Title 49—TRANSPORTATION

Chapter I—Hazardous Materials Regulations Board, Department of Transportation

[Docket OPS-3]

PART 190—INTERIM MINIMUM FEDERAL SAFETY STANDARDS FOR THE TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE

PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS

Establishment of Minimum Standards

This amendment establishes a new Part 192 in Title 49, Code of Federal Regulations, containing the minimum Federal safety standards for the transportation of gas and for pipeline facilities used for this transportation.

The Natural Gas Pipeline Safety Act was enacted on August 12, 1968. It required the Secretary of Transportation to adopt, within 3 months, the then existing State safety standards for gas pipelines as interim regulations and to establish, within 24 months, minimum Federal safety standards. The interim standards were issued on November 7, 1968, as Part 190 of Title 49 of the Code of Federal Regulations and became effective on December 13, 1968. With the adoption of these minimum Federal standards in Part 192, the interim standards are no longer necessary. Therefore, the interim standards are revoked on the date that Part 192 becomes effective, except for those provisions applicable to design, installation, construction, initial inspection, and initial testing of new pipelines which will remain in effect until March 13, 1971.

These regulations were proposed in the following notices of proposed rulemaking issued between November 14, 1969, and June 10, 1970:

OPS Notice 69-3, 34 F.R. 18556.
OPS Notice 70-1, 35 F.R. 1112.
OPS Notice 70-2, 35 F.R. 3237.
OPS Notice 70-3, 35 F.R. 4413.
OPS Notice 70-4, 35 F.R. 5012.
OPS Notice 70-5, 35 F.R. 5482.
OPS Notice 70-6, 35 F.R. 5724.
OPS Notice 70-7, 35 F.R. 5713.
OPS Notice 70-11, 35 F.R. 9293.

This amendment does not include the requirements on corrosion control (Subpart I) which were proposed in a notice published in the FEDERAL REGISTER on May 6, 1970 (35 F.R. 2127). Final action on that notice will be taken after the comments that were received on the notice and at the public hearing that was held on July 20, 1970, have been analyzed.

Part 192 differs in many respects from the notices upon which it is based. Some changes were made for consistency in terminology and format. Others involve the moving of requirements from one section to another, or from one subpart to another, for better organization.

Many sections were renumbered, particularly in Subparts C, D, L, and M. Even numbered sections and blocks of sections between subparts were left blank to accommodate additional sections in future rulemaking actions.

Some changes are substantive in nature and are based both on the comments received on the notices (over 500 separate comments totaling over 2,500 pages were received and the recommendations of the Technical Pipeline Safety Standards Committee. Each of these changes is within the general scope of the notice on which it was based.

This is a major rulemaking action dealing with a highly technical subject in which many requirements are interdependent. Since the entire project was accomplished in less than 9 months from the first notice to the final rule, some of the changes may create problems in interpretation and compliance. Interested persons should inform the Office of Pipeline Safety in writing of any such problems, so that a determination can be made as to whether a correcting or clarifying amendment should be issued before the effective date of the particular requirement.

In addition to the many comments on the proposals which have been reflected in this final rule, a number of commenters recommended additional requirements to supplement present requirements or to cover areas not presently covered. Since many of these recommendations were beyond the scope of the proposed regulations, they could not be included in this final rule. However, these recommendations will be considered as petitions for rulemaking and many will be the subject of future rulemaking actions.

A large number of the comments were directed to areas of overall effect, such as the determination of maximum allowable operating pressure, the definition of "class location", and the determination and effect of a change in class location. These general subjects are discussed in detail below. All other significant changes and comments are discussed in a subpart by subpart, section by section, analysis.

Determination of maximum allowable operating pressure. As proposed in the notice, maximum allowable operating pressure would have been limited to the lowest of a designated series of pressures. Two of the designated pressures were (1) the design pressure in the weakest element in the pipeline system, and (2) the pressure obtained by dividing the pressure to which the pipeline was tested after construction by the factor for the appropriate class location.

Since some pipelines have been operated above 72 percent of specified minimum yield strength (the highest design stress allowed by Part 192) and since many were tested to no more than 50 pounds above maximum allowable operating pressure, these proposed requirements would have required a reduction of operating pressures in those pipelines. In a letter to the Office of Pipeline Safety, the Federal Power Commission stated (NOTE: the section numbers are those used in the notice):

Section 192.617 establishes maximum allowable operating pressure for existing steel pipelines. Several limitations are listed with paragraph (a) providing, "No person may operate a steel or plastic pipeline or main at a pressure that exceeds the lowest of the following." Paragraph (a) (2) (ii) is a table that requires applying a factor related to test pressure to establish the maximum allowable operating pressure. This table provides that in Class 1 locations the maximum allowable operating pressure cannot exceed the test pressure divided by 1.1 and in Class 2 locations a factor of 1.25.

Presumably these limits were established to relate to the requirements for testing presently contained in the Interim Federal Safety Standards which are essentially the same as those in ANSI B31.8-1968.

The proposed regulation does not recognize that the B31.8 Code did not establish these minimum test levels until 1952. Prior to that time, between 1935 and 1951, the predecessor Code, B31, required only that a pipeline be tested to a pressure 50 p.s.i.g. in excess of the proposed maximum operating pressure.

There are thousands of miles of jurisdictional interstate pipelines installed prior to 1952, in compliance with the then existing codes, which could not continue to operate at their present pressure levels and be in compliance with proposed section 192.617.

This Commission has reviewed the operating record of the interstate pipeline companies and has found no evidence that would indicate a material increase in safety would result from requiring wholesale reductions in the pressure of existing pipelines which have been proven capable of withstanding present operating pressures through actual operation.

If it is the intention of the Office of Pipeline Safety to require the retesting of all existing pipelines to the higher standards proposed in section 192.617, it is our suggestion that this section be revised to permit the development of an orderly testing program that will allow the jurisdictional pipeline companies the necessary time to obtain from this Commission such certificate authorizations as may be necessary.

In view of the statements made by the Federal Power Commission, and the fact that this Department does not now have enough information to determine that existing operating pressures are unsafe, a "grandfather" clause has been included in the final rule to permit continued operation of pipelines at the highest pressure to which the pipeline had been subjected during the 5 years preceding July 1, 1970.

The uprating requirements in Subpart K apply when an operator wants to establish a maximum allowable operating pressure higher than the highest actual operating pressure to which the pipeline was subjected in these 5 years. This will prevent an operator from using a theoretical maximum allowable operating pressure which may have been determined under some formula used 20, 30, or 40 years ago.

Changes in class location. The notice proposed that confirmation or revision of maximum allowable operating pressure, due to a change in class location, must be accomplished within 60 days of the date when the operator has notice that such a change has occurred. The notice requested specific comment on the proposed 60-day period, since the B31.8 Code provisions upon which this proposal was based did not contain a specific time

limit. (It is relevant to note that the requirement for the evaluation of pipeline facilities when it appears that there has been a change in class location was newly adopted in the 1968 edition of the B31.8 Code, which does not apply in a number of States, and that there is diversity of opinion as to the burden these requirements impose on operators.) The comments on the proposed requirement were in general agreement that a 60-day time limit would be impractical and would leave the operators no alternative but to reduce pressure, thereby decreasing throughput. With respect to this proposal, the Federal Power Commission in its comments stated (note: the section numbers are those used in the notice):

Section 192.609(e) requires that, "confirmation or revision of the maximum allowable operating pressure in accordance with this section must be accomplished within 60 days of the date when the operator has noticed that a change in location class has occurred."

It is the Commission's opinion that this is an unduly restrictive requirement which would be impossible of accomplishment by jurisdictional interstate pipeline companies under the requirements of the Natural Gas Act.

Section 7(b) of the Act prohibits abandonment of facilities or any service rendered by such facilities without the permission of the Commission after due hearing.

Section 7(c) of the Act prohibits construction or extension of facilities unless there is in force a certificate of public convenience and necessity issued by the Commission authorizing such construction.

Giving consideration to requirements for public noticing, opportunity for intervention and accumulation of an adequate record upon which a decision can be rendered, it does not appear that in every instance the Commission would have adequate time to permit alternate construction within the 60-day time limit.

The potential loss in delivery capacity at a time when many pipeline companies are encountering difficulty in obtaining adequate supply of gas to meet growth requirements could seriously affect the ability of the industry to meet its obligation to satisfactorily serve the public convenience and necessity of the Nation.

It is suggested that the Office of Pipeline Safety consider modifying proposed § 192.609(e) to not be mandatory as applied to jurisdictional interstate pipeline companies unless and until appropriate certificate authorization has been granted by the Federal Power Commission.

The alternative time periods suggested by the other commenters ranged from 120 days to 5 years. Further, the comments pointed out that compliance with this section would be complicated by the fact that the "class location" definitions were not indentical with the present B31.8 definitions.

In view of these comments, the change in class location requirements will be treated in two phases. A new §192.607 contains requirements for the initial determination of class location and confirmation or establishment of maximum allowable operating pressure. Each operator is required to complete before April 15, 1971, a study to determine (for pipelines operated at more than 40 percent of SMYS) the present class location of all of the pipeline in its system, and whether the maximum allowable operating pressure for each segment of pipeline is commensurate with the present class location. The operator is then required to confirm or revise, in accordance with section 192.611, the maximum allowable operating pressure of the affected segment of pipeline so that at least 50 percent of the affected pipeline is confirmed or revised before January 1, 1972, and the remainder before January 1, 1973.

In view of the new definitions of "class location", the diversity of views as to how much time is needed for confirmation or revision of pressures after a change has been discovered, the fact that the change in class location requirements are not included in the interim Federal standards in a number of States, and the disagreement within the pipeline industry as to the actual meaning of the change in class location requirements added in the 1968 edition of the B31.8 Code, the impact of § 192.607 will not be known until April 1971, when the required studies are completed. These studies may show that the existing pipelines are, for the most part, already in compliance with the new class locations, so that there will be little difficulty in meeting the schedule for adjusting operating pressure. On the other hand, the studies may reveal a problem of such magnitude as to raise serious question as the practicality of the schedule.

The Office of Pipeline Safety plans to hold a public hearing in late April 1971 to get the results of the required studies and to give all interested parties an opportunity to present their recommendations on any adjustment which may be required in the schedule for adjusting operating pressures. The date, time, location, and other specific details of that hearing will be announced.

Sections 192.609 and 192.611 apply to changes in class location that occur after April 15, 1971. Under § 192.611(e), an operator will have 1 year from the date when a change in class location has occurred to accomplish the confirmation or revision.

Odorization of gas in transmission lines. The notice of proposed rulemaking proposed to require the odorization of gas in transmission lines. This proposal was based on a requirement that presently exists in the States of California, New York, New Jersey, Massachusetts, and Vermont (previously Wisconsin was erroneously included in this list). Because the comments received on the original notice were almost unanimously opposed to the odorization of gas in high pressure transmission lines, we issued a supplemental notice on June 10 requesting additional comments.

The comments received on the June 10 notice also generally opposed the proposal. However, the States of New York, New Jersey, and Massachusetts urged that the requirement be adopted as originally proposed. These States indicated that their experience with the odorization of transmission lines did not support the objections that had been listed in the supplemental notice.

The information on hand is conflicting and inconclusive, though it tends toward eliminating the requirement for odorization of gas in interstate transmission lines. Further, the comments were largely expressions of opinion, with little objective information to support the opinions. To insure that those who favor the requirement have ample opportunity to furnish further supporting information, the Office of Pipeline Safety plans to hold a public hearing in mid-September on this subject. The date, location, and other specific details on this public hearing will be announced in the near future. If warranted by the information received at that hearing, further action will be taken before November 12, 1970, when Part 192 takes effect.

Liquefied petroleum gas systems. Section 192.11 contains requirements applicable to petroleum gas pipeline systems. The authority of this Department to regulate certain petroleum gas pipeline systems under the Natural Gas Pipeline Safety Act, has been questioned. While there may be some question as to jurisdiction over a pipeline carrying petroleum gas from a tank (where it is stored in liquid form), to one or two single-family houses, there is no question as to authority over petroleum gas systems that serve a significant number of customers. In these cases, there is certainly a sufficient affect on interstate commerce to sustain a Congressional grant of authority and the language of the Natural Gas Pipeline Safety Act is broad enough to cover such cases. Section 192.11 applies only to petroleum gas systems that serve more than 10 customers from a common source or in which a pipeline crosses a public place, such as a highway.

A new paragraph (c) has been added to make clear which gas systems have to meet the additional requirements of this section. In effect it excludes gas systems that use petroleum gas only to supplement natural gas supplies during peak shaving. The word liquefied has been deleted to avoid any implication that these sections apply to petroleum gas when it is in liquid form. Notwithstanding that § 192.11 reflects the present requirements of the B31.8 Code, certain requirements (particularly in the operating and maintenance areas) may not be appropriate for a petroleum gas system. In order to determine whether there are any such inappropriate requirements and what, if any, changes should be made, we are asking operators of petroleum gas systems and other interested persons to comment on the various provisions of this regulation. If any of the provisions are inappropriate, commenters should suggest alternative requirements that would be appropriate and that would achieve the same safety objective.

Authority of States to act as enforcement agents of the Department with respect to interstate pipelines. In section 190.6 of the interim minimum Federal safety standards, States were authorized to act as the agents of this Department with respect to inspecting and overseeing interstate pipeline facilities, because the Office of Pipeline Safety was not

staffed to enforce regulations. Termination of the interim regulations will not affect the authority of the States to act as agents of this Department with respect to interstate pipelines. The authority is being continued and those States that are already acting as agents of the Department may continue to do so without further indication of their intent. All existing agency relationships will continue until formally terminated by either the State or by this Department. Any State which wishes to act as agent, but did not previously so indicate, may establish an agency relationship merely by submitting a statement of intent to the Office of Pipeline Safety.

The agency authority with respect to interstate pipelines authorizes the State to maintain surveillance over the operation to insure compliance with Federal regulations. State personnel should perform the same function that Federal field personnel perform, inspecting operations and giving informal opinions and approvals as to compliance with the regulations.

The agency authority does not create enforcement authority in the State. Enforcement actions, except those which the operator voluntarily accepts, will be taken at the Federal level.

The agency authority does not authorize a State to create new standards or to take any action which would substantively change the Federal standards. The Act requires that standards be prescribed by the Department in accordance with applicable rulemaking procedures.

State and industry officials are invited to contact the Office of Pipeline Safety with regard to any questions that may arise concerning this relationship.

Effective date. As stated in Notice 70–1, section 3(c) of the Natural Gas Pipeline Safety Act requires that standards and amendments thereto prescribed under that Act "shall become effective 30 days after the date of issuance unless the Secretary, for good cause recited, determines an earlier or later effective date is required as a result of the period reasonably necessary for compliance". In that notice, it was stated that since most of the proposed requirements would be based on existing recommended industry standards, a long lead time should not be necessary for compliance. Further, the notice requested commenters to identify specific requirements that would require a longer lead time.

In addition to the numerous comments received in the various dockets on the proposed effective date, the question of effective dates was discussed with the Technical Pipeline Safety Standards Committee. That Committee unanimously recommended that the overall effective date should be 90 days after the date of issuance. Additional time for certain provisions relating to new pipelines is covered in § 192.13 and discussed elsewhere in this preamble. The primary reasons for an effective date more than 30 days after issuance are as follows:

(1) Part 192 is a complete revision of the interim minimum Federal regulations and it is desirable to allow time for all affected parties to receive copies of the new regulation and to thoroughly review its provisions before its effective date.

(2) Though Part 192 is based largely on the interim minimum Federal regulations, which were based primarily on recommended industry standards, we have found that many operators are not familiar with the recommended standards of the B31.8 Code. From investigations of accidents and the comments on our notices of proposed rulemaking, we know that a wide range of operators—large and small, privately owned and municipally-owned—are not familiar with either the Act or the interim regulations.

(3) The B31.8 Code in many cases recommended the establishment of written plans, and the interim Federal regulations required plans, but the requirement was not stated in clearly mandatory terms. We now find many companies have not established the plans.

Therefore, after considering the comments, the recommendations of the Technical Pipeline Safety Standards Committee, and the other information that has come to our attention, the 90-day recommendation of the Technical Committee has been accepted.

Retroactive effect on existing pipelines. Many comments related to the effect of these regulations on existing pipelines. They expressed concern that existing pipelines would not meet the design, construction, and testing requirements of the new regulations and would therefore have to be replaced or otherwise modified in order to comply. There is no basis for this concern and the prospective effect of Part 192 is made clear in section 192.13. The Natural Gas Pipeline Safety Act (Section 3(b)) speaks quite clearly on this point, as follows:

> Not later than 24 months after the enactment of this Act, and from time to time thereafter, the Secretary shall, by order, establish minimum Federal safety standards for the transportation of gas and pipeline facilities. Such standards may apply to the design, installation, inspection, testing, construction, extension, operation, replacement, and maintence of pipeline facilities. Standards affecting the design, installation, construction, intial inspection, and initial testing shall not be applicable to pipeline facilities in existence on the date such standards are adopted.

Existing pipelines are subject to the maintenance, repair, and operations requirements. They may be subject to retest requirements or restrictions on operating pressure, under a future rulemaking action, if that action is necessary to meet the need for pipeline safety.

Federal regulations as a minimum standard. The scope provisions of these regulations state that they prescribe *minimum* safety standards. Though some commenters objected to the word "minimum," it has been retained. Under the Natural Gas Pipeline Safety Act, these are in fact minimum standards. With respect to interstate facilities under Federal jurisdiction, an operator may voluntarily exceed these standards. With respect to intrastate facilities under State jurisdiction, an operator may voluntarily exceed these standards. Further, section 3(b) of the Act specifically provides that a State agency may adopt additional or more stringent standards.

As evidence of hazardous situations becomes available the Department will, either through an individual hazardous condition order or through a general amendment, provide more stringent requirements for individual pipelines or for different types of pipelines.

Performance vs. specification requirements. As indicated in the series of notices upon which this regulation is based, we intend to state the Federal safety standards in performance terms, rather than as detailed specifications, whenever it is possible to do so within the state-of-the-art and without lowering the required level of safety. Several commenters pointed out certain requirements that are stated in specification language and recommended that they be stated in the final rule in performance terms. As the discussion of this subject in the notices pointed out, the schedule within which this rulemaking action was accomplished did not give us time to develop adequate performance-type substitutes in all of the instances where such a standard would be appropriate. This is one of the areas to which future attention will be devoted and will be the subject of future rulemaking actions where performance-type requirements are appropriate.

Incorporation by reference. In the proposed rulemaking it was stated that, while the editions of the documents incorporated by reference in the notice were based on the B31.8 Code, the final regulation might be updated to incorporate the most recent edition of the referenced standard or specification. Specific comments were requested on whether the use of the newer editions would cause a significant change in the impact of the regulations involved. The comments in general indicated that use of the latest published edition would not create any problems. However, some commenters questioned how future edition changes would be handled, since pipe and materials built to a new specification could not be used if that specification were not referenced in the regulations. New editions of referenced documents will be reviewed as soon as they are available and, if found to be acceptable, will be included in the referenced documents.

Subpart A—General:

Section 192.3. In response to many requests, several new definitions have been added. A number of comments suggested the incorporation of all of the definitions in the B31.8 Code. This has not been done, since it is not necessary to define a term when it is used in its ordinary dictionary sense or in accordance with the meaning commonly understood in the industry.

We have defined those terms which are being used in a different sense than the commonly understood meaning. For example, the term "pipeline" is used in

the B31.8 Code to refer to a high pressure, long distance transmission line, while in the Natural Gas Pipeline Safety Act the term is used as a generic term for all types of lines carrying gas in gathering, transmission, or distribution systems. Since this latter meaning is also consistent with the liquid pipeline regulation (49 CFR, Part 195), pipeline is defined in this broad sense in these regulations.

In most places where the proposed rules used the phrase "pipeline facilities," the word "pipeline" has been substituted. The terms "gathering line" "transmission line," and "distribution line" are defined as various types of pipelines. "Distribution line" is further divided into "main" and "service line." In addition to these six terms, we have defined the term "pipe" to include tubing.

The definition of SMYS has been changed to make it consistent with the use of that term in the design formula of § 192.105. For specifications listed in Appendix B, SMYS will be the yield strength specified as a minimum in the specification. For unlisted or unknown specifications, SMYS is the yield strength determined by tensile testing in accordance with § 192.107(b) and Appendix B, paragraph II-D.

Section 192.5. A number of comments pointed out that the proposed class location definitions could create a 2-mile stretch of high class location solely to protect a small cluster of buildings at a crossroad or road crossing.

To avoid this situation, a new paragraph (f) has been added to allow adjustment of class location boundaries. A Class 4 location boundary may be moved to within 220 yards of the nearest four-story building. Whenever a Class 2 or 3 location is required by a cluster of buildings in otherwise open country, the boundary may be moved to within 220 yards of the nearest building in the cluster.

In addition, a number of other changes have been made to clarify this section. It was pointed out by one commenter that heavy traffic and many other underground utilities almost always exist in an area where four-story buildings are prevalent thus making the proposed Class 4 location criteria redundant. Since other comments indicated some confusion about whether these requirements were cumulative or alternative in effect, the references to heavy traffic and other underground utilities have been deleted and the sole criterion for Class 4 locations will be a prevalence of four-story buildings.

The term "class location unit" has been substituted for the sliding mile, but will be used in the same way. It also has been made clear that each separate dwelling unit, such as an apartment, must be counted as a building intended for human occupancy.

