



Natural Gas Pressure Regulation Reliability and Inspections

Matching Operator Actions with Design and Operating Conditions



U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

PHMSA: Your Safety is Our Mission



Distribution Team Mission Statement

The NAPSR / PHMSA Distribution Team is a collaboration of State and Federal Regulators to support improvements in the integrity of the Nations' gas distribution pipeline systems through the conduct of investigations and research to develop educational materials as well as improving our inspection methods and guidance for evaluation of Operator's Distribution systems

Disclaimer

The document is intended to provide clarity to the public regarding existing pipeline safety standards. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, but pipeline operators must comply with the underlying safety standards.

The materials contained in this work product are for educational and awareness purposes only.



Natural Gas Overpressure Protection (OPP) Reliability Compliance



OPP For Natural Gas Systems 49 CFR Part 192

Operators are Required to:

- Select the proper and approved equipment for the service conditions of the system or service line to protect downstream piping from overpressure
- Properly design and install the selected equipment
- Set/adjust the equipment to prevent overpressure
- Inspect the equipment when, where and anytime it is required to ensure it is adequate and operating properly
- Document any required repairs and adjustments to the equipment for future inspections, unusual operating/maintenance and failure monitoring
- Take appropriate action where single or successive equipment failures are documented



Natural Gas Overpressure Protection (OPP) Equipment Selection and Installation



OPP Equipment Selection

§192.195 – Overpressure Protection Where Required:

- §192.199 (a – h) – Design, Installation and Materials
- §192.201 – Capacity, Pressure Settings, Overpressure Protection



OPP Equipment Selection

- To meet requirements for §192.199,
 - Operators must select the appropriate overpressure equipment to meet the operating requirements and conditions where it is employed.



OPP Equipment Inspection

- To meet requirements for §192.739,
 - Where the equipment is initially or subsequently found to be inadequate or unreliable for the operating requirements and conditions, it must be substituted with equipment meeting the task or complimented with additional equipment that allows it to be reliable



OPP Equipment Selection

Section 192.199

Except for rupture discs, each pressure relief or pressure limiting device must;

(a) Be constructed of materials such that the operation of the device will not be impaired by corrosion;

(b) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;



OPP Equipment Installation

§192.199

(c) Be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be tested for leakage when in closed position;

(d) Have support made of noncombustible material;

(e) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;



OPP Equipment Installation

Section 192.199

(f) Be designed and installed so the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;

(g) Where installed at a district regulator station to protect a pipeline system from overpressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the overpressure protective device and the district regulator; and



OPP Equipment Installation

Section 192.201

(b) When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulators or compressors in that station will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.

(c) Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low-pressure distribution system. With a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment.



OPP Equipment Installation and Settings

Section 192.201

- a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to ensure the following:
- (1) In a low-pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.
 - (2) In pipelines other than a low-pressure distribution system:
 - (i) If the maximum allowable operating pressure is 60 p.s.i. (414 kPa) gage or more, the pressure may not exceed the maximum allowable operating pressure plus ten percent, or the pressure that produces a hoop stress of 75% of SMYS, whichever is lower;



OPP Equipment Installation and Settings

Section 192.201

(a) (2) (ii) If the maximum allowable operating pressure is 12 p.s.i. (83 kPa) gage or more, but less than 60 p.s.i. (414 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 6 p.s.i. (41 kPa) gage;

or

(iii) If the maximum allowable operating pressure is less than 12 p.s.i. (83 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 50 percent.



OPP Equipment Installation and Settings

- Operators must install the appropriate overpressure equipment in an appropriate configuration to meet the pressure regulation requirements of §§ 192.199 and 192.201 such that no overpressure event occurs downstream.
- Where an overpressure occurs, the selection and installation of pressure regulation and relief equipment failure is likely the primary or at the least one of the secondary causes.



