

5.0 DEFINITIONS

The following definitions shall apply to this Standard:

- 5.1 STRESS is the magnitude of the internal forces that act to change in size or shape, a body acted on by external forces.
- 5.2 OPERATING STRESS is the stress in a pipe or structural member under normal operating conditions.
- 5.3 HOOP STRESS is the stress in a pipe wall, acting circumferentially in a plane perpendicular to the longitudinal axis of the pipe and produced by the pressure of the fluid in the pipe.
- 5.4 DESIGN PRESSURE¹ is the maximum operating pressure permitted by G.O. 112 as determined by the design procedures applicable to the pipe size, wall thickness, material, and location involved.
- 5.5 MAXIMUM ALLOWABLE OPERATING PRESSURE¹ (MAOP) is the maximum pressure at which a gas pipeline segment may be operated in accordance with the provisions of G.O. 112.
- 5.6 MAXIMUM OPERATING PRESSURE¹ (MOP) is the maximum pressure at which a system may be operated as specified by the Manager of Gas System Design Department.
- 5.7 TEST MEDIUM is a substance such as water, air, or gas used to exert an internal pressure to leak or strength test a facility.
- 5.8 TEST PRESSURE is the internal fluid pressure specified for testing.
- 5.9 STRENGTH TEST is a pressure test to prove the mechanical strength of the system.
- 5.10 LEAK TEST is a pressure test to determine the tightness of the system.
- 5.11 CLASS LOCATION is a geographic area as classified and described in G.O. 112, §192.5, and Standard Practice 460-1.
- 5.12 DESIGN FACTOR is the percentage of SMYS to which operating stress must be limited, as further described in G.O. 112, §192.111.
- 5.13 SPECIFIED MINIMUM YIELD STRENGTH (SMYS) is the minimum yield strength prescribed by the specification under which the pipe is manufactured and qualified to be sold.

¹Standard Practice 463-8 gives a complete description of these terms and their application. (S.P. 463-8 is included in the "Engineers Estimators Manual.")

DESIGN AND TEST REQUIREMENTS GAS STANDARD - PIPING - DATA SHEET	PG&E CO.	DRAWING NUMBER	REV.
	SHEET 2 OF 8 SHEETS	087950	3
		MICROFILM	

DESIGN CRITERIA

6.0 DESIGN

6.1 The design criteria stamp must appear on drawings for all facilities where strength testing is required.

6.2 When determining design requirements to establish the MAOP, consideration shall be given to:

6.2.1 Future development of the area.

6.2.2 Current and future gas supply pressures.

6.2.3. Probability of increase in supply pressure.

6.3 The design formula for steel pipe is given below:

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

where: P = design pressure, psig
 S = specified minimum yield strength, psi
 D = nominal outside diameter, inches
 t = nominal wall thickness, inches
 F = design factor determined in accordance with §192.111 of G.O. 112
 E = longitudinal joint factor determined in accordance with §192.113 of G.O. 112
 T = temperature derating factor determined in accordance with §192.115 of G.O. 112

***6.4 Initial Construction**

The design of all new gas facilities and any subsequent additions or alterations to existing facilities shall meet the expected future Class location and at least the planned future MAOP requirements of the pipeline. Use approved pipe shown in Appendices B, C, D, E, F, and G.

6.5 Drawings for facilities to be constructed with steel pipe other than that shown in Appendices B, C, D, E, and F shall be submitted to the Gas System Design Department for approval.

6.6 Pressure ratings for fittings, valves, and other piping components shall be equal to or greater than the design pressure established for the piping system.

7.0 INSPECTION

7.1 Welds must be inspected as required by Standard D-40.

* Revised paragraph

LOCATION CLASS _____
 DESIGN FACTOR _____
 D.P. _____ % SMYS _____
 MAOP _____ % SMYS _____
 STRENGTH TEST PRESSURE
 MAX. _____ PSIG _____ % SMYS
 MIN. _____ PSIG _____ % SMYS
 _____ PSIG = 90% SMYS
 TEST FLUID _____
 PIPE SPEC _____
 O.D. _____
 W.T. _____
 WELD INSPECTION (GAS STD. D-40)
 VISUAL
 RADIOGRAPHIC
 20% MIN.
 100%

DESIGN AND TEST REQUIREMENTS GAS STANDARD - PIPING - DATA SHEET	PG & E CO.	DRAWING NUMBER	REV.
	SHEET 3 OF 8 SHEETS	087950	3

7.2 Trench, pipe and pipe coating must be inspected as required by Standard A-36.

8.0 TESTING

8.1 All new, replaced, or reconnected pipelines and facilities transporting natural gas must be tested in accordance with the requirements in this standard. Except as noted in Paragraphs 8.5 and 8.6, the test shall be conducted after the pipeline and/or facilities have been installed.

8.2 The test medium shall be one permitted for the design pressure and Class location as specified in Appendix A. Factors to be considered in the choice of test media, as shown in the table of test requirements (Appendix A) shall include safety, availability, and economy.

8.3 Test pressure shall not be less than that required by Appendix A to test the tightness and strength of a system. All lines shall be tested in accordance with Appendix A.

*8.4 All pipelines 6" and larger, which are designed to operate at more than 40% of SMYS, are to be tested to a minimum of 90% of SMYS, and as close to 100% of SMYS as practical (tests of ERW pipe should be limited to a maximum of 95% of SMYS). This will permit them to continue to operate at the established MAOP should a class location change occur. However, a test to 90% of SMYS is not to be used as an alternative to designing a pipeline to meet a higher class location which may reasonably be anticipated to occur in the future.

**8.5 For pipelines 6" and larger, which are designed to operate at over 20% of SMYS, up to 40% of SMYS; consideration should be given to a test to a minimum of 90% of SMYS. Testing to this pressure will provide additional assurance of the integrity of the line, and will minimize the possibility of a failure due to stress resulting from soil settlement or other environmental effects. The decision to conduct a test to the higher pressure should be based on engineering judgment, considering the importance of the line to meet system demand, and any potential environmental effects on the line, such as might be caused by intense development, or heavy construction near the line.

8.6 For fabricated units and short sections of pipe, that will operate at 30% or more of SMYS, 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 four hours. This includes short sections of pipe and fabricated units used to replace a damaged section of pipeline. A one hour preinstallation test is required for pipe that will operate at less than 30% of SMYS and above 100 psig. For pipe that will operate at 100 psig or less, a leak test is required.

8.7 Pipe held for emergency use must be tested for a minimum of four hours. A test to 90% of SMYS is recommended.

*Revised paragraph

**New paragraph

DESIGN AND TEST REQUIREMENTS
GAS STANDARD - PIPING - DATA SHEET

PG & E CO.

SHEET 4 OF 8 SHEETS

DRAWING NUMBER REV.

087950

3

8.8 Girth welds used to tie-in fabricated units and short sections of pipe shall be inspected as required by Gas Standard D-40.

8.9 Testing of Facilities Damaged by Construction Work

8.9.1 All facilities known or suspected to have been struck during excavation or construction activities must be checked to assure their safety if they are to remain in service.

8.9.1.1 Transmission and Distribution Lines

The inspection, repair, and testing required for a damaged transmission or distribution line will depend on the extent of the damage and other conditions, which can best be determined by the responsible Supervisor in the field. However, adequate steps must be taken either by testing or leak survey to insure that no leakage is present.

