 1. Upon approval, the ratio of elastic limit to ultimate strength may be raised to permit use of special alloy steels of definite composition that will give equal or better physical properties than steels herein specified.

§ 179.500-8 Openings in tanks. (a) Each end shall be closed by a cover made of forged steel. Covers must be secured to ends of tank by through bolts or studs not entering interior of tank. Covers must be of a thickness sufficient to meet test requirements of § 179.500-12 and to compensate for the openings closed by attachments prescribed herein.

(1) It is also provided that each end may be closed by internal threading to accommodate an approved fitting. The internal threads as well as the threads on fittings for these openings shall be clean cut, even, without checks, and tapped to gage. Taper threads are required and shall be of a length not less than as specified for American Standard taper pipe threads. External threading of an approved type shall be permissible on the internal threaded ends.

(b) Joints between covers and ends and between cover and attachments shall be of approved form and made tight against vapor or liquid leakage by means of a confined gasket of suitable material.

§ 179.500-9 Tank mounting. (a) For tank mounting, see § 179.10.

§ 179.500-10 Protective housing. (a) Safety relief devices, and loading and unloading valves on tanks shall be protected from accidental injury by approved metal housing, arranged so it may be readily opened to permit inspection and adjustment of safety relief devices and valves, and securely locked in closed position. Housing shall be provided with opening having an opening equal to twice the total discharge area of safety relief device enclosed.

§ 179.500-12 Safety relief devices. (a) Tank shall be equipped with one or more safety relief devices of approved type and discharge area, mounted on the cover or threaded into the non-marked end of the tank. If fittings are mounted on a cover, they shall be of the flanged type, made of metal not subject to rapid deterioration by lading or in service. Total flow capacity shall be such that, with tank filled with air at pressure equal to 70 percent of the marked test pressure of tank, flow capacity will be sufficient to reduce air pressure to 30 percent of the marked test pressure within 3 minutes after safety relief device opens.

(b) Safety relief devices shall open at pressure not exceeding the marked test pressure of tank and not less than 7/10 of marked test pressure. (For tolerance for safety relief valves, see § 179.500-16(a).)

(c) Cars used for the transportation of flammable gases shall have the safety devices equipped with an approved ignition device.

§ 179.500-13 Fixtures. (a) Attachments, other than those mounted on tank covers or serving as threaded closures for the ends of the tank, are prohibited.

§ 179.500-14 Test of tanks. (a) After heat-treatment, tanks shall be subjected to hydrostatic tests in a water jacket, or by other accurate method, operated so as to obtain reliable data. No tank shall have been subjected previously to internal pressure greater than 90 percent of the marked test pressure. Each tank must be tested to a pressure at least equal to the marked test pressure of the tank. Pressure must be maintained for 30 seconds, and sufficiently longer to insure complete expansion of tank. Pressure gage must permit reading to accuracy of one percent. Expansion gage must permit reading of total expansion to accuracy of one percent. Expansion must be recorded in cubic centimeters.

(b) No leaks shall appear and permanent volumetric expansion shall not exceed 10 percent of the total volumetric expansion at test pressure.

§ 179.500-15 Handling of tanks failing in tests. (a) Tanks rejected for failure in any of the tests prescribed may be reheat-treated, and will be acceptable if subsequent to reheat-treatment they are subjected to and pass all of the tests.

§ 179.500-16 Tests of safety relief devices. (a) Safety relief valves shall be tested by air or gas before being put into service. Valve must open at pressure not exceeding the marked test pressure of tank and must be vapor-tight at 80 percent of the marked test pressure. These limiting pressures must not be affected by any auxiliary closure or other combination.

(b) For safety relief devices of frangible disc type, samples of discs used shall burst at a pressure not exceeding the marked test pressure of tank and not less than 7/10 of marked test pressure.

§ 179.500-17 Marking. (a) Each tank shall be plainly and permanently marked, thus certifying that tank complies with all requirements of this specification. These marks must be stamped into the metal of necked-down section of tank at marked end, in letters and figures at least ⅛ inch high, as follows:

(1) Spec. DOT-107A****, the **** to be replaced by figures indicating marked test pressure of the tank. This pressure shall not exceed the calculated maximum marked test pressure permitted, as determined by the formula in § 179.500-4(b).

(2) Serial number immediately below the stamped mark specified in paragraph (a)(1) of this section.

(3) Inspector's official mark immediately below the stamped mark specified in paragraph (a)(1) of this section.

(4) Name, mark (other than trademark), or initials of company or person for whose use tank is being made, which shall be recorded with the Bureau of Explosives.

(5) Date, (such as 1-62, for January 1962) of tank test, so placed that dates of subsequent tests may easily be added thereto.

(6) Date, (such as 1-62, for January 1962) of latest test of safety relief valve or of frangible disc, required only when tank is used for transportation of flammable gases.

(7) Name of gas for which tank car is being used, stenciled in letters at least 2 inches high on each side of car where they are clearly visible.

§ 179.500-18 Inspection and reports. (a) Before a tank car is placed in service, the party assembling the completed car shall furnish to car owner, Bureau of Explosives, and the Secretary, Mechanical Division, Association of American Railroads, a report in proper form certifying that tanks and their equipment comply with all the requirements of this specification and including information as to serial numbers, dates of tests, and ownership marks on tanks mounted on car structure.

(b) Purchaser of tanks shall provide for inspection by a competent inspector as follows:

(1) Inspector shall carefully inspect all material and reject that not complying with § 179.500-5.

(2) Inspector shall stamp his official mark on each forging or seamless tube accepted by him for use in making tanks, and must verify proper application of heat number to such material by occasional inspections at steel manufacturer's plant.

(3) Inspector shall obtain certified chemical analysis of each heat of material.

(4) Inspector shall make inspection of inside surface of tanks before necking-down, to insure that no seams, cracks, laminations, or other defects exist.

(5) Inspector shall fully verify compliance with specification, verify heat treatment of tank as proper; obtain samples for all tests and check chemical analyses; witness all tests; and report minimum thickness of tank wall, maximum inside diameter, and calculated value of D, for each end of each tank as prescribed in § 179.500-4(c).

(6) Inspector shall stamp his official mark on each accepted tank immediately below serial number, and make certified report (see paragraph (c) of this section) to builder, to company or person for whose use tanks are being made, to builder of car structure on which tanks are to be mounted, to the Bureau of Explosives, and to the Secretary, Mechanical Division, Association of American Railroads.

(c) Inspector's report required herein shall be in the following form:

(Place) .....

(Date) .....

Steel Tanks

It is hereby certified that drawings were submitted for these tanks under AAR Application for Approval ..... and approved by the AAR

Committee on Tank Cars under date of .....
Built for .....Company
Location at .....
Built by .....Company
Location at .....
Consigned to .....Company
Location at .....
Quantity .....
Length (inches) .....
Outside diameter (inches) .....
Marks stamped into tank as required in § 179.500-17 are

DOT-107A****

Note 1: The marked test pressure substituted for the **** on each tank is shown on Record of General Data on Tanks attached hereto

Serial numbers ..... to ..... inclusive
Inspector's mark .....
Owner's mark .....
Test date .....
Water capacity (see Record of Hydrostatic Tests)
Tare weights (yes or no) (See Record of Hydrostatic Tests)
These tanks were made by process of .....

Steel used was identified as indicated by the attached list showing the serial number of each tank, followed by the heat number.

Steel used was verified as to chemical analysis and record thereof is attached hereto. Heat numbers were stamped into metal

All material was inspected and each tank was inspected both before and after closing in ends; all material accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to strength of tank. Processes of manufacture and heat treatment of tanks were witnessed and found to be efficient and satisfactory.

Before necking-down ends, each tank was measured at each location prescribed in § 179.500-4(c) and minimum wall thickness in inches at each location was recorded, maximum inside diameter in inches at each location was recorded, value of D in inches at each location was calculated and recorded, maximum fiber stress in wall at location showing larger value for

$$\frac{D^2 + d^2}{D^2 - d^2}$$

was calculated for 7/10 the marked test pressure and recorded. Calculations were made by the formula

$$S = 0.7P\,\frac{(D^2 + d^2)}{(D^2 - d^2)}$$

Hydrostatic tests, tensile tests of material, and other tests as prescribed in this specification, were made in the presence of the inspector, and all material and tanks accepted were found to be in compliance with the requirements of this specification. Records thereof are attached hereto.

I hereby certify that all of these tanks proved satisfactory in every way and comply with the requirements of Department of Transportation Specification No. 107A****.

(Signed) .....
(Inspector)
(Place) .....
(Date) .....

RECORD OF CHEMICAL ANALYSIS OF STEEL FOR TANKS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Built by ..... Company
For ..... Company

Heat No.	Tanks represented (Serial Nos.)	Chemical analysis							
		C	Mn	P	S	Si	Ni	Cr	Mo

These analyses were made by

(Signed) .....

(Place) .....
(Date) .....

RECORD OF TENSILE TESTS OF MATERIAL IN TANKS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Built by ..... Company
For ..... Company

Heat No.	Tanks represented by test (Serial Nos.)	Elastic limit (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 2 inches)	Reduction of area (percent)

(Signed) .....
(Place) .....
(Date) .....

RECORD OF HYDROSTATIC TESTS ON TANKS

Numbered ..... to ..... inclusive
Size ..... inches outside diameter by ..... inches long
Built by ..... Company
For ..... Company

Serial Nos. of tanks	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters)[1]	Permanent expansion (cubic centimeters)[1]	Percent ratio of permanent expansion to total expansion[1]	Tare weight (pounds)[2]	Capacity in pounds of water at 60° F.

[1] If tests are made by method involving measurement of amount of liquid forced into tank by test pressure, then the basic data on which calculations are made, such as pump factors, temperature of liquid, coefficient of compressibility of liquid, etc., must also be given.
[2] Do not include protective housing, but state whether with or without valves.

(Signed) .....
(Place) .....
(Date) .....

RECORD OF GENERAL DATA ON TANKS

Numbered ..... to ..... inclusive
Built by ..... Company
For ..... Company

Data obtained as prescribed in § 179.500-4(cc)											
Marked end of tank				Other end of tank							
Serial No. of tank	(C) Minimum thickness of wall in inches	(B) Maximum inside diameter in inches	(D) Calculated value of D in inches = d + 2t	(E) Minimum thickness of wall in inches	(A) Maximum inside diameter in inches	(D) Calculated value of D in inches = d + 2t	Larger value of the factor $\frac{D^2 + d^2}{D^2 - d^2}$	(S) Calculated fiber stress in pounds per square inch at 7/10 marked test pressure	Marked test pressure in pounds per square inch stamped in tank	Minimum tensile strength of material in pounds per square inch recorded

(Signed) .....

For explanation of abbreviations and reference marks, see last page of this tariff.

PART 397—TRANSPORTATION OF HAZARDOUS MATERIALS; DRIVING AND PARKING RULES

§ 397.1 Application of the rules in this part. (a) Except as provided in paragraph (c) of this section, the rules in this part apply to each motor carrier engaged in the transportation of hazardous materials by a motor vehicle which must be marked or placarded in accordance with §177.823 of this title and to—.

(1) Each officer or employee of the carrier who performs supervisory duties related to the transportation of hazardous materials; and

(2) Each person who operates or who is in charge of a motor vehicle containing hazardous materials.

(b) Each person designated in paragraph (a) of this section must know and obey the rules in this part.

(c) Intracity operations: The rules in this part do not apply to a driver or a vehicle wholly engaged in exempt intracity operations as defined in §390.16, of this chapter.

§ 397.2 Compliance with Federal motor carrier safety regulations. A motor carrier or other person to whom this part is applicable must comply with the rules in Part 390 through 397, inclusive, of this subchapter when he is transporting hazardous materials by a motor vehicle which must be marked or placarded in accordance with § 177.823 of this title.

§ 397.3 State and local laws, ordinances, and regulations. Every motor vehicle containing hazardous materials must be driven and parked in compliance with the laws, ordinances, and regulations of the jurisdiction in which it is being operated, unless they are at variance with specific regulations of the Department of Transportation which are applicable to the operation of that vehicle and which impose a more stringent obligation or restraint.

§ 397.5 Attendance and surveillance of motor vehicles. (a) Except as provided in paragraph (b) of this section, a motor vehicle which contains Class A or Class B explosives must be attended at all times by its driver or a qualified representative of the motor carrier that operates it.

(b) The rules in paragraph (a) of this section do not apply to a motor vehicle which contains Class A or Class B explosives if all the following conditions exist—

(1) The vehicle is located on the property of a motor carrier, on the property of a shipper or consignee of the explosives, in a safe haven, or, in the case of a vehicle containing 50 pounds or less of either Class A or Class B explosives, on a construction or survey site; and

(2) The lawful bailee of the explosives is aware of the nature of the explosives the vehicle contains and has been instructed in the procedures he must follow in emergencies; and

(3) The vehicle is within the bailee's unobstructed field of view, or is located in a safe haven.

(c) A motor vehicle which contains hazardous materials other than Class A or Class B explosives and which is located on a public street or highway or the shoulder of a public highway must be attended by its driver. However, the vehicle need not be attended while its driver is performing duties which are incident and necessary to his duties as the operator of the vehicle.

(d) For purposes of this section—

(1) A motor vehicle is attended when the person in charge of the vehicle is on the vehicle, awake, and not in a sleeper berth, or is within 100 feet of the vehicle and has it within his unobstructed field of view.

(2) A qualified representative of a motor carrier is a person who—

(i) Has been designated by the carrier to attend the vehicle;

(ii) Is aware of the nature of the hazardous materials contained in the vehicle he attends;

(iii) Has been instructed on the procedures he must follow in emergencies; and

(iv) Is authorized to move the vehicle and has the means and ability to do so.

(3) A safe haven is an area specifically approved in writing by local, State, or Federal governmental authorities for the parking of unattended vehicles containing Class A or Class B explosives.

(e) The rules in this section do not relieve a driver from any obligation imposed by law relating to the placing of warning devices when a motor vehicle is stopped on a public street or highway.

§ 397.7 Parking. (a) A motor vehicle which contains Class A or Class B explosives must not be parked under any of the following circumstances—

(1) On or within 5 feet of the traveled portion of a public street or highway;

(2) On private property (including premises of a fueling or eating facility) without the knowledge and consent of the person who is in charge of the property and who is aware of the nature of the hazardous materials the vehicle contains; or

(3) Within 300 feet of a bridge, tunnel, dwelling, building, or place where people work, congregate, or assemble, except for brief periods when the necessities of operation require the vehicle to be parked and make it impracticable to park the vehicle in any other place.

(b) A motor vehicle which contains hazardous materials other than Class A or Class B explosives must not be parked on or within five feet of the traveled portion of public street or highway except for brief periods when the necessities of operation require the vehicle to be parked and make it impracticable to park the vehicle in any other place.

§ 397.9 Routes. (a) Unless there is no practicable alternative, a motor vehicle which contains hazardous materials must be operated over routes which do not go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys. Operating convenience is not a basis for determining whether it is practicable to operate a motor vehicle in accordance with this paragraph.

(b) Before a motor carrier requires or permits a motor vehicle containing Class A or Class B explosives to be operated, he must prepare a written plan of a route that complies with the rules in paragraph (a) of this section for that vehicle and must furnish a copy of the written plan to the vehicle's driver. However, the driver may prepare the written plan as agent for the motor carrier when the driver begins his trip at a location other than the carrier's terminal.

§ 397.11 Fires. (a) A motor vehicle containing hazardous materials must not be operated near an open fire unless its driver has first taken precautions to ascertain that the vehicle can safely pass the fire without stopping.

(b) A motor vehicle containing hazardous materials must not be parked within 300 feet of an open fire.

§ 397.13 Smoking. No person may smoke or carry a lighted cigarette, cigar, or pipe on or within 25 feet of—

(a) A motor vehicle which contains explosives, oxidizing materials, or flammable materials; or

(b) An empty tank motor vehicle which has been used to transport flammable liquids or gases and which, when so used, was required to be marked or placarded in accordance with the rules in §177.823 of this title.

§ 397.15 Fueling. When a motor vehicle which contains hazardous materials is being fueled—

(a) Its engine must not be operating; and

(b) A person must be in control of the fueling process at the point where the fuel tank is filled.

§ 397.17 Tires. (a) If a motor vehicle which contains hazardous materials is equipped with dual tires on any axle, its driver must stop the vehicle in a safe location at least once during each 2 hours or 100 miles of travel, whichever is less, and must examine its tires. The driver must also examine the vehicle's tires at the beginning of each trip and each time the vehicle is parked.

(b) If, as the result of an examination pursuant to paragraph (a) of this section, or otherwise, a tire if found to be flat, leaking, or improperly inflated, the driver must cause the tire to be repaired, replaced, or properly inflated before the vehicle is driven. However, the vehicle may be driven to the nearest safe place to perform the required repair, replacement, or inflation.

(c) If, as the result of an examination pursuant to paragraph (a) of this section, or otherwise, a tire is found to be overheated, the driver shall immediately cause the overheated tire to be removed and placed at a safe distance from the vehicle. The driver shall not operate the vehicle until the cause of the overheating is corrected.

(d) Compliance with the rules in this section does not relieve a driver from the duty to comply with the rules in §§397.5 and 397.7.

§ 397.19 Instructions and documents. (a) A motor carrier that transports Class A or Class B explosives must furnish the driver of each motor vehicle in which the explosives are transported with the following documents:

(1) A copy of the rules in this part;

(3) A document containing instructions on procedures to be followed in the event of accident or delay. The documents must include the names and telephone numbers of persons (including representatives of carriers or shippers) to be contacted, the nature of the explosives being transported, and the precautions to be taken in emergencies such as fires, accidents, or leakages.

(b) A driver who receives documents in accordance with paragraph (a) of this section must sign a receipt for them. The carrier shall retain the receipt in his files for 1 year at his principal place of business. However,

upon a written request to, and with the approval of, the Director, Regional Motor Carrier Safety Office, for the region in which a motor carrier has his principal place of business, the carrier may maintain the receipts at a regional or terminal office. The addresses and jurisdictions of the Directors of Regional Motor Carrier Safety Offices are shown in § 390.40 of this subchapter.

(c) A driver of a motor vehicle which contains Class A or Class B explosives must be in possession of, be familiar with, and be in compliance with—

(1) The documents specified in paragraph (a) of this section;
(2) The documents specified in § 177.817 of Chapter I of this title; and
(3) The written route plan specified in § 397.9(b).

§ 397.21 Marking of vehicles operated by private carriers.

(a) *General.* A motor vehicle being operated by a private carrier of property must be marked as specified in paragraphs (b) and (c) of this section if that vehicle—

(1) Is transporting hazardous materials of a kind or quantity that require the vehicle to be marked or placarded in accordance with § 177.823 of this title; and

(2) Is operating under its own power, either alone or in combination.

(b) *Nature of marking.* The marking must display the following information:

(1) The name or trade name of the private carrier operating the vehicle.

(2) The city or community in which the carrier maintains its principal office or in which the vehicle is customarily based.

(3) If the name of a person other than the operating carrier appears on the vehicle, the words "operated by" immediately preceding the information required by subparagraphs (1) and (2) of this paragraph.

Other identifying information may be displayed on the vehicle if it is not inconsistent with the information required by this paragraph.

(c) *Size, shape, location, and color of marking.* The material must—

(1) Appear on both sides of the vehicle;
(2) Be in letters that contrast sharply in color with the background;
(3) Be readily legible during daylight hours from a distance of 50 feet while the vehicle is stationary; and
(4) Be kept and maintained in a manner that retains the legibility required by subparagraph (3) of this paragraph.

The marking may consist of a removable device if that device meets the identification and legibility requirements of this section.

PART 146

TRANSPORTATION OR STORAGE

OF MILITARY

EXPLOSIVES ON BOARD VESSELS

PART 146—
TRANSPORTATION OR STORAGE OF MILITARY EXPLOSIVES ON BOARD VESSELS

SUBPART 146.01

PREFACE

§ 146.01-1 *Purpose of regulations.* The purpose of the regulations in this subchapter is to promote safety in the handling, stowage, storage and transportation of military explosives as defined herein, on board vessels on any navigable waters within the limits of the jurisdiction of the United States including its territories and possessions excepting only the Panama Canal Zone and to make more effective the provisions of the International Convention for the Safety of Life at Sea, 1960, relative to the carriage of dangerous goods.

§ 146.01-2 [Removed]

§ 146.01-3 *Plan of regulations.* This part prescribes the requirements of the Department of Transportation governing the transportation of military explosives on board vessels. Regulations governing the transportation of other hazardous materials in packages on board vessels are in 49 CFR Parts 171-189.

§ § 146.01-4 through 146.01-13 [Removed]

SUBPART 146.02

GENERAL REGULATIONS

§ 146.02-1 *Scope of regulations.* The regulations in this part:
(a) Set forth the requirements that shall be observed in the preparation and packing of military explosives for shipment or storage on board vessels;
(b) Set forth the descriptive name, shipping name, requirements relative to certification, containers, marking, labeling, information required on bills of lading or other shipping papers, manifests or cargo stowage plans for shipments of military explosives on board vessels;
(c) Set forth the provisions under which permitted military explosives within the scope of the definitions given herein, may be accepted, handled, stored, stowed, or transported on board vessels, and with respect to rejection and report of faulty containers and the disposition of any military explosives found to be in an unsafe condition when on board a vessel;
(d) Establish such other requirements as may be necessary to make effective the safe transportation of military explosives on board vessels.

§ 146.02-2 *Application to vessels.* (a) Except as provided in paragraph (b) of this section, this part applies to each domestic or foreign vessel when in the navigable waters of the United States, regardless of its character, tonnage, size, or service, and whether self-propelled or not, whether arriving or departing, underway, moored, anchored, aground, or while in dry dock.
(b) This part does not apply to:
(1) A public vessel not engaged in commercial service;
(2) A vessel constructed or converted for the principal purpose of carrying flammable or combustible liquid cargo in bulk in its own tanks, when only carrying these liquid cargoes;
(3) A vessel of 15 gross tons or smaller when not engaged in carrying passengers for hire;
(4) A vessel used exclusively for pleasure;
(5) A vessel of 500 gross tons or smaller when engaged in fisheries;
(6) A tug or towing vessel except when towing another vessel having explosives, flammable liquids or flammable compressed gas on board on deck in which case the tug or towing vessel shall make such provisions to guard against and extinguish fire as the Coast Guard may prescribe; or
(7) A cable vessel, dredge, elevator vessel fireboat, icebreaker, pile driver, pilot boat, welding vessel, salvage vessel, or wrecking vessel.

§ 146.02-3, 146.02-4 [Removed]

§ 146.02-5 *Responsibility for compliance.* Unless this part specifically provides that another person must perform a duty, each carrier, including a connecting carrier, shall comply with all applicable regulations in this part, and shall thoroughly instruct his employees in relation thereto.

§ 146.02-6 *Enforcement.* (a) An enforcement officer of the U.S. Coast Guard may at any time and at any place, within the jurisdiction of the United States, board any vessel for the purpose of enforcement of this part.
(b) Under the authority of 46 U.S. Code 170(13) and in the manner provided therein, a collector of customs may detain a vessel which is in violation of this part.

§ 146.02-6a *Assignment and certification.* (a) The National Cargo Bureau, Inc., is authorized to assist the Coast Guard in administering this part with respect to the following:
(1) Inspection of vessels for suitability for loading military explosives;
(2) Examination of stowage of military explosives;
(3) Making recommendations for stowage requirements of military explosives; and
(4) Issuance of certificates of loading setting forth that the stowage of military explosives is in accordance with the requirements of 46 U.S.C. 170 and this part.
(b) A certificate of loading issued by the National Cargo Bureau, Inc., may be accepted by the Coast Guard as prima facie evidence that the cargo is stowed in conformity with the requirements of 46 U.S.C. 170 and this part.

§ § 146.02-7 through 146.02-11 [Removed]

§ 146.02-12 *Inspection of cargo.* (a) *Manned vessels.* (1) The master of a vessel transporting military explosives shall cause an inspection of each hold or compartment containing military explosives to be made after stowage is complete, and at least once every 24 hours thereafter, weather permitting, in order to ensure that the cargo is in a safe condition and that no damage caused by shifting, spontaneous heating, leaking, sifting, wetting, or other cause has been sustained by the vessel or its cargo since loading and stowage. This requirement does not require freight containers or individual barges to be opened. A vessel's holds equipped with smoke or fire detecting systems, having an automatic monitoring capability, need not be inspected except after stowage is complete and after periods of heavy weather.
(2) The master shall cause an entry to be made in the vessel's deck log book for each inspection of the stowage of military explosives performed.
(b) *Unmanned and magazine vessels.* An inspection of the cargo must be made after stowage has been completed to ensure that stowage has been accomplished properly and that there are no visible signs of damage to any packages or evidence of heating, leaking, or sifting. This inspection must be made by the individual who is responsible to the carrier and who is in charge of loading and stowing the cargo on the unmanned vessels or the individual in charge in the case of a magazine vessel.
(c) The master of each ocean-going vessel carrying military explosives shall, immediately prior to entering a port in the United States, cause an inspection of that cargo to be made.
(d) When inspecting a cargo of military explosives capable of evolving flammable vapors, any artificial means of illumination must be of an explosion-proof type.

For explanation of abbreviations and reference marks, see last page of this tariff.

§ 146.02-14 Acceptance of damaged or leaking packages. A carrier may not transport by vessel any package that is so damaged as to permit the escape of its contents, that appears to have leaked, or that gives evidence of failure to properly contain the contents unless it is restored or repaired to the satisfaction of the master of the vessel.

§ 146.02-15 Emergency situations. (a) When an accident occurs on board a vessel involving military explosives, and the safety of the vessel, its passengers or crew are endangered, the master shall adopt such procedures as will, in his judgment, provide maximum safety for the vessel and its crew. When the accident results in damaged packages or the emergency use of unauthorized packagings, these packages may not be offered to any forwarding carrier for transportation. The master shall notify the nearest District Commander, U.S. Coast Guard, and request instructions for disposition of the packages.

(b) Military explosives may be jettisoned only if the master believes this action necessary to prevent or substantially reduce a hazard to human life or reduce a substantial hazard to property.

§ 146.02-16 Rejections of shipments in violation. (a) A carrier may not knowingly transport by vessel any military explosive offered under a false or deceptive name, marking, invoice, shipping paper or other declaration, or without the shipper furnishing written information about the true nature of the material at the time of delivery.

(b) If a shipment in violation is found in transit, the master of the vessel shall adopt procedures which in his judgment provide maximum safety to the vessel, its passengers and its crew and which are in compliance with § 146.02-15. If the vessel is in port, the material may not be delivered to any party, and the master shall immediately notify the nearest District Commander and request instructions for disposition of the material.

§ §146.02-17 through 146.02-19 [Removed]

§ 146.02-20 Repairs involving welding or burning. (a) Except as provided in paragraph (b) of this section, repairs or work involving welding or burning, or the use of power-actuated tools or appliances which may produce intense heat may not be undertaken on any vessel having military explosives on board as cargo.

(b) Paragraph (a) of this section does not apply if the repairs or work are approved by the local Coast Guard Captain of the Port or his authorized representative.

§ 146.02-21 [Removed]

§ 146.02-22 Preservation of records. (a) When this part requires shipping orders, manifest, cargo lists, stowage plans, reports, or any other papers, documents or similar records to be prepared, the carrier shall preserve them or copies of them in his place of business or office in the United States for a period of one year after their preparation.

(b) Any record required to be preserved must be made available upon request to an authorized representative of the U.S. Coast Guard.

§ 146.02-25 Exemptions and Alternative Stowage Procedures. (a) Procedures whereby persons subject to the requirements of this part may obtain administrative relief therefrom on the basis of equivalent levels of safety or levels of safety consistent with the public interest are set forth in 49 CFR Part 107, Subpart B.

(b) When a military explosive is to be loaded on board a vessel and it is shown to the satisfaction of the Captain of the Port for the place where the vessel is being loaded that it is impracticable to comply with a stowage location, handling, or stowage requirement prescribed in this part, the Captain of the Port may authorize in writing the use of an alternative stowage location or method of handling or stowage subject to such conditions as he finds will ensure a level of safety at least equivalent to that afforded by the regulatory requirement concerned.

§ 146.02-30 [Removed]

§ 146.02-35 Situation requiring report. (a) When a fire or other hazardous condition exists on a vessel transporting military explosives, the master shall notify the nearest District Commander as soon as possible and shall comply with any instructions given by the District Commander.

(b) When an incident occurs during transportation in which military explosives are involved, Hazardous Materials Incident Reports may be required. See 49 CFR 171.15 and 171.16.

(c) If a package, container, portable tank, highway or railroad vehicle containing military explosives is jettisoned or lost, the master shall notify the nearest District Commander as soon as possible of the location, quantity, and type of explosives.

SUBPARTS 146.03 AND 146.04

[REMOVED]

SUBPART 146.05

SHIPPER'S REQUIREMENTS REGARDING PACKING, MARKING, LABELING AND SHIPPING PAPERS

§ 146.05-1 General requirements. (a) No person may offer military explosives for transportation on board a vessel unless they are properly classed, described, packaged, marked, labeled, and in the condition for shipment required by this part.

(b) A shipment of military explosives that is not prepared for shipment in accordance with this part may not be offered for transportation on board a vessel. It is the duty of each person who offers military explosives for transportation to instruct each of his officers, agents, and employees having any responsibility for preparing military explosives for shipment as to applicable regulations in this part.

(c) Methods of container manufacture, packing, and storage, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or a representative of the U.S. Coast Guard.

§ 146.05-2 [Removed]

§ 146.05-3 Prohibited packaging. (a) No person may offer for transportation on board a vessel any military explosives in an outside packaging which also contains any substance likely to cause a dangerous evolution of heat or gas or produce corrosive materials.

(b) No person may offer for transportation on board a vessel any military explosives which under conditions normally incident to transportation may polymerize (combines or react with itself) or decompose so as to cause dangerous evolution of heat or gas, unless they are properly stabilized or inhibited. Refrigeration may be used as a means of stabilization only when approved by the Commandant (GMHM).

§ §146.05-4 through 146.05-10a [Removed]

§ 146.05-11 Shipper's certification. Each person who offers military explosives for transportation on board a vessel shall certify in writing that the explosives are being presented for transportation in accordance with this part by printing (manually or mechanically) the following statement on the shipping paper containing the required shipping description:

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Note.—Preprinted certificates complying with 49 CFR 173.430(a) in effect on June 30, 1978, may be used through June 30, 1979. After June 30, 1979, use of the certificate required by this section is mandatory.

§ 146.05-12 Shipping papers. (a) A carrier may not transport military explosives on board a vessel unless the explosives are properly described on the shipping papers in the manner prescribed in 49 CFR, Part 172, Subpart C.

(b) A carrier may not transport military explosives on board a vessel unless it has been certified by the shipper in accordance with § 146.05-11.

§ § 146.05-13, 146.05-14 [Removed]

§ 146.05-15 Marking and labeling. Each package of military explosives offered for transportation on board a vessel must be marked and labeled in accordance with 49 CFR, Part 172, Subparts D and E respectively.

§ § 146.05-16, 146.05-17 [Removed]

SUBPARTS 146.06, 146.07, AND 146.08

[REMOVED]

SUBPART 146.09

CARGO HANDLING AND STOWAGE DEVICES

§ § 146.09-1 through 146.09-6 [Removed]

§ 146.09-7 Specifications of moisture proofed paper bags.

SPECIFICATION MIN-W10

MOISTURE PROOFED MULTIWALL PAPER BAGS FOR TRANSPORTATION OF QUICKLIME BY WATER

GENERAL

1. **Compliance.** Containers must comply with, or may exceed, details of the specifications.
2. **Capacity.** Not over 100 pounds net.

MATERIAL

3. **Paper.** Kraft (100% sulfate) paper.
4. **Moisture proofing.** Asphalt or other material equal or superior to asphalt.

CONSTRUCTION

5. **(a) Description.** A multiwall paper bag constructed of not less than four plies, one or more of which will be moisture proofed.

(b) Assembly of moisture proofed ply. The assembly of the moisture proofed ply will be accomplished by combining two sheets of Kraft (100% sulfate) paper having a basis weight of not less than 20 pounds each with not less than 25 pounds of asphalt applied evenly to the paper surface.

(c) Alternate moisture proofed ply. Any other moisture proofed Kraft paper of a total basis weight of not less than 40 pounds before treatment, whose moisture proofed qualities are equal or superior to the above asphalt treated paper as determined by the Thwing Vapometer test for moisture-vapor transmission.

(d) Additional plies. Remaining plies of the bag will be constructed of Kraft (100%) sulfate paper, each sheet having a basis weight of not less than 40 pounds, and a Kady or Mullen test of 40 pounds per square inch. The combined weight of said remaining plies to be not less than the weights given in the following table:

Approximate weight of contents:	*Combined weight of remaining plies in addition to moisture proofed ply described in (5)(b)*
To and including 50 pounds	130 pounds
51 pounds to and including 80 pounds	150 pounds
81 pounds to and including 100 pounds	170 pounds

All weights given are on the basis of 480 (24 x 36 inch) sheets.

(e) Longitudinal seams. Longitudinal seams made by lapping not less than one inch and pasting.

(f) Bottom closure. Bottom closure made by folding and interlapping and pasting; or taped sewed and dipped in a waterproofing compound; *or sewed and taped over stitching.*

(g) Top closure. By wire ties consisting of not less than two No. 16 Birmingham wire gauge or heavier wires; or by valve mouth with top of bag folded and interlapped and pasted; or by valve mouth with top of bag taped, sewed and dipped in waterproofing compound; *or sewed and taped over stitching.*

6. **Test.** The finished container, filled and closed, must be capable of withstanding a drop test of 4 feet on the butt without sifting or rupture of any ply.

MARKING

7. **In each container.** By marks at least one inch high as follows:

(a) Min-W10. This marking shall be understood to certify that the container complies with all specification requirements.

(b) Name and address of maker located above or below the mark specified in (7)(a).

§ 146.09-8 Specifications of moisture proofed paper lined burlap bags.

SPECIFICATION MIN-W11

MOISTURE PROOFED PAPER LINED BURLAP BAGS FOR TRANSPORTATION OF QUICKLIME BY WATER

GENERAL

1. **Compliance.** Containers must comply with, or may exceed, details of the specifications.
2. **Capacity.** Not over 100 pounds net.

MATERIAL

3. **Burlap.** At least equal in quality and strength to 7½ ounce 40 inch (7½/40) Calcutta common burlap. Thread count at least 9 per inch warp and 9 per inch fillet.
4. **Paper.** No. 1 Kraft creped. Finished weight of 40 pounds per ream (480 sheets 24 x 36 inch) after creping.

CONSTRUCTION

5. **(a) Description.** Burlap bag lined with a water proofed paper lining.

(b) Assembly of moisture proofed lining. The assembly of the moisture proofed lining will be accomplished by combining two plies of creped paper having a finished weight of not less than 40 pounds each, evenly coated between the two plies with asphalt of any desirable type, of minimum 150° F. melting point, over the entire area of paper, with minimum coverage of 110 pounds per ream.

(c) Assembly of moisture proofed ply and burlap. The burlap will be lined with the moisture proofed creped paper by cementing together with a suitable latex compounded adhesive to securely attach paper lining to the burlap.

(d) Stretch of paper lining. After they are cemented to the burlap the stretch of the paper lining must equal the stretch of the burlap in the direction of the warp and filling and equal to 10 percent in a diagonal direction.

(e) Seams. Bags must be made with cemented center seams and taped bottoms to make them sift proof and airtight and to provide strength at least equal to the bag material.

(f) Closure. Bags to be wire tied with two No. 16 Birmingham wire gauge or heavier wire ties.

6. **Test.** The finished container, filled and closed, must be capable of withstanding a drop test of 4 feet on the butt without sifting or rupture of any ply.

MARKING

7. **On each container.** By marks at least 1 inch high as follows:

(a) MIN-W11. This marking shall be understood to certify that the container complies with all specification requirements.
(b) Name and address of maker located above or below the mark specified in (7)(a).

§ 146.09-11 Requirements of equipment for handling explosives. (a) A chute for loading and unloading explosives must be constructed of smooth planed boards not less than one-inch thick with side guards of the same material at least 4 inches high. Only brass screws may be used to assemble the sides and bottom. D-shaped wooden strips or runners not more than six inches apart and running the length of the chute must be fastened to the upper surface of the slide by glue and wooden dowels extended through the bottom of the chute. Four lashing rings must be provided, one at each outside corner of the chute, for purposes of securing during use.
(b) A roller conveyor constructed of aluminum or other non-sparking material may be used for loading or unloading explosives. The conveyor must be grounded when in use.
(c) A powered conveyor may be used only after the design, construction, and specifications have been approved by the Commandant (GMHM).

§ 146.09-12 [Removed]

§ 146.09-15 Use of power-operated industrial trucks on board vessels. (a) A power-operated truck (including a power-operated tractor, forklift, or other specialized truck used for cargo handling) may not be used on board a vessel in a space containing military explosives unless the truck complies with the requirements of this section.
(b) Each truck must have a specific designation of Underwriter's Laboratories or Factory Mutual Laboratories. Any repair or alteration to a truck must be equivalent to that required on the original designation.
(c) Description of designations. The recognized testing laboratory type designations are as follows:
(1) An "E" designated unit is an electrically-powered unit that has minimum acceptable safeguards against inherent fire hazards.
(2) An "EE" designated unit is an electrically-powered unit that has, in addition to all the requirements for the "E" unit, the electric motor and all other electrical equipment completely enclosed.
(3) An "EX" designated unit is an electrically-powered unit that differs from the "E" and "EE" units in that the electrical fittings and equipment are so designed, constructed, and assembled that the unit may be used in certain atmospheres containing flammable vapors or dusts.
(4) A "G" designated unit is a gasoline-powered unit having minimum acceptable safeguards against inherent fire hazards.
(5) A "GS" designated unit is a gasoline-powered unit that is provided with additional safeguards to the exhaust, fuel, and electrical systems.
(6) An "LP" designated unit is similar to a "G" unit except that it is powered by liquified petroleum gas instead of gasoline.
(7) An "LPS" designated unit is a unit similar to a "GS" unit except that liquefied petroleum gas is used for fuel instead of gasoline.
(8) A "D" designated unit is a unit similar to a "G" unit except that it is powered by a diesel engine instead of a gasoline engine.
(9) A "DS" designated unit is a unit powered by a diesel engine provided with additional safeguards to the exhaust, fuel, and electrical systems.
(d) Explosives. A truck may not be used in a hold or compartment containing explosives unless its use is approved by the Commandant (GMHM). In a space in which packaged small arms ammunition without explosive bullets is stowed, an approved power-operated industrial truck (except "E", "G", or "LP") may not be used unless its use is approved by the Captain of the Port when the truck is to be so used.
(e) [Reserved]
(f) Minimum safety features. In addition to the construction and design safety features required, each truck must have at least the following minimum safety features:
(1) The truck must be equipped with a warning horn, whistle, gong, or other device that may be heard clearly above normal shipboard noises.
(2) When the truck operation may expose the operator to danger from a falling object, the truck must be equipped with a driver's overhead guard, when the overall height of the truck with forks in the lowered position is limited by head room the overhead guard may be omitted. This overhead guard is only intended to offer protection from impact of small packages, boxes, bagged material, or similar hazards.
(3) A fork lift truck which handles small objects or unstable loads must be equipped with a load backrest extension having height, width, and strength sufficient to prevent any load, or part of it, from falling toward the mast is in a position of maximum backward tilt. It must be constructed in a manner that does not interfere with good visibility.
(4) The forks on a fork lift truck must be secured to the carriage so as to prevent any unintentional lifting of the toe which could create a hazard. The forks may not display permanent deformation when subjected to a test load of three times the rated capacity.
(5) Each fork extension or other attachment must be secured to prevent unintentional lifting or displacement on primary forks.
(6) Tires extending beyond the confines of the truck shall be provided with a guard to prevent the tires from throwing particles at the operator.
(7) Unless the steering mechanism is a type that prevents road reactions from causing the steering handwheel to spin, a mushroom type steering knob must be used to engage the palm of the operator's hand, or the steering mechanism must be arranged in some other manner to prevent injury. The knob must be mounted within the perimeter of the wheel.
(8) All steering controls must be confined within the clearance of the truck or guarded so that movement of the controls will not result in injury to the operator when passing stanchions, obstructions or other.
(g) Special operating conditions. (1) A truck may not be used on board a vessel unless prior notification of its use is given to the master or senior deck officer on board.
(2) Before a truck is operated on board a vessel, it must be in a safe operating condition as determined by the master or senior deck officer on board.
(3) Any truck that emits sparks or flames from the exhaust system must immediately be removed from service and may not be returned to service until the cause of these sparks or flames has been eliminated.
(4) A truck may not be operated on board a vessel when the temperature of any part of the truck is found to be in excess of a safe operating temperature.
(5) All truck motors must be shut off immediately when an emergency condition arises on board a vessel.
(6) All truck motors must be shut off immediately when a breakage or leakage of packages containing flammable liquids or gases, flammable solids, oxidizers, or organic peroxides occurs or is discovered.
(7) The rated capacity of the truck must be posted on the truck at all times in a conspicuous place. This capacity may not be exceeded.
(8) At least one Coast Guard approved marine type size 1 Type B, or UL approved 5BC portable fire extinguisher, or its approved equivalent, must be affixed to the truck in a readily accessible position or must be kept in close proximity, available for immediate use.
(9) The vessel's fire fighting equipment, both fixed (where installed) and portable, must be kept ready for immediate use in the vicinity of the space being worked.
(h) Refueling. (1) A truck using gasoline as fuel may not be refueled in the hold or on the weather deck of a vessel unless a portable non-spilling fuel handling system of not over five gallons capacity is used. Gasoline may not be transferred to a portable non-spilling fuel handling device on board the vessel.
(2) A truck using liquefied petroleum gas as fuel may not be refueled in the hold or on the weather deck of a vessel unless it is fitted with a removable tank and the hand-operated shutoff valve of the depleted tank is closed. In addition, the motor must be run until it stalls from lack of fuel and then the hand-operated shutoff valve closed before the quick disconnect fitting to the fuel tank is disconnected.
(3) A truck using diesel oil as fuel may not be refueled on the weather deck or in the hold of a vessel unless a portable container of not over a five gallon capacity is used. A truck may be refueled or a portable container may be refilled from a larger container of diesel fuel on the weather deck of a vessel if a suitable pump is used for the transfer operation and a drip pan of adequate size is used to prevent any dripping of fuel on the deck.
(4) Refueling must be performed under the direct supervision of an experienced and responsible person specifically designated for this duty by the person in charge of the loading or unloading of the vessel.
(5) Refueling may not be undertaken with less than two persons specifically assigned and present for the complete operation, at least one of whom must be experienced in using the portable fire extinguishers required in the fuel area.
(6) At least one Coast Guard approved marine type size 1 Type B or UL approved 5BC portable fire extinguisher or its approved equivalent, must be provided in the fueling area. This is an addition to the extinguisher required by paragraph (g)(8) of this section.
(7) The location for refueling trucks must be designated by the master or senior deck officer on board the vessel. "NO SMOKING" signs must be conspicuously posted in the area.
(8) The location designated for refueling must be adequately ventilated to insure against accumulation of any hazardous concentration of vapors. When a truck is being refueled, the ventilation requirements of §146.09-16 apply.
(9) Before any truck in a hold is refueled or before any fuel handling device or unmounted liquefied petroleum gas cylinder is placed in a hold, the motors of all trucks in the same hold must be stopped.
(10) All fuel handling devices and unmounted liquefied petroleum gas containers must be removed from a hold before any truck motor is started and the trucks are placed in operation in that hold.
(i) Replacing batteries. Batteries for electrically powered trucks and for the ignition systems of internal combustion powered trucks may be changed in the hold of a vessel subject to the following conditions:
(1) Only suitable handling equipment may be employed.
(2) Adequate precautions must be taken to avoid damage to the battery, short circuiting of the battery, and spillage of the electrolyte.
(j) Charging of batteries. Batteries of industrial trucks may be recharged in a hold of a vessel subject to the following conditions:
(1) The batteries must be housed in a suitable, ventilated, portable metal container with a suitable outlet at the top for connection of a portable air hose, or must be placed directly beneath a suitable outlet at

the top for connection of a portable air hose. The air hose must be permanently connected to an exhaust duct leading to the open deck and terminate in a gooseneck or other suitable weather head. If natural ventilation is not practicable or adequate, mechanical means of exhaust must be employed in conjunction with the duct. The air outlet on the battery container must be equipped with an interlock switch so arranged that the charging of the battery cannot take place unless the air hose is properly connected to the box.