Section 192.9. Several comments pointed out that, although gathering lines in nonrural areas were included in the scope, the proposed rules made no specific provision for them. This new section has been added to eliminate the problem by requiring all gathering lines, if they are subject to the regulations under § 192.1, to meet the requirements applicable to transmission lines.

Section 192.13. This new section has been added to clearly state the applicability of these regulations with respect to new and existing pipelines, and to avoid confusion as to the retroactive effect of these standards. Due to the long lead times involved in preparing for pipeline construction, the new requirements for design, installation, construction, initial inspection, and initial testing will apply only to new pipelines that initially became ready for service after March 12, 1971. Since the comparable provisions of the interim standards will continue in effect until March 13, 1971, a pipeline that is readied for service before March 13, 1971, will have to comply with the interim Federal standards. With respect to existing pipelines, all changes made after November 12, 1970, must comply with Part 192.

A paragraph (c) has been included to make clear that plans, programs, and procedures required to be established must also be followed by the operators.

Section 192.15. Some basic rules to be used in construing these regulations have been set forth in this section.

Subpart B—Materials:

A number of commenters felt that failure to include certain types of materials would preclude their use. This is not the result because these regulations are not all-encompassing. Rather, they establish prohibitions and requirements only for those areas where safety problems are known to exist. To the extent that certain materials are not specifically treated, they need only meet the general requirements of this subpart to be qualified for use in a pipeline.

Section 192.53. This section has been reorganized slightly and, based on paragraph 810.1 of the B31.8 Code, a new requirement for chemical compatibility has been added. Since it is now used in other subparts as well, the definition of "listed specification" has been placed in § 192.3.

Section 192.55. In paragraph (a) the word "or" was inadvertently omitted in the proposed rules. It has been inserted to make clear that paragraph (a) (1), (2), and (3) is complete alternatives, any one of which will suffice to qualify new steel pipe.

Several commenters apparently misunderstood the import of paragraph (c). This paragraph merely states the ways that new or used steel pipe may be used if it is not otherwise qualified under paragraph (a) or (b).

Section 192.61. This section has been expanded to require both new and used copper pipe to be manufactured in accordance with a listed specification.

Section 192.63. Several comments expressed concern that small diameter pipe is sometimes marked only by the bundle and therefore would not comply with this section. However, so long as marking by the bundle is prescribed in the manufacturing specification, the pipe will comply with this section under paragraph (a)(1). A paragraph has been added to prohibit field die stamping on surfaces of pipe or components that are subjected to internal stress.

Section 192.65. This section has been limited in application to large-diameter, thin-wall pipe which is more susceptible to damage during railroad transportation, if it is not properly loaded. Although the other pipe that would have been covered by the language of the proposed regulation might also be damaged by improper loading, this damage would be of a type that could be found by the required visual inspections and need not be a basis for rejecting the pipe as required by this section.

Subpart C—Pipe Design:

The proposed sections on corrosion factors and design limitations for steel pipe have been deleted and a new § 192.103 has been added with general requirements for pipe design. These changes have resulted in renumbering of each section of this subpart after § 192.101. The corrosion section is deleted, because we are now considering regulations which will require the installation of corrosion protection (proposed Subpart I) and control systems. Therefore, requiring an increase in the wall thickness of pipe to provide additional protection against the effects of corrosion will be unnecessary. The design limitations for steel pipe have been placed in §§ 192.103 and 192.105(b).

Section 192.103. This new section has been added as a composite of several separate provisions contained in the design requirements for each type of pipe material. It replaces requirements proposed in the notice as §§ 192.117(b), 192.119(b), 192.121(b), and 192.127(d).

Section 192.105. A sentence has been added to the definition of "t" to prevent the increase of design pressure based on wall thickness added under § 192.103 to protect against external loads. Paragraph (b) was taken from the proposed design limitations on steel pipe without change. One comment suggested an alternative method of determining "S" for pipe of unlisted specification by hydrostatic yield testing. This suggestion appears to have merit but will require further study and a separate rulemaking proceeding to obtain the benefit of full public comment.

Section 192.111. In response to comments requesting clarification of this section, language has been inserted in paragraphs (b)(1), (b)(2), and (c) to insure that heavier wall pipes is installed across the entire right-of-way when a pipeline crosses a public road or street without a casing.

Since Classes 3 and 4 locations require the use of design factors 0.50 and 0.40, the application of paragraph (d) has been limited to Class 1 and 2 locations.

Proposed paragraph (e) has been deleted. The situation it was designed for is now covered by § 192.5(f) which permits adjustment of class location boundaries in thinly populated areas.

Section 192.113. ASTM specification A333 has been added to the longitudinal

joint factor list. The flush paragraph at the end of the table has been reworded so as not to preclude the use of a lower joint factor if this is desired by the operator.

Section 192.115. In response to a comment, the word "gas" has been inserted in the table to make clear that this is a temperature attained during operation of the pipeline.

Section 192.121. The definition of "S" for thermosetting plastic pipe has been change to 11,000 p.s.i. to conform to the design provisions contained in the B31.8 Code.

Section 192.123. Paragraph (a) has been rearranged for greater clarity and a new paragraph, which was proposed as part of Subpart D, has been added.

Section 192.125. The minimum wall thickness requirement for copper service lines has been moved from Subpart H to this section.

Subpart D—Design of Pipeline Components:

This subpart has been completely renumbered and some sections have been combined or deleted to remove overlapping and redundant provisions. For instance, where there were 10 separate sections on compressor station design, there are now six sections; where there were six sections on pipe and bottle-type holders, there are now two sections. Most of this consolidation has been done without substantive change and, except for transfers to other subparts, the requirements that were proposed will be found in Subpart D. The substantive changes or transfers to other subparts are discussed below along with some of the more significant changes resulting from consolidation of proposed regulations.

Section 192.141. Reference to specific components or devices covered in Subpart D has been deleted from the Scope.

Section 192.145. Paragraph (a) has been rewritten to require that valves be used in accordance with the applicable API and MSS standards, rather than the service recommendation of the manufacturer, and that valves be capable of meeting "anticipated" operating conditions.

Paragraph (c) restricts the use of valves "having shell components made of ductile iron", whereas the proposed rule referred to valves "having pressure containing parts made of ductile iron". The substitution was made in response to comments that, as written, the rule would limit the use of valves with internal pressure containing parts, such as valve discs or plugs made of ductile iron. However, paragraph (d) retains the words "pressure containing parts made of ductile iron", since it was intended to limit such use in compressor stations where valves are subjected to greater vibration.

Section 192.147. Paragraph (a) is a new paragraph requiring that flanges and flange accessories meet the minimum requirements of applicable ANSI and MSS standards. Except for paragraph (c) (1), § 192.144 as proposed in the notice and on which § 192.147 is based has been eliminated in accordance with comments recommending that the section be rewritten in performance language, omitting details, and specifications.

Section 192.149. Paragraph (b), which requires that the actual bursting strength of steel butt-welding fittings must at least equal the computed bursting strength of pipe of the designated material and wall thickness, has been modified by the addition of the words, "as determined by a proto-type that was tested to at least the pressure required for the pipeline to which it is being added."

Section 192.151. This section, entitled "Branch connections" as proposed in the notice as § 192.146, is now entitled "Tapping". It now provides that a 1¼-inch tap may be made in a 4-inch cast iron or ductile iron pipe without reinforcement. However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6-inch or larger pipe.

Section 192.167. In response to a number of comments, electrical circuits needed to protect equipment, such as circuits driving the lubricating pumps, will not have to be deactivated by the emergency shutdown system. Since the requirements for shutdown systems for transmission and distribution compressor stations were so similar, they have been combined in paragraph (a) of this section.

Section 192.175. Since pipe-type holders are basically pieces of pipe, the requirements for their design and installation were nearly identical to those for pipe contained in other subparts. Therefore, the definition of pipe has been expanded to include these holders and all the identical provisions have been deleted. In addition, the prohibition against the storage of gas with a high hydrogen sulfide content in pipe-type and bottle-type holders has been transferred to Subpart L.

Section 192.179. The provisions on spacing of transmission line valves have been rewritten to more clearly express the intended result. Due to the lack of necessity and the impracticality of installation and operation, all offshore transmission lines have been exempted from the requirements for sectionalizing block valves.

Section 192.185. The requirement that vaults be located in accessible locations away from street intersections, heavy traffic, etc., has been modified by the addition of the words, "so far as practical". Many comments indicated that it would be impossible in some cases to comply with the section as written.

Section 192.189. The provision that "all electrical equipment in vaults must conform to the requirements of Class 1, Group D, of the National Electrical Code, ANSI Standard C1, has been modified by the insertion of the word "applicable" before the word "requirements".

Section 192.197. Paragraph (a) (5) has been rewritten in performance-type language by the addition of the words "to prevent a pressure which would cause the unsafe operation of any connected and properly adjusted gas utilization equipment."

Paragraph (c) (1) has been rewritten by changing "secondary regulator" to "upstream regulator" for purposes of clarity. A new subparagraph (4) has been added to the list of methods in paragraph (c) which may be used to regulate and limit the pressure of gas where the maximum actual operating pressure of the distribution system exceeds 60 p.s.i.g. This new subparagraph authorizes the use of—"A service regulator and an automatic shut-off device that closes upon a rise in pressure downstream from the regulator and remains closed until manually reset."

Section 192.199. A new paragraph (h) has been added to the requirements for pressure limiting or pressure relief devices. It provides that "except for a valve that will isolate the system under protection from its source of pressure, (such devices must) be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative."

Section 192.201. Paragraph (c) has been rewritten in performance-type language by deleting "2 p.s.i.g." and substituting "a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment."

Section 192.203. Paragraph (b) (6) is a new provision which requires that pipe or components subject to clogging from solids or deposits must have suitable connections for cleaning. Several comments pointed out that this requirement was contained in the B31.8 Code and should not be omitted from the regulations.

Subpart E—Welding of Steel in Pipelines:

Three of the sections that were in proposed Subpart E have been deleted or moved. Since each welding procedure contains detailed requirements for filler metal, it is not necessary to have a separate requirement in these regulations. Section 192.213 now contains the restrictions on miter joints which were transferred from Subpart G. The section on the acceptability of welds has been added to § 192.241 as paragraph (c). The section requiring repair of arc burns has been included in Subpart G with the section on repair of steel pipe.

Section 192.221. The words "arc and gas" have been deleted so as not to exclude new welding processes such as electron beam welding, from the scope of this subpart. In this section, as in other scope sections, the newly defined word "pipeline" has been substituted for "pipeline facilities." This will make it clear that these requirements do not apply to welding on water or air piping or welding during construction of buildings that will house gas equipment. Since the scope is broad enough to include all welding on pipelines and components, the words "when constructing, relocating, replacing, repairing, or otherwise changing * * *" are unnecessary and have been deleted.

Section 192.223. As proposed, paragraph (c) related to industrial safety practices; it has been deleted as inappropriate in these regulations. The size of a fillet weld is covered by individual welding procedures and a separate requirement proposed for paragraph (d) is repetitious and unnecessary. Paragraph (b) has been reworded to make clear that multiple qualification of welders under API 1104 is acceptable.

Sections 192.227 and 192.229. In response to a number of comments requesting clarification, these two sections have been reorganized. As proposed, § 192.209 was intended only as an alternative method of qualifying for low stress level welders and did not preclude the use of high stress level welders on low stress level pipe. This section has been placed in § 192.227 as paragraph (c) to clarify this point. Section 192.229 now contains only the limitations on the use of welders. The limitation in § 192.229(c) has been added to cover the situation of the welder qualified for high stress level pipe (i.e., qualified under § 192.227 (a)) who welds only on low stress level pipe. High stress level welders are not required to periodically requalify since it is assumed that their work is regularly subjected to nondestructive testing. However, this is not always the case when they weld only on low stress level pipe, since nondestructive testing is not required for pipe to be operated below 20 percent of SMYS. Consequently, paragraph (c) requires high stress level welders to have at least one weld destructively or nondestructively tested each 6 months.

Since the guided bend test is appropriate only for butt welds and not for fillet welds, the requirement for compressor station welders has been made more flexible by requiring only that a welder's qualification be based on destructive testing, rather than requiring the specific test.

Section 192.233. Since miter bends are another form of welded joint, the restrictions on their use have been moved from Subpart G to this section. The provisions have been reworded and the prohibition against miter bends in plastic pipe has been placed in Subpart F with the other provisions on the joining of plastic pipe.

Section 192.235. In response to many comments, paragraphs (c) and (d) have been deleted and paragraphs (a) and (b) have been combined. Since these requirements were appropriate for all welding, the section has been expanded and is no longer limited to butt welding.

Section 192.241. Paragraph (a) has been modified to avoid the implication that every weld must be inspected. This requirement is intended to impose on the operator the responsibility for providing sufficient visual inspection to ensure that certain criteria are met. In the case of a highly qualified and experienced welder, occasional spot checking may be sufficient to achieve this goal, while apprentice welders may require constant inspection.

Section 192.243. Several changes have been made to this section to remove or reduce some burdensome requirements that, in light of the comments received, would have provided little increased safety. There is a substantial increase in time spent and cost associated with testing the last few welds in order to achieve 100 percent coverage. Therefore, some flexibility is permitted in Classes 3 and 4 locations and at river crossings by permitting, if 100 percent testing is not practicable, the testing of less than 100 percent, but in no event less than 90 percent of the welds.

Also, since the identification and retention of X-ray film would present a substantial clerical burden, and will not prove too valuable in accident investigation, these requirements have been deleted from paragraph (f). Instead the operator will have to identify his testing records by geographic location to facilitate their analysis should leaks occur during subsequent testing or operation of the pipeline.

A third major change involves the applicability of paragraphs (d), (e), and (f). In order to encourage the use of nondestructive testing on the low stress level lines where it is not required, the provisions of these paragraphs have been changed so as to apply only to nondestructive testing that is required by § 192.241(b). This will permit random testing of welds and welders on lines operated below a 20 percent stress level even though they are in a Classes 3 or 4 location and will avoid the burden of keeping records in this situation.

Since the comments indicated that a single daily sampling of each welder's work is sufficient to establish his continued competency, the requirement for sampling to a specific percentage has been removed from paragraph (e).

An exception has also been made to avoid the problem of testing welders each day, who might be working in areas quite remote from the regular welding crew and testing apparatus.

The prohibition against the use of trepanning as a nondestructive testing method has been placed in paragraph (a) of this section.

Subpart F—Joinings of Materials other than by welding:

Section 192.271. The scope of this subpart has been changed to make it clear that welding material other than steel is not covered. At such time as regulations to cover this subject are issued they will be placed in Subpart E. This change will also make it clear that joining of steel, other than by welding, is covered by this subpart. As with the scope of Subpart E, the broad coverage of this section permits the elimination of redundant language concerning constructing, replacing, and repairing of pipelines.

Section 192.273. The general requirement proposed for this section has been reworded to make clear that the use of restraint devices at points other than at the joints is permitted. So long as each joint will sustain the forces that may be applied, it does not matter whether the joint does so because of its own intrinsic strength or because of a restraining or anchoring device attached elsewhere on the pipeline.

In addition, two new requirements have been added to require visual inspection of the completed joints and the use of written procedures in joining. These new paragraphs are based on the general construction requirements of the B31.8 Code.

Section 192.275. As proposed, this section contained two requirements that related to existing joints in cast iron lines. To alleviate the misunderstandings that resulted from this placement and to put these requirements in their proper perspective, these requirements have been added to the subpart on maintenance as § 192.753. As now written, paragraph (a) of this section applies only to newly joined caulked bell and spigot joints. The prohibition against brazing of cast iron pipe that has been added to this section was taken from a proposed requirement in Subpart H.

Section 192.281. Paragraph (a) has been rewritten in performance type language. The prohibition against miter joints in plastic pipe has been transferred to this section from Subpart G. The prohibitions against joining different types of plastic were too inflexible and have been deleted since the requirement for compatability of materials that is contained in § 192.53 attains the same objective.

Subpart G—General Construction Requirements for Transmission Lines and Mains:

Three proposed sections, 192.313—Dents, 192.319—Miter bends, and 192.329—Casing of plastic pipe or tubing, have been deleted or combined with other sections. Restrictions on dents are now included in the section on repair of steel pipe, § 192.309. The restrictions on miter bends have been transferred to § 192.233 of Subpart F. Paragraph (b) of the proposed section on casing of plastic pipe was deleted, since the design requirement in new § 192.103, and the balance of the section on the casing of plastic pipe have been added to § 192.325.

Section 192.301. Some comments suggested the establishment of separate sets of regulations for transmission lines and mains because of different operating conditions. However, the requirements are sufficiently similar to warrant retention in one set of regulations. If at some time in the future the requirements for transmission and distribution systems become sufficiently different, separate bodies of regulations may be established.

Section 192.309. The requirements for elimination of dents and arc burns have been added to this section as new paragraphs (b) and (c). In response to a number of comments, an alternative limitation has been established for the depth of a repair by grinding. If a piece of pipe has a greater nominal wall thickness than required for the pressure and stress level at which the pipe is to be operated, the operator may grind down the pipe wall to the required thickness even though the remaining wall may be less than permitted by the tolerances of the pipe specification.

Many commenters suggested that this section apply only to pipeline operated at 20 percent of SMYS, or more. In response to these comments, paragraph (a) has been changed to require repair only when the damage is such that the serviceability of the pipe is impaired. This will allow greater flexibility in repair of low stress level pipe, rather than requiring repair whenever a stress concentrator, however small, is discovered. With respect to dents, the specific requirements for removal contained in paragraph (b) will apply only to pipe operated at more than 20 percent of SMYS. Dents on lower stress level pipe will be subject to repair or removal under paragraph (a) if they impair the serviceability of the pipe.

Section 192.313. When this section was proposed in Notice 70-2, it applied only to steel pipe operated at 30 percent of SMYS or more. This limitation was based on a proposal originally made in Notice 69-3, the first notice of the series. It was intended to apply only to paragraph (a)(1) of the proposed section which required bends to be made at least one and one-half pipe diameters away from a circumferential weld. This restriction on bends has been deleted due to a number of comments questioning its validity and pointing out the problems this created when bending double jointed pipe. Therefore, the 30 percent stress level limitation has been deleted as well. The new paragraph (a)(1) contains a broad, general requirement that a bend may not impair the serviceability of the pipe. Paragraph (a)(4) has been combined with paragraph (d) in a general requirement that applies to all types of pipe.

The restriction on out-of-roundness has been limited to pipe of more than 4 inches in diameter because the 2½ percent of nominal diameter is difficult to measure on small diameter pipe. In addition, it appears that a greater degree of out-of-roundness is acceptable in small diameter, low pressure pipe. Pipe that is four inches or smaller in diameter will be required to be serviceable as provided in pararaph (a)(1). Proposed paragraph (e) has been deleted.

Section 192.325. In response to a great many comments pointing out the difficulties that distribution companies would have attaining the proposed 12 inches of clearance, the clearance requirements for mains are now couched in performance type language. This will allow these operators flexibility to attain the desired objectives of proper maintenance and protection from external damage. In addition, a new paragraph has been added to refer to the section in Subpart D which prescribes clearance for pipe-type and bottle-type holders.

Section 192.327. The minimum depth of cover for transmission lines laid in consolidated rock has been decreased to 24 inches for pipe under drainage ditches and in Classes 2, 3, and 4 locations. After considering the comments it appears that a rock ditch with 24 inches of cover provides a considerable degree of protection, which is increased relatively little by requiring 30 or 36 inches of cover. However, despite the small increase in protection this additional 6 or 12 inches of cover adds substantially to the cost of construction.

It also appears that increasing the cover for mains from 24 to 30 inches will not provide nearly as much additional protection as had been hoped. Therefore the 24-inch requirement of the existing standards is being retained. However, we plan on developing new standards, particularly in the areas of marking, mapping, and interutility coordination of construction work, to achieve the additional protection.

The requirement for encasing or bridging a pipeline to protect from excessive external loads has been removed from this section since it is now covered by § 192.103.

Subpart H—Customer Meters, Service Regulators and Service Lines:

Section 192.351. In accordance with suggestions received in the comments, reference to specific materials used for service lines has been deleted from the scope, and the words "customer's meters" have been changed to "customer meters" to avoid any implication of customer control over meters.

Section 192.353. The following changes, all of which were suggested in the comments, have been made in § 192.353:

(1) Paragraph (a) no longer requires that meters and service regulators be installed in a location that provides protection from corrosion or other damage", but only that they be installed in a readily accessible location, and "be protection from corrosion or other damage, age". The comments indicated that it is sometimes impossible for protection from corrosion and damage to be provided by the location itself. In addition, paragraph (a) now permits the upstream regulator in a series to be buried.

(2) Paragraph (b) provides that each service regulator within a building must be located "as near as practical" to the point of service line entrance.

(3) Paragraph (d) provides that "where feasible," the upstream regulator in a series must be located outside the building, "unless it is located in a separate metering or regulating building."

Section 192.357. Paragraph (b) of this section has been completely rewritten to express the intention that close all-thread nipples must be of extra strong wall pipe so that after the threads are cut, the remaining wall thickness meets the minimum wall thickness requirements of Part 192. Paragraph (d) was added to make clear that regulators that release gas must be vented to the outside atmosphere.

Section 192.359. This section has been rewritten to reflect the present practice of the industry, which based on the comments and further investigation, appears to be safe. Paragraph (a) limits the pressure at which any meter may be used to 67 percent of the manufacturer's shell test pressure.

Paragraph (b) requires that each new meter must have been tested by the manufacturer to a minimum of 10 p.s.i.g.