- a. Repairs to damaged steel transmission or distribution lines shall be made in accordance with Standard A-65.
- b. Repairs to damaged plastic mains shall be made in accordance with Gas Standard A-93.1.
- c. Special attention shall be given to a damaged casing for a plastic insert, to make certain that the damage did not result in a failure in the plastic at another location remote from the point of contact.

8.9.1.2 Service Lines (including service risers)

- a. If a steel, copper, or other metallic service line or the casing for a metallic insert has been broken, bent, pulled, crushed, or otherwise deformed, the service must be tested from tee to riser in accordance with Appendix A.
- b. Steel, copper, or other metallic service lines or casings for metallic inserts that have been hit but not moved or deformed may be leak surveyed with a leak detector as an alternate check. The survey should include the entire length of the service and adjacent areas as appropriate.

*8.9.1.3 See Gas Standard A-93.1 for plastic service lines and plastic inserts. Also, refer to Gas Standard A-93.1 for plastic service risers which may have been exposed to excessive heat.

8.9.1.4 All service risers that have been struck and/or damaged in above ground incidents shall be leak surveyed with a leak detector. The survey shall include the service line adjacent to the customer's building and/or other areas as appropriate.

*Revised paragraph

DESIGN AND TEST REQUIREMENTS
GAS STANDARD - PIPING - DATA SHEET

PG & E CO.
SHEET 5 OF 8 SHEETS

DRAWING NUMBER	REV.
087950	3

9.0 TEST LIMITATIONS ON VALVES

- *9.1 When performing a hydrostatic test on a line, the test pressure to which a valve may be subjected shall not exceed the manufacturer's shell test pressure, as shown in Section F of the Gas Standards. Where the required MAOP of the line cannot be established because of these limitations, an engineering study shall be made to verify that it is safe to subject the valve to the higher pressure during the test. When making this study, consideration shall be given to the pressure to which the valve was tested by the manufacturer, the age and condition of the valve, and the effect of stresses which may be transmitted to the valve by the pipeline.
- 9.2 When performing a test with air or inert gas, or an uprating with natural gas, the pressure to which a valve may be subjected shall be limited to 110% of the maximum working pressure of the valve. Where the required MAOP of the line cannot be established because of this limitation, the matter shall be reviewed with the Gas System Design Department, to determine whether a higher test pressure may be permitted. This limitation shall not apply to the 100 psig air test on a service line.
- 9.3 When a valve is to be subjected to a test pressure which is greater than its maximum working pressure, it shall normally be in the open position. However, in some cases, with prior approval from the Gas System Design Department, closed valves may be subjected to hydrostatic test pressures exceeding their rated working pressure, depending on the type and condition of the valve and with the limitations that the differential pressure must not exceed the working pressure and the test pressure must not exceed the manufacturer's shell test pressure.

10.0 RECORDS

- 10.1 For facilities operating above 100 psig, estimate sketches and design drawings shall contain the following information: pipe, fittings, and valve specifications, design pressure, MAOP, Class location, design factor and strength or leak test information. Where more than one size or type is involved, the required information shall be supplied for each size and type.
- 10.2 For facilities operating at or under 100 psig, test information shall be recorded on the gas service record, the estimate sketch, and work order or other authorized forms.
- 10.3 Estimate Form 62-6251 shall be marked by the person making the estimate to indicate if the pipe is to operate at or over 30% of SMYS and has to be strength tested.

* Revised paragraph

DESIGN AND TEST REQUIREMENTS
GAS STANDARD - PIPING - DATA SHEET

PG & E CO.

SHEET 6 OF 8 SHEETS

DRAWING NUMBER REV.

087950

3

11.0 STRENGTH TEST PRESSURE REPORT

A Strength Test Pressure Report (Form 62-4921) is required for each facility operating above 100 psig (see Appendix A). For instructions on completing the Strength Test Pressure Report, refer to Mains-9 of the Engineers-Estimators Manual.

12.0 TEST CHART

12.1 A chart record shall be made of the pressure test for all lines or systems being uprated and for new or reinstated facilities to operate at or over 30% of SMYS. The procedure for handling the chart, and the minimum information required on the chart is outlined below:

- 12.1.1 The chart must be designed for the recorder on which it is to be used and must have appropriate scale and time lines.
- 12.1.2 The calibration of the recorder must have been checked.
- 12.1.3 The chart must be set on the correct time at the start of the test. The actual time, date, and initials of the person starting the test must be shown on face of the chart at the start of the test.
- 12.1.4 The chart must show a minimum of eight hours (except where a four hour test is permitted in Appendix A). Any discrepancies should be explained.
- 12.1.5 At the end of the test, the actual time, date, and initials of the person removing the chart must be shown on the face of the chart.
- 12.1.6 The section of pipe under test must be identified on the face of the chart, along with the job number.
- 12.1.7 The following additional information is to be shown on the back of the chart:
 - 12.1.7.1 Job number
 - 12.1.7.2 Location of test
 - 12.1.7.3 Test pressure, date, and duration
 - 12.1.7.4 Size, wall thickness, pipe specification, and length of section tested
 - 12.1.7.5 The serial number of the recorder or other means of identification
 - 12.1.7.6 The date the recorder was last calibrated and serial number of the dead weight tester or other reference standard used.

DESIGN AND TEST REQUIREMENTS
GAS STANDARD - PIPING - DATA SHEET

PG & E CO.
SHEET 7 OF 8 SHEETS

DRAWING NUMBER	REV.
087950	3

12.1.8 The above information is to be recorded on the chart at the time of the test. After the test is completed, the supervisor is to review the chart and then sign and date it to verify that it complies with the requirements of this Standard.

12.1.9 The original of the test chart is to be attached to the original of the Strength Test Pressure Report Form 62-4921. A copy of the test chart is to be attached to each copy of the test report. This record is to be retained for the life of the facility.

13.0 TEST RECORDS FOR FACILITIES OPERATING AT OR UNDER 100 PSIG

For each facility operating at or under 100 psig, the test information shall be recorded in a box provided on the work order form or the gas service form. If these documents are not used, the test information shall be recorded on the as-built copy of the construction drawing. The test record shall be retained for the life of the facility.