(2) If mechanical ventilation is used, an additional interlock must be provided between the fan and the charging circuit so that the fan must be in operation in order to complete the charging circuit for operation. It is preferable that this interlock switch be of a centrifugal type driven by the fan shaft.

(3) The hold may not contain any hazardous materials.

(4) The charging facilities may be part of the truck equipment or may be separate from the truck and located inside or outside the cargo hold. The power supply or charging circuit (whichever method is used) must be connected to the truck by a portable plug connection of the breakaway type. This portable plug must be so engaged with the truck battery charging outlet that any movement of the truck away from the charging station will break the connection between the plug and receptacle without exposing any live parts to contact with a conducting surface or object and without the plug falling to the deck where it may become subject to damage.

(5) All unmounted batteries must be suitably protected or removed from an area in the hold of the vessel before any truck is operated in that area.

(k) **Stowage of power-operated industrial trucks on board a vessel.** (1) Trucks may be stowed in any location on board a vessel subject to the following conditions:

(i) Each gasoline-powered truck must have all the fuel expended from the fuel system.

(ii) Each liquefied petroleum gas-operated truck must have the fuel tank removed and all the fuel expended from the fuel system.

(2) Any truck not meeting the conditions set forth in paragraph (k)(1) of this section must be stowed on the open deck except for intervals such as lunch hours, between work shifts, and interdock and intraport movements. If a truck is stowed in a fixed metal enclosure located on or above the weather deck, this enclosure must have access from the weather deck only and must have adequate ventilation arranged to remove vapors from both the upper and lower portions of the space.

(l) **Packaging and stowage of fuel on board a vessel.** (1) Packaging. Flammable liquids and gases to be used as fuels for trucks must be packaged in DOT specification containers, A.S.M.E. containers, or portable safety containers approved by a recognized testing laboratory and authorized for the contents.

(2) Marking and labeling. The appropriate DOT label must be affixed to each container of flammable liquid or flammable gas.

(3) Stowage. Each container must be stowed on or above the weather deck as designated by the master. However, a DOT specification container, A.S.M.E. container, or portable safety container having a capacity of five gallons or less and approved by a recognized testing laboratory may be stowed below deck in a paint locker and diesel fuel may be stowed in any location designated by the master.

§ 146.09-15 Spaces exposed to carbon monoxide or other hazardous vapors. When military explosives are transported by vessel in an enclosed space which is exposed to carbon monoxide or other hazardous vapors from exhausts of power-operated industrial trucks or other mechanized equipment, the space must be provided with adequate ventilation to prevent the accumulation of dangerous vapors. The senior deck officer shall insure that a test of the carbon monoxide content of the atmosphere is made as frequently as conditions require to detect the presence of any dangerous concentration of vapors in areas where persons may be working. The test must be made by a person acquainted with the test equipment and procedure. The carbon monoxide concentration in any hold or intermediate deck where any person is working may not exceed 50 parts per million (0.005 percent) as a time weighted average. Persons may not be permitted to remain in any hold or intermediate deck where the concentration exceeds 75 parts per million (0.0075 percent). Portable blowers of adequate size and location may be used to remove any vapors not removed by installed ventilation systems.

SUBPARTS 146.10 AND 146.19 [REMOVED]

SUBPART 146.20

DETAILED REGULATIONS GOVERNING EXPLOSIVES

§ 146.20-1 An explosive. For the purpose of the regulations in this subchapter an explosive is defined as any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified in the regulations in this part.

§ 146.20-3 Prohibited or not permitted explosives. The offering of the following explosives for transportation, carriage, conveyance, storage, stowage, or use on board vessels is forbidden:

(a) Fulminates or other detonating compounds in bulk in dry condition.

(b) Explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F).

(c) Explosives containing an ammonium salt and a chlorate.

(d) Liquid nitroglycerin, diethylene glycol dinitrate, or other liquid explosives not authorized by the Commandant of the Coast Guard.

(e) Explosives condemned by the Department of Transportation (except properly packed samples for laboratory examinations). Appeal may be made to the Department of Transportation from such condemnations.

(f) Leaking or damaged packages of explosives.

(g) Condemned or leaking dynamite shall not be repacked and offered for shipment unless written authority is granted by the Department of Transportation and the repacking is done by a competent person in the presence of an inspector designated by the Department of Transportation.

(h) Firecrackers, flash crackers, salutes, or similar commercial devices which produce or are intended to produce an audible effect, the explosive content of which exceeds 12 grains each in weight, and pest control bombs, the explosive content of which exceeds 18 grains in weight; and any such devices, without respect to explosive content, which on functioning are liable to project or disperse metal, glass or brittle plastic fragments.

(i) Fireworks that combine an explosive and a detonator or blasting cap.

(j) Fireworks containing an ammonium salt and a chlorate.

(k) Fireworks containing yellow or white phosphorus.

(l) Fireworks or fireworks compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F).

(m) Fireworks condemned by the Department of Transportation except properly repacked samples for laboratory examinations.

(n) Toy torpedoes, the maximum outside dimension of which exceeds ⅞ inch, or toy torpedoes containing a mixture of potassium chlorate, black antimony and sulfur with an average weight of explosive composition in each torpedo exceeding 4 grains.

(o) Toy torpedoes containing a cap composed of a mixture of red phosphorus and potassium chlorate exceeding an average of one-half (0.5) grain per cap.

(p) Fireworks containing copper sulfate and a chlorate.

(q) New explosives and explosive devices except samples for laboratory examination and military explosives of a security classification approved by the United States Army Materiel Command: Commander, Naval Ordinance Systems Command, Department of the Navy; or Com-

mander, Air Force Systems Command and Commander, Air Force Logistics Command, Department of the Air Force. All other new explosives must be approved for transportation by the Department of Transportation.

(r) Loaded firearms.

§ 146.20-5 Acceptable explosives. (a) Acceptable explosives are divided by the Department of Transportation regulations into three classes according to degree of hazard in transportation, as follows:

Class A explosives, detonating or otherwise of maximum hazard
Class B explosives, inflammable hazard
Class C explosives, minimum hazard

(b) Acceptable explosives are defined by the Department of Transportation regulations as set forth in this subpart and such definitions are binding upon all shippers making shipments of any explosives by common carrier vessels engaged in interstate or foreign commerce by water. Such definitions are accepted and adopted and form part of the regulations in this subchapter applying to all shippers making shipments of explosives by any vessel and shall apply to the owners, charterers, agents, masters or persons in charge of vessels and to other persons transporting, carrying, conveying, storing, stowing or using explosives on board any vessel.

§ 146.20-7 Class A explosives. Class A explosives are defined as:

(a) **Type 1.** Solid explosives which can be caused to deflagrate by contact with sparks or flame such as produced by safety fuse or an electric squib, but cannot be detonated[1] by means of a No. 8 test blasting cap.[2] Examples: Black powder and low explosives.

(b) **Type 2.** Solid explosives which contain a liquid explosive ingredient and which, when unconfined,[3] can be detonated by means of a No. 8 test blasting cap,[2] or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus,[4] under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Commercial dynamite containing a liquid explosive ingredient.

(c) **Type 3.** Solid explosives which contain no liquid explosive ingredient and which can be detonated, when unconfined,[3] by means of a No. 8 test blasting cap,[2] or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus[4] under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Commercial dynamite containing no liquid explosive ingredient, trinitrotoluene, amatol, tetryl, picric acid, urea nitrate, pentolite and commercial boosters.

(d) **Type 4.** Solid explosives which can be caused to detonate when unconfined,[3] by contact with sparks or flame such as produced by safety fuse or an electric squib, or which can be exploded in the Bureau of Explosives' Impact Apparatus[4] in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Initiating and priming explosives, lead azide, fulminate of mercury, etc.

(e) **Type 5.** Desensitized liquid explosives are explosives which may be detonated separately or when absorbed in sterile absorbent cotton, by a No. 8 test blasting cap,[2] but which cannot be exploded in the Bureau of Explosives' Impact Apparatus[4] by a drop of less than 10 inches. The desensitizer must not be significantly more volatile than nitroglycerin and the desensitized explosive must not freeze at temperatures above minus 10° F. Example: Desensitized nitroglycerin.

(f) **Type 6.** Liquid explosives that can be exploded in the Bureau of Explosives' Impact Apparatus[4] under a drop of less than 10 inches. Example: Nitroglycerin. See "Prohibited or not permitted explosives" in § 146.20-3.

(g) **Type 7.** (1) Blasting caps[5] are small tubes, usually made of an alloy of either copper or aluminum, or of molded plastic, closed at one end and loaded with a charge of initiating or priming explosives, Class A—Type 4, either with or without other suitable explosives. The total weight for explosives per unit shall not exceed 150 grains. Blasting caps[5] which have been provided with a means for firing by an electric current, and sealed, are known as electric blasting caps.

(2) Detonating primers are devices for commercial use which contain a detonator and an additional charge of explosives, all assembled in a suitable envelope.

(3) Detonating fuzes, class A explosives, are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In addition to a powerful detonator, they may contain several ounces of a high explosive, such as tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component. Those that are so made and packed that they will not cause functioning of other fuzes, explosives, or explosive devices in the same or adjacent containers are classed as class C explosives.

(h) **Type 8.** (1) Any solid or liquid compound, mixture or device which is not specifically included in any of the above types, and which under special conditions may be so designated and approved by the Bureau of Explosives. Example: Shaped charge, commercial.

(2) A shaped charge, commercial, consists of a plastic, paper, or other suitable container comprising a charge of not to exceed 8 ounces of a high explosive containing no liquid explosive ingredient and with a hollowed-out portion (cavity) lined with a rigid material. Detonators or other initiating elements shall not be assembled in the device.

(i) **Charged oil well jet perforating guns.** Charged oil well jet perforating guns are steel tubes, metallic strips, or tubular frameworks into which are inserted shaped charges connected in series by primacord. These devices are not permitted to be shipped as cargo on board any vessel subject to the regulations in this subchapter. Charged oil well jet perforating guns when carried in special motor vehicles under the conditions prescribed in 49 CFR 173.60 or on offshore downhole tool pallets, and accompanied by personnel trained in the safe handling of these devices are classed as Class C explosives: *Provided*, That:

(1) No blasting caps, electric blasting caps or other firing devices shall be affixed or installed in the guns.

(2) Each shaped charge shall contain not over 4 ounces of explosives.

(3) Each shaped charge if not completely enclosed in glass or metal shall be fully protected by a metal cover after installation in the gun.

(4) The total weight of the explosive contents of shaped charges assembled in guns being carried does not exceed 20 pounds per vehicle, pallet or vessel.

(j) **Type 9.** Propellant explosives, Class A, are solid chemicals or solid mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, Class A, include some types of smokeless powder and some types of solid propellant explosives for jet thrust units, rockets or other devices. Any propellant explosive in Class A which detonates in any one out of five trials when tested in the packages in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and the absence of flame shall be considered as evidence of detonation.

§ 146.20-9 Class B explosives. (a) Class B explosives are defined as those explosives which in general function by rapid combustion rather than detonation and include some explosive devices, such as special fireworks, flash powders, some pyrotechnic signal devices and liquid or solid propellant explosives which include some smokeless powders.

(b) Propellant explosives, Class B, are solid or liquid chemical's or chemical mixtures which function by combustion. The combustion is controlled by composition, size, form of grain, or other chemical or mechanical means. Any propellant is Class B which fails to detonate in five trials when tested in the package in which it is offered for shipment. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container, placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidence of detonation. Propellant explosives, Class B, include smokeless powder for small arms (see note 1), smokeless powder for cannon, liquid monopropellant fuel, smokeless powder, or solid propellant explosives for rockets, jet thrust units, or other devices. Black powder is not included in this classification and is defined in § 146.20-7(a). Fire extinguisher charges containing not to exceed 50 grains of propellant explosives per unit are exempt from the regulations in this part.

Note 1: Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one vehicle, container or other packaging authorized by 49 CFR 173.89(g) (except shipments by, for or to the Departments of the Army, Navy, or Air Force of the U.S. Government) shall be classed as a flammable solid for purposes of transportation when packaged in accordance with § 146.22-3(a). To be classed as a flammable solid, smokeless powder for small arms shall be limited to not more than 100 pounds in one hold or vehicular deck irrespective of the number of vehicles or containers.

§ 146.20-11 Class C explosives. Class C explosives are defined as certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks.

§ 146.20-13 New explosives, definitions; approval and notification. (a) As used in this section, "new explosive" means an explosive compound, mixture or device, produced by a person who:

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[1] The detonation test is performed by placing the sample in an open end fiber tube which is set on the end of a lead block approximately 1½ inches in diameter and 4 inches high which, in turn, is placed on a solid base. A steel plate may be placed between the fiber tube and the lead block.

[2] A No. 8 test blasting cap is one containing 2 grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate, or a cap of equivalent strength.

[3] "Unconfined" as used in this section does not exclude the use of a paper or soft fiber tube wrapping to facilitate tests.

[4] The Bureau of Explosives impact apparatus is a testing device designed so that a guided 8-pound weight may be dropped from predetermined heights so as to impact specific quantities of liquid or solid materials under fixed conditions. Detailed prints may be obtained from the Bureau of Explosives, 1920 "L" Street, N.W., Washington, D.C. 20036.

[5] Blasting caps, blasting caps with safety fuse, or electric blasting caps in quantities of 1,000 or less are classified as Class C explosives.

(1) Has not previously produced that explosive compound, mixture or device; or

(2) Has previously produced the explosive compound, mixture or device, but has made a change in the formulation, design, process or production equipment. An explosive compound, mixture or device will not be considered a "new explosive" if an agency listed in paragraph (b) of this section has determined and confirmed in writing to the Office of Hazardous Materials Operations (OHMO), Department of Transportation, that there are no significant differences in hazard characteristics relative to the explosive compound, mixture or device previously approved.

(b) No person may offer a new explosive for transportation unless it has been examined, classed, and approved by one of the following agencies:

(1) Bureau of Explosives;

(2) The U.S. Energy Research and Development Administration (ERDA) for new explosives made by, or under the direction or supervision of ERDA, when tested in accordance with the Explosives Hazard Classification Procedures contained in DOD TB 700-2 (May 19, 1967), or

(3) U.S. Army Material Development and Readiness Command (DRCFS), Naval Sea Systems Command (NAVSEA 04H), or HQUSAF (IGD SEV) for new explosives made by, or under the direction or supervision of the Department of Defense when tested in accordance with the Explosives Hazard Classification Procedures contained in DOD TB 700-2 (May 19, 1967), (NAVORDiMST 8020.3 to 11A-1-47, DSAR 8220.1).

(c) Except as provided in paragraphs (d) and (e) of this section, each person who offers a new explosive for transportation, other than a new DOD explosive covered by a security classification, must file a copy of the approval for the new explosive accompanied by a supporting laboratory report of equivalent data with OHMO before offering the new explosive for transportation.

(d) Notwithstanding paragraph (b) of this section, any person may offer a sample of a new explosive that has not been approved for transportation by railroad, highway, or vessel to a laboratory for examination and approval if:

(1) The new explosive has been assigned a tentative shipping description and class in writing by one of the agencies listed in paragraph (b) of this section;

(2) The sample consists of no more than five pounds of the new explosive;

(3) The new explosive is packaged as required in this part according to the tentative description and class assigned unless otherwise specified in writing by one of the agencies listed in paragraph (b) of this section, and

(4) The package is labeled as required by this subchapter and the following is marked on the package:

(i) The words "SAMPLE FOR LABORATORY EXAMINATION";

(ii) The net weight of the new explosive, and

(iii) The tentative shipping description.

(e) Notwithstanding paragraph (b) of this section, a manufacturer of a new explosive that has not been examined or approved may transport that new explosive from where it was produced to an explosive testing facility if:

(1) The new explosive is not a forbidden explosive or an initiating explosive according to this part;

(2) If the new explosive is a compound or mixture, it must be described as high explosive or high explosive, liquid, as appropriate (other than when contained in a device) and packed, marked, labeled, and described on the shipping paper as required by this part;

(3) If the new explosive is a device, it must be assigned a tentative description and class by the owner and packed, marked, labeled, and described on the shipping paper as required by this part based on its tentative description and class.

(4) The new explosive is transported in a motor vehicle operated by the owner of the explosive, and

(5) The new explosive is accompanied by a person, in addition to the driver of the motor vehicle, who is qualified by training and experience to handle the explosive.

§ §146.20-15 through 146.20-51 [Removed]

§ 146.20-53 Magazine vessels. (a) General. The requirements of this section are applicable to magazine vessels and are in addition to any prescribed elsewhere in this part.

(b) Type vessel authorized. A single deck vessel with or without a house on deck is the only type vessel that may be used as a magazine vessel. A magazine vessel may not be moved while explosives are on board.

(c) Location of explosives. Class A and Class B explosives in excess of 5,000 pounds stored in any magazine vessel must be stowed below deck. No explosive may be stowed on deck unless the vessel is fitted with a deck house having a stowage area which meets the requirements in this subpart for the stowage of explosives. Quantities of blasting caps in excess of 1,000 may not be stored on the same magazine vessel with Class A or Class B explosives.

(d) Explosives storage spaces. Any compartment on a magazine vessel used for the stowage of explosives must be completely ceiled with wood so as to provide a smooth interior surface. Each metal stanchion in the compartment must be boxed in the same manner. An overhead ceiling is not required when the overdeck is weathertight. All nail and bolt heads must be countersunk and any exposed metal must be covered with wood.

(e) Primers and blasting caps. No initiating or priming explosive may be stowed in the same compartment with any other explosive when there is any high explosive on the same magazine vessel. Blasting caps must be stowed at least 25 feet from any bulkhead forming a boundary of a compartment containing any other explosives.

(f) Dry storage spaces. A magazine vessel having a dry storage space capable of being used for any purpose whatsoever must have a cofferdam at least 24 inches wide fitted between the dry storage space and each adjacent compartment containing explosives. The cofferdam must be constructed of wood or steel, formed by two tight athwartship bulkheads extending from the skin of the vessel to the overdeck. If the cofferdam extends to the weather deck, a watertight hatch must be fitted in the deck to provide access to the cofferdam.

(g) Lighting. Non-sparking, battery-powered, self-contained electric lanterns or non-sparking hand flashlights are the only means of artificial light authorized.

(h) Living quarters. Living quarters must be fitted on the inside with asbestos board or other equivalent fire resistant material. Bracketed ship's lamps are the only lighting fixtures authorized to be used in the living quarters. Any stove used for heating or cooking must be securely fastened and may not be mounted closer than 6 inches to the deck or sides of the house. Any smoke pipe for the stove which passes through the roof of the house must be kept at least 3 inches away from any woodwork. Each smoke pipe must be protected by a layer of asbestos, an air space of at least 1 inch, and a metal collar of at least 16 gauge sheets secured only on the weather side of the roof. There may be no opening from any living quarters into any stowage compartment.

(i) Storage of other hazardous materials. Magazine vessels having explosives on board may not be used for the storage of any other hazardous material.

(j) Magazine vessel's stores. Articles for use as stores on board any magazine vessel must be in compliance with the requirements of Part 147 of this title.

(k) Matches. Safety matches requiring a prepared surface for ignition are the only type of matches authorized for use on board a magazine vessel. They must be kept in a metal box or can with a metal cover and stored in the custodian's living quarters.

(l) Firearms. Firearms and ammunition (other than cargo) are not permitted on board a magazine vessel.

(m) Fire extinguishing equipment. No explosive may be received, stored, or dispensed from any magazine vessel, unless four 2½-gallon extinguishers of the soda-acid type and four 2-gallon pails filled with dry sand are placed about the vessel. The contents of each liquid extinguisher continuously exposed to a temperature lower than 40 degrees F. (45 degrees C.) must be modified or otherwise protected to prevent freezing.

(n) Supervision. A magazine vessel containing explosives must be continuously attended by a custodian employed for that purpose by the vessel's owner.

(o) Unauthorized persons on magazine vessels. The custodian of a magazine vessel shall prevent unauthorized persons from coming on board unless it is necessary to abate a hazard to human life or a substantial hazard to property.

(p) Repacking of explosives on board. No explosive may be repacked on board a magazine vessel. Any broken or damaged package must be placed in an open box and carried to a safe location for repacking or other disposition.

(q) Work boat. Each magazine vessel must be equipped with a work boat.

(r) Life preservers. One approved personal flotation device must be available for each person employed on a magazine vessel.

(s) Fenders. Each magazine vessel must be fitted with fenders in sufficient number and size to prevent any vessel tieing up alongside from coming in contact with the hull.

§ §146.20-55 through 146.20-300 [Removed]

SUBPARTS 146.21 THROUGH 146.28 [REMOVED]

SUBPART 146.29

DETAILED REGULATIONS GOVERNING THE TRANSPORTATION OF MILITARY EXPLOSIVES AND HAZARDOUS MUNITIONS ON BOARD VESSELS

§ 146.29-1 Effective date. The regulations in this subpart will become effective on and after July 1, 1962.

§ 146.29-3 Relationship to other regulations. (a) Commercial shipments of explosives shall be conducted in accordance with 49 CFR Parts 171–189.

(b) Where reference is made to other hazardous materials in this subpart, the regulations in 49 CFR Parts 171–189 apply.

§ 146.29-5 [Removed]

§ 146.29-7 Port security regulations. The applicable provisions of 33 CFR Parts 6, and 121 to 126, inclusive, shall, unless specifically authorized to the contrary by any provision of this subpart, be complied with by vessels, masters, agents, or charterers thereof and by all persons engaged in handling, loading, stowing or unloading explosives.

§ 146.29-9 Import shipments. Import shipments of military explosives shall be made in accordance with the provisions of the regulations in this subpart.

§ 146.29-11 Definitions and abbreviations. For the purpose of the regulations in this subpart, certain words, phrases, and abbreviations are defined as follows:

(a) **Military explosives.** Military explosives for the purpose of this subpart consist of all Department of Transportation's Classes A, B, and C explosives as defined below shipped by, for, or to the Departments of the Army, Navy, or Air Force of the United States or similar types of explosives shipped by, for, or to the government of any country whose defense is deemed vital to the defense of the United States. However, this definition shall not include those explosives shipped by, for, or to the Corps of Engineers, Department of the Army, for use in river and harbor works or other works under permits issued by that Agency, in which case the regulations in this part pertaining to commercial explosives shall apply. Military explosives are divided into two classes, as follows:

(1) **Ammunition.** Ammunition consists of all types of projectiles, cartridges, grenades, bombs, mines, torpedoes, torpedo warheads, propellant powder charges, pyrotechnics, rockets, missiles, special weapons, chemical, smoke or incendiary ammunition, or other "made up" explosive devices that are utilized by the armed forces in the prosecution of a war.

(2) **Explosives in bulk.** Explosives in bulk consist of any high explosives, black powder, and low explosives or propellant explosives in accordance with the definitions in §§ 146.20–1, 146.20–7, and 146.20–9, when such substances are shipped in containers other than containers such as bombs, grenades, mines, torpedoes, powder bags in individual containers, cartridges, projectiles, fuzes, detonators, caps, primers, and similar "made up" ammunition devices.

(b) **Hazardous munitions.** Hazardous munitions for the purpose of these regulations are those dangerous articles used as oxidizers or fuels for missile propulsive systems. Such fuels and oxidizers are listed in Tables XI–C and XI–D and will be stowed and handled in accordance with these tables when shipped with military explosives. When shipment is made on a vessel not carrying military explosives, the hazardous munitions may be shipped under the regulations contained in 49 CFR Parts 171–189.

(c) **Related terms.**

(1) **Adjacent hold; hold adjacent.** Any hold which has as one of its boundaries a permanent steel bulkhead that is common, either partially or in its entirety, to another hold shall be termed "adjacent hold" or "hold adjacent" to the local hold. This shall not be construed as meaning a hold above or a hold below said hold nor shall it include a hold that is situated diagonally from said hold and has only a corner as a common boundary.

(2) **Any hold above.** "Any hold above" shall mean any hold that is partially or entirely in the same vertical plane over another hold even though there may be a hold or holds intervening.

(3) **Any hold below.** "Any hold below" shall mean any hold that is partially or entirely in the same vertical plane under another hold even though there may be a hold or holds intervening.

(4) **Ammunition for cannon.** Ammunition for cannon is fixed, semi-fixed or separate loading ammunition which is fired from a cannon, mortar, gun, howitzer or recoilless rifle.

(5) **Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles or without projectiles, and catapult charges exceeding 2 inches in diameter.** Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles or without projectiles, and catapult charges exceeding 2 inches in diameter, is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer with empty, inert-loaded, or solid projectiles, or without projectiles, which is fired from a cannon, mortar, gun, howitzer, or recoilless rifle.

(6) **Ammunition for cannon with projectiles.** Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles or illuminating projectiles is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer, and the projectiles, fuzed or unfuzed.

(7) **Ammunition for small arms with explosive bullets or explosive projectiles.** Ammunition for small arms with explosive bullets or ammunition for small arms with explosive projectiles is fixed ammunition to be used in machine guns or similar fire arms and consists of a metallic cartridge case, the primer and the propelling charge, with explosive bullet or explosive projectile with or without detonating fuze, the component parts necessary for one firing being all in one assembly.

(8) **Boosters, bursters and supplementary charges.** Boosters and supplementary charges consist of a casing containing a high explosive and are used to increase the intensity of explosion of the detonator of a detonating fuze. Bursters consist of a casing containing a high explosive and are used to rupture a projectile or bomb to permit release of its contents.

(9) **Cargo hold.** A cargo hold is a space allotted entirely to the carriage of cargo and is bounded by permanent steel bulkheads, decks and the shell of the vessel; the deck openings being provided with means of effectively closing the hold against the weather, and in the case of superimposed holds, effectively closing off each hold.

(10) **Cargo net.** A cargo net is a net made of fiber or wire rope and used as a means of handling loose or package cargo to and from the hold of a vessel.

(11) **Cargo transporter.** This term covers a noncollapsible, reusable steel shipping box of not over 135 cubic feet capacity, used for shipping separate items of cargo as a unit, and handled on board ship by "lift-on lift-off" methods. Such container must conform to Military Specification MIL–B–11886 or MIL–B–21560. It is commonly referred to as "Conex Box."

(12) **Chemical ammunition.** Chemical ammunition used in warfare is all kinds of explosive chemical projectiles, bombs, grenades, mines, etc., loaded with toxic, tear, or other gas, smoke or incendiary agent, also such miscellaneous apparatus as cloud-gas cylinders, smoke generators, etc., that may be utilized to project chemicals.

(13) **Compartment.** A compartment is any space formed by permanent steel bulkheads and the ship's side and decks. The limits of a compartment are determined by the integrity of the bulkheads, shell or decks forming its boundaries. Access openings fitted with doors, hatch covers (steel or wood) or bolted plates are accepted as preserving the integrity of deck, bulkhead or shell.

(14) **Compatible explosives.** Compatible explosives as used in § 146.29-100 shall mean explosives that have compatibility in accordance with the admixture charts in § 146.29-99.

(15) **Complete round.** A complete round of "cannon ammunition," "artillery ammunition" or "gun ammunition" includes ammunition used in cannon or gun of caliber .75 in. and above. It includes complete round with components. The complete round comprises all of the components necessary to fire the cannon or gun once. These components are, in general, the projectile, fuze, propelling charge and primer. Depending upon both the type of propelling charge and method of loading the required components into the weapon, complete rounds of "cannon ammunition," "artillery ammunition" or "gun ammunition" are described as fixed, semifixed, separated or separate loading ammunition.

(16) **Container.** A container is a cargo carrying body other than a portable tank which may be designed and constructed to be removed from a chassis or wheels for water transportation. Military explosives permitted to be transported in containers are limited to explosives of Coast Guard Classes I and II, with the exception of Class II–J, which are compatible in accordance with the admixture charts in § 146.29-99. All other types of military explosives, including Class II–J may be carried in containers on approval of the Commandant.

(17) **Definition of other hazardous materials.** The definitions of other hazardous materials are in 49 CFR Parts 171–189.

(i) Radioactive materials, see § 146.19–1.
(ii) Flammable liquids, see § 146.21–1.
(iii) Flammable solids and oxidizing materials, see § 146.22–1.
(iv) Corrosive materials, see § 146.23–1.
(v) Compressed gases, see § 146.24–1.
(vi) Poisons, Class A, see § 146.25–5; Class B, see § 146.25–10; Class C, see § 146.25–15.
(vii) Combustible liquids, see § 146.26–1.
(viii) Hazardous articles, see § 146.27–1.

(18) **Detonating fuzes.** (i) Detonating fuzes, Class A are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In addition to a

powerful detonator, they may contain several ounces of a high explosive, such a tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component.

(ii) Detonating fuzes, Class C are those that are so made and packed that they will not cause functioning of other fuzes, explosives, or explosive devices in the same or adjacent containers.

(19) Division bulkhead.

(i) When part of a compartment or hold is utilized for the stowage of military explosives, the remaining portion of such compartment or hold may be utilized for the stowage of general cargo provided a temporary wooden bulkhead is constructed in the compartment or hold to completely divide and protect the stowage of military explosives from the general cargo. The scantlings and construction of such bulkheads shall be as follows: For tween deck compartments or holds construction shall be of commercial 2-inch boarding, secured on 4" × 6" uprights spaced not to exceed 30 inches center to center. For lower holds construction shall be of commercial 2-inch boarding secured on 6" × 6" uprights, spaced not more than 24 inches center to center. Random widths of boarding may be used. The boarding shall be close fitted edge to edge and butt to butt to form a smooth surface facing the explosive stowage. Nails shall not protrude beyond the surface of the boarding.

(ii) See § 146.29-81(e) for construction of a partition bulkhead within a Class "A" magazine measuring more than 40 feet in any direction.

(iii) When general cargo is to be stowed adjacent to the exterior of the Class "A" magazine see § 146.29-61(b).

(20) Dunnage. Lumber of not less than 1-inch commercial thickness laid over tank tops, decks or against bulkheads, frames, plating, ladders, etc., or used for filling up voids, or fitted around the cargo for the purpose of preventing damage during transportation.

(21) Explosive bombs. Explosive bombs are metal or other containers filled with explosives. They are used in warfare and include aeroplane bombs and depth bombs.

(22) Explosive mines. Explosive mines are metal or other containers filled with a high explosive.

(23) Explosive projectiles. Explosive projectiles are projectiles, guided missiles with warheads, warheads, or rocket heads, loaded with explosives or bursting charges, with or without other materials, for use in cannons, guns, tubes, mortars, or other firing or launching devices.

(24) Explosive torpedoes. Explosive torpedoes, such as are used in warfare, are metal devices containing a means of propulsion and a quantity of high explosives.

(25) Fixed ammunition. Fixed ammunition describes "cannon ammunition," "artillery ammunition" or "gun ammunition" of the type comprising a cartridge case with primer, a propellant charge and a projectile (fuzed or unfuzed) all of these components being assembled as a unit for one firing.

(26) Grenades. Grenades, hand or rifle, are small metal or other containers designed to be thrown by hand or projected from a rifle. They are filled with an explosive or a liquid, gas or solid material such as a toxic or tear gas or an incendiary or smoke producing material and a bursting charge.

(27) Guided missile ammunition. Includes missile or rocket bodies and related components; warheads (explosives, chemical practice, etc.); propellants (liquid or solid); fuzes and arming devices with associated components; fins, stabilizers, or control surfaces; either or all of which may be in complete round configuration or as separately packaged items, as issued to assemble complete rounds as fired.

(28) Hatch. An opening in the weather deck and all decks below in the same vertical plane through which cargo, etc., is passed. This term is also used in the regulations in this subpart to designate the entire series of holds served through one weather deck hatch.

(29) Igniters. Igniters consist of fiberboard, plastic, paper or metal tubes containing a small quantity of igniting compound which is ignited by the action of a primer, pull wire or scratch composition.

(30) Jet thrust units (jato), explosive (Class A), or igniters jet thrust (jato), explosive (Class A). Jet thrust units (jato), explosive (Class A), are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Under certain conditions the chemical fuel with which the unit is loaded may explode. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist airplanes to take off. Igniters jet thrust (jato), explosive (Class A) and igniters, rocket motor, Class A explosives, are devices consisting of an electrically operated or remotely controlled ignition element and a charge of fast burning composition meeting the definition prescribed for Type 1 Class A explosives assembled in a unit for use in igniting the propelling charge of jet thrust units or rocket motors. Under certain conditions the burning composition may explode.

(31) Jet thrust units (jato), Class B explosives. Jet thrust units (jato), Class B explosives are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist airplanes to take off.

(i) Igniters, jet thrust (jato), Class B explosives, and igniters, rocket motor, Class B explosives are devices consisting of an electrically operated or remotely controlled ignition element and a fastburning composition which functions by rapid burning rather than detonation, assembled in a unit for use in igniting the propelling charge of jet thrust units, rocket motors, or rocket engines.

(ii) Starter cartridges, jet engine, Class B explosives, consist of plastic and or rubber cases, each containing a pressed cylindrical block of propellant explosive and having in the top of the case a small compartment that encloses an electric squib, small amounts of black powder and smokeless powder, which constitute an igniter. The starter cartridge is used to activate a mechanical starter for jet engines.

(32) On deck. "On deck" means that that article may be stowed on the open weather deck of the vessel.

(33) Overstow. The term "overstow" as used in these regulations shall mean to stow directly over.

(34) Pallet. A pallet is a tray so designed as to be picked up by a fork truck or similar cargo handling equipment. Pallets are not usually equipped with sideboards.

(35) Palletized unit. Individual packages or unpackaged items stowed in a compact mass upon a pallet or skids and banded together and to the pallet or skids by metal straps to form a unit consisting of pallet and packages.

(36) Partition bulkhead. A partition bulkhead is a temporary bulkhead constructed of commercial 1-inch lumber of widths not less than 4 inches, secured alternately on both sides of the uprights and spaced not more than 6 inches apart. The uprights are at least 2" × 4" size, spaced not more than 30 inches apart.

(37) Percussion fuzes, combination fuzes, and time fuzes. Percussion fuzes, combination fuzes, and time fuzes are devices designed to ignite powder charges of ammunition or to initiate an intermediate charge (booster) in projectiles, bombs, etc. When such fuzes are assembled with booster charges they are properly described as "detonating fuzes."

(38) Pieplate. A pieplate is the term generally applied to a round, oval or hexagonal tray without sideboards.

(39) Primers. Primers are devices used to ignite the powder charges of ammunition. For small-arms ammunition, the primers are "small-arms primers" or "percussion caps."

(40) Propellant explosives, solid, Class A. Propellant explosives, Class A, are solid chemicals or solid chemical mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, Class A, include some types of smokeless powder for small arms and some types of solid propellant explosives for jet thrust units, rockets, or other devices. Any propellant explosive is Class A which detonates in any one out of five trials when tested in the package in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidence of detonation.

(41) Propellant explosives, solid, Class B. Propellant explosives, Class B, are solid chemicals or solid chemical mixtures which function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Any propellant explosive in Class B which fails to detonate in five trials when tested in the packages in which it is offered for shipment. (See (40) for test.) Propellant explosives, Class B, include smokeless powder for cannon, smokeless powder or solid propellant explosives for rockets, jet thrust units, or other devices. Black powder is not included in this classification.

(42) Rocket ammunition. Rocket ammunition is fired ammunition which is fired from a tube, launcher, rails, trough, or other device as distinguished from cannon ammunition which is fired from a cannon, gun, or mortar.

(43) Rocket motor, Class A explosives. Rocket motor, Class A explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s) closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. (The rocket motor carries its own solid oxidizer-fuel combination.) The propelling charge consists of a mixture of chemicals and or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will sustain a detonation. Rocket motors, Class A explosives, should be nonpropulsive in shipment (see subparagraph (i) of this paragraph). Rocket motors, Class A explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust

For explanation of abbreviations and reference marks, see last page of this tariff.

neutralizers, or other similar devices must be proven adequate by test prior to authorization for use.

(44) **Rocket motor, Class B explosives.** Rocket motor, Class B explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s), closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. The propelling charge consists of a mixture of chemicals and/or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will not sustain a detonation. (The rocket motor carries its own solid oxidizer-fuel combination.) Rocket motors, Class B explosives, should be nonpropulsive in shipment (see subparagraph (i) of this paragraph). Rocket motors, Class B explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and/or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers or other similar devices must be proven by test prior to authorization for use.

(45) **Rocket engine (liquid), Class B explosives.** Rocket engine (liquid), Class B explosives is a complete, self-contained rocket propulsion unit which contains an oxidizer and a fuel, each separated by an aluminum or stainless steel wall of not less than 0.250 inch thickness. Double walls are permitted. Pressurization of the propellant tanks is by use of a gas generator. The ignition source must be in an unarmed position for shipment. Rocket engines (liquid) are used to propel or provide thrust for rockets, missiles or spacecraft.

(46) **Semifixed ammunition (Army).** Complete rounds composed of a projectile (fuzed) and a cartridge case with a primer and propellant charge which is in a cloth bag or bags of small size. The base of the projectile fits free in the neck of the cartridge case and may be readily detached from the cartridge case. The round is loaded into the cannon with the projectile assembled to the cartridge case and is handled similarly to fixed ammunition in loading. It may be packed with the projectile disassembled from the cartridge case containing the propellant. The projectile is usually assembled loosely in the cartridge case and is packed in the same individual container.

(47) **Semifixed ammunition (Navy).** Semifixed ammunition is ammunition in which the primer and the propellant charge are firmly secured in the cartridge case with the projectile separate from the cartridge case. The propellant charge is loaded loosely in the cartridge case, differing in this respect from that of the Army which is loaded in a bag. The end of the cartridge case is sealed with a prepared plug or disc which is fired with the powder and is usually shipped stowed in a metal tank. The projectile is shipped separate. The U.S. Army may refer to this ammunition as separate loading ammunition.

(48) **Separate loading ammunition.** Complete rounds in which the separate components—projectile, propellant charge and primer—are loaded into the cannon or gun separately are known as "separate loading ammunition." Although the propellant charge may be in one section, it is usually divided into parts with each part assembled in a bag packed in outside shipping containers which may be of wood, fiber, or metal.

(49) **Separated ammunition.** In this type of ammunition, the propellant is sealed in a metal cartridge case into which a primer is fitted and this assembly is called a propelling charge. It is separate from the projectile with which it is used but the projectile and the propelling charge are loaded into the weapon in one operation. Separated ammunition is generally used in medium caliber antiaircraft and antitank guns.

(50) **Shelter deck space.** A shelter deck space is a space available for cargo situated above the uppermost complete continuous deck (main deck) and the deck next above. Normally this space contains no permanent watertight transverse bulkheads except at its forward and aft extremities.

(51) **Shoring.** Shoring is a method of securing cargo against movement sidewise or downward. In this subpart it describes the use of timbers fitted vertically or at an angle to the side of the stowage. It may also describe the use of timber to support a stowage from moving downward.

(52) **Skipboard.** A skipboard is the term generally applied to a rectangular or square tray without sideboards.

(53) **Small arms ammunition.** Small arms ammunition is fixed ammunition consisting of a metallic, plastic composition, or paper cartridge case, a primer and a propelling charge, with or without bullet, projectile, shot, tear gas material, tracer components, or incendiary compositions, or mixtures, and is further limited to the following:

(i) Ammunition designed to be fired from a pistol, revolver, rifle, or shotgun held by the hand or to the shoulder.

(ii) Ammunition of caliber less than 20 millimeters with incendiary, solid, inert or empty projectiles (with or without tracers), designed to be fired from machine guns or cannons.

(iii) Blank cartridges including canopy remover cartridges, starter cartridges, and seat ejector cartridges, containing not more than 500 grains of propellant powder, provided that such cartridges shall be incapable of functioning en masse as a result of the functioning of any single cartridge in the container or as a result of exposure to external flame.

(iv) Twenty millimeter ammunition without explosive projectiles or incendiary projectiles.

(54) **Special fireworks.** Special fireworks are manufactured articles designed primarily for the purpose of producing visible or audible pyrotechnic effects by combustion or explosion. Examples are toy torpedoes, railway torpedoes, some firecrackers and salutes, exhibition display pieces, aeroplane flares, illuminating projectiles, incendiary projectiles or incendiary bombs and smoke projectiles or smoke bombs fuzed or unfused and containing expelling charges but without bursting charges, hand or rifle grenades with ignition elements but not containing bursting charges, flash powders in inner units not exceeding 2 ounces each, flash sheets in interior packages, flash powder or spreader cartridges containing not over 72 grains of flash powder each and flash cartridges consisting of a paper cartridge shell, small-arms primer, and flash composition, not exceeding 180 grains all assembled in one piece. Fireworks must be in a finished state, exclusive of mere ornamentation, as supplied to the retail trade and must be so constructed and packed that loose pyrotechnic composition will not be present in packages in transportation.

(55) **Superstructure.** Superstructure is a structure of a vessel located on the weather deck integral with the deck and of substantial weight and size to provide physical separation of cargoes, e.g., deck house, mast house, bridge structure, etc.

(56) **The hold above.** "The hold above" shall be a hold immediately above another hold having its deck, either partially or in its entirety, common to the overhead of the hold below.

(57) **The hold below.** "The hold below" shall be a hold immediately below another hold having its overhead, either partially or in its entirety, common to the deck of the hold above.

(58) **Tomming.** Tomming is a method of securing cargo against displacement of movement upwardly.

(59) **Tray.** A tray is any flat group of boards securely fastened to bearers in order to provide a level surface for the loading of cargo. Trays are given various names, those applied in some ports differing from those in other ports, according to (i) shape, (ii) method of securing to cargo handling gear, or (iii) use or lack of sideboards in conjunction with the tray.

(60) **Tracer fuzes and tracers.** Tracer fuzes and tracers are devices which are attached to projectiles and contain a slow-burning composition to show the flight of projectiles at night.

