Draft 8/19/09 WJH

Review notes 10/13/09 YA

Utility Standard S4125

ASSET TYPE:	**Gas Transmission and Distribution Pipelines and Mains**	EFFECTIVE DATE:	**January 2008**
FUNCTION:	**Gas Operations**	PAGE NO.:	**1** OF **11**

TITLE: Maximum Allowable Operating Pressure Requirements for Distribution Systems and Transmission and Gathering Lines

Purpose: This standard specifies requirements for establishing, revising, confirming and documenting the Maximum Allowable Operating Pressure (MAOP), the Maximum Operating Pressure (MOP), and Future Design Pressure (FDP) of transmission, gathering, and distribution pipelines and mains. The requirements of this standard apply to all gas transmission and gas gathering pipelines as well as all distribution system piping.

In addition, this standard also provides requirements for recording and reviewing distribution system pressures to meet the requirements of 49 CFR 192.741.

This standard does not cover requirements for:

- Determining setpoints on overpressure protection devices. See Utility Standard S 4430, *Gas Station and Facility Requirements*, and related Work Procedures for those requirements.
- Recorders used to determine pressure for customers' billing purposes downstream from customer regulators at customer meters.
- The operation of compressor stations.
- Telemetering (except for telemeter charts used to meet the requirements described herein).

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Safety Perform all gas system engineering, design, operations and maintenance safely and in accordance with all applicable safety rules, the *Code of Safe Practices,* and Utility Standard Practice (USP) 22, "Safety and Health Program."

Requirements The requirements for establishing, revising, confirming and documenting MAOPs and MOPs, and FDPs for all of PG&E's pipelines and mains is outlined as follows

DISTRIBUTION

MAOP - Establishing

Low Pressure Distribution Systems

1 For systems or portions of systems installed, replaced or rehabilitated on or after July 1, 1970, the MAOP is established by a test conducted in accordance with the requirements of Gas Standard A-34

2 For systems or portions of systems installed prior to July 1, 1970, the MAOP is established as 150% of the Standard Delivery Pressure (For Standard Delivery Pressure of 7 inches w c , the MAOP is 10-1/2 inches w c)

Semi-High and High Pressure Distribution Systems

1 For systems or portions of systems installed, replaced, or rehabilitated on or after July 1, 1970, the MAOP is established by a test conducted in accordance with the requirements of Gas Standard A-34

2 For systems or portions of systems installed prior to July 1, 1970

a The MAOP is established by the highest operating pressure for the five years ending July 1, 1970, which can be documented (e g , pressure chart, station or foreman's log, dispatcher's order, etc), unless the system was subsequently uprated in accordance with Subpart K of 49 CFR Part 192, or pressure tested after July 1, 1965, in accordance with the requirements of Gas Standard A-34

b If there is no pressure record available to document the operating pressure of a system during the 5 years prior to July 1, 1970, the MAOP may alternatively be established by the documented pressure of the system when the most recent leak survey made in the period between July 1, 1970, and March 1, 1979, demonstrated the system to be safe while operating at the documented pressure (documented pressure at time of survey or before and after survey) If a leak survey was made but there is no record of the pressure at the time of survey (or before and after the survey), the MAOP is established as the pressure of record, if knowledgeable personnel can certify that the pressure at the time of the survey was the same as the pressure of record MAOPs established in this manner must have been verified during the next leak survey

3 If records described in Paragraphs 2 a or 2 b are not available, the MAOP must be established by a test conducted in accordance with the

requirements of Gas Standard A-34

MAOP – Distribution Design Requirements for New or Replaced Lines

Distribution Systems

1 Except as provided in Paragraph 2, new, replaced or rehabilitated mains and services in low-pressure, semi-high, and high pressure distribution systems shall be designed and tested to qualify for a future MAOP of 60 psig

2 Cut, test, and transferred services in low-pressure distribution systems that will remain low-pressure shall be leak tested at 10 psig This includes

a Services which must be extended with new pipe in order to tie into the new main, and

b Repaired services (i e , services with segments that have been repaired or replaced with new pipe)

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MAOP – Revising Distribution

The CPUC shall be notified of a proposed increase in the MAOP in accordance with the requirements of Gas Standard A-34 1 and the steps outlined in WP 4125-01 "Revising Gas System MAOP, MOP, and FDP Designations "

Distribution Systems

If any distribution system requires an MAOP greater than the established MAOP, it must be uprated in accordance with the requirements of Gas Standard A-34 2 or Subpart K, 49 CFR Part 192, as appropriate Any system with an MAOP lower than 60 psig for which uprating is planned should be considered for an MAOP of 60 psig

DISTRIBUTION

MOP - Establishing

The MOP of a gas pipeline system shall be determined by the responsible operating department in accordance with the criteria provided below

Low Pressure Distribution Systems

The MOP of a system shall not exceed the lower of the following

1 A pressure which would cause the unsafe operation of any approved, connected, and properly adjusted low-pressure appliance

2 150% of Standard Delivery Pressure (For a Standard Delivery Pressure of 7 inches w c , the MAOP is 10-1/2 inches w c)

Semi-High and High Pressure Distribution Systems

The MOP of a system shall not exceed the lowest of the following

1 60 psig (25 psig for systems having cast iron pipe with unreinforced bell and spigot joints)

2 The established MAOP

3 The MAOP of any connected system of lower MAOP, unless required regulation and overpressure protection is provided between them

4 A pressure limited by operating conditions, or the condition of the system

TRANSMISSION

MAOP - Establishing

Transmission and Gathering Lines

1 For lines installed, replaced or rehabilitated on or after July 1, 1970, the MAOP is established by a test conducted in accordance with the requirements of Gas Standard A-34

2 For lines installed prior to July 1, 1970, the MAOP is established by the highest actual operating pressure for the five years ending July 1, 1970, which can be documented (e g , pressure chart, station or foreman's log, dispatcher's order, etc), unless the system was subsequently uprated in accordance with Subpart K of 49 CFR Part 192, or pressure tested after July 1, 1965, in accordance with the requirements of Gas Standard A-34

MAOP – Transmission Design Requirements for New or Replaced Lines

Transmission and Gathering Lines

1 New, replaced or rehabilitated sections of line shall be designed and tested in accordance with the requirements of Gas Standard A-34 to

qualify the pipeline to be operated up to the FDP of the system, as listed in the latest version of PG&E Drawing No. 086868.

2. In existing systems where the MAOP is less than the FDP, new additions to that system shall have a design pressure at least equal to the FDP.

MAOP – Revising Transmission

The CPUC shall be notified of a proposed increase in the MAOP in accordance with the requirements of Gas Standard A-34.1 and the steps outlined in WP 4125-01 "Revising Gas System MAOP, MOP, and FDP Designations."

Transmission and Gathering Lines

If any transmission or gathering line requires an MAOP greater than the established MAOP, it must be uprated in accordance with the requirements of Subpart K, 49 CFR Part 192. This requires that the following steps be taken:

1. A written procedure shall be prepared.
2. The pressure increases made in increments.
   a. Checks for leaks after each pressure increase.
   b. Repairs of any hazardous leaks before further increases in pressure.
   c. Limitations on the pressure the pipeline may be increased in accordance with the maximum that would be allowed under §§192.619 and 192.621 for a new segment of pipeline constructed of the same materials in the same location. In addition, if any of the variable necessary to determine the design pressure under the design formula (§192.105) is unknown, the MAOP may be increased as provided in §192.619(a)(1).
3. Records shall retain for the life of the segment a record of each investigation required by this subpart, of all work performed, and of each pressure test conducted, in connection with the uprating.

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TRANSMISSION:

MOP - Establishing

Transmission and Gathering Lines

The MOP shall not exceed the lowest of the following:

1. The lowest established MAOP for any pipe segment in the pipeline

system

2 The MAOP of any connected system of lower MAOP, unless required regulation and overpressure protection is provided between them

3 A pressure limited by operating conditions, or the condition of the system

4 The pressure rating of any valve, fitting, piece of equipment, or facility installed in, or connected to, any pipe segment in the pipeline system

MOP - Revising (Transmission and Gathering Lines Only)

As further detailed in WP 4125-01, "Revising Gas System MAOP, MOP, and FDP Designations," proper notifications of changes in an MOP of a Transmission of Gathering Line shall be made

FDP - Establishing (Transmission and Gathering Lines Only)

1 The department managing gas transmission system planning activities shall establish the FDP for transmission and gathering lines in consultation with the department managing pipeline engineering activities

2 For pipelines with nominal diameters up to 24", the FDP shall be established at 275 psig, 720 psig, or 1440 psig to match ANSI ratings of 150, 300 and 600, respectively The FDP selected will depend on current and projected operating needs and conditions

3 The FDP should be established on a project-specific basis for nominal diameters greater than 24" or for very large jobs where it is more cost effective to optimize the pipe for the job and class location

Annual Update of MOP, MAOP and FDP

1 The departments that manage the gas transmission planning and mapping an operating records shall work together to update PG&E Drawing 086868 annually on or before March 15 of each year

Requirements for Recording Pressures in Distribution Systems

I Permanent Pressure Recorder Requirements

A Provide at least one permanent pressure recorder for each distribution system as outlined below

1 On each principal distribution main leaving a major control facility, such as a compressor station, transmission terminal, load center, holder station, or major district regulator station

2 On each high-pressure or semi-high-pressure distribution system

a) Supplied by two or more district regulator stations

b) Supplied by a single district regulator station where a complete system outage would constitute 500 or more customer-outage hours (Determine customer-outage hours based on estimated average outage time for incidents such as regulator freeze-up, third party damage, etc , from the time of the outage to restoration of service, including response time plus repair time plus relighting time)

c) At the discretion of the Maintenance and Construction (M&C) superintendent, any specific number of customers not to exceed 500 may be used in lieu of the 500 customer-outage hours specified in (b)

3 On low-pressure distribution systems, a minimum of one permanent or portable recorder for each 100 miles (or fraction thereof) of main in each system

4 On other systems or at a location as directed by the superintendent of M&C personnel

B Telemetered pressure records may be used to meet the requirements of Section A provided the charted pressure record meets all other requirements of this standard, including chart retention

II Permanent Pressure Recorder Locations

A When permanent pressure recorders are required, they shall be located at one or more of the following locations

1 The district regulator station outlet

2 Other locations that will provide information to identify any high or low pressure within a distribution system and any unsatisfactory performance of the regulator(s) supply of gas to the system Regardless of where the permanent pressure recorder is located, the pressure at the district regulator must be correlated with the low-pressure point of the system to determine whether over-pressuring or under-pressuring has occurred in the system

III Portable Pressure Recorder Requirements

A Provide a portable pressure recorder on a high-pressure, semi-high-pressure, or low-pressure distribution system as follows, except where existing permanent recorders fulfill the requirements

1 If a low-pressure condition is suspected, a recorder shall be installed to record pressure at the suspected locations during one or more high-load periods

2 As required to establish correlation of pressure between

a) District regulator station outlet pressure and system low-pressure points

b) System low-pressure points and permanent pressure recorders

c) Actual system pressures and network analysis data

3 To provide a record of district regulator performance

4 In other cases as directed by the superintendent of M&C personnel

B Provide portable pressure recorders on low-pressure systems during six months of the peak season to make at least one 24-hour recording each week for each 100 miles (or fraction thereof) of main in each system Pressure shall be measured at the outlet of customers' meters at selected locations A 24-hour segment of a seven-day pressure recording is acceptable

Note 50% of these pressure recordings may be waived in lieu of an equal number of 24-hour pressure recordings from permanent pressure recorders located at critical points in the system

IV Pressure Recording Equipment

Permanent recorders not at a district regulator station shall be single range (preferred), dual ranges are recommended at district regulators to record pressures both upstream and downstream of the controlling regulator For mechanical recorder, all shall be either seven-day rotation or 31-day rotation The chart range and rotation shall match that of the pressure recorder on which it is used Optimum range selection shall place the maximum anticipated pressure at about 60% to 90% of chart range For electronic recorder, all recorders shall be able to record and store 31-day of data Data in electronic recorders are to be downloaded and printed out at 31-day or required intervals The print-out data will be maintained on file similar to other mechanical paper charts

Contacts [redacted]

Approved by Robert T Howard

Vice President, Gas Transmission & Distribution (GT&D)

Implementation Responsibilities

The Vice President of Gas Transmission and Distribution is responsible for issuing and updating this standard Each work procedure associated with this Standard will contain the detailed implementation responsibilities for that particular procedure

Compliance

Implementation and effectiveness are measured by responsible directors, managers/superintendents Periodic audits can be conducted by internal company departments The California Public Utilities Commission also conducts compliance reviews on the requirements in this standard

Rescissions

Gas Supply Interim Standard IS 463-8, "Maximum Operating Pressure of Pipelines and Mains Operating at or over 20% SMYS, dated 9/17/90

Standard Practice 463-6, "Maximum Allowable Operating Pressures of Gas Distribution Systems," dated 2/13/78

D-S0456, "Recording Pressures in Distribution Systems", issued 4-99

Exhibits

Exhibit 1, Form F4125 Rev 2, "Request to Revise MAOP/MOP, Transmission and Gathering Lines"

Reference Documents

49 CFR 192 Sections 619, 621, 623, Subpart K, and 741

General Order 58-A, "Standards for Gas Service in the State of California"

General Order 112-E, "State of California Rules governing Design, construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems "

Gas Rate Schedule G-NT

Utility Standard S 4430, "Gas Station and Facilities Requirements"

Utility Standard S 4460, "Gas Transmission and Distribution Mapping and Documentation Requirements"

Gas Standard A-34, "Piping Design and Test Requirements"

Gas Standard A-34 1, "General Requirements, Work Reportable to the CPUC"

Gas Standard A-34 2, "General Requirements, Uprating Procedures Low Pressure to High Pressure"

Gas Standard H-70, "Pressure Relief Devices"

PG&E Drawing 086868, "Pipeline — Data Sheet, MAOP of Lines Operating at or Over 20% SMYS"

Definition of Terms:

Distribution Feeder Main (DFM). See definition for Transmission Line.

Distribution Main is a pipeline that serves as a common source of supply for more than two service lines operating at 60 psig or less.

Distribution System includes distribution mains and service lines.

Future Design Pressure (FDP) is the pressure to which proposed and future additions or changes to existing facilities are to be designed and tested.

Gathering Line is a pipeline that transports gas from a current production facility to a transmission line or distribution main.

High Pressure Distribution System is a system which operates at a pressure greater than 25 psig, but not greater than 60 psig. Service regulators with the characteristics listed in Section 192.197 (a) of 49 CFR are required on each customer meter set.

Low Pressure Distribution System is a system which operates at a pressure of 3-1/2 inches water column (w.c.) through 10-1/2 inches w.c. Service regulators are not required on each customer meter set.

Maximum Allowable Operating Pressure (MAOP) is the maximum pressure at which a pipeline, pipeline segment, or component is qualified to operate in accordance with the requirements of 49 CFR Part 192 based on the design pressure of the weakest element in a pipeline segment.

Maximum Operating Pressure (MOP) is the maximum pressure at which a gas pipeline system may be operated in accordance with the criteria established in this standard and based on the design pressure of the weakest element of any segment in the pipeline.

Pressure Recording Device: Pressure recording device shall mean a mechanical or electronic device that automatically records gas pressure on an analog chart, or an electronic device which provides a printed log of the pressure or records it on storage media.

Semi-High Pressure Distribution System is a system which has traditionally operated at a pressure greater than 10-1/2 inches w.c. but not more than 25 psig. Service regulators with the characteristics listed in Section 192.197 (a) of 49 CFR Part 192 are required on each customer meter set.

Service Line is a pipeline that transports gas from a common source of supply to a customer meter set.

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Specified Minimum Yield Strength (SMYS) is the minimum yield strength in psi prescribed by the specification under which pipe is purchased from the manufacturer or as specified in 49 CFR Part 192.

Standard Delivery Pressure is 7 inches w.c.

System is that portion of a pipeline which, as a unit, is protected by overpressure protection devices (e.g., regulator and monitor) in a manner that will prevent the lowest maximum allowable operating pressure of any component of the system from being exceeded.

Transmission Line as defined by PG&E in this standard is any pipeline that operates over 60 psig and is not a gathering line. Transmission lines are grouped as backbone transmission, local transmission and Distribution Feeder Main (DFM).

- Backbone transmission lines transport gas over long distances from the interconnection points with gathering systems, interstate pipelines, and storage fields.
- Local transmission lines interconnect with backbone transmission or sources of supply.
- DFMs branch off backbone or local transmission lines and transport gas to large volume customers or to Distribution Systems which operate at pressures at or below 60 psig.

Uprate is defined in this standard as the process for increasing the maximum operating pressure (MOP) or the maximum allowable operating (MAOP) pressures (uprating) for pipelines according to the requirements of Subpart K, 49 CFR Part 192.

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Water Column (w.c.) is a unit of pressure. At 60° F, 7 inches w.c. is equivalent to approximately ¼ psig.