Section 192.361. In response to the comments, paragraph (b) no longer requires that each service line be "properly supported at all points" on undisturbed or well compacted soil but merely that it be "properly supported", material for backfill must be "free of materials that could damage the pipe or its coating", rather than "free of rocks and building materials", as provided in the proposal.

Paragraph (d) now provides that service lines must be installed so as to minimize "anticipated" piping strain or external loading.

Section 192.363. The requirement for tamperproof valves in paragraph (c) is now limited to valves on high pressure service lines, installed above ground or in an area where the blowing of gas would be hazardous, rather than all high pressure service lines, as in the proposal.

Section 192.365. Paragraph (b) requires that each serivce line be equipped with a shutoff valve in a readily accessible location that, "if feasible", is outside the building. This requirement applies not only to new shutoff valves, but also to replacement valves and valves on replaced service lines.

Section 192.367. The requirement of paragraph (a) that a service line connection to a main must be located at the top of the main, or if that is not practical, at the side of the main, has been modified by the addition of the words "unless a suitable protective device is installed to minimize the possibility of dust and moisture being carried from the main into the service line."

Section 192,369. This section has been rewritten to require that a service line connection to a cast iron or ductile iron main must be made by a mechanical clamp, by drilling or tapping the main, or by another method meeting the requirements of § 192.273. If a threaded tap is used, the requirements of § 192.151 (b) and (c) must be met. Paragraph (c) of the proposal, which prohibited brazing a service line connection directly to a cast iron or ductile iron main, has been deleted from this section since it is covered in §§ 192.275(d) and 192.277(c).

Section 192.371. The proposed requirement on installation of steel service lines in bores has been deleted and will be included in Subpart I on corrosion control.

Section 192.373. The prohibition against the installation of cast iron pipe less than 6 inches in diameter for service lines has been extended to ductile iron, since it appears that this will not cause any practical problems for the industry and will result in added safety. The possibility of eliminating the use of cast iron in any size for service lines has been suggested, and is currently under consideration. This proposal may be the subject of a future notice of proposed rule making.

Section 192.375. Paragraph (a) of the proposal has been deleted because it is covered in § 192.321(c) of Subpart G, General Construction Requirements.

This section also provides that a plastic service line inside a building "must be protected against external damage", in contrast to the former requirement that it "not be exposed".

Section 192,377. Paragraph (a) of the proposal, on the minimum wall thickness for copper pipe used for service lines, has

been moved to § 192.125(b) of Subpart C, Pipe Design.

Subpart J—Test Requirements:

Section 192.503. Section 192.503(b) has been rewritten to make it clear that liquid, air, natural gas, or inert gas may each be used as a test medium, provided that the stated requirements are met.

Section 192.505. The inclusion of the test medium authorizations in § 192.503 has made it possible to eliminate the table that was proposed for § 192.505(a). The required test pressures in each case may be calculated by applying the factors set forth in § 192.619(a)(2) to the desired maximum allowable operating pressure.

Paragraph (c) of § 192.505 in the notice proposed to require that field tests be conducted by maintaining the test pressure for at least 24 consecutive hours after the pressure stabilized in all parts of the pipeline facility being tested. Numerous objections were received to the 24-hour requirement. After consultation with the Technical Pipeline Safety Standards Committee, it has been concluded that the evidence available at this time will substantiate a requirement for an 8-hour test, but not for a longer test. The question of test duration will be the subject of further study and, if it is determined that a different test period is warranted, will be covered in a future rule making action.

Section 192.507. The requirements of proposed §§ 192.507 and 192.509 have been combined in § 192.507. The proposed 4-hour test duration has been reduced to one hour since, as many commenters pointed out, the test requirements of proposed § 192.507 are essentially leak test rather than strength test requirements.

Subpart K—Uprating:

Section 192.553. Several commenters objected to the requirements of proposed § 192.553(a)(2) that each leak must be repaired before a further pressure increase is made. Section 192.553(a)(2), as issued, includes an exception for leaks that are determined not to be hazardous, provided they are monitored during the pressure increase and do not become potentially hazardous. This will permit the repair of very minor leaks in the course of routine maintenance.

Section 192.555. The notice proposed that, where a pipeline qualified for an increase in maximum allowable operating pressure, the increase must be made in increments not greater than 25 percent of the total of the proposed increase. Some commenters questioned the need for incremental increases in distribution systems, while others questioned the need for four increments where the total pressure increase was a small percentage of the pressure before the proposed increase. Other commenters questioned the justification for incremental increases where the basis for the proposed uprating was a pressure test.

Section 192.555(e). Requires that, where a pipeline segment qualifies for uprating, the increase in pressure must be made in increments of either—

(1) 10 percent of the pressure before the uprating; or

(2) 25 percent of the total pressure increase;

whichever requires fewer increments. This will eliminate the need for four incremental increases if the total increase is small as compared to the pressure before uprating. Section 192.557(c) contains a similar provision for pipeline segments that are uprated under that section. Also, § 192.555(e) does not require incremental increases where the basis for the uprating is a new pressure test under paragraph (d)(1) of § 192.555.

Section 192.557. Proposed §§ 192.557, 192.559, and 192.561 have been combined since the requirements of each proposed section were substantially similar. Several commenters indicated that, while proposed § 192.561(b)(4) required the testing of each regulator to determine if it is functioning, it would be impossible to complete such a test without increasing the pressure. Therefore, § 192.557(b)(6) has been revised to permit pressure to be increased, as necessary, to test each regulator after a regulator has been installed on each pipeline that is subject to the increased pressure.

Subpart L—Operations:

Section 192.605. In response to comments received, several changes have been made. In paragraph (a), the requirement that the operating and maintenance plan include detailed instructions for employees covering operating and maintenance procedures has been changed by the deletion of the word "detailed."

Paragraph (e), proposed to cover periodic inspection of transmission systems only, has been reworded to also include distribution systems.

Paragraph (f) as proposed in the notice, which required that provisions for a detailed population index survey be included in the operating and maintenance plan, has been deleted, since § 192.609 requires that a study must be made whenever an increase in population density indicates a change in class location.

Section 192.607 is a new section on the initial determination of class location and confirmation or establishment of maximum allowable operating pressure applying to existing pipelines. It has been discussed above.

Section 192.611. In paragraph (c), the word "hydrostatically" has been deleted, since testing must be done in accordance with the applicable requirements of Subpart J and there may be instances where other methods of testing would be permitted under that subpart. Paragraph (e) has been rewritten to provide that the operator shall confirm or revise the maximum allowable operating pressure "within 1 year of the date when a change in class location has occurred", instead of "within 60 days of the date when the operator has notice that a change in class location has occurred", as was proposed in the notice. The reasons for this change are discussed in detail above.

Section 192.613. In response to comments received, paragraph (a) was rewritten by deleting "drop in flow efficiency due to internal corrosion", from the list of conditions to be determined by a continuing surveillance program and by adding "changes in class location" to this list. A drop occurring in flow efficiency cannot necessarily be related to internal corrosion and may be due to other factors.

Section 192.615. Paragraph (d) of this section on emergency plans has been changed by omitting the requirement for an educational program to enable customers and the general public "to know how and when to shut off the supply of gas at the customer's meter in an emergency". Although this requirement was a recommendation of the National Transportation Safety Board, most of the comments indicated that safety would be lessened if inexperienced persons were to close or open the supply of gas. For this reason, the requirement was not included. If further information indicates its desirability, it will be considered for a future notice of proposed rulemaking.

Section 192.617. In accordance with suggestions received in the comments, the selection of samples of a failed facility or equipment for laboratory examination is required only "where appropriate".

Section 192.619. In this section, which establishes the maximum allowable operating pressure for steel or plastic pipelines, new paragraphs (a)(3) and (c) have been added to permit operation at the highest actual operating pressure to which an existing segment of pipeline in satisfactory condition was subjected during the 5 years preceding July 1, 1970. Paragraph (a)(3) also permits operation at a pressure for which a segment of pipeline was qualified by test during that period. This section has been more fully discussed above.

Sections 192.621 and 192.623. In these sections, dealing with maximum allowable operating pressure for high- and low-pressure distribution systems, paragraph (a)(5) of § 192.619 and paragraph (a)(2) of § 192.621 as proposed in the notice have been deleted, because the definitions of "high-pressure distribution systems" and "low-pressure distribution system" permit the elimination of 2 p.s.i.g. as a dividing line between high and low pressure distribution systems, and have also permitted the use of performance-type language.

Section 192.625. Paragraph (a) of this section limits the applicability of the odorization requirements to mains and service lines. This requirement is discussed above.

Section 192.629. This section on purging of pipelines has been modified to make the procedure for purging air consistent with the procedure for purging gas. Paragraph (c) has been eliminated from this section and moved to § 192.751, Subpart M, Maintenance.

Subpart M—Maintenance:

Section 192.701. In accordance with suggestions received in the comments, references to the specific areas of maintenance covered in this subpart have been deleted from this section.

Section 192.703. This is a new section comprised of general provisions. Section 192.703 (a) and (b) was formerly contained in proposed § 192.723(b) (3) and (4).

Sections 192.711 and 192.713. The words "injurious defect, gouge, groove, dent, or leak," have been replaced by "leak, imperfection, or damage that impairs its serviceability," and the definitions contained in the proposal have been eliminated, in order to make this section consistent with Subpart G.

Section 192.715. The words "Each weld found to have an injurious defect" have been eliminated and replaced by "Each weld that is unacceptable under § 192.241(c)."

Sections 192.713, 192.715, and 192.717. A full encirclement welded split sleeve is required to be "of appropriate design" and the words "greater design strength" have been substituted for the words, "greater wall thickness and grade."

Section 192.725. The provisions concerning service lines "previously abandoned" and service lines "temporarily disconnected" are combined, since in each instance the line must be tested in the same manner as a new service line before being reinstated.

Section 192.727. Sections 192.719 and 192.725 as proposed in the notice have been combined in this section, since the requirements for abandonment of transmission and distribution facilities are substantiallly the same. Abandoned lines now include lines that are not subject to gas pressure, except when undergoing maintenance. In addition, it is now provided in paragraph (a) that the line need not be purged when the volume of gas is so small that there is no potential hazard. Paragraph (b) requires that, if air is used to purge the line, the operator shall ensure that a combustible mixture is not present after purging.

Section 192.737. Paragraph (b) has been eliminated since the requirements to follow prescribed plans, keep records and promptly correct all unsatisfactory conditions are covered elsewhere.

Sections 192.739 and 192.743. Rupture discs are excepted from the periodic testing requirements for pressure relief devices in order to make these sections consistent with § 192.731, and because testing of a rupture disc would destroy it and require replacement.

Section 192.751. This section has been modified to require the operator to minimize the danger of accidental ignition of gas in areas where the pressure of gas constitutes a hazard, including the removal of potential sources of ignition when a hazardous amount of gas is being vented into open air, and the prohibition of welding or cutting on pipe containing a combustible mixture of gas and air in the area of work.

Section 192.753. This section requires that all existing cast iron caulked bell and spigot joints, subject to pressure of 25 p.s.i.g. or more must be sealed with mechanical leak clamps. Those subject to pressure of less than 25 p.s.i.g. must be sealed by means other than caulking whenever exposed for any reason. These requirements were transferred to Subpart M from Subpart F (§ 192.255 as proposed in the notice).

Appendices. The proposed appendices have been relettered so as to appear in the order in which they are referred to in the regulations. This results in proposed Appendixes A and C being exchanged. The materials incorporated by reference have been corrected and the editions listed have been updated to the most recent one. The dates have also been added to the listed specifications in Appendix B, section I for convenient reference. ASTM specification A 539 has been added to the list in Appendix B.

Report of Technical Pipeline Safety Standards Committee. Section 4(a) of the Natural Gas Pipeline Safety Act required the establishment of a 15-member Technical Pipeline Safety Standards Committee. Section 4(b) of the Act requires that all proposed standards and amendments to such standards be submitted to the Committee and that the Committee be afforded a reasonable opportunity to prepare a report on the "technical feasibility, reasonableness, and practicality of each such proposal." Part 192 was submitted to the Technical Committee and that Committee has submitted a favorable report. The Committee's report and the minority views of the one Committee member who disagreed with the majority report are set forth below. As indicated in the majority report, several members of the Committee submitted concurring statements recommending further regulatory action in specific areas. These recommendations have been included in the rulemaking docket for Part 192.

SECRETARY OF TRANSPORTATION,
400 Sixth Street SW.,
Washington, D.C.

Attention: Mr. William C. Jennings, Acting Director, Office of Pipeline Safety.

AUGUST 10, 1970.

GENTLEMEN: In accordance with the provisions of Section 4 of the Natural Gas Pipeline Safety Act of 1968, the Technical Pipeline Safety Standards Committee herewith submits its report on the technical feasibility, reasonableness and practicability of the several proposals of the Office of Pipeline Safety which together comprise a "Rule Establishing Comprehensive Federal Pipeline Safety Standards." These minimum Federal safety standards are those which were developed by the Office of Pipeline Safety to comply with the requirements of section 3(b) of the Act and consist of proposals, and modifications thereto, which were published in the FEDERAL REGISTER as follows:

Notice	Docket	Title	FEDERAL REGISTER publication
69-3	OPS-3	Minimum Federal Safety Standards	34 F.R. 18550.
70-1	OPS-3A	Welding and Other Joining of Pipe Components	35 F.R. 1112.
70-2	OPS-3B	General Construction Requirements	35 F.R. 3237.
70-3	OPS-3C	Customers Meters, Service Regulators and Service Lines	35 F.R. 4626.
70-4	OPS-3D	Class Location	35 F.R. 5012.
70-5	OPS-3E	Operation and Maintenance	35 F.R. 5483.
70-6	OPS-3F	Testing and Uprating	35 F.R. 5724.
70-7	OPS-3G	Pipe and Component Design	35 F.R. 5713.
70-11	OPS-3E	Odorization of Gas—Request for Additional Comment	35 F.R. 9293.

The Committee has worked very closely with the Office of Pipeline Safety and has offered technical assistance in a series of meetings in June and July of this year which resulted in material changes in the technical content of the several proposals.

In view of the Committee's close association with the development of the final rule it did not appear appropriate to prepare a separate report on Committee consideration of individual items of the final rule. Therefore the Committee has, by letter ballot, evaluated the proposed final rule and a majority concurs that the proposed standards accomplished the intent of Congress to establish reasonable minimum standards applicable to the design, installation, inspection, testing, construction, extension, operation, replacement, and maintenance of pipeline facilities.

It should be noted from the concurring views, expressed in the attached documents, that a number of the members of the majority are concerned that much work remains to be accomplished in future rulemaking to expand and clarify the rules to further improve the safety of pipeline facilities.

The Committee, in approving the presently proposed final rule, relies on assurances of the Office of Pipeline Safety and the General Counsel of the Department of Transportation that supplemental rulemaking dockets will be instituted to provide opportunity to consider additional items affecting safety of pipeline facilities that were judged to be beyond the scope of Docket OPS-3 and its several subparts. Additionally, the Committee recognizes the necessity for inclusion of "Requirements for Corrosion Control" which is the subject of Notice 70-8, Docket OPS-5 (35 F.R. 7127) and was considered in a public hearing on July 20, 1970, pursuant to Notice 70-12.

The letter ballot canvass of the Committee (copies attached) indicated a vote of 13 approving the majority report and one opposed.

Minority views on specific items (copies attached) were submitted by Committee members Melvin R. Meyerson, A. W. Peabody, Martin T. Bennett, George W. White, Robert L. Snyder, and A. F. Rhodes.

Mr. Lang in voting in opposition to the majority has chosen to refer to the transcripts of the several meetings of the Committee for detail of his proposed alternate to the rule recommended by the majority.

This final Committee action is based on a review of the final rule without benefit of the preamble that will be issued with the rule. Therefore, the Committee has voted on the assumption that the preamble statement will be consistent with the Committee's understanding of the intent of the various requirements as specifically discussed with the Committee at its several meetings with the Office of Pipeline Safety.

LOUIS W. MENDONSA,
Secretary, Technical Pipeline Safety Standards Committee.

Attachments:
cc: Mr. Sheftel, Bureau of the Budget,
Each committee member.

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EXPLANATION OF THE DISAPPROVAL BY FREDERIC A. LANG OF THE PROPOSED MAJORITY REPORT ON THE PROPOSED FINAL RULE ESTABLISHING COMPREHENSIVE FEDERAL PIPELINE SAFETY STANDARDS

August 7, 1970.

As member of the Technical Pipeline Safety Standards Committee, I disapprove the proposed majority report because the proposed Final Rule will establish regulations not measurably more effective than the standards written and suggested by the industry. In fact, the proposed Final Rule is based on the industry standard B 31.8 and has the same deficiencies.

Industry standards do not require more safety than is optimum for profits. The industry standards leave major loopholes available to the pipeline operator in order that the standard or the regulation not result in higher costs which might result from using a safer pipe material or a safer design, construction, or operating practice.

A further weakening of the Final Rule exists because of documents incorporated by reference. The opinion of DOT counsel is that documents incorporated by reference provide the same loopholes (lack of regulation) in this DOT Regulation (Part 192) that exist in the referenced document. Referenced documents were written in most cases by industry groups such as American Petroleum Institute who were not desirous of creating self-imposed regulation and who provided numerous loopholes and options that leave uncontrolled important pipeline safety items.

A suitable alternate Proposed Final Rule was outlined by me and others during the official Committee meeting on the Proposed Final Rule. The transcript of the meetings is available.

FREDERIC A. LANG.

After considering the comments, the recommendations of the Technical Pipeline Safety Standards Committee, and other information discussed above, I have determined that good cause exists for making these regulations effective more than 30 days after issuance.

This amendment is issued under the authority of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. § 1671 et seq.), Part 1 of the Regulations of the Office of the Secretary of Transportation (49 CFR Part 1), and the delegation of authority to the Director, Office of Pipeline Safety, dated November 6, 1968 (33 F.R. 16468).

In consideration of the foregoing and for the reasons stated in the series of notices listed above, Title 49 of the Code of Federal Regulations is amended as follows:

1. Part 190, except for those provisions applicable to design, installation, construction, initial inspection, and initial testing, is revoked effective November 12, 1970.

2. The provisions of Part 190 applicable to design, installation, construction, initial inspection, and initial testing are revoked effective March 12, 1971.

3. A new Part 192 is added, effective November 12, 1970, to read as set forth below.

Issued in Washington on August 11, 1970.

NOTE: The reporting and/or recordkeeping requirements contained herein have been approved by the Office of Management and Budget in accordance with the Federal Reports Acts of 1942.

WILLIAM C. JENNINGS,
Acting Director,
Office of Pipeline Safety.

The incorporation by reference provisions in this Part 192 were approved by the Director of the Federal Register on August 18, 1970.

Subpart A—General

Subpart B—Materials

Subpart C—Pipe Design

Subpart D—Design of Pipeline Components

Subpart E—Welding of Steel in Pipelines

Subpart F—Joining of Materials Other Than by Welding

Subpart G—General Construction Requirements for Transmission Lines and Mains

Subpart H—Customer Meters, Service Regulators, and Service Lines

Subpart I—[Reserved]

Subpart J—Test Requirements

AUTHORITY: The provisions of this Part 192 issued under 49 U.S.C. 1671 et seq.

Subpart A—General

§ 192.1 Scope of part.

(a) This part prescribes minimum safety requirements for pipeline facilities and the transportation of gas, including pipeline facilities and the transportation of gas within the limits of the outer continental shelf as that term is defined in the Outer Continental Shelf Lands Act (43 U.S.C. 1331).

(b) This part does not apply to the gathering of gas outside of the following areas:

(1) An area within the limits of any incorporated or unincorporated city, town, or village.

(2) Any designated residential or commercial area such as a subdivision, business or shopping center, or community development.

§ 192.3 Definitions.

As used in this part—

"Distribution Line" means a pipeline other than a gathering or transmission line.

"Gas" means natural gas, flammable gas, or gas which is toxic or corrosive.

"Gathering Line" means a pipeline that transports gas from a current production facility to a transmission line or main.

"High pressure distribution system" means a distribution system in which the gas pressure in the main is higher than the pressure provided to the customer.

"Listed specification" means a specification listed in section I of Appendix B of this part.

"Low-pressure distribution system" means a distribution system in which the gas pressure in the main is substantially the same as the pressure provided to the customer.

"Main" means a distribution line that serves as a common source of supply for more than one service line.

"Maximum actual operating pressure" means the maximum pressure that occurs during normal operations over a period of 1 year.

"Maximum allowable operating pressure" means the maximum pressure at which a pipeline or segment of a pipeline may be operated under this part.

"Municipality" means a city, county, or any other political subdivision of a State.

"Operator" means a person who engages in the transportation of gas.

"Person" means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and includes any trustee, receiver, assignee, or personal representative thereof.

"Pipe" means any pipe or tubing used in the transportation of gas, including pipe-type holders.

"Pipeline" means all parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.

"Pipeline facility" means new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

"Secretary" means the Secretary of Transportation or any person to whom he has delegated authority in the matter concerned.

"Service Line" means a distribution line that transports gas to a customer meter set assembly from a common source of supply.

"SMYS" means specified minimum yield strength is—

(1) For steel pipe manufactured in accordance with a listed specification, the yield strength specified as a minimum in that specification; or

(2) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with § 192.107(b).

"State" means each of the several States, the District of Columbia, and the Commonwealth of Puerto Rico.

"Transmission line" means a pipeline, other than a gathering line, that—

(1) Transports gas from a gathering line or storage facility to a distribution center or storage facility;

(2) Operates at a hoop stress of 20 percent or more of SMYS; or

(3) Transports gas within a storage field.