(61) **Tween deck height.**

(i) For the purpose of load calculations the height of a tween deck is ascertained by measuring the distance from the heel of the overhead deck beam to the heel of the underdeck beam. (The thickness of the plating forming the deck is not deducted from the height.)

(ii) For height of a tween-deck affected by the sheer of a deck, measure as above at both the forward and after ends of the hold and divide the sum of these heights by two.

(62) **Tween deck hold.** A tween deck hold is a space located between the weather deck and the lower hold.

(63) **Type "A" dunnage floor.** A type "A" dunnage floor shall be constructed of two layers of commercial 1-inch dunnage of widths not less than 4 inches fitted as close as possible, edge to edge, and butt to butt, the top course being laid crosswise to the lower course, or of a single layer of 2-inch lumber of widths not less than 6 inches fitted as close as possible edge to edge, and butt to butt. When using 2-inch lumber over hatch boards the lumber shall be laid fore and aft.

(64) **Type "B" dunnage floor.** A type "B" dunnage floor shall be constructed of one layer of commercial 1-inch thick dunnage of widths not less than 4 inches fitted as close as possible, edge to edge, and butt to butt.

(65) **Accessible stowage.** Accessible stowage is one which can enable a fire-fighting party with equipment to approach with ease.

(d) **Abbreviations.**

AA	Antiaircraft.
AAC	8.3Antiaircraft common.
AA Com ...	9.7Antiaircraft common.
AC	Aircraft cannon.
AC	Hydrocyanic acid.
A.C.E.I.S. ..	Aircraft emergency identification signals.
A.D.F.	Auxiliary detonating fuze.
AIC	Ammunition identification code (Army).
ALN	Ammunition lot number.
Amm	Ammunition.
Ammo	Ammunition.
AP	Armor-piercing.
APC	Armor-piercing capped.
APT	Armor-piercing tracer.
ASSEM	Assembled.
AT	Anti-tank.
Aux	Auxiliary.
Aux Det	Auxiliary detonating fuze.
BBC	Bromobenzylcyanide (tear gas).

BQ ..... Bursting charge.
BD ..... Base detonating.
BDF ..... Base detonating fuze.
BL and P .. Blind loaded and plugged.
BL and T ... Blind loaded and tracer.
BP ..... Black powder.
BUWEPS .. Bureau of Weapons.
BUR CHG .. Bursting charge.
CAL ..... Caliber.
CCIP ..... Case combination ignition primer.
CHG ..... Charge.
CG ..... Phosgene.
CK ..... Cyanogen chloride.
CL ..... Chlorine.
Cml-C ..... Chemical Corps.
CNS ..... Chloracetophenone solution (tear gas).
COM ..... Common.
Comp A .... RDX-Wax explosive.
Comp B .... RDX-TNT explosive.
Comp C ... Plastic type RDX explosive.
Cor ..... Corrosive materials.
CPI ..... Case percussion igniter.
CPP ..... Case percussion primer.
CT-TNT ... Cast TNT.
D ..... Explosive "D" (ammonium picrate).
DA ..... Diphenylchlor arsine.
DC ..... Depth charge.
DDR ..... Dummy drill.
DEMO ..... Demolition.
DM ..... Adamsite (sneeze gas).
DP ..... Diphosgene.
EX ..... Experimental.
EXP ..... Expellant or explosive.
EXP "D" ... Explosive "D".
F ..... Fuze.
FC ..... Full charge.
FFAR ..... Folding fin aircraft rocket.
FFFG ..... Fine fine fine grain (black powder).
FFG ..... Fine fine grain (black powder).
FG ..... Fine grain (black powder).
FG. ..... Flammable compressed gas.
FL ..... Flammable liquid.
FM ..... FM smoke mix (titanium tetrachloride).
FNH ..... Flashless, nonhygroscopic.
FP ..... Flashless pellets.
FRAG ..... Fragmentation.
FS ..... FS smoke mix (sulfur trioxide).
FS. ..... Flammable solid.
GB ..... Isopropyl methylphosphonofluoridate (nerve gas).
GP ..... General purpose.
H ..... Mustard gas.
HBX, H6 ... RDX-TNT-AL type explosive.
HC ..... Hexachlorethane mixture (smoke).
HC ..... High capacity.
HD ..... Distilled mustard.
HE ..... High explosive.
HEAT ..... High explosive antitank.
HEI ..... High explosive incendiary.
HEIT ..... High explosive incendiary tracer.
HET ..... High explosive tracer.
HMX ..... Cyclotetramethylenetrinitramine.
HN ..... Nitrogen mustard gas.
HPAG ..... High performance air to ground (rocket).
HVAR ..... High velocity aircraft rocket.
ICC ..... Interstate Commerce Commission.
ILLUM ..... Illuminating.
IM ..... Thickened gasoline.
IN ..... Inert.
INCEND ... Incendiary.
L ..... Lewisite.
LC ..... Light case.
LE ..... Low explosive.
L and F .... Loaded and fuzed.
L and P .... Loaded and plugged.
M ..... Model (Army).
Maj Cal .... Major caliber.
MCBD ..... Major caliber base detonating.
MG ..... Magnesium.
MIN CAL ... Minor caliber.
MK ..... Mark.
MM ..... Millimeter.
Mod ..... Modification.
MTF ..... Mechanical time fuze.
NC ..... Nitrocellulose.
NF ..... Nose fuze.
NH ..... Non-hygroscopic.
Nonfl. G .... Nonflammable compressed gas.
NP ..... Thickened gasoline.
O H ..... Overhauled.
ORD ..... Ordnance.
Oxy M ..... Oxidizing material.
PD ..... Point detonating
PDF ..... Point detonating fuze.
PENT ..... Pentolite.
PERC ..... Percussion.
Pois A ..... Poison gas or liquid, Class A.
Pois. B .... Poison liquid or solid, Class B.
Pois. C .... Tear gas, Class C.
Pois. D .... Radioactive material, Class D.
PRAC ..... Practice.
PRI ..... Primer.
PROJ ..... Projectile.
PS ..... Chlorpicrin.
PT ..... Thickened fuel.
PWP ..... Plasticized white phosphorus.
RD ..... Round.
RDX ..... Cyclotrimethylenetrinitramine (cyclonite).
SA ..... Small arms.
SAP ..... Semi-armor piercing.
SCAR ..... Sub-caliber aircraft rocket.
SEIS ..... Ship's emergency identification signals.
SF ..... Semi-fixed.
SQ ..... Super quick.
T ..... Tentative model designation.
TET ..... Tetryl (trinitrophenylmethylnitramine).
TF ..... Time fuze.
TH ..... Thermate or Thermite
TNT ..... Trinitrotoluene.
TPX ..... Torpex.
VT ..... Variable time (proximity) (VT).
w ..... with.
w/o ..... without.
WP ..... White phosphorous.

§ 146.29-13 Permit for handling military explosives. (a) Shipments of military explosives and military lethal chemicals except material covered in § 146.29-100 as Coast Guard Class I shall not be laden on, handled nor discharged from any vessel at any port or place in the United States, its territories or possessions (not including the Panama Canal Zone) until authorization has been obtained by the owner, agent, charterer, master, or person in charge of the vessel from the District Commander of the U.S. Coast Guard, Captain of the Port, or other officer designated by the District Commander.

(b) Before a permit is issued authorizing the loading, handling or discharging of military explosives or military lethal chemicals in accordance with paragraph (a) of this section, the permittee shall file a written application for a permit authorizing the loading or handling or discharging. When filed, the application for loading or handling shall be accompanied by a preliminary manifest of all explosives or other dangerous articles comprising the cargo of the vessel together with a preliminary cargo stowage plan showing the proposed stowage of all such cargo. Changes in final stowage from that shown in the preliminary cargo stowage plan may be made upon approval of the issuing officer.

§ 146.29-14 Dangerous cargo manifest, list or stowage plan. (a) The master of a vessel transporting military explosives shall prepare a dangerous cargo manifest, list or stowage plan. This document must be kept in a designated holder, on or near the vessel's bridge while the vessel is in the navigable waters of the United States.

(b) The information required to appear on the dangerous cargo manifest, list or stowage plan by the provisions of paragraph (c) of this section shall be the information actually furnished to the vessel by the shipper of the military explosives or hazardous munitions upon his bill of lading or other shipping paper. This shipping order shall comply with the provisions of § 146.05-12 of this subchapter.

(c) This manifest, list or stowage plan shall show thereon the following information:

(1) Name of vessel and official number. (If the vessel has no official number, the international radio call sign shall be substituted.)

(2) Nationality of vessel.

(3) True shipping name of all military explosives as specified in § 146.29-100. Noun descriptions must be used.

(4) Tonnage in bulk shipment or the number and description of the outside containers and their gross weight.

(5) Classification of the military explosives as specified in § 146.29-100.

(6) DOT label applied to the package if any required.

(7) The stowage location of the explosives on board the vessel.

(8) Signature of the Master or other officer of the vessel authorized by the Master to sign for him.

(d) When military explosives are transported on board a vessel which is transporting other hazardous materials, the manifest list or stowage plan required by this section may be incorporated in the one required by 49 CFR 176.30.

(e) The manifest, list, or stowage plan aboard the vessel shall be

produced upon demand of the Commandant of the Coast Guard or his authorized representative.

(f) Owners, charterers, or agents of vessels transporting or storing military explosives or hazardous munitions shall retain ashore for one year a copy of the manifest, list, or stowage plan and shall produce said manifest or list in accordance with the provisions of § 146.02-22.

(g) Manifests for storage vessels shall be prepared according to the provisions of § 146.06-20 of this subchapter.

§ 146.29-15 Authority to load, handle or discharge; facilities and use. (a) Military explosives, except material covered in § 146.29-100 as Coast Guard Class I, shall not be handled, stowed, stored, loaded on, or discharged from a vessel except at one of the following:

(1) Explosives anchorages; the areas upon the navigable waters that are designated explosives anchorages under the applicable provisions of 33 CFR Parts 109 and 110 (Anchorage Regulations), and within which a vessel may anchor or moor to handle, stow, store, load, or discharge explosives as cargo.

(2) Designated waterfront facility of particular hazard (33 CFR 126.05(b)); the facility which has been specifically authorized by the District Commander or Captain of the Port for this purpose.

(3) Temporary location; a location the District Commander or Captain of the Port may designate as a temporary location for a specific loading of Classes XI-A, XI-B, XI-C, and XI-D ammunition.

(b) A vessel, subject to the regulations in this part, may load or discharge military explosives at any Army or Navy depot, arsenal, navy yard, port of embarkation or other facility under the direct control and operation of the Navy, or Army, provided a permit authorizing such loading has been granted to the vessel owner, agent, charterer, master, or person in charge of the vessel by the Captain of the Port. (See §§ 146.29-19 and 146.29-21.)

(c) In an emergency arising by reason of military necessity or casualty, a vessel may upon authorization by a Captain of the Port, load or discharge military explosives in any location authorized by said Captain of the Port.

§ 146.29-17 Prohibited explosives. (a) Explosives prohibited by subsection 3 of R.S. 4472, as amended (46 U.S.C. 170) (fulminates or other detonating compounds in bulk in dry condition, or explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 167 degrees Fahrenheit, or compositions containing an ammonium salt and a chlorate, or other like explosives) shall not be accepted by any vessel.

(b) A passenger vessel shall not accept any Class A or Class B military explosives for transportation as cargo.

§ 146.29-19 Explosives loading supervisory detail. (a) There may be assigned to every vessel, subject to the regulations in this part, loading, handling, or discharging military explosives at an explosives anchorage or waterfront facility as may be approved by the Captain of the Port or the District Commander for the loading or unloading of military explosives, a Coast Guard detail to supervise such loading, handling or discharging. The owners, agents, charterers, masters or persons in charge of the vessel and all persons engaged in the handling, loading and stowage of the military explosives shall obey all orders, oral or written, that are given by the person in charge of such assigned detail.

(b) A vessel, subject to the regulations in this part, loading, handling, or discharging military explosives except material covered in § 146.29-100 as Coast Guard Class I at a Navy or Army depot, arsenal, navy yard, port of embarkation or other facility under the direct control and operation of the Navy or Army shall apply to the Captain of the Port for a permit for such loading, handling or discharging. A Coast Guard detail may be assigned to such a vessel unless the Commanding Officer of such Navy or Army facility declines the detail.

§ 146.29-21 Personnel identification. The provisions of this section shall apply to vessels loading, handling or discharging military explosives in accordance with the provisions of § 146.29-19 (a).

(a) No person shall enter upon a vessel loading, handling, or discharging military explosives unless such person first identifies himself to the satisfaction of the Coast Guard detail.

(b) Every person who is permitted to enter into a magazine or a hold or compartment of a vessel wherein military explosives are being handled or stowed shall provide the Coast Guard representative with his name and address and the name and address of the firm employing him, furnishing satisfactory identification to substantiate such information.

(c) A person who, for any reason, is requested to leave a vessel loading, handling or discharging military explosives by the person in charge of the Coast Guard detail shall immediately obey the request and not return until permission is granted.

§ 146.29-23 Ship's officer present. (a) During the entire operation involving the building of a magazine, the preparation of holds, and the actual handling and stowage of military explosives, it shall be the responsibility of the master of the vessel to assign a deck officer of the vessel who shall be in constant attendance. It shall be these officers' responsibility to see that the provisions of the regulations in this part insofar as such provisions apply to the vessel, are complied with.

(b) It shall be these officers' further responsibility at the end of the work shift to see that all means of access to the partially loaded holds are closed off in such a manner as to provide the maximum safety and protection for the explosives stowed within the hold.

§ 146.29-25 Fires and fire protection. (a) No unnecessary fire shall be permitted on a dock, lighter, or vessel while loading, handling, or discharging military explosives.

(b) Every fire deemed necessary must be properly safeguarded and for the entire period of cargo transfer shall be in constant charge of a competent person assigned for that purpose by the master or by the person in charge of the vessel or by the person in charge of the dock.

(c) (1) Every vessel engaged in the handling and transfer of military explosives and equipped with means of power, heating, cooking, or lighting involving use of smoke pipes or stacks shall have such smoke pipes and or stacks protected by spark screens. For the purpose of screening smoke pipes, vessels shall be divided into two categories. Large or ocean vessels shall have their main smoke pipes protected by corrosion resistant screens of not larger than ½-inch mesh and small or inland vessels and small or auxiliary smoke pipes on large vessels by screens not larger than ¼-inch mesh.

(2) Insofar as practicable, unless the barge, lighter, etc. is loading or discharging military explosives to or from the vessel, barges, lighters, tow boats, and other types of vessels shall not come alongside a vessel handling, stowing, storing, loading, discharging or transporting military explosives opposite the area where hatches serving a hold containing explosives are open. (See § 146.29-73(1).)

(3) This paragraph is not applicable to vessels transiting main channels contiguous to explosives loading facilities or anchorages.

(4) Vessels loading or unloading Class I ammunition at waterfront facilities not designated by the Captain of the Port as explosives loading piers do not require screening of smoke pipes and or stacks.

(d) Welding or cutting operations involving the use of open flames or arc shall not be undertaken on a vessel having military explosives on board as cargo, except in case of an emergency affecting the security of a vessel, or for the purpose of welding pad eyes, angle bars or other devices to the deck for securing deck cargo. Such welding or cutting shall be done only on special permission of the Captain of the Port, and then only in the presence of an officer of the Coast Guard detail and in conformity with said officer's instructions.

(e) The cleaning of fireside of boilers shall not be undertaken on a vessel while at an explosives or ammunition loading facility or anchorage except upon express permission of the Captain of the Port.

(f) All tubes and uptakes of the vessel must be thoroughly swept or blown and reasonably free of soot prior to the arrival of the vessel at an explosives or ammunition loading facility or anchorage. A vessel at an explosives ammunition loading facility or anchorage shall not blow tubes or uptakes except upon permission of the Captain of the Port and then the operation shall be under the supervision of the master or person in charge of the vessel with a licensed engineer in attendance.

(g) Bunkering of a vessel shall not be done while the vessel is at an explosives loading or ammunition loading waterfront facility. When at an anchorage, an explosives laden vessel may engage in bunkering operations provided explosives are not being loaded, handled, or discharged, and all holds in which explosives are stowed are secured.

(h) A vessel at an explosives or ammunition loading facility or anchorage shall not transfer fuel oil between its own fuel oil storage tanks or from its storage tanks to the settling tank, except under the close supervision of a licensed engineer who shall be in constant attendance until the operation is completed.

(i) [Reserved]

(j) The transfer of lubricating oils and cleaning oils, either from containers on board the vessel or by pipeline or hose shall be prohibited at an explosives or ammunition loading facility. However, the transfer on board the vessel of galley fuel oil may be authorized by the Captain of the Port when the galley stove is cold, or when the vessel is equipped with an overflow system which returns surplus fuel oil from the galley tanks back into the main storage tanks provided such transfer is under the supervision of the master or person in charge of the vessel with a licensed engineer in attendance.

(k) The fueling of powered lifeboats or units of the vessel's machinery shall not be done while the vessel is at an explosives or ammunition loading facility.

(l) Boiler room and engine room bilges must be clean and free of oil or unnecessary residue before the vessel proceeds to an explosives or ammunition loading facility or anchorage, and it is further required that the bilges be maintained in this condition during the entire time the vessel is moored at the explosives or ammunition loading facility or anchorage. Attention is invited to the provisions of the Oil Pollution Acts of 1924 and 1961, and the Refuse Act, 1899, which prohibit the discharge of oil into the navigable waters of the United States. The term "oil" means oil of any kind or in any form, including fuel oil, oil sludge, and oil refuse.

(m) On every vessel located at explosives loading facility or anchorage or ammunition loading facility no work shall be undertaken on the main propulsion machinery, auxiliaries or boilers that will render inoperative fire pumps, electric power or propulsion of the vessel without express authority of the Captain of the Port. When the repairs authorized

make inoperative the main propulsion unit an auxiliary tug shall stand by.

(n) (1) Every self-propelled vessel having on board military explosives shall at all times maintain means of propulsion. When not under way, such a vessel shall have available on deck, fore and aft, hawsers capable of being used for emergency towing. The eye of such hawser shall be clear of the chock with messenger attached and ready to run and the ship's end shall be stopped off on the bitts to permit reasonable scope of hawser for towing. A heaving line made up and secured to the rail by rope yarn shall be bent to the messenger. Fire axes shall be kept conveniently at hand, fore and aft, to be used on the ship or passed to the dock for cutting mooring lines in case of an emergency.

(2) Nonself-propelled vessels having on board military explosives when moored or anchored shall have at least one tug for each facility or area at which they are moored or anchored.

(o) Every vessel loading or unloading military explosives shall display at its masthead by day a red flag at least 16 square feet in area or at least 10 feet above the upper deck if the vessel has no mast, and at night, while fast to a dock, a red light in the position specified for the flag.

(p) Any device, such as a radio, radar, etc., capable of radiating electromagnetic energy shall be de-energized by opening the main switches thereto, and these switches shall be tagged to warn personnel against reenergizing the circuits whenever the vessel is at an explosives or ammunition handling facility, at an explosive anchorage with a barge or other type of vessel containing explosives alongside, or when a hatch containing explosives is uncovered.

§ 146.29-27 Fire hose. (a) During the handling, loading, or unloading of military explosives the vessel shall "run out" or otherwise make ready for quick use a *minimum of two* lines of hose on the weather deck, one fore and one aft. These hoses shall be of sufficient length so that a stream of water from at least one hose can reach all areas of the weather deck. The fire hose valves *controlling* these lines shall remain "cracked open" (except in freezing weather) so casual observation may indicate that water is available.

(b) Additional fire lines shall be "run out" or otherwise made ready at each hold or compartment working or containing military explosives when the hatch serving the hold is open. These lines shall of sufficient length so that a stream of water can be directed onto all portions of the hold or compartment.

(c) Fire lines "run out" or otherwise made ready shall be fitted with an approved combination spray nozzle.

§ 146.29-29 Smoking. (a) Smoking is prohibited on or near any vessel handling, loading or unloading military explosives at an explosives or ammunition loading pier. Smoking areas may be designated upon approval by the Captain of the Port provided such areas are located at a safe distance from the vessel. "No Smoking" warning signs shall be posted during operations of handling, loading or unloading such cargo. At least one such "No Smoking" sign shall be located on the pier at a reasonable distance from the vessel when such handling, loading, or unloading is taking place at a pier.

(b) Smoking is prohibited on or near any vessel handling, loading, or unloading explosives at an explosives anchorage, except the Captain of the Port may, with the concurrence of the master or person in charge of the vessel, designate a compartment as a smoking area. This compartment will be provided with electric lighting devices without open flame. "No Smoking" warning signs shall be posted conspicuously in other parts of the vessel during operations of handling, loading, or unloading.

(c) The Captain of the Port may approve a room aboard ship to be a designated "Smoking room for the ship's personnel only," while at a pier or anchorage; provided the necessary approved firefighting equipment is at hand and portholes, vents, and doors are effectively screened with approved screening and electric cigarette lighting devices without open flame are provided.

§ 146.29-31 Liquor or drugs. No person who, in the judgment of the master, person in charge of the vessel, or the officer in charge of the Coast Guard detail, is considered as being under the influence of intoxicating liquor or of drugs shall be permitted on board a vessel while operations involving the handling, loading, unloading, or transportation of explosives are being carried on, except if the person under the influence of intoxicating liquor or drugs in a bona fide member of the crew of the vessel involved, he may at the discretion of the Officer-in-Charge of the Coast Guard detail board the vessel: *Provided*, That the master or person in charge of the vessel will accept custody and full responsibility for said person. *And provided further*, That this person shall not be permitted to perform any work on the vessel while under the influence of intoxicating liquor or drugs.

§ 146.29-33 Cargo working gear and equipment. (a) Before military explosives are loaded or unloaded on or from a vessel the master or other person in charge of the vessel is required to ascertain by examination the adequacy, the condition and working order of all working equipment including slings, crates, baskets, boxes, chutes, mattresses, and tackle.

(b) Any and all equipment, which in the judgment of the master or other person in charge of the vessel is not adequate or in safe working condition shall be rejected by him and he shall prohibit its use and shall take such precautions as he may deem necessary to be certain such rejected equipment is not used for the purpose of loading or unloading explosives. The master or other person in charge of the vessel shall keep watch of all equipment used during the transfer of explosives and if any part of the equipment shows any defect or is damaged in use, work shall be stopped and the damaged or defective equipment repaired or replaced before permitting the loading or unloading to continue.

(c) This inspection of cargo working equipment shall apply to the vessel's equipment and to stevedore's or other contractor's equipment.

(d) The Captain of the Port or his representative may prohibit the use of any cargo working gear or equipment, including stevedore equipment, which he deems unsafe.

§ 146.29-35 Lights, tools, and portable equipment. (a) No artificial lights except electric lights, electric lamps, or electric floodlights shall be used while loading or unloading military explosives. Such light fixtures shall not be used unless protected against accidental breakage by metal guards. Portable electric lights shall be fitted with stout guards protecting the bulb. Wires of such lights shall be sound and show no evidence of liability to short circuit. When deemed necessary by the military service concerned with the shipment of the explosives due to the possible presence of explosive dust or vapors in the hold of the ship being worked, all electrical equipment and light fixtures used therein shall be of a type approved for the hazardous location as defined in the National Electric Code. This equipment shall be grounded and continuity of the grounding system assured by the applicable methods prescribed in the National Electric Code.

(b) Portable lights shall be so installed as to prevent any part of the light or its cable from coming in contact with the deck or the cargo. A hanging portable light shall not be suspended from its cord but shall be fitted with a gantline so installed that no strain is carried by the light cable. No portable light shall be taken into a hold or compartment in which the stowage of ammunition or explosives has been completed without prior approval by the Captain of the Port or his representative. A portable light and light cord that is permitted in a hold shall; be installed in a manner which will prevent the light cord from coming into contact with the ship's metal surfaces; be guarded and protected from damage that may be caused by the ship's working gear or stevedore handling equipment; and shall not be permitted to be in bearing with any of the ammunition, explosives or hazardous munitions or containers thereof.

(c) Flashlights of a non-spark type shall be provided by the vessel owner, agent or its master or other person in charge of the vessel, for personnel required to enter holds in which explosives are stowed.

(d) Members of the crew of the vessel and other persons permitted on board the vessel to aid and assist in loading, unloading or handling military explosives shall not be permitted to carry on their persons firearms, matches, flame producing devices, knives, bale hooks, metallic tools except as provided in paragraph (e) of this section or personal packages of any description, except the prohibition against knives shall not apply to the seaman's knife in possession of a member of the crew of the vessel, provided such crew member is not actually working the explosives or ammunition. Lunch boxes, pails, thermos bottles, other food containers or personal packages of any description shall not be brought on board a vessel unless such items have been examined and passed by the Coast Guard detail. Food containers that are passed on board the vessel shall not be stored in the hold in which explosives are being worked nor shall their contents be eaten in such hold. Persons engaged in handling and stowage of military explosives shall not wear shoes or boots shod or strengthened with iron nail or other spark producing metal unless such footwear is covered with rubber, leather, or other nonsparking material.

(e) The Captain of the Port may authorize the use of pinch bars of ferrous metal in "breaking out" or stowing unfuzed bombs, large caliber separate loading projectiles, and packages of ammunition shipped in heavy unit weight containers. He may also permit the use of saws and hammers that are actually powered by the hand or hand and arm, in the hold of a vessel when necessary in fitting dunnage or constructing a partition or a division bulkhead or installing protection required for the stowage of military explosives. The Captain of the Port may authorize sparkproof electrically powered or pneumatic saws or hammers, but they shall not be used in any compartment containing military explosives. The Captain of the Port or his representative may authorize the use of metallic tools on deck in the vicinity of the hatch for necessary work associated with the loading, such as winch repairs, opening or tightening shackles, etc.: *Provided*, That they are removed from the scene as soon as the work is completed.

(f) All electric wiring in holds in which explosives are to stowed shall be inspected prior to the loading of explosives into the hold. The electrical circuits which terminate in or service holds in which explosives are to be stowed shall be deenergized by removing their fuses or inactivating their circuit breakers at the main panel prior to loading and these circuits shall remain deenergized while explosives are within the hold. The main panel shall be tagged to warn personnel against reenergizing these circuits.

§ 146.29-37 Handling drafts of lumber. All lumber in excess of 3 feet in length shall be handled into or out of the holds of vessels loading, unloading or containing military explosives or ammunition by

use of a double sling. Small pieces of lumber used in chocking and dunnaging shall be handled in trays with sideboards. Cargo nets may also be used provided they are lined with canvas or similar fabric. Dunnage shall not be lowered directly onto stowages of ammunition or explosives. Landing mats or timbers shall be laid to receive such drafts.

§ 146.29-39 Handling and slinging of explosives. (a) All military explosives or chemical warfare agents in bulk shall be handled carefully. Packages and other containers shall not be dropped, dragged, tumbled, walked, slid over each other or over the deck or otherwise subjected to shock except that heavy containers of military explosives equipped with pulling bar assemblies and skids may be positioned in the holds of vessels by using the pulling bar assemblies to maneuver the containers for short distances at slow speed. Packages and other containers shall not be rolled unless rolling is specifically permitted by the provisions governing handling as set forth in § 146.29-100.

(b) In transferring military explosives between pier facilities and vessels or from vessel to vessel, or within the hold of a vessel the items may be handled by hand, power operated mechanical hoist or power operated conveyor approved by the Captain of the Port, power operated cargo lift truck, hand truck or nonpowered (gravity) roller conveyor (hand controlled); or unless specifically prohibited by the regulations in this subpart, a specification chute and mattress may be used. (Refer to §§ 146.09-11 and 146.09-12 for specifications of chute and mattress.)

(c) Classes III, VI, VIII, and IX-C shall be lowered carefully onto a mattress or other shock absorbing material.

(d) The Captain of the Port may permit the use of cargo-handling vehicles or equipment powered by internal combustion engines on docks, wharves or piers for the handling of military explosives under such conditions as he may prescribe. Such type vehicles or equipment shall not be used within a hatch of a vessel having military explosives in any hold within said hatch. Electric or battery powered vehicles or equipment of explosion-proof or spark-proof type such as approved power-operated industrial trucks with recognized testing laboratory designations of "EE" and "EX" may be used to handle military explosives on docks, wharves, piers or in the holds of vessels under such conditions as the Captain of the Port may prescribe. All power-operated cargo-handling vehicles or equipment shall at all times be maintained in safe mechanical, electrical and operating condition. The use of cargo-handling vehicles or equipment may be suspended or prohibited by the Captain of the Port or his representative when he considers such use inimical to safety.

(e) When handling, loading or unloading by mechanical means, all military explosives shall be handled in the type equipment specified for the various classes of explosives in § 146.29-100. Military explosives shall be arranged on trays so that no portion of the military explosives or containers overhangs the tray. For trays provided with sideboards, military explosives or containers shall not extend above the sideboards to a height exceeding one-third of the vertical dimension of the item as stowed on the tray. Rope net slings with pie-plates, pallet, skipboard or similar base shall be so loaded that when lifted a minimum displacement of items shall occur and the cargo net shall completely encompass the entire load except on its topside.

(f) The mesh of a cargo net shall be of such size as will prevent any item or container of military explosives in the draft from passing through the mesh under any possible circumstances.

(g) Drafts shall not be raised or stopped in lowering by sudden application of power or brake. Drafts shall not be unloaded by tripping or freeing one side of the net, tray, or pallet and tumbling the ammunition or explosives out of the gear. All drafts, beams, shackles, bridles, slings, hooks, etc., shall be hand freed before the winch takes control. Slings shall not be disengaged by hand unhooking and then dragged from under draft by means of winch except for the topmost layer in the hold when power removal is the only possible method and when the cargo cannot be toppled. Handles or beckets on ammunition packages shall not be used for slinging purposes.

(h) Blasting caps, detonators, primer-detonators, fulminate of mercury and initiating or priming explosives as defined in the regulations in this part shall be considered as constituting a distinct class of dangerous explosives, and because of the hazard involved they shall be handled with extreme care.

(i) [Reserved]

(j) "Cant" or barrel hooks shall not be used for raising or lowering a barrel, drum, depth bomb, depth charge or other container of military explosives. Metal bale hooks shall not be used in handling packages of explosives.

(k) Combination woven rope and wire slings are not permitted for use in handling explosives. A sling that is formed by use of an open hook shall not be used in hoisting or lowering a draft of military explosives.

(l) Wire rope or wire rope assemblies including splices or fittings thereof, used in handling military explosives shall be kept bare to permit ready inspection of its safe working condition. Mechanical type endings may be used in lieu of hand splices provided such endings have a minimum breaking strength equal to the catalog strength of wire rope from which it is made.

(m) Bombs shall not be handled by the lifting lug or suspension lugs.

(n) Only safety hooks or hooks that have been moused by wire shall be utilized in loading or discharging drafts of military explosives or munitions.

§ 146.29-41 Weight per draft. To eliminate excessive draft, slings will be as short as practicable when handling military ammunition or explosives. The maximum permitted weight per draft of all classes of military explosives shall be as follows for a 5-ton boom. The weights per draft may be increased proportionately for booms of greater capacity. In all instances the allowance shall remain as 10 percent. For example, in paragraph (d)(2) of this section, the maximum weight of drafts consisting of one or more palletized units of Class V or VII military explosives shall not exceed 4,400 pounds when using a five ton boom; however, if a ten ton boom is used the weight of the draft may be increased to 8,800 pounds (8,000 pounds plus 10 percent of same).

(a) **Class I.** (1) When handled by pallet, skipboard, or tray fitted with cargo net or sideboards shall not exceed 3,000 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(b) **Classes II-A, II-B, II-C, II-D, II-E, II-F, II-G, II-H, II-J, IV, IX-A, IV-B.** (1) When handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(c) **Classes III, VI.** (1) When handled by tray fitted with sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(d) **Classes V, VII.** (1) When handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(3) Single shells weighing in excess of 2,200 pounds must be loaded or unloaded one at a time.

(e) **Class VIII.** (1) When handled by tray fitted with sideboards shall not exceed 1,000 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 2,400 pounds plus 10 percent.

(3) The maximum permitted weight for lift of a portable magazine containing Class VIII ammunition shall not exceed 2,400 pounds plus 10 percent.

(f) **Class IX-C.** (1) When handled by tray fitted with sideboards shall not exceed 1,000 pounds plus 10 percent.

(2) the maximum permitted weight for purpose of lift of a portable magazine containing IX-C explosives shall not exceed 2,400 pounds plus 10 percent.

(g) **Classes X-A, X-B, X-C, X-D.** (1) When handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) When handling bombs, more than one to a draft, by sling method or in palletized units, the draft shall not exceed 4,000 pounds plus 10 percent.

(3) Table of limiting loads applicable when handling bombs by sling method:

Weight of individual bomb or cluster.	Maximum limits in units per draft
1 pound to 250 pounds plus 10 percent per unit	8
276 to 500 pounds plus 10 percent per unit	6
551 to 1,000 pounds plus 10 percent per unit	4
1,101 to 2,000 pounds plus 10 percent per unit	2
Over 2,200 pounds	1

(4) Single items or assembled units (other than palletized), designed to be handled as a unit, may be loaded regardless of weight provided the cargo handling gear is of a design capable of handling a working load at least 50 percent additional to the actual weight of the item or unit comprising the draft, and provided further the integrity of the cargo handling gear is unimpaired.

(h) **Classes XI-A, XI-B, XI-C, XI-D.** (1) When handled by trays, skipboards, pallets or pieplates fitted with cargo nets or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(3) Single bombs or other unit containers weighing in excess of 2,200 pounds must be loaded or unloaded one at a time.

(i) [Reserved]

(j) A tray with a top and so constructed that it may be considered equivalent to a palletized unit may, subject to the approval of the Captain of the Port, be permitted a maximum weight per draft of 4,000 pounds plus 10 percent. This top may be constructed of other material than the tray, provided it serves to make the tray an integral unit.

§ 146.29-42 Containers of ammunition. Containers or portable magazines containing explosives of Coast Guard Classes I and II, designed to be loaded and discharged in a loaded condition by "lift-on, lift-off" method may be handled regardless of weight provided the rated working capacity of the cargo handling gear is not exceeded and

provided further that the integrity of the handling gear is unimpaired. The volume of explosives that may be stowed in a container is not limited unless the container is being used as a portable magazine as described in §146.29-69. Where the regulations of this subpart require magazines, containers may not be used for stowage purposes unless they comply with magazine requirements. All other classes of military explosives may be carried in containers on approval of the Commandant.

§ 146.29-43 Requirement for the opening of hatches. (a) **Vessels at explosives loading piers or at ammunition loading piers.** (1) A weather deck hatch through which ammunition or explosives are being worked shall have sufficient hatch covers and hatch beams removed across the entire width of the hatch so that the resulting opening, measured parallel to the side of the vessel, is at least equal to twice the longest axis of the largest draft being loaded.

(2) Strongbacks or hatch beams left in place shall be firmly secured by hatch battens or other approved means.

(b) **Vessels at explosives anchorages.** A weather deck hatch through which ammunition or explosives are being worked shall have all hatch covers and all hatch beams removed unless otherwise authorized by the Captain of the Port.

(c) **Vessels at explosives anchorages having a magazine constructed in the square of a weather deck hatch.** Sufficient hatch covers and hatch beams shall be removed from the weather deck hatch to expose the entire magazine.

(d) **General requirements.** (1) During the working of ammunition and explosives to or from the deep holds, the 'tween-deck hatch openings shall at all times be equal to, if not greater than, the weather deck hatch openings.

(2) The use of open hooks in removing or replacing hatch beams or hatch strongbacks is prohibited. Closed hooks, shackles or T bars shall be used in this operation.

§ 146.29-45 Loading or unloading military explosives and other cargo. (a) Military explosives shall not be loaded or unloaded in a hatch at the same time that other cargo is being worked in any of the holds serviced through said hatch.

(b) Military explosives shall not be loaded or unloaded from the same hatch from both sides of the ship simultaneously, unless the hatch is fitted with cargo handling gear located at both the forward and after ends of the hatch. A vessel so equipped may also use both sets of cargo handling gear simultaneously from the same side of the vessel.

(c) When military explosives are stowed in a hold below one in which any cargo is being worked the 'tween-deck hatch dividing the two holds will have all of its covers securely in place.

(d) Military explosives may be loaded in a hold before or after other cargo, provided that all precautions are taken to assure full protection to the explosives against the hazard of articles being dropped from the cargo sling. When possible hatches should be partially covered to assure such protection.

(e) Drafts of any kind shall not be handled over explosives or other dangerous articles that are stowed "On deck".

(f) Any deck loads over which military explosives must be passed shall be limited in height to that of the hatch coaming, bulwark, or three feet, whichever is greater.

(g) Drafts of explosives may not be handled over explosives or other dangerous articles which have been placed on deck permanently or temporarily.

§ 146.29-47 Packing and marking. Military explosives shall not be offered to vessels or accepted by vessels subject to the regulations in this part unless they are in proper condition for transportation and are packed, marked, labeled, described, certified and otherwise acceptable in accordance with the applicable provisions of the regulations in this part.

§ 146.29-49 Stowage on board barges. (a) Barges subject to the regulations in this part, engaged in the transfer of explosives between receiving points and delivery points within the harbors, bays, sounds, lakes, and rivers, including the explosives anchorages on the navigable waters, shall conform to the applicable provisions of 49 CFR §§176.95 through 176.99. Ammunition or explosives in bulk, in combustible outside packages, stowed "On deck in open" shall after loading and during transportation be covered by fire resistant and or flame proof tarpaulins securely lashed in place.

(b) Notwithstanding the requirements of this subpart relative to the stowage of detonators, blasting caps and fuzes, Class VIII, such articles may be stowed "On deck" on Class AA and Class AB barges with other ammunition or explosives in bulk stowed thereon, provided a sandbag barrier of at least 2 feet in thickness intervenes between the ammunition or explosives in bulk and the detonators, blasting caps or fuzes. When both are stowed "On deck" the height of this barrier shall be at least equal to the height of the stowage of the detonators, blasting caps or fuzes, or the ammunition or explosives in bulk, whichever is highest. The barrier shall either completely surround the detonators, blasting caps or fuzes or extend across with width of the barge. With this type of barrier no additional separation is required. For Class AC barges, the stowage of detonators, blasting caps or fuzes, Class VIII, shall, when no permanent steel bulkhead intervenes, be separated from the stowage of ammunition or explosives in bulk by a distance of 40 feet; with a permanent steel bulkhead intervening, detonators, blasting caps or fuzes shall be separated from the stowage of explosives in bulk by a distance of 25 feet and from the stowage of ammunition by a distance of 10 feet. If, under deck, a 2-foot sandbag barrier is utilized to intervene between the stowage of ammunition or explosives in bulk, it shall be considered as though a permanent steel bulkhead or deck intervenes. Notwithstanding the provisions of 49 CFR §176.93, Class CA and Class CB barges may transport ammunition on deck.

§ 146.29-51 Stowage on board vessels. (a) All articles of cargo classified as military explosives by the regulations in this subpart shall be stowed on board a vessel in conformity with the provisions of the regulations in this subpart.

(b) Mixed stowage of ammunition or explosives in bulk with other ammunition or explosives, or other dangerous articles or substances, or combustible liquids or hazardous articles shall be in conformity with the provisions of the explosives and hazardous munitions admixture charts, §146.29-99, the classification, handling and stowage chart §146.29-100 and other applicable specific provisions of this subpart. A military explosive or hazardous munition shall not be stowed in the same van or cargo transporter with any other explosive or dangerous article with which it is incompatible according to the regulations in this part. Stowage of vans containing military explosives and hazardous munitions shall follow the compatibility requirements of §§146.29-99 and 146.29-100.

(c) Specifications governing construction and location of magazines and lockers and the preparation of cargo compartments to be used in the stowage of military ammunition are detailed in §§146.29-71 to 146.29-95, inclusive.

§ 146.29-53 Stowage of military explosives in holds containing coal. Unless expressly authorized by the Commandant of the Coast Guard military explosives shall not be stowed in a hold containing coal as cargo nor in any hold above, below or adjacent to one containing coal.

§ 146.29-55 Stowage of military explosives in holds containing household or personal effects and/or mail as cargo. (a) Unless expressly authorized by the Commandant of the Coast Guard, military explosives shall not be stowed in a hold containing household or personal effects and/or mail as cargo, nor in the hold above or below the hold containing any of these items.

(b) Military explosives may be stowed in a compartment or hold adjacent to one containing household or personal effects. However, if the explosives are stowed up to or against the intervening permanent bulkhead, a buffer consisting of at least three feet of non-dangerous cargo shall be placed between the household or personal effects or mail and the permanent bulkhead intervening between this stowage and the explosives. If non-dangerous cargo is not available for this purpose, a division bulkhead shall be erected to provide an air space of at least one foot wide between the household or personal effects, or mail, and the intervening permanent bulkhead.

(c) This section shall not apply to vessels having on board military explosives of Coast Guard Class I category only.

§ 146.29-57 "On deck" stowage. (a) Articles classified as military explosives, the stowage of which is permitted "On deck" by the regulations in this subpart shall be properly secured. Such security may be obtained by using existing vessels structures such as bulwarks, hatch coamings, shelter deck and poop bulkheads, as part boundaries and effectively closing in the cargo by fitting angle bar closing means, secured by bolting to clips or other parts of the ship's structure. Lashing of deck stowage permitted provided eye pads are fitted to carry such lashings. Guard rails shall not be used to secure such lashings.

(b) Bulky articles may be secured by lashing with individual wire rope lashings or other equally efficient means.

(c) Shoring of such bulky articles of cargo shall be in addition to the foregoing means of securing.

(d) Military explosives stowed "On deck" shall not be stowed within a distance of 20 feet of an incinerator, the topside terminus of an ash hoist or a coal or oil fire gallery or bake shop. For vessels fitted with electrically operated galleys and bake shops, the military explosives stowed on deck may be stowed not closer than 10 feet of such galleys and bake shop provided no incinerator or topside terminus ash hoist is within a distance of 20 feet of such stowage.

(e) Deck boxes, portable magazines, containers or cargo transporters containing military explosives shall meet the requirements of this section when stowed "On deck." Compatibility of the explosives within the deck box, portable magazine, cargo transporters or containers shall be in accordance with §§146.29-99 and 146.29-100. A deck box, portable magazine, container or cargo transporter containing military explosives shall be separated from other deck boxes, portable magazines, containers or cargo transporter containing explosives of incompatible classes by the superstructure or, if the height of the container does not exceed that of the hatch coaming, by the weather deck hatch.

Fire plugs, sounding pipes and access ways shall be maintained free and clear.

§ 146.29-59 Stowage adjacent to other dangerous articles. As noted in § 146.29-11, missile and rocket fuels or oxidizers listed in Classes XI-C and XI-D of § 146.29-100 are excluded from the provisions of this section when shipped with military explosives, and compatibility will be in accordance with the chart in § 146.29-99.

(a) **Flammable liquids.** (1) Military explosives shall not be stowed in the same hold, nor in any hold below, any hold above or a hold adjacent to one in which flammable liquids are stowed. Military vehicles including ducks, buffaloes, alligators and similar amphibious types of craft, referred to in this subpart as "vehicles" or "military vehicles", using a flammable liquid as fuel may be stowed in holds adjacent to a hold in which military explosives are stowed provided the fuel is confined to the vehicle's tank and is not in excess of approximately 75 percent of the capacity of the fuel tank.

