1.0 PURPOSE

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

Note: The CPUC G.O. 112 also requires that certain work be reported to them 30 days prior to the start of construction. See Gas Standard A-34.1 for these requirements.

2.0 RESCISSION

Supercedes any previous instructions which are contrary to this Standard.

3.0 POLICY AND APPLICATION

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

4.0 RESPONSIBILITY

4.1 The Engineer responsible for the design of a facility shall specify the test or tests required, in accordance with this standard. For all facilities to operate at more than 100 psig, the Engineer shall prepared a Strength Test Pressure Report (Form 62-4921) for each test required. Part I - Design Data, shall be filled out to included all applicable information. These reports shall accompany the construction drawings to the field.

4.2 The Supervisor responsible for the construction of the facility shall have the responsibility for testing it in accordance with this standard. Prior to testing any facility which is to operate at greater than 100 psig, the Supervisory shall verify that a Strength Test Pressure Report (Form 62-4921), with Part I (Design Data) completely filled out, is available at the job site. The Supervisory shall verify that the pipe specifications and footages are correct before proceeding with the test. Upon completion of the test, the Supervisor is responsible for the completion of Part II - Test Data, of the Strength Test Pressure Report.

4.3 The Engineer and the Construction Supervisory are responsible to see that all other provisions of CPUC General Order 112 (latest edition) which are applicable, shall be followed when designing, constructing and testing a facility.

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Future change

APPROVED BY		REV.	DATE	DESCRIPTION	GM	DWN.	CHKD.	SUPV.	APVD.
BFO	RFD	3		REVISED PAR. 8.2.1.3					
PAL		2	8/20/84	Added Note to Par. 1.0				BFO	
		1	3/19/84	Issued for Use				CJT	BFO/PAL
	CJT								

GM		PIPING - DATA SHEET DESIGN AND TEST REQUIREMENTS GAS STANDARD	B/M
SUPV.			DWG. LIST
DSGN.			SUPSDS 087712
DWN.			SUPSD BY
CHKD.			SHEET NO. 1 of 7 SHEETS
O.K.			REV.
DATE 3/19/84	SCALE None	PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA	087950 2
62-1804 F v 7-75			MICROFILM

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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 PRESSURE[1] 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 PRESSURE[1] (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 PRESSURE[1] (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.

[1] 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.")

Material Redacted GTR0042553

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.

8.8.1.2 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.

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

8.8.1.4 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

Material Redacted GTR0042554

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.

Material Redacted GTR0042555