Natural Gas Overpressure Protection (OPP) Equipment Inspection



OPP Inspection, 49 CFR 192 Subpart M

Section 192.739 (a)

Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected at intervals not exceeding 15 months, but at least once each calendar year, to inspections and tests to determine that it is-

- (1) In good mechanical condition;



OPP Inspection, Repair, and Documentation

Section 192.743 (a)

Pressure relief devices at pressure limiting stations and pressure regulating stations must have sufficient capacity to protect the facilities to which they are connected. Except as provided in §192.739 (b), the capacity must be consistent with the pressure limits of §192.201 (a). This capacity must be determined at intervals not exceeding 15 months, but at least once each calendar year, by testing the devices in place or by review and calculations



OPP Equipment Inspections

Section 192.739 (a)

(2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed

(3) Except as provided in paragraph (b) of this section, set to control or relieve at the correct pressure consistent with the pressure limits of 192.201 (a); and

(4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

Note: Interpretation PI-19-0019, 07-14-2021, allows one of the pressure control/relief devices to be set at above MAOP, however the downstream system is not allowed to operate at above MAOP during normal operations.



OPP Inspection, Part 192, Subpart M

Section 192.740

- (a) This section applies, except as provided in paragraph (c) of this section, to any service line directly connected to a production, gathering, or transmission pipeline that is not operated as part of a distribution system.
- (b) Each pressure regulating or limiting device, relief device (except rupture discs), automatic shutoff device, and associated equipment must be inspected and tested at least once every 3 calendar years, not exceeding 39 months, to determine that it is:
 - (1) In good mechanical condition;



OPP Equipment Inspections

Section 192.740

- (b) (2) – Adequate in Capacity and Reliability
- (b) (4) – Properly Installed and Protected from Dirt, Liquids, or Other Conditions
- (c) – Excludes Service Line Feeding Irrigation Pump Engines



OPP Equipment Inspections

What is meant by reliable?

From Webster's Dictionary

Reliable: (1) Suitable or fit to be relied on:
Dependable

(2) Giving the same results on successive trials

Dependable: Capable of being trusted or depended on: Reliable



OPP Equipment Inspections

- Operators must inspect overpressure equipment at or prior to the maximum frequencies allowed within §§ 192.739 and 192.740.
- Operators must ensure that the overpressure protection equipment is adequate from the standpoint of capacity and reliability during the inspection and that the equipment is protected from debris, liquids or any other contaminate.
- Operators may inspect overpressure protection equipment more frequently than prescribed by 49 CFR 192 to eliminate equipment failure, however, must establish procedural criteria to perform such inspections.



Natural Gas Overpressure Protection (OPP) Equipment Repair



OPP Inspection, Repair, and Documentation

Section 192.703 (a)

No person may operate a segment of pipeline, **unless it is maintained** in accordance with this subpart.

Section 192.703 (b)

Each segment of pipeline that **becomes unsafe must be replaced, repaired, or removed** from service.

Section 192.743 (c)

If a relief device is of insufficient capacity, a new, different, or additional device must be installed to provide the capacity required by paragraph (a) of this section.



Documentation of Repairs and Failures

- Operators must properly maintain overpressure equipment to ensure that **between inspections, the equipment is adequate and functioning correctly.**
- Operators must consider **whether the inspection frequency is appropriate and/or if the overpressure protection equipment design is appropriate** where overpressure equipment fails to perform between inspections.



Natural Gas Overpressure Protection (OPP) Equipment Inspection and Repair Documentation



OPP Inspection, Repair, and Documentation

Section 192.603 (b)

Each operator shall keep records necessary to administer the procedures established under 192.605.

Section 192.605 (b) Maintenance and Normal Operations

The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations.