(2) Military vehicles, landing craft and small boats using flammable liquid as fuel and having the fuel confined to the vehicle's or boat's tank and not in excess of approximately 75 percent of the capacity of said tank may be stowed "On deck" over a hold in which military explosives are stowed. *Provided*, That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and that such stowage is not made over the square of the hatch, except that amphibious type vehicles, landing craft or boats having fuel tanks installed within a tight hull may be stowed over the square of a hatch.

(3) Flammable liquids as cargo shall not be stowed "On deck" immediately above a hold in which military explosives are stowed. The applicable provisions of 49 CFR Part 176, shall be observed in the stowage of flammable liquids "On deck".

(b) **Flammable solids or oxidizing materials.** (1) Military explosives shall not be stowed in the same hold nor in any hold above or below or a hold adjacent to one in which flammable solids, oxidizing materials, or organic peroxides are stowed except as specifically authorized by the provisions of § 146.29-100.

(2) Flammable solids, oxidizing materials, or organic peroxides may be stowed "On deck" over a hold in which military explosives are stowed: *Provided*, That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and such stowage is accomplished by means of a crib and platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur: *And provided further*, That such stowage is not made over the square of the hatch.

(c) **Corrosive materials.** (1) Military explosives shall not be stowed in the same hold nor in the hold below one in which corrosive materials are stowed except as specifically authorized by the provisions of § 146.29-100. Corrosive material's may be stowed "On deck" over a hold in which military explosives are stowed: *Provided*, That the weather deck is tight and the cargo hatch is fitted with a right raised coaming and such stowage is accomplished by means of a crib and a platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur: *And further provided*, That such stowage is not made over the square of the hatch.

(2) The substances listed below shall not be transported on board a vessel which is carrying in excess of 100 tons of ammunition or explosives:

Acid sludge
Bromine
Chloracetyl chloride
Dimethyl sulfate
Hydrofluoric acid, anhydrous
Nitrating (mixed) acid
Nitric acid
Phosphorus oxychloride
Phosphorus tribromide
Phosphorus trichloride
Spent acid (sulfuric or mixed)
Sulfur chloride

(d) **Military vehicles and privately owned vehicles shipped by, for, or to the United States Department of Defense with electrolyte.** Notwithstanding the provisions of 49 CFR Part 176, electrolyte of not over 47 percent strength (39° Baume) may be accepted for transportation and be stowed on board vessels carrying military explosives under the following conditions of packing:

(1) In glass or earthenware containers, not exceeding 160 ounces capacity (one imperial gallon) in fiberboard cartons of a size to permit cushioning with an incombustible, absorbent material of a sufficient amount to absorb the contents of the container in event of breakage. The outside container shall consist of a wooden box (DOT-15A, 16B or Army Specification) in which 1, 2, 3, or 4 fiberboard cartons may be packed. Battery electrolyte may also be shipped in one-gallon polyethylene bottles made and packaged in accordance with Military Specification 207B, Type IV, Class II. The outside containers shall carry the white (acid) label. No military ammunition shall be included within this package.

(2) Electrolyte packed in accordance with provisions set forth in subparagraph (1) of this paragraph may be stowed:

(i) "On deck in open" including deck areas over holds containing military explosives.

(ii) "Tween-deck" or "Under deck" in holds adjacent to or in any hold below a hold containing military explosives.

(3) Electrolyte, when packed in accordance with the provisions of subparagraph (1) of this paragraph, may be accepted for transportation when securely fastened within or on a military vehicle or other military equipment whether such vehicle or equipment is shipped crated, boxed, or without crating or boxing. Such military vehicles or military equipment, when shipped crated or boxed, may be accepted for transportation when the container of electrolyte is securely fastened on the inside of the shipping crate or box containing the vehicle or military equipment. When so shipped, the overall crate or box shall carry the white (acid) label and shall be marked "This side up" and "Inside packages comply with prescribed specifications."

(4) Electrolyte packed in accordance with the provisions of subparagraph (1) of this paragraph when offered for transportation under the conditions set forth in subparagraph (3) of this paragraph, may be stowed as follows:

(i) "On deck in open", including deck areas over holds containing military explosives;

(ii) "Tween-deck" or "Under deck" in holds adjacent, any hold below or any hold above holds containing military explosives; or,

(iii) In the same hold containing Class I, IV, V, VII, X-A, X-B, X-C, or X-D, provided the stowage of military vehicles and the stowage of ammunition are separated by a division bulkhead or a 2-inch dunnage floor.

(5) Military vehicles and privately owned vehicles shipped by, for, or to the United States Department of Defense (crated or uncrated) containing an electrolyte storage battery shall not be stowed in the same hold over military explosives stowed therein. Such vehicles may be stowed in the same hold under or alongside of military explosives stowed therein: *Provided*, That all the applicable provisions of this section and section 146.29-61 are observed: *And provided further*, That the vehicles are processed, the fuel tank drained dry, the battery terminal leads disconnected, taped and protected against short circuit.

(6) Military vehicles or military equipment as used in this section includes naval vehicles or naval equipment.

(e) **Flammable compressed gases.** (1) Military explosives shall not be stowed in the same hold nor in any hold below, any hold above or a hold adjacent to one in which flammable compressed gases are stowed.

(2) Flammable compressed gases shall not be stowed "On deck" over a hold in which any Class II-A, II-C, II-D, II-E, II-G, V, VI, VII, VIII, IX-A, IX-B, IX-C, X-A, X-B, X-C, X-D, XI-A, XI-B, or XI C is stowed.

(3) Flammable compressed gases may be stowed "On deck" over a hold in which Class I, II-B, II-F, II-J, III, or IV is stowed: *Provided*, That, the weather deck is tight and the cargo hatch is fitted with a tight raised coaming, and such stowage is accomplished by means of skids at least 6 inches in height off the deck or a crib and platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib. Other applicable provisions of §§ 146.24-1 to 146.24-100, inclusive, shall be observed. Stowage may be over the square of the hatch.

(f) **Non-flammable compressed gases.** Ammunition of the following Classes I, II-B, II-G, IV, V, and VII may be stowed in the same hold or compartment with non-flammable compressed gases provided the two stowages are separated by a type "A" dunnage floor or a division bulkhead. This mixed stowage is not permitted for the following non-flammable gases: Boron trifluoride, chlorine, oxygen and sulphur dioxide.

(g) **Poisons.** (1) **Class "A".** Classes I and II-F ammunition may be stowed in the same hold or compartment with Class "A" poisons provided the two stowages are separated by a type "A" dunnage floor or a division bulkhead.

(2) **Class "B".** Ammunition of the following classes, I, II-B, II-F, IV, V, VII, XI-A and XI-B may be stowed in the same hold or compartment with class "B" poisons: *Provided*, That the two stowages are separated by a type "A" dunnage floor or a division bulkhead.

(3) **Irritating materials.** Ammunition of the following classes I, II-B, II-F, II-G, IV, V, VII, XI-A, and XI-B may be stowed in the same hold or compartment with irritating materials: *Provided*, That the two stowages are separated by a type "A" dunnage floor or a division bulkhead. Class II-A, propellant charges, may also be stowed in the same hold with irritating materials: *Provided*, That the two stowages are separated by a type "A" dunnage floor or a division bulkhead: *And provided further*, That the Class II-A, propellant charges, ammunition is given top stowage.

(h) **Other regulated materials (ORM).** Military explosives shall not be stowed in the same hold or in the hold below, the hold above or a hold adjacent to one in which other regulated materials (ORM) are stowed.

(i) **Radioactive materials.** Military explosives may not be stowed in the same hold in which radioactive materials are stowed.

(j) **Combustible liquids.** (1) Military explosives shall not be stowed in the same hold nor in the hold below one in which combustible liquids are stowed.

(2) Combustible liquids may be stowed "On deck" over a hold in which military explosives are stowed: *Provided*, That the weather deck is

tight and the cargo hatch is fitted with a tight raised coaming and such stowage is accomplished by means of a crib and a platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur. *And provided further,* That such stowage is not made over the square of a hatch.

(h) "On deck" stowage. When packages of flammable liquids, flammable solids, oxidizing materials, or organic peroxides, corrosive materials, compressed gases, poisons, radioactive materials, combustible liquids, or other regulated materials (ORM) are stowed "On deck," such packages shall not be stowed within 12 inches of any steam pipe fitted on deck.

§ 146.29-61 Stowage with nondangerous cargo in the same hold. (a) Military explosives that are stowed in the same hold with nondangerous cargo shall be protected from damage likely to be caused by heavy nondangerous cargo. Shafting, steel bar, steel shapes, pipe, heavy machinery, vehicles (uncrated), and similar types of cargo shall, when stowed in the same hold with military explosives, be so isolated or dunnaged or secured as to prevent damage to military explosives or magazines containing said substances, or temporary bulkheads protecting explosive stowages, under any conditions likely to be encountered during the voyage.

(b) When nondangerous cargo is to be stowed adjacent of the exterior of a magazine, wooden cargo battens of not less than commercial 2" x 4" size spaced not more than 12 inches, center to center, shall be fitted horizontally to the uprights forming the frame of the magazine.

§ 146.29-63 Stowage and dunnaging of ammunition and containers of explosives in bulk. (a) Military explosives shall be so stowed and dunnaged as to prevent damage to the cargo or the vessel from shifting cargo caused by forces incident to the voyage of the vessel. Nothing within this paragraph shall be construed as requiring the entire interior of the cargo compartment to be covered with dunnage.

(b) Containers of military explosives marked, "This side up" or otherwise marked directing their stowage shall be so stowed.

(c) Kegs of black powder shall be stowed in an upright position, the bungs or other filling openings "up". Each tier shall be floored off.

(d) Metal containers or metal tanks or other containers of propellant charges having closure means which protrude beyond the chime or the surface of the container shall be so dunnaged as to prevent damage occurring to such closures.

(e) The uppermost tier of military explosives shall be so secured to the mutual satisfaction of the Captain of the Port and the Master of the vessel by tomming, bracing, strapping, top stowing with permissible cargo of sufficient unit weight and quantity or other effective means that no displacement can occur either upwardly or laterally.

(f) Military explosives shall be so stowed that they or the containers are not liable to be pierced by the dunnaging or crushed by superimposed weight.

(g) Containers of military explosives shall not be "cant" stowed. They shall be stowed in full bearing on dunnage or both end and center bearing on dunnage. Broken stowage may at the turn of the bilge, be dunnaged out with cordwood or otherwise so cribbed as to provide maximum bearing attainable for the container to be stowed in the tier above. Broken stowage in other locations in the hold may be compensated for by cribbing out or by the insertion of sufficient dunnage to provide proper bearing for packages in the tier above.

(h) Fixed or semifixed ammunition in fiber containers, crated or uncrated, may be stowed on its base or on its side. Dunnaging shall be accomplished in such manner as to bear only upon the metal part of the container. No dunnage or weight shall bear directly upon the fiber portion of the container.

(i) [Reserved]

(j) Separate-loading projectiles boxed, crated, unboxed, or uncrated may be stowed on their bases or on their sides except as otherwise provided for Army WP filled ammunition in the stowage requirements for Class II-D ammunition, § 146.29-100.

(k) When tween-deck holds of cargo vessels are utilized for the stowage of military explosives, the maximum permissible deck load for such tween decks shall not be in excess of 45 pounds per square foot of tween-deck space for each foot of tween-deck height, except where the deck and hatch structure of ships have been specially designed or reinforced for the carriage of heavy loads the Captain of the Port may permit loading in accordance with these schedules of increased intensity of loading when they are furnished by the master or operator.

§ 146.29-65 Damaged or leaking containers of explosives. (a) Any container of explosives or chemical warfare agents showing evidence of failure, leaking of a liquid ingredient or inability to retain its contents shall not be accepted for transportation, storage, or stowage on board any vessel.

(b) Any container of an explosive when offered for transportation, storage, or stowage, showing excessive dampness or which is moldy or shows outward signs of any oil stain or other indications that absorption of the liquid part of the explosive is not perfect, or that the amount of the liquid part of the explosive is greater than the absorbent can carry, shall not be accepted for transportation. The shipper must substantiate any claim that a stain is due to accidental contact with grease, oil, or similar substances. In case of doubt the container shall be refused.

§ 146.29-67 Defective ammunition. Ammunition found to be defective while being unloaded from a barge, freight car, or other vehicle, shall not be placed on board a vessel. If found to be defective while on board the vessel, it shall, if at all possible, be removed from the vessel to an isolated location as quickly as possible.

§ 146.29-69 Recoopering damaged packages. Defective packages shall not be recoopered in the hold of a vessel. Such packages shall not be recoopered elsewhere on board the vessel except upon conditions authorized by the Captain of the Port. Replacing bomb shipping bands, loose covers, nose plugs or strapping containers is not classed as recoopering.

§ 146.29-71 Constructing magazines. (a) All work in connection with the construction of a magazine, or other conditioning of holds, decks, or hatches shall be completed before the actual loading of military explosives is undertaken except as provided in §§ 146.29-35(e) and 146.29-81(b). Magazine construction or other conditioning of a hold in which military explosives are not actually being loaded or which do not contain any military explosives is permitted.

(b) Sizes of material used for the construction of a magazine or other conditioning of holds, decks, or hatches, as set forth in the regulations in this subpart, are minimum. Increased sizes may be used, if desired. Nails shall not protrude beyond the surface of the lumber or other material authorized.

§ 146.29-73 Preparation of magazines, decks, hatches and holds for handling military explosives. (a) All magazines and holds shall be cleared of all rubbish and discarded dunnage and be swept, hosed down or cleaned by such other efficient method that will insure the compartment to be broom clean and free of any residue from cargo before commencing to load any military explosives. Bilges, overhead deckbeams and strongbacks shall be examined and any residue of previous cargo removed therefrom.

(b) All decks, gangways, and hatches over or through which military explosives must be passed or handled in loading or unloading shall be freed of all loose material and shall be swept broom clean both before and after loading or unloading.

(c) The hatches or cargo ports opening into a compartment in which military explosives are stowed shall be kept closed at all times except during the operation of loading or unloading of the compartments or during periods of short duration for such as lunchbreaks and railcar and truck switching or between shifts on a two- or three-shift daily operation. During the period of such stoppages the hold shall be protected as prescribed by the Captain of the Port. Hatches covered with wooden covers shall be securely closed with tarpaulins.

(d) No debris of any description which creates a fire hazard or a hazardous condition for persons engaged in the explosives handling operation shall be permitted to stand on the weather deck of a vessel while military explosives are being worked.

(e) (1) Hatch beams and hatch covers shall, where possible, be stowed on the opposite side of the hatch from that over which the military explosives are being worked. If this is impossible, they may be stowed on the working side of the hatch.

(2) Hatch beams shall be stowed or secured in a manner that will prevent them from rolling, rocking, turning or sliding.

(3) Hatch covers shall be so stowed as to form as level a platform as possible.

(f) During the time a hatch is open and military explosives are being worked or stowed, the vessel's officer on duty supervising the handling of explosives shall warn the masters of other vessels coming alongside and the operator of any dock equipment (capable of producing sparks) to stay clear of the area adjacent to open hatches as far as practicable.

§ 146.29-75 Location of magazines and ammunition stowage. (a) A cool location being an important factor, magazines shall be built and military explosives stowed in an authorized location in accordance with the following factors in the order listed. The Captain of the Port may authorize in his discretion a modification of the below established location priorities when circumstances so justify:

(1) A tween-deck hold, preferably a lower tween-deck.
(2) A lower hold.
(3) In the square of a hatch.
(4) A shelter deck in a location as far removed from uptakes or engine casing as possible.
(5) A forecastle, poop or permanent deck house provided the space is ventilated and does not contain any "in use" crew accommodations, nor vessel stores, and can be closed off from traffic while at sea.
(6) "On deck" stowage.
(7) Insulated spaces normally comprising refrigerator spaces may be used for the stowage of all classes of military explosives, except Class II-J chemical ammunition: *Provided,* That all regulations relative to stowage of explosives with other dangerous articles of cargo are observed and the spaces may be ventilated sufficiently to provide a temperature consistent with the temperature of other holds of the vessel. When such

For explanation of abbreviations and reference marks, see last page of this tariff.

spaces are fully ceiled, the entire compartment will be considered as a magazine, however, any pipes within the compartment shall be protected by horizontal cargo battens of a size not less than commercial 2" × 4", spaced not more than 12 inches apart, center to center and secured to 4" × 6" uprights spaced not more than 36 inches apart. Refrigerator spaces, the floors of which are lined with lead, shall not be used as a stowage for picric acid in bulk or ammonium picrate.

(b) When it is necessary to construct a magazine or to stow ammunition adjacent to the engine room, boiler room or coal bunker bulkheads, or the engine or boiler room uptakes or casings, the following provisions shall be complied with except in the stowage of small arms ammunition without explosive bullets:

(1) A tight wooden temporary bulkhead shall be constructed at least one foot off the permanent bulkheads, uptakes or casings with the smooth side facing the stowage of the explosives or ammunition.

(2) When the permanent bulkhead is smooth on the cargo side, construction shall be of commercial 2-inch boarding secured to uprights of 4" × 6" size spaced not more than 30 inches apart in the 'tween or shelter deck, or 6" × 6" size spaced not more than 24 inches apart in the lower hold. Uprights shall not be stepped directly onto a metal deck or overhead. A 2" × 6" bearer to carry the upright shall be laid on the metal deck, and a 2" × 6" header shall be fitted against the underside of the overhead deck to receive the top of uprights. Top of uprights fitted against overhead deck beams may be wedged direct to the beam with 2" × 4" spacers fitted between. Suitable horizontal stringers shall be fitted between temporary and permanent bulkhead at the top and bottom, as well as intermediate stringers spaced a maximum of 5 feet. Uprights shall be securely fastened to horizontal stringers or horizontally braced at the top, bottom and center.

(3) When the permanent bulkhead stiffeners are on the cargo side, suitable uprights of not less than 2" × 4" may be installed against the permanent vertical stiffeners to give the required 12 inches off the bulkhead. If the permanent stiffeners are over 30 inches apart, center to center, 2½-inch boarding shall be used. Uprights shall be stepped and braced as required by the provisions of subparagraph (2) of this paragraph. Bulkhead stiffeners that do not extend the full depth of the cargo space shall not be used for this purpose.

(4) Other methods of construction using steel or wooden uprights, bolted to plates or lugs welded to deck beams, decks, or tank tops may be used provided the strength is equivalent to that obtained by the foregoing methods of construction.

(c) Stowage provided for military explosives shall be dry and except for deep tanks well ventilated.

(d) Ammunition as cargo shall not be stowed within a distance of 10 feet of a vessel's radio shack, receiving or transmitting apparatus, radio antenna or antenna lead-in. The same restriction applies to radar equipment.

§ 146.29-77 Allocation of stowage. Military explosives that are tendered to a vessel for transportation as cargo shall be stowed on board the vessel utilizing the type of stowage authorized for the particular ammunition or explosives in bulk by the provisions of § 146.29-100.

§ 146.29-79 Types of stowage. The types of stowage prescribed for military explosives are described as follows:

(a) Magazine stowage A.
(b) Ammunition stowage.
(c) Chemical ammunition stowage.
(d) Special stowage.
(e) Portable magazine stowage.
(f) Pyrotechnic stowage.
(g) Stowage of blasting caps, detonators, primer detonators, etc.
(h) Deck box and van.

§ 146.29-81 Magazine Stowage A. The following shall be observed in the construction of a magazine required by the table in § 146.29-100 for "Magazine A" type of stowage:

(a) Magazines may be constructed of steel or wood.

(b) Magazines constructed of steel shall have the whole of the interior thoroughly protected by wood dunnage of a minimum thickness of ¾ inch. This lining may be installed during the progress of the stowage. Metal stanchions within the magazine shall be boxed with wood of a thickness of not less than ¾ inch. Boxing of portable non-ferrous dunnage system stanchions is not required. Bulkhead stiffeners or other structural members extending into the stowage spaces shall not be protected by dunnaging but shall be completely boarded over. When bare steel decks or tank tops are utilized to form the floor of a magazine, a wooden floor consisting of at least two layers of commercial 1-inch thick dunnaging shall be laid, the top course being laid crosswise to the lower course. When steel decks or tanks tops are originally fitted with a wood flooring or are ceiled, it shall be necessary to fit one course of dunnage. All flooring formed by these methods shall be laid with commercial 1-inch lumber of widths not less than 4 inches, fitted as close as possible, edge to edge and butt to butt.

(c) Magazines constructed of wood shall have the bulkheads forming the sides and ends constructed of commercial 1-inch lumber, of ¾-inch longue and groove sheathing, or of ¾-inch plywood, secured to uprights of at least a 3" × 4" size, spaced not more than 18 inches apart and secured at top, bottom and center with horizontal bracing. When ¾-inch plywood is used, the uprights may be spaced on 24-inch centers. Uprights shall not be stepped directly onto a metal deck. A 2" × 4" bearer to carry the uprights shall be laid upon the metal deck. A 2" × 4" header shall be fitted against the underside of an overhead deck to receive the top of uprights. Top of uprights fitted against channel beams may be wedged directly to the beam with 2" by 4" spacers fitted between. Care shall be taken in securing upright framing that no nails penetrate to the interior of the magazine. When a magazine is constructed as a permanent compartment in the vessel, increased size and finish of lumber and other methods of fastening may be used provided such fastenings are recessed below the surface of the boarding to avoid projections within the interior of the magazine. All boardings shall be fitted and finished so as to form a smooth surface within the interior of the magazine. Construction shall be such as to separate all containers of explosives from contact with metal surfaces of the structure of the vessel. When a metal stanchion, post or other obstruction is located within the interior area of the magazine, such obstruction must be completely covered with wood of a thickness of at least ¾ inch secured in place with nails or screws. When screws are used for fastening, the screwheads shall be countersunk below the surface of the wood. The floor of the magazine shall conform to the provisions of paragraph (b) of this section. The door of the magazine shall be of substantial construction, fitted reasonably tight into its jamb. The door may be secured in place by the use of extension battens and wedges.

(d) A magazine constructed in accordance with the provisions of paragraphs (b) and (c) of this section, in which it is proposed to stow containers of explosives within 12 inches of the overdeck beams, or hatch coaming, shall have such deck beams and coaming sheathed with wood similar to that required for metal stanchions, posts or other obstructions by the provisions of paragraph (c) of this section.

(e) When a Class A magazine measures more than 40 feet in any direction, a partition bulkhead shall be fitted within the magazine as near half length as practicable, extending from the deck to at least the top of the stowage. Such partition bulkhead shall be constructed to the same scantlings as the sides of the magazine, except the boardings may be spaced not more than 6 inches apart alternately on both sides of the uprights. This bulkhead shall be constructed before loading commences and care shall be exercised that nail points do not protrude beyond the surface of the boarding. Such partition bulkheads are not required in magazines using the U.S. Navy nonferrous metal dunnage system.

(f) A magazine constructed in accordance with the provisions of paragraphs (b) and (c) of this section shall comply with the provisions of § 146.29-75(c).

§ 146.29-83 Ammunition stowage. Military explosives that are authorized to be given ammunition stowage by the provisions of § 146.29-100 shall be stowed in a location selected in accordance with the provisions of § 146.29-75. Dunnage shall be laid over metal decks or tank tops, except that dunnage is not required when decks or tank tops are coated with mastic, magnesite, or other equivalent material, and when palletized units are used and the pallets are constructed of wood. Dunnaging shall be fitted to protect packages or articles or military explosives from damage. Nothing within this paragraph shall be construed as requiring the entire interior of the cargo compartment to be covered with dunnage.

§ 146.29-85 Chemical ammunition stowage. Chemical ammunition or chemical agents in bulk that are authorized to be given chemical ammunition stowage by the provisions of § 146.29-100 shall, unless given another authorized stowage, be stowed under the following conditions:

(a) Shall be afforded the same protection as required for ammunition stowage.

(b) Stowage shall preferably be in a deep tank or a lower hold.

(c) When stowed in a deep tank, pump suctions shall be effectively sealed off to prevent the escape of any leakage which may take place. Sealing off shall be accomplished by inserting a blank flange in way of the suction side of the bilge pump manifold.

Note: The blank flange is to prevent inadvertent leaking of chemical agents into occupied spaces through bilge suction piping. Nothing herein shall preclude the removal of the flange in an emergency situation should (in the opinion of the vessel's master) pumping of the deep tank be necessary.

(d) When stowed in a lower hold or other compartment, the hatch covers, ventilators and pump's suction shall be effectively sealed off to prevent the escape of any leakage which may take place. Sealing off the pump's suction shall be accomplished by inserting a blank flange in way of the suction side of the bilge pump manifold.

(e) When the quantity of chemical ammunition or chemical agents in bulk exceeds the capacity of deep tanks and lower holds, other holds may be used, preference being given to other lower holds or to a 'tween-deck hold directly over a lower hold in which such substances are stowed.

(f) Chemical ammunition or containers of chemical agents in bulk stowed in a 'tween-deck shall not be stowed within 8 feet of the side of the vessel.

(g) When the quantity of chemical ammunition to be stowed on board the vessel does not justify the use of a deep tank or lower hold, a suitable tween-deck space may be selected and the ammunition stowed in a portable magazine especially constructed to prevent any leakage from the ammunition escaping outside of the magazine. Such portable magazine shall be located at least 8 feet from the ship's side.

(h) Before entering a deep tank, lower hold or other compartment containing chemical ammunition the air inside the compartment must be tested by competent personnel to ascertain if leakage has taken place. If leakage has occurred, the operation of removing the ammunition or chemical agent shall be conducted by skilled personnel, preferably representatives of the appropriate Department of Defense technical service.

§ 146.29-87 Special stowage. Special stowage may be on deck protected from the elements, in a deck house, mast house, mast locker or in a vacant stateroom: *Provided*, That such a location conforms to the distance separation rule applicable to the item so stowed and adjacent military ammunition: *And provided further*, That the space is ventilated and does not contain any vessel stores or machinery or equipment used during the navigation of the vessel and can be closed off from traffic while at sea. Dunnage shall be fitted to protect packages from damage by contacting any metal parts of the ship.

§ 146.29-89 Portable magazine stowage. Military explosives authorized to be given portable magazine stowage by the provisions of § 146.29-100 shall be stowed under the following conditions:

(a) Shall be located in a hold or on deck in accordance with the provisions of § 146.29-99 and § 146.29-100 for the particular class of military explosive stowed therein. "On deck" stowage shall also meet the requirements of § 146.29-57.

(b) Portable magazines shall be constructed of wood, or of metal lined with wood ¾-inch minimum thickness, and not more than 100 cubic feet plus 10 percent of explosives (gross) shall be stowed therein.

(c) All inner surfaces of the magazine shall be smooth and free of nails, screws, or other projections.

(d) When constructed of wood the scantlings shall not be less than those required for a type "A" magazine in § 146.29-79, and a strong, close fitting hinged cover or door with an effective means of securing shall be provided.

(e) When constructed of metal, the minimum thickness of the metal shall be not less than ⅛-inch sheet, or formed material.

(f) Ammunition or containers of ammunition or explosives in bulk when stowed in a portable magazine shall be so stowed and secured that no displacement can occur either upwardly or laterally.

(g) When stowed on deck the magazine shall be protected from the direct rays of the sun and elements. Runners, bearers, skids, or other suitable means shall be provided to elevate it a minimum of 4 inches from the deck. Pad eyes, ring bolts, or other suitable means shall be provided for lashing the magazines and they shall be so lashed, chocked or braced as to prevent movement in any direction.

(h) Portable magazines shall carry the legend "Inflammable—Keep Lights and Fire Away," or "Flammable—Keep Lights and Fire Away." When used in lieu of ammunition stowage, the legend shall indicate the Coast Guard class or classes of military explosives stowed therein.

§ 146.29-90 Use of cargo transporters (Conex Boxes). Cargo transporters, complying with Military Specifications MIL-B-11886 and MIL-B-21560, may be used for the transportation of military explosives and hazardous munitions subject to the following conditions:

(a) Type I or Type II transporters may be used.

(b) The load content shall not exceed 7800 pounds, equally distributed.

(c) Prior to filling, each transporter is required to be thoroughly inspected by an authorized representative of the shipping activity. Special attention shall be given to the inspection of the corner posts, floor system, and lower eight inches of the side and end panels, doors, and door latches. A record of this inspection shall be maintained by the shipping installation for a period of one year after the shipment leaves the installation or activity.

(d) Lifting shall be accomplished in a manner which will support the floor system. When slings or wire ropes are used, they shall be placed under the container to support the floor system.

(e) The cargo handling gear must be of a design capable of handling a working load at least 50 percent greater than the actual weight of the unit comprising the draft.

(f) The master, owner, charterer, agent or other person in charge of the vessel shall require the shipper or his agent, or the delivering carrier to furnish a copy of the shipper's shipping order, shipping paper, bill of lading, manifest or other memorandum, or a waybill prepared from information furnished in the shipper's shipping order bearing the required certification before accepting cargo transporters containing military explosives or hazardous munitions. This shipping paper shall have entered upon it the proper and definite name and class of the commodity or commodities contained therein according to § 146.29-100, the total quantity by weight, the label applied, if required, and the identification number of the transporter.

(g) Cargo transporters shall carry the legend "Explosives—Keep Lights and Fire Away", or if hazardous munitions are being shipped "Hazardous Munitions—Keep Lights and Fire Away" as well as the Coast Guard class or classes of military explosives or hazardous munitions stowed therein, e.g., "Coast Guard Class II-H." Letters shall be at least three inches high in contrasting color with the background.

(h) The master or other person in charge of the vessel shall assign an officer of the vessel to supervise the acceptance and stowage of the transporters containing military explosives or hazardous munitions. This officer shall examine the transporters for signs of leaking, damage to the containers, or sifting of contents. Any transporter found to be damaged, leaking or sifting shall not be accepted for transportation.

(i) Cargo transporters containing any military explosives or hazardous munitions may be opened by a duly authorized representative of the Coast Guard for inspection to determine compliance with the regulations applicable to such shipments.

§ 146.29-91 Pyrotechnic stowage. (a) Pyrotechnic ammunition shall be afforded ammunition stowage or special stowage in a location away from heat and so protected as to insure no moisture contacting the packages. This class of ammunition shall not be stowed in a hold or compartment with any other military explosives, except as permitted by the admixture charts (§ 146.29-99). Pyrotechnics shall not be overstowed with other cargo.

(b) For limited quantities of pyrotechnic ammunition an alternate stowage may be utilized consisting of stowing in metal lockers or portable magazines so located as to conform with the provisions of paragraph (a) of this section as regards other explosives, over-stowage, heat, and moisture.

§ 146.29-93 Stowage of blasting caps, detonators, primer detonators, etc. Stowage of Classes III, VI and VIII type ammunition shall conform to the provisions of §§ 146.29-99 and 146.29-100, and to the following requirements:

(a) Class VIII ammunition, when stowed on board the same vessel with Classes II, IV, V, or VII military explosives, shall be separated as follows:

(1) With a permanent steel deck or bulkhead intervening, the separation shall not be less than 10 feet in any direction except where there exist additional intervening permanent steel decks or bulkheads in which case the distance requirement may be reduced by 50 percent.

(2) Without a permanent steel deck or bulkhead intervening, the separation shall not be less than 25 feet in any direction.

(b) Class VIII ammunition, when stowed on board the same vessel with Classes IX, X, or XI military explosives, shall be separated as follows:

(1) With a permanent steel deck or bulkhead intervening, the separation shall not be less than 25 feet in any direction except where there are existing additional intervening permanent steel decks or bulkheads, in which case the distance requirement may be reduced by 50 percent.

(2) Without a permanent steel deck or bulkhead intervening, the separation shall be not less than 40 feet in any direction.

(c) Class VIII ammunition shall not be stowed within 8 feet of the vessel's side, except blasting caps stowed in a portable magazine "On deck" need not meet this requirement.

(d) When Class VIII ammunition is stowed over tween-deck hatch covers, and military explosives are stowed in a hold below, a single layer of commercial 2-inch lumber is required over the tween-deck hatch cover to form the floor of the magazine. Under these conditions, wooden hatch covers may be considered an integral part of the permanent steel deck and the separation requirements of paragraphs (a)(1) and (b)(1) of this section shall apply.

(e) When Class III or VI ammunition is stowed with Class VIII ammunition the provisions governing the stowage and separations of Class VIII shall apply.

(f) When a portable magazine is used for detonator stowage, such magazine may be stowed in the square of a weather deck hatch.

(g) Upon approval by the Captain of the Port, a portable magazine containing Class VIII ammunition may be stowed in an isolated cabin or steel deck house secure from aircraft machine-gun fire and not subject to casual contact by persons on board the vessel.

§ 146.29-95 Ventilation of magazine. A magazine that is not fitted with ventilating ducts to the atmosphere shall be ventilated by omitting the top course of boarding on the sides of the magazine to provide a clear space at least 1 inch and not more than 6 inches below the lower flange or toe of the deck beam within the compartment or hold in which the magazine is constructed. Ventilators of systems feeding directly into a magazine or a hold in which military explosives are stowed shall be covered with a layer of wire screen of not less than ¼-inch mesh at the weather end of the coat. This screen shall be attached securely in place in such a manner as to insure a positive closure.

§ 146.29-97 Statements of characteristic properties and hazards. (a) In § 146.29-100 there are statements in italics setting forth certain characteristics and hazards of the substances or articles listed therein. It is not intended, nor shall it be assumed, that these statements set forth all of the characteristic properties or hazards of the particular

substance or article and such statements as are shown are informative only.

(b) For the purpose of the regulations in this subpart Army Class XII explosives are treated as follows:

(1) Ammonium nitrate is classified as an oxidizing material.

(2) Wet nitrocellulose wet with 20 percent of water is classified as a flammable solid.

(3) Wet nitrocellulose wet with 30 percent of alcohol or flammable solvent is classified as a flammable liquid.

§ 146.29-99 Explosives admixture charts. (a) Chart A of this section indicates the compatibility of the various classes of ammunition described in § 146.29-100. Chart B of this section indicates the compatibility within the class of items of Classes XI–C and XI–D.

(b) A shaded block at an intersection of horizontal and vertical columns in Chart A indicates that the particular class of military explosives shown by the heading of the horizontal column to the left must NOT be stowed in the same hold or compartment with the particular class of military explosives indicated by the heading of the vertical column at the top of the chart. A shaded block at the intersection of horizontal and vertical columns in Chart B indicates that that particular item shown by the heading of the horizontal column to the left must NOT be stowed "On deck" together unless separated by the superstructure, or in the same hold or compartment with the item indicated by the heading of the vertical column at the top of the chart. For specific provisions of stowage, and items included in each class, refer to § 146.29-100.

(c) In the charts the letters refer to the following notes:

Note A: Class II-F may be stowed in the same lower hold or tween-deck hold with Classes II-C, II-E, II-G, and III provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosive or ammunition is stowed in the hold or tank below.

Note B: Class II-F may be stowed in the same deep tank, lower hold or tween-deck hold with Classes II-B, IV, V, VII: *Provided*, That the Class II-F ammunition is bottom stowed: *And provided further*, That no other class of explosives or ammunition is stowed in the hold or tank below.

Note C: Propellant charges Class II-A for separate loading artillery projectile filled with Class XI-A or XI-B chemical may be stowed together in the same hold or compartment: *Provided*, That the propellant charges are "top stowed," the two items being separated by a type "A" dunnage floor. When so stowed the propellant charges shall not be overstowed with any other cargo.

Note D: Class II-J TH incendiary filled ammunition shall be stowed only in a deep tank or lower hold, and in all cases, bottom stowed, except that a limited quantity shipment not in excess of 500 lbs. net TH content may be stowed on deck in a special magazine constructed of material as set forth in § 146.29-81(c) and provided such magazine has an insulation of sand at least 1 foot thick on the bottom. This magazine shall be so mounted that there is at least 1 foot void between its bottom and the deck on which it is mounted, and its preferred location is aft. There shall be one charged fire hose in the immediate vicinity of this magazine when this class ammunition is stowed therein. There shall be only one such stowage per vessel and that stowage shall not be over living quarters or hatches in which military explosives, other dangerous articles, or ship's stores are stowed below.

Note E: Class I, V (unfuzed and no fuzes packed in container), VII (unfuzed and no fuzes packed in container), and IX-B may be stowed with Class X-A if the two classes are separated by a partition bulkhead or type "A" dunnage floor.

Note F: See Chart B for compatibility of items within this class.

Note G: May be stowed together if separate stowage is not available.

Note H: May be stowed together if the two classes are separated by a partition bulkhead on or a type "A" dunnage floor.

Note I: [Reserved]

Note J: Classes III and VI may not be overstowed with any other type of cargo or ammunition except classes III, VI and VIII. Class VIII may not be overstowed with any other type of cargo.

Note K: Class IX–C must be stowed in a separate magazine if stowed in the same hold with Class I.

Chart A—Compatibility Chart for Various Classes of Military Explosives and Hazardous Munitions

Legend: *Refer to different DOT classes: F.L., F.G., Cot. L., Oxy. M., etc. ● Shall NOT be stowed together. □ May be stowed together. A, B, C, D, E, F, G, H, J, and K—Check notes in § 146.29-99 for proper stowage

DOT class		Class	I	V-VII	II-B	II-C	II-D	II-E	II-F	II-G	II-H	II-J	III	IV	V	VI	VII	VIII	IX-A	IX-B	IX-C	X-A	X-B	X-C	X-D	X-E	XI-A	XI-B	XI-C	XI-D	Class
C	Small-arms ammunition w/o explosive bullets, mechanical time fuze and like items	I	□	H	□	□	□	□	□	●	D	J	□	□	J	□	J	H	H	K	E	H	○	○	●	□	□	●	●	I
B	Bulk propellants, such as ballistite, cordite, FNH, NH, and NC powder, "Made-up bag charges" in outside shipping containers	II-A	H	□	□	○	○	○	○	○	○	○	□	□	○	□	○	□	○	○	○	○	○	●	○	○	C	C	○	●	II-A
B	Fired ammunition w/o explosive projectiles and like items	II-B	□	□	□	□	○	B	○	○	D	J	□	□	J	□	○	□	○	○	○	H	○	○	○	○	□	○	○	●	II-B
B or C	Pyrotechnics (fireworks)	II-C	□	●	□	□	○	A	○	○	D	J	□	□	○	□	○	□	○	○	○	○	○	○	○	○	○	○	○	●	II-C
*Var.	Chemical ammunition—WP or PWP filled (solid)	II-D	□	●	●	○	□	□	□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	II-D
*Var.	Chemical ammunition—HC filled (solid)	II-E	□	●	□	□	□	□	A	□	○	○	J	○	○	○	○	○	○	○	○	○	○	●	○	○	□	□	○	●	II-E
*Var.	Chemical ammunition—FS or FM filled smoke (liquid)	II-F	□	●	B	A	○	A	□	A	○	○	A	B	B	○	B	○	○	○	○	○	○	●	○	○	□	□	○	●	II-F
*Var.	Chemical ammunition—IM, NP, or PT filled, incendiary composition (oil gel)	II-G	□	●	○	○	●	□	A	□	○	D	○	○	○	○	○	○	○	○	○	○	○	●	○	○	□	□	○	●	II-G
None	Chemical ammunition—water activated	II-H	●	C	●	○	○	●	●	○	□	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	●	II-H
*Var.	Chemical ammunition—TH filled incendiary composition (solid)	II-J	D	○	D	D	○	●	○	D	○	□	○	D	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	●	II-J
B or C	Fuzes, PD w/o booster; fuzes AT mine (nonchemical) w/o booster; fuzes, bomb tail w/o booster; fuzes, tracer; primers; primer detonators, etc	III	J	○	J	○	●	J	A	●	○	○	□	J	J	□	○	J	●	○	○	●	○	●	○	●	○	●	●	●	●	III
A	Fired and semifired ammunition with explosive loaded projectile	IV	□	□	□	○	○	●	B	○	●	D	J	□	□	J	□	○	○	○	○	●	○	H	●	○	□	□	●	●	IV
A	Separate loading projectiles filled with explosive "D"	V	□	□	□	○	○	●	B	○	○	○	J	□	□	J	□	○	○	○	○	E	●	●	○	○	□	□	●	●	V
A	BD fuzes; PD fuzes with booster; bomb fuzes with booster; rocket fuzes with booster; and like items	VI	J	○	J	○	○	○	○	○	○	○	□	J	J	□	○	J	○	○	○	○	○	●	○	○	○	○	○	●	VI
A	Separate loading proj. filled with HE other than explosive "D"	VII	□	□	□	○	○	○	B	○	○	○	○	□	□	○	□	○	○	○	○	E	○	H	●	○	□	□	●	●	VII
A or C	Blasting caps; detonators; AT mine fuzes (chemical); etc	VIII	J	C	○	○	○	○	○	○	○	○	J	○	○	J	○	□	○	○	○	○	○	●	○	○	○	○	○	●	VIII
A or B	Explosives in bulk, such as black powder, propellant explosives for small arms, etc	IX-A	H	□	□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	IX-A
A	High explosives, such as dynamite, TNT, demolition blocks, etc	IX-B	H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	IX-B
A	Initiating and priming explosives in bulk	IX-C	K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	IX-C
A	Explosive bombs, mines, torpedoes, etc	X-A	E	○	○	○	○	○	○	○	○	○	●	○	○	E	○	○	E	○	○	○	○	○	○	○	○	○	○	●	X-A
A	Explosive bombs, mines, etc. packed with fuze in integral package	X-B	H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	X-B
A	Guided missiles with solid propellant motors, w, w/o HE warhead	X-C	○	○	H	○	○	○	○	○	○	○	○	H	○	○	H	○	○	○	○	○	○	□	○	○	○	○	○	●	X-C
A	Guided missiles with liquid petroleum fueled propellant motors, HE warhead	X-D	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	□	○	○	○	○	●	X-D
B	Rocket engines liquid	X-E	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	□	○	○	○	●	X-E
A or Pois. A	Chemical ammunition—lethal	XI-A	□	C	●	●	○	○	□	○	○	●	●	○	○	●	○	●	●	○	○	●	○	●	○	○	□	□	●	●	XI-A
A or Irr. Matls	Chemical ammunition—nonlethal	XI-B	□	C	□	○	●	●	□	□	○	●	●	●	□	□	●	□	○	●	○	●	○	●	○	●	□	□	●	●	XI-B
*Var.	Fuels in containers for missile and rocket engines	XI-C	●	●	●	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	○	F	●	XI-C
*Var.	Oxidizers in containers for missile and rocket engines	XI-D	●	●	●	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	○	F	●	XI-D

Chart B—Compatibility Chart For Various Items Within Class XI-C and Class XI-D

Legend: ●● Shall NOT be stowed together □□ May be stowed together 0 Check note for proper stowage

	Nomenclature	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
a	Acids; i. e., nitric sulfuric; fuming red nitric; fuming white nitric; etc.	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	a
b	Liquid hydrogen	●●	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	b
c	Liquid fluorine	●●	●●	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	c
d	Liquid oxygen	●●	●●	●●	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	d
e	Liquid nitrogen tetroxide	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	e
f	Anhydrous ammonia	●●	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	f
g	Diborane; pentaborane	●●	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	g
h	Aluminum borohydrides	●●	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	h
i	Diethylene glycol dinitrate, liquid	●●	●●	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	i
j	Nitroglycerine, liquid	●●	●●	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	j
k	Hydrogen peroxide	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	k
l	Hydrazine; hydrazine hydrate	●●	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	l
m	Dimethyl hydrazine, unsymmetrical	●●	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	□□	□□	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	m
n	Alcohol-ethyl, methyl, furfuryl	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	0	0	□□	0	0	0	0	0	0	0	0	0	0	n
o	Gasoline (AVGAS)	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	□□	□□	0	0	0	0	0	0	0	0	0	0	0	o
p	Heptane; kerosene; octane	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	□□	□□	□□	0	0	0	0	0	0	0	0	0	0	0	p
q	Pentane	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	0	0	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	q
r	Aniline	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	0	0	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	r
s	Monoethylaniline	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	0	0	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	□□	s
t	Nitromethane, tetranitromethane	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	●●	●●	●●	●●	●●	●●	●●	t
u	Diethylene triamine	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	0	0	□□	□□	□□	□□	□□	●●	●●	●●	●●	●●	●●	u
v	Acetonitrile (methyl cyanide)	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	0	0	0	0	□□	□□	□□	□□	□□	●●	●●	●●	●●	●●	●●	v
w	Potassium cuprocyanide	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	●●	●●	●●	w
x	Sodium permanganate, solid	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	●●	●●	x
y	Calcium permanganate, solid	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	●●	y
z	Lithium, metallic	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	z
aa	Metals, powdered	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	□□	aa
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	

§146.29-100 Classification, handling and stowage chart.