"Transportation of gas" means the gathering, transmission, or distribution of gas by pipeline or the storage of gas, in or affecting interstate or foreign commerce.

§ 192.5 Class locations.

(a) Class location is determined by applying the criteria set forth in this section. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. Except as provided in paragraphs (d)(2) and (f) of this section, the class location is determined by the buildings in the class location unit. For the purposes of this

section, each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(b) A Class 1 location is any class location unit that has 10 or less buildings intended for human occupancy.

(c) A Class 2 location is any class location unit that has more than 10 but less than 46 buildings intended for human occupancy.

(d) A Class 3 location is—

(1) Any class location unit that has 46 or more buildings intended for human occupancy; or

(2) An area where the pipeline lies within 100 yards of any of the following:

(i) A building that is occupied by 20 or more persons during normal use.

(ii) A small, well-defined outside area that is occupied by 20 or more persons during normal use, such as a playground, recreation area, outdoor theater, or other place of public assembly.

(e) A Class 4 location is any class location unit where buildings with four or more stories above ground are prevalent.

(f) The boundaries of the class locations determined in accordance with paragraphs (a) through (e) of this section may be adjusted as follows:

(1) A Class 4 location ends 220 yards from the nearest building with four or more stories above ground.

(2) When a cluster of buildings intended for human occupancy requires a Class 3 location, the Class 3 location ends 220 yards from the nearest building in the cluster.

(3) When a cluster of buildings intended for human occupancy requires a Class 2 location, the Class 2 location ends 220 yards from the nearest building in the cluster.

§ 192.7 Incorporation by reference.

(a) Any documents or parts thereof incorporated by reference in this part are a part of this regulation as though set out in full.

(b) All incorporated documents are available for inspection in the Office of Pipeline Safety, Room 107, 400 Sixth Street SW., Washington, D.C. In addition, the documents are available at the addresses provided in Appendix A to this part.

(c) The full titles for the publications incorporated by reference in this part are provided in Appendix A to this part.

§ 192.9 Gathering lines.

Each gathering line must comply with the requirements of this part applicable to transmission lines.

§ 192.11 Petroleum gas systems.

(a) No operator may transport petroleum gas in a system that serves 10 or more customers, or in a system, any portion of which is located in a public place (such as a highway), unless that system meets the requirements of this part and of NFPA Standards No. 58 and No. 59. In the event of a conflict, the requirements of this part prevail.

(b) Each petroleum gas system covered by paragraph (a) of this section must comply with the following:

(1) Aboveground structures must have open vents near the floor level.

(2) Belowground structures must have forced ventilation that will prevent any accumulation of gas.

(3) Relief valve discharge vents must be located so as to prevent any accumulation of gas at or below ground level.

(4) Special precautions must be taken to provide adequate ventilation where excavations are made to repair an underground system.

(c) For the purpose of this section, petroleum gas means propane, butane, or mixtures of these gases, other than a gas air mixture that is used to supplement supplies in a natural gas distribution system.

§ 192.13 General.

(a) No person may operate a segment of pipeline that is readied for service after March 12, 1971, unless that pipeline has been designed, installed, constructed, initially inspected, and initially tested in accordance with this part.

(b) No person may operate a segment of pipeline that is replaced, relocated, or otherwise changed after November 12, 1970, unless that replacement, relocation, or change has been made in accordance with this part.

(c) Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and programs that it is required to establish under this part.

§ 192.15 Rules of regulatory construction.

(a) As used in this part—

"Includes" means including but not limited to.

"May" means "is permitted to" or "is authorized to".

"May not" means "is not permitted to" or "is not authorized to".

"Shall" is used in the mandatory and imperative sense.

(b) In this part—

(1) Words importing the singular include the plural;

(2) Words importing the plural include the singular; and

(3) Words importing the masculine gender include the feminine.

Subpart B—Materials

§ 192.51 Scope.

This subpart prescribes minimum requirements for the selection and qualification of pipe and components for use in pipelines.

§ 192.53 General.

Materials for pipe and components must be—

(a) Able to maintain the structural integrity of the pipeline under temperature and other environmental conditions that may be anticipated;

(b) Chemically compatible with any gas that they transport and with any other material in the pipeline with which they are in contact; and

(c) Qualified in accordance with the applicable requirements of this subpart.

§ 192.55 Steel pipe.

(a) New steel pipe is qualified for use under this part if—

(1) It was manufactured in accordance with a listed specification;

(2) It meets the requirements of paragraphs II–A through II–D of Appendix B of this part; or

(3) It is used in accordance with paragraph (c) of this section.

(b) Used steel pipe is qualified for use under this part if—

(1) It was manufactured in accordance with a listed specification and it meets the requirements of paragraph II–C of Appendix B to this part;

(2) It meets the requirements of paragraph II–A through II–D of Appendix B to this part.

(3) It has been used in an existing line of the same or higher pressure and meets the requirements of paragraph II–C of Appendix B to this part; or

(4) It is used in accordance with paragraph (c) of this section.

(c) New or used steel pipe may be used at a pressure resulting in a hoop stress of less than 6,000 p.s.i. where no close coiling or close bending is to be done, if visual examination indicates that the pipe is in good condition and that it is free of split seams and other defects that would cause leakage. If it is to be welded, steel pipe that has not been manufactured to a listed specification must also pass the weldability tests prescribed in paragraph II–B of Appendix B to this part.

(d) New steel pipe that has been cold expanded must comply with the mandatory provisions of API Standard 5LX.

§ 192.57 Cast iron or ductile iron pipe.

(a) New cast iron or new ductile iron pipe is qualified for use under this part if it has been manufactured in accordance with a listed specification.

(b) Used cast iron or used ductile iron pipe is qualified for use under this part if inspection shows that the pipe is sound and allows the makeup of tight joints and—

(1) It has been removed from an existing pipeline that operated at the same or higher pressure; or

(2) It was manufactured in accordance with a listed specification.

§ 192.59 Plastic pipe.

(a) New plastic pipe is qualified for use under this part if—

(1) It is manufactured in accordance with a listed specification; and

(2) It is resistant to chemicals with which contact may be anticipated.

(b) Used plastic pipe is qualified for use under this part if—

(1) It meets the requirements of a listed specification;

(2) It is resistant to chemicals with which contact may be anticipated;

(3) It has been used only in natural gas service;

(4) Its dimensions are still within the tolerances of the specification to which it was manufactured; and

(5) It is free of visible defects.

§ 192.61 Copper pipe.

Copper pipe is qualified for use under this part if it has been manufactured in accordance with a listed specification.

§ 192.63 Marking of materials.

(a) Each valve, fitting, length of pipe, and other component must be marked as prescribed in—

(1) The specification or standard to which it was manufactured; or

(2) MSS standard practice, SP–25.

(b) Surfaces of pipe and components that are subject to stress from internal pressure may not be field die stamped.

(c) If any item is marked by die stamping, the die must have blunt or rounded edges that will minimize stress concentrations.

§ 192.65 Transportation of pipe.

In a pipeline to be operated at a hoop stress of 20 percent or more of SMYS, no operator may use pipe having an outer diameter to wall thickness ratio of 70 to one, or more, that is transported by railroad unless that transportation was performed in accordance with API RP5L1.

Subpart C—Pipe Design

§ 192.101 Scope.

This subpart prescribes the minimum requirements for the design of pipe.

§ 192.103 General.

Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation.

§ 192.105 Design formula for steel pipe.

(a) The design pressure for steel pipe is determined in accordance with the following formula:

$$P = \frac{2St}{D} \times F \times E \times T$$

P=Design pressure in pounds per square inch gage.

S=Yield strength in pounds per square inch determined in accordance with § 192.107.

D=Nominal outside diameter of the pipe in inches.

t=Nominal wall thickness of the pipe in inches. If this is unknown, it is determined in accordance with § 192.109. Additional wall thickness required for concurrent external loads in accordance with § 192.103 may not be included in computing design pressure.

F=Design factor determined in accordance with § 192.111.

E=Longitudinal joint factor determined in accordance with § 192.113.

T=Temperature derating factor determined in accordance with § 192.115.

(b) If steel pipe that has been cold worked to meet the SMYS is heated, other than by welding, to 600° F. or more, the design pressure is limited to 75 percent of the pressure determined under paragraph (a) of this section.

§ 192.107 Yield strength (S) for steel pipe.

(a) For pipe that is manufactured in accordance with a specification listed in section I of Appendix B of this part, the yield strength to be used in the design formula in § 192.105 is the SMYS stated in the listed specification, if that value is known.

(b) For pipe that is manufactured in accordance with a specification not listed in section I of Appendix B to this part or whose specification or tensile properties are unknown, the yield strength to be used in the design formula in § 192.105 is one of the following:

(1) If the pipe is tensile tested in accordance with section II–D of Appendix B to this part, the lower of the following:

(i) 80 percent of the average yield strength determined by the tensile tests.

(ii) The lowest yield strength determined by the tensile tests, but not more than 52,000 p.s.i.

(2) If the pipe is not tensile tested as provided in subparagraph (1) of this paragraph 24,000 p.s.i.

§ 192.109 Nominal wall thickness (t) for steel pipe.

(a) If the nominal wall thickness for steel pipe is not known, it is determined by measuring the thickness of each piece of pipe at quarter points on one end.

(b) However, if the pipe is of uniform grade, size, and thickness and there are more than 10 lengths, only 10 percent of the individual lengths, but not less than 10 lengths, need be measured. The thickness of the lengths that are not measured must be verified by applying a gage set to the minimum thickness found by the measurement. The nominal wall thickness to be used in the design formula in § 192.105 is the next wall thickness found in commercial specifications that is below the average of all the measurements taken. However, the nominal wall thickness used may not be more than 1.14 times the smallest measurement taken on pipe less than 20 inches in outside diameter, nor more than 1.11 times the smallest measurement taken on pipe 20 inches or more in outside diameter.

§ 192.111 Design factor (F) for steel pipe.

(a) Except as otherwise provided in paragraphs (b), (c), and (d) of this section, the design factor to be used in the design formula in § 192.105 is determined in accordance with the following table:

Class location	*Design factor (F)*
1	0.72
2	0.60
3	0.50
4	0.40

(b) A design factor of 0.60 or less must be used in the design formula in § 192.105 for steel pipe in Class 1 locations that:

(1) Crosses the right-of-way of an unimproved public road, without a casing;

(2) Crosses without a casing, or makes a parallel encroachment on, the right-of-way of either a hard surfaced road, a highway, a public street, or a railroad;

(3) Is supported by a vehicular, pedestrian, railroad, or pipeline bridge; or

(4) Is used in a fabricated assembly, (including separators, mainline valve assemblies, cross-connections, and river crossing headers) or is used within five pipe diameters in any direction from the last fitting of a fabricated assembly, other than a transition piece or an elbow used in place of a pipe bend which is not associated with a fabricated assembly.

(c) For Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in § 192.105 for uncased steel pipe that crosses the right-of-way of a hard surfaced road, a highway, a public street, or a railroad.

(d) For Class 1 or Class 2 locations, a design factor of 0.50, or less, must be used in the design formula in § 192.105 for each compressor station, regulator station, and measuring station.

§ 192.113 Longitudinal joint factor (E) for steel pipe.

The longitudinal joint factor to be used in the design formula in § 192.105 is determined in accordance with the following table:

Specification	Pipe class	Longitudinal joint factor (E)
ASTM A 53	Seamless	1.00
	Electric resistance welded	1.00
	Furnace butt welded	.60
ASTM A 106	Seamless	1.00
ASTM A 134	Electric fusion arc welded	.80
ASTM A 135	Electric resistance welded	1.00
ASTM A 139	Electric fusion welded	.80
ASTM A 155	Electric fusion arc welded	1.00
ASTM A 211	Spiral welded steel pipe	.80
ASTM A 333	Seamless	1.00
	Electric resistance welded	1.00
ASTM A 381	Double submerged arc welded	1.00
API 5 L	Seamless	1.00
	Electric resistance welded	1.00
	Electric flash welded	1.00
	Submerged arc welded	1.00
	Furnace butt welded	.60
	Furnace lap-welded	.80
API 5 LX	Seamless	1.00
	Electric resistance welded	1.00
	Electric flash welded	1.00
	Submerged arc welded	1.00
API 5 LS	Electric resistance welded	1.00
	Submerged arc welded	1.00
Other	Pipe over 4 inches	.80
Other	Pipe 4 inches or less	.60

If the type of longitudinal joint cannot be determined, the joint factor to be used must not exceed that designated for "Other".

§ 192.115 Temperature derating factor (T) for steel pipe.

The temperature derating factor to be used in the design formula in § 192.105 is determined as follows:

Gas temperature in degrees Fahrenheits	*Temperature derating factor (T)*
250 or less	1.000
300	0.967
350	0.933
400	0.900
450	0.867

For intermediate gas temperatures, the derating factor is determined by interpolation.

§ 192.117 Design of cast iron pipe.

Cast iron pipe must be designed in accordance with ANSI A 21.1 using the following values for S (bursting tensile

strength) and R (modulus of rupture) in the design equations:

Specification	Type of pipe	S	R
		psi	psi
ANSI A 21.3	Pit cast	11,000	31,000
ANSI A 21.7	Centrifugal (metal mold)	18,000	40,000
ANSI A 21.9	Centrifugal (sand-lined mold)	18,000	40,000

§ 192.119 Design of ductile iron pipe.

(a) Ductile iron pipe must be designed in accordance with ANSI A21.50 using the following values in the design equations:

s (design hoop stress) = 16,800 p.s.i.
f (design bending stress) = 36,000 p.s.i.

(b) Ductile iron pipe must be grade (60–42–10) and must conform to the requirements of ANSI A21.52.

§ 192.121 Design of plastic pipe.

(a) The design pressure for plastic pipe is determined in accordance with the following formula and is subject to the limitations of § 192.123:

$$P = 2S\frac{t}{(D-t)} \times F$$

P = Design pressure in pounds per square inch gage.
S = For thermoplastic pipe, the long-term hydrostatic strength in pounds per square inch as stated in the listed specification; for thermosetting plastic pipe, 11,000 p.s.i.
t = Specified wall thickness in inches.
D = Specified outside diameter in inches.
F = Design factor for plastic pipe.

(b) The design factor for plastic pipe is determined as follows:

Class location	Design factor
1	0.32
2	0.25
3	0.25
4	0.20

§ 192.123 Design limitations for plastic pipe.

(a) The design pressure may not exceed 100 p.s.i.g. for plastic pipe used in—

(1) Distribution systems; or

(2) Classes 3 and 4 locations.

(b) Plastic pipe may not be used where operating temperatures of the pipe will be—

(1) Below minus 20° F.; or

(2) Above 100° F. for thermoplastic pipe or above 150° F. for reinforced thermosetting plastic pipe.

(c) The wall thickness for thermoplastic pipe may not be less than 0.062 inches.

(d) The wall thickness for reinforced thermosetting plastic pipe may not be less than that listed in the following table:

Nominal size in inches	Minimum wall thickness in inches
2	0.060
3	0.060
4	0.070
6	0.100

§ 192.125 Design of copper pipe.

(a) Copper pipe used in mains must have a minimum wall thickness of 0.065 inches and must be hard drawn.

(b) Copper pipe used in service lines must have a minimum wall thickness as specified for type "L" pipe in ASTM B 88.

(c) Copper pipe used in mains and service lines may not be used at pressures in excess of 100 p.s.i.g.

(d) Copper pipe that does not have an internal corrosion resistant lining may not be used to carry gas that has an average hydrogen sulfide content of more than 0.3 grains per 100 standard cubic feet of gas.

Subpart D—Design of Pipeline Components

§ 192.141 Scope.

This subpart prescribes minimum requirements for the design and installation of pipeline components and facilities. In addition, it prescribes requirements relating to protection against accidental overpressuring.

§ 192.143 General requirements.

Each component of a pipeline must be able to withstand operating pressures and other anticipated loadings with unit stresses equivalent to those allowed for comparable material in pipe in the same location and kind of service.

§ 192.145 Valves.

(a) Each valve must meet the minimum requirements of API 6D, or MSS SP–52, or the equivalent, and may not be used under operating conditions that exceed the applicable pressure-temperature ratings contained in those standards.

(b) Each valve must be able to meet the anticipated operating conditions.

(c) No valve having shell components made of ductile iron may be used at pressures exceeding 80 percent of the pressure ratings for comparable steel valves at their listed temperature. However, a valve having shell components made of ductile iron may be used at pressures up to 80 percent of the pressure ratings for comparable steel valves at their listed temperature, if—

(1) The temperature-adjusted service pressure does not exceed 1,000 p.s.i.g.; and

(2) Welding is not used on any ductile iron component in the fabrication of the valve shells or their assembly.

(d) No value having pressure containing parts made of ductile iron may be used in the gas pipe components of compressor stations.

§ 192.147 Flanges and flange accessories.

(a) *General requirements.* Each flange or flange accessory must meet the minimum requirements of ANSI B16.5, MSS SP–44, or ANSI B16.24, or the equivalent.

(b) Each flange assembly must be able to withstand the maximum pressure at which the pipeline is to be operated and to maintain its physical and chemical properties at any temperature to which it is anticipated that it might be subjected in service.

§ 192.149 Standard fittings.

(a) The minimum metal thickness of threaded fittings may not be less than specified for the pressures and temperatures in the applicable standards referenced in this part, or their equivalent.

(b) Each steel butt-welding fitting must have pressure and temperature ratings based on stresses for pipe of the same or equivalent material. The actual bursting strength of the fitting must at least equal the computed bursting strength of pipe of the designated material and wall thickness, as determined by a prototype that was tested to at least the pressure required for the pipeline to which it is being added.

§ 192.151 Tapping.

(a) Each mechanical fitting used to make a hot tap must be designed for at least the operating pressure of the pipeline.

(b) Where a ductile iron pipe is tapped, the extent of full-thread engagement and the need for the use of outside-sealing service connections, tapping saddles, or other fixtures must be determined by service conditions.

(c) Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that

(1) Existing taps may be used for replacement service, if they are free of cracks and have good threads; and

(2) A 1¼-inch tap may be made in a 4-inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6-inch or larger pipe.

§ 192.153 Components fabricated by welding.

(a) Except for branch connections and assemblies of standard pipe and fittings joined by circumferential welds, the design pressure of each component fabricated by welding, whose strength cannot be determined, must be established in accordance with paragraph UG–101 of section VIII of the ASME Boiler and Pressure Vessel Code.

(b) Each prefabricated unit that uses plate and longitudinal seams must be designed, constructed, and tested in accordance with the ASME Boiler and Pressure Vessel Code, except for the following:

(1) Regularly manufactured butt-welding fittings.

(2) Pipe that has been produced and tested under a specification listed in Appendix B to this part.

(3) Partial assemblies such as split rings or collars.

(c) Orange-peel bull plugs and orange-peel swages may not be used on pipelines that are to operate at a hoop stress of 20 percent or more of the SMYS of the pipe.

(d) Except for flat closures designed in accordance with section VIII of the ASME Boiler and Pressure Code, flat closures and fish tails may not be used on pipe that either operates at 100 p.s.i.g., or more, or is more than 3 inches nominal diameter.

§ 192.155 Welded branch connections.

Each welded branch connection made to pipe in the form of a single connection, or in a header or manifold as a series of connections, must be designed to ensure that the strength of the pipeline system is not reduced, taking into account the stresses in the remaining pipe wall due to the opening in the pipe or header, the shear stresses produced by the pressure acting on the area of the branch opening, and any external loadings due to thermal movement, weight, and vibration.

§ 192.157 Extruded outlets.

Each extruded outlet must be suitable for anticipated service conditions and must be at least equal to the design strength of the pipe and other fittings in the pipeline to which it is attached.

§ 192.159 Flexibility.

Each pipeline must be designed with enough flexibility to prevent thermal expansion or contraction from causing excessive stresses in the pipe or components, excessive bending or unusual loads at joints, or undesirable forces or moments at points of connection to equipment, or at anchorage or guide points.

§ 192.161 Supports and anchors.

(a) Each pipeline and its associated equipment must have enough anchors or supports to—

(1) Prevent undue strain on connected equipment;

(2) Resist longitudinal forces caused by a bend or offset in the pipe; and

(3) Prevent or damp out excessive vibration.

(b) Each exposed pipeline must have enough supports or anchors to protect the exposed pipe joints from the maximum end force caused by internal pressure and any additional forces caused by temperature expansion or contraction or by the weight of the pipe and its contents.

(c) Each support or anchor on an exposed pipeline must be made of durable, noncombustible material and must be designed and installed as follows:

(1) Free expansion and contraction of the pipeline between supports or anchors may not be restricted.

(2) Provision must be made for the service conditions involved.

(3) Movement of the pipeline may not cause disengagement of the support equipment.

(d) Each support on an exposed pipeline operated at a stress level of 50 percent or more of SMYS must comply with the following:

(1) A structural support may not be welded directly to the pipe.

(2) The support must be provided by a member that completely encircles the pipe.

(3) If an encircling member is welded to a pipe, the weld must be continuous and cover the entire circumference.

(e) Each underground pipeline that is connected to a relatively unyielding line or other fixed object must have enough flexibility to provide for possible movement, or it must have an anchor that will limit the movement of the pipeline.

(f) Each underground pipeline that is being connected to new branches must have a firm foundation for both the header and the branch to prevent lateral and vertical movement.

§ 192.163 Compressor stations: design and construction.

(a) *Location of compressor building.* Each main compressor building of a compressor station must be located on property under the control of the operator. It must be far enough away from adjacent property, not under control of the operator, to minimize the possibility of fire being communicated to the compressor building from structures on adjacent property. There must be enough open space around the main compressor building to allow the free movement of fire-fighting equipment.

