

Maximum Allowable Operating Pressure (MAOP) – Establishing MAOP

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Agenda

- Existing Rule 192.619 (Example)
 - (a)(1) – Design
 - (a)(2) – Pressure Test
 - (a)(3) – 5-Year Operating History
 - (a)(4) – Operator Safe Pressure
 - (c) – Grandfather Clause
- Existing Rule 192.621
- Traceable, Verifiable, & Complete
 - Review of ADB 12-06
- Proposed Rule Changes to 192.619
 - 192.619 (e) – 192.624
 - 192.619 (f)



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a) – No person may operate a segment of steel or plastic pipeline at a pressure that exceeds the MAOP determined under paragraph (c) or (d) of this section, or the lowest of the following:
 - 1) Design
 - 2) Test Pressure
 - 3) 5-year Operating History
 - 4) Maximum Safe Pressure (Operator Determined)



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(1) – Design:
 - Steel Pipelines – 192.105:

$$P = \left(\frac{2 * S * t}{D} \right) (F)(E)(T)$$

- Plastic Pipelines – 192.121
- Components –
Manufacturer's Rating

- P = Design Pressure
- S = Yield Strength
- D = Outside Diameter
- t = Wall thickness
- F = Design Factor (192.111)
- E = Longitudinal Joint factor (192.113)
- T = Temperature derating factor (192.115)

Maximum Allowable Operating Pressure (MAOP)

- Design Example:
- API 5L, Grade B, 8", 0.322 wall, Class 3 Location

$$P = \left(\frac{2 * S * t}{D} \right) (F)(E)(T)$$

$$P = \left(\frac{2 * 35,000 * 0.322}{8.625} \right) (0.5)(1)(1)$$

$$P = \underline{\mathbf{1306}} \text{ psig}$$

- P = Design Pressure
- S = Yield Strength
- D = Outside Diameter
- t = Wall thickness
- F = Design Factor (192.111)
- E = Longitudinal Joint factor (192.113)
- T = Temperature derating factor (192.115)



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(2) – Test Pressure:
- Pressure obtained by dividing post construction pressure test by one of the following factors:
 - Class 1 Loc. - 1.1*
 - Class 2 Loc. - 1.25
 - Class 3 Loc. - 1.5
 - (If installed *BEFORE* 11-11-1970 – 1.4)
 - Class 4 Loc. - 1.5
 - (If installed *BEFORE* 11-11-1970 – 1.4)
 - Plastic Pipe - 1.5

* NPRM Proposes change to 1.25



Maximum Allowable Operating Pressure (MAOP)

- Test Pressure Example:
- Post Construction Pressure test:
 - Class 3 Loc.
 - Tested to a minimum of 2160 psig

$$P = \left(\frac{2160}{1.5} \right) = \underline{\mathbf{1440}} \text{ psig}$$



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(3) – 5-year operating history
- The ***highest*** actual operating pressure to which the segment was subject during the five years preceding the applicable date:
 - *For Gathering Lines that first became subject to Part 192 after April 13, 2006, The applicable date is March 15, 2006, OR
 - *The date the line becomes subject to this part, whichever is later.
- Unless the pipeline was pressure tested in the 5 years prior to the applicable date or uprated under Subpart K.

* NPRM Proposes changes to dates.



Maximum Allowable Operating Pressure (MAOP)

- 5-year operating history example:

- 3-11-06 – 798 psig
- 3-12-06 – 796 psig
- 3-13-06 – **850** psig
- 3-14-06 – 802 psig
- 3-15-06 – 795 psig
- 3-16-06 – 792 psig
- 3-17-06 – 1000 psig
- 3-18-06 – 794 psig
- 3-19-06 – 795 psig



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(4) – Maximum Safe Pressure (Operator Determined):
- The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.
- Example: Pipe is in adequate condition, Fittings are rated to 1440, Pressure test was to 2160. The operator feels that **1440** psig is the maximum safe pressure for this line.