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
1						
Small arms ammunition w/o explosive bullets, detonating fuzes, DOT Class C; mechanical time fuze and its items.	Small arms ammunition is a variety of fixed ammunition and includes blank ammunition and shotgun shells designed to be fired from a pistol, revolver, rifle, shotgun, or similar weapon held by the hand, or by the hand and shoulder, or machine guns of caliber less than 0.75 in. (19.05mm), or blank remover cartridges for pilot seat ejectors and canopy removing catapults, and consists of a metallic, plastic composition or paper cartridge case, a primer and a propelling charge, with or without bullet, shot, tear gas material, tracer components or incendiary ouchi stors or mixtures, but not including bullets loaded with high explosives. (For small arms ammunition with explosive bullets or projectiles see Class IV) Other items of ammunition or component parts of ammunition having similar hazard characteristics to small arms ammunition are also included in this class. Includes but is not limited to: Cartridges (small arms type, less than 0.75 inch or 19.05mm): Aircraft engine starter. Armor piercing. Armor piercing incendiary. Armor piercing incendiary tracer. Ball. Blank. Carbine. Catapult, aircraft ejection seat. Exactor. High pressure test. Ignition. Impulse charges, DOT Class C. Incendiary. Initiator. Powder actuated tool, shipped separately. Remover, aircraft canopy. Rifle grenade. Slick mortar (MK1). Tear gas. Thruster. Tracer. Catapult w/cartridge: Aircraft ejection seat. Chemical delay pencil. Detonating cord. Detonating fuzes, DOT Class C. Empty cartridge case, primed. Firing device w/o detonator. Fuse, blasting cap. Grenade projection adapter and similar inert devices when packed with blank small arms cartridge. Grenades, empty primed. Igniter, torpedo. Mechanical time fuze. Miniature practice bomb signal. Powder actuated tool w/cartridge packed in the same outside box. Primer, lock combination. Primer, lock electric. Primer, small-arms. Primers, percussion cap (such as used in small-arms ammunition). Remover w/cartridge, aircraft canopy, M1. Shell, shotgun. Small arms ammunition w/o explosive bullets. Time cutter (MK2). Note: The U.S. Army and Navy definitions of small-arms is based on tactical considerations. The Coast Guard definition shall take precedence in all cases involving transportation, handling, and stowage as cargo or board merchant vessels which are subject to the regulations in this part. This Coast Guard class does not require a permit. See §146.29-13 and §146.29-15.	"Cannon primers"	C	The principal hazard in connection with the stowage of this class of ammunition is its involvement in fire from outside source. Under such conditions the presence of this type of ammunition will not contribute excessively to the fire. Fire may be controlled and extinguished by flooding or spraying with large amounts of water. Missiles from burning ammunition will not be projected with any considerable velocity. Fire fighting personnel should take normal precautions and not expose themselves unnecessarily.	Any compartment or hold. May be stowed in any hold above, any hold below, or a hold adjacent to one in which flammable liquids, flammable solids or oxidizing materials, flammable compressed gases, hazardous articles or combustible liquids are stowed. Provisions of §146.29-59 (Stowage adjacent to other dangerous articles) shall be complied with unless specifically exempted by the above paragraph. May be overstowed. May be transported in vans stowed on deck. Small arms ammunition w/o explosive bullets may be stowed adjacent to heat bulkheads without the additional requirements stipulated by §146.29-75(c). When Class II-A, IX-A, IX-B, X-A, or XI-B ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III, VI, and VIII ammunition may not be overstowed with this class. See §146.29-99(c), Note D for stowage with Class II-J.	1. Observe marking on package to be certain that no small arms ammunition with explosive bullets is included. 2. Do not subject packages to rough handling. 3. Maximum weight per draft shall not exceed 3,000 lbs plus 10%. 4. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 5. Lifts of palletized units shall not be bend except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 6. The limiting weights noted above are for a 5-ton boom. See §146.29-41.
	"Combustion primers"	C				
	"Cordeau detonant"	C				
	"Empty cartridge case, primed"	C				
	"Explosive cable cutters"	C				
	"Explosive rivets"	C				
	"Fuse lighters"	C				
	"Grenades, empty, primed"	C				
	"Igniter"	C				
	"Percussion caps"	C				
	"Percussion fuze"	C				
	"Safety fuse"	C				
	"Small arms ammunition"	C				
	"Small arms ammunition, tear gas cartridge"	C				
	"Small arms primers"	C				
	"Time fuze (mechanical w/o booster)"	C				

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
E A						
Bulk propellants such as: Ballistite, Cordite, FNH, NH, and NC powders; propellant charges, "Made-up bag charges" in outside shipping containers.	Propellant explosives for cannon in bulk. Rocket propellants in bulk. Propellant charges (made up charges) in cloth powder bags with igniter attached and with or without its primer and packed in outside metal or fiber pack containers. Includes but is not limited to: Ballistite (bulk) for any purpose in large grains, sheets, or masses. Cartridge starter, jet engine Charge, propelling for rod, earth blast driven. Cordite FNH powder. NC powder (SPD). NH powder (SPDN). Propellant charges for separate loading ammunition such as 6", 8", 12", 14", 16", 155mm, 240mm, 280mm. SPCA powder. SPCG powder.	"Propellant explosives, solid, Class A." "Propellant explosives, solid, Class B." "Starter cartridge, jet engine."	A B B	Loose powder may be ignited by spark, friction, or intense heat. Powder dust is especially hazardous. Burns rapidly with excessive heat. Burning powder in ships hold may explode, producing structural damage and missiles. If involved in a fire, immediately apply water freely and in quantity.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Shall not be overstowed with any other kind of cargo except bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. When Class I ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Propellant charges of this class, for separate loading artillery projectile, filled with Class 10-A or 10-B chemical may be stowed together in the same hold or compartment provided the propellant charges are "top stowed," the two items being separated by a type "A" dunnage floor. When so stowed, the propellant charges shall not be overstowed with any other cargo. For stowage adjacent to other dangerous articles see §146.29-59. Bulk propellants shall not be loaded at an ammunition loading pier. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 4. Observe packages or containers for evidence of rusting or inability to retain contents and reject any showing such signs. 5. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 6. Remove damaged container and residue of powder to a safe location. 7. Gravity roller conveyor shall not be used unless authorized by the Captain of the Port in ports of facilities under his jurisdiction. At other ports or facilities authority for such use may be granted by the Officer in Charge. 8. Cargo handling stevedore gear may be trays, skidboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 9. Cargo nets w/o trays, skidboards, pallets, or pieplates are not permitted. 10. The maximum permitted weight per draft when handled by pallet, skidboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be bersd except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5-ton boom. See §146.29-41.
E B						
Fixed ammunition without explosive projectile and like items.	Fixed ammunition with solid projectile, blind loaded projectile, empty projectile or without projectile—(the explosive components consisting of the primer and powder charges in a cartridge case); cartridge cases primed and containing powder charges; practice grenades; practice and target rockets. Includes but is not limited to: Ammunition for cannon: Blank. Blind loaded and plugged (BL & P). Blind loaded with tracer (BL & T). Empty projectile. Solid projectile. Without projectile. Ammunition, armor piercing, shot (w/o HE). Cartridge, 20 mm HPT, LPT, BLT, TP, BLP. Cartridges, blank, salubing. Cartridges, fixed and semifixed, with smoke projectiles (other than HC). Cartridges, impulse. Cartridges, semi fixed for Navy type guns: 5"/38, 5"/51, 5"/54, 6"/47. Cartridges, semi fixed 120mm (Army w/o projectile). Charges: Catapult (other than aircraft personnel). Jato (DOT Class B). Rocket—target. Rocket Motors (w/o rocket heads). Rocket, packed with but not assembled to inert rocket heads. Rocket, practice, assembled with inert head.	"Ammunition for cannon with empty projectile." "Ammunition for cannon with inert loaded projectile." "Ammunition for cannon with solid projectile." "Ammunition for cannon w/o projectile." "Jet thrust units (JATO) Class B." "Special fireworks."	B B B B B B	The principal hazard associated with this class of ammunition is its involvement in a fire. Pressures which would cause serious structural damage are not usually generated. If involved in a fire, it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Fire fighting personnel should take appropriate precautions and not expose themselves.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Boxed and crated ammunition may be overstowed with non-dangerous cargo and compatible explosives. Tanked ammunition may be overstowed with bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. May be stowed in the same deep tank, lower hold or tweendeck hold with Class II-F ammunition provided the Class II-F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or the tank below. May be stowed in the same deep tank or lower hold with Class II-J ammunition provided the Class II-J is bottom stowed. For stowage adjacent to other dangerous articles see §146.29-59. May be transported in vans stowed on deck. When Class X-C ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III and VI ammunition may not be overstowed with this class of ammunition.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Cargo handling stevedore gear may be trays, skidboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 4. Cargo nets without trays, skidboards, pallets or pieplates are not authorized. 5. The maximum permitted weight per draft when handled by pallet, skidboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 6. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 7. Lifts of palletized units shall not be bersd except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 8. The limiting weights noted above are for a 5-ton boom. See §146.29-41.

For explanation of abbreviations and reference marks, see last page of this tariff.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
II-D Chemical ammunition, WP or PWP filled (solid)	All chemical ammunition, including fixed, semi-fixed and separate loading, filled with WP or PWP (white phosphorus) when assembled or packed with or w/o their ignition elements, bursting charges, fuzes or propellants. WP or PWP shipped in bulk in drums, barrels, or other authorized shipping containers shall be classified as a flammable solid. WP or PWP when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including projectiles, bombs, and rocket heads, w/o ignition elements, bursting charges or fuzes), may be handled and stowed either as a flammable solid or as chemical ammunition Class II-D. Includes but is not limited to: Bombs, aircraft, WP or PWP filled British Calling Cards Fire leaves Grenades, hand, WP or PWP filled Grenades, rifle, WP or PWP filled Igniters, phosphorus filled Projectiles, WP or PWP filled packed w/ or w/o propellants Rockets Heads, WP or PWP filled Rockets, assembled w/ motors, WP or PWP filled The U.S. Army and Navy, when shipping ammunition filled with white phosphorus, mark such ammunition and the containers thereof with the word "smoke" and the symbol WP or PWP. The ammunition is also marked with one yellow band.	"Ammunition for cannon with explosive projectile." "Ammunition for cannon with smoke projectile." "Explosive bomb" "Explosive projectile." "Igniter" "Special fireworks" Shipping name of item when shipped as flammable solid	A A A A C B FS	The principal characteristic of white phosphorus is that of spontaneously igniting upon exposure to air, burning with an intensely hot flame, and giving off large volumes of white smoke. The fumes are highly discomforting. Burning phosphorus gives off phosphorus oxide which is toxic upon sustained exposure thereto. Phosphorus is intensely poisonous when taken internally. It becomes liquid at 111° F. Leakage which sometimes occurs, usually gives warning by smoke. Ammunition filled with fuzes and boosters, if involved in a fire will usually explode with moderate violence thus tending to spread the fire rapidly. Apply water freely and in quantity to control spread of fire. Steam or fog is also effective but less so than water. It is necessary to keep the loose WP or PWP completely covered with water to prevent reignition. Organic material contaminated with WP or PWP such as dunnage in the holds of vessels, must be removed and disposed of by burning. Otherwise after drying out, these substances are likely to reignite. Rockets, WP filled, assembled with motor and involved in a fire will present an additional hazard due to the propulsive nature of the rocket. Loose phosphorus in contact with skin tissue will adhere causing painful burns and continue to consume skin tissue until removed. A solution of copper sulphate is effective in counteracting this action. Use rubber protective gloves, boots, aprons, and gas masks to provide effective protection.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow in locations not subject to temperatures above 100° F. When shipments of Army ammunition cannot be so stowed the following shall be complied with. WP or PWP filled items of ammunition shall be stowed in a nose up position unless other requirements are specified by the Army. The position of the nose end of the item of ammunition is marked on the outside package or container. Drums or other authorized DOT or Army Materiel Command specification containers filled with WP or PWP may be stowed in the same hold or compartment with chemical ammunition Class II-D. For stowage adjacent to other dangerous articles see § 146.29-59. When given chemical ammunition stowage, see § 146.29-85 for additional requirements. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Observe packages or projectiles for leakage and reject any showing such signs. 5. Packages or containers shall be stowed in the position indicated by their marking. 6. Cargo handling stevedore gear may be trays, skidboards, pallets, or pieplates provided they are used with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skidboards, pallets, or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skidboard, tray or pieplate used with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be lifted except when using a sling so designed as to prevent the upper tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with WP or PWP. (See table Limiting Loads, Class X-A.) 12. Drums of WP or PWP shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
§ C						
Pyrotechics (fireworks)	Fireworks are all manufactured articles designed primarily for the purpose of producing visible or audible pyrotechnic effects by combustion or explosion. Includes but is not limited to: Blue lump Bomb, target identification Cartridge igniter, turbo jet engine Delay electric igniters Depth charge markers, day Destroyer, document, No 3 Firecrackers, except M30 Fire starter Fireworks - bombs Fireworks - projectile Flares of all types, such as Aircraft Airport Bombardment Float High altitude parachute Parachute Parachute trip Tow target Trip Flash cartridge 72 grains or under Flash reducer (non black powder) Flash sheets (Ild packing, DOT) Float lights Fuse igniters Fuse lighters Fusee, warning, railroad Grenade, hand or rifle, colored smoke (other than HC, WP or WPW filled) Igniters, M1 and M2 Illuminating grenades and projectiles Metal powders (Ild packing DOT) Photoflash bomb M122 Photographic flash powder (Ild packing DOT) Pull wire fuse lighter Pyrotechnic mixture, 72 grains or under Quick match Roman candles Salutes Separate loading smoke projectiles (other than HC, WP, WPW filled) when assembled with or without ejection charges and or fuze Signals Aircraft float light Day distress aircraft Distress hand smoke Double star Drift day (bronze powder, inert) Drift night (red phosphorous) Emergency identification, smoke, star submarine Ground cluster Ground high burst ranging Ground parachute smoke Ground parachute star Highway Pistol rocket, Comet shower, smoke star Single star Submarine float Simulator Boobytrap, flash, illuminating, whistling 72 grains or under Hand grenade, M116 Smoke pots w/o oil Squibs of all kinds Tear gas pot fuse Torpedo signalling, railway Tracers Very signal lights	"Common fireworks" "Electric squibs" "Fuse igniters" "Fuse lighters" "Igniter" "Railway fusee" "Railway torpedoes" "Safety squibs" "Special fireworks"	C C C C C C B C B	The principal hazard is involvement in a fire Some pyrotechnics may ignite spontaneously if exposed to moisture or high temperatures, but under these conditions most types tend to become less sensitive and more difficult to ignite Aircraft flares and high burst ranging ground signals involved in a fire may explode Most other types burn with intense heat and without serious explosion If involved in a fire immediately apply water freely and in quantity Steam or fog is also effective but less so than water Fire fighting personnel should work from behind barriers and not expose themselves unnecessarily	*AMMUNITION STOWAGE, DEEP TANK STOWAGE, PORTABLE MAGAZINE OR PYROTECHNIC LOCKER* Shall be stowed away from heat and in a dry location, protected against moisture contacting the stowage Shall not be overstowed with any other kind of cargo May be stowed in the same deep tank, lower hold or between-decks hold with III-F provided the Class II-F ammunition is bottom stowed and provided that no other class of explosives or ammunition is stowed in the hold below such stowage May be stowed in the same deep tank or lower hold as Class II-J provided the II-J ammunition is bottom stowed For stowage adjacent to other dangerous articles see § 146.29-59 May be transported in vans stowed on deck	1. Handle by hand or mechanical means 2. Do not drag, drop, tumble, walk or otherwise subject packages to shock 3. Do not load during excessive rainy weather, unless complete protection against moisture coming in contact with the package is provided 4. Do not use chute in loading or unloading 5. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized 6. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted 7. Packages or containers shall be stowed in the position indicated by their marking 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10% 9. Drafts consisting of one or more palletized units shall not exceed 8,000 lbs. plus 10% 10. Lifts of palletized units shall not be lifted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
II-E Chemical ammunition, HC filled (solid)	All chemical ammunition including fixed, semi-fixed and separate loading, filled with HC (Hexachloroethane, a smoke mixture) when assembled or packed w/ or w/o their ignition elements, bursting charges, ejection charges, fuzes or propellants. HC mixture shipped in bulk in drums, barrels or other authorized shipping containers shall be classified as an oxidizing material HC mixture when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers [including projectiles and bombs w/o ignition elements, bursting charges or fuzes] may be handled and stowed either as an oxidizing material or as chemical ammunition Class II E Includes but is not limited to Bombs, aircraft, smoke, HC filled Bombs, floating, smoke, HC filled Bombs, smoke identification, HC filled Float, smoke, HC filled Grenades, hand, HC filled Grenades, signal, HC filled Grenades, colored smoke, HC filled Pots, smoke, HC filled Projectiles, artillery, smoke, HC filled Projectiles, mortar, smoke, HC filled The U.S. Army and Navy, when shipping ammunition filled with HC smoke or colored smoke, mark such ammunition HC smoke or colored smoke and mark the ammunition with one yellow band	"Ammunition for cannon with smoke projectile." "Explosive bomb" "Explosive projectile." "Special fireworks" Shipping name of item when shipped as oxidizing material	A A A B Only M.	HC (hexachlorethane mixture) is subject to spontaneous ignition through the action of moisture on the HC mixture. Once started, the temperature rises quickly and may be sufficient to cause adjacent containers of HC to ignite. The reaction once started is self-supporting and requires no oxygen. Water can be applied freely to prevent spread of fire. The use of Foamite, CO_2 or fog is less effective. Personnel fighting fire involving HC articles of ammunition especially when stowed in the hold of a vessel, should avoid working in dense smoke if not wearing rescue breathing apparatus or gas masks. As there will probably be an oxygen deficiency in dense smoke, self-contained breathing apparatus should always be used in preference to gas masks.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow in locations not subject to temperatures above 100° F. and protected from moisture. Stowage shall be accessible from cargo hatch or other access means to the hold or compartment. Drums or other authorized DOT or Army Materiel Command specification containers filled with HC may be stowed in the same hold or compartment with chemical ammunition Class II E. May be stowed in the same deep tank, lower hold or tween-deck hold with Class II-F provided the Class II-F ammunition is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. For stowage adjacent to other dangerous articles see § 146.29-59. When given chemical ammunition stowage, see § 146.29-85 for additional requirements. May be transported in vans stowed on deck. Class III may not be overstowed with this class of ammunition.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Observe packages or projectiles for leakage and reject any showing such signs. 5. Packages or containers shall be stowed in the position indicated by their markings. 6. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards, shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 8,000 lbs. plus 10%. 10. Lifts of palletized units shall not be bend except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with HC mixture. (See table of Limiting Loads, Class II-A.) 12. Drums of HC mixture shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

II-F						
Chemical ammunition, FS or FM smoke filled (liquid).	All chemical ammunition including fixed, semi-fixed and separate loading filled with smoke, FS (sulfur trioxide in chlorosulfonic acid) or FM (titanium tetrachloride) when assembled or packed with or w/o their bursting charges, fuzes, or propellants. FS or FM shipped in drums, barrels, cylinders or other authorized containers shall be classified as a corrosive liquid. FS or FM when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including rocket heads, w/o bursting charges or fuzes) may be handled and stowed either as corrosive liquid or as a chemical ammunition Class II-E. Includes but is not limited to: Grenades, frangible, smoke FS or FM filled. Grenades, smoke, FS or FM filled. Rockets, FS or FM filled. Projectile, artillery, FS or FM filled. Projectile, mortar, FS or FM filled. Spotting charges, FS filled. The U.S. Army and Navy, when shipping ammunition filled with FS or FM smoke, mark such ammunition and the containers thereof with the word "Smoke" and the symbol FS or FM. The ammunition is also marked with one yellow band.	"Ammunition for cannon with smoke projectile." "Explosive projectile." "Rocket ammunition with smoke projectile." Shipping name of items when shipped as corrosive material.	A A A Cor. L.	FS (sulfur trioxide in chlorosulfonic acid) and FM (titanium tetrachloride) are liquids which fume badly when hot. They react violently with small amounts of water and form a dense white smoke upon release to the atmosphere. FS is highly corrosive both as a liquid and as a smoke. FM is corrosive in liquid only, but its smoke is very irritating. Leakage of FS or FM should be washed off immediately with large volumes of water. Personnel working in a confined space where high concentrations of FS or FM smoke exists should use rubber protective gloves, boots, aprons and gas masks for effective protection.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow away from heat and to protect from moisture. May be stowed in the same deep tank, lower hold or tween-deck hold with Classes II-C, II-E, II-G, and III provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosives or ammunition is stowed in the hold or tank below. May be stowed in the same deep tank, lower hold or tween-deck hold with Classes II-B, IV, V, and VII provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosives or ammunition is stowed in the hold or tank below. Drums of other authorized DOT or Army Materiel Command specification containers filled with FS or FM may be stowed in the same hold or compartment with chemical ammunition Class II-E. Shall not be stowed over other types of ammunition. For stowage adjacent to other dangerous articles see § 146-29-59. When given chemical ammunition stowage, see § 146-29-85 for additional requirements. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Observe packages or projectiles for leakage and reject any showing such signs. 4. Containers or projectiles shall be stowed in the position indicated by their marking. 5. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 6. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 7. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate filled with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 8. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 10. Drums of FS or FM shall not be handled by hooks attached to the chime of the drums. 11. The limiting weights noted above are for a 5-ton boom. See § 146-29-41.
II-G						
Chemical ammunition, incendiary composition, IM, PT or NP filled (jet gel).	Chemical ammunition filled with IM, PT or NP (thickened fuels) when assembled or packed with or w/o ignition elements, bursting charges or fuzes. IM, PT or NP shipped in drums, barrels or other authorized shipping containers shall be classified as a flammable solid. IM, PT or NP when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including bombs w/o ignition elements, bursting charges or fuzes) may be handled and stowed either as a flammable solid or as chemical ammunition Class II-G. Napalm B in containers identified as DOD BLU-27/B, BLU-29/B, and BLU-32/B A/B Pam bombs overpacked in outside shipping crate may be shipped as "Flammable Liquid, N.O.S." Includes but is not limited to: Bombs. Bombs, cluster incendiary. Frangible grenades. The U.S. Army and Navy, when shipping ammunition filled with these incendiary compositions, mark such ammunition or containers thereof with the Army Materiel Command symbol of the filler and one purple band.	"Explosive bomb" "Grenade, hand" "Special fireworks" Shipping name of items when shipped as flammable solid.	A A B FS.	The principal hazard of IM, PT or NP filled items is involvement in a fire. They burn rapidly with intense heat. Extinguishment of fires is best accomplished by means of water fog. Fog foam or a foam stream (mechanical or chemical) is likewise effective. CO_2 should not be used unless the fire is small and in its incipient stage. In holds of a vessel large volumes of water are recommended as a cooling agent provided such may be employed without "floating off" burning gel. The vapors from heated napalm are toxic and rescue breathing apparatus should be worn while working in noticeable concentrations. Clusters of incendiary bombs in this category may contain a certain percentage of bombs bearing a high explosive charge capable of causing fragments which could be dangerous to fire fighting personnel. Incendiaries of this type may contain ignition components of WP adding an additional hazard.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* Shall not be stowed within 10 feet of a heat bulkhead. May be stowed in the same deep tank, lower hold or tween deck hold with Class II-F provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosives or ammunition is stowed in the hold or tank below. May be stowed in a deep tank or lower hold with Class II-J incendiary ammunition provided the Class II-J is bottom stowed. For stowage adjacent to other dangerous articles, see § 146-29-59. When given chemical ammunition stowage, see § 146-29-85 for additional requirements. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages, containers or bombs to shock. 3. Do not use chute in loading or unloading. 4. Observe packages, containers or bombs for failure or inability to retain contents and reject any showing such signs. 5. Packages or containers shall be stowed in the position indicated by their marking. 6. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with IM, PT or NP. (See table of Limiting Loads, Class X-A.) 12. Drums of IM, PT or NP shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5-ton boom. See § 146-29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
II-H						
Chemical ammunition, Water activated	Chemical ammunition filled with sodium, calcium carbide, calcium phosphide, lithium hydride, with or w/o explosive components. Includes but is not limited to: Beacons, NEA Can, false target Depth charge markers, night Grenades, sodium filled Ignitant, sodium filled Pots, torpedo torch Projectile, false target	There are no provisions in the current DOT regulations for the marking of this class of ammunition.	.....	On contact with moisture, metallic sodium or lithium hydride will liberate large quantities of hydrogen gas thus producing an explosive hazard. The reaction of metallic sodium with water is sufficiently violent to cause ignition of the liberated hydrogen. Fumes from burning sodium are caustic. On contact with moisture, calcium carbide or calcium phosphide will liberate phosphine and acetylene gases. The phosphine is toxic but extremely unstable, ignites spontaneously and at the same time ignites the acetylene gas. Fires involving these items cannot be extinguished by water, carbon dioxide or foam. Smothering with an inert substance such as dry sand or dry soda ash offers effective control. Jettisoning should not be accomplished in a port or roadstead as the floats will continue to burn until lifer is consumed jeopardizing other vessels and piers.	*SPECIAL STOWAGE* On deck in a portable magazine, in a deck house or other location readily accessible for jettisoning. Stowage shall be waterproof. Shall not be stowed with any other class of military explosives or any other dangerous articles. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Do not load during excessive rainy weather unless complete protection against moisture coming in contact with the package is provided. 5. Observe packages or containers for evidence of failing or inability to retain contents and reject any showing such signs. 6. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 7. Remove damaged container and residue of powder to a safe location. 8. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 9. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 10. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12 Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5 ton boom. See §146.29-41.
II-J						
Chemical ammunition, TH incendiary composition filled (solid)	All chemical ammunition filled with incendiary composition TH (thermite, thermate or thermate magnesium) with or w/o fuze or explosive element. Includes but is not limited to: Bombs, incendiary cluster Grenades, thermate Incendiary safe destroyers Thermite burning charges Thermite charges under water Thermite igniters Thermite units 10 lbs The U.S. Army and Navy, when shipping ammunition filled with these incendiary compositions, mark such ammunition or containers thereof with the Army Materiel Command symbol of the filler and with one purple band.	"Explosive bomb" "Grenade, hand" "Igniter" "Special fireworks"	A A C B	The principal hazard of TH filled items is in element in a fire. They burn rapidly with intense heat and usually form large quantities of molten iron. The presence of a small explosive charge in some TH items forms an additional hazard in case of a fire. Carbon dioxide and carbon tetrachloride extinguishers should not be used to combat fires involving TH because the reaction of carbon tetrachloride with molten metal produces toxic gases and that of carbon dioxide on magnesium may produce an explosion. In the hold of a vessel large volumes of water are recommended as an extinguishing agent. Fire fighters should work from behind barriers when possible.	*DEEP TANK STOWAGE, AMMUNITION STOWAGE OR PORTABLE MAGAZINE* May be stowed only in deep tank or lower hold, only with Classes I, II-B, II-C, II-G, and IV and in all cases must be bottom stowed. For limited quantity shipment not in excess of 500 lbs net TH content, see § 146.29-99(b), Note D. For stowage adjacent to other dangerous articles see section §146.29-59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Observe packages or containers for evidence of failure or inability to retain contents and reject any showing such signs. 5. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 6. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 7. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate, fitted with cargo net or sideboards shall not exceed 4,000 lbs. plus 10%. 8. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 9 Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 10 Wire rope slings are permitted when handling unboxed bombs or containers filled with TH. (See table of Limiting Loads, Class X-A) 11. The limiting weights noted above are for a 5-ton boom. See §146.29-41.

III						
Fuzes, PD w/o boosters, fuzes, AT mine, non-chemical, w/o booster, fuzes, bomb tail, w/o boosters, fuzes, tracer, primer detonators, primers, etc.	Point fuzes w/o boosters for projectiles and rockets, and tank mine fuzes (non-chemical) w/o booster, bomb tail fuzes w/o boosters, primer detonators, cannon primers, other than ball primers, when packed in separate shipping containers. Many DOT Class C fuzes, with or w/o boosters, are also of this class. If these fuzes are shipped with boosters, they must be so made and packed that they will not cause functioning of other fuzes, explosives or explosives devices if one of the fuzes detonates in a shipping container. Includes but is not limited to Case combination primer. Case electric primer. Case percussion ignition primer. Case percussion primer. Combination electric and percussion primer. Fuze, anti-tank, mine (non-chemical) w/o booster. Fuze, base percussion. Fuze, bomb tail, w/o booster. Fuze, PD w/o booster. Fuze, percussion. Fuze, M150 w/o booster. Fuze, tracer. Fuze, TSQ w/o booster. Grenade, hand, practice. Igniter, Jato, such as M151. Igniter for rockets, i.e. M12, M18, M20. Magazine, extension primers. Mines practice with spotting charge and or fuze. Percussion primers other than ball. Primer, detonators, fuze, bomb, various delays.	"Cannon primers" "Combination fuzes." "Combination primers." "Igniter, jet thrust" "Percussion caps" "Percussion fuzes" "Time fuzes" "Tracer fuzes"	C C C B C C C C	The amount of explosives in single items of this class varies from 30 to 500 grains. It is likely they will explode progressively. Structural damage caused by the pressures generated would probably be limited to the immediate vicinity. Missiles are light and usually fall within 300 feet. These types of ammunition are loaded with explosives that are sensitive to shock and friction. Shock and fire are the principal hazards to this type of ammunition. If involved in a fire, fire fighting personnel should take normal precautions and not expose themselves unnecessarily. Fire may be controlled and extinguished by flooding or spraying with large amounts of water.	*AMMUNITION STOWAGE SPECIAL STOWAGE, OR PORTABLE MAGAZINE* This class of ammunition shall not be overstowed with any other cargo or ammunition except Classes VI and VIII. May be stowed in the same lower hold or tween-deck hold with Class II F provided the Class II-F is bottom stowed and provided further that no other class of military explosives is stowed in the hold below or the deep tank directly below. For stowage adjacent to other dangerous articles see § 146.29-58.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be swung unnecessarily over open hatches or holds containing military explosives or other dangerous cargo. 8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 4,000 lbs. plus 10%. 14. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.
IV						
Fixed and semi-fixed ammunition with explosive loaded projectile	Fixed and semi-fixed ammunition, packed as complete rounds (including artillery, mortar and gun ammunition) grenades and rockets, when assembled with explosive projectiles or bursting charge. Small arms ammunition with explosive bullets or projectiles. Includes but is not limited to Anti-personnel mine, M2 and M3. Artillery ammunition of calibers 0.75" to 5" inclusive, with explosive, illuminating or incendiary projectiles. Grenades, hand, defensive. Grenades, hand, defensive, TNT filled, fuzed or unfuzed. Grenades, hand, fragmentation. Grenades, rifle, AT. Grenades, rifle, HE filled. Gun ammunition of calibers 0.75" to 5" inclusive, with explosive, illuminating or incendiary projectiles. Mortar ammunition (explosive or illuminating). Rockets, with explosive heads packed in the same container with, but not assembled to motors. Rockets, 2.75" FFAR, assembled or unassembled. Rockets, 3.5" HEAT. Small arms ammunition with explosive bullets.	"Ammunition for cannon with explosive projectile." "Ammunition for cannon with incendiary projectile." "Ammunition for small arms with explosive bullets." "Ammunition for small arms with explosive projectile." "Hand grenades" "Rifle grenades" "Rocket ammunition with explosive projectile." "Rocket ammunition with illuminating projectile."	A A A A A A A	A-Sides in this class present a severe fire hazard and usually explode progressively, only a few boxes at a time, many explosions of individual rounds being of a very low order. Pressure which would cause serious structural damage is not usually generated. Most missiles would fall within 600 feet. If involved in a fire it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Fire fighting personnel should take appropriate precautions and not expose themselves unnecessarily.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Boxed and crated ammunition may be overstowed with non-dangerous cargo and compatible explosives. Palletized ammunition may be overstowed with bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. May be stowed in the same deep tank, lower hold or tween-deck hold with Class II-F ammunition provided the Class II-F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. May be stowed in the same deep tank or lower hold with Class III-J ammunition provided the Class III-J is bottom stowed. For stowage adjacent to other dangerous articles see § 146.29-58. When Class X-G ammunition is stowed in the same hold with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III and VI may not be overstowed with this class of ammunition.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates, provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 4. Cargo nets without trays, skipboards, pallets or pieplates are not authorized. 5. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 6. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 7. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 8. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
V Separate loading projectiles filled with explosive "D".	Separate loading projectiles of all calibers filled with explosive "D", fuzed or unfuzed, and projectiles filled with explosives "D", fuzed or unfuzed, not assembled to or packed with cartridge cases. Explosive "D" is used as a bursting charge for all projectiles which must withstand severe stresses and shocks before detonating, such as armor piercing projectiles. Includes but is not limited to: Armor piercing projectiles. Deck piercing projectiles. Note: In general, Classes V and VII types of projectiles will be shipped in accordance with the following basic rules: Point fuzed projectiles with false ogives will be crated. Point fuzed projectiles without false ogives will have grommets and eyebolt lifting plugs. Base fuzed projectiles with relatively fragile parts such as false ogives, steel caps and windshields will be crated. Base fuzed projectiles without false ogives will not be crated but will have grommets. All Navy 6" through 16" separate loading projectiles are explosive "D" loaded.	"Explosive projectile".	A	If involved in a fire will very likely detonate as a result of exposure to heat. These projectiles usually explode one at a time and in practically all cases with low order explosion. There is no certainty that en masse explosion will not occur. Most missiles will fall within 1,200 feet.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* This ammunition, boxed, unboxed, or palletized units thereof, may be overstowed. Care must be taken not to damage rotating bands of projectiles that are not in containers. May be stowed in the same deep tank, lower hold or tween deck hold with Class II F ammunition provided the Class II F is bottom stowed and provided further that no other class of military explosives is stowed in the hold below or in the tank below. Class V when unfuzed and no fuzes packed in container may be stowed with Class II-A. For stowage adjacent to other dangerous articles see section 146.29-59. Classes III and VI may not be overstowed with this type of ammunition.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Bare projectiles shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Protect rotating bands from damage. Avoid injury to or removal of paint or grease from bourrelet. 6. When handling items packed in outside containers, cargo handling stevedore gear may be trays, skip boards, pallets, or pieplates, provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 7. Projectile tongs or lifting stud and eye are authorized. Wire slings of a design approved by the Captain of the Port may be used. 8. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 9. The maximum permitted weight per draft when handled by tray, skipboard, pallet or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 10. Single projectiles weighing in excess of 2,201 lbs. must be loaded or unloaded one at a time. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5 ton boom. See §146.29-41.
VI 80 fuzes. Bomb fuzes with boosters. PD fuzes with boosters. Rocket fuzes with boosters.	Base detonating fuzes (for all calibers) and PD fuzes with boosters, bomb and rocket fuzes with boosters, auxiliary booster assembled to or packed with the fuze, depth charge pistol with detonator and with or without booster assembled to or packed with pistol. (For boosters, auxiliary boosters, bursters, etc., having no initiating or priming elements and packed independently, see Class X-A.) Includes but is not limited to: Adapter booster, with detonator. Auxiliary booster, with detonator. Boosters. Burster, with detonator. Depth charge pistol, with detonator and with or without booster. Detonating fuzes, Class A. Fuze: Auxiliary detonating. Base detonating (for all calibers). Bomb nose. Bomb tail with booster. Hydrostatic bomb. Hydrostatic bomb tail. Point detonating with booster. Rocket. Fuzes with boosters assembled thereto. Mine, anti-personnel, non-metallic, M14. Mine firing mechanism, C-1.	"Detonating fuzes, Class A".	A	The amount of explosives in single items does not usually exceed one half pound. It is likely they would explode progressively. Structural damage caused by the pressure generated would probably be limited to the immediate vicinity. Missiles are light and usually fall within 600 feet. These types of ammunition are loaded with explosives that are sensitive to shock and heat. If involved in a fire, it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Fire fighting personnel shall take appropriate precautions and not expose themselves unnecessarily.	*AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* This class of ammunition shall not be overstowed with any other cargo or military explosives except Classes III and VIII. For stowage adjacent to other dangerous articles see § 146.29-59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be swung unnecessarily over open hatches or holds containing military explosives or other dangerous cargo. 8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock-absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 4,000 lbs. plus 10%. 14. The limiting weights noted above are for a 5 ton boom. See §146.29-41.

VI						
Separate loading HE projectiles, mass detonating, with other than explosive "D".	Separate loading projectiles of all calibers, fuzed or unfuzed, except those loaded with explosive "D"; and loaded projectiles except those loaded with explosive "D", fuzed or unfuzed, not assembled to or packed with cartridge cases, fuzed cluster fragmentation bombs, rocket heads fuzed or unfuzed and less than 200 lbs. gross weight, antitank mines, packed with fuzes in same container or box. Includes but is not limited to: Anti tank mines, packed with fuzes in same container or box. Cluster, fragmentation bomb (with individual bombs fuzed but without cluster fuzed). High explosive anti tank projectile. High explosive projectile. Rocket heads fuzed or unfuzed and under 200 lbs. not assembled to or shipped with rocket motors. Wafers of fragmentation bombs (with individual bombs fuzed). In general, Classes V and VII types of projectiles will be shipped in accordance with the following basic rules. Point fuzed projectile with false ogives will be crated. Point fuzed projectile without false ogives will have grommets and eyebolt lifting plugs. Base fuzed projectile with relatively fragile parts such as false ogives, steel caps, and windshields will be crated. Base fuzed projectiles without false ogives will not be crated but will have grommets to protect rotating bands.	"Explosive bomb" "Explosive mine" "Explosive projectile".	A A A	The principal hazard in transportation will be involvement in fire from sources other than the ammunition itself. Projectiles or bombs in this class may explode progressively but very likely en masse. Most missiles will fall within 1,800 feet and detonation will result in severe structural damage increasing in severity and range in relation to the amount of high explosives involved.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* This ammunition boxed, unboxed, or palletized units thereof, may be overstowed. Care must be taken not to damage rotating bands of unboxed projectiles. This class of ammunition when unfuzed and no fuzes packed in container may be stowed with Class X-A. For stowage adjacent to other dangerous articles see § 146.29-59. May be stowed in the same deep tank, lower hold or 'tween deck hold with Class 8-F ammunition provided the Class 8-F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. When Class X-C ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Bare projectiles shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Protect rotating bands from damage. Avoid injury to or removal of paint or grease from bourrelet. 6. When handling items packed in outside containers, cargo handling stevedore gear may be trays, slipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 7. Projectile tongs or lifting stud and eye are authorized. Wire slings of a design approved by the Captain of the Port may be used. 8. Cargo nets without trays, slipboards, pallets, or pieplates are not permitted. 9. The maximum permitted weight per draft when handled by tray slipboard, pallet or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 10. Single projectiles weighing in excess of 2,201 lbs. must be loaded or unloaded one at a time. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10 %. 12. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5- ton boom. See § 146.29- 41.
VII						
All mine fuzes (chemical), etc. Blasting caps. Detonators.	Blasting caps of all types; detonators; grenade fuzes, detonating type, fuzes, anti tank mine (chemical). Includes but is not limited to: Blasting caps. Blasting caps with safety fuze. Destructor, explosive, M10 and M2 Mod 0. Detonating grenade fuzes. Detonators, all types. Detonators, torpedo. Electric blasting caps. Fuzes, All mine (chemical). Percussion elements (Army). Primers, electric. Priming assembly for demolition outfit MK104.	"Blasting caps" "Blasting caps with safety fuze" "Boosters (explosive)". "Detonating fuzes, Class A". "Electric blasting caps". "Percussion caps" "Percussion fuzes" "Time fuzes" "Class A (more than 1000), Class C (1000 or less).	C C A A C C C C	The two primary hazards in the transportation of these devices are shock and involvement in fire. A collateral hazard is the effect of the detonating of these articles upon other explosives or ammunition stowed in proximity to such articles. All of this class ammunition in a unit stowage may explode at one time, but as the total amount of explosives involved is limited structural damage would not tend to be great.	Light missiles having limited range would be forbid. *MAGAZINE STOWAGE "A" SPECIAL STOWAGE, OR PORTABLE MAGAZINE.* The location of magazines is restricted to a hold or compartment in which no other explosives or ammunition (except Classes 8, 8L and VI) are stowed. Shall not be stowed within 8 feet of the vessel's side except blasting caps stowed in a portable magazine. "On deck" need not meet this requirement. This class of ammunition shall not be overstowed with any other cargo. For detail of stowage see § 146.29-93. For stowage with other dangerous articles see § 146.29-59.	Ammunition of Class VIII constitutes a distinct class of ammunition when not assembled in projectiles, bombs, or other ammunition. These types of ammunition are loaded with explosives that are sensitive to shock. The handling and stowage provisions of these regulations give consideration to the probable effect accidental detonation of these devices may have upon other ammunition or explosives stowed within the vessel. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors are not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be strung unnecessarily over open hatches or holds containing military explosives or other dangerous articles. 8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 1,000 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 2,400 lbs. plus 10%. 12. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 2,400 lbs. plus 10%. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
IX-A						
Explosives in bulk such as: Black powder. Propellant explosives for small arms, etc.	Black powder in bulk, ballistite for small arms, propellant explosives for small arms, black blasting powder, flash powder and powder having similar hazard characteristics to those named. Includes but is not limited to: Ballistite for small arms. Black blasting powder. Black lance powder. Black pellet powder. Black powder. Black powder and magnesium mixtures. Black powder, unglazed. Black rifle powder. Black shell powder. Bull's eye powder #2. Cannon powder. Charges, rifle gun. Charges, spotting, black powder, M1A1, M3, M4. EC blank rifle powder. FF black powder. Firecracker, M80. FFFG black powder. Flash cartridges over 72 grains. Flash powder sheets inner unit over 2 ounces. Flash reducer (black powder with potassium sulfate). Flash sheets in bulk. Flashlight powder in bulk. High rel #65. Igniter pads. Igniter, rocket motor, Class A. IMR #1195. IMR #4166. IMR #4676. Low blasting explosives. Pistol powder #5. Propellant explosives (for small arms). Pyrotechnic mixture, in excess of 72 grains. Rifle powder. Simulator: Booby-trap, flash, illuminating, whistling in excess of 72 grains. Booby-trap, whistling, M114. Gunflash, M110. Projectile, air burst. Projectile, ground burst M115. Smoke pull charge. Sodium nitrate black powder. Spherehexagonal black powder. Sporting powder. Sulfurless black powder.	"Black powder" "High explosives" "Low explosives" "Propellant explosives, solid, Class A." "Propellant explosives, solid, Class B."	A A A A B	Group IX-A explosives constitute a group having relatively similar hazard characteristics which principally consists of being very susceptible to ignition by spark or friction. They burn with explosive violence and under even slight confinement are likely to explode en masse. They are adversely affected by high temperature. Powder dust is especially hazardous.	MAGAZINE STOWAGE "A" OR *PORTABLE MAGAZINE STOWAGE.* When Class I ammunition is stowed in the same hold or magazine with this Class the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Shall not be overstowed with any other kind of cargo. For stowage with other dangerous articles see §146.29-58.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 4. Observe packages or containers for evidence of shifting or inability to retain contents and reject any showing such signs. 5. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 6. Remove damaged container and residue or powder to a safe location. 7. Gravity roller conveyor not authorized. 8. Drums and kegs shall be stowed on end with bungs up. Metal cans shall be stowed with filling openings up. Packages or containers shall be stowed in the position indicated by their markings. 9. Cargo handling stevedore gear may be trays, slipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 10. Cargo nets without trays, slipboards, pallets, or pieplates are not permitted. 11. The maximum permitted weight per draft when handled by tray, slipboard, pallet, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 14. The limiting weights noted above are for a 5 ton boom. See §145.29-41.
IX-B						
High explosives such as: Demolition blocks, etc. Dynamite. TNT	High explosives in bulk, items of high explosives such as shaped charges for demolition or other purposes, and powder in bulk, possessing the characteristics of being likely to detonate en masse. Includes but is not limited to: Amatex. Amatol. Ammonite. Ammonium perchlorate particle size, 15 microns and less. Ammonium picrate. Ammonol. Anchor charges. Aqueous slurries. A.S.A. pellets. Atlas amodyn. Balls of cellulose nitrate. Baranol. Beehive charges. Blasting gelatin. British beehive. C.E. pellet. Charge, demolition, block. Charge, demolition, chain.	"High explosives"	A	High explosives in bulk, and demolition blocks have relatively similar hazard characteristics. They may be considered stable in stowage. Can be ignited by spark or friction and detonated by shock. When ignited will burn vigorously. Bulk shipments in amounts likely to be found on board vessels would, if ignited, be very likely to detonate.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Shall not be stowed in the same hold or compartment with other compatible ammunition, or explosives, unless the two are separated by a partition bulkhead or a type "A" dunnage floor. Shall not be overstowed with any other kind of cargo. For stowage adjacent to other dangerous articles see §145.29-59. Military dynamite when transported on a commercial vessel simultaneously with commercial dynamite, and no other military explosives are on board, shall be shipped under those requirements set forth for the shipment of commercial dynamite.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble or walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 5. Observe packages or containers for evidence of shifting or inability to retain contents and reject any showing such signs. 6. In event a package is damaged and powder is spilled, immediately stop operations and sweep up loose powder. 7. Remove damaged containers and residue of powder to a safe location. 8. Gravity roller conveyors not authorized. 9. Packages or containers shall be stowed in the position indicated by their markings. 10. Cargo handling stevedore gear may be trays, slipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized.