(b) *Building construction.* Each building on a compressor station site must be made of noncombustible materials if it contains either—

(1) Pipe more than 2 inches in diameter that is carrying gas under pressure; or

(2) Gas handling equipment other than gas utilization equipment used for domestic purposes.

(c) *Exits.* Each operating floor of a main compressor building must have at least two separated and unobstructed exits located so as to provide a convenient possibility of escape and an unobstructed passage to a place of safety. Each door latch on an exit must be of a type which can be readily opened from the inside without a key. Each swinging door located in an exterior wall must be mounted to swing outward.

(d) *Fenced areas.* Each fence around a compressor station must have at least two gates located so as to provide a convenient opportunity for escape to a place of safety, or have other facilities affording a similarly convenient exit from the area. Each gate located within 200 feet of any compressor plant building must open outward and, when occupied, must be openable from the inside without a key.

(e) *Electrical facilities.* Electrical equipment and wiring installed in compressor stations must conform to the National Electrical Code, ANSI Standard C1, so far as that code is applicable.

§ 192.165 Compressor stations: liquid removal.

(a) Where entrained vapors in gas may liquefy under the anticipated pressure and temperature conditions, the compressor must be protected against the introduction of those liquids in quantities that could cause damage.

(b) Each liquid separator used to remove entrained liquids at a compressor station must—

(1) Have a manually operable means of removing these liquids,

(2) Where slugs of liquid could be carried into the compressors, have either automatic liquid removal facilities, an automatic compressor shutdown device, or a high liquid level alarm; and

(3) Be manufactured in accordance with section VIII of the ASME Boiler and Pressure Vessel Code, except that liquid separators constructed of pipe and fittings without internal welding must be fabricated with a design factor of 0.4, or less.

§ 192.167 Compressor stations: emergency shutdown.

(a) Except for unattended field compressor stations of 1,000 horsepower or less, each compressor station must have an emergency shutdown system that meets the following:

(1) It must be able to block gas out of the station and blow down the station piping.

(2) It must discharge gas from the blowdown piping at a location where the gas will not create a hazard.

(3) It must provide means for the shutdown of gas compressing equipment, gas fires, and electrical facilities in the vicinity of gas headers and in the compressor building, except, that—

(i) Electrical circuits that supply emergency lighting required to assist station personnel in evacuating the compressor building and the area in the vicinity of the gas headers must remain energized; and

(ii) Electrical circuits needed to protect equipment from damage may remain energized.

(4) It must be operable from at least two locations, each of which is—

(i) Outside the gas area of the station;

(ii) Near the exit gates in the station fence; and

(iii) Not more than 500 feet from the limits of the station.

(b) If a compressor station supplies gas directly to a distribution system with no other adequate source of gas available, the emergency shutdown system must be designed so that it will not function at the wrong time and cause an unintended outage on the distribution system.

§ 192.169 Compressor stations: pressure limiting devices.

(a) Each compressor station must have pressure relief or other suitable protective devices of sufficient capacity and sensitivity to ensure that the maximum allowable operating pressure of the station piping and equipment is not exceeded by more than 10 percent.

(b) Each vent line that exhausts gas from the pressure relief valves of a compressor station must extend to a location where the gas may be discharged without hazard.

§ 192.171 Compressor stations: additional safety equipment.

(a) Each compressor station must have adequate fire protection facilities. If fire pumps are a part of these facilities, their operation may not be affected by the emergency shutdown system.

(b) Each compressor station prime mover, other than an electrical induction or synchronous motor, must have an automatic device to shut down the unit before the speed of either the prime mover or the driven unit exceeds a maximum safe speed.

(c) Each compressor unit in a compressor station must have a shutdown or alarm device that operates in the event of inadequate cooling or lubrication of the unit.

(d) Each compressor station gas engine that operates with pressure gas injection must be equipped so that stoppage of the engine automatically shuts off the fuel and vents the engine distribution manifold.

(e) Each muffler for a gas engine in a compressor station must have vent slots or holes in the baffles of each compartment to prevent gas from being trapped in the muffler.

§ 192.173 Compressor stations: ventilation.

Each compressor station building must be ventilated to ensure that employees are not endangered by the accumulation of gas in rooms, sumps, attics, pits, or other enclosed places.

§ 192.175 Pipe-type and bottle-type holders.

(a) Each pipe-type and bottle-type holder must be designed so as to prevent the accumulation of liquids in the holder, in connecting pipe, or in auxiliary equipment, that might cause corrosion or interfere with the safe operation of the holder.

(b) Each pipe-type or bottle-type holder must have minimum clearance from other holders in accordance with the following formula:

$$C = \frac{3D \times P \times F}{1{,}000}$$

in which:

C = Minimum clearance between pipe containers or bottles in inches.
D = Outside diameter of pipe containers or bottles in inches.
P = Maximum allowable operating pressure, p.s.i.g.
F = Design factor as set forth in § 192.111 of this part.

§ 192.177 Additional provisions for bottle-type holders.

(a) Each bottle-type holder must be—

(1) Located on a storage site entirely surrounded by fencing that prevents access by unauthorized persons and with minimum clearance from the fence as follows:

Maximum allowable operating pressure	Minimum clearance (feet)
Less than 1,000 p.s.i.g.	25
1,000 p.s.i.g. or more	100

(2) Designed using the design factors set forth in § 192.111; and

(3) Buried with a minimum cover in accordance with § 192.327.

(b) Each bottle-type holder manufactured from steel that is not weldable under field conditions must comply with the following:

(1) A bottle-type holder made from alloy steel must meet the chemical and tensile requirements for the various grades of steel in either API Standard 5A or ASTM A 372.

(2) The actual yield-tensile ratio of the steel may not exceed 0.85.

(3) Welding may not be performed on the holder after it has been heat treated or stress relieved, except that copper wires may be attached to the small diameter portion of the bottle end closure for cathodic protection if a localized thermit welding process is used.

(4) The holder must be given a mill hydrostatic test at a pressure that produces a hoop stress at least equal to 85 percent of the SMYS.

(5) The holder, connection pipe, and components must be leak tested after installation as required by Subpart J of this part.

§ 192.179 Transmission line valves.

(a) Each transmission line, other than offshore segments, must have sectionalizing block valves spaced as follows:

(1) Each point on the pipeline in a Class 4 location must be within 2½ miles of a valve.

(2) Each point on the pipeline in a Class 3 location must be within 4 miles of a valve.

(3) Each point on the pipeline in a Class 2 location must be within 7½ miles of a valve.

(4) Each point on the pipeline in a Class 1 location must be within 10 miles of a valve.

(b) Each sectionalizing block valve on a transmission line, other than offshore segments, must comply with the following:

(1) The valve and the operating device to open or close the valve must be readily accessible and protected from tampering and damage.

(2) The valve must be supported to prevent settling of the valve or movement of the pipe to which it is attached.

(c) Each section of a transmission line, other than offshore segments, between main line valves must have a blowdown valve with enough capacity to allow the transmission line to be blown down as rapidly as practicable. Each blowdown discharge must be located so the gas can be blown to the atmosphere without hazard and, if the transmission line is adjacent to an overhead electric line, so that the gas is directed away from the electrical conductors.

§ 192.181 Distribution line valves.

(a) Each high-pressure distribution system must have valves spaced so as to reduce the time to shut down a section of main in an emergency. The valve spacing is determined by the operating pressure, the size of the mains, and the local physical conditions.

(b) Each regulator station controlling the flow or pressure of gas in a distribution system must have a valve installed on the inlet piping at a distance from the regulator station sufficient to permit the operation of the valve during an emergency that might preclude access to the station.

(c) Each valve on a main installed for operating or emergency purposes must comply with the following:

(1) The valve must be placed in a readily accessible location so as to facilitate its operation in an emergency.

(2) The operating stem or mechanism must be readily accessible.

(3) If the valve is installed in a buried box or enclosure, the box or enclosure must be installed so as to avoid transmitting external loads to the main.

§ 192.183 Vaults: structural design requirements.

(a) Each underground vault or pit for valves, pressure relieving, pressure limiting, or pressure regulating stations, must be able to meet the loads which may be imposed upon it, and to protect installed equipment.

(b) There must be enough working space so that all of the equipment required in the vault or pit can be properly installed, operated, and maintained.

(c) Each pipe entering, or within, a regulator vault or pit must be steel for sizes 10 inches, and less, except that control and gage piping may be copper. Where pipe extends through the vault or pit structure, provision must be made to prevent the passage of gasses or liquids through the opening and to avert strains in the pipe.

§ 192.185 Vaults: accessibility.

Each vault must be located in an accessible location and, so far as practical, away from—

(a) Street intersections or points where traffic is heavy or dense;

(b) Points of minimum elevation, catch basins, or places where the access cover will be in the course of surface waters; and

(c) Water, electric, steam, or other facilities.

§ 192.187 Vaults: sealing, venting, and ventilation.

Each underground vault or closed top pit containing either a pressure regulating or reducing station, or a pressure limiting or relieving station, must be sealed, vented or ventilated, as follows:

(a) When the internal volume exceeds 200 cubic feet—

(1) The vault or pit must be ventilated with two ducts, each having at least the ventilating effect of a pipe 4 inches in diameter;

(2) The ventilation must be enough to minimize the formation of combustible atmosphere in the vault or pit; and

(3) The ducts must be high enough above grade to disperse any gas-air mixtures that might be discharged.

(b) When the internal volume is more than 75 cubic feet but less than 200 cubic feet—

(1) If the vault or pit is sealed, each opening must have a tight fitting cover without open holes through which an explosive mixture might be ignited, and there must be a means for testing the internal atmosphere before removing the cover;

(2) If the vault or pit is vented, there must be a means of preventing external sources of ignition from reaching the vault atmosphere; or

(3) If the vault or pit is ventilated, paragraph (a) or (c) of this section applies.

(c) If a vault or pit covered by paragraph (b) of this section is ventilated by openings in the covers or gratings and the ratio of the internal volume, in cubic feet, to the effective ventilating area of the cover or grating, in square feet, is less than 20 to 1, no additional ventilation is required.

§ 192.189 Vaults: drainage and waterproofing.

(a) Each vault must be designed so as to minimize the entrance of water.

(b) A vault containing gas piping may not be connected by means of a drain connection to any other underground structure.

(c) All electrical equipment in vaults must conform to the applicable requirements of Class 1, Group D, of the National Electrical Code, ANSI Standard C1.

§ 192.191 Design pressure of plastic fittings.

(a) Thermosetting fittings for plastic pipe must conform to ASTM D 2517.

(b) The design pressure of alpha-buna-styrene (ABS) and polyvinyl chloride (PVC) Schedule 40 and 80 thermoplastic fittings must be obtained from the following table:

DESIGN PRESSURE OF THERMOPLASTIC FITTINGS, P.S.I.G. OF VARIOUS STRENGTHS, MATERIALS AND CLASS LOCATIONS

Size inches	Schedule	ABS Type I and PVC Type II class location			PVC Type I class location		
		1	2 and 3	4	1	2 and 3	4
½	40	100	100	100	100	100	100
	80	100	100	100	100	100	100
¾	40	100	100	96	100	100	100
	80	100	100	100	100	100	100
1	40	100	100	90	100	100	100
	80	100	100	100	100	100	100
1¼	40	100	92	74	100	100	100
	80	100	100	100	100	100	100
1½	40	100	83	66	100	100	100
	80	100	100	94	100	100	100
2	40	89	69	55	100	100	100
	80	100	100	81	100	100	100
2½	40	99	76	61	100	100	100
	80	100	100	85	100	100	100
3	40	84	66	53	100	100	100
	80	100	94	75	100	100	100
3½	40	77	60	48	100	100	96
	80	100	86	69	100	100	100
4	40	71	56	44	100	100	80
	80	100	81	65	100	100	100
5	40	62	49	39	100	97	78
	80	93	72	58	100	100	100
6	40	59	44	35	100	88	71
	80	89	70	56	100	100	100

NOTE: These pressure ratings are the same value as the design pressure of the corresponding pipe size and schedule in the same class location, as determined by the formula given in § 192.121 and the limitations in § 192.123 of this part.

§ 192.193 Valve installation in plastic pipe.

Each valve installed in plastic pipe must be designed so as to protect the plastic material against excessive torsional or shearing loads when the valve or shutoff is operated, and from any other secondary stresses that might be exerted through the valve or its enclosure.

§ 192.195 Protection against accidental overpressuring.

(a) *General requirements.* Except as provided in § 192.197, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of §§ 192.199 and 192.201.

(b) *Additional requirements for distribution systems.* Each distribution system that is supplied from a source of gas that is at a higher pressure than the maximum allowable operating pressure for the system must—

(1) Have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the event of failure of some portion of the system; and

(2) Be designed so as to prevent accidental overpressuring.

§ 192.197 Control of the pressure of gas delivered from high-pressure distribution systems.

(a) If the maximum actual operating pressure of the distribution system is under 60 p.s.i.g. or less and a service regulator having the following characteristics is used, no other pressure limiting device is required:

(1) A regulator capable of reducing distribution line pressure to pressures recommended for household appliances.

(2) A single port valve with proper orifice for the maximum gas pressure at the regulator inlet.

(3) A valve seat made of resilient material designed to withstand abrasion of the gas, impurities in gas, cutting by the valve, and to resist permanent deformation when it is pressed against the valve port.

(4) Pipe connections to the regulator not exceeding 2 inches in diameter.

(5) A regulator that, under normal operating conditions, is able to regulate the downstream pressure within the necessary limits of accuracy and to limit the build-up of pressure under no-flow conditions to prevent a pressure that would cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(6) A self-contained service regulator with no external static or control lines.

(b) If the maximum actual operating pressure of the distribution system is 60 p.s.i.g., or less, and a service regulator that does not have all of the characteristics listed in paragraph (a) of this section is used, or if the gas contains materials that seriously interfere with the operation of service regulators, there must be suitable protective devices to prevent unsafe overpressuring of the customer's appliances if the service regulator fails.

(c) If the maximum actual operating pressure of the distribution system exceeds 60 p.s.i.g., one of the following methods must be used to regulate and limit, to the maximum safe value, the pressure of gas delivered to the customer:

(1) A service regulator having the characteristics listed in paragraph (a) of this section, and another regulator located upstream from the service regulator. The upstream regulator may not be set to maintain a pressure higher than 60 p.s.i.g. A device must be installed between the upstream regulator and the service regulator to limit the pressure on the inlet of the service regulator to 60 p.s.i.g. or less in case the upstream regulator fails to function properly. This device may be either a relief valve or an automatic shutoff that shuts, if the pressure on the inlet of the service regulator exceeds the set pressure (60 p.s.i.g. or less), and remains closed until manually reset.

(2) A service regulator and a monitoring regulator set to limit, to a maximum safe value, the pressure of the gas delivered to the customer.

(3) A service regulator with a relief valve vented to the outside atmosphere, with the relief valve set to open so that the pressure of gas going to the customer does not exceed a maximum safe value. The relief valve may either be built into the service regulator or it may be a separate unit installed downstream from the service regulator. This combination may be used alone only in those cases where the inlet pressure on the service regulator does not exceed the manufacturer's safe working pressure rating of the service regulator, and may not be used where the inlet pressure on the service regulator exceeds 125 p.s.i.g. For higher inlet pressures, the methods in subparagraph (1) or (2) of this paragraph must be used.

(4) A service regulator and an automatic shutoff device that closes upon a rise in pressure downstream from the regulator and remains closed until manually reset.

§ 192.199 Requirements for design of pressure relief and limiting devices.

Each pressure relief or pressure limiting device must—

(a) Be constructed of materials such that the operation of the device will not be impaired by corrosion;

(b) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;

(c) Be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be tested for leakage when in the closed position;

(d) Have support made of noncombustible material;

(e) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;

(f) Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;

(g) Where installed at a district regulator station to protect a pipeline system from overpressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the overpressure protective device and the district regulator; and

(h) Except for a valve that will isolate the system under protection from its source of pressure, be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative.

§ 192.201 Required capacity of pressure relieving and limiting stations.

(a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to prevent—

(1) The pressure from exceeding the maximum allowable operating pressure plus 10 percent or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower; or

(2) In a low-pressure distribution system, a pressure that would cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(b) When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulator or compressor, or any single run of lesser capacity regulators or compressors in that station, will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.

(c) Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low-pressure distribution system, with a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment.

§ 192.203 Instrument, control, and sampling pipe and components.

(a) *Applicability.* This section applies to the design of instrument, control, and sampling pipe and components. It does not apply to permanently closed systems, such as fluid-filled temperature-responsive devices.

(b) *Materials and design.* All materials employed for pipe and components must be designed to meet the particular conditions of service and the following:

(1) Each takeoff connection and attaching boss, fitting, or adapter must be made of suitable material, be able to withstand the maximum service pressure and temperature of the pipe or equipment to which it is attached, and be designed to satisfactorily withstand all stresses without failure by fatigue.

(2) A shutoff valve must be installed in each takeoff line as near as practicable to the point of takeoff. Blowdown valves must be installed where necessary.

(3) Brass or copper material may not be used for metal temperatures greater than 400° F.

(4) Pipe or components that may contain liquids must be protected by heating or other means from damage due to freezing.

(5) Pipe or components in which liquids may accumulate must have drains or drips.

(6) Pipe or components subject to clogging from solids or deposits must have suitable connections for cleaning.

(7) The arrangement of pipe, components, and supports must provide safety under anticipated operating stresses.

(8) Each joint between sections of pipe, and between pipe and valves or fittings, must be made in a manner suitable for the anticipated pressure and temperature condition. Slip type expansion joints may not be used. Expansion must be allowed for by providing flexibility within the system itself.

(9) Each control line must be protected from anticipated causes of damage and must be designed and installed to prevent damage to any one control line from making both the regulator and the over-pressure protective device inoperative.

Subpart E—Welding of Steel in Pipelines

§ 192.221 Scope.

(a) This subpart prescribes minimum requirements for welding steel materials in pipelines.

(b) This subpart does not apply to welding that occurs during the manufacture of steel pipe or steel pipeline components.

§ 192.223 General.

(a) Welding must be performed in accordance with established written welding procedures that have been qualified under § 192.225 to produce sound, ductile welds.

(b) Welding must be performed by welders who are qualified under §§ 192.227 and 192.229 for the welding procedure to be used.

§ 192.225 Qualification of welding procedures.

(a) Each welding procedure must be qualified under either section IX of the ASME Boiler and Pressure Vessel Code or section 2 of API Standard 1104, whichever is appropriate to the function of the weld.

(b) When a welding procedure is being qualified under section IX of the ASME Boiler and Pressure Vessel Code, the following steels are considered to fall within the P-Number 1 grouping for the purpose of the essential variables and do not require separate qualification of welding procedures:

(1) Carbon steels that have a carbon content of 0.32 percent (ladle analysis) or less.

(2) Carbon steels that have a carbon equivalent (C+¼ Mn) of 0.65 percent (ladle analysis) or less.

(3) Alloy steels with weldability characteristics that have been shown to be similar to the carbon steels listed in subparagraphs (1) and (2) of this paragraph.

Alloy steels and carbon steels that are not covered by subparagraph (1), (2), or (3) of this paragraph require separate qualification of procedures for each individual pipe specification in accordance with sections VIII and IX of the ASME Boiler and Pressure Vessel Code.

(c) Each welding procedure must be recorded in detail during the qualifying tests. This record must be retained and followed whenever the procedure is used.

§ 192.227 Qualification of welders.

(a) Except as provided in paragraph (c) of this section, each welder must be qualified in accordance with one of the following:

(1) Section IX of the ASME Boiler and Pressure Vessel Code.

(2) Section 3 of API Standard 1104.

(b) When a welder is being qualified under section IX of the ASME Boiler and Pressure Vessel Code, the following steels are considered to fall within the P-Number 1 grouping for the purpose of the essential variables and do not require separate qualification:

(1) Carbon steels that have a carbon content of 0.32 percent (ladle analysis) or less.

(2) Carbon steels that have a carbon equivalent (C+¼ Mn) of 0.65 percent (ladle analysis) or less.

(3) Alloy steels with weldability characteristics that have been shown to be similar to the carbon steels listed in subparagraphs (1) and (2) of this paragraph.

Alloy steels and carbon steels that are not covered by subparagraph (1), (2), or (3) of this paragraph require separate qualification of welders for each individual pipe specification in accordance with sections VIII and IX of the ASME Boiler and Pressure Vessel Code.

(c) A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20 percent of SMYS by performing an acceptable test weld, for the process to be used, under the test set forth in section I of Appendix C to this part. A welder who makes welded service line connections to mains must also perform an acceptable test weld under section II of Appendix C to this part as a part of

his qualifying test. After initial qualification, a welder may not perform welding unless—

(1) Within the preceding 12 calendar months, he has requalified; or

(2) Within the preceding 6 calendar months he has had—

(i) A production weld cut out, tested and found acceptable in accordance with the qualifying test; or

(ii) For welders who work only on service lines 2 inches or smaller in diameter, two sample welds tested and found acceptable in accordance with the test in section III of Appendix C to this part.

§ 192.229 Limitations on welders.

(a) No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.

(b) No welder may weld with a particular welding process unless, within the preceding 6 calendar months, he has engaged in welding with that process.

(c) No welder who is qualified under § 192.227(a) may weld unless, within the preceding 6 calendar months, he has had at least one weld tested and found acceptable under either section 3 or 6 of API Standards 1104.

§ 192.231 Protection from weather.

The welding operation must be protected from weather conditions that would impair the quality of the completed weld.

