PURPOSE:

1. To establish a uniform company policy for designing and testing gas piping systems that will be within the requirements of G.O. 112B of the CPUC.

RESCISSIONS:

2. Supersedes earlier letter and instructions, including:

   a. Letter, April 2, 1962, [redacted] to Division Gas Superintendents, "Marking Estimates for Work on Piping Systems Designed to Operate at Stress Levels over 20% of the Specified Minimum Yield Strength".

   b. Letter, May 4, 1962, [redacted] to Division Gas Superintendents, "Replacement of Pipe in Mains Operating at Stress Levels over 20% of the Specified Minimum Yield Strength".

   c. Letter, March 25, 1936, [redacted] to Division Managers, calling attention to the serious consequences that may result when main or services are damaged.

POLICY AND APPLICATION:

3. Scope - Gas piping systems both new construction and reconstruction.

4. All facilities within the scope of this standard procedure must be designed and tested in accordance with the requirements of General Order 112B.

5. Pipe to meet the design pressure is to be selected from standards established in this standard procedure.

6. All fittings, valves, and other components must satisfy the design requirements established for the design pressure.

7. Strength test and leak test requirements are established.

8. Design and test requirements appear in the following pages of this standard procedure.

RESPONSIBILITIES:



10. The Engineer - When the facility is designed to operate above 100 psi, responsibility lies with the engineer in the office that originates the estimate to:

    a. Mark the need for strength testing on the estimate.
    b. Show the design criteria on drawings accompanying the estimate.
    c. Prepare and forward a "Strength Test Report" to the job foreman.

| CHG. | DATE | DESCRIPTION | APPRD. | CHG. | DATE | DESCRIPTION | APPRD. |
|---|---|---|---|---|---|---|---|
| 2 | 2-69 | SUPERSEDED | [redacted] | | | | |
| 1 | 2-26-68 | Changed D33 to A34 | | | | | |

APPROVED [redacted]

BY

DSGN.

DR.

CH.

O.K.

DATE 11-67 | SCALE —

GAS STANDARD

DESIGN AND TEST REQUIREMENTS FOR GAS PIPING SYSTEMS

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CAL.

SUPERSEDES

SUPERSEDED BY 283621

SHEET NO. 1 OF 5 SHEETS

DRAWING NUMBER 084509 | CHANGE 2

d. Show correct pipe specifications on all copies of the estimate and strength test report.

11. The Job Foreman - Responsibility lies with the job foreman to:

a. Observe the specified testing requirements.
b. Complete the "Strength Test Report" and return it to the appropriate District Gas Superintendent or other personnel.
c. Note leak test information on gas service record, work order or other authorized form for all facilities operating at 100 psi or less.

DEFINITIONS:

12. Stress Level - Stress induced in piping system by the design pressure expressed as a per cent of the Specified Minimum Yield Strength (SMYS).

13. Design Pressure - The pressure selected in the engineering of a facility. It may be:

a. The manufacturer's rating of a component,
b. The maximum permitted by the pipeline design procedures of G.O. 112B, or
c. A lower pressure established by the Company.

14. Test Pressure - The internal fluid pressure specified for testing which shall not be less than that required by G.O. 112B to test the tightness and/or strength of a system.

15. Strength Test - A pressure test to prove the mechanical strength of the system.

16. Leak Test - A pressure test to determine the tightness of the system.

DESIGN:

17. Operating pressures for design purposes should be determined in the light of probable future developments, including:

a. Growth patterns
b. Available gas supply pressures
c. Increases in supply pressures

18. Initial Construction - Design of all gas facilities must meet with the requirements of the highest probable future location class.

19. Additions to Existing Facilities - Subsequent additions or alterations must be designed in accordance with, or better than, the requirements of the initial construction.

20. Test requirements and test fluids are specified in Appendix A.

21. Specifications and ratings of steel pipe that will satisfy the design pressure requirements are shown in Appendix B. All pipelines designed to Type A and B construction shall be submitted for approval to Gas System Design Department. All other requirements of G.O.112B must be observed.