For explanation of abbreviations and reference marks, see last page of this tariff.

Chlorate explosives, dry
Chlorate propellants
Clams, MG
Composition "A," etc.
Composition "B," "B2," etc
Composition "C," "C2" etc
Cratering charges
Cyclonite, RDX
Cyclotol
Demolition blocks
Depth bomb explosives
Dynamite
Ednatol
Explosive "D," (Ammonium picrate)
Explosive gelatin
808 plastic
Gelatin dynamite
Gelignite
General wade
Grenite
Guncotton
HBX
H6
Halelite
Hayrick charges
Hercomite
Hexogen
HMX
Limpet
Minol
Negative cotton
Nitrocellulose, dry
Nitroguanidine, dry
Nitrostarch, dry
Nitrourea
Nobel's ammoral (7048)
Nobel's explosives (808)
PEP 1, 2, and 3
Pentolite
Picrates, dry
Picric acid, dry or wet
Plastic explosives
PTX, 1 and 2
RDX
Reddy Fox
Seachest demolition blocks
Shaped charges
Sheelite
Snake demolition explosive charges
Supplementary charges
Tetryl
Tetrytol
TNT
TNX
Torpex

High explosives in bulk, etc—Continued
Includes but is not limited to:
Tridite
Trike
Trimonite
Trinitroaniline
Trinitrobenzene
Trinitrocresol
Trinitrophenylmethylnitramine
Trinitroresorcinol
Trinitronal
Trinitrotoluene
Trinitroxylene
Trinitroxylol
Triton blocks
Trojan powder
Urea nitrate, dry or wet

11. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted.
12. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%.
13. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%.
14. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft.
15. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
(1-C						
Initiating and priming explosives in bulk.	Initiating and priming explosives when shipped in bulk. Includes but is not limited to: Guanodinitrophenol (DONP, DNOL). Guanyl-nitrosamino-guanildene hydrazine. Guanyl-nitrosamino-guanyl tetrazene. Lead azide. Lead styphnate. Lead trinitrorcorcinate. Mercury fulminate. Nitro mannite. Nitrosoguanidine. Pentaerythrite tetranitrate. PETN. Tetrazene. Note: Bulk priming or initiating explosives in dry condition are not permitted to be transported on board vessels.	"Initiating explosive"	A	Bulk initiating and priming explosives constitute a distinct class of explosives. They are extremely sensitive to shock. The only permitted packing for transportation in bulk consists of a soft proof cotton duck, rubber or rubberized cloth bag in a metal barrel or drum or wooden barrel or keg and wet with 20 to 40% of water or water alcohol mixture. Mercury fulminate and lead azide also have 3" of sawdust saturated with water between the bag and the outer container.	*MAGAZINE STOWAGE "A", SPECIAL STOWAGE OR PORTABLE MAGAZINE STOWAGE* Shall not be stowed in the same magazine with other ammunition or explosives. When storing containers of explosives of this class in a magazine, have each tier floored off with a type "A" dunnage floor. The location of a magazine is restricted to a hold or compartment in which no other military ammunition (except Class 1) is stowed. Shall not be stowed within 8 feet of vessel's side. This class of ammunition shall not be overstowed with any other cargo. For stowage adjacent to other dangerous articles see § 146.29-59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Do not roll barrels on their bases. 5. Gravity roller conveyer not authorized. 6. Barrels or drums contain 20 to 40% water or water alcohol mixture. 7. Observe barrels, drums or containers for evidence of leakage or inability to retain contents and reject any showing such signs. 8. In event a container is damaged immediately stop operations and carefully remove damaged container to a safe location. 9. Drums and kegs shall be stowed on end with bungs up. Containers shall be stowed in the position indicated by their markings. 10. Trays with sideboards shall be used when handling by mechanical means. 11. Containers shall not be stacked on a tray to a height above its sideboards. 12. The maximum permitted weight per draft when handled by tray fitted with sideboards shall not exceed 1,000 lbs. plus tare. 13. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 14. The limiting weights noted above are for a 5-ton boom. See §146.29-41.

X-A Explosive bombs, mines, torpedoes, etc.	Bombs, bomb clusters, mines, depth charges, warheads (all unfuzed), rocket heads (fuzed or unfuzed and without motors 200 lbs. or more gross weight), torpedo bangalore (unfuzed), and other unfuzed ammunition filled with relatively large amounts of HE; all possessing a similar hazard characteristic of an massе detonation. Includes but is not limited to: Activator – without detonator. Bombs: Armor piercing. Demolition. Depth. Depth charge. Fragmentation. G.P. Photoflash. S.A.P. Shallow water depth. Boosters – without detonators. Boosters, adapter – without detonators. Burster – without detonator. Mines: Aerial. Aircraft. Anti-personnel (unfuzed). Anti-personnel fragmentation (unfuzed). Anti-tank (unfuzed). Anti-tank non-metallic (unfuzed). Grenade. High explosive. Land. Rocket heads (fuzed or unfuzed and without motors 200 lbs. or more gross weight). Signal, underwater sound, w/o fuze. Torpedo bangalore. Torpedo warheads.	"Booster (explosive)." "Burster (explosive." "Explosive bombs." "Explosive mines." "Explosive projectiles." "Explosive torpedoes."	A A A A A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of their tendency to detonate en massе if involved in a fire or subjected to shock. Detonation will result in severe structural damage, increasing in severity and range in relation to the amount of high explosives involved. All high explosive loaded items in this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impacts, though not sufficiently severe to rupture them, has occasionally resulted in partial or complete detonation, and such kind of ammunition is said to possess "container dent sensitivity." A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact apparently causes instantaneous explosive action. But whatever may be the actual mechanics of this phenomenon, the kinds of impacts known to have caused explosion of these items include such impacts as dropping on or striking against a rounded corner, similar to a hatch coaming, impact of one bomb against another, or being struck by handling and transportation equipment. In placing or removing dunnage, an accidental or misdirected blow from a sledge hammer, pinch bar or other hand tool may cause such explosions. The impact need not be violent. A short drop of only 2 feet caused a low order detonation of a depth bomb. Warheads, depth bombs, depth charges, Naval mines, and other like items are in the "Container-dent sensitivity" category. All of the foregoing also apply in substantial effect to containers of this class of ammunition that are not thin walled.	AMMUNITION STOWAGE OR PORTABLE MAGAZINE Items in this class having thin container walls and said to possess "container dent sensitivity" shall not be tiered one layer on top of another unless they are boxed, crated or dunnaged in such a manner that they are properly protected to withstand the superimposed weight. Items having thin walls and possessing "container dent sensitivity" may be overstowed only with very light cargo such as bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. Items of this class having thick walled containers may be tiered one layer on top of another provided they are so stowed, dunnaged, blocked and or braced as to prevent movement that is likely to damage the ammunition, the vessel or other cargo. Shall not be overstowed with inert permitted cargo having lesser bearing surface or greater unit weight than any item stowed below. Classes 1, V (unfuzed and no fuzes packed in container), VII (unfuzed and no fuzes packed in container), and DI-B may be stowed with this class. Provided that the two classes are separated by a partition bulkhead or type "A" dunnage floor. Except for wooden barrels or boxes and fiberboard containers, no flammable or combustible material as cargo shall be stowed in a hold or compartment in which this class of ammunition is stowed. When photoflash bombs are stowed with any other military explosive, including items of this class, the two stowages must be separated by a partition bulkhead or a type "A" dunnage floor. For stowage adjacent to other dangerous articles see § 146.29-59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skidboard, or tray or as a preventer or save all. 5. Bombs, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated warheads, depth bombs, depth charges, or other like rolled items shall not be tiered in "nesting up" drafts (hoists). 7. No "hard" or barrel hooks shall be used on this class of ammunition. 8. Depth charges and rocket heads that are not boxed or crated shall be loaded by use of pallet, skidboard or tray fitted with cargo net or sideboards. 9. Bombs, except depth bombs, may be loaded by use of wire rope slings, or by pallet, skidboard or tray fitted with cargo net or sideboards. 10. Depth bombs shall be loaded only by using pallet, skidboard, or tray fitted with cargo net or sideboards. (See § 146.29-39.) 11. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 12. Single slings made up in multiple assembly with spreader may be used in handling bombs that do not exceed 1,101 pounds each. Two legged slings shall be used in handling bombs of more than 1,101 pounds each. TABLE OF LIMITING LOADS (Applicable when handling bombs by sling method) Maximum units in one draft Weight of individual bomb or cluster. 1 lb. to 250 lbs.[1] ..... 8 276 lbs. to 500 lbs.[1] ..... 4 551 lbs. to 1,000 lbs.[1] ..... 2 1,101 lbs. to 2,000 lbs.[1] ..... 1 Over 2,200 lbs. ..... — [1] A tolerance of 10% per unit is allowed. (For example, a bomb weighing 550 lbs. may be considered as coming within the 500 lb. group.) 13. Naval mines, uncrated and fitted with lifting eye shall be loaded by using wire rope and shackle. 14. Naval mines, uncrated and not fitted with lifting eye may be loaded by use of wire rope slings or trays fitted with sideboards. 15. The following items when boxed or crated shall be loaded by the use of pallet, skidboard or tray fitted with cargo net or sideboards, photoflash bombs, antitank mines, antipersonnel mines, naval mines, warheads, depth charges, torpedo bangalore, projector charges and rocket heads. 16. Warheads, crated in such a manner that the nose lifting ring is exposed may be loaded by means of said ring. 17. The maximum permitted weight per draft, when handled by pallet, skidboard, tray or pedpiate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 18. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 19. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 20. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
X-B						
Explosive bombs, mines, torpedoes, etc., packed with fuzes in integral package. (Fuzes will not detonate item with which packaged nor adjacent packages.)	Bombs, bomb clusters, mines, depth charges, warheads (fuzed and unfuzed), projector charges (unfuzed and without motors), torpedo bangalore (unfuzed), and other unfuzed ammunition filled with relatively large amounts of HE; all possessing a similar hazard characteristic of en masse detonation. The fuze is packed integral with the item, but the fuze will not detonate the item with which packaged nor adjacent packages. Includes but is not limited to: Bombs: Armor-piercing. Demolition. Depth. Depth charge. Fragmentation. GP. Photoflash (except M-122). SAP. Shallow water depth. Mines: Aerial. Aircraft. Anti-personnel (unfuzed). Anti-personnel fragmentation (unfuzed). Anti-tank (unfuzed). Anti-tank non-metallic (unfuzed). Grenade. High explosive. Land. Nuclear weapons (see para. 21 under "Handling"). Signals, underwater sound, w fuze. Torpedo bangalore. Torpedo warheads.	"Explosive bombs" "Explosive mines" "Explosive projectiles." "Explosive torpedoes."	A A A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of their tendency to detonate en masse if involved in a fire or subjected to shock. Detonation will result in severe structural damage, increasing in severity and range in relation to the amount of high explosives involved. All high explosive loaded items in this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impacts, though not sufficiently severe to rupture them has occasionally resulted in partial or complete detonation, and such kind of ammunition is said to possess "container-dent sensitivity." A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact apparently causes instantaneous explosive action. But whatever may be the actual mechanics of this phenomenon, the kinds of impacts known to have caused explosion of these items include such impacts as dropping on or striking against a rounded corner, similar to a hatch coaming, impact of one bomb against another, or being struck by handling and transportation equipment. In placing or removing dunnage, an accidental or misdirected blow from a sledge hammer, pinch bar or other hand tool may cause such explosions. The impact need not be violent. A short drop of only 2 feet caused a low order detonation of a depth bomb. Warheads, depth bombs, depth charges, Naval mines, and other like items are in the "Container-dent sensitivity" category. All of the foregoing also apply in substantial effect to containers of this class of ammunition that are not thin walled.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Class XB items shall not be stowed in the same hold or compartment with Class I items unless the two classes are separated by a partial bulkhead or a type "A" dunnage floor. Items in this class having thin container walls and said to possess "container-dent sensitivity" shall not be tiered one layer on top of another unless they are boxed, crated or dunnaged in such a manner that they are properly protected to withstand the superimposed weight. Items having thin walls and possessing "container-dent sensitivity" may be overstowed only with very light cargo such as bomb fin assemblies, empty water filled practice bombs and empty auxiliary gas tanks. Items of this class having thick walled containers may be tiered one layer on top of another provided they are so stowed, dunnaged, blocked and or braced as to prevent movement that is likely to damage the ammunition, the vessel or other cargo. Shall not be overstowed with inert compatible cargo having lesser bearing surface or greater unit weight than any item stowed below. Except for wooden barrels or boxes and fiberboard containers no flammable or combustible material as cargo or containers of same shall be stowed in a hold in which this class of ammunition is stowed. When photoflash items of this class are stowed with any other military explosive, including other items of this class, the two stowages must be separated by a partial bulkhead or type "A" dunnage floor. For stowage adjacent to other dangerous articles see § 146.29-59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skidboard, or tray, or as a preventor or save all. 5. Bombs, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non powered roller conveyors, provided these surface or conveyors are relatively level and free from projections. 6. Unboxed or uncrated warheads, depth bombs, depth charges, or other thin walled items shall not be tiered in "nesting up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. Depth charges and rocket heads that are not boxed or crated shall be loaded by use of pallet, skidboard or tray fitted with cargo net or sideboards. 9. Bombs, except depth bombs, may be loaded by use of wire rope slings, or by pallet, skidboard or tray fitted with cargo net or sideboards. 10. Depth bombs shall be loaded only by using pallet, skidboard, or tray fitted with cargo net or sideboards. 11. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 12. Single slings made up in multiple assembly with spreader may be used in handling bombs that do not exceed 1,101 pounds each. Two legged slings shall be used in handling bombs of more than 1,101 pounds each. (See table of Limiting Loads, Class X-A). 13. Naval mines, uncrated and fitted with lifting eye shall be loaded by using wire rope and shackle. 14. Naval mines, uncrated and not fitted with lifting eye may be loaded by use of wire rope slings or trays fitted with sideboards. 15. The following items when boxed or crated shall be loaded by the use of pallet, skidboard or tray fitted with cargo net or sideboards, photoflash bombs, antitank mines, antipersonnel mines, naval mines, warheads, depth charges, torpedo bangalore, projector charges and rocket heads. 16. Warheads, crated in such a manner that the nose lifting ring is exposed may be loaded by means of said ring. 17. The maximum permitted weight per draft, when handled by pallet, skidboard, tray or preplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 18. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 19. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 20. The limiting weights noted above are for a 5-ton boom. See § 146.29-41. 21. Nuclear weapons, warheads, and their components shall be handled and transported in accordance with pertinent military service directives.

X-C Guided missiles, solid propellant motors, packed with or without HE warheads.	Completely assembled missiles or rockets with DOT Class A and Class B solid fuel motors. Projector charges. Rocket motors, Class A.	"Rocket ammunition with explosive projectiles." Jato units, Class A. Jet, thrust units, Class A.	A or B A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of (1) their tendency to detonate en masse if involved in a fire or subjected to shock, and (2) the combustibility and toxicity of the fuel if involved in a fire. All high explosive loaded items of this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impact, though not sufficiently severe to rupture them may result in a partial or complete detonation. A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact causes instantaneous explosive action. These kinds of impacts are, striking against a rounded corner similar to a hatch coaming, impact of one missile against another, or being struck by handling or transportation equipment. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased. Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the container with resulting leakage or spillage	AMMUNITION STOWAGE OR PORTABLE MAGAZINE Class XC items shall not be stowed in the same hold or compartment with Classes II-B IV and VII items unless the two classes are separated by a partition bulkhead or a type "A" dunnage floor. Except for wooden boxes or barrels and fiberboard containers, no flammable or combustible material shall be stowed in a hold or compartment in which this class of ammunition is stowed. Shall not be overstowed with any other kind of cargo. May be stowed on deck protected, except on the square of a hatch. For stowage adjacent to other dangerous articles see § 146.29-59	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skipboard, or tray, or as a preventer or save all. 5. Missiles, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated missiles shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. May be loaded by use of wire rope slings, or by pallet, skipboard or tray fitted with cargo net or sideboards. 9. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 10. Single slings made up in multiple assembly with spreader may be used in handling missiles that do not exceed 1,101 pounds each. Two legged slings shall be used in handling missiles of more than 1,101 pounds each. (See table of Limiting Loads, Class X-A) 11. The maximum permitted weight per draft, when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

For explanation of abbreviations and reference marks, see last page of this tariff.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
X-D Guided missiles, liquid propellant motors, packed with HE warheads.	Completely assembled missiles or rockets with liquid petroleum fueled motors.	"Rocket ammunition with explosive projectiles."	A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of (1) their tendency to detonate en masse if involved in a fire or subjected to shock, and (2) the combustibility and toxicity of the fuel if involved in a fire. All high explosive loaded items of this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impact, though not sufficiently severe to rupture them, may result in a partial or complete detonation. A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact causes instantaneous explosive action. These kinds of impacts are, striking against a rounded corner, similar to a hatch coaming, impact of one missile against another, or being struck by handling or transportation equipment. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased. Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the container with resulting leakage or spillage.	*AMMUNITION STOWAGE* Class X-D items shall not be stowed in the same hold or compartment with other military explosives, other dangerous cargo, or regulated items. Shall be stowed only in a lower hold, or "On deck protected," not on the square of a hatch. Shall not be overstowed. For stowage adjacent to other dangerous articles see § 146.29-58. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. Preferred "On deck" stowage is aft. Missiles with liquid petroleum fueled motors may be stowed at any level in any hatch provided leakage of the fuel will drain directly into the bilges.	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skidboard, or tray, or a preventor or save all. 5. Missiles, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Uncrated or uncrated missiles shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. May be loaded by use of wire rope slings, or by pallet, skidboard or tray fitted with cargo net or sideboards. 9. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 10. Single slings made up in multiple assembly with spreader may be used in handling missiles that do not exceed 8,101 pounds each. Two legged slings shall be used in handling missiles of more than 8,101 pounds each. (See table of Limiting Loads, Class X-A). 11. The maximum permitted weight per draft, when handled by pallet, skidboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

X-E Rocket engines, liquid	Rocket engines containing a liquid propellant, a hypergolic fuel oxidizer combination which is shipped separately packaged within the rocket engine. The igniter booster is also shipped as an integral part of the rocket engine. Includes but is not limited to Bullpup rocket engine.	Rocket engines (liquid), Class B explosives.	B	Fire can cause the engines to liberate dangerous toxic gases. Such gases (or smoke) are dangerous if allowed to become airborne contaminators, or to be ingested or inhaled into the body. Use copious amounts of water to combat fires or leaters. Fire extinguishers containing carbon dioxide, carbon tetrachloride, or dry powder should not be used. Normal fire fighting equipment is less useful, since the blanketing or smothering is less effective because the oxidizers supply their own oxygen. In case of fire, or if leaky containers are discovered, personnel should use protective clothing.	"On deck protected" Class X-E items shall not be stowed in the same hold or compartment with other military explosives. Ammunition stowage in a lower hold or deep tank if the space is equipped with a sprinkler system. Shipments stowed on deck shall be last on first off shipments on board the vessel. Shipments stowed on deck shall be last on first off shipments on board the vessel. On vessels having the bridge structure amidship, the holds separated by the bridge structure from the Class X-E explosives stowage may be worked. Adequate fire hose, adjacent to the stowage area, shall be readily accessible to ship's personnel. The on deck stowage shall be isolated from other deck cargo. It shall be separated from other military explosives, hazardous munitions or dangerous cargoes on deck by the bridge structure. Stowage on deck shall not be over the square of the hatch.	1. Observe containers for evidence of leakage and reject any showing such signs. 2. Handle by hand or mechanical means using extreme care against damage to the container. 3. Do not drop, drag, tumble, wash or otherwise subject packages to shock. 4. Packages shall be stowed in the position indicated by their markings. 5. Do not use chute in loading or unloading. 6. In the event of damage to a container resulting in leakage or spillage, stop operations, clear area of all personnel, render first aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled by personnel trained in this procedure and equipped with protective clothing and self contained breathing apparatus. 7. Four complete sets of acid-resistant protective clothing, including a self-contained breathing apparatus of an approved type, must always be immediately available for emergency use. In this operation, as well as all other operations involving fuming nitric acid, treadle type of deluge showers and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 8. Weight per draft shall not exceed 2,400 pounds plus 10% using a five ton boom. Single items of this class, or assembled units designed to be handled as a unit, may be loaded regardless of weight provided the cargo handling gear is of a design capable of handling a working load at least 50 percent additional to the actual weight of the item or unit comprising the draft and provided further the integrity of the cargo handling gear is unimpaired. 9. Must be loaded first on the side away from the pier so that motors being loaded do not pass over those already loaded.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
10 A						
Chemical ammunition, lethal	Chemical ammunition filled with lethal gases such as mustard gas (H), lewisite gas (L), nerve gas (GB and VX), BNT agents, phosgene gas (CG), hydrocyanic acid (AC), nitrogen mustard gas (HN), dichlorgene (DF), chloropicrin gas (PS), cyanogen chloride (CK) when shipped assembled with or without their ignition elements, bursting charges or fuzes. When these substances are shipped in drums, barrels, cylinders or other authorized containers they shall be classified Class A Poison Gas. When these substances are shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including projectiles, bombs and rockets without ignition elements, bursting charges or fuzes) they may be handled and stowed either as Class A poison gas or chemical ammunition Class 10 A. Includes but is not limited to the following items when filled with any of the above agents: Ammunition for guns with gas projectile Bombs, chemical Bombs, clusters, chemical Frangible grenade Hand grenade Howitzer projectile Land mine Mortar projectile Rockets, chemical Separate loading projectile Note: The Army Materiel Command or U.S. Navy, when shipping chemical ammunition, mark such ammunition and the containers thereof, in general, as follows: (a) By the use of color bands painted upon the ammunition the containers thereof, by letter symbol to indicate the particular kind of chemical therein and the word "Gas" stenciled upon the ammunition of the containers thereof. (b) Persistent gases are marked with two (2) green bands. Nonpersistent gases with one (1) green band. (c) The word "Gas" will be stenciled upon projectiles and upon the outside container of projectiles, grenades, bombs, candles, etc., the stenciling to be of the same color as the designating band. (d) The bodies of all ammunition containing gas will be painted gray.	"Ammunition for cannon with gas projectile." "Explosive bomb" "Explosive projectile." Explosive mine." "Hand grenade" "Rifle grenade" "Rocket ammunition with gas projectile." Shipping name of item when shipped as Class A poison.	A A A A A A A Poison A	This type of ammunition or bulk shipments of these substances in containers other than ammunition, represents a particular and special hazard. Minute quantities of either liquid or vapor can cause serious burns and death. The liquid or vapor will contaminate everything with which it comes in contact, cause serious and painful burns to exposed portions of the body and the eyes, and attack the respiratory system usually with fatal results. Nerve gas is highly toxic, quick acting nerve poison. It can be absorbed through any body surface including the respiratory tract, skin, eyes, and gastrointestinal tract. The rapidity of action of nerve gas and absence of identifying symptoms may incapacitate a person so rapidly that he may be unable to take individual protective measures.	*CHEMICAL AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* Bulk shipments of chemical agents in DOT cylinders, tanks or Army Materiel Command specification containers of integrity equal to DOT containers may be stowed in a shelter deck space or in a deck house suitable for such stowage. Chemical ammunition (explosive) shall be stowed in a deep tank, lower hold or between deck, and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. (See § 146.29-85.) Drums or other authorized DOT or Army Materiel Command specification containers filled with Class A poison gas may be stowed in the same hold or compartment with chemical ammunition Class 10 A. For stowage adjacent to other dangerous articles see § 146.29-59. May be loaded at a temporary location authorized by the Captain of the Port for the specific loading. When given chemical ammunition stowage, see § 146.29-85 for additional requirements.	When possible and the amount of such ammunition or containers of these chemical substances warrants, a technical representative of the appropriate Department of Defense technical service shall be present during the loading and stowage. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Packages shall be braced so as to prevent any movement. Top tiers shall be braced to prevent upward movement. 6. Packages or containers shall be stowed in the position indicated by their markings. When not so marked, boxes shall be stowed on the most stable side and arranged in such a manner that the joints between boxes are staggered. 7. No packages shall be "cant" stowed. 8. Dunnage shall be applied to the sides, ends and tops of the boxes before bracing is applied. 9. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 10. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with this class of chemical warfare material. 12. The maximum permitted weight per draft when handled by tray, skipboard, pallet, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 13. Single bombs or other unit containers weighing in excess of 2,200 lbs. must be loaded or unloaded one at a time. 14. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 15. Lifts of palletized units shall not be hoisted except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 16. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

10-8 Chemical ammunition, nonlethal	Chemical ammunition filled with non-lethal gases such as Chloracetophenone gas (CN), Chloracetophenone solution (CNS) or (CNS), Bromobenzylcyanide (BBC) and Adamsite (DM), when shipped assembled with or without their ignition elements, bursting charges or fuzes. When these substances are shipped in drums, barrels, cylinders or other authorized containers, they shall be classified as tear gasses or irritating substances, Class C—poisons. When these substances are shipped in authorized DOT specification containers or Army Materiel Command containers of integrity equal to DOT containers (including projectiles, bombs and rockets, without ignition elements, bursting charges or fuzes) they may be handled and stowed either as Class C—poisons or as chemical ammunition Class 10-8. Includes but is not limited to the following items when filled with any of the above agents: Ammunition for cannon with gas projectile Bombs, aircraft Bombs, aircraft cluster CN capsules Gas identification sets Grenades, hand Grenades, liangible, hand Grenades, rifle Rockets Projectiles, mortar Tear gas candles Tear gas pots Note: The U.S. Army and Navy when shipping harassing gas ammunition, mark such ammunition and the containers thereof with the word "gas" and Army Materiel Command symbol of the gas with one red band.	"Ammunition for cannon with gas projectiles." "Explosive bomb" "Explosive projectile." "Hand grenade" "Rifle grenade" "Tear gas candle" "Tear gas grenade" "Rocket ammunition with gas projectile." Shipping name of item when shipped as Class C poison.	A A A A A Pois. C Pois. C A Pois. C	Fire and intolerable vapors. The fire hazard of some of these items is similar to that of smokeless powder. The vapors are rarely lethal as concentrations far below the lethal range are intolerable. Gas mask provides complete protection.	*CHEMICAL AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* It is important to stow in locations not subject to temperatures above 150° F. Stowage shall be accessible from cargo hatch or other access means to the hold or compartment. Drums or other authorized DOT or Army Materiel Command specification containers filled with Class C poison gas may be stowed in the same hold or compartment with chemical ammunition, Class 10-8. For stowage adjacent to other dangerous articles see § 146.29-59. May be loaded at a temporary location authorized by the Captain of the Port for the specific loading. When given chemical ammunition stowage, see § 146.29-85 for additional requirements.	When possible and the amount of such ammunition or containers of these chemical substances warrants, the loading and stowage of chemical ammunition or chemical agents for such should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Packages shall be braced so as to prevent any movement. Top tiers shall be braced to prevent upward movement. 6. Packages or containers shall be stowed in the position indicated by their markings. When not so marked, boxes shall be stowed on the most stable side and arranged in such a manner that the joints between boxes are staggered. 7. No packages shall be "cant" stowed. 8. Dunnage shall be applied to the sides, ends and tops of the boxes before bracing is applied. 9. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 10. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with this class of chemical warfare material. 12. The maximum permitted weight per draft when handled by tray, skipboard, pallet or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 13. Single bombs or other unit containers weighing in excess of 2,200 lbs. must be loaded or unloaded one at a time. 14. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 15. Lifts of palletized units shall not be bend except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 16. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

§146.29-100 Classification, handling and stowage chart—*(Continued)*

Class	Description	DOT Marking	DOT Class	Hazard	Stowage	Handling
JO-C Fuels in containers for guided missiles and rockets	Missile fuels are usually non-corrosive, highly combustible mixtures, shipped in drums of aluminum or glass containers, used as fuels for guided missiles or rockets. Includes but is not limited to: Acetonitrile (methyl cyanide). Aluminum borohydride. Anhydrous ammonia. Aniline. Diborane. Diethylene triamine. Diethylene glycol dinitrate, liquid. Dimethyl hydrazine, unsymmetrical Ethyl alcohol. Furfuryl alcohol. Gasoline (AVGAS). Heptane. Hydrazine. Hydrazine hydrate. Kerosene. Liquid fluorine Liquid hydrogen. Methyl alcohol. Monoethylaniline. Nitroglycerine, liquid. Nitromethane. Octane. Pentaborane. Pentane. Potassium cuprocyanide. Tetranitromethane.	Shipping name of item.	FG., FL., FS., Oxi M., Nonfl G. Pois B	The principal hazard is its involvement in a fire since all of the fuels are highly combustible and toxic and under certain conditions will explode. Aniline furfuryl alcohol mixtures are toxic through inhalation of the fumes or vapors, ingestion, and absorption through the skin. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased. Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the containers with resulting leakage or spillage.	This class will not be stowed with any corrosive liquid (acids, etc.), oxidizing agents, or explosives. For stowage adjacent to other dangerous articles see § 146.29-59. May be stowed "On deck" and protected from direct rays of the sun and inclement weather, or may be stowed in a deep tank and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. Pertinent parts of § 146.29-85 apply. Compatibility of items within this class shall be in accordance with § 146.29-99, Chart B. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. This requirement also applies to non-compatible items within this class. Preferred "On deck" stowage is aft. Drums may be tiered 2-high by use of metal dunnage of aluminum. When stowed on deck, the weather deck must be tight and the cargo hatch fitted with a tight raised coaming. The stowage must be accomplished by means of a crib and a platform so constructed as to provide a free space of at least six inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur. The stowage must not be made over the square of the hatch. If stowed aboard a vessel carrying no other military explosives, see § 146.29-11(b).	When possible, and the amount of substance warrants, the loading and stowage of fuels should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means using extreme care against damage to the container resulting in leakage or spillage. 2. Do not drop, drag, tumble, walk or otherwise subject packages or drums to shock. Drums will not be rolled. 3. Packages shall be stowed in the position indicated by their markings, drums and kegs shall be stowed on end with bung holes up. 4. Do not use chute in loading or unloading. 5. Observe packages or drums for leakage or spillage and for odor of aniline or alcohol in the case of aniline furfuryl alcohol shipments. If no odor is present and no evidence of leakage is present, the shipment is assumed to be in safe working condition and the cargo can be handled by personnel wearing the usual type of leather gloves and safety shoes. No other type of protective clothing will be required, however, in this operation as well as all other operations involving aniline furfuryl alcohol mixtures, the safe type of deluge shower and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 6. In the event of damage to a container resulting in leakage or spillage, stop operations, clear area of all personnel, render first aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled with a minimum delay by personnel trained in this procedure and equipped with protective clothing and self-contained breathing apparatus. 7. Cargo handling stevedore gear may be trays, skidboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 8. Cargo nets without trays, skidboards, pallets or pieplates are not permitted. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 10. The maximum permitted weight per draft, when handled by pallet, skidboard, tray or pieplate fitted with cargo nets or sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

xo-O Oxidizers in containers for guided missiles and rockets.	Oxidizers for use with guided missiles and rockets are non-flammable liquids; however, they are strong oxidizers and if allowed to come in contact with readily organic materials or metallic powders, may cause spontaneous combustion. They are highly toxic producing poisonous vapors and fumes and capable of producing severe burns or death if improperly handled. Fuming nitric acid vigorously attacks most metals, particularly iron and steel. Includes but is not limited to: Compressed gas, oxygen. Hydrogen peroxide. Liquid nitrogen tetroxide. Liquid oxygen. Mixed acid (nitric-sulfuric) Red nitric acid, fuming. White nitric acid, fuming	Shipping name of item.	Cat I. Nonl. G Oxy M.	The principal hazards arise from the combustibility of organic materials when in contact with acids and the toxicity of fumes and vapors produced. The oxides of nitrogen, referred to as "nitrous fumes" if inhaled in appreciable quantities, may cause severe damage to respiratory and pulmonary tissues and, under certain conditions, may result in death. Color of the fumes is not an index to their toxicity. All nitric acid fumes are dangerous. Contact with the skin results in severe burns and may result in permanent scars or deformity. Contact with the eyes may cause blindness. Red Fuming Nitric Acid (RFNA) is not flammable in itself and cannot be detonated, but the combustibility of all organic material is greatly increased in contact with this acid. This acid is very hygroscopic (completely soluble), and its introduction INTO water will cause rapid evolution of heat with spattering of the acid. RFNA vigorously attacks most metals, particularly iron and steel. Nitric acid will react with salt water to liberate chlorine and other poisonous gases. Winterized water fire extinguishers containing salt as a freezing point depressant, should not be used to fight fires involving nitric acid. The use of large quantities of water, as a spray rather than a stream, to dilute the acid and extinguish the fire, is effective. Fire extinguishers of a suitable type should be provided wherever this acid is handled or stowed.	This class will not be stowed with any inflammable liquid fuels, metallic powders, or explosives. For stowage adjacent to other dangerous articles see § 146.29-59. May be stowed "On deck" and protected from direct rays of the sun and inclement weather, or may be stowed in a deep tank and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. Pertinent parts of § 146.29-85 apply. Compatibility of items within this class shall be in accordance with § 146.29-99, Chart B. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. This requirement also applies to non-compatible items within this class. Preferred "On deck" stowage is aft. Drums may be tiered 2 high by use of metal dunnage of aluminum. When stowed on deck, the weather deck must be light and the cargo hatch fitted with a light raised coaming. The stowage must be accomplished as to provide a free space of at least six inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur. The stowage must not be made over the square of the hatch. If stowed aboard a vessel carrying no other military explosives, see § 146.29-11(b).	When possible, and the amount of substance warrants, the loading and stowage of oxidizers and acids should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means using extreme care against damage to the container resulting in leakage or spillage. 2. Do not drop, drag, tumble, walk, or otherwise subject packages or drums to shock. Drums will not be rolled. 3. Packages shall be stowed in the position indicated by their markings; drums and kegs shall be stowed on end with bung holes up. 4. Do not use chute in loading or unloading. 5. Visually inspect packages or drums for evidence of spillage or leakage and for odor of nitrous dioxide fumes in the case of fuming nitric acid shipments. If no odor is detected and no fumes are visible, the shipment is assumed to be in safe working condition and the cargo can be handled by personnel wearing gloves and aprons of acid-resistant material, safety shoes and eye goggles. No other type of protective clothing will be required, however, two complete sets of acid-resistant protective clothing, including a self-contained breathing apparatus, of an approved type, must always be immediately available for emergency use. In this operation, as well as all other operations involving fuming nitric acid, a safe type of deluge showers and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 6. In the event of damage to a container resulting in leakage, spillage or fumes, stop operations, clear area of all personnel, render first aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled with a minimum delay by personnel trained in this procedure and equipped with approved type of protective clothing and self-contained breathing apparatus. Damaged containers will be removed only by such personnel. 7. Cargo handling slevedore gear may be trays, skidboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays fitted with fixed or removable sides are authorized. 8. Cargo nets without trays, skidboards, pallets or pieplates are not permitted. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 10. The maximum permitted weight per draft, when handled by pallet, skidboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.

IM TANK TABLE

A TABLE LISTING HAZARDOUS MATERIALS APPROVED BY THE ASSOCIATE DIRECTOR FOR HAZARDOUS MATERIALS REGULATION, MATERIALS TRANSPORTATION BUREAU, FOR CARRIAGE IN INTERMODAL PORTABLE TANKS UNDER SPECIFIED CONDITIONS.

U.S. DEPARTMENT OF TRANSPORTATION

RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
MATERIALS TRANSPORTATION BUREAU

January 1, 1981

This Table must be used in conjunction with the regulations that apply to the use of IM portable tanks set forth in 49 CFR Parts 171–189 and specifies additional conditions under which a hazardous material is approved for transportation in a specification IM 101 or IM 102 portable tank (see § 173.32c).

The most recent IM Tank Table and any subsequent amendments are available from the Dockets Branch (DCA-22), Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590. The Dockets Branch is located in Room 8426 of the Nassif Building, 400 Seventh Street, S.W., Washington, D.C. The office hours are 8:00 a.m. to 4:30 p.m., Monday thru Friday.

Procedures for adding, deleting, or modifying materials to the IM Tank Table

Any person seeking to add to or change an entry in the IM Tank Table must submit an application to the Associate Director for Hazardous Materials Regulation (DMT-20), Materials Transportation Bureau, Washington, D.C. 20590 (see 49 CFR 173.32d). Each application, submitted in duplicate and titled "Proposed Addition (or Change) to IM Tank Table," must contain the following information:

a. Name and address of applicant.
b. Name and address of USA representative if applicant is based in a foreign country.
c. Information concerning material:
   1. Common industrial name.
   2. Chemical name.
   3. DOT shipping name.
   4. DOT hazard class.
   5. UN hazard class.
   6. UN number.
   7. Specific gravity at 20°C (water taken as 1).
   8. Absolute vapor pressure (psia or mm Hg) at 50°C.
   9. Boiling point (°C).
   10. Flash point (°C) closed cup (specify method).
   11. Is material pyrophoric?
   12. Does material require inert gas atmosphere?
   13. Coefficient of thermal expansion.
   14. Total emergency venting capacity required for tank in standard cubic feet per hour calculated in accordance with formulas in CGA Pamphlet S-1.2, IMCO CODE, Volume II, paragraph 13.1.13.6.3 or UN Recommendations on Multimodal Tank Transport, paragraph 12.13.2. Calculations must be provided.
   15. Toxicity:
      (i) Oral LD_{50}
      (ii) Dermal LD_{50}
      (iii) Inhalation LC_{50}
      (iv) Is material considered a lachrymater?
   16. Corrosivity:
      (i) Skin (apply test prescribed in § 173.240)
      (ii) Steel (1020) at 55 C (mm/yr.).
      (iii) Aluminum (7075 T-6) at 55 C (mm/yr.).
      (iv) Metal of which tank is constructed at 55 C (mm/yr.).
   17. Stability:
      Does material require inhibition or stabilization?
      If yes, what is:
      (i) Inhibitor or stabilizer.
      (ii) Duration of effectiveness.
d. Applicant's proposals concerning:
   1. IM tank type (101 or 102).
   2. Design pressure.
   3. Type of pressure relief devices.
   4. Bottom outlets.
   5. Minimum shell thickness.

Use of the Table

(a) Locate the proper shipping name of the material in 49 CFR 172.101.
(b) Follow across the Hazardous Materials Table in § 172.101 to column (5)(b) for section(s) referenced in Part 173.
(c) Check the sections referenced in Part 173 to determine if IM portable tanks are authorized for the material.
(d) If a referenced section contains an authorization for an IM portable tank, locate the most specific and appropriate description of the material in the IM Tank Table. Some descriptions listed in the IM Tank Table are not proper shipping names. A material described by an "n.o.s." entry in § 172.101 may be listed in the IM Tank Table by a general description or by a technical name, or both. (For example, "Flammable liquid, n.o.s." in § 172.101 is listed in the IM Tank Table as "Flammable liquids not listed by name in this table." Where both the technical description and a general description of a material are listed, the technical description must be used, in determining the specific requirements of the IM Tank Table that are applicable.

