PURPOSE

1. To establish a uniform procedure for designing and testing gas piping systems that will meet the requirements of G.O. 112C §192.101 and §192.501 of the CPUC.

RESCISSION

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. All gas piping systems and facilities both new and reconstructed are to be designed and tested in accordance with the requirements of G.O. 112C. This includes the reinstating of abandoned or temporarily disconnected piping.

RESPONSIBILITY

4. The Supervisor in charge of engineering and installation shall be responsible for design and testing, respectively, of pipe facilities in accordance with this Standard. Other provisions required by G.O.112C of the CPUC shall be observed.

DEFINITIONS

5. The following definitions shall apply to this Standard:
   a. Stress is the resultant internal force that resists change in size or shape of a body acted on by external forces.
   b. Operating stress is the stress in a pipe or structural member under normal operating conditions.
   c. 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.
   * d. Design Pressure is the maximum operating pressure permitted by G.O. 112C as determined by the design procedures applicable to the material and locations involved.
   * e. Maximum Allowable Operating Pressure (MAOP) is the maximum pressure at which a gas system may be operated in accordance with the provisions of G.O. 112C.
   * f. Maximum Operating Pressure (MOP) is the maximum pressure at which a system may be operated as specified by the Manager of G.S.D. Department.
   g. Test Medium is a substance such as water, air, or gas through which a force acts to leak or strength test a facility.
   h. Test Pressure is the internal fluid pressure specified for testing.
   i. Strength Test is a pressure test to prove the mechanical strength of the system.
   j. Leak Test is a pressure test to determine the tightness of the system.
   k. Location Class is a geographic area as classified and described in G.O. 112C §192.5.
   l. Construction Type is a construction specification for pipeline and mains that fixes the stress levels.
   m. Specified Minimum Yield Strength (SMYS) is the minimum yield strength prescribed by the specification under which the pipe is purchased from the manufacturer (psi).

* Standard Practice 463-8 gives a complete description of these terms and their application. (S.P. 463-8 is included in the "ENGINEERS ESTIMATORS MANUAL").

CHG	DATE	DESCRIPTION	BY	CH.	APPD.
3	2-20-74	Added Footnote Concerning M.A.O.P., M.O.P. and Design Pressure.	AC.	A.N.K.	
2	2-17-72	Revised Title For Computer Listing, Also Paragraphs 1, 3, & 5e		M.C.	
1	9-10-70	Revised Par. 5f.			

APPROVED

SUPV. BY	
DSGN.	
DR.	
CH.	
O.K.	
DATE	2-11-69
SCALE	NONE

PIPING — DATA SHEET

DESIGN AND TEST REQUIREMENTS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CALIFORNIA

SUPERSEDES 084509	
SUPERSEDED BY	
SHEET NO. 1 OF 4 SHEETS	
DRAWING NUMBER	CHANGE
283621	3

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DESIGN

6. a. Design criteria stamp must appear on drawings for all facilities where strength testing is required.

   b. When determining MAOP consideration shall be given to:
      i. Future development of the area.
      ii. Current and future Gas Supply Pressures.
      iii. Probability of increase in Supply Pressure.

7. Initial Construction
   Design all gas facilities to meet the requirements of the expected future location class.

8. Addition to Existing Facilities

   The design requirements for subsequent additions or alterations to existing pipeline facilities shall be at least equivalent to that of the original construction, or the expected future M.A.O.P. of the line.

9. Facilities designed for either Location Class 1 and 2 or which deviate from the steel pipe specification (Appendix B,C,D,E and F) shall be submitted to the Gas System Design Department for approval.

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

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. _____

TESTING

11. Welds must be inspected as required by Std. D-31, Section 6.

12. a. The test medium shall be one permitted for the design pressure and location class as specified in Appendix A (pg. 4 of this std). 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.

    b. Test Pressure shall not be less than that required by Appendix A to test the tightness and strength of a system. Except as modified by paragraph 13, all lines shall be tested in accordance with Appendix A.

13. Exceptions:

    Short replacement shall be treated as follows.

    a. Replacement section of pipe shall be subjected to a preinstallation strength test. The section of replacement pipe shall be tested to the pressure required for a new pipeline or main installed in the same location by maintaining the pressure at or above the test pressure for at least four hours. The test may be made on the replacement pipe prior to installation provided all tie-in girth welds are nondestructively tested.

    b. Minimum test duration for pipe to be held for emergency use is four hours. Minimum Test Pressure shall be at least equal to the Test Pressure required for the line in which it is used.

    c. Replacement section of pipe to be operated at less than 30% S.M.Y.S. and over 100 P.S.I.G. shall be given a one hour Preinstallation Leak Test.

14. All steel gas service lines that have been hit, bent, pulled, dented, broken or otherwise damaged, which are to remain in service; shall be leak tested in accordance with Appendix A from tee to riser. The test shall be performed even though a repair was not made to the service. Refer to the Gas Std A 93.1 for plastic service lines.

RECORDS

15. a. For facilities operating above 100 P.S.I., estimate sketches and design drawings shall contain the following information: Where more than one size or type of pipe is involved, the Required Information shall be supplied for each size or type. Where several sizes are involved the Information should be provided in Tabular Form.
    b. Leak Test Information shall be recorded on the gas service record, the estimate sketch, and work order or other authorized form for facilities operating under 100 P.S.I.G.
    c. Estimate Form 62-6251 shall be marked by person making estimate to indicate that the pipe is over 30% yeld and has to be strength tested.

6 Revised section 14 to reference Std A 93.1 for Plastic Services,

CHG	DATE	DESCRIPTION	BY	CH.	APPD.
5	8-21-74	Added Notes 6a and 11; Chgd previous Note 11 to 2a; Revised Note 12a and 12b; Engr. Redrawn.	A.K.	A.N.K.	
4	9-11-73	Revised Par. 14, 8 and 12.	A.C.	A.N.K.	
3	1-22-73	Revised Paragraph 9 and 13; Added Paragraph 14 and 15.	A.N.K.		
2	2-17-72	Revised Title For Computer Listing & Paragraphs 11, 12 & K.		M.C.	
1	9-10-70	Revised Par. 13a			

APPROVED

SUPV. BY
DSGN.
DR. [redacted]
CH
O.K.

DATE 2-11-69
SCALE NONE

PIPING — DATA SHEET

DESIGN AND TEST REQUIREMENTS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

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SHEET NO. 2 OF 4 SHEETS
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CHANGE 5 → 6