§ 192.233 Miter joints.

(a) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent or more of SMYS may not deflect the pipe more than 3°.

(b) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of less than 30 percent, but more than 10 percent, of SMYS may not deflect the pipe more than 12½° and must be a distance equal to one pipe diameter or more away from any other miter joint, as measured from the crotch of each joint.

(c) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 10 percent or less of SMYS may not deflect the pipe more than 90°.

§ 192.235 Preparation for welding.

Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, and the pipe or component must be aligned to provide the most favorable condition for depositing the root bead. This alignment must be preserved while the root bead is being deposited.

§ 192.237 Preheating.

(a) Carbon steel that has a carbon content in excess of 0.32 percent (ladle analysis) or a carbon equivalent (C+¼ Mn) in excess of 0.65 percent (ladle analysis) must be preheated for welding.

(b) Carbon steel that has a lower carbon content or carbon equivalent than the steels covered by paragraph (a) of this section must be preheated for welding when preheating will alleviate existing conditions that would limit the welding technique or tend to adversely affect the quality of the weld.

(c) When steel materials with different preheat temperatures are being preheated for welding, the higher temperature must be used.

(d) Preheat temperature must be monitored to ensure that the required preheat temperature is reached before, and maintained during, the welding operation.

§ 192.239 Stress relieving.

(a) Except as provided in paragraph (f) of this section, each weld on carbon steel that has a carbon content in excess of 0.32 percent (ladle analysis) or a carbon equivalent (C+¼ Mn) in excess of 0.65 percent (ladle analysis) must be stress relieved as prescribed in section VIII of the ASME Boiler and Pressure Vessel Code.

(b) Except as provided in paragraph (f) of this section, each weld on carbon steel that has a carbon content of less than 0.32 percent (ladle analysis) or a carbon equivalent (C+¼ Mn) of less than 0.65 percent (ladle analysis) must be thermally stress relieved when conditions exist which cool the weld at a rate detrimental to the quality of the weld.

(c) Except as provided in paragraph (f) of this section, each weld on carbon steel pipe with a wall thickness of more than 1¼ inches must be stress relieved.

(d) When a weld connects pipe or components that are of different thickness, the wall thickness to be used in determining whether stress relieving is required under this section is—

(1) In the case of pipe connections, the thicker of the two pipes joined; or

(2) In the case of branch connections, slip-on flanges, or socket weld fittings, the thickness of the pipe run or header.

(e) Each weld of different materials must be stress relieved, if either material requires stress relieving under this section.

(f) Notwithstanding paragraphs (a), (b), and (c) of this section, stress relieving is not required for the following:

(1) A fillet or groove weld one-half inch, or less, in size (leg) that attaches a connection 2 inches, or less, in diameter; or

(2) A fillet or groove weld three-eighths inch, or less, in groove size that attaches a supporting member or other nonpressure attachment.

(g) Stress relieving required by this section must be performed at a temperature of at least 1,100° F. for carbon steels and at least 1,200° F. for ferritic alloy steels. When stress relieving a weld between steel materials with different stress relieving temperatures, the higher temperature must be used.

(h) When stress relieving, the temperature must be monitored to ensure that a uniform temperature is maintained and that the proper stress relieving cycle is accomplished.

§ 192.241 Inspection and test of welds.

(a) Visual inspection of welding must be conducted to insure that—

(1) The welding is performed in accordance with the welding procedure; and

(2) The weld is acceptable under paragraph (c) of this section.

(b) The welds on a pipeline to be operated at a pressure that produces a hoop stress of 20 percent or more of SMYS must be nondestructively tested in accordance with § 192.243, except that welds that are visually inspected and approved by a qualified welding inspector need not be nondestructively tested if—

(1) The pipe has a nominal diameter of less than 6 inches; or

(2) The pipeline is to be operated at a pressure that produces a hoop stress of less than 40 percent of SMYS and the welds are so limited in number that nondestructive testing is impractical.

(c) The acceptability of a weld that is nondestructively tested or visually inspected is determined according to the standards in section 6 of API Standard 1104.

§ 192.243 Nondestructive testing.

(a) Nondestructive testing of welds must be performed by any process, other than trepanning, that will clearly indicate defects that may affect the integrity of the weld.

(b) Nondestructive testing of welds must be performed—

(1) In accordance with written procedures; and

(2) By persons who have been trained and qualified in the established procedures and with the equipment employed in testing.

(c) Procedures must be established for the proper interpretation of each nondestructive test of a weld to ensure the acceptability of the weld under § 192.241(c).

(d) When nondestructive testing is required under § 192.241(b), the following percentages of each day's field butt welds, selected at random by the operator, must be nondestructively tested over their entire circumference:

(1) In Class 1 locations, at least 10 percent.

(2) In Class 2 locations, at least 15 percent.

(3) In Classes 3 and 4 locations and at crossings of major or navigable rivers, 100 percent if practicable, but not less than 90 percent.

(4) Within railroad or public highway rights-of-way, including tunnels, bridges and overhead road crossings, and at pipeline tie-ins, 100 percent.

(e) Except for a welder whose work is isolated from the principal welding activity, a sample of each welder's work for each day must be nondestructively tested, when nondestructive testing is required under § 192.241(b).

(f) When nondestructive testing is required under § 192.241(b), each operator must retain, for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.

§ 192.245 Repair or removal of defects.

(a) Each weld that is unacceptable under § 192.241(c) must be removed or repaired. A weld must be removed if it has a crack that is more than 2 inches long or that penetrates either the root or second bead.

(b) Each weld that is repaired must have the defect removed down to clean metal and the segment to be repaired must be preheated. After repair, the segment of the weld that was repaired must be inspected to insure its acceptability. If the repair is not acceptable, the weld must be removed.

Subpart F—Joining of Materials Other Than by Welding

§ 192.271 Scope.

(a) This subpart prescribes minimum requirements for joining materials in pipelines, other than by welding.

(b) This subpart does not apply to joining during the manufacture of pipe or pipeline components.

§ 192.273 General.

(a) The pipeline must be designed and installed so that each joint will sustain the longitudinal pullout or thrust forces caused by contraction or expansion of the piping or by anticipated external or internal loading.

(b) Each joint must be made in accordance with written procedures that have been proven by test or experience to produce strong gastight joints.

(c) Each joint must be inspected to insure compliance with this subpart.

§ 192.275 Cast iron pipe.

(a) Each caulked bell and spigot joint in cast iron pipe must be sealed with mechanical leak clamps.

(b) Each mechanical joint in cast iron pipe must have a gasket made of a resilient material as the sealing medium. Each gasket must be suitably confined and retained under compression by a separate gland or follower ring.

(c) Cast iron pipe may not be joined by threaded joints.

(d) Cast iron pipe may not be joined by brazing.

(e) Each flange on a flanged joint in cast iron pipe must conform in dimensions and drilling to ANSI Standard B16.1 and be cast integrally with the pipe, valve, or fitting.

§ 192.277 Ductile iron pipe.

(a) Each mechanical joint in ductile iron pipe must conform to ANSI Standard A21.52 and ANSI Standard A21.11.

(b) Ductile iron pipe may not be joined by threaded joints.

(c) Ductile iron pipe may not be joined by brazing.

§ 192.279 Copper pipe.

Copper pipe may not be threaded, except that copper pipe used for joining screw fittings or valves may be threaded if the wall thickness is equivalent to the comparable size of standard wall pipe, as defined in ANSI Standard B36.10.

§ 192.281 Plastic pipe.

(a) *General.* Each plastic pipe joint must be made in accordance with written procedures that have been proven by destructive burst test to produce joints at least as strong as the pipe being joined. A plastic pipe joint that is joined by solvent cement, adhesive, or heat fusion may not be disturbed until it has properly set. Plastic pipe may not be joined by a threaded joint or miter joint.

(b) *Solvent cement joints.* Each solvent cement joint on plastic pipe must comply with the following:

(1) The mating surfaces of the joint must be clean, dry, and free of material which might be detrimental to the joint.

(2) The solvent cement must conform to ASTM Specification D 2513.

(3) The safety requirements of Appendix A of ASTM Specification D 2513 must be met.

(4) The joint may not be heated to accelerate the setting of the cement.

(c) *Heat-fusion joints.* Each heat-fusion joint on plastic pipe must comply with the following:

(1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the plastic hardens.

(2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature.

(3) Heat may not be applied with a torch or other open flame.

(d) *Adhesive joints.* Each adhesive joint on plastic pipe must comply with the following:

(1) The adhesive must conform to ASTM Specification D 2517.

(2) The materials and adhesive must be compatible with each other.

(e) *Mechanical joints.* Each compression type mechanical joint on plastic pipe must comply with the following:

(1) The gasket material in the coupling must be compatible with the plastic.

(2) A rigid internal tubular stiffener, other than a split tubular stiffner, must be used in conjection with the coupling.

Subpart G—General Construction Requirements for Transmission Lines and Mains

§ 192.301 Scope.

This subpart prescribes minimum requirements for constructing transmission lines and mains.

§ 192.303 Compliance with specifications or standards.

Each transmission line or main must be constructed in accordance with comprehensive written specifications or standards that are consistent with this part.

§ 192.305 Inspection: general.

Each transmission line or main must be inspected to ensure that it is constructed in accordance with this part.

§ 192.307 Inspection of materials.

Each length of pipe and each other component must be visually inspected at the site of installation to ensure that it has not sustained any visually determinable damage that could impair its serviceability.

§ 192.309 Repair of steel pipe.

(a) Each imperfection or damage that impairs the serviceability of a length of steel pipe must be repaired or removed. If a repair is made by grinding, the remaining wall thickness must at least be equal to either:

(1) The minimum thickness required by the tolerances in the specification to which the pipe was manufactured; or

(2) The nominal wall thickness required for the design pressure of the pipeline.

(b) Each of the following dents must be removed from steel pipe to be operated at a pressure that produces a hoop stress of 20 percent, or more, of SMYS:

(1) A dent that contains a stress concentrator such as a scratch, gouge, groove, or arc burn.

(2) A dent that affects the longitudinal weld or a circumferential weld.

(3) In pipe to be operated at a pressure that produces a hoop stress of 40 percent or more of SMYS, a dent that has a depth of—

(i) More than one-quarter inch in pipe 12¾ inches or less in outer diameter; or

(ii) More than 20 percent of the nominal pipe diameter in pipe over 12¾ inches in outer diameter.

For the purpose of this section a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe-wall thickness. The depth of a dent is measured as the gap between the lowest point of the dent and a prolongation of the original contour of the pipe.

(c) Each arc burn on steel pipe to be operated at a pressure that produces a hoop stress of 40 percent, or more, of SMYS must be repaired or removed. If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

(1) The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or

(2) The nominal wall thickness required for the design pressure of the pipeline.

(d) A gouge, groove, arc burn, or dent may not be repaired by insert patching or by pounding out.

(e) Each gouge, groove, arc burn, or dent that is removed from a length of pipe must be removed by cutting out the damaged portion as a cylinder.

§ 192.311 Repair of plastic pipe.

Each imperfection or damage that would impair the serviceability of plastic pipe must be repaired by a patching saddle or removed.

§ 192.313 Bends and elbows.

(a) Each field bend in steel pipe, other than a wrinkle bend made in accordance with § 192.315, must comply with the following:

(1) A bend may not impair the serviceability of the pipe.

(2) On pipe containing a longitudinal weld, the longitudinal seam must be as near as practicable to the neutral axis of the bend.

(3) A bend on pipe that is 12 inches, or more, in nominal diameter must not deflect the pipe more than 1½° in any length of pipe equal to the diameter.

(4) For pipe more than 4 inches in nominal diameter, the difference between the maximum and minimum diameter at a bend may not be more than 2½ percent of the nominal diameter.

(b) Each circumferential weld of steel pipe that is subjected to stress during bending must be nondestructively tested.

(c) Wrought-steel welding elbows and transverse segments of these elbows may not be used for changes in direction on steel pipe that is 2 inches or more in diameter unless the arc length, as measured along the crotch, is at least 1 inch.

(d) Each bend, other than a wrinkle bend made in accordance with § 192.315, must have a smooth contour and be free of mechanical damage.

§ 192.315 Wrinkle bends in steel pipe.

(a) A wrinkle bend may not be made on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent, or more, of SMYS.

(b) Each wrinkle bend on steel pipe must comply with the following:

(1) The bend must not have any sharp kinks.

(2) When measured along the crotch of the bend, the wrinkles must be a distance of at least one pipe diameter.

(3) On pipe 16 inches or larger in diameter, the bend may not have a deflection of more than 1½° for each wrinkle.

(4) On pipe containing a longitudinal weld the longitudinal seam must be as near as practicable to the neutral axis of the bend.

§ 192.317 Protection from hazards.

(a) Each transmission line or main must be protected from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipe to move or to sustain abnormal loads.

(b) Each transmission line or main that is constructed above ground must be protected from accidental damage by vehicular traffic or other similar causes, either by being placed at a safe distance from the traffic or by installing barricades.

§ 192.319 Installation of pipe in a ditch.

(a) When installed in a ditch, each transmission line that is to be operated at a pressure producing a hoop stress of 20 percent or more of SMYS must be installed so that the pipe fits the ditch so as to minimize stresses and protect the pipe coating from damage.

(b) Each ditch for a transmission line or main must be backfilled in a manner that—

(1) Provides firm support under the pipe; and

(2) Prevents damage to the pipe and pipe coating from equipment or from the backfill material.

§ 192.321 Installation of plastic pipe.

(a) Plastic pipe must be installed below ground level.

(b) Plastic pipe that is installed in a vault or any other below grade enclosure must be completely encased in gas-tight metal pipe and fittings that are adequately protected from corrosion.

(c) Plastic pipe must be installed so as to minimize shear or tensile stresses.

(d) Thermoplastic pipe that is not encased must have a minimum wall thickness of 0.090 inches, except that pipe with an outside diameter of 0.875 inches or less may have a minimum wall thickness of 0.062 inches.

(e) Plastic pipe that is not encased must have an electrically conductive wire or other means of locating the pipe while it is underground.

(f) Plastic pipe that is being encased must be inserted into the casing pipe in a manner that will protect the plastic. The leading end of the plastic must be closed before insertion.

§ 192.323 Casing.

Each casing used on a transmission line or main under a railroad or highway must comply with the following:

(a) The casing must be designed to withstand the superimposed loads.

(b) If there is a possibility of water entering the casing, the ends must be sealed.

(c) If the ends of an unvented casing are sealed and the sealing is strong enough to retain the maximum allowable operating pressure of the pipe, the casing must be designed to hold this pressure at a stress level of not more than 72 percent of SMYS.

(d) If vents are installed on a casing, the vents must be protected from the weather to prevent water from entering the casing.

§ 192.325 Underground clearance.

(a) Each transmission line must be installed with at least 12 inches of clearance from any other underground structure not associated with the transmission line. If this clearance cannot be attained, the transmission line must be protected from damage that might result from the proximity of the other structure.

(b) Each main must be installed with enough clearance from any other underground structure to allow proper maintenance and to protect against damage that might result from proximity to other structures.

(c) In addition to meeting the requirements of paragraph (a) or (b) of this section, each plastic transmission line or main must be installed with sufficient clearance, or must be insulated, from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.

(d) Each pipe-type or bottle-type holder must be installed with a minimum clearance from any other holder as prescribed in § 192.175(b).

§ 192.327 Cover.

(a) Except as provided in paragraph (c) of this section, each buried transmission line must be installed with a minimum cover as follows:

Location	Normal soil	Consolidated rock
	Inches	*Inches*
Class 1 locations	30	18
Class 2, 3, and 4 locations	30	24
Drainage ditches of public roads and railroad crossings	30	24

(b) Except as provided in paragraphs (c) and (d) of this section, each buried main must be installed with at least 24 inches of cover.

(c) Where an underground structure prevents the installation of a transmission line or main with the minimum cover, the transmission line or main may be installed with less cover if it is provided with additional protection to withstand anticipated external loads.

(d) A main may be installed with less than 24 inches of cover if the law of the State or municipality—

(1) Establishes a minimum cover of less than 24 inches;

(2) Requires that mains be installed in a common trench with other utility lines; and

(3) Provides adequately for prevention of damage to the pipe by external forces.

Subpart H—Customer Meters, Service Regulators, and Service Lines

§ 192.351 Scope.

This subpart prescribes minimum requirements for installing customer meters, service regulators, service lines, service line valves, and service line connections to mains.

§ 192.353 Customer meters and regulators: location.

(a) Each meter and service regulator, whether inside or outside of a building, must be installed in a readily accessible location and be protected from corrosion and other damage. However, the upstream regulator in a series may be buried.

(b) Each service regulator installed within a building must be located as near as practical to the point of service line entrance.

(c) Each meter installed within a building must be located in a ventilated place and not less than 3 feet from any source of ignition or any source of heat which might damage the meter.

(d) Where feasible, the upstream regulator in a series must be located outside the building, unless it is located in a separate metering or regulating building.

§ 192.355 Customer meters and regulators: protection from damage.

(a) *Protection from vacuum or back pressure.* If the customer's equipment might create either a vacuum or a back pressure, a device must be installed to protect the system.

(b) *Service regulator vents and relief vents.* The outside terminal of each service regulator vent and relief vent must—

(1) Be rain and insect resistant;

(2) Be located at a place where gas from the vent can escape freely into the atmosphere and away from any opening into the building; and

(3) Be protected from damage caused by submergence in areas where flooding may occur.

(c) *Pits and vaults.* Each pit or vault that houses a customer meter or regulator at a place where vehicular traffic is anticipated, must be able to support that traffic.

§ 192.357 Customer meters and regulators: installation.

(a) Each meter and each regulator must be installed so as to minimize anticipated stresses upon the connecting piping and the meter.

(b) When close all-thread nipples are used, the wall thickness remaining after the threads are cut must meet the minimum wall thickness requirements of this part.

(c) Connections made of lead or other easily damaged material may not be used in the installation of meters or regulators.

(d) Each regulator that might release gas in its operation must be vented to the outside atmosphere.

§ 192.359 Customer meter installations: operating pressure.

(a) A meter may not be used at a pressure that is more than 67 percent of the manufacturer's shell test pressure.

(b) Each new meter must have been tested by the manufacturer to a minimum of 10 p.s.i.g.

(c) A rebuilt or repaired tinned steel case meter may not be used at a pressure that is more than 50 percent of the pressure used to test the meter after rebuilding or repairing.

§ 192.361 Service lines: installation.

(a) *Depth.* Each buried service line must be installed with at least 12 inches of cover in private property and at least 18 inches of cover in streets and roads. However, where an underground structure prevents installation at those depths, the service line must be able to withstand any anticipated external load.

(b) *Support and backfill.* Each service line must be properly supported on undisturbed or well-compacted soil, and material used for backfill must be free of materials that could damage the pipe or its coating.

(c) *Grading for drainage.* Where condensate in the gas might cause interruption in the gas supply to the customer, the service line must be graded so as to drain into the main or into drips at the low points in the service line.

(d) *Protection against piping strain and external loading.* Each service line must be installed so as to minimize anticipated piping strain and external loading.

(e) *Installation of service lines into buildings.* Each underground service line installed below grade through the outer foundation wall of a building must—

(1) In the case of a metal service line, be protected gainst corrosion;

(2) In the case of a plastic service line, be protected from shearing action and backfill settlement; and

(3) Be sealed at the foundation wall to prevent leakage into the building.

(f) *Installation of service lines under buildings.* Where an underground service line is installed under a building—

(1) It must be encased in a gas-tight conduit;

(2) The conduit and the service line must, if the service line supplies the building it underlies, extend into a normally usable and accessible part of the building; and

(3) The space between the conduit and the service line must be sealed to prevent gas leakage into the building and, if the conduit is sealed at both ends, a vent line from the annular space must extend to a point where gas would not be a hazard, and extend above grade, terminating in a rain and insect resistant fitting.

§ 192.363 Service lines: valve requirements.

(a) Each service line must have a service-line valve that meets the applicable requirements of Subparts B and D of this part. A valve incorporated in a meter bar, that allows the meter to be bypassed, may not be used as a service-line valve.

(b) A soft seat service line valve may not be used if its ability to control the flow of gas could be adversely affected by exposure to anticipated heat.

(c) Each service-line valve on a high-pressure service line, installed above ground or in an area where the blowing of gas would be hazardous, must be designed and constructed to minimize the possibility of the removal of the core of the valve with other than specialized tools.

§ 192.365 Service lines: location of valves.

(a) *Relation to regulator or meter.* Each service-line valve must be installed upstream of the regulator or, if there is no regulator, upstream of the meter.

(b) *Outside valves.* Each service line must have a shut-off valve in a readily accessible location that, if feasible, is outside of the building.

(c) *Underground valves.* Each underground service-line valve must be located in a covered durable curb box or standpipe that allows ready operation of the valve and is supported independently of the service lines.

§ 192.367 Service lines: general requirements for connections to main piping.

(a) *Location.* Each service-line connection to a main must be located at the top of the main or, if that is not practical, at the side of the main, unless a suitable protective device is installed to minimize the possibility of dust and moisture being carried from the main into the service line.

(b) *Compression-type connection to main.* Each compression-type service line to main connection must—

(1) Be designed and installed to effectively sustain the longitudinal pull-out or thrust forces caused by contraction or expansion of the piping, or by anticipated external or internal loading; and

(2) If gaskets are used in connecting the service line to the main connection fitting, have gaskets that are compatible with the kind of gas in the system.

§ 192.369 Service lines: connections to cast iron or ductile iron mains.