Outage

Section 173.32c specifies that the outage in an IM portable tank may not be less than 2 percent at a temperature of 50°C (122°F). The maximum extent to which a tank may be filled with liquid at a filling temperature (t_f) to insure that the minimum 2% outage is maintained may be determined by the following formula:

Maximum filling density at $t_f = 98/(1 + a(T_r - T_f))$
(percent by volume)

Where:

a = mean coefficient of cubical expansion of the liquid between temperatures t_f and T_r and may be determined as follows:

For metric units
$a = (d_{15} - d_{50})/(35\ d_{50})$
For nonmetric units
$a = (d_{59} - d_{122})/(63\ d_{122})$

T_r = maximum temperature of the liquid in the tank 50°C (122°F.)
t_f = actual temperature of the liquid in the tank in °C or °F as appropriate
d_{15} = density of the liquid at 15°C.
d_{50} = density of the liquid at 50°C.
d_{59} = density of the liquid at 59°F.
d_{122} = density of the liquid at 122°F.

Format of IM Tank Table

(a) Column (1) provides the description of the hazardous material. These descriptions are to be used to determine required construction features on tanks which contain a material meeting the description, but *may not* be used on shipping papers in place of the appropriate proper shipping name (see § 172.203(1)).
(b) Column (2) contains Identification Numbers (UN or NA).
(c) Column (3) specifies the IM specification tank required.
(d) Column (4) specifies the lowest Maximum Allowable Working Pressure (MAWP) in bars required for the tank. The equivalent pressures in psig is as follows:
1.0 bar = 14.5 psig 2.67 bar = 38.7 psig
1.75 bar = 25.4 psig 4.0 bar = 58.0 psig
(e) Column (5) specifies the type of pressure relief devices arrangement required on the tank. Hazardous materials authorized for transport in a tank fitted with a "Normal" pressure relief device arrangement are also authorized for transport in a tank fitted with a "Special" pressure relief device arrangement.
(1) "Normal"—Means that 178.270-11 (a)(1) or (2) applies.
(2) "Special"—Means that, in addition to the requirements of § 178.270-11 (a)(1) or (2), a frangible disc shall be used in

For explanation of abbreviations and reference marks, see last page of this tariff.

series with the required relief valve. This arrangement of the relief valve and frangible disc must conform to § 178.270-11(a)(3). However, a frangible disc is not required for tanks in dedicated service if the relief valve is corrosion resistant to, and otherwise compatible with, the lading.

(f) Column (6) provides requirements for the arrangement of bottom openings:

(1) "Prohibited"—Means bottom openings are prohibited.

(2) "A"—Means bottom openings having two serially mounted closures as provided in 49 CFR 173.32c(g)(1) are authorized;

(3) "B"—Means each filling or discharge connection located below the normal liquid level of the tank, or compartment thereof, must have three serially-mounted closures as provided in 49 CFR 173.32c(g)(2). The three closures shall consist of an internal discharge valve capable of being closed from a location remote from the valve itself, an external valve, and a bolted blank flange or other suitable, liquid-tight closure on the outlet side of the external valve.

(4) Hazardous materials authorized for transport in a tank fitted with bottom outlets having two serially mounted closures are also authorized for transport in a tank fitted with three serially mounted closures and in tanks fitted with no bottom outlets. Similarly, hazardous materials authorized for transport in tanks fitted with bottom outlets having three serially mounted closures are also authorized for transport in tanks fitted with no bottom outlets.

(g) Column (7) provides requirements for minimum shell thickness:

(1) "Standard"—Means the requirements of 49 CFR 178.270-5 or 49 CFR 178.272-2 apply as appropriate;

(2) When a specific thickness is specified it is the actual specified minimum shell and head thickness in mild steel and the requirements of 49 CFR 178.270-5(d) apply.

(3) Hazardous materials authorized for transport in a tank with a standard shell thickness are also authorized for transport in a tank of greater specified minimum thickness.

(h) Column (8) contains reference to special provisions specified in this paragraph as follows:

"a" means a nitrogen or other inert gas blanket is required.

"b" means a 5mm lead lining, or other suitable lining materials approved by the Associate Director for HMR, is required.

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Acetal	UN 1088	101	1.75	Normal	A	Standard	
Acetaldehyde	UN 1089	101	4.0	Normal	B	6.35 mm	a
Acetaldehyde oxime	UN 2332	101	1.75	Normal	B	Standard	
Acetic acid, glacial (or over 80 percent solution)	UN 2789	101	1.75	Normal	B	Standard	
Acetic acid, solution (over 10 percent but not greater than 80 percent)	UN 2790	101	1.75	Normal	B	Standard	
Acetic anhydride	UN 1715	101	1.75	Normal	B	Standard	
Acetone	UN 1090	101	1.75	Normal	B	Standard	
Acetone cyanohydrin	UN 1541	101	2.67	Special	Prohibited	6.35 mm	
Acetone oils							
(a) Flashpoint below 32 deg F	UN 1091	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1091	102	1.0	Normal	A	Standard	
Acetonitrile (methyl cyanide)	UN 1648	101	2.67	Normal	B	Standard	
Acetyl bromide	UN 1716	101	1.75	Special	Prohibited	6.35 mm	
Acetyl chloride	UN 1717	101	2.67	Special	Prohibited	Standard	
Acetylene tetrabromide	UN 2504	101	1.75	Normal	A	Standard	
Acetyl iodide	UN 1898	101	1.75	Normal	Prohibited	Standard	
Acetyl methyl carbinol	UN 2621	102	1.0	Normal	A	Standard	
Acid butyl phosphate (butyl acid phosphate)	UN 1718	101	1.75	Normal	A	Standard	
Acid, sludge (sludge acid)	UN 1906	101	1.75	Normal	Prohibited	8 mm	
Acrolein dimer, [inhibited]	UN 2607	101	1.75	Normal	B	Standard	
Acrolein, inhibited	UN 1092	Not authorized for transportation in IM101 or IM102 tanks					
Acrylamide (aqueous solutions)	UN 2074	101	1.75	Normal	B	Standard	
Acrylic acid, [inhibited]	UN 2218	101	1.75	Normal	B	Standard	
Acrylonitrile, [inhibited]	UN 1093	101	2.67	Special	Prohibited	6.35 mm	
Adiponitrile	UN 2205	102	1.0	Normal	A	Standard	
Alcohol, not listed by name in this table.							
(a) Flashpoint below 32 deg F	Various	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	Various	102	1.0	Normal	A	Standard	
Aldol	UN 2839	101	1.75	Normal	B	Standard	
Aliphatic mercaptan mixtures. [See] Mercaptans, liquid							
Alkaline battery fluid (battery fluid, alkaline)	UN 2797	101	1.75	Normal	B	Standard	
Alkaline [corrosive] liquid. [See] Corrosive liquid							
Alkyl aluminum hydides	—	Not authorized for transportation in IM101 or IM102 tanks					
Alkyl, aryl or toluene sulfonic acid, liquid							
(a) With more than 5 percent free sulfuric acid	UN 2584	101	1.75	Normal	B	8 mm	
(b) With not more than 5 percent free sulfuric acid	UN 2586	101	1.75	Normal	B	Standard	
Allyl acetate	UN 2333	101	1.75	Normal	B	Standard	
Allyl alcohol	UN 1098	101	2.67	Special	Prohibited	Standard	
Allylamine	UN 2334	101	2.67	Special	Prohibited	6.35 mm	
Allyl bromide	UN 1099	101	2.67	Special	Prohibited	Standard	
Allyl chloride	UN 1100	101	2.67	Special	Prohibited	6.35 mm	
Allyl chlorocarbonate ([allyl chloroformate])	UN 1722	101	2.67	Special	Prohibited	6.35 mm	
Allyl ethyl ether	UN 2335	101	1.75	Normal	B	Standard	
Allyl formate	UN 2336	101	2.67	Special	Prohibited	6.35 mm	
Allyl glycidyl ether	UN 2219	101	1.75	Normal	A	Standard	

IM TANK TABLE
January 1, 1981

For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Require-ments
Allyl iodide	UN 1723	101	2.67	Special	Prohibited	Standard	
Allyl isothiocyanate, [inhibited]	UN 1545	101	2.67	Special	B	Standard	
Allyltrichlorosilane, [inhibited]	UN 1724	101	1.75	Normal	B	6.35 mm	
Aluminum alkyls	Various	Not authorized for transportation in IM101 or IM102 tanks					
Aluminum borohydride	UN 2870	Not authorized for transportation in IM101 or IM102 tanks					
Aluminum bromide, solution	UN 2580	101	1.75	Normal	B	Standard	
Aluminum chloride, solution	UN 2581	101	1.75	Normal	B	Standard	
a-Aminoethylpiperazine	UN 2815	101	1.75	Normal	A	Standard	
Ammonium dinitro-o-cresolate, aqueous solutions	UN 1843	101	1.75	Normal	B	Standard	
Ammonium hydrogen fluoride, solution	UN 2817	101	2.67	Normal	Prohibited	Standard	
Ammonium hydroxide ([ammonia solution, containing 35 percent or less ammonia in water])	UN 2672	101	2.67	Normal	B	Standard	
Ammonium polysulphide solution	UN 2818	101	2.67	Normal	B	Standard	
Ammonium sulfide, solution	UN 2683	101	2.67	Normal	B	Standard	
Amyl acetate	UN 1104	102	1.0	Normal	A	Standard	
Amyl acid phosphate	UN 2819	101	1.75	Normal	A	Standard	
Amyl alcohols	UN 1105	102	1.0	Normal	A	Standard	
Amylamine	UN 1106	102	1.0	Normal	A	Standard	
Amyl butyrates	UN 2620	102	1.0	Normal	A	Standard	
Amyl chloride	UN 1107	102	1.0	Normal	A	Standard	
Amylene, [normal]	UN 1108	101	2.67	Normal	B	Standard	
Amyl formates	UN 1109	102	1.0	Normal	A	Standard	
Amyl mercaptan	UN 1111	101	1.75	Normal	B	Standard	
Amyl methyl ketone	UN 1110	102	1.0	Normal	A	Standard	
Amyl nitrate	UN 1112	102	1.0	Normal	A	Standard	
Amyl nitrite	UN 1113	101	1.75	Normal	B	Standard	
Amyltrichlorosilane	UN 1728	101	1.75	Normal	B	6.35 mm	
Aniline oil, liquid ([aniline])	UN 1547	101	1.75	Normal	B	Standard	
ortho-Anisidine	UN 2431	102	1.0	Normal	A	Standard	
Anisole	UN 2222	102	1.0	Normal	A	Standard	
Anisoyl chloride	UN 1729	101	1.75	Normal	B	Standard	
Antimony pentachloride	UN 1730	101	1.75	Normal	B	6.35 mm	
Antimony pentachloride solution	UN 1731	101	1.75	Normal	B	8 mm	
Antimony pentafluoride	UN 1732	101	1.75	Special	Prohibited	6.35 mm	
Arsenic acid solution	UN 1553	101	2.67	Special	Prohibited	8 mm	
Arsenic trichloride, liquid	UN 1560	101	2.67	Special	Prohibited	6.35 mm	
Aryl sulfonic acid. [See] Alkyl, aryl or toluene sulfonic acid							
Asphalt, cut back. [See] Tars, liquid							
Barium chlorate, solution	UN 1445	101	1.75	Normal	B	Standard	
Barium perchlorate, solution	UN 1447	101	1.75	Normal	B	Standard	
Battery fluid, acid	UN 2796	101	1.75	Normal	Prohibited	8 mm	
Battery fluid, alkali	UN 2797	101	1.75	Normal	B	Standard	
Benzene	UN 1114	101	1.75	Normal	B	Standard	
Benzene phosphorus dichloride ([phenyl phosphorus dichloride])	UN 2798	101	1.75	Normal	B	6.35 mm	
Benzene phosphorus thiodichloride ([phenyl phosphorus thiodichloride])	UN 2799	101	1.75	Normal	B	6.35 mm	

IM TANK TABLE
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(1) Hazardous Materials Descriptions (Entry of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Benzene sulfonyl chloride	UN 2225	101	1.75	Normal	B	Standard	
Benzonitrile	UN 2224	101	2.67	Normal	B	Standard	
Benzotrichloride	UN 2226	101	2.67	Normal	Prohibited	Standard	
Benzotrifluoride	UN 2338	102	1.0	Normal	B	Standard	
Benzoyl chloride	UN 1736	101	1.75	Normal	Prohibited	6.35 mm	
Benzoyl bromide	UN 1737	101	1.75	Special	Prohibited	6.35 mm	
Benzyl chloride	UN 1738	101	1.75	Special	Prohibited	6.35 mm	
Benzyl chlorocarbonate	UN 1739	101	2.67	Special	Prohibited	6.35 mm	
Benzyl cyanide	UN 2470	101	1.75	Normal	B	Standard	
Benzyl dimethylamine	UN 2619	102	1.0	Normal	A	Standard	
Benzylidene chloride	UN 1886	101	1.75	Normal	B	Standard	
Benzyl iodide	UN 2653	101	1.75	Normal	B	Standard	
1,2-Bis-(dimethylamino) ethane	UN 2372	101	1.75	Normal	B	Standard	
Boron tribromide	UN 2692	Not authorized for transportation in IM101 or IM102 tanks					
Boron trichloride	UN 1741	Not authorized for transportation in IM101 or IM102 tanks					
Boron trifluoride	UN 1008	Not authorized for transportation in IM101 or IM102 tanks					
Boron trifluoride—acetic acid complex	UN 1742	101	1.75	Normal	Prohibited	8 mm	
Boron trifluoride diethyl etherate	UN 2604	101	1.75	Normal	B	6.35 mm	
Boron trifluoride dihydrate	UN 2851	101	1.75	Normal	Prohibited	8 mm	
Boron trifluoride—propionic acid complex	UN 1743	101	1.75	Normal	Prohibited	8 mm	
Brake fluid							
(a) Flashpoint below 32 deg F	UN 1118	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1118	102	1.0	Normal	A	Standard	
Bromine [bromine solutions]	UN 1744	101	2.67	Special	Prohibited	12 mm	b
Bromine pentafluoride	UN 1745	Not authorized for transportation in IM101 or IM102 tanks					
Bromine trifluoride	UN 1746	Not authorized for transportation in IM101 or IM102 tanks					
1-Bromo-3-methylbutane	UN 2341	102	1.0	Normal	A	Standard	
Bromoacetic acid, solution	UN 1938	101	1.75	Normal	Prohibited	Standard	
Bromoacetone, liquid	UN 1569	Not authorized for transportation in IM101 or IM102 tanks					
Bromoacetyl bromide	UN 2513	101	1.75	Normal	Prohibited	6.35 mm	
Bromobenzene	UN 2514	102	1.0	Normal	A	Standard	
Bromobenzyl cyanide	UN 1694	Not authorized for transportation in IM101 or IM102 tanks					
2-Bromobutane	UN 2339	102	1.0	Normal	A	Standard	
Bromochloromethane	UN 1887	101	1.75	Normal	A	Standard	
2-Bromoethyl ethyl ether	UN 2340	101	1.75	Normal	A	Standard	
Bromoform	UN 2515	101	1.75	Normal	A	Standard	
Bromomethylpropanes	UN 2342	101	1.75	Normal	A	Standard	
2-Bromopentane	UN 2343	102	1.0	Normal	A	Standard	
Bromopropanes	UN 2344	101	1.75	Normal	A	Standard	
3-Bromopropyne	UN 2345	101	1.75	Normal	B	Standard	
Butadiyne	UN 2708	102	1.0	Normal	A	Standard	
Butyl acetates	UN 1123	102	1.0	Normal	A	Standard	
iso-Butyl acrylate	UN 2527	101	1.75	Normal	B	Standard	
Butyl acrylate, [inhibited]	UN 2348	101	1.75	Normal	B	Standard	
Butyl alcohols [butanols]	UN 1120	102	1.0	Normal	A	Standard	

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January 1, 1991

For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Butylamine, [normal]	UN 1125	101	1.75	Normal	B	Standard	
N-Butylaniline	UN 2738	101	1.75	Normal	B	Standard	
Butyl benzenes	UN 2709	102	1.0	Normal	A	Standard	
Butyl bromide, [normal]	UN 1126	102	1.0	Normal	A	Standard	
Butyl chlorides ([chlorobutanes])	UN 1127	101	1.75	Normal	B	Standard	
n-Butyl chloroformate	UN 2743	101	2.67	Special	Prohibited	Standard	
tert-Butylcyclohexyl chloroformate	UN 2747	101	1.75	Normal	B	Standard	
Butyl ether ([dibutyl ether])	UN 1149	102	1.0	Normal	B	Standard	
Butyl formate, [normal]	UN 1128	102	1.0	Normal	A	Standard	
N-n-Butyl imidazole	UN 2690	101	1.75	Normal	B	Standard	
n-Butyl isocyanate	UN 2485	101	1.75	Normal	Prohibited	Standard	
tert-Butyl isocyanate	UN 2484	101	2.67	Special	Prohibited	6.35 mm	
Butyl mercaptan ([butane-1-thiol])	UN 2347	101	1.75	Normal	B	Standard	
n-Butyl methacrylate	UN 2227	102	1.0	Normal	A	Standard	
Butyl methyl ether	UN 2350	101	1.75	Normal	B	Standard	
Butyl nitrite	UN 2351	101	1.75	Normal	B	Standard	
Butyl phenols, liquid	UN 2228	101	1.75	Normal	A	Standard	
Butyl propionate	UN 1914	102	1.0	Normal	A	Standard	
Butyl toluenes	UN 2667	102	1.0	Normal	B	Standard	
Butyltrichlorosilane	UN 1747	101	1.75	Normal	B	6.35 mm	
Butyl vinyl ether, [inhibited]	UN 2352	101	1.75	Normal	A	Standard	
Butyraldehyde	UN 1129	101	1.75	Normal	B	Standard	
Butyraldoxime	UN 2840	102	1.0	Normal	A	Standard	
Butyric acid	UN 2820	102	1.0	Normal	A	Standard	
Butyric anhydride	UN 2739	102	1.0	Normal	B	Standard	
Butyronitrile	UN 2411	101	2.67	Normal	B	Standard	
Butyryl chloride	UN 2353	101	1.75	Normal	Prohibited	6.35 mm	
Caesium hydroxide, solution	UN 2681	101	1.75	Normal	B	Standard	
Calcium chlorate, solution	UN 2429	101	1.75	Normal	B	Standard	
Calcium perchlorate, solution	UN 1455	101	1.75	Normal	B	Standard	
Camphor oil	UN 1130	102	1.0	Normal	A	Standard	
Carbolic acid, solutions, [See] Phenol, solutions							
Carbon bisulfide	UN 1131	Not authorized for transportation in IM101 or IM102 tanks					
Carbon tetrachloride	UN 1846	101	1.75	Normal	B	Standard	
Cement, containing linoleum, tile, rubber, pyroxylin and wallboard, [See] Cement liquid							
Cement, liquid (Adhesive, liquid):							
(a) Flashpoint below 32 deg F	UN 1133	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1133	102	1.0	Normal	A	Standard	
Chloral, anhydrous, [inhibited]	UN 2075	101	2.67	Normal	B	Standard	
Chlorate and Magnesium chloride mixtures, solution	UN 1459	101	1.75	Normal	B	Standard	
Chloric acid, solution, ([not more than 10 percent by weight])	UN 2626	Not authorized for transportation in IM101 or IM102 tanks					
Chlorine trifluoride	UN 1749	Not authorized for transportation in IM101 or IM102 tanks					
1-Chloro-3-bromopropane	UN 2688	102	1.0	Normal	B	Standard	
Chloroacetaldehyde	UN 2232	101	1.67	Special	B	Standard	

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(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Chloroacetic acid, liquid [or] solution ([monochloroacetic acid, liquid or solution])	UN 1750	101	1.75	Normal	Prohibited	8 mm	
Chloroacetone, [stabilized]	UN 1695	Not authorized for transportation in IM101 or IM102 tanks					
Chloroacetonitrile	UN 2668	101	1.75	Normal	B	Standard	
Chloroacetophenone, liquid	UN 1697	Not authorized for transportation in IM101 or IM102 tanks					
Chloroacetyl chloride	UN 1752	101	1.75	Normal	Prohibited	6.35 mm	
Chloroanilines, liquid	UN 2019	101	2.67	Normal	B	Standard	
Chlorobenzene ([chlorobenzol])	UN 1134	102	1.0	Normal	A	Standard	
Chlorobenzotrifluorides	UN 2234	102	1.0	Normal	A	Standard	
p-Chlorobenzyl chloride	UN 2235	101	1.75	Normal	B	Standard	
Chlorocresols	UN 2669	101	1.75	Normal	B	Standard	
Chloroform	UN 1888	101	2.67	Normal	B	Standard	
Chloromethylchloroformate	UN 2745	101	2.67	Special	Prohibited	Standard	
Chloromethyl ethyl ether	UN 2354	101	1.75	Normal	B	Standard	
Chloromethylpropanes	UN 2554	101	1.75	Normal	B	Standard	
Chloronitrobenzenes ([nitrochlorobenzenes])	UN 1578	101	2.67	Normal	B	Standard	
4-Chloro-o-toluidine hydrochloride	UN 1579	101	2.67	Normal	B	Standard	
Chlorophenols, liquid	UN 2021	101	1.75	Normal	A	Standard	
Chlorophenyltrichlorosilane	UN 1753	101	1.75	Normal	B	6.35 mm	
Chloropicrin, liquid	UN 1580	Not authorized for transportation in IM101 or IM102 tanks					
Chloroprene, [inhibited]	UN 1991	101	2.67	Special	Prohibited	Standard	
2-Chloropropane	UN 2356	101	2.67	Normal	B	Standard	
3-Chloropropanol-1	UN 2849	101	1.75	Normal	B	Standard	
1,3-Chloropropanol-2	UN 2750	101	1.75	Normal	B	Standard	
2-Chloropropene	UN 2456	101	2.67	Normal	B	Standard	
alpha-Chloropropionic acid, aqueous solutions	UN 2511	101	1.75	Normal	B	Standard	
2-Chloropyridine	UN 2822	101	2.67	Normal	B	Standard	
Chlorosulphonic acid	UN 1754	101	1.75	Special	Prohibited	8 mm	
Chlorotoluenes	UN 2238	102	1.0	Normal	A	Standard	
Chlorotoluidines	UN 2239	101	1.75	Normal	A	Standard	
Chromic acid, solution	UN 1755	101	1.75	Normal	C	8 mm	
Chromic fluoride, solution	UN 1757	101	1.75	Normal	B	Standard	
Chromium oxychloride [or] Chromyl chloride	UN 1758	101	1.75	Special	Prohibited	6.35 mm	
Chromosulfuric acid	UN 2240	101	1.75	Special	Prohibited	8 mm	
Coal tar distillate							
(a) Flashpoint below 32 deg F	UN 1136	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1137	102	1.0	Normal	A	Standard	
Coating solution							
(a) Flashpoint below 32 deg F	UN 1139	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1139	102	1.0	Normal	A	Standard	
Combustible liquid, not listed by name in this table	Various	102	1.0	Normal	A	Standard	
Corrosive liquid, not listed by name in this table ([vapor pressure not greater than 43 psia at 122 deg F and no subsidiary hazards])							
(a) Causing irreversible damage to tissue in 3 minutes or less	Various	Must be specifically authorized prior to transportation. See 49CFR173.32c(d)					
(b) Causing irreversible damage to tissue in greater than 3 minutes but in not more than one hour	Various	101	2.67	Normal	B	Standard	

(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
(c) Liquids not in (a) or (b) above	Various	101	1.75	Normal	A	Standard	
Cresols	UN 2076	101	1.75	Normal	B	Standard	
Cresylic acid	UN 2022	101	1.75	Normal	B	Standard	
Crotonaldehyde, [stabilized]	UN 1143	101	1.75	Normal	B	Standard	
Crotonylene	UN 1144	101	4.0	Normal	B	Standard	
Crude oil [See] Petroleum crude oil							
Cuprietylene diamine, solution	UN 1761	101	1.75	Normal	B	6.35 mm	
Cyanide solutions	UN 1935	101	2.67	Special	Prohibited	6.35 mm	
Cyanogen bromide	UN 1889	Not authorized for transportation in IM101 or IM102 tanks					
Cyclobutyl chloroformate	UN 2744	101	2.67	Special	Prohibited	Standard	
1,5,9 Cyclododecatriene	UN 2518	101	1.75	Normal	A	Standard	
Cycloheptane	UN 2241	102	1.0	Normal	A	Standard	
Cycloheptatriene	UN 2603	101	2.67	Normal	B	Standard	
Cycloheptene	UN 2242	101	1.75	Normal	A	Standard	
Cyclohexane	UN 1145	101	1.75	Normal	B	Standard	
Cyclohexanone	UN 1915	102	1.0	Normal	A	Standard	
Cyclohexene	UN 2256	101	1.75	Normal	A	Standard	
Cyclohexenyltrichlorosilane	UN 1762	101	1.75	Normal	B	6.35 mm	
Cyclohexyl acetate	UN 2243	102	1.0	Normal	A	Standard	
Cyclohexylamine	UN 2357	101	1.75	Normal	B	6.35 mm	
Cyclohexyl isocyanate	UN 2488	101	1.75	Normal	B	Standard	
Cyclohexyltrichlorosilane	UN 1763	101	1.75	Normal	B	6.35 mm	
Cyclooctadienes	UN 2520	102	1.0	Normal	A	Standard	
Cyclooctatetraene	UN 2358	101	1.75	Normal	B	Standard	
Cyclopentane	UN 1146	101	2.67	Normal	B	Standard	
Cyclopentanol	UN 2244	102	1.0	Normal	A	Standard	
Cyclopentanone	UN 2245	102	1.0	Normal	A	Standard	
Cyclopentene	UN 2246	101	2.67	Normal	A	Standard	
Cymenes	UN 2046	102	1.0	Normal	A	Standard	
Decahydronaphthalene	UN 1147	102	1.0	Normal	A	Standard	
n-Decane	UN 2247	102	1.0	Normal	A	Standard	
Di (2-ethylhexyl) phosphoric acid [See] Diisooctyl acid phosphate							
Diacetone alcohol	UN 1148	102	1.0	Normal	A	Standard	
Diacetyl (2,3-butanedione))	UN 2346	102	1.0	Normal	A	Standard	
Dialylamine	UN 2359	101	1.75	Normal	B	Standard	
Diallyl ether	UN 2360	101	1.75	Normal	B	Standard	
Dibenzyldichlorosilane	UN 2434	101	1.75	Normal	B	6.35 mm	
Dibromobenzene	UN 2711	102	1.0	Normal	A	Standard	
Dibromochloropropane	UN 2872	101	1.75	Normal	A	Standard	
Dibromodifluoromethane	UN 1941	101	2.67	Normal	A	Standard	
Dibutylaminoethanol	UN 2873	102	1.0	Normal	A	Standard	
Dibutyl ethers	UN 1149	102	1.0	Normal	A	Standard	
1,1-Dichloro-1-nitroethane	UN 2650	101	1.75	Normal	B	Standard	
Dichloroacetic acid	UN 1764	101	1.75	Normal	C	8 mm	
Dichloroacetyl chloride	UN 1765	101	1.75	Normal	B	6.35 mm	

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(1) Hazardous Materials Descriptions [many of these descriptions are not proper shipping names. See 172.101 for proper shipping name]	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Dichloroanilines	UN 1590	101	2.67	Normal	B	Standard	
ortho-Dichlorobenzene	UN 1591	101	1.75	Normal	A	Standard	
Dichlorodimethyl ether, [symmetrical]	UN 2249	Not authorized for transportation in IM101 or IM102 tanks					
1,1-Dichloroethane	UN 2362	101	1.75	Normal	A	Standard	
Dichloroethylene	UN 1150	101	2.67	Normal	B	Standard	
Dichloroethyl ether	UN 1916	101	1.75	Normal	B	Standard	
Dichloroisopropyl ether	UN 2490	101	1.75	Normal	B	Standard	
Dichloromethane	UN 1593	101	2.67	Normal	A	Standard	
Dichloropentanes	UN 1152	102	1.0	Normal	A	Standard	
Dichlorophenyltrichlorosilane	UN 1766	101	1.75	Normal	B	6.35 mm	
Dichloropropene	UN 2047	101	1.75	Normal	B	Standard	
Dicyclohexylamine	UN 2565	101	1.75	Normal	B	Standard	
Dicyclopentadiene	UN 2048	101	1.75	Normal	B	Standard	
Diethoxymethane	UN 2373	101	1.75	Normal	B	Standard	
3,3-Diethoxypropene	UN 2374	102	1.0	Normal	A	Standard	
Diethyl aluminum chloride	UN 1101	Not authorized for transportation in IM101 or IM102 tanks					
Diethylamine	UN 1154	101	1.75	Normal	B	Standard	
Diethylaminoethanol	UN 2686	102	1.0	Normal	A	Standard	
Diethylaminopropylamine	UN 2684	101	1.75	Normal	B	Standard	
N,N-Diethylaniline	UN 2432	102	1.0	Normal	B	Standard	
Diethylbenzene	UN 2049	102	1.0	Normal	A	Standard	
Diethylcarbonate	UN 2366	102	1.0	Normal	A	Standard	
Diethyl dichlorosilane	UN 1767	101	1.75	Normal	B	6.35 mm	
N,N-Diethylenediamine	UN 2685	101	1.75	Normal	B	Standard	
Diethylenetriamine	UN 2079	101	1.75	Normal	B	Standard	
Diethyl ketone	UN 1156	102	1.0	Normal	A	Standard	
Diethyl magnesium	UN 1367	Not authorized for transportation in IM101 or IM102 tanks					
Diethyl sulfate	UN 1594	101	2.67	Normal	B	Standard	
Diethyl sulfide	UN 2375	101	2.67	Normal	B	Standard	
Diethyl thiophosphoryl chloride	UN 2751	101	1.75	Normal	B	Standard	
Diethyl zinc	UN 1366	Not authorized for transportation in IM101 or IM102 tanks					
Difluorophosphoric acid, anhydrous	UN 1768	101	1.75	Normal	Prohibited	8 mm	
2,3-Dihydropyran	UN 2376	101	1.75	Normal	A	Standard	
Diisobutylamine	UN 2361	101	1.75	Normal	B	Standard	
Diisobutylene, [isomeric compounds]	UN 2050	102	1.0	Normal	A	Standard	
Diisobutyl ketone	UN 1157	102	1.0	Normal	A	Standard	
Diisooctyl acid phosphate	UN 1902	101	1.75	Normal	A	Standard	
Diisopropylamine	UN 1158	101	1.75	Normal	B	Standard	
Diisopropylethanolamine	UN 2925	101	1.75	Normal	A	Standard	
Diisopropyl ether ([isopropyl ether])	UN 1159	101	1.75	Normal	B	Standard	
Diketene, [inhibited]	UN 2521	101	1.75	Normal	A	Standard	
1,1-Dimethoxyethane	UN 2377	102	1.0	Normal	A	Standard	
1,2-Dimethoxyethane	UN 2252	102	1.0	Normal	A	Standard	
Dimethylamine, aqueous solution ([not exceeding 40 percent by weight])	UN 1160	101	1.75	Normal	B	Standard	
2-Dimethylaminoacetonitrile	UN 2378	101	1.75	Normal	B	Standard	

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For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Dimethylaminoethyl methacrylate	UN 2522	101	1.75	Normal	B	Standard	
N,N Dimethylaniline	UN 2253	101	1.75	Normal	B	Standard	
2,3-Dimethyl butane	UN 2457	101	2.67	Normal	A	Standard	
1,3 Dimethylbutylamine	UN 2379	101	1.75	Normal	B	Standard	
Dimethyl carbamoyl chloride	UN 2262	101	1.75	Normal	B	Standard	
Dimethyl carbonate	UN 1161	101	1.75	Normal	B	Standard	
Dimethylcyclohexanes	UN 2263	102	1.0	Normal	A	Standard	
Dimethylcyclohexylamine	UN 2264	101	1.75	Normal	B	Standard	
Dimethyldichlorosilane	UN 1162	101	2.67	Normal	Prohibited	6.35 mm	
Dimethylethoxysilane	UN 2380	101	1.75	Normal	B	Standard	
Dimethyldioxanes	UN 2707	101	1.75	Normal	B	Standard	
Dimethyl disulfide	UN 2381	101	1.75	Normal	B	Standard	
Dimethylethanolamine	UN 2051	101	1.75	Normal	B	Standard	
N,N-Dimethylformamide	UN 2265	102	1.0	Normal	A	Standard	
Dimethyl hydrazine, [symmetrical]	UN 2382	101	2.67	Special	Prohibited	6.35 mm	
Dimethyl hydrazine, [unsymmetrical]	UN 1163	101	2.67	Special	Prohibited	Standard	
Dimethyl magnesium	UN 1368	Not authorized for transportation in IM101 or IM102 tanks					
Dimethyl-N-propylamine	UN 2266	101	2.67	Normal	B	6.35 mm	
Dimethyl sulfate	UN 1595	101	2.67	Special	Prohibited	6.35 mm	
Dimethyl sulfide	UN 1164	101	2.67	Normal	B	Standard	
Dimethyl thiophosphoryl chloride	UN 2267	101	1.75	Normal	A	Standard	
Dimethyl zinc	UN 1370	Not authorized for transportation in IM101 or IM102 tanks					
Di-(n-amyl)amine	UN 2841	101	1.75	Normal	B	Standard	
Di-(n-butyl)amine	UN 2248	101	1.75	Normal	B	Standard	
Dinitroanilines	UN 1596	101	2.67	Normal	B	Standard	
Dinitrobenzenes, solutions	UN 1597	101	2.67	Normal	B	Standard	
Dinitrochlorobenzene ([chlorodinitrobenzene, solution])	UN 1577	101	2.67	Normal	B	Standard	
Dinitro-o-cresol	UN 1598	101	2.67	Normal	B	Standard	
Dinitrophenol, solutions	UN 1599	101	1.75	Normal	B	Standard	
Dinitrotoluenes, [liquid]	UN 1600	101	2.67	Normal	B	Standard	
Dioxane	UN 1165	101	1.75	Normal	B	Standard	
Dioxolane	UN 1166	101	1.75	Normal	B	Standard	
Dipentene	UN 2052	102	1.0	Normal	A	Standard	
Diphenylamine-chloroarsine	UN 1698	Not authorized for transportation in IM101 or IM102 tanks					
Diphenylchloroarsine	UN 1699	Not authorized for transportation in IM101 or IM102 tanks					
Diphenyldichlorosilane	UN 1769	101	1.75	Normal	B	6.35 mm	
Diphenylmethane-4,4-diisocyanate	UN 2489	101	1.75	Normal	B	Standard	
Diphenylmethyl bromide solution	UN 1770	101	1.75	Normal	B	6.35 mm	
Diphosgene	Not authorized for transportation in IM101 or IM102 tanks						
Dipropylamine	UN 2383	101	1.75	Normal	B	Standard	
Dipropylene triamine	UN 2269	101	1.75	Normal	B	Standard	
Dipropyl ether	UN 2384	102	1.0	Normal	A	Standard	
Dipropyl ketone	UN 2710	102	1.0	Normal	A	Standard	
Divinyl ether, [inhibited]	UN 1167	101	2.67	Normal	B	Standard	
Dodecyltrichlorosilane	UN 1771	101	1.75	Normal	B	6.35 mm	

(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Driers, paint or varnish							
(a) Flashpoint below 32 deg F	UN 1168	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1168	102	1.0	Normal	B	Standard	
Electrolyte (acid [or] alkaline). [See] Battery fluid							
Epibromohydrin	UN 2558	101	2.67	Special	Prohibited	6.35 mm	
Epichlorohydrin	UN 2023	101	2.67	Normal	B	Standard	
1,2-Epoxy-3-ethoxy propane	UN 2752	102	1.0	Normal	A	Standard	
Eradicators, paint or grease, liquid							
(a) Flashpoint below 32 deg F	UN 1850	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1850	102	1.0	Normal	A	Standard	
Ethyl acetate	UN 1173	102	1.0	Normal	B	Standard	
Ethyl acrylate, [inhibited]	UN 1917	101	1.75	Normal	B	Standard	
Ethyl alcohol ([ethanol or ethanol solutions, including alcoholic beverages)]	UN 1170	102	1.0	Normal	A	Standard	
Ethyl aluminum dichloride	UN 1924	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl aluminum sesquichloride	UN 1925	Not authorized for transportation in IM101 or IM102 tanks					
Ethylamine, solution, ([50 to 70 percent by weight])	UN 2270	101	2.67	Normal	B	Standard	
Ethyl amyl ketone	UN 2271	102	1.0	Normal	A	Standard	
N-Ethylaniline	UN 2272	102	1.0	Normal	B	Standard	
2-Ethylaniline	UN 2273	102	1.0	Normal	B	Standard	
Ethyl benzene	UN 1175	102	1.0	Normal	A	Standard	
N-Ethylbenzyltoluidines	UN 2753	101	2.67	Normal	B	Standard	
Ethyl borate	UN 1176	101	1.75	Normal	B	Standard	
Ethyl bromide	UN 1891	101	2.67	Special	B	Standard	
Ethyl bromoacetate	UN 1603	101	2.67	Normal	B	Standard	
2-Ethyl butanol	UN 2275	102	1.0	Normal	A	Standard	
Ethyl butyl acetate	UN 1177	102	1.0	Normal	A	Standard	
Ethyl butyl ether	UN 1179	102	1.0	Normal	A	Standard	
Ethyl butyraldehyde	UN 1178	102	1.0	Normal	A	Standard	
Ethyl butyrate	UN 1180	102	1.0	Normal	A	Standard	
Ethyl chloride	UN 1037	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl chloroacetate	UN 1181	101	2.67	Normal	B	Standard	
Ethyl chloroformate	UN 1182	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl chlorothioformate	UN 2826	101	2.67	Normal	B	Standard	
Ethyl crotonate	UN 1862	102	1.0	Normal	A	Standard	
Ethyl cyanoacetate	UN 2666	101	1.75	Normal	B	Standard	
Ethyldichloroarsine	UN 1892	Not authorized for transportation in IM101 or IM102 tanks					
Ethyldichlorosilane	UN 1183	101	2.67	Normal	Prohibited	6.35 mm	
Ethylene chlorohydrin	UN 1135	101	2.67	Special	Prohibited	Standard	
Ethylene diamine	UN 1604	101	2.67	Normal	B	Standard	
Ethylene dibromide	UN 1605	101	2.67	Normal	B	Standard	
Ethylene dichloride	UN 1184	101	2.67	Normal	B	Standard	
Ethylene glycol diethyl ether	UN 1153	102	1.0	Normal	A	Standard	
Ethylene glycol monobutyl ether	UN 2369	102	1.0	Normal	A	Standard	
Ethylene glycol monoethyl ether	UN 1171	102	1.0	Normal	A	Standard	

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For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Ethylene glycol monoethyl ether acetate	UN 1172	102	1.0	Normal	A	Standard	
Ethylene glycol monoethyl ether	UN 1188	102	1.0	Normal	A	Standard	
Ethylene glycol monomethyl ether acetate	UN 1189	102	1.0	Normal	A	Standard	
Ethyleneimine, [inhibited]	UN 1185	Not authorized for transportation in IM101 or IM102 tanks					
Ethylene oxide	UN 1040	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl ether ([ether, or diethyl ether])	UN 1155	101	4.0	Normal	Prohibited	Standard	
Ethyl formate	UN 1190	101	1.75	Normal	B	Standard	
Ethyl hexaldehyde	UN 1191	102	1.0	Normal	A	Standard	
2-Ethylhexylamine	UN 2276	102	1.0	Normal	B	Standard	
2-Ethylhexylchloroformate	UN 2748	101	1.75	Special	Prohibited	Standard	
Ethyl isobutyrate	UN 2385	102	1.0	Normal	A	Standard	
Ethyl isocyanate	UN 2481	101	2.67	Special	Prohibited	6.35 mm	
Ethyl lactate	UN 1192	102	1.0	Normal	A	Standard	
Ethylene glycol monoethyl ether acetate	UN 1172	102	1.0	Normal	A	Standard	
Ethylene glycol monomethyl ether	UN 1188	102	1.0	Normal	A	Standard	
Ethylene glycol monomethyl ether acetate	UN 1189	102	1.0	Normal	A	Standard	
Ethyleneimine, [inhibited]	UN 1185	Not authorized for transportation in IM101 or IM102 tanks					
Ethylene oxide	UN 1040	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl ether ([ether, or diethyl ether])	UN 1155	101	4.0	Normal	Prohibited	Standard	
Ethyl formate	UN 1190	101	1.75	Normal	B	Standard	
Ethyl hexaldehyde	UN 1191	102	1.0	Normal	A	Standard	
2-Ethylhexylamine	UN 2276	102	1.0	Normal	B	Standard	
2-Ethylhexylchloroformate	UN 2748	101	1.75	Special	Prohibited	Standard	
Ethyl isobutyrate	UN 2385	102	1.0	Normal	A	Standard	
Ethyl isocyanate	UN 2481	101	2.67	Special	Prohibited	6.35 mm	
Ethyl lactate	UN 1192	102	1.0	Normal	A	Standard	
Ethyl mercaptan	UN 2363	101	4.0	Normal	Prohibited	Standard	
Ethyl methacrylate	UN 2277	102	1.0	Normal	A	Standard	
Ethyl methyl ether	UN 1039	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl methyl ketone [or] Methyl ethyl ketone	UN 1193	101	1.75	Normal	B	Standard	
N-Ethyl-N-benzylaniline	UN 2274	102	1.0	Normal	B	Standard	
Ethyl nitrite ([including solutions])	UN 1194	Not authorized for transportation in IM101 or IM102 tanks					
Ethyl orthoformate	UN 2524	101	1.75	Normal	A	Standard	
Ethyl oxalate	UN 2525	102	1.0	Normal	A	Standard	
Ethyl phenyl dichlorosilane	UN 2435	101	1.75	Normal	B	6.35 mm	
Ethyl propionate	UN 1195	102	1.0	Normal	A	Standard	
Ethyl propyl ether	UN 2615	101	1.75	Normal	B	Standard	
Ethyl silicate ([tetraethyl silicate])	UN 1292	102	1.0	Normal	A	Standard	
Ethylsulfuric acid	UN 2571	101	1.75	Normal	Prohibited	8 mm	
N-Ethyltoluidines	UN 2754	101	2.67	Normal	B	Standard	
Ethyltrichlorosilane	UN 1196	101	2.67	Normal	Prohibited	6.35 mm	
Extracts, aromatic, liquid							
(a) Flashpoint below 32 deg F	UN 1169	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1169	102	1.0	Normal	A	Standard	
Extracts, flavoring, liquid							
(a) Flashpoint below 32 deg F	UN 1197	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1197	102	1.0	Normal	A	Standard	
Ferric chloride solution	UN 2582	101	1.75	Normal	B	Standard	