- (1) Operating, maintaining, and repairing the pipeline in accordance with each of the requirements of this subpart **and subpart M of this part.**
- (3) Making construction records, maps, **and operating history available to appropriate operating personnel.**



OPP Inspection, Repair, and Documentation – Transmission

Section 192.709

- (a) The date, location, and description of each repair made to pipe (including pipe-to-pipe connections) must be retained for as long as the pipe remains in service.
- (b) The date, location, and description of each repair made to parts of the pipeline other than pipe must be retained for at least 5 years. However, repairs generated by patrols, surveys, inspections or tests required by Subpart L and M of this part must be retained in accordance with paragraph (c) of this section.
- (c) **A record of each patrol, survey, inspection, and test required by subparts L and M of this part must be retained for at least 5 years or until the next patrol, survey, inspection, or test is completed, whichever is longer.**



OPP Inspection, Repair, and Documentation

Section 192.605 (b) (5)

Starting up and shutting down any part of the pipeline in a manner designed to assure operation within the MAOP limits prescribed by this part, plus the build-up allowed for operation of pressure-limiting and control devices.

Section 192.703

(a) No person may operate a segment of pipeline, unless it is maintained in accordance with this subpart.



Documentation of Repairs and Failures

- Operators must document the repairs made to overpressure equipment and to ensure that employees that inspect and repair such facilities have access to this recorded operating history to ensure proper repairs and to ensure that downstream systems will not be overpressured.

Note: §§ 192.613, 192.617, and 192.1007 may each require operators to perform further actions regarding pressure equipment failures



Natural Gas Overpressure Protection (OPP) Equipment Failure and Failure Response



OPP Equipment Failure and Response

Section 192.613 (a)

Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, **failures**, leakage history, corrosion, substantial changes in cathodic protection requirements, **and other unusual operating and maintenance conditions.**

Section 192.617

Each operator shall establish **procedures for analyzing** accidents and **failures**, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, **for the purpose of determining the causes of the failure and minimizing the possibility of a recurrence.**



OPP Equipment Failure and Response

Distribution Integrity, 49 CFR 192, Subpart P

Section 192.1007 (a) (2)

Consider the information gained from past design, operations, and maintenance.

Section 192.1007 (b) Identify Threats

The **operator must consider** the following categories of threats to each of its gas distribution pipeline: corrosion, natural forces, excavation damage, other outside force damage, **material or welds, equipment failure, incorrect operations, and other concerns that could threaten the integrity of its pipeline. An operator must consider reasonably available information** to identify existing and potential threats.



OPP Equipment Failure and Response

Distribution Integrity, 49 CFR 192, Subpart P

Section 192.1007 (b) Identify Threats

Sources of data may include, but are not limited to, incident and leak history, corrosion control records, **continuing surveillance records**, patrolling records, **maintenance history**, and excavation damage experience.



OPP Equipment Failure and Response

Transmission Integrity, 49 CFR 192, Subpart O

Section 192.907 (a)

. . . and that addresses the risks on each covered transmission segment.

Section 192.911 (c) Identify Threats

. . . . An identification of threats to each covered pipeline segment, which must include data integration and risk assessment.

Section 192.937 (a) Reassessment

. . . . The periodic evaluation must be based upon a data integration and risk assessment of the entire pipeline . . .



OPP Equipment Failure Response

Operators are required to document and if necessary, analyze specific failed pressure regulation components and respond appropriately to the failure or incorrect operation of overpressure protection equipment to minimize the possibility of recurrence. Such actions may include, but are not limited to:

- Replacement of pressure regulation facilities/components
- More frequent overpressure equipment inspection intervals
- Adding relief devices
- Redesigning pressure regulation facilities



OPP Equipment Failure Response

- Primary or secondary overpressure protection device failures for any reason are not considered normal operating conditions where failure of the remaining overpressure protection device would cause an overpressure condition.
- Operators may not rely on a single remaining functioning device where the equipment is regulated by §192.201 on an ongoing basis. Recurring or persistent regulation/relief device failures must be resolved.
- Any found condition of pressure relief or regulation equipment that results in the equipment not passing an inspection, such as flow and lockup or adequate pressure relief, should constitute a failure of the equipment.



OPP Equipment Failure Response

- Replacing pressure relief or regulating equipment or such equipment components prior to performing a required inspection may mask failures of the equipment and should not be practiced.
- Inspections are required to be performed to pressure equipment prior to making