(a) Each service line connected to a cast iron or ductile iron main must be connected by a mechanical clamp, by drilling and tapping the main, or by another method meeting the requirements of § 192.273.

(b) If a threaded tap is being inserted, the requirements of § 192.151 (b) and (c) must also be met.

§ 192.371 Service lines: steel.

Each steel service line to be operated at less than 100 p.s.i.g. must be designed for a minimum of 100 p.s.i.g.

§ 192.373 Service lines: cast iron and ductile iron.

(a) Cast or ductile iron pipe less than 6 inches in diameter may not be installed for service lines.

(b) If cast iron pipe or ductile iron pipe is installed for use as a service line, the part of the service line which extends through the building wall must be of steel pipe.

(c) A cast iron or ductile iron service line may not be installed in unstable soil or under a building.

§ 192.375 Service lines: plastic.

(a) Each plastic service line outside a building must be installed below ground level, except that it may terminate above ground and outside the building, if—

(1) The above ground part of the plastic service line is protected against deterioration and external damage; and

(2) The plastic service line is not used to support external loads.

(b) Each plastic service line inside a building must be protected against external damage.

§ 192.377 Service lines: copper.

Each copper service line installed within a building must be protected against external damage.

Subpart I—[Reserved]

Subpart J—Test Requirements

§ 192.501 Scope.

This subpart prescribes minimum leak-test and strength-test requirements for pipelines.

§ 192.503 General requirements.

(a) No person may operate a new segment of pipeline, or return to service a

segment of pipeline that has been relocated or replaced, until—

(1) It has been tested in accordance with this subpart to substantiate the proposed maximum allowable operating pressure; and

(2) Each potentially hazardous leak has been located and eliminated.

(b) The test medium must be liquid, air, natural gas, or inert gas that is—

(1) Compatible with the material of which the pipeline is constructed;

(2) Relatively free of sedimentary materials; and

(3) Except for natural gas, nonflammable.

(c) Except as provided in § 192.505 (a), if air, natural gas, or inert gas is used as the test medium, the following maximum hoop stress limitations apply:

Class location	Maximum hoop stress allowed as percentage of SMYS	
	Natural gas	Air or inert gas
1	80	80
2	30	75
3	30	50
4	30	40

(d) Each weld used to tie-in a test segment of pipeline is excepted from the test requirements of this subpart.

§ 192.505 Strength test requirements for steel pipeline to operate at a hoop stress of 30 percent or more of SMYS.

(a) Except for service lines, each segment of a steel pipeline that is to operate at a hoop stress of 30 percent or more of SMYS must be strength tested in accordance with this section to substantiate the proposed maximum allowable operating pressure. In addition, in a Class 1 or Class 2 location, if there is a building intended for human occupancy within 300 feet of a pipeline, a hydrostatic test must be conducted to a test pressure of at least 125 percent of maximum operating pressure on that segment of the pipeline within 300 feet of such a building, but in no event may the test section be less than 600 feet unless the length of the newly installed or relocated pipe is less than 600 feet. However, if the buildings are evacuated while the hoop stress exceeds 50 percent of SMYS, air or inert gas may be used as the test medium.

(b) In a Class 1 or Class 2 location, each compressor station, regulator station, and measuring station, must be tested to at least Class 3 location test requirements.

(c) Except as provided in paragraph (e) of this section, the strength test must be conducted by maintaining the pressure at or above the test pressure for at least 8 hours.

(d) If a component other than pipe is the only item being replaced or added to a pipeline, a strength test after installation is not required, if the manufacturer of the component certifies that—

(1) The component was tested to at least the pressure required for the pipeline to which it is being added; or

(2) The component was manufactured under a quality control system that ensures that each item manufactured is at least equal in strength to a prototype and that the prototype was tested to at least the pressure required for the pipeline to which it is being added.

(e) For fabricated units and short sections of pipe, for which a post installation test is impractical, a preinstallation strength test must be conducted by maintaining the pressure at or above the test pressure for at least 4 hours.

§ 192.507 Test requirements for pipelines to operate at a hoop stress less than 30 percent of SMYS and above 100 p.s.i.g.

Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated at a hoop stress less than 30 percent of SMYS and above 100 p.s.i.g. must be tested in accordance with the following:

(a) The pipeline operator must use a test procedure that will ensure discovery of all potentially hazardous leaks in the segment being tested.

(b) If, during the test, the segment is to be stressed to 20 percent or more of SMYS and natural gas, inert gas, or air is the test medium—

(1) A leak test must be made at a pressure between 100 p.s.i.g. and the pressure required to produce a hoop stress of 20 percent of SMYS; or

(2) The line must be walked to check for leaks while the hoop stress is held at approximately 20 percent of SMYS.

(c) The pressure must be maintained at or above the test pressure for at least 1 hour.

§ 192.509 Test requirements for pipelines to operate at or below 100 p.s.i.g.

Except for service lines and plastic pipelines, each segment of a pipeline that is to be operated at or below 100 p.s.i.g. must be leak tested in accordance with the following:

(a) The test procedure used must ensure discovery of all potentially hazardous leaks in the segment being tested.

(b) Each main that is to be operated at less than 1 p.s.i.g. must be tested to at least 10 p.s.i.g. and each main to be operated at or above 1 p.s.i.g. must be tested to at least 90 p.s.i.g.

§ 192.511 Test requirements for service lines.

(a) Each segment of a service line (other than plastic) must be leak tested in accordance with this section before being placed in service. If feasible, the service-line connection to the main must be included in the test; if not feasible, it must be given a leakage test at the operating pressure when placed in service.

(b) Each segment of a service line (other than plastic) intended to be operated at a pressure of at least 1 p.s.i.g. but not more than 40 p.s.i.g. must be given a leak test at a pressure of not less than 50 p.s.i.g.

(c) Each segment of a service line (other than plastic) intended to be operated at pressures of more than 40 p.s.i.g. must be tested to at least 90 p.s.i.g., except that each segment of a steel service line stressed to 20 percent or more of SMYS must be tested in accordance with § 192.507 of this subpart.

§ 192.513 Test requirements for plastic pipelines.

(a) Each segment of a plastic pipeline must be tested in accordance with this section.

(b) The test procedure must insure discovery of all potentially hazardous leaks in the segment being tested.

(c) The test pressure must be at least 150 percent of the maximum operating pressure or 50 p.s.i.g., whichever is greater. However, the maximum test pressure may not be more than three times the design pressure of the pipe.

(d) The temperature of thermoplastic material must not be more than 100° F. during the test.

§ 192.515 Environmental protection and safety requirements.

(a) In conducting tests under this subpart, each operator shall insure that every reasonable precaution is taken to protect its employees and the general public during the testing. Whenever the hoop stress of the segment of the pipeline being tested will exceed 50 percent of SMYS, the operator shall take all practicable steps to keep persons not working on the testing operation outside of the testing area until the pressure is reduced to or below the proposed maximum allowable operating pressure.

(b) The operator shall insure that the test medium is disposed of in a manner that will minimize damage to the environment.

§ 192.517 Records.

Each operator shall make, and retain for the useful life of the pipeline, a record of each test performed under §§ 192.505 and 192.507. The record must contain at least the following information:

(a) The operator's name, the name of the operator's employee responsible for making the test, and the name of any test company used.

(b) Test medium used.

(c) Test pressure.

(d) Test duration.

(e) Pressure recording charts, or other record of pressure readings.

(f) Elevation variations, whenever significant for the particular test.

(g) Leaks and failures noted and their disposition.

Subpart K—Uprating

§ 192.551 Scope.

This subpart prescribes minimum requirements for increasing maximum allowable operating pressures (uprating) for pipelines.

§ 192.553 General requirements.

(a) *Pressure increases.* Whenever the requirements of this subpart require that an increase in operating pressure be made in increments, the pressure must be increased gradually, at a rate that can be controlled, and in accordance with the following:

(1) At the end of each incremental increase, the pressure must be held constant while the entire segment of pipeline that is affected is checked for leaks.

(2) Each leak detected must be repaired before a further pressure increase is made, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous.

(b) *Records.* Each operator who uprates a segment of pipeline shall retain for the life of the segment a record of each investigation required by this subpart, of all work performed, and of each pressure test conducted, in connection with the uprating.

(c) *Written plan.* Each operator who uprates a segment of pipeline shall establish a written procedure that will ensure that each applicable requirement of this subpart is complied with.

(d) *Limitation on increase in maximum allowable operating pressure.* Except as provided in § 192.555(c), a new maximum allowable operating pressure established under this subpart may not exceed the maximum that would be allowed under this part for a new segment of pipeline constructed of the same materials in the same location.

§ 192.555 Uprating to a pressure that will produce a hoop stress of 30 percent or more of SMYS in steel pipelines.

(a) Unless the requirements of this section have been met, no person may subject any segment of a steel pipeline to an operating pressure that will produce a hoop stress of 30 percent or more of SMYS and that is above the established maximum allowable operating pressure.

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure the operator shall—

(1) Review the design, operating, and maintenance history and previous testing of the segment of pipeline and determine whether the proposed increase is safe and consistent with the requirements of this part; and

(2) Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure.

(c) After complying with paragraph (b) of this section, an operator may increase the maximum allowable operating pressure of a segment of pipeline constructed before September 12, 1970, to the highest pressure that is permitted under § 192.619, using as test pressure the highest pressure to which the segment of pipeline was previously subjected (either in a strength test or in actual operation).

(d) After complying with paragraph (b) of this section, an operator that does not qualify under paragraph (c) of this section may increase the previously established maximum allowable operating pressure if at least one of the following requirements is met:

(1) The segment of pipeline is successfully tested in accordance with the requirements of this part for a new line of the same material in the same location.

(2) An increased maximum allowable operating pressure may be established for a segment of pipeline in a Class 1 location if the line has not previously been tested, and if—

(i) It is impractical to test it in accordance with the requirements of this part;

(ii) The new maximum operating pressure does not exceed 80 percent of that allowed for a new line of the same design in the same location; and

(iii) The operator determines that the new maximum allowable operating pressure is consistent with the condition of the segment of pipeline and the design requirements of this part.

(e) Where a segment of pipeline is uprated in accordance with paragraph (c) or (d) (2) of this section, the increase in pressure must be made in increments that are equal to—

(1) 10 percent of the pressure before the uprating; or

(2) 25 percent of the total pressure increase,

whichever produces the fewer number of increments.

§ 192.557 Uprating: steel pipelines to a pressure that will product a hoop stress less than 30 percent of SMYS; plastic, cast iron, and ductile iron pipelines.

(a) Unless the requirements of this section have been met, no person may subject—

(1) A segment of steel pipeline to an operating pressure that will produce a hoop stress less than 30 percent of SMYS and that is above the previously established maximum allowable operating pressure; or

(2) A plastic, cast iron, or ductile iron pipeline segment to an operating pressure that is above the previously established maximum allowable operating pressure.

(b) Before increasing operating pressure above the previously established maximum allowable operating pressure, the operator shall—

(1) Review the design, operating, and maintenance history of the segment of pipeline;

(2) Make a leakage survey (if it has been more than 1 year since the last survey) and repair any leaks that are found, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous;

(3) Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure;

(4) Reinforce or anchor offsets, bends and dead ends in pipe joined by compression couplings or bell and spigot joints to prevent failure of the pipe joint, if the offset, bend, or dead end is exposed in an excavation;

(5) Isolate the segment of pipeline in which the pressure is to be increased from any adjacent segment that will continue to be operated at a lower pressure; and

(6) If the pressure in mains or service lines, or both, is to be higher than the pressure delivered to the customer, install a service regulator on each service line and test each regulator to determine that it is functioning. Pressure may be increased as necessary to test each regulator, after a regulator has been installed on each pipeline subject to the increased pressure.

(c) After complying with paragraph (b) of this section, the increase in maximum allowable operating pressure must be made in increments that are equal to 10 p.s.i.g. or 25 percent of the total pressure increase, whichever produces the fewer number of increments. Whenever the requirements of paragraph (b) (6) of this section apply, there must be at least two approximately equal incremental increases.

(d) If records for cast iron or ductile iron pipeline facilities are not complete enough to ascertain compliance with § 192.117 or § 192.119, as applicable, the following procedures must be followed:

(1) If the original laying conditions cannot be ascertained, the operator shall assume, when applying the design formulas of ANSI A21.1, that cast iron pipe was supported on blocks with tamped backfill and, when applying the design formulas of ANSI A21.50, that ductile iron pipe was laid without blocks with tamped backfill.

(2) Unless the actual maximum cover depth is known, the operator shall measure the actual cover in at least three places where the cover is most likely to be greatest and shall use the greatest cover measured.

(3) Unless the actual nominal wall thickness is known, the operator shall determine the wall thickness by cutting and measuring coupons from at least three separate pipe lengths. The coupons must be cut from pipe lengths in areas where the cover depth is most likely to be the greatest. The average of all measurements taken must be increased by the allowance indicated in the following table:

Pipe size (inches)	Allowance (inches)		
	Cast iron pipe		Ductile iron pipe
	Pit cast pipe	Centrifugally cast pipe	
3–8	0.075	0.065	0.065
10–12	0.08	0.07	0.07
14–24	0.08	0.08	0.075
30–42	0.09	0.09	0.075
48	0.09	0.09	0.09
54–60	0.09		

NOTE.—The nominal wall thickness of the cast iron is the standard thickness listed in table 10 or table 11, as applicable, of ANSI A21.1 nearest the value obtained under this subparagraph. The nominal wall thickness of ductile iron pipe is the standard thickness listed in table 6 of ANSI A21.50 nearest the value obtained under this subparagraph.

(4) For cast iron pipe, unless the pipe manufacturing process is known, the operator shall assume that the pipe is pit case pipe with a bursting tensile strength of 11,000 p.s.i. and a modulus of rupture of 31,000 p.s.i.

Subpart L—Operations

§ 192.601 Scope.

This subpart prescribes minimum requirements for the operation of pipeline facilities.

§ 192.603 General provisions.

(a) No person may operate a segment of pipeline unless it is operated in accordance with this subpart.

(b) Each operator shall establish a written operating and maintenance plan meeting the requirements of this part and keep records necessary to administer the plan.

§ 192.605 Essentials of operating and maintenance plan.

Each operator shall include the following in its operating and maintenance plan:

(a) Instructions for employees covering operating and maintenance procedures during normal operations and repairs.

(b) Items required to be included by the provisions of Subpart M of this part.

(c) Specific programs relating to facilities presenting the greatest hazard to public safety either in an emergency or because of extraordinary construction or maintenance requirements.

(d) A program for conversion procedures, if conversion of a low-pressure distribution system to a higher pressure is contemplated.

(e) Provision for periodic inspections to ensure that operating pressures are appropriate for the class location.

§ 192.607 Initial determination of class location and confirmation or establishment of maximum allowable operating pressure.

(a) Before April 15, 1971, each operator shall complete a study to determine for each segment of pipeline with a maximum allowable operating pressure that will produce a hoop stress that is more than 40 percent of SMYS—

(1) The present class location of all such pipeline in its system; and

(2) Whether the hoop stress corresponding to the maximum allowable operating pressure for each segment of pipeline is commensurate with the present class location.

(b) If an operator finds that the hoop stress corresponding to the established maximum allowable operating pressure of a segment of pipeline is not commensurate with the present class location and the segment is in satisfactory physical condition, the operator shall confirm or revise the maximum allowable operating pressure of the affected segment of pipeline as required by § 192.611 in accordance with the following schedule:

(1) Before January 1, 1972, the operator shall complete the confirmation or revision of at least 50 percent of the affected pipelines.

(2) Before January 1, 1973, the operator shall complete the confirmation or revision of the remainder of the affected pipelines.

§ 192.609 Change in class location: required study.

Whenever an increase in population density indicates a change in class location for a segment of an existing steel pipeline operating at hoop stress that is more than 40 percent of SMYS, or indicates that the hoop stress corresponding to the established maximum allowable operating pressure for a segment of existing pipeline is not commensurate with the present class location, the operator shall immediately make a study to determine—

(a) The present class location for the segment involved.

(b) The design, construction, and testing procedures followed in the original construction, and a comparison of these procedures with those required for the present class location by the applicable provisions of this part.

(c) The physical condition of the segment to the extent it can be ascertained from available records;.

(d) The operating and maintenance history of the segment;

(e) The maximum actual operating pressure and the corresponding operating hoop stress, taking pressure gradient into account, for the segment of pipeline involved; and

(f) The actual area affected by the population density increase, and physical barriers or other factors which may limit further expansion of the more densely populated area.

§ 192.611 Change in class location: confirmation or revision of maximum allowable operating pressure.

If the hoop stress corresponding to the established maximum allowable operating pressure of a segment of pipeline is not commensurate with the present class location, and the segment is in satisfactory physical condition, the maximum allowable operating pressure of that segment of pipeline must be confirmed or revised as follows:

(a) If the segment involved has been previously tested in place to at least 90 percent of its SMYS for a period of not less than 8 hours, the maximum allowable operating pressure must be confirmed or reduced so that the corresponding hoop stress will not exceed 72 percent of SMYS of the pipe in Class 2 locations, 60 percent of SMYS in Class 3 locations, or 50 percent of SMYS in Class 4 locations.

(b) If the segment involved has not been previously tested in place as described in paragraph (a) of this section, the maximum allowable operating pressure must be reduced so that the corresponding hoop stress is not more than that allowed by this part for new segments of pipelines in the existing class location.

(c) If the segment of pipeline involved has not been qualified for operation under paragraph (a) or (b) of this section, it must be tested in accordance with the applicable requirements of Subpart J of this part, and its maximum allowable operating pressure must then be established so as to be equal to or less than the following:

(1) The maximum allowable operating pressure after the requalification test is 0.8 times the test pressure for Class 2 locations, 0.667 times the test pressure for Class 3 locations, and 0.555 times the test pressure for Class 4 locations.

(2) The maximum allowable operating pressure confirmed or revised in accordance with this section, may not exceed the maximum allowable operating pressure established before the confirmation or revision.

(3) The corresponding hoop stress may not exceed 72 percent of the SMYS of the pipe in Class 2 locations, 60 percent of SMYS in Class 3 locations, or 50 percent of the SMYS in Class 4 locations.

(d) Confirmation or revision of the maximum allowable operating pressure of a segment of pipeline in accordance with this section does not preclude the application of §§ 192.553 and 192.555.

(e) After completing the study required by § 192.609, the operator shall confirm or revise the maximum allowable operating pressure in each segment of pipeline in accordance with this section within 1 year of the date when a change in class location has occurred.

§ 192.613 Continuing surveillance.

(a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.

(b) If a segment of pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, the operator shall initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with § 192.619 (a) and (b).

§ 192.615 Emergency plans.

Each operator shall—

(a) Have written emergency procedures;

(b) Acquaint appropriate operating and maintenance employees with the procedures;

(c) Establish liaison with appropriate public officials, including fire and police officials, with respect to the procedures; and

(d) Establish an educational program to enable customers and the general public to recognize and report a gas emergency to the appropriate officials.

§ 192.617 Investigation of failures.

Each operator shall establish procedures for analyzing accidents and failures, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, for the purpose of determining the causes of the failure and minimizing the possibility of a recurrence.

§ 192.619 Maximum allowable operating pressure: steel or plastic pipelines.

(a) Except as provided in paragraph (c) of this section, no person may operate a segment of steel or plastic pipeline at a pressure that exceeds the lowest of the following:

(1) The design pressure of the weakest element in the segment, determined in accordance with Subparts C and D of this part.

(2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows:

(i) For plastic pipe in all locations, the test pressure is divided by a factor of 1.5.

(ii) For steel pipe, the test pressure is divided by a factor determined in accordance with the following table:

Class location	Factor	
	Segment installed before (Nov. 12, 1970)	Segment installed after (Nov. 11, 1970)
1	1.1	1.1
2	1.25	1.25
3	1.4	1.5
4	1.4	1.5

(3) The highest actual operating pressure to which the segment was subjected during the 5 years preceding July 1, 1970, unless the segment was tested in accordance with paragraph (a)(2) of this section after July 1, 1965, or the segment was uprated in accordance with Subpart K of this part.

(4) For furnace butt welded steel pipe, a pressure equal to 60 percent of the mill test pressure to which the pipe was subjected.

(5) For steel pipe other than furnace butt welded pipe, a pressure equal to 85 percent of the highest test pressure to which the pipe has been subjected, whether by mill test or by the post installation test.

(6) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

(b) No person may operate a segment to which paragraph (a)(6) of this section is applicable, unless over-pressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with § 192.195.

(c) Notwithstanding the other requirements of this section, an operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the 5 years preceding July 1, 1970, subject to the requirements of § 192.611.

§ 192.621 Maximum allowable operating pressure: high-pressure distribution systems.

(a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable:

(1) The design pressure of the weakest element in the segment, determined in accordance with Subparts C and D of this part.

(2) 60 p.s.i.g., for a segment of a distribution system otherwise designed to operate at over 60 p.s.i.g., unless the service lines in the segment are equipped with service regulators or other pressure limiting devices in series that meet the requirements of § 192.197(c).

(3) 25 p.s.i.g. in segments of cast iron pipe in which there are unreinforced bell and spigot joints.

(4) The pressure limits to which a joint could be subjected without the possibility of its parting.

(5) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressures.

(b) No person may operate a segment of pipeline to which paragraph (a)(5) of this section applies, unless overpressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with § 192.195.

§ 192.623 Maximum and minimum allowable operating pressure: low-pressure distribution systems.

(a) No person may operate a low-pressure distribution system at a pressure high enough to make unsafe the operation of any connected and properly adjusted low-pressure gas burning equipment.

(b) No person may operate a low pressure distribution system at a pressure lower than the minimum pressure at which the safe and continuing operation of any connected and properly adjusted low-pressure gas burning equipment can be assured.

§ 192.625 Odorization of gas.

(a) Combustible gases in mains and service lines must be odorized as provided in this section.

(b) The intensity of the odor of combustible gases must be such as to be readily detectable at concentrations of one fifth of the lower explosive limit.

(c) In the concentrations in which it is used, the odorant in combustible gases must comply with the following:

(1) The odorant may not be deleterious to persons, materials, or pipe.

(2) The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

(d) The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.

(e) Equipment for odorization must introduce the odorant without wide variations in the level of odorant.

(f) Each operator shall conduct periodic sampling of combustible gases to assure the proper concentration of odorant in accordance with this section.

§ 192.627 Tapping pipelines under pressure.

Each tap made on a pipeline under pressure must be performed by a crew qualified to make hot taps.

§ 192.629 Purging of pipelines.

(a) When a pipeline is being purged of air by use of gas, the gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.

(b) When a pipeline is being purged of gas by use of air, the air must be released into one end of the line in a moderately rapid and continuous flow. If air cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the air.

Subpart M—Maintenance

§ 192.701 Scope.

This subpart prescribes minimum requirements for maintenance of pipeline facilities.

§ 192.703 General.

(a) No person may operate a segment of pipeline, unless it is maintained in accordance with this subpart.

(b) Each segment of pipeline that becomes unsafe must be replaced, repaired, or removed from service.

(c) Hazardous leaks must be repaired promptly.

§ 192.705 Transmission lines: patrolling.

(a) Each operator shall have a patrol program to observe, at intervals not exceeding 1 year, surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity, and other factors affecting safety and operation.

(b) The frequency of the patrol must be determined by the size of the line, the operating pressures, the class location, terrain, weather, and other relevent factors.

(c) Highway and railroad crossings must be patrolled more often and in greater detail than transmission lines in open country.

§ 192.707 Transmission lines: markers.

Each operator shall install signs or markers wherever necessary to identify the location of a transmission line in order to reduce the possibility of damage or interference.

§ 192.709 Transmission lines: recordkeeping.

Each operator shall keep records covering each leak discovered, repair made, transmission line break, leakage survey, line patrol, and inspection, for as long as the segment of transmission line involved remains in service.

§ 192.711 Transmission lines: general requirements for repair procedures.

(a) Each operator shall take immediate temporary measures to protect the public whenever—

(1) A leak, imperfection, or damage that impairs its serviceability is found in a segment of steel transmission line operating at or above 40 percent of the SMYS; and

(2) It is not feasible to make a permanent repair at the time of discovery.

As soon as feasible, the operator shall make permanent repairs.

(b) Except as provided in § 192.717(c), no operator may use a welded patch as a means of repair.

§ 192.713 Transmission lines: permanent field repair of imperfections and damage.

Each imperfection or damage that impairs the serviceability of a segment of steel transmission line operating at or above 40 percent of SMYS must be repaired, as follows:

(a) If it is feasible to take the segment out of service, the imperfection or damage must be removed by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

(b) If it is not feasible to take the segment out of service, a full encirclement welded split sleeve of appropriate design must be applied over the imperfection or damage.

(c) If the segment is not taken out of service, the operating pressure must be reduced to a safe level during the repair operations.

§ 192.715 Transmission lines: permanent field repair of welds.

Each weld that is unacceptable under § 192.241(c) must be repaired as follows:

(a) If it is feasible to take the segment of transmission line out of service, the weld must be repaired in accordance with the applicable requirements of § 192.245.

(b) A weld may be repaired in accordance with § 192.245 while the segment of transmission line is in service if—

(1) The weld is not leaking;

(2) The pressure in the segment is reduced so that it does not produce a stress that is more than 20 percent of the SMYS of the pipe; and

(3) Grinding of the defective area can be limited so that at least ⅛-inch thickness in the pipe weld remains.

(c) A defective weld which cannot be repaired in accordance with paragraph (a) or (b) of this section must be repaired by installing a full encirclement welded split sleeve of appropriate design.

§ 192.717 Transmission lines: permanent field repair of leaks.

Each permanent field repair of a leak must be made as follows:

(a) If feasible, the segment of transmission line must be taken out of service and repaired by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

(b) If it is not feasible to take the segment of transmission line out of service, it must be repaired by installing a full encirclement welded split sleeve of appropriate design.

(c) If the leak is due to a corrosion pit, the repair may be made by installing a properly designed bolt-on leak clamp; or, if the leak is due to a corrosion pit and on pipe of not more than 40,000 p.s.i. SMYS, the repair may be made by fillet welding over the pited area a steel plate patch with rounded corners, of the same or greater thickness than the pipe, and not more than one-half the diameter of the pipe in size.

§ 192.719 Transmission lines: testing of repairs.

(a) *Testing of replacement pipe.* (1) If a segment of transmission line is repaired by cutting out the damaged portion of the pipe as a cylinder, the replacement pipe must be tested to the pressure required for a new line installed in the same location.

(2) The test required by subparagraph (1) of this paragraph may be made on the pipe before it is installed, but all field girth butt welds that are not strength tested must be tested after installation by nondestructive tests meeting the requirements of § 192.243.

(b) *Testing of repairs made by welding.* Each repair made by welding in accordance with §§ 192.713, 192.715, and 192.717 must be examined in accordance with § 192.241.

§ 192.721 Distribution systems: patrolling.

(a) The frequency of patroling mains must be determined by the severity of the conditions which could cause failure or leakage, and the consequent hazards to public safety.

(b) Mains in places or on structures where anticipated physical movement or external loading could cause failure or leakage must be patroled at intervals not exceeding 3 months.

§ 192.723 Distribution systems: leakage surveys and procedures.

(a) Each operator of a distribution system shall provide for periodic leakage surveys in its operating and maintenance plan.

(b) The type and scope of the leakage control program must be determined by the nature of the operations and the local conditions, but it must meet the following minimum requirements:

(1) A gas detector survey must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 1 year.

(2) Leakage surveys of the distribution system outside of the principal business areas must be made as frequently as necessary, but at intervals not exceeding 5 years.

§ 192.725 Test requirements for reinstating service lines.

(a) Except as provided in paragraph (b) of this section, each disconnected service line must be tested in the same manner as a new service line, before being reinstated.

(b) Each service line temporarily disconnected from the main must be tested from the point of disconnection to the service line valve in the same manner as a new service line, before reconnecting. However, if provisions are made to maintain continuous service, such as by installation of a bypass, any part of the original service line used to maintain continuous service need not be tested.

§ 192.727 Abandonment or inactivation of facilities.

Each operator shall provide for abandonment or inactivation of facilities in its operating and maintenance plan, including the following provisions:

(a) Each facility abandoned in place, or, except when undergoing maintenance, each line not subject to gas pressure, must be disconnected from all sources and supplies of gas, purged of gas, and the ends sealed; however, the line need not be purged when the volume of gas is so small that there is no potential hazard.

(b) If air is used for purging, the operator shall ensure that a combustible mixture is not present after purging.

(c) Each abandoned vault must be filled with a suitable compacted material.

§ 192.729 Compressor stations: procedures for gas compressor units.

Each operator shall establish starting, operating, and shutdown procedures for gas compressor units.

§ 192.731 Compressor stations: inspection and testing of relief devices.

(a) Except for rupture discs, each pressure relieving device in a compressor station must be inspected and tested in accordance with §§ 192.739 and 192.743, and must be operated periodically to determine that it opens at the correct set pressure.

(b) Any defective or inadequate equipment found must be promptly repaired or replaced.

(c) Each remote control shutdown device must be inspected and tested, at intervals not to exceed 1 year, to determine that it functions properly.

§ 192.733 Compressor stations: isolation of equipment for maintenance or alterations.

Each operator shall establish procedures for maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service.

§ 192.735 Compressor stations: storage of combustible materials.

(a) Flammable or combustible materials in quantities beyond those required for everyday use, or other than those normally used in compressor buildings, must be stored a safe distance from the compressor building.

(b) Aboveground oil or gasoline storage tanks must be protected in accordance with National Fire Protection Association Standard No. 30.

§ 192.737 Pipe-type and bottle-type holders: plan for inspection and testing.

Each operator having a pipe-type or bottle-type holder shall establish a plan for the systematic, routine inspection and testing of these facilities, including the following:

(a) Provision must be made for detecting external corrosion before the strength of the container has been impaired.

(b) Periodic sampling and testing of gas in storage must be made to determine the dew point of vapors contained in the stored gas, that if condensed, might cause internal corrosion or interfere with the safe operation of the storage plant.

(c) The pressure control and pressure limiting equipment must be inspected and tested periodically to determine that it is in a safe operating condition and has adequate capacity.

§ 192.739 Pressure limiting and regulating stations: inspection and testing.

Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected, at intervals not exceeding 1 year, to inspections and tests to determine that it is—

(a) In good mechanical condition;

(b) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;

(c) Set to function at the correct pressure; and

(d) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

§ 192.741 Pressure limiting and regulating stations: telemetering or recording gages.

(a) Each distribution system supplied by more than one district pressure regulating station must be equipped with telemetering or recording pressure gages to indicate the gas pressure in the district.

(b) On distribution systems supplied by a single district pressure regulating station, the operator shall determine the necessity of installing telemetering or recording gages in the district, taking into consideration the number of customers supplied, the operating pressures, the capacity of the installation, and other operating conditions.

(c) If there are indications of abnormally high- or low-pressure, the regulator and the auxiliary equipment must be inspected and the necessary measures employed to correct any unsatisfactory operating conditions.

§ 192.743 Pressure limiting and regulating stations: testing of relief devices.

(a) If feasible, pressure relief devices (except rupture discs) must be tested in place, at intervals not exceeding 1 year, to determine that they have enough capacity to limit the pressure on the facilities to which they are connected to the desired maximum pressure.

(b) If a test is not feasible, review and calculation of the required capacity of the relieving device at each station must be made, at intervals not exceeding one year, and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it works.

(c) If the relieving device is of insufficient capacity, a new or additional device must be installed to provide the additional capacity required.

§ 192.745 Valve maintenance: transmission lines.

Each transmission line valve that might be required during any emergency must be inspected and partially operated, at intervals not exceeding 1 year.

§ 192.747 Valve maintenance: distribution systems.

Each valve, the use of which may be necessary for the safe operation of a distribution system, must be checked and serviced, at intervals not exceeding 1 year.

§ 192.749 Vault maintenance.

(a) Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet or more, must be inspected, at intervals not exceeding 1 year, to determine that it is in good physical condition and adequately ventilated.

(b) If gas is found in the vault, the equipment in the vault must be inspected for leaks, and any leaks found must be repaired.

(c) The ventilating equipment must also be inspected to determine that it is functioning properly.

(d) Each vault cover must be inspected to assure that it does not present a hazard to public safety.

§ 192.751 Prevention of accidental ignition.

Each operator shall take steps to minimize the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion, including the following:

(a) When a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.

(b) Gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work.

(c) Post warning signs, where appropriate.

§ 192.753 Caulked bell and spigot joints.

(a) Each cast iron caulked bell and spigot joint that is subject to pressures of 25 p.s.i.g. or more must be sealed with mechanical leak clamps.

(b) Each cast iron caulked bell and spigot joint that is subject to pressures of less than 25 p.s.i.g. and is exposed for any reason, must be sealed by a means other than caulking.

APPENDIX A—INCORPORATED BY REFERENCE

I. List of organizations and addresses.

A. American National Standards Institute (ANSI), 1430 Broadway, New York, N.Y. 10018 (formerly the United States of American Standards Institute (USASI)). All current standards issued by USASI and ASA have been redesignated as American National Standards and continued in effect.

B. American Petroleum Institute (API), 1271 Avenue of the Americas, New York, N.Y. 10020 or 300 Corrigan Tower Building, Dallas, Tex. 75201.

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

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

E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 1815 North Fort Myer Drive, Room 913, Arlington, Va. 22209.

F. National Fire Protection Association (NFPA), 60 Batterymarch Street, Boston, Mass. 02110.

II. Documents incorporated by reference.

A. American Petroleum Institute:

1. API Standard 5L "API Specification for Line Pipe" (1970 edition).

2. API Standard 5LS "API Specification for Spiral-Weld Line Pipe" (1970 edition).

3. API Standard 5LX "API Specification for High-Test Line Pipe" (1970 edition).

4. API Recommended Practice 5LI entitled "API Recommended Practice for Railroad Transportation of Line Pipe" (1967 edition).

5. API Standard 5A "API Specification for Casing, Tubing, and Drill Pipe" (1968 edition).

6. API Standard 6D "Specification for Pipeline Valves" (1968 edition).

7. API Standard 1104 "Standard for Welding Pipe Line and Related Facilities" (1968 edition).

B. The American Society for Testing and Materials:

1. ASTM Specification A53 "Standard Specification for Welded and Seamless Steel Pipe" (A53–68).

2. ASTM Specification A72 "Standard Specification for Welded Wrought-Iron Pipe" (A72–68).

3. ASTM Specification A106 "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (A106–68).

4. ASTM Specification A134 "Standard Specification for Electric-Fusion (ARC)-Welded Steel Plate Pipe, Sizes 16 in. and Over" (A134–68).

5. ASTM Specification A135 "Standard Specification for Electric-Resistance-Welded Steel Pipe" (A135–68).

6. ASTM Specification A139 "Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (Sizes 4 in. and over)" (A139–68).

7. ASTM Specification A155 "Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service" (A155–68).

7a. ASTM Specification 211 "Standard Specification for Spiral Welded Steel or Iron Pipe" (A211–68).

8. ASTM Specification A333 "Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service" (A333–67).

9. ASTM Specification A377 "Standard Specification for Cast Iron and Ductile Iron Pressure Pipe" (A377–66).

10. ASTM Specification A381 "Standard Specification for Metal-Arc-Welded Steel Pipe for High-Pressure Transmission Service" (A381–68).

10a. ASTM Specification A539 "Standard Specification for Electric-Resistance Welded Coiled Steel Tubing for Gas and Fuel Oil Lines" (A539–65).

11. ASTM Specification B42 "Standard Specification for Seamless Copper Pipe, Standard Sizes" (B42–66).

12. ASTM Specification B68 "Standard Specification for Seamless Copper Tube, Bright Annealed" (B68–68).

13. ASTM Specification B75 "Standard Specification for Seamless Copper Tube" (75–68).
14. ASTM Specification B88 "Standard Specification for Seamless Copper Water Tube" (B88–66).
15. ASTM Specification B251 "Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube" (B251–68).
16. ASTM Specification D2513 "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings" (D2513–68).
17. ASTM Specification D2517 "Standard Specification for Reinforced Thermosetting Plastic Gas Pressure Piping and Fittings" (D2517–67).
18. ASTM Specification A372 "Standard Specification for Carbon and Alloy Steel Forgings for Pressure Vessel Shells" (A372–67).

C. The American National Standards Institute, Inc.:

1. ANSI A21.1 "Thickness Design of Cast-Iron Pipe" (A21.1–1967).
2. ANSI A21.3 "Specifications for Cast Iron Pit Cast Pipe for Gas" (A21.3–1953).
3. ANSI A21.7 "Cast-Iron Pipe Centrifugally Cast in Metal Molds for Gas" (A21.7–1962).
4. ANSI A21.9 is titled "Cast-Iron Pipe Centrifugally Cast in Sand-Lined Molds for Gas" (A21.9–1962).
5. ANSI A21.11 "Rubber Gasket Joints for Cast-Iron Pressure Pipe and Fittings" (A21.11–1964).
6. ANSI 21.50 "Thickness Design of Ductile-Iron Pipe" (A21.50–1965).
6a. ANSI A21.52 "Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Gas" (A21.52–1965).
7. ANSI B16.1 "Cast Iron Pipe Flanges and Flanged Fittings" (B16.1–1967).
8. ANSI B16.5 "Steel Pipe Flanges and Flanged Fittings" (B16.5–1968).
9. ANSI B16.24 "Bronze Flanges and Flanged Fittings" (B16.24–1962).
10. ANSI B36.10 "Wrought-Steel and Wrought-Iron Pipe" (B36.10–1959).
11. ANSI C1 "National Electrical Code, 1968" (C1–1968).

D. The American Society of Mechanical Engineers:

1. ASME Boiler and Pressure Vessel Code, section VIII is titled "Pressure Vessels, Division 1" (1968 edition).
2. ASME Boiler and Pressure Vessel Code, section IX is titled "Welding Qualifications" (1968 edition).

E. Manufacturer's Standardization Society of the Valve and Fittings Industry:

1. MSS SP–25 "Standard Marking System for Valves, Fittings, Flanges, and Union" (1964 edition).
2. MSS SP–44 "Steel Pipe Line Flanges" (1955 edition).
3. MSS SP–52 "Cast Iron Pipe Line Valves" (1957 edition).

F. National Fire Protection Association:

1. NFPA Standard 30 "Flammable and Combustible Liquids Code" (1969 edition).
2. NFPA Standard 58 "Storage and Handling, Liquefied Petroleum Gases" (1969 edition).
3. NFPA Standard 59 "LP Gases at Utility Gas Plants" (1968 edition).

Appendix B—Qualification of Pipe

I. *Listed Pipe Specifications.*

API 5 L—Steel and iron pipe (1970).
API 5 LS—Steel pipe (1970).
API 5 LX—Steel pipe (1970).
ASTM A 53—Steel pipe (1968).
ASTM A 106—Steel pipe (1968).
ASTM A 134—Steel pipe (1968).
ASTM A 135—Steel pipe (1968).
ASTM A 139—Steel pipe (1968).
ASTM A 155—Steel pipe (1968).
ASTM A 211—Steel and iron pipe (1968).
ASTM A 333—Steel pipe (1967).
ASTM A 377—Cast iron pipe (1966).
ASTM A 381—Steel pipe (1968).
ASTM A 539—Steel tubing (1965).
ANSI A 21.3—Cast iron pipe (1953).
ANSI A 21.7—Cast iron pipe (1962).
ANSI A 21.9—Cast iron pipe (1962).
ANSI A 21.52—Ductile iron pipe (1965).
ASTM A 72—Wrought iron pipe (1968).
ASTM B 42—Copper pipe (1966).
ASTM B 68—Copper tubing (1968).
ASTM B 75—Copper tubing (1968).
ASTM B 88—Copper tubing (1966).
ASTM B 251—Copper pipe and tubing (1968).
ASTM D 2513—Thermoplastic pipe and tubing (1968).
ASTM D 2517—Thermosetting plastic pipe and tubing (1967).

II. *Steel pipe of unknown or unlisted specification.*

A. *Bending Properties.* For pipe 2 inches or less in diameter, a length of pipe must be cold bent through at least 90 degrees around a cylindrical mandrel that has a diameter 12 times the diameter of the pipe, without developing cracks at any portion and without opening the longitudinal weld.

For pipe more than 2 inches in diameter, the pipe must meet the requirements of the flattening tests set forth in ASTM A53, except that the number of tests must be at least equal to the minimum required in paragraph II–D of this appendix to determine yield strength.

B. *Weldability.* A girth weld must be made in the pipe by a welder who is qualified under Subpart E of this part. The weld must be made under the most severe conditions under which welding will be allowed in the field and by means of the same procedure that will be used in the field. On pipe more than 4 inches in diameter, at least one test weld must be made for each 100 lengths of pipe. On pipe 4 inches or less in diameter, at least one test weld must be made for each 400 lengths of pipe. The weld must be tested in accordance with API Standard 1104. If the requirements of API Standard 1104 cannot be met, weldability may be established by making chemical tests for carbon and manganese, and proceeding in accordance with section IX of the ASME Boiler and Pressure Vessel Code. The same number of chemical tests must be made as are required for testing a girth weld.

C. *Inspection.* The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and there are no defects which might impair the strength or tightness of the pipe.

D. *Tensile Properties.* If the tensile properties of the pipe are not known, the minimum yield strength may be taken as 24,000 p.s.i.g. or less, or the tensile properties may be established by performing tensile tests as set forth in API Standard 5LX. All test specimens shall be selected at random and the following number of tests must be performed:

Number of Tensile Tests—All Sizes

10 lengths or less	1 set of tests for each length.
11 to 100 lengths	1 set of tests for each 5 lengths, but not less than 10 tests.
Over 100 lengths	1 set of tests for each 10 lengths, but not less than 20 tests.

If the yield-tensile ratio, based on the properties determined by these tests, exceeds 0.85, the pipe may be used only as provided in § 192.55(c).

Appendix C—Qualification for Welders of Low Stress Level Pipe

I. *Basic test.* The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The beveling, root opening, and other details must conform to the specifications of the procedure under which the welder is being qualified. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than ⅛-inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered.

II. *Additional tests for welders of service line connections to mains.* A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The weld is unacceptable if it shows a serious undercutting or if it has rolled edges. The weld is tested by attempting to break the fitting off the run pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and run pipe.

III. *Periodic tests for welders of small service lines.* Two samples of the welder's work, each about 8 inches long with the weld located approximately in the center, are cut from steel service line and tested as follows:

(1) One sample is centered in a guided bend testing machine and bent to the contour of the die for a distance of 2 inches on each side of the weld. If the sample shows any breaks or cracks after removal from the bending machine, it is unacceptable.

(2) The ends of the second sample are flattened and the entire joint subjected to a tensile strength test. If failure occurs adjacent to or in the weld metal, the weld is unacceptable. If a tensile strength testing machine is not available, this sample must also pass the bending test prescribed in subparagraph (1) of this paragraph.

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