DESIGN AND TEST REQUIREMENTS
GAS STANDARD - PIPING - DATA SHEET

PG & E CO.
SHEET 8 OF 8 SHEETS

DRAWING NUMBER	REV.
087950	3

TEST REQUIREMENTS FOR PIPELINES, MAINS, SERVICES, INSTRUMENT LINES AND OTHER GAS FACILITIES

DESIGN PRESSURE (D.P.)	30% OR MORE		PRETESTED PIPE FOR EMERGENCY USE (SEE NOTE 7)	UNDER 30% SMYS AND OVER 100 PSIG	100 PSIG OR LESS (INCLUDING LOW PRESSURE)	PLASTIC (SEE NOTE 12)
	PIPELINE (INCLUDING FABRICATED UNITS TESTED IN PLACE)	FABRICATED UNITS, SHORT SECTIONS OF PIPE (SEE NOTE 6)		INCLUDING FABRICATED UNITS AND SHORT SECTIONS OF PIPE		
TYPE OF TEST	STRENGTH	STRENGTH	STRENGTH	LEAK	LEAK	LEAK
TEST MEDIUM	WATER, AIR, INERT GAS, OR GAS (SEE NOTES 1, 2 AND 16)	WATER, AIR, INERT GAS, OR GAS (SEE NOTES 1, 2 AND 16)	WATER	WATER, AIR, INERT GAS, OR GAS (SEE NOTES 1, 2 AND 16)	AIR OR GAS (SEE NOTE 16)	AIR OR GAS (SEE NOTE 16)
MAXIMUM TEST PRESSURE (SEE NOTES 1 AND 2)	100% SMYS OR FACTORY TEST PRESSURE OF FITTING (SEE NOTES 3 AND 5)	100% SMYS OR FACTORY TEST PRESSURE OF FITTING (SEE NOTES 3 AND 5)	100% SMYS	(SEE NOTES 3 AND 14)	110 PSIG	3 X DESIGN PRESSURE
MINIMUM TEST PRESSURE	1.5 X DESIGN PRESSURE (SEE NOTES 4 AND 5)	1.5 X DESIGN PRESSURE (SEE NOTES 4 AND 5)	90% SMYS (RECOMMENDED)	1.5 X DESIGN PRESSURE (SEE NOTE 4)	100 PSIG	100 PSIG OR 1.5 X MAOP WHICHEVER IS GREATER
DURATION OF TEST	8 HOURS MINIMUM (SEE NOTE 17)	4 HOURS MINIMUM (SEE NOTE 17)	4 HOURS MINIMUM	1 HOUR MINIMUM (SEE NOTE 17)	5 MINUTES	5 MINUTES (SEE NOTE 9)
TEST RECORDS REQUIRED (SEE NOTE 15)	FORMS REQUIRED	COMPLETED STRENGTH TEST PRESSURE REPORT	COMPLETED STRENGTH TEST PRESSURE REPORT	COMPLETED STRENGTH TEST PRESSURE REPORT	COMPLETE BOX ON W.O. FORM OR GAS SERVICE RECORD FORM	COMPLETE BOX ON W.O. FORM OR GAS SERVICE RECORD FORM
	TEST CHART	YES (SEE NOTE 11)	YES (SEE NOTE 11)	YES (SEE NOTE 11)	NO (SEE NOTE 13)	NO (SEE NOTE 13)

NOTES:

- (1) MAXIMUM TEST PRESSURE PERMITTED, EXPRESSED AS A PERCENT OF SMYS:

CLASS LOCATION	1	2	3	4
AIR OR INERT GAS (SEE NOTE 10)	80	75	50	40
NATURAL GAS	80	30	30	30
WATER	100	100	100	100
- (2) SAFETY - WHEN TESTING WITH AIR, INERT GAS, OR NATURAL GAS, THE PRESSURE SHALL BE HELD AT ABOUT 100 PSIG AND OBSERVED FOR LEAKAGE BEFORE RAISING TO THE REQUIRED TEST PRESSURE.
- (3) MAXIMUM TEST CAPABILITIES OF FITTINGS SUCH AS VALVES AND ELBOVS MUST BE DETERMINED BEFORE TESTING. (SEE PARAGRAPH 9.0)
- (4) THE MINIMUM TEST PRESSURE SHALL NOT BE LESS THAN 1.5 TIMES THE DESIGN PRESSURE IN CLASS 2, 3 AND 4 LOCATIONS, AND NOT LESS THAN 1.25 TIMES THE DESIGN PRESSURE IN CLASS 1 LOCATION. THE ONLY EXCEPTION IS FOR TRANSMISSION LINES WHERE TESTING TO 1.5 TIMES THE DESIGN PRESSURE CREATES PROBLEMS DUE TO LIMITATIONS IMPOSED BY VALVES (SEE NOTE 3) AND WHERE THE FUTURE MAOP TO BE ESTABLISHED IS BELOW THE DESIGN PRESSURE. THE MINIMUM TEST PRESSURE MAY THEN BE LIMITED TO 1.5 TIMES THE MAOP, WITH THE APPROVAL OF THE GAS SYSTEM DESIGN DEPARTMENT.
- (5) ALL PIPELINES 8" AND LARGER, WHICH ARE DESIGNED TO OPERATE AT MORE THAN 40% OF SMYS, ARE TO BE TESTED TO A MINIMUM OF 90% OF SMYS, AND AS CLOSE TO 100% OF SMYS AS PRACTICAL. (TESTS OF ERW PIPE SHOULD BE LIMITED TO A MAXIMUM OF 95% OF SMYS). IN ADDITION, CONSIDERATION SHOULD BE GIVEN TO TESTING ALL OTHER TRANSMISSION AND DISTRIBUTION LINES 6" AND LARGER, WHICH ARE TO OPERATE AT OVER 20% OF SMYS, TO A MINIMUM OF 90% OF SMYS. A TEST TO THIS PRESSURE PROVIDES ADDITIONAL ASSURANCE OF THE INTEGRITY OF THE LINE, AND WILL MINIMIZE THE POSSIBILITY OF A FAILURE DUE TO STRESS RESULTING FROM SOIL SETTLEMENT OR OTHER ENVIRONMENTAL EFFECTS. THE DECISION TO CONDUCT THE TEST AT THE HIGHER PRESSURE SHOULD BE BASED ON ENGINEERING JUDGEMENT, CONSIDERING THE IMPORTANCE OF THE LINE TO MEET SYSTEM DEMAND, AND THE POTENTIAL ENVIRONMENTAL EFFECTS ON THE LINE SUCH AS DEVELOPMENT, OR HEAVY CONSTRUCTION.
- (6) ALL FACILITIES DESIGNED TO OPERATE AT 30% OR MORE OF SMYS SHALL BE TESTED AS A UNIT FOR A MINIMUM OF EIGHT HOURS AFTER INSTALLATION, EXCEPT FOR FABRICATED UNITS OR SHORT SECTIONS OF REPLACEMENT PIPE FOR WHICH A POST INSTALLATION TEST IS IMPRACTICAL. FABRICATED UNITS, FOR WHICH A POST INSTALLATION TEST IS IMPRACTICAL, SHALL BE TESTED AFTER COMPLETION AND BEFORE INSTALLATION FOR A MINIMUM OF FOUR HOURS. THIS TEST IS REQUIRED EVEN THOUGH PRETESTED PIPE WAS USED TO FABRICATE THE UNIT. SHORT SECTIONS OF REPLACEMENT PIPE SHALL BE TESTED FOR A MINIMUM OF FOUR HOURS PRIOR TO INSTALLATION. FOR GAS STANDARD A-34, THE FOLLOWING DEFINITIONS SHALL APPLY:
 (a) A SHORT SECTION OF PIPE IS DEFINED AS A SINGLE PIECE OF PIPE CONTAINING NO GIRTH WELDS.
 (b) A FABRICATED UNIT IS AN ASSEMBLY OF TWO OR MORE FITTINGS AND/OR PIECES OF PIPE JOINED TOGETHER. WHERE MORE THAN 40 FEET OF PIPE IS INCLUDED IN THE UNIT, THERE SHALL BE A FULL EIGHT HOUR TEST.
- (7) TESTING EMERGENCY PIPE:
 (a) THE "LOCATION CLASS," "DESIGN FACTOR," "PRESENT MAOP OF FACILITY," "MAOP TO BE ESTABLISHED BY THIS TEST," "DESIGN PRESSURE--THIS SECTION (FUTURE DESIGN PRESSURE)," AND "% OF SMYS AT DESIGN PRESSURE" SHOULD NOT BE SPECIFIED ON THE STRENGTH TEST PRESSURE REPORT FOR THE EMERGENCY PIPE SINCE IT IS NOT KNOWN AT THE TIME OF THE TEST WHERE THE PIPE WILL BE INSTALLED.
 (b) IT IS RECOMMENDED THAT ALL EMERGENCY PIPE BE TESTED TO A MINIMUM OF 90% OF SMYS FOR A MINIMUM OF FOUR HOURS.
 (c) THE EMERGENCY PIPE TEST INFORMATION FORM (SEE APPENDIX "H") SHALL BE COMPLETED SUBSEQUENT TO THE STRENGTH TEST AND ATTACHED TO THE STRENGTH TEST PRESSURE REPORT.
 FOR EMERGENCY REPAIRS, SOME EXCEPTIONS TO THE DESIGN AND TEST REQUIREMENTS MAY BE PERMITTED BUT ONLY WITH THE APPROVAL OF THE GAS SYSTEM DESIGN DEPARTMENT.
- (8) TESTING INSTRUMENT LINES:
 ALL INSTRUMENT LINES MADE OF STEEL PIPE AND SUBJECTED DIRECTLY TO MAINLINE GAS PRESSURES SHALL BE TESTED IN ACCORDANCE WITH THE APPLICABLE TEST REQUIREMENTS IN THE ABOVE TABLE. IT IS NOT NECESSARY TO TEST TUBING, BUT ALL FITTINGS AND CONNECTIONS SHOULD BE CHECKED FOR LEAKS AFTER START-UP.
- (9) ALTHOUGH THE TEST DURATION FOR PLASTIC PIPE IS 5 MINUTES, IF THE CONSTRUCTION SCHEDULE PERMITS, IT IS DESIRABLE TO MAINTAIN THE TEST PRESSURE FOR A LONGER PERIOD OF TIME. IF THE PIPE IS NOT GASSED UP ON THE SAME DAY AS THE TEST, IT MUST BE RETESTED BEFORE GASSING UP.
- (10) ALL TESTS TO OVER 50% SMYS SHOULD BE PERFORMED WITH WATER AS THE TEST MEDIUM, UNLESS SUCH A TEST IS IMPRACTICAL. WHERE A HYDROSTATIC TEST IS IMPRACTICAL, AIR OR INERT GAS MAY BE USED, WITH THE LIMITATIONS SHOWN IN NOTE 1. BUILDINGS WITHIN 300' OF THE TEST SECTION MUST BE EVACUATED DURING THE TEST.
- (11) TEST CHARTS MUST BE COMPLETED AND RETAINED AS OUTLINED IN A-34, PARAGRAPH 12.0
- (12) TEMPERATURE OF THERMOPLASTIC MATERIAL MUST NOT BE MORE THAN 100°F DURING THE TEST.
- (13) TABLE INDICATES TEST CHART REQUIREMENTS FOR NEW FACILITIES. TEST CHARTS ARE REQUIRED FOR ALL UPGRADING JOBS REGARDLESS OF THE OPERATING PRESSURE OF THE LINE.
- (14) FOR FACILITIES OPERATING AT UNDER 30% SMYS AND OVER 100 PSIG, THE MAXIMUM TEST PRESSURE IS TO BE DETERMINED BY THE PROJECT ENGINEER. A REASONABLE DIFFERENTIAL BETWEEN MAXIMUM AND MINIMUM TEST PRESSURES SHOULD BE ALLOWED, CONSIDERING ELEVATION DIFFERENTIALS AND THE REQUIREMENTS OF NOTE 3.
- (15) ALL TEST RECORDS MUST BE RETAINED FOR THE LIFE OF THE FACILITY.
- (16) TESTING USING WATER, AIR, OR INERT GAS IS NOT NORMALLY PERMITTED WHERE THE TEST SECTION IS ISOLATED FROM AN OPERATING LINE ONLY BY A CLOSED VALVE, SQUEEZE OFF EQUIPMENT, OR PLUGGING EQUIPMENT, SINCE LEAKAGE MAY OCCUR CREATING AN UNDESIRABLE AND POTENTIALLY HAZARDOUS SITUATION. IF THE TEST MUST BE PERFORMED UNDER THIS CIRCUMSTANCE, PRIOR APPROVAL MUST BE OBTAINED FROM THE GAS SYSTEM DESIGN DEPARTMENT, AND ADDITIONAL PRECAUTIONS MAY BE REQUIRED IN ORDER TO MINIMIZE THE POSSIBILITY OF AN ACCIDENT. FOR TEST LIMITATIONS ON VALVES, SEE PARAGRAPH 9.0.

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APPROVED BY	4	2-25-86	REVISED NOTE 17 & 18(b) ON SHT. 2	RDM	RAB
PAL	JLL	3	11-18-85	ATG	BFO
TET	JWL	2	3-19-84		BFO
WER	EFS	1	2-25-83		KAFL PAL/CJT
	REV	DATE	DESCRIPTION	DWN	CHKD



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SUPV			SUPERSEDED BY		
DSGN			SHEET NO.	1 OF 2 SHEETS	
DWN	CADD/BAL		DRAWING NUMBER	284283	
CHKD			REV	4	
OK		DATE	11-1-82	SCALE	NONE
			MICROFILM		

61-436 REV. 7-78

- (17) WHERE PIPELINES ARE INSTALLED ON STREET OR HIGHWAY BRIDGES UNDER PERMITS FROM GOVERNMENTAL AGENCIES, MORE STRINGENT TESTING MAY BE REQUIRED BY THE AGENCY THAN WOULD BE REQUIRED BY THIS GAS STANDARD. FOR PIPELINES DESIGNED TO OPERATE OVER 200 PSIG AND LOCATED ON CALIFORNIA STATE BRIDGES, THE TEST PRESSURE SHALL BE MAINTAINED FOR A MINIMUM OF 24 HOURS.
- (18) INSTALLATION OF A HOT TAP BRANCH CONNECTION WITH REINFORCEMENT PAD OR SLEEVE:
 - (a) THE BRANCH TO HEADER WELD SHALL BE LEAK TESTED PRIOR TO THE INSTALLATION OF THE REINFORCEMENT PAD OR SLEEVE FOR A MINIMUM OF FIVE MINUTES. THE MINIMUM TEST PRESSURE SHALL BE 100 PSIG.
 - (b) AFTER THE REINFORCEMENT PAD OR SLEEVE IS WELDED IN PLACE AND PRIOR TO TAPPING THE HEADER, THE ASSEMBLY SHALL BE TESTED TO AT LEAST 1.5 TIMES THE MAOP OF THE HEADER. DO NOT TEST MORE THAN 1.8 TIMES THE MAOP OF THE HEADER. THE LIMITATIONS IN NOTE 1 SHALL BE OBSERVED. THE TEST DURATION IS GIVEN IN THE TABLE ABOVE.
- (19) INSTALLATION OF LINE STOPPER FITTINGS:
 - (a) AFTER THE FITTING HAS BEEN COMPLETELY WELDED TO THE HEADER AND PRIOR TO TAPPING THE HEADER, THE FITTING SHALL BE TESTED TO 1.5 TIMES THE MAOP OF THE HEADER.
 - (b) DO NOT TEST MORE THAN 1.8 TIMES THE MAOP OF THE HEADER. THE TEST DURATION IS GIVEN IN THE TABLE ABOVE.