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a) – No person may operate a segment of ... pipeline ... that exceeds ... the lowest of the following:
 - 1) Design - 1306 psig
 - 2) Test Pressure - 1440 psig
 - 3) 5-year History - 850 psig
 - 4) Operator Safe Pressure - 1440 psig



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a) – No person may operate a segment of steel or plastic pipeline at a pressure that exceeds the MAOP determined under paragraph (c) or (d) of this section, or the lowest of the following:
 - 1) Design
 - 2) Test Pressure
 - 3) 5-year Operating History
 - 4) Maximum Safe Pressure (Operator Determined)



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(1) – Design:
 - Steel Pipelines – 192.105:

$$P = \left(\frac{2 * S * t}{D} \right) (F)(E)(T)$$

- Plastic Pipelines – 192.121
- Components –
Manufacturer's Rating

- P = Design Pressure
- S = Yield Strength
- D = Outside Diameter
- t = Wall thickness
- F = Design Factor (192.111)
- E = Longitudinal Joint factor (192.113)
- T = Temperature derating factor (192.115)

Maximum Allowable Operating Pressure (MAOP)

- Design Example:
- API 5L, Grade B, 8", 0.322 wall, Class 3 Location, ANSI 300 Class fittings.

$$P = \left(\frac{2 * S * t}{D} \right) (F)(E)(T)$$

$$P = \left(\frac{2 * 35,000 * 0.322}{8.625} \right) (0.5)(1)(1)$$

- $P = 1306$ psig
- $P = \underline{750}$ psig

- P = Design Pressure
- S = Yield Strength
- D = Outside Diameter
- t = Wall thickness
- F = Design Factor (192.111)
- E = Longitudinal Joint factor (192.113)
- T = Temperature derating factor (192.115)



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(2) – Test Pressure:
- Pressure obtained by dividing post construction pressure test by one of the following factors:
 - Class 1 Loc. - 1.1*
 - Class 2 Loc. - 1.25
 - Class 3 Loc. - 1.5
 - (If installed *BEFORE* 11-11-1970 – 1.4)
 - Class 4 Loc. - 1.5
 - (If installed *BEFORE* 11-11-1970 – 1.4)
 - Plastic Pipe - 1.5

* NPRM Proposes change to 1.25



Maximum Allowable Operating Pressure (MAOP)

- Test Pressure Example:
- Post Construction Pressure test:
 - Class 3 Loc.
 - Tested to a minimum of 456 psig

$$P = (456/1.5) = \underline{\mathbf{304}} \text{ psig}$$



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(3) – 5-year operating history
- The ***highest*** actual operating pressure to which the segment was subject during the five years preceding the applicable date:
 - For Distribution: July 1, 1970
- Unless the pipeline was pressure tested in the 5 years prior to the applicable date or updated under Subpart K.



Maximum Allowable Operating Pressure (MAOP)

- 5-year operating history example:
 - 6-27-70 – 298 psig
 - 6-28-70 – 296 psig
 - 6-29-70 – **315** psig
 - 6-30-70 – 299 psig
 - 7-1-70 – 295 psig
 - 7-2-70 – 292 psig
 - 7-3-70 – 400 psig
 - 7-4-70 – 294 psig
 - 7-5-70 – 295 psig



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a)(4) – Maximum Safe Pressure (Operator Determined):
- The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.
- Example: Pipe is in adequate condition, Fittings are rated to 750, Pressure test was to 456. The operator feels that **450** psig is the maximum safe pressure for this line.



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a) – No person may operate a segment of ... pipeline ... that exceeds ... the lowest of the following:
 - 1) Design - 750 psig
 - 2) Test Pressure - 304 psig
 - 3) 5-year History - 315 psig
 - 4) Operator Safe Pressure - 450 psig



Maximum Allowable Operating Pressure (MAOP)

- 192.619(a) – No person may operate a segment of steel or plastic pipeline at a pressure that exceeds the MAOP determined under paragraph (c) or (d) of this section, or ...



Maximum Allowable Operating Pressure (MAOP)

- 192.619(c) – The requirements on pressure restrictions in this section do not apply in the following instance. An operator may operate a segment of pipeline found to be in satisfactory condition ... at the ***highest*** operating pressure to which the segment was subjected during the 5 years preceding the applicable date in the second column of the table in paragraph (a)(3) of this section.