(1) Hazardous Material's Descriptions [many of these descriptions are not proper shipping names. See 172.101 for proper shipping name]	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Flammable liquid, not listed by name in this table ([vapor pressure not greater than 43 psia at 122 deg F and no subsidiary hazards]):							
(a) Boiling point 95 deg F or lower	Various	Must be specifically authorized prior to transportation. See 49CFR173.32c(d)					
(b) Boiling point above 95 deg F, vapor pressure not greater than 33.7 psi at 150 deg F	Various	101	2.67	Normal	B	Standard	
(c) Boiling point above 95 deg F, vapor pressure not greater than 20.4 psi at 150 deg F	Various	101	1.75	Normal	A	Standard	
(d) Boiling point above above 95 deg F, vapor pressure not greater than 9.5 psi at 150 deg F, flashpoint 32 deg F or above	Various	102	1.0	Normal	A	Standard	
Flammable liquid, not listed by name in this table ([vapor pressure not greater than 43 psia at 122 deg F, subsidiary Class B poison hazard]):							
(a) Boiling point 95 deg F or lower, oral LD50 of 5 mg/kg or lower, dermal LD50 of 40 mg/kg or lower or LC50 of 2 mg/l or lower	Various	Must be specifically authorized prior to transportation. See 49CFR173.32c(d)					
(b) Vapor pressure not greater than 33.7 psi at 150 deg F	Various	101	2.67	Special	Prohibited	Standard	
Flammable liquid, not listed by name in this table ([vapor pressure not greater than 43 psia at 122 deg F, with subsidiary corrosive hazard]):							
(a) Boiling point 95 deg F or lower	Various	Must be specifically authorized prior to transportation. See 49CFR173.32c(d)					
(b) Boiling point 95 deg F or above, and vapor pressure not greater than 33.7 psia at 150 deg F	Various	101	2.67	Special	Prohibited	Standard	
Fluoboric acid	UN 1775	101	2.67	Normal	Prohibited	6 mm	
Fluorbenzene	UN 2387	101	1.75	Normal	B	Standard	
Fluorophosphoric acid, anhydrous [See] Monofluorophosphoric acid							
Fluorosilicic acid	UN 1778	101	1.75	Normal	Prohibited	6 mm	
Fluorosulfonic acid [or] Fluorosulphonic acid	UN 1777	101	1.75	Special	Prohibited	6 mm	
Fluortoluenes	UN 2388	101	1.75	Normal	B	Standard	
Formaldehyde, solution							
(a) Flashpoint not greater than 141 deg F	UN 1198	101	1.75	Normal	B	Standard	
(b) Flashpoint greater than 141 deg F	UN 2209	102	1.0	Normal	A	Standard	
Formic acid	UN 1779	101	1.75	Normal	B	Standard	
Fuel, aviation, turbine engine							
(a) Flashpoint below 32 deg F	UN 1863	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 F or above	UN 1863	102	1.0	Normal	A	Standard	
Fuel oil [See] Gas oil							
Fuel, pyrophoric, not listed by name in this table	Various	Not authorized for transportation in IM101 or IM102 tanks					
Fumaryl chloride	UN 1780	101	1.75	Normal	B	6.35 mm	
Furan	UN 2389	101	2.67	Special	Prohibited	Standard	
Furfural	UN 1199	101	1.75	Normal	B	Standard	
Furfuryl alcohol	UN 2874	102	1.0	Normal	B	Standard	
Furfurylamine	UN 2526	101	1.75	Normal	B	Standard	
Fusel oil	UN 1201	102	1.0	Normal	A	Standard	
Gas drips, hydrocarbon							
(a) Flashpoint below 32 deg F	UN 1864	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1864	102	1.0	Normal	A	Standard	
Gasohol ([gasoline mixed with ethyl alcohol]) [See] Gasoline							
Gas oil							
(a) Flashpoint below 32 deg F	UN 1202	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1202	102	1.0	Normal	A	Standard	
Gasoline ([including casinghead and natural])	UN 1203	101	1.75	Normal	B	Standard	
Glycerol alpha-monochlorohydrin	UN 2689	102	1.0	Normal	B	Standard	
Glycidaldehyde	UN 2622	101	1.75	Normal	B	Standard	
Gutta percha solution							
(a) Flashpoint below 32 deg F	UN 1205	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1205	102	1.0	Normal	A	Standard	
Heptanes	UN 1206	102	1.0	Normal	B	Standard	
Heptene	UN 2278	101	1.75	Normal	B	Standard	
Hexachloroacetone	UN 2661	101	1.75	Normal	B	Standard	

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For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Hexachlorobutadiene	UN 2279	101	1.75	Normal	A	Standard	
Hexachlorocyclopentadiene	UN 2646	101	2.67	Special	Prohibited	6.35 mm	
Hexadecyltrichlorosilane	UN 1781	101	1.75	Normal	B	Standard	
Hexadiene	UN 2458	101	1.75	Normal	A	Standard	
Hexaethyl tetraphosphate, liquid	UN 1611	Not authorized for transportation in IM101 or IM102 tanks					
Hexaethyl tetraphosphate mixtures. [See] Poisonous liquid							
Hexafluoroacetone hydrate	UN 2552	101	2.67	Normal	B	Standard	
Hexafluorophosphoric acid	UN 1782	101	1.75	Normal	Prohibited	8 mm	
Hexaldehyde	UN 1207	102	1.0	Normal	A	Standard	
Hexamethylenediamine, solution	UN 1783	101	1.75	Normal	B	Standard	
Hexamethyleneimine	UN 2493	101	1.75	Normal	B	Standard	
Hexanes	UN 1208	101	1.75	Normal	B	Standard	
Hexanols	UN 2282	102	1.0	Normal	A	Standard	
1-Hexene	UN 2370	101	1.75	Normal	B	Standard	
Hexyltrichlorosilane	UN 1784	101	1.75	Normal	B	6.35 mm	
Hydrazine, anhydrous [or] hydrazine aqueous solutions [with more than 64 percent hydrazine by weight]	UN 2029	Not authorized for transportation in IM101 or IM102 tanks					
Hydrazine hydrate, [or] hydrazine aqueous solutions [with not more than 64 percent hydrazine by weight]	UN 2030	101	2.67	Normal	Prohibited	Standard	
Hydriodic acid	UN 1787	101	1.75	Normal	Prohibited	8 mm	
Hydrobromic acid	UN 1788	101	1.75	Normal	Prohibited	8 mm	
Hydrochloric acid mixtures. [See] Hydrochloric acid							
Hydrochloric acid [up to and including 36%]	UN 1789	101	1.75	Normal	Prohibited	8 mm	
Hydrocyanic acid, aqueous solution	UN 1613	Not authorized for transportation in IM101 or IM102 tanks					
Hydrofluoric acid, solution [less than 60 percent by weight]	UN 1790	101	2.67	Special	Prohibited	8 mm	
Hydrofluoric and sulfuric acid mixtures [acid mixtures, hydrofluoric and sulfuric]	UN 1786	101	2.67	Special	Prohibited	8 mm	
Hydrofluosilicic acid. [See] Fluosilicic acid							
Hydrogen peroxide solution:							
(a) Not more than 60 percent by weight in water	UN 2014	101	2.67	Normal	B	Standard	
(b) Over 60 percent by weight in water	UN 2015	Not authorized for transportation in IM101 or IM102 tanks					
Hydroquinone	UN 2662	101	1.75	Normal	B	Standard	
Hypochlorite solutions [with more than 7 percent available chlorine]	UN 1791	101	1.75	Normal	A	Standard	
Ink, [printers]							
(a) Flashpoint below 32 deg F	UN 1210	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1210	102	1.0	Normal	A	Standard	
Iodine monochloride	UN 1792	101	1.75	Normal	B	6.35 mm	
Iodine pentafluoride	UN 2495	Not authorized for transportation in IM101 or IM102 tanks					
2-Iodobutane	UN 2390	101	1.75	Normal	B	Standard	
Iodo-methylpropanes	UN 2391	101	1.75	Normal	B	Standard	
Iodopropanes	UN 2392	101	1.75	Normal	B	Standard	
Iron pentacarbonyl	UN 1994	Not authorized for transportation in IM101 or IM102 tanks					
Isobutanol	UN 1212	102	1.0	Normal	A	Standard	
Isobutyl acetate	UN 1213	102	1.0	Normal	A	Standard	
Isobutylamine	UN 1214	101	1.75	Normal	B	Standard	
Isobutyl formate	UN 2393	102	1.0	Normal	A	Standard	
Isobutyl isobutyrate	UN 2528	102	1.0	Normal	A	Standard	

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(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 173.181 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Isobutyl isocyanate	UN 2486	101	1.75	Normal	Prohibited	Standard	
Isobutyl methacrylate	UN 2283	102	1.0	Normal	A	Standard	
Isobutyl propionate	UN 2394	101	1.75	Normal	A	Standard	
Isobutyraldehyde	UN 2045	101	1.75	Normal	B	Standard	
Isobutyric acid	UN 2529	102	1.0	Normal	A	Standard	
Isobutyric anhydride	UN 2530	102	1.0	Normal	A	Standard	
Isobutyronitrile	UN 2284	101	2.67	Special	B	Standard	
Isobutyryl chloride	UN 2395	101	1.75	Normal	C	6.35 mm	
Isododecane. [See] Pentamethylheptane							
Isoheptane	UN 2287	101	1.75	Normal	A	Standard	
Isohexane	UN 2288	101	1.75	Normal	A	Standard	
Isooctane. [See] octane and its isomers							
Isooctene	UN 1216	101	1.75	Normal	B	Standard	
Isopentane	UN 1265	101	4.0	Normal	B	Standard	
Isopentenes	UN 2371	101	4.0	Normal	B	Standard	
Isophoronediamine	UN 2289	101	1.75	Normal	B	Standard	
Isophoronediisocyanate	UN 2290	101	1.75	Normal	B	Standard	
Isoprene, [inhibited]	UN 1218	101	4.0	Normal	B	Standard	
Isopropanol	UN 1219	102	1.0	Normal	A	Standard	
Isopropenyl acetate	UN 2403	102	1.0	Normal	A	Standard	
Isopropenyl benzene	UN 2303	102	1.0	Normal	A	Standard	
Isopropyl acetate	UN 1220	102	1.0	Normal	A	Standard	
Isopropyl acid phosphate	UN 1793	101	1.75	Normal	A	Standard	
Isopropylamine	UN 1221	101	4.0	Normal	B	Standard	
Isopropylbenzene	UN 1918	102	1.0	Normal	A	Standard	
Isopropyl butyrate	UN 2405	102	1.0	Normal	A	Standard	
Isopropyl chloroformate	UN 2407	Not authorized for transportation in IM101 or IM102 tanks					
Isopropyl formate	UN 2406	101	1.75	Normal	B	Standard	
Isopropyl isobutyrate	UN 2406	102	1.0	Normal	A	Standard	
Isopropyl isocyanate	UN 2483	101	2.67	Special	Prohibited	6.35 mm	
Isopropyl mercaptan	UN 2703	101	2.67	Normal	Prohibited	Standard	
Isopropyl nitrate	UN 1222	Not authorized for transportation in IM101 or IM102 tanks					
Isopropyl propionate	UN 2409	102	1.0	Normal	A	Standard	
Kerosene	UN 1223	102	1.0	Normal	A	Standard	
Ketones, liquid, not listed by name in this table							
(a) Flashpoint below 32 deg F	Various	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	Various	102	1.0	Normal	B	Standard	
Lead perchlorate, solution	UN 1470	101	1.75	Normal	B	Standard	
Lithium alkyls	UN 2445	Not authorized for transportation in IM101 or IM102 tanks					
Lithium aluminum hydride, ethereal	UN 1411	Not authorized for transportation in IM101 or IM102 tanks					
Lithium hydroxide, solution	UN 2679	101	1.75	Normal	B	Standard	
Magnesium perchlorate, solution	UN 1475	101	1.75	Normal	B	Standard	
Maleic anhydride (molten)	UN 2215	101	1.75	Normal	A	Standard	
Mercaptans, liquid, [or] Mercaptan mixtures, liquid ([aliphatic]), not listed by name in this table	Varies	101	2.67	Normal	Prohibited	Standard	
Mesityl oxide	UN 1229	101	1.75	Normal	B	Standard	

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(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Metal alkyls, not listed by name in this table	Various	Not authorized for transportation in IM101 or IM102 tanks					
Methacrylaldehyde	UN 2396	101	1.75	Normal	B	Standard	
Methacrylic acid, [inhibited]	UN 2531	101	1.75	Normal	B	Standard	
Methallyl alcohol	UN 2614	101	1.75	Normal	B	Standard	
4 Methoxy 4 methylpentan-2-one	UN 2293	102	1.0	Normal	A	Standard	
Methoxymethyl isocyanate	UN 2605	101	2.67	Special	Prohibited	6.35 mm	
2 Methyl 1-butene	UN 2459	101	2.67	Normal	B	Standard	
3 Methyl 1-butene	UN 2561	101	4.0	Normal	B	Standard	
2 Methyl 2-butene	UN 2460	101	2.67	Normal	B	Standard	
Methyl acetate	UN 1231	101	1.75	Normal	B	Standard	
Methyl acetone	UN 1232	101	1.75	Normal	B	Standard	
Methyl acrylate, inhibited	UN 1919	101	1.75	Normal	B	Standard	
Methylal	UN 1234	101	2.67	Normal	B	Standard	
Methyl alcohol ([methanol])	UN 1230	101	1.75	Normal	B	Standard	
Methyl allyl chloride	UN 2554	101	1.75	Normal	B	Standard	
Methyl aluminum sesquibromide	UN 1926	Not authorized for transportation in IM101 or IM102 tanks					
Methyl aluminum sesquichloride	UN 1927	Not authorized for transportation in IM101 or IM102 tanks					
Methylamine, aqueous solution	UN 1235	101	1.75	Normal	B	Standard	
Methyl amyl acetate	UN 1233	102	1.0	Normal	A	Standard	
Methyl amyl ketone ([amyl methyl ketone])	UN 1110	102	1.0	Normal	A	Standard	
N Methylaniline	UN 2294	101	1.75	Normal	A	Standard	
Methyl bromide	UN 1062	Not authorized for transportation in IM101 or IM102 tanks					
Methyl bromide and ethylene dibromide mixtures, liquid	UN 1647	Not authorized for transportation in IM101 or IM102 tanks					
Methyl bromoacetate	UN 2643	101	1.75	Normal	B	Standard	
3 Methyl butan-2-one	UN 2397	102	1.0	Normal	A	Standard	
Methyl butyrate	UN 1237	102	1.0	Normal	A	Standard	
Methyl chloroacetate	UN 2295	101	1.75	Special	B	Standard	
Methyl chloroformate	UN 1238	Not authorized for transportation in IM101 or IM102 tanks					
Methyl chloromethyl ether, anhydrous ([methyl chloromethyl ether])	UN 1239	101	1.75	Normal	B	Standard	
Methyl chlorosilane	UN 2534	101	2.67	Special	Prohibited	6.35 mm	
Methyl cyclohexane	UN 2296	102	1.0	Normal	A	Standard	
Methylcyclohexanols	UN 2617	102	1.0	Normal	B	Standard	
Methyl cyclohexanone	UN 2297	102	1.0	Normal	A	Standard	
Methyl cyclopentane	UN 2298	101	1.75	Normal	B	Standard	
Methyl dichloroacetate	UN 2299	102	1.0	Normal	A	Standard	
Methyl dichlorosilane	UN 1242	101	2.67	Normal	B	6.35 mm	
Methyl ethyl pyridine	UN 2300	101	1.75	Normal	A	Standard	
Methyl formate	UN 1243	101	4.0	Normal	B	Standard	
Methylfuran	UN 2301	101	1.75	Normal	A	Standard	
5 Methylhexan-2-one	UN 2302	102	1.0	Normal	A	Standard	
Methylhydrazine	UN 1244	101	2.67	Special	Prohibited	6.35 mm	
Methyl iodide	UN 2644	101	2.67	Normal	B	Standard	
Methylisobutyl carbinol	UN 2053	102	1.0	Normal	A	Standard	
Methyl isobutyl ketone	UN 1245	102	1.0	Normal	A	Standard	
Methyl isocyanate [or] Methyl isocyanate solutions	UN 2480	101	4.0	Special	Prohibited	6.35 mm	

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(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Methyl isopropenyl ketone, [inhibited]	UN 1246	101	1.75	Normal	A	Standard	
Methyl isothiocyanate	UN 2477	101	2.67	Normal	Prohibited	Standard	
Methyl isovalerate	UN 2400	102	1.0	Normal	A	Standard	
Methyl magnesium bromide in ethyl ether	UN 1928	Not authorized for transportation in IM101 or IM102 tanks					
Methyl methacrylate monomer, inhibited	UN 1247	101	1.75	Normal	B	Standard	
Methyl morpholine	UN 2535	101	1.75	Normal	B	Standard	
Methyl orthosilicate	UN 2606	101	2.67	Special	Prohibited	6.35 mm	
Methyl parathion mixtures [See] Poisonous liquid							
Methylpentadiene	UN 2461	101	1.75	Normal	A	Standard	
2 Methylpentan-2-ol	UN 2560	101	1.75	Normal	A	Standard	
Methylpentanes	UN 2462	101	1.75	Normal	A	Standard	
Methylphenyldichlorosilane	UN 2437	101	1.75	Normal	B	6.35 mm	
1 Methylpiperidine	UN 2399	101	1.75	Normal	B	Standard	
Methyl propionate	UN 1248	102	1.0	Normal	B	Standard	
Methyl propyl ether	UN 2612	101	2.67	Normal	B	Standard	
Methyl propyl ketone	UN 1249	102	1.0	Normal	A	Standard	
Methyl tert butyl ether	UN 2398	101	1.75	Normal	A	Standard	
Methyltetrahydrofuran	UN 2536	101	1.75	Normal	A	Standard	
Methyltrichloroacetate	UN 2533	102	1.0	Normal	A	Standard	
Methyltrichlorosilane	UN 1250	101	2.67	Normal	B	6.35 mm	
alpha Methyl valeraldehyde	UN 2367	102	1.0	Normal	A	Standard	
Methyl vinyl ketone	UN 1251	101	1.75	Normal	B	Standard	
Mixtures of chlorosulphonic acid—sulfur trioxide		101	4.0	Special	Prohibited	6.35 mm	
Molybdenum pentachloride	UN 2508	101	1.75	Normal	B	6.35 mm	
Monoethanol amine [ethanol amine or ethanolamine solution]	UN 2491	101	1.75	Normal	A	Standard	
Monoethylamine [ethylamine]	UN 1036	Not authorized for transportation in IM101 or IM102 tanks					
Monofluorophosphoric acid, anhydrous [fluorophosphoric acid, anhydrous]	UN 1776	101	1.75	Normal	Prohibited	8 mm	
Morpholine	UN 2054	101	1.75	Normal	B	Standard	
Motor fuel antiknock compound	UN 1649	Not authorized for transportation in IM101 or IM102 tanks					
Motor spirit [See] Gasoline							
Naphthalene, molten	UN 2304	101	1.75	Normal	B	Standard	
Naphthas							
(a) Flashpoint below 32 deg F	Various	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	Various	102	1.0	Normal	A	Standard	
Naphthylamine (alpha)	UN 2077	101	1.75	Normal	A	Standard	
Naphthylamine (beta), liquid	UN 1650	101	1.75	Special	Prohibited	6.35 mm	
Neohexane [See] Hexane							
Nickel carbonyl	UN 1259	Not authorized for transportation in IM101 or IM102 tanks					
Nicotine sulfate solution	UN 1658	101	2.67	Normal	B	Standard	
Nitrating acid [acid mixtures, nitrating acid]	UN 1796	101	1.75	Special	Prohibited	8 mm	
Nitrating acid, spent [acid mixtures, nitrating acid, spent]							
(a) More than 40 percent nitric acid	UN 1826	101	4.0	Special	Prohibited	Standard	
(b) Not more than 40 percent nitric acid	UN 1826	101	2.67	Normal	B	Standard	
Nitric acid, fuming	UN 2032	101	2.67	Special	Prohibited	8 mm	
Nitric acid [other than fuming]	UN 2031	101	1.75	Normal	Prohibited	8 mm	

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
3-Nitro-4-chlorobenzotrifluoride	UN 2307	101	1.75	Normal	B	Standard	
Nitroanilines	UN 1661	101	2.67	Normal	B	Standard	
Nitroanisoles	UN 2730	101	1.75	Normal	B	Standard	
Nitrobenzene [(nitrobenzol)]	UN 1662	101	2.67	Normal	B	Standard	
Nitrobenzotrifluorides	UN 2306	101	1.75	Normal	B	Standard	
Nitrobromobenzene	UN 2732	101	1.75	Normal	B	Standard	
Nitrocellulose, containing not more than 12.6 percent nitrogen, solutions in flammable liquids not exceeding 55 percent nitrocellulose by weight							
(a) Flashpoint of solution below 73 deg F	UN 2059	101	1.75	Normal	Prohibited	Standard	
(b) Flashpoint of solution 73 deg F or above	UN 2060	101	1.75	Normal	Prohibited	Standard	
Nitroethane	UN 2842	101	1.75	Normal	B	Standard	
Nitrohydrochloric acid	UN 1798	101	2.67	Special	Prohibited	8 mm	
Nitromethane	UN 1261	Not authorized for transportation in IM101 or IM102 tanks					
Nitropropanes	UN 2608	102	1.0	Normal	A	Standard	
Nitrosylsulphuric acid	UN 2308	101	1.75	Normal	Prohibited	8 mm	
Nitrotoluenes	UN 1664	101	2.67	Normal	B	Standard	
Nitroxylenes [(nitroxylols)]	UN 1665	101	2.67	Normal	B	Standard	
Nonanes	UN 1920	102	1.0	Normal	A	Standard	
Nonyltrichlorosilane	UN 1799	101	1.75	Normal	B	6.35 mm	
Di-normal-amylamine	UN 2841	101	1.75	Normal	B	Standard	
Octadecyltrichlorosilane	UN 1800	101	1.75	Normal	B	Standard	
Octadiene	UN 2309	102	1.0	Normal	A	Standard	
Octanes	UN 1262	102	1.0	Normal	A	Standard	
Octyltrichlorosilane	UN 1801	101	1.75	Normal	B	6.35 mm	
Oleum. [See] Sulfuric acid, fuming							
Organic phosphate mixtures [or] Organic phosphorus compound mixtures. [See] Poisonous liquid							
Organic phosphate [or] Organic phosphorus compound. [See] Poisonous liquid							
Paints, enamels, lacquers, stains, shellac, varnish, polishes, fillers [(liquid)], lacquer base, thinners, etc.							
(a) Flashpoint below 32 deg F	UN 1263	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1263	102	1.0	Normal	A	Standard	
Paraldehyde	UN 1264	102	1.0	Normal	A	Standard	
Parathion	Not authorized for transportation in IM101 or IM102 tanks						
Parathion mixtures. [See] Poisonous liquid							
Pentaborane	UN 1380	Not authorized for transportation in IM101 or IM102 tanks					
Pentachloroethane	UN 1669	101	2.67	Normal	B	Standard	
Pentamethylheptane	UN 2286	102	1.0	Normal	A	Standard	
Pentan-2,4-dione	UN 2310	102	1.0	Normal	A	Standard	
Pentane	UN 1265	101	4.0	Normal	B	Standard	
3-Pentanol	UN 2706	101	1.75	Normal	B	Standard	
1-Pentol	UN 2705	101	1.75	Normal	B	Standard	
Perchloric acid, not exceeding 50 percent acid by weight	UN 1802	101	1.75	Normal	Prohibited	Standard	
Perchloric acid [(over 50 percent by weight)]	UN 1873	Not authorized for transportation in IM101 or IM102 tanks					
Perchloromethyl mercaptan	UN 1670	101	2.67	Special	Prohibited	6.35 mm	

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(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Perfumery products, flammable							
(a) Flashpoint below 32 deg F	UN 1266	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1266	102	1.0	Normal	A	Standard	
Petroleum crude oil							
(a) Flashpoint below 32 deg F	UN 1267	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1267	102	1.0	Normal	B	Standard	
Petroleum distillate:							
(a) Flashpoint below 32 deg F	UN 1268	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1268	102	1.0	Normal	B	Standard	
Petroleum ether. [See] Petroleum spirit							
Petroleum oil							
(a) Flashpoint below 32 deg F	UN 1270	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1270	102	1.0	Normal	B	Standard	
Petroleum spirit	UN 1271	101	1.75	Normal	B	Standard	
Phenetidines (ortho-, para-)	UN 2311	101	1.75	Normal	A	Standard	
Phenols, molten, liquid	UN 2312	101	1.75	Normal	B	Standard	
Phenol, solution	UN 2821	101	2.67	Normal	B	Standard	
Phenolsulfonic acid, liquid	UN 1803	101	1.75	Normal	B	Standard	
Phenylacetyl chloride	UN 2577	101	1.75	Normal	B	6.35 mm	
Phenylcarbylamine chloride	UN 1672	101	2.67	Special	Prohibited	6.35 mm	
Phenyl chloroformate	UN 2746	101	1.75	Special	Prohibited	Standard	
Phenyldichloroarsine	—	Not authorized for transportation in IM101 or IM102 tanks					
Phenylhydrazine	UN 2572	101	1.75	Normal	B	Standard	
Phenyl isocyanate	UN 2487	101	1.75	Normal	B	Standard	
Phenyl mercaptan	UN 2337	101	2.67	Special	Prohibited	6.35 mm	
Phenyltrichlorosilane	UN 1804	101	1.75	Normal	B	6.35 mm	
Phosgene	UN 1076	Not authorized for transportation in IM101 or IM102 tanks					
Phosphoric acid	UN 1805	101	1.75	Normal	A	Standard	
Phosphoric acid, anhydrous	UN 1807	Not authorized for transportation in IM101 or IM102 tanks					
Phosphorous oxybromide	UN 1939	101	1.75	Normal	B	6.35 mm	
Phosphorus, oxybromide, molten	UN 2576	101	1.75	Normal	B	8 mm	
Phosphorus oxychloride	UN 1810	101	1.75	Normal	B	6.35 mm	
Phosphorus, tribromide	UN 1808	101	1.75	Normal	B	6.35 mm	
Phosphorus, trichloride	UN 1809	101	1.75	Special	B	6.35 mm	
Phthalic anhydride (molten)	UN 2214	101	1.75	Normal	A	Standard	
Picolines	UN 2313	101	1.75	Normal	B	Standard	
alpha-Pinene	UN 2368	102	1.0	Normal	A	Standard	
Pine oil	UN 1272	102	1.0	Normal	A	Standard	
Piperidine	UN 2401	102	1.0	Normal	B	Standard	
Pivaloyl chloride. [See] Trimethyl acetyl chloride							
Poisonous liquid [(other than Class A poison)], not listed by name in this table ([vapor pressure not exceeding 43 psia at 122 deg F and no subsidiary hazard]):							
(a) Oral LD50 of 4 mg/kg or lower, dermal LD50 of 40 mg/kg or lower or LC50 of 2 mg/l or lower	Various	Must be specifically authorized prior to transportation. See 49CFR173.32c(d)					
(b) Oral LD50 greater than 5 mg/kg and dermal LD50 greater than 40 mg/kg	Various	101	2.67	Normal	B	Standard	

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For explanation of abbreviations and reference marks, see last page of this tariff.

(1) Hazardous Materials Descriptions [many of these descriptions are not proper shipping names. See 172.101 for proper shipping name]	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Potassium chlorate, solution	UN 2427	101	1.75	Normal	B	Standard	
Potassium cyanide solution	UN 1680	101	2.67	Special	Prohibited	6.35 mm	
Potassium fluoride solution	UN 1812	101	1.75	Normal	B	Standard	
Potassium hydrogen fluoride solution	UN 1811	101	1.75	Normal	B	Standard	
Potassium hydroxide, solution	UN 1814	101	1.75	Normal	B	Standard	
Potassium perchlorate, solution	UN 1489	101	1.75	Normal	B	Standard	
Propanethiols	UN 2402	101	1.75	Normal	B	Standard	
Propionaldehyde	UN 1275	101	2.67	Normal	B	Standard	
Propionic acid	UN 1848	101	1.75	Normal	A	Standard	
Propionic anhydride	UN 2496	102	1.0	Normal	B	Standard	
Propionitrile	UN 2404	101	2.67	Normal	B	Standard	
Propionyl chloride	UN 1815	101	1.75	Normal	B	6.35 mm	
Propyl acetate, normal	UN 1276	102	1.0	Normal	A	Standard	
Propyl alcohol (propanol)	UN 1274	102	1.0	Normal	A	Standard	
Propylamine	UN 1277	101	2.67	Normal	B	Standard	
Propyl benzene	UN 2364	102	1.0	Normal	A	Standard	
Propyl chloride	UN 1278	101	2.67	Normal	B	Standard	
n-Propyl chloroformate	UN 2740	Not authorized for transportation in IM101 or IM102 tanks					
Propylene chlorohydrin	UN 2611	101	1.75	Normal	Prohibited	Standard	
Propylene diamine	UN 2258	101	1.75	Normal	B	Standard	
Propylene dichloride	UN 1279	102	1.0	Normal	A	Standard	
Propylene imine, [inhibited]	UN 1921	Not authorized for transportation in IM101 or IM102 tanks					
Propylene oxide	UN 1280	101	4.0	Normal	B	Standard	a
Propylene tetramer	UN 2850	102	1.0	Normal	A	Standard	
Propyl formates	UN 1281	101	1.75	Normal	B	Standard	
n-Propyl isocyanate	UN 2482	101	2.67	Special	Prohibited	6.35 mm	
Propyl mercaptan	UN 2704	101	2.67	Normal	Prohibited	Standard	
Propyl nitrate	UN 1865	Not authorized for transportation in IM101 or IM102 tanks					
Propyltrichlorosilane	UN 1816	101	1.75	Normal	B	6.35 mm	a
Pyridine	UN 1282	101	1.75	Normal	B	Standard	
Pyrophoric liquids not listed by name in this table	Various	Not authorized for transportation in IM101 or IM102 tanks					
Pyrosulfuryl chloride	UN 1817	101	1.75	Normal	Prohibited	8 mm	
Pyroxylin solution, [See] Nitrocellulose, containing not more than 12.6 percent nitrogen, solutions in flammable liquids not exceeding 55 percent nitro cellulose by weight							
Pyrrolidine	UN 1922	102	1.0	Normal	A	Standard	
Quinoline	UN 2656	101	1.75	Normal	B	Standard	
Resin oil	UN 1256	102	1.0	Normal	A	Standard	
Resin solution ([in flammable liquid]):							
(a) Flashpoint below 32 deg F	UN 1866	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above but not more than 90 deg F	UN 1866	102	1.0	Normal	A	Standard	
(c) Flashpoint 90 deg F or above	UN 2668	102	1.0	Normal	A	Standard	
Road asphalt, [or] tar, [See] Tars, liquid							
Rubber solution							
(a) Flashpoint below 32 deg F	UN 1287	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1287	102	1.0	Normal	A	Standard	

(1) Hazardous Material's Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Rubidium hydroxide, solutions	UN 2677	101	1.75	Normal	B	Standard	
Selenium oxychloride	UN 2879	101	1.75	Special	Prohibited	8 mm	
Shale oil							
(a) Flashpoint below 32 deg F	UN 1288	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1288	102	1.0	Normal	A	Standard	
Silicon tetrachloride [or] Silicon chloride	UN 1818	101	2.67	Special	Prohibited	6.35 mm	8
Sludge acid [See] Acid, sludge							
Sodium aluminate, solution	UN 1819	101	1.75	Normal	B	Standard	
Sodium arsenite, aqueous solution	UN 1686	101	2.67	Normal	Prohibited	Standard	
Sodium chlorate, solution	UN 2428	101	1.75	Normal	B	Standard	
Sodium chlorite, solution	UN 1496	101	1.75	Normal	B	Standard	
Sodium chlorite solution ([not exceeding 42 per cent sodium chlorite])	UN 1908	101	1.75	Normal	B	Standard	
Sodium cuprocyanide solution	UN 2317	101	1.75	Normal	B	6.35 mm	
Sodium cyanide solution	UN 1689	101	2.67	Special	Prohibited	6.35 mm	
Sodium fluoride, solution	UN 1690	101	1.75	Normal	B	Standard	
Sodium hydrogen sulfate, solution	UN 2837	101	1.75	Normal	B	6.35 mm	
Sodium hydroxide solution	UN 1824	101	1.75	Normal	B	Standard	
Sodium methylate, alcohol solutions	UN 1289	101	1.75	Normal	B	Standard	
Sodium perchlorate, solution	UN 1502	101	1.75	Normal	B	Standard	
Spirits of nitroglycerin, ([1 to 10%]) ([Nitroglycerin, solutions in alcohol])	UN 1204	Not authorized for transportation in IM101 or IM102 tanks					
Strontium chlorate, solution	UN 1506	101	1.75	Normal	B	Standard	
Strontium perchlorate, solution	UN 1508	101	1.75	Normal	B	Standard	
Styrene monomer, [inhibited]	UN 2055	102	1.0	Normal	A	Standard	
Sulfur chloride	UN 1828	101	2.67	Special	Prohibited	8 mm	
Sulfuric acid	UN 1830	101	1.75	Normal	Prohibited	8 mm	
Sulfuric acid, fuming	UN 1831	101	2.67	Special	Prohibited	8 mm	
Sulfuric acid, spent	UN 1832	101	1.75	Normal	Prohibited	8 mm	
Sulfurous acid	UN 1833	101	1.75	Normal	B	Standard	
Sulfur trioxide, [inhibited]	UN 1829	101	2.67	Special	Prohibited	8 mm	
Sulfuryl chloride	UN 1834	101	2.67	Special	Prohibited	8 mm	
Sulphur, molten	UN 2448	101	1.75	Normal	Prohibited	Standard	
Tars, liquid ([including cutback asphalt])							
(a) Flashpoint below 32 deg F	UN 1999	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1999	102	1.0	Normal	A	Standard	
Terpene hydrocarbons not listed by name in this table	Various	102	1.0	Normal	A	Standard	
Terpinolene	UN 2541	102	1.0	Normal	A	Standard	
Tetrachloroethane	UN 1702	101	2.67	Normal	B	Standard	
Tetrachloroethylene	UN 1897	102	1.0	Normal	A	Standard	
Tetraethyl dithiopyrophosphate, liquid	UN 1704	Not authorized for transportation in IM101 or IM102 tanks					
Tetraethyl dithiopyrophosphate mixtures, [See] Poisonous liquid							
Tetraethylenepentamine	UN 2320	102	1.0	Normal	B	Standard	
Tetraethyl lead	UN 1649	Not authorized for transportation in IM101 or IM102 tanks					
Tetraethyl pyrophosphate, liquid	NA 2783	Not authorized for transportation in IM101 or IM102 tanks					
Tetraethyl pyrophosphate mixtures, [See] Poisonous liquid							
Tetraethyl silicate	UN 1292	102	1.0	Normal	A	Standard	

(1) Hazardous Materials Descriptions (many of these descriptions are not proper shipping names. See 172.101 for proper shipping name)	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
1,2,3,6-Tetrahydrobenzaldehyde	UN 2498	102	1.0	Normal	A	Standard	
Tetrahydrofuran	UN 2056	101	1.75	Normal	B	Standard	
1,2,3,6-Tetrahydropyridine	UN 2410	101	1.75	Normal	B	Standard	
Tetrahydrothiophene	UN 2412	101	1.75	Normal	A	Standard	
Tetramethyl ammonium hydroxide, liquid ([or solution])	UN 1835	101	1.75	Normal	B	Standard	
Tetramethylsilane	UN 2749	101	4.0	Normal	Prohibited	6.35 mm	
Tetrapropyl orthotitanate	UN 2413	101	1.75	Normal	B	Standard	
Thiacetic acid	UN 2436	101	1.75	Normal	B	Standard	
Thioglycolic acid	UN 1940	101	1.75	Normal	B	Standard	
Thionyl chloride	UN 1836	101	2.67	Special	Prohibited	8 mm	
4 Thiopentanal	UN 2785	101	1.75	Normal	B	Standard	
Thiophene	UN 2414	102	1.0	Normal	B	Standard	
Thiophosgene	UN 2474	101	2.67	Normal	B	Standard	
Thiophosphoryl chloride	UN 1837	101	1.75	Special	Prohibited	Standard	
Tinctures, medicinal							
(a) Flashpoint below 32 deg F	UN 1293	101	1.75	Normal	B	Standard	
(b) Flashpoint 32 deg F or above	UN 1293	102	1.0	Normal	B	Standard	
Tin tetrachloride, anhydrous ([stannic chloride, anhydrous])	UN 1827	101	1.75	Normal	B	6.35 mm	
Titanium tetrachloride	UN 1838	101	1.75	Special	Prohibited	6.35 mm	
Toluene	UN 1294	102	1.0	Normal	A	Standard	
2,4-Toluenediamine	UN 1709	101	1.75	Normal	A	Standard	
Toluene diisocyanate	UN 2078	101	2.67	Normal	B	Standard	
Toluene sulfonic acid [See] Alkyl, aryl or toluene sulfonic acid							
Toluidines	UN 1708	101	2.67	Normal	B	Standard	
Triallylamine	UN 2610	101	1.75	Normal	B	Standard	
Tributylamine	UN 2542	102	1.0	Normal	B	Standard	
Trichloroacetic acid solution	UN 2564	101	1.75	Normal	B	Standard	
Trichloroacetyl chloride	UN 2442	101	1.75	Normal	Prohibited	6.35 mm	
Trichlorobenzenes, liquid	UN 2321	101	1.75	Normal	A	Standard	
Trichlorobutene	UN 2322	101	1.75	Normal	B	Standard	
1,1,1-Trichloroethane	UN 2831	101	1.75	Normal	A	Standard	
Trichloroethylene	UN 1710	102	1.0	Normal	A	Standard	
Trichlorosilane	UN 1295	101	4.0	Special	Prohibited	6.35 mm	
Tricresylphosphate	UN 2574	101	1.75	Normal	B	Standard	
Triethylamine	UN 1296	101	1.75	Normal	B	Standard	
Triethylenetetramine	UN 2259	101	1.75	Normal	B	Standard	
Triethyl phosphite	UN 2323	102	1.0	Normal	A	Standard	
Trifluoroacetic acid	UN 2699	101	2.67	Special	Prohibited	8 mm	
Triisobutyl aluminum	UN 1930	Not authorized for transportation in IM101 or IM102 tanks					
Triisobutylene	UN 2324	101	1.75	Normal	A	Standard	
Triisopropyl borate	UN 2616	101	1.75	Normal	B	Standard	
Trimethyl acetyl chloride	UN 2438	101	1.75	Normal	B	6.35 mm	
Trimethylamine, aqueous solutions ([with not more than 30 percent trimethylamine by weight])	UN 1297	101	2.67	Normal	B	Standard	
1,3,5-Trimethylbenzene	UN 2325	102	1.0	Normal	A	Standard	

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(1) Hazardous Materials Descriptions [many of these descriptions are not proper shipping names. See 172.101 for proper shipping name]	(2) ID Number	(3) IM Tank Type	(4) Lowest MAWP in bars	(5) Pressure Relief Devices	(6) Bottom Outlets	(7) Minimum Shell Thickness	(8) Special Requirements
Trimethyl borate	UN 2416	101	2.67	Normal	B	Standard	
Trimethylchlorosilane	UN 1298	101	2.67	Normal	B	6.35 mm	
Trimethylcyclohexylamine	UN 2326	102	1.0	Normal	B	Standard	
3,3,5 Trimethyl-hexamethylene diamine	UN 2327	101	1.75	Normal	A	Standard	
Trimethylhexamethylene diisocyanate	UN 2328	101	1.75	Normal	B	Standard	
Trimethyl phosphite	UN 2329	102	1.0	Normal	A	Standard	
Tripropyl aluminum	UN 2718	Not authorized for transportation in IM101 or IM102 tanks					
Tripropylamine	UN 2260	101	1.75	Normal	B	Standard	
Tripropylene	UN 2057	102	1.0	Normal	A	Standard	
Tris (1 aziridinyl) phosphine oxide, ([solutions])	UN 2501	101	1.75	Normal	B	Standard	
Turpentine	UN 1299	102	1.0	Normal	A	Standard	
Turpentine substitute	UN 1300	102	1.0	Normal	A	Standard	
Undecane	UN 2330	102	1.0	Normal	A	Standard	
Valeraldehyde	UN 2058	102	1.0	Normal	A	Standard	
Vinyl chloride	UN 2502	101	1.75	Normal	B	Standard	
Vanadium oxytrichloride	UN 2443	101	1.75	Normal	B	6.35 mm	
Vanadium tetrachloride	UN 2444	101	1.75	Normal	B	6.35 mm	
Vinyl acetate, [inhibited]	UN 1301	101	1.75	Normal	B	Standard	
Vinyl butyrate	UN 2838	101	1.75	Normal	A	Standard	
Vinyl chloroacetate	UN 2589	101	2.67	Normal	B	Standard	
Vinyl ethyl ether, [inhibited]	UN 1302	101	2.67	Normal	B	Standard	
Vinylidene chloride, [inhibited]	UN 1303	101	4.0	Special	B	Standard	a
Vinylisobutyl ether, [inhibited]	UN 1304	101	1.75	Normal	B	Standard	
Vinyl toluene, mixed isomers, [inhibited]	UN 2618	102	1.0	Normal	A	Standard	
Vinyltrichlorosilane, [inhibited]	UN 1305	101	2.67	Normal	B	6.35 mm	
Wood preservatives, flammable							
(a) Flashpoint below 32 deg F	UN 1306	101	1.75	Normal	A	Standard	
(b) Flashpoint 32 deg F or above	UN 1306	102	1.0	Normal	A	Standard	
Xylene ([mixed])	UN 1307	102	1.0	Normal	A	Standard	
Xylenols	UN 2261	101	1.75	Normal	B	Standard	
Xylidines	UN 1711	101	2.67	Normal	B	Standard	
Xylyl bromide	UN 1701	Not authorized for transportation in IM101 or IM102 tanks					
Zinc chloride solution	UN 1840	101	1.75	Normal	A	Standard	

IM TANK TABLE
January 1, 1981

For explanation of abbreviations and reference marks, see last page of this tariff.

EXPLANATION OF ABBREVIATIONS, DEFINITIONS AND REFERENCE MARKS
(See §171.6 Definitions and Abbreviations)

Abbreviation or Reference Mark	EXPLANATION
°C	degree Centigrade (Celsius)
DOT	Department of Transportation
d/b/a	doing business as
etc.	Et cetera (and other things, or the rest; and so forth)
°F	degree Fahrenheit
FMC	Federal Maritime Commission
ICC	Interstate Commerce Commission
oz.	Ounces
t/d/b/a	Trading and doing business as
U.S.	United States
viz.	Namely
Vol.	Volume
°	Degree
%	Indicates percent
Ⓦ	Indicates water carrier operating under ICC jurisdiction
Ⓡ	Indicates railroad
Ⓒ	Carrier's participation canceled; no further application.
Ⓕ	Indicates freight forwarder
§	Indicates 'Section' number.
¶	Indicates 'Part' number.
‡	This tariff, as amended, is applicable in connection with California intrastate rates only where tariffs making reference hereto specifically so provide.
Ⓖ	Except as noted.
Ⓔ	Except as noted. The carrier 'alpha' codes listed herein represent only those carriers participating in the ATA Hazardous Materials Tariff. For a complete listing of all assigned alpha codes, see the Directory of Standard Multi-Modal Carrier and Tariff Agents Codes, ICC NMF 101, published by the National Motor Freight Traffic Association, Inc., 2200 Mill Road, Alexandria, VA 22314.

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