DESIGN AND TEST REQUIREMENTS

PG & E CO.

DRAWING NUMBER

REV.

SHEET 2 OF 2 SHEETS

284283

4

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STEEL PIPE SPECIFICATION

API 5LX GRADE X-42, 6" - 16" ERW, 18" - 42" DSAW, 42,000 SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS							
				CLASS LOCATION:							
				100%	90%	72%	60%	50%	40%	30%	20%
6	6.625	* .156 ⊖	1480	1978	1780	1424	1187	989	791	593	396
		.172	1640	2181	1963	1570	1308	1090	872	654	436
		* .188	1790	2384	2145	1716	1430	1192	953	715	477
8	8.625	* .172 ⊖	1260	1675	1508	1206	1005	838	670	503	335
		.188	1370	1831	1648	1318	1099	915	732	549	366
		.219	1600	2133	1920	1536	1280	1066	853	640	427
10	10.75	.219	1350	1711	1540	1232	1027	856	685	513	342
		.250	1660	1953	1758	1407	1172	977	781	586	391
		* .281	1860	2195	1976	1580	1317	1098	878	659	439
12	12.75	.365	2420	2852	2567	2054	1711	1426	1141	856	570
		.219	1230	1443	1299	1039	866	721	577	433	289
		.250	1400	1647	1482	1186	988	824	659	494	329
16	16.0	.281	1570	1851	1666	1333	1111	926	741	555	370
		.312	1750	2056	1850	1480	1233	1028	822	617	411
		* .250	1120	1313	1181	945	788	656	525	394	263
18	18.0	.281	1250	1475	1328	1062	885	738	590	443	295
		* .375	1670	1969	1772	1418	1181	985	788	591	394
		.250	990	1167	1050	840	700	583	467	350	233
20	20.0	.312	1240	1456	1310	1048	874	728	582	437	291
		.250	940	1050	945	756	630	525	420	315	210
		.281	1060	1180	1062	850	708	590	472	354	236
22	22.0	.312	1180	1310	1179	943	786	655	524	393	262
		.344	1300	1445	1300	1040	867	722	578	433	289
		* .375	1420	1575	1418	1134	945	788	630	473	315
24	24.0	.250	860	955	859	687	573	477	382	286	191
		.312	1070	1191	1072	858	715	596	477	357	238
		.281	790	875	788	630	525	438	350	263	175
26	26.0	.281	890	984	885	708	590	492	393	295	197
		.312	980	1092	983	786	655	546	437	328	218
		.344	1080	1204	1084	867	722	602	482	361	241
30	30.0	* .375	1180	1313	1181	945	788	656	525	394	263
		.281	820	908	817	654	545	454	363	272	182
		.312	910	1008	907	726	605	504	403	302	202
32	32.0	.344	1000	1111	1000	800	667	556	445	333	222
		.406	1020	1137	1023	818	682	568	455	341	227
		.438	1100	1226	1104	883	736	613	491	368	245
34	34.0	.469	1180	1313	1182	946	788	657	525	394	263
		.469	1110	1231	1108	886	739	616	492	369	246
		.500	1180	1313	1181	945	788	656	525	394	263
36	36.0	.562	1330	1475	1328	1062	885	738	590	443	295
		.469	1040	1159	1043	834	695	579	463	348	232
		.500	1110	1235	1112	889	741	618	494	371	247
40	40.0	.562	1250	1388	1250	1000	833	694	555	417	278
		.500	1050	1167	1050	840	700	583	467	350	233
		.562	1180	1311	1180	944	787	656	525	393	262
42	42.0	.625	1310	1458	1313	1050	875	729	583	438	292
		.562	1060	1180	1062	850	708	590	472	354	236
		.625	1180	1313	1181	945	788	656	525	394	263
		.688	1300	1445	1300	1040	867	722	578	433	289
		.562	1010	1124	1012	809	674	562	450	337	225
		.625	1120	1250	1125	900	750	625	500	375	250
		.688	1240	1376	1238	991	826	688	550	413	275

*PIPE NORMALLY IN STOCK AT DECOTO PIPE YARD. FOR CODE NUMBERS SEE GAS STD. A-15

SEE NOTES PAGE 15.

⊖ PIPE IS MINIMUM ALLOWABLE GRADE AND WALL THICKNESS FOR GAS FIELD GATHERING SYSTEMS HAVING AN MAOP OF 800 PSIG OR LESS. REFER TO GAS STD. B-20 FOR THIN WALL FITTINGS SUITABLE FOR WELDING TO THIS PIPE.

Ⓢ IN DESIGN FORMULA FOR STEEL PIPE, 6.0, 112, \$192.105, THESE CORRESPOND TO NOMINAL OUTSIDE DIAMETER (D) AND NOMINAL WALL THICKNESS (t).

1220, 1701820385V, G24 6-6-86 BB

APPROVED BY	8	1-3-78	CHANGED MINIMUM W.T. FOR 6" & 8" GAS FIELD PIPE	HF	MC	KAF	PAL/CJT		
LWH	PAL	12	8-6-86	ADDED 6", .188" W.T. PIPE; REVISED ⊖ NOTE					
WER		11	11-13-85	ADDED 10", .281" W.T. & 16", .375" W.T., BOTH STOCKED AT DECOTO. REVISED PAGE NO.	ATG	BFO	PAL/CJT		
		10	3-15-84	ADDED CODE NO. NOTE TO *		CJT	BFO/PAL		
JAF	CJT	REV	DATE	DESCRIPTION	DWN	CHKD	APVD		
GM	<p style="text-align: center;">PIPING-DATA SHEET STEEL PIPE-API 5LX GRADE X-42 GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>						SUPERSEDES		
SUPV							SUPERSEDED BY		
DSCN							SHEET NO. 2 OF 5 SHEETS		
DWN							CADD/ST	DRAWING NUMBER	REV
CHKD							O K	283253	12
DATE	SCALE	MICROFILM							
10-14-64									



STEEL PIPE SPECIFICATION
API 5L GRADE B, SEAMLESS, 35,000 PSI SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS							
				CLASS LOCATION: 1				2			
				100%	90%	72%	60%	50%	40%	30%	20%
3/4*	1.05	.113	700	7533	6780	5424	4520	3767	3013	2260	1507
1-1/4*	1.66	.140	1300	5904	5313	4251	3542	2952	2361	1771	1181
2*⊖	2.375	.154	2500	4539	4085	3268	2723	2269	1816	1362	908
3*	3.5	.216	2500	4320	3888	3110	2592	2160	1728	1296	864
4*	4.5	.237	2210	3687	3318	2654	2212	1843	1474	1106	737
6*	6.625	.280	1780	2958	2663	2130	1775	1479	1183	888	592
8*	8.625	.322	1570	2613	2352	1881	1568	1307	1045	784	523
10	10.75	.365	1430	2377	2139	1711	1426	1188	951	713	475
12	12.75	.375	1240	2059	1853	1482	1235	1029	824	618	412
16	16.0	.375	980	1641	1477	1181	984	820	656	492	328
20	20.0	.375	790	1313	1181	945	788	656	525	394	263
24	24.0	.375	660	1094	984	788	656	547	438	328	219

STEEL PIPE SPECIFICATION
API 5L GRADE B, ERW, 35,000 PSI SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS							
				CLASS LOCATION: 1				2			
				100%	90%	72%	60%	50%	40%	30%	20%
3*⊖	3.5	.156	1870	3120	2808	2246	1872	1560	1248	936	624
4*⊖	4.5	.156	1460	2427	2184	1747	1456	1213	971	728	485
6	6.625	.219	1390	2314	2083	1666	1388	1157	926	694	463
8	8.625	.219	1070	1777	1600	1280	1066	889	711	533	355
10	10.75	.219	860	1426	1283	1027	856	713	570	428	285
12	12.75	.219	720	1202	1082	866	721	601	481	361	240
14	14.0	.250	750	1250	1125	900	750	625	500	375	250
16	16.0	.250	660	1094	984	788	656	547	438	328	219

STEEL PIPE SPECIFICATION
API 5L GRADE A-25, FURNACE BUTT WELD **, 25,000 PSI SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	(COMPANY'S OPERATING LIMIT FOR A-25 PIPE IS 400 PSIG)	PRESSURE AT 20% OF SYMS
1-1/4*	1.66	.140	1000		>400
2*	2.375	.154	1000		389

* PIPE NORMALLY IN STOCK AT DECOTO PIPE YARD. FOR CODE NUMBERS SEE GAS STD. A-15

** BUTT WELD PIPE HAS .6 JOINT FACTOR. HOWEVER, FOR PIPE SPECIFIED IN TABLE, CALCULATED PRESSURES EXCEED THE 400 PSIG COMPANY LIMIT.

SEE NOTES ON PAGE 14

⊖ PIPE IS MINIMUM ALLOWABLE GRADE AND WALL THICKNESS FOR USE IN GAS FIELD GATHERING SYSTEMS WITH MAOP OF 800 PSIG OR LESS.

Ⓢ IN DESIGN FORMULA FOR STEEL PIPE, G.O. 112, §192.105, THESE CORRESPOND TO NOMINAL OUTSIDE DIAMETER (D) AND NOMINAL WALL THICKNESS (+).

CADD 820364 11/19/82

9	1-20-85	REVISED TABLES						
8	9-17-76	ADDED ⊖		CA	HF	LWH/PAL		
APPROVED BY	7	10-23-75	CHANGED "CONTINUOUS WELD" TO "FURNACE BUTT WELD" FOR CLARITY; ADDED 3" & 4" GR. B ERW	HF	VVP	JLL		
WER	ETS	6	1-29-73	TITLE REVISED, DRAWING REVISION		JLL		
PER	AHY	11	11-20-85	REVISED PAGE No.	JRC	ATG		
JLL	TJB	10	3-15-82	ADDED NOTE TO *				
	REV	DATE	DESCRIPTION	DWN	CHKD	APVD		

GM
SUPV
DSGN
DWN CADD/ST
CHKD
O K
DATE 10-13-64
SCALE

PIPING-DATA SHEET

STEEL PIPE-API 5L GRADES B & A-25

GAS STANDARD
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES
SUPERSEDED BY
SHEET NO. 1 OF 5 SHEETS
DRAWING NUMBER 283253
REV II
MICROFILM

STEEL PIPE SPECIFICATION
API 5LX GRADE X-60, 20" - 42" DSAW, 60,000 SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES) ①	WALL THICKNESS (INCHES) ①	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS									
				CLASS LOCATION:									
				1	2	3	4	100%	90%	72%	60%	50%	40%
20	20.0	.250	1350	1500	1350	1080	900	750	600	450	300		
		.281	1520	1686	1517	1214	1012	843	674	506	337		
		.312	1680	1872	1685	1348	1123	936	749	562	374		
		.375	2020	2250	2025	1620	1350	1125	900	675	450		
22	22.0	.250	1230	1364	1227	982	818	682	545	409	273		
		.281	1400	1560	1404	1123	936	780	624	468	312		
		*.375	1690	1875	1688	1350	1125	938	750	563	375		
		.406	1830	2030	1827	1462	1218	1015	812	609	406		
24	24.0	.250	1120	1250	1125	900	750	625	500	375	250		
		.281	1260	1405	1265	1012	843	703	562	422	281		
		.312	1400	1560	1404	1123	936	780	624	468	312		
		*.375	1690	1875	1688	1350	1125	938	750	563	375		
26	26.0	.281	1170	1297	1167	934	778	648	519	389	259		
		.312	1300	1440	1296	1037	864	720	576	432	288		
		.344	1430	1588	1429	1143	953	794	635	476	318		
		.375	1560	1731	1558	1246	1038	865	692	519	346		
30	30.0	.406	1690	1874	1686	1349	1124	937	750	562	375		
		.375	1350	1500	1350	1080	900	750	600	450	300		
		.406	1460	1624	1462	1169	974	812	650	487	325		
		.438	1580	1752	1577	1261	1051	876	701	526	350		
32	32.0	.375	1270	1406	1266	1013	844	703	563	422	281		
		.406	1370	1523	1370	1096	914	761	609	457	305		
		.438	1480	1643	1478	1183	986	821	657	493	329		
		.406	1290	1433	1290	1032	860	716	573	430	287		
34	34.0	.438	1390	1546	1391	1113	928	773	618	464	309		
		.469	1490	1655	1490	1192	993	828	662	497	331		
		.500	1590	1765	1588	1271	1059	882	706	529	353		
		.406	1220	1353	1218	974	811	677	541	406	271		
36	36.0	.438	1310	1460	1314	1051	876	730	584	438	292		
		.469	1410	1563	1407	1126	937	782	625	469	313		
		.500	1500	1667	1500	1200	1000	833	667	500	333		
		.438	1180	1314	1183	946	788	657	526	394	263		
40	40.0	.469	1270	1407	1266	1013	844	704	563	422	281		
		.500	1350	1500	1350	1080	900	750	600	450	300		
		.469	1210	1340	1206	965	804	670	536	402	268		
		.500	1290	1429	1286	1029	857	714	571	429	286		
42	42.0	.562	1450	1606	1445	1156	963	803	642	482	321		

SEE NOTES PAGE 14.

- ① IN DESIGN FORMULA FOR STEEL PIPE, G.O. 112, §92.105, THESE CORRESPOND TO NOMINAL OUTSIDE DIAMETER (D) AND NOMINAL WALL THICKNESS (t).
- * PIPE NORMALLY IN STOCK AT DECOTO PIPE YARD. FOR CODE NUMBERS, SEE GAS STD. A-15.

CADD 820367 11-04-82

APPROVED BY										
LWH	PAL	3	11-12-85	ADDED * NOTE FOR 24" .375" WT. REVISED PAGE No.		ATG	850			
WER		2	1-20-83	REVISED TABLE						
JAF		1	9-17-76	ADDED ①		CADD	HF	LWH/PAL		
CJT	REV	DATE		DESCRIPTION		DWN	CHKD	APVD		
CM	<p align="center">PIPING-DATA SHEET STEEL PIPE-API 5LX GRADE X-60 GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>								SUPERSEDES	
SUPV									SUPERSEDED BY	
DSGN									SHEET NO. 4 OF 5 SHEETS	
DWN S TONARELLI									DRAWING NUMBER	
CHKD MC									REV	
O K M CALLEJAS	283253		3							
DATE 2-21-73	SCALE		MICROFILM							

61-006 REV. 7-78

STEEL PIPE SPECIFICATION
API 5LX GRADE X-52, 10" - 16" ERW, 18" - 42" DSAW, 52,000 SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS									
				CLASS LOCATION:									
				1	2	3	4	100%	90%	72%	60%	50%	40%
10	10.750	.219	1800	2119	1907	1525	1271	1059	847	636	424		
12	12.750	.219	1520	1786	1608	1286	1072	893	715	536	357		
		.250	1730	2039	1835	1468	1224	1020	816	612	408		
16	16.0	.250	1380	1625	1463	1170	975	813	650	488	325		
		.281	1550	1827	1644	1315	1096	913	731	548	365		
		.312	1720	2028	1825	1460	1217	1014	811	608	406		
18	18.0	.250	1230	1444	1300	1040	867	722	578	433	289		
20	20.0	.250	1170	1300	1170	936	780	650	520	390	260		
		.281	1320	1461	1315	1052	877	731	584	438	292		
		.312	1460	1622	1460	1168	973	811	649	487	324		
		.344	1610	1789	1610	1288	1073	894	716	537	358		
		*.375	1760	1950	1755	1404	1170	975	780	585	390		
		.406	1900	2111	1900	1520	1267	1056	844	633	422		
22	22.0	.250	1060	1260	1064	851	709	591	473	355	236		
24	24.0	.250	980	1083	975	780	650	542	433	325	217		
		.281	1100	1218	1096	877	731	609	487	365	244		
		.312	1220	1352	1217	973	811	676	541	406	270		
		.344	1340	1491	1342	1073	894	745	596	447	298		
		.375	1460	1625	1463	1170	975	813	650	488	325		
		.438	1710	1898	1708	1367	1139	949	759	569	380		
26	26.0	.281	1010	1124	1012	809	674	562	450	337	225		
		.312	1120	1248	1123	899	749	624	499	374	250		
		.344	1240	1376	1238	991	826	688	550	413	275		
		.375	1350	1500	1350	1080	900	750	600	450	300		
30	30.0	.375	1170	1300	1170	936	780	650	520	390	260		
		.406	1270	1407	1267	1013	844	704	563	422	281		
		.438	1370	1518	1367	1093	911	759	607	456	304		
32	32.0	.406	1190	1320	1188	950	792	660	528	396	264		
		.438	1280	1424	1281	1025	854	712	569	427	285		
		.469	1370	1524	1372	1097	915	762	610	457	305		
		.500	1460	1625	1463	1170	975	813	650	488	325		
34	34.0	.438	1210	1340	1206	965	804	670	536	402	268		
		.469	1290	1435	1291	1033	861	717	574	430	287		
		.500	1380	1529	1376	1101	918	765	612	459	306		
36	36.0	.438	1140	1265	1139	911	759	633	506	380	253		
		.469	1220	1355	1219	976	813	677	542	406	271		
		.500	1300	1444	1300	1040	867	722	578	433	289		
40	40.0	.500	1170	1300	1170	936	780	650	520	390	260		
		.562	1320	1461	1315	1052	877	731	584	438	292		
		.625	1460	1625	1463	1170	975	813	650	488	325		
42	42.0	.500	1110	1238	1114	891	743	619	495	371	248		
		.562	1250	1392	1252	1002	835	696	557	417	278		
		.625	1390	1548	1393	1114	929	774	619	464	310		

SEE NOTES PAGE 14.

⊙ IN DESIGN FORMULA FOR STEEL PIPE, G.O. 112, § 192.105, THESE CORRESPOND TO NOMINAL OUTSIDE DIAMETER (D) AND NOMINAL WALL THICKNESS (t).

* PIPE NORMALLY IN STOCK AT DECOTO PIPE YARD. FOR CODE NUMBERS, SEE GAS STD. A-15.

CADD 820366 02/14/83

APPROVED BY												
LWH	PAL	3	11-12-85	ADDED * NOTE FOR 20" .375" W.T.; REVISED PAGE NO.				ATG	BFO			
WER		2	...	REVISED TABLE					KATJ			
JAF		1	9-17-76	ADDED ⊙				CADD	HF	PAL		
	CJT		REV DATE	DESCRIPTION				DWN	CHKD	APVD		
GN	PIPING-DATA SHEET										SUPERSEDES	
SUPY	STEEL PIPE-API 5LX GRADE X-52										SUPERSEDED BY	
DSGN	GAS STANDARD										SHEET NO. 3 OF 5 SHEETS	
DWN	PACIFIC GAS AND ELECTRIC COMPANY										DRAWING NUMBER	
CHKD	SAN FRANCISCO, CALIFORNIA										283253	
O K											REV	
DATE											3	
2-16-73											MICROFILM	

61-424 REV. 7-76



STEEL PIPE SPECIFICATION
API 5LX GRADE X-65, 34" - 42" DSAW, 65,000 SMYS

NOMINAL PIPE SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MILL TEST PRESSURE (PSIG)	PRESSURE AT % OF SMYS							
				CLASS LOCATION:							
				1	2	3	4	5	6	7	8
34	34.0	.375	1290	1434	1290	1032	860	717	574	430	287
		.406	1400	1552	1397	1118	931	776	621	466	310
		.438	1510	1675	1507	1206	1005	837	670	502	335
36	36.0	.406	1320	1466	1320	1056	880	733	586	440	293
		.438	1420	1582	1424	1139	949	791	633	475	316
		.469	1520	1694	1524	1219	1016	847	677	508	339
40	40.0	.500	1620	1806	1625	1300	1083	903	722	542	361
		.438	1280	1424	1281	1025	854	712	569	427	285
		.469	1370	1524	1372	1097	915	762	610	457	305
42	42.0	.500	1460	1625	1463	1170	975	813	650	488	325
		.469	1310	1452	1307	1045	871	726	581	436	290
		.500	1390	1548	1393	1115	929	774	619	464	310
		.562	1570	1740	1566	1252	1044	870	696	522	348

Ⓛ IN DESIGN FORMULA FOR STEEL PIPE, G.O. 112, §192.105, THESE CORRESPOND TO NOMINAL OUTSIDE DIAMETER (D) AND NOMINAL WALL THICKNESS (t).

NOTES:

- THE SYMBOLS AND ABBREVIATIONS USED IN THIS TABLE HAVE THESE MEANINGS:
 ERW-ELECTRIC RESISTANCE WELDED
 DSAW-DOUBLE SUBMERGED ARC WELDED
 SMYS-SPECIFIED MINIMUM YIELD STRENGTH
 20%, 30%,...ETC.- 20%, 30%... OF SPECIFIED MINIMUM YIELD STRENGTH.
- A-25 AND X-42 ARE THE MOST ECONOMICAL CHOICES FOR MOST APPLICATIONS THROUGH 10".
 GRADE B IS NORMALLY USED WHEN SCHEDULE 40 PIPE IS REQUIRED.
 X-52, X-60, AND X-65 BECOME DESIRABLE AS DIAMETERS AND OPERATING PRESSURES INCREASE.
- OTHER COMBINATIONS OF SIZE, GRADE, AND WALL THICKNESS ARE AVAILABLE.
 GAS SYSTEM DESIGN SHOULD BE CONSULTED IF PIPE THAT IS NOT SHOWN IS TO BE USED, OR IF THERE IS A QUESTION AS TO THE MOST ECONOMICAL GRADE AND WALL THICKNESS FOR A PARTICULAR APPLICATION.
- WHEN SPECIFYING PIPE, THE FOLLOWING INFORMATION SHALL BE GIVEN IN SEQUENCE:
 A) OUTSIDE DIAMETER AND WALL THICKNESS.
 B) API SPECIFICATION AND GRADE.
 C) LONGITUDINAL SEAM WELDING PROCESS.
 D) COATING: SPECIFY BARE OR COATED. IF COATED, THE TYPE OF COATING FOR EACH INSTALLATION MUST BE RECORDED IN THE PERMANENT RECORDS. (SEE GAS STD. E-10.)
 E) P.G.&E. CODE NUMBER. REFER TO GAS STD. A-15 OR M & S CODE BOOK.

EXAMPLES:

- 16" O.D. X .250" W.T.
 API 5LX GRADE X-42, ERW, COATED
 CODE NO. 01-0131 } TYPICAL SPECIFICATION FOR ORDERING PIPE
 - 2.375" O.D. X .154" W.T.
 API 5L GRADE A-25, CONTINUOUS WELD,
 EXTRUDED PLASTIC COATING
 CODE NO. 01-1563 } TYPICAL SPECIFICATION FOR PERMANENT RECORDS
 - 4.50" O.D. X .237" W.T.
 API 5L GRADE B, SEAMLESS, BARE
 CODE NO. 01-1693 } TYPICAL BARE PIPE SPECIFICATION FOR EITHER ORDERS OR RECORDS
5. *STANDARD WALL* PIPE (SEE GAS STD. A-10 & A-10.1) IS MINIMUM ALLOWABLE WALL THICKNESS FOR STATIONS AND BRIDGE CROSSINGS. MINIMUM ALLOWABLE WALL THICKNESS FOR SIZES 2" THRU 8" FOR USE IN GATHERING SYSTEMS ARE INDICATED IN APPENDICES B & C OF THIS STANDARD. CONSULT THE GAS SYSTEM DESIGN DEPARTMENT IF FURTHER INFORMATION IS REQUIRED.

CADD 820573 02-15-83

APPROVED BY	4	11-20-85	REVISED PAGE No.	JRC	ATG			
LWH	PAL	3	REVISED TABLE, NOTES 3, 4 & 5		KAT			
WER		2	8-22-75 REVISED NOTE 4 TO REFERENCE STD E-10, ADDED NOTE 5		LWH	PAL		
JAF		1	6-4-74 REVISED NOTE 4		LWH	PAL		
CJT	REV	DATE	DESCRIPTION	DWN	CHKD	APVD		
GM	<p align="center">PIPING-DATA SHEET STEEL PIPE-A.P.I. 5LX GRADE X-65 GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>					SUPERSEDES		
SUPV						SUPERSEDED BY		
DSGN						SHEET NO. 5 OF 5 SHEETS		
DWN						CV HO	DRAWING NUMBER	REV
CHKD						MC	283253	4
O K						M CALLEJAS		
DATE	SCALE							
2-21-73	NONE							
MICROFILM								

81-008 REV. 1-75

APPENDIX "H" EMERGENCY PIPE TEST INFORMATION FORM

THIS FORM IS TO BE COMPLETED SUBSEQUENT TO THE STRENGTH TEST & ATTACHED TO THE STRENGTH TEST PRESSURE REPORT.

PART I: THIS INFORMATION IS AVAILABLE FROM THE COMPLETED STRENGTH TEST PRESSURE REPORT (FORM 62-4921).

LOCATION OF TEST	
DATE OF TEST	
DURATION OF TEST	_____ HRS. _____ MIN.
PIPE SPECIFICATION (O.D. X W.T. X SMYS)	
FOOTAGE TESTED	_____ FT.
TEST PRESSURE	_____ PSIG

PART II: FOR A GIVEN CLASS LOCATION, THIS PIPE MAY BE USED IN PIPELINE FACILITIES HAVING FUTURE DESIGN PRESSURES UP TO & INCLUDING THE PRESSURE CALCULATED IN THE "MAXIMUM PRESSURE" COLUMN.

CLASS LOCATION	DESIGN FACTOR (F)	TEST FACTOR	LIMITED BY DESIGN FACTOR (1) PSIG	LIMITED BY TEST PRESSURE (2) PSIG	ALLOWABLE USE*	
					MAXIMUM PRESSURE PSIG	CLASS LOCATION
1	.72	1.25				1
2	.60	1.50				2
3	.50	1.50				3
4	.40	1.50				4

* WHEN DETERMINING IF THE EMERGENCY PIPE IS QUALIFIED FOR A PARTICULAR GAS FACILITY (THE CLASS LOCATION & DESIGN FACTOR ARE SPECIFIED), THE DESIGN FACTOR OF THE GAS FACILITY MUST BE COMPARED TO THE DESIGN FACTORS LISTED IN THE CHART. FOR CERTAIN TYPES OF GAS FACILITIES, THE DESIGN FACTORS ARE LESS THAN THOSE IN THE CHART. IF THE DESIGN FACTORS ARE DIFFERENT, (1) MUST BE RECALCULATED USING THE CORRECT DESIGN FACTOR, THEN COMPARED TO (2). THE SMALLER OF (1) AND (2) WILL BE THE NEW "MAXIMUM PRESSURE."

$$(1) = \frac{2 \times \text{SMYS (psi)} \times \text{w.t. (inch)}}{\text{O.D. (inch)}} \times F$$

$$(2) = \frac{\text{TEST PRESSURE (FROM PART I)}}{\text{TEST FACTOR}}$$

MAXIMUM PRESSURE = THE SMALLER OF (1) AND (2)

NAME _____ DATE _____

CADD 821490 Q1/07/82

APPROVED BY							
REV	DATE	DESCRIPTION	DWN	CHKD	APVD		
2	11-20-85	REVISED PAGE NO.	JRC	ATG			
1	1-20-85	ISSUED FOR USE		KA42			
GM		PIPING-DATA SHEET				SUPERSEDES	
SUPV		TESTING OF EMERGENCY PIPE				SUPERSEDED BY	
DSGN		GAS STANDARD				SHEET NO. 1 OF 1 SHEETS	
DWN MD STEPHAN		PACIFIC GAS AND ELECTRIC COMPANY				DRAWING NUMBER	
CHKD		SAN FRANCISCO, CALIFORNIA				REV	
O K						284300	
DATE	SCALE					2	
10-25-82	NONE					MICROFILM	

61-4248 REV. 7-78

