Maximum Allowable Operating Pressure (MAOP) and Pressure Testing for Jurisdictional LPG Systems

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Maximum Allowable Operating Pressure (MAOP)

Definition: (49 CFR 192.3)

The maximum pressure at which a pipeline or segment of a pipeline may be operated under 49 CFR Part 192.

It is determined by the lowest design pressure of the weakest element in a pipeline segment.

MAOP Requirement

49 CFR 192.619(a):

No person may operate a segment of steel or plastic pipeline at a pressure that exceeds a Maximum Allowable Operating Pressure.

MAOP Requirement (Continued)

MAOP Can't Exceed the **Lowest** of:

- The design pressure of the weakest element in the segment;
- The pressure determined by pressure/ leak testing.

MAOP

- Applies to All Piping Segments on LPG Systems:
  - Liquid Piping
  - Container Piping Upstream of the 1st Stage Regulator
  - Piping Downstream of the 1st Stage Regulator

MAOP Requirements by Segment

- Liquid Piping:
  - The MAOP must be established at or above 350 psig

MAOP Requirements by Segment (Continued)

- Container Piping Upstream of the 1st Stage Regulator:
  - The MAOP must be established at or above 250 psig

MAOP Requirements by Segment (Continued)

- Container Piping Downstream of the 1st Stage Regulator:
  - The MAOP must be established at a pressure that will maintain the required pressure and flow in the distribution lines, but may not operate at pressures that could cause re-liquefying in the lines or exceed the pressure limitations of any downstream piping or components. **10 psig** is most commonly used.

MAOP Requirements by Segment (Continued)

- Plastic Piping:
  - Per NFPA 58 6.8.1.1(3) the MAOP must not exceed 30 psig.

Pipeline Testing Requirements

- For Other Than Service Lines or Plastic
  - MAOP > 100 psig: Tested to 1.5 times the MAOP for one hour
  - MAOP < 100 psig: Tested to the greater of 90 psig or 1.5 times the MAOP for 15 minutes

Pipeline Testing Requirements (Continued)

- For Service Lines Other than Plastic
  - MAOP > 40 psig: Tested to the greater of 90 psig or 1.5 times the MAOP for one hour
  - MAOP < 40 psig: Tested to the greater of 50 psig or 1.5 times the MAOP for 15 minutes

Pipeline Testing Requirements (Continued)

- For Plastic Pipelines
  - Tested to at least 1.5 times the MAOP for:
    - One hour for mains
    - 15 minutes for services
  - The pipe temperature must not exceed 100°F during testing

Overpressure Protection

- Each segment must be equipped with appropriately sized regulators and protection devices to prevent the over pressurization of downstream piping.

Overpressure Protection Build-Up Limitation

49 CFR 192.201(a)(2): In pipelines other than a low-pressure distribution system:

i. If the MAOP is 60 psig or more, the pressure may not exceed the MAOP plus 10 percent, or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower.

Overpressure Protection Build-Up Limitation (Continued)

49 CFR 192.201(a)(2): In pipelines other than a low-pressure distribution system:

ii. If the MAOP is 12 psig or more, but less than 60 psig, the pressure may not exceed the MAOP plus 6 psig

Overpressure Protection Build-Up Limitation (Continued)

49 CFR 192.201(a)(2): In pipelines other than a low-pressure distribution system:

iii. If the MAOP is less than12 psig, the pressure may not exceed the MAOP plus 50%

Overpressure Protection Device Sizing

- Devices must be sized such that:
  - They operate (either open up or shut down) before the limiting build-up pressure has been reached; and
  - If a relief, the flow capacity is such that the flow can be passed without the build-up pressure being exceeded.

Thank You!


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