22. Fittings, valves, and other piping components must be carefully selected to satisfy the design pressure requirements established for the piping system.

23. Requests shall be directed to the Manager, Gas System Design Department, 245 Market Street, Room 645, San Francisco, for:

    a. Guidance in design situations not covered by Appendix A, or
    b. Deviations from the design requirements.

TESTING:

24. The test medium must be one permitted for the design pressure (see Appendix A). Factors to be considered in the choice of test medium will include safety, availability, and economy.

25. Short replacements of 40' or less shall be treated as a tie-in and the following shall be observed:

    a. When the design is between 100psi and under 40% SMYS, strength testing is not necessary.

    b. At hoop stress levels--40% of the SMYS and above, the replacement section of pipe shall be subjected to a pressure test. The replacement section of pipe shall be tested to the pressure required for a new pipeline or main installed in the same location. The tests may be made on the pipe prior to use, provided nondestructive tests are made on all girth butt welds after installation.

26. All broken or severely strained services shall be tested after repair in accordance with Appendix A.

RECORDS:

27. Estimate sketches and design drawings:

    a. The essential design considerations listed below shall be noted on the estimate sketch for the facilities as follows:

        1. Location Class_____
        2. Type Construction_____
        3. Design Pressure_____
        4. Stress Level_____
        5. Strength TP Max._____Min._____
        6. Test Fluid_____
        7. M.A.O.P._____
        8. Pipe Specs._____

        _____

        _____

    b. For valves and fittings shown on estimate sketches or design drawings, specify the required pressure rating and refer to the appropriate Gas Standards and Specification sheets to assure correct material selection and construction practices.

28. Reports:

a. Strength test pressure reports shall be made whenever a strength test is required. File one copy with the completed foreman's copy of the estimate. Distribute other copies as indicated on the form.

b. Weld inspection reports. See D-40.

c. The copy of the Strength Test Pressure and Weld Inspection Reports filed with the completed foreman's copy of the estimate shall be retained for the life of the facility.

# Appendix A

## TEST REQUIREMENTS FOR PIPELINES, MAINS, AND SERVICES

| Design Pressure | 20% SMYS or More | Under 20% SMYS & Over 100 Psi | | 100 Psi or Less |
|---|---|---|---|---|
| | | 2" & Larger | 1¼" & Smaller Mains & Serv. | |
| Type of Test | Strength | Strength | Strength | Leak |
| Test Medium | Water, Air, Inert Gas or Gas (1) | Water, Air Inert Gas or Gas (1) | Water, Air, Inert Gas or Gas (1) | Air or Gas |
| Max. Test Pressure (4) | (1) 100% SMYS (6) (2) Factory test press. of fitting (5) | Factory test Press. of Fitting (5) | 1.50 DP | 100 Psi |
| Min. Test Pressure | 1.50 DP (6) | 1.50 DP | 1.50 DP | 100 Psi |
| Duration of Test | 8 hours (2) | 1 hour or until press. has stabilized | (3) | (3) |

Notes: (1) Maximum test pressure percent of SMYS -

| Location Class | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Air or Inert Gas | 79.2 | 75 | 50 | 40 |
| Gas | 79.2 | 30 | 30 | 30 |

(2) Exposed piping 100 feet or shorter may be tested for 1 hour.

(3) Piping in these classifications shall be tested for five minute minimum.

(4) Safety - When testing with air, inert gas, or gas, the pressure shall be held at about 100 psi and observed for leakage before raising to the required test value.

(5) (a) The maximum test pressure on valve in open position equals shell test pressure.
(b) The maximum test pressure on valve in close position equals seat test pressure.

(6) It is the intent to test as close to SMYS as practical. There may be instances, as in Item 5, where pressures shall be limited, but in no case shall it be less than 1.5 DP.