

6.0 DESIGN

- 6.1 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 Design Formula for Steel Pipe:

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

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

DESIGN CRITERIA

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%

6.4 Initial Construction

Design all gas facilities to meet the requirements of the expected future Class location.

6.5 Addition to Existing Facilities

The design requirements for subsequent additions or alterations to existing pipeline facilities shall be at least equivalent to the planned future MAOP of the line.

6.6 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.

6.7 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.

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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.

see attached
***8.5*

~~*8.4 All pipelines designed to operate at greater than 40% of SMYS are to be tested to a minimum of 90% of SMYS to permit them to continue operation at the established MAOP should a location class 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 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.~~

~~8.6 Pipe held for emergency use must be tested for a minimum of four hours.~~

~~8.7 A test to 90% of SMYS is recommended.~~

~~8.7 Girth welds used to tie-in fabricated units and short sections of pipe~~

~~8.8 shall be inspected as required by Gas Standard D-40.~~

~~8.8 Testing of Facilities Damaged by Construction Work~~

~~8.9 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

* REVISOR PARAGRAPH
**New paragraph.

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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.

8.1.2 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.

8.1.3 See Gas Standard A-93.1 for plastic service lines and plastic inserts.

8.1.4 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.

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 should normally not exceed the manufacturer's shell test pressure, as shown in Gas Standards F-30 and F-40, or as determined by the Gas System Design Department. 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

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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.

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.

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