Maximum Allowable Operating Pressure (MAOP)

- 5-year operating history example:
 - 6-27-70 – 298 psig
 - 6-28-70 – 296 psig
 - 6-29-70 – **315** psig
 - 6-30-70 – 299 psig
 - 7-1-70 – 295 psig
 - 7-2-70 – 292 psig
 - 7-3-70 – 400 psig
 - 7-4-70 – 294 psig
 - 7-5-70 – 295 psig

Maximum Allowable Operating Pressure (MAOP)

- 192.621(a) – No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following, as applicable:
 - 1) *Design*
 - 2) 60 psig (or greater with regulators meeting the requirements of 192.197(c)).
 - 3) **10**** psig (unreinforced bell and spigot joints.)
 - 4) Joint Pressure Limits
 - 5) *Maximum Safe Pressure (Operator Determined)*



Traceable, Verifiable, & Complete

- ADB 12-06
 - In review of the design, construction, and other data used to establish MAOP, an operator must:
 - Ensure records are reliable, traceable, verifiable, and complete.
 - If such a search, review, and verification cannot be satisfactorily completed, an operator:
 - Cannot rely on this method,
 - Must instead rely on another method as allowed by 192.619.



Traceable, Verifiable, & Complete

- Traceable:

“Traceable records are those which can be clearly linked to original information about a pipeline segment or facility. Traceable records might include pipe mill records, purchase requisition, or asbuilt documentation indicating minimum pipe yield strength, seam type, wall thickness and diameter. Careful attention should be given to records transcribed from original documents as they may contain errors. Information from a transcribed document, in many cases, should be verified with complementary or supporting documents. ”



- Verifiable:

“Verifiable records are those in which information is confirmed by other complementary, but separate, documentation. Verifiable records might include contract specifications for a pressure test of a line segment complemented by pressure charts or field logs. Another example might include a purchase order to a pipe mill with pipe specifications verified by a metallurgical test of a coupon pulled from the same pipe segment. In general, the only acceptable use of an affidavit would be as a complementary document, prepared and signed at the time of the test or inspection by an individual who would have reason to be familiar with the test or inspection. ”



- **Complete:**

“Complete records are those in which the record is finalized as evidenced by a signature, date or other appropriate marking. For example, a complete pressure testing record should identify a specific segment of pipe, who conducted the test, the duration of the test, the test medium, temperatures, accurate pressure readings, and elevation information as applicable. An incomplete record might reflect that the pressure test was initiated, failed and restarted without conclusive indication of a successful test. A record that cannot be specifically linked to an individual pipe segment is not a complete record for that segment. Incomplete or partial records are not an adequate basis for establishing MAOP or MOP. If records are unknown or unknowable, a more conservative approach is indicated.”



- Reliable:
 - No PHMSA Definition / Guidance in the ADB.
 - Phrase is in the proposed rulemaking.
 - Merriam-Webster.com: “able to be believed : likely to be true or correct”



- PHMSA will issue more direction.
- Further details will be provided as to the manner in which PHMSA intends to require operators to reestablish MAOP.
- NPRM Proposed rules 192.619(e), 192.619(f), and 192.624.



Proposed Rule Changes – MAOP

- 192.619(e) – New Rule (Transmission ONLY)
 - Operators ***must establish and document*** MAOP in accordance with Rule 192.624 (new rule).



Proposed Rule Changes – MAOP

- 192.624 – New Rule (Transmission ONLY)
 - Applicable pipe must be subjected to pressure verification by one of the following methods:
 - Method 1: Pressure Test
 - Method 2: Pressure Reduction
 - Method 3: Engineering Critical Assessment
 - Method 4: Pipe Replacement
 - Method 5: Pressure Reduction for Segments with Small PIR and Diameter; or
 - Method 6: Alternative Technology



Proposed Rule Changes – MAOP

- 192.619(f) – New Rule
 - Operators must maintain all records necessary to establish and document the MAOP of each pipeline as long as the pipe or pipeline remains in service. Records that establish the pipeline MAOP, include, but are not limited to, design, construction, operation, maintenance, inspection, testing, material strength, pipe wall thickness, seam type, and other related data. Records must be reliable, traceable, verifiable, and complete.

Proposed Rule Changes – MAOP



- Comment period for NPRM closed in July of 2016.
- PHMSA is currently categorizing and reviewing comments received.
- No indication on implementation date for final rule making.

Questions or Comments?



MPSC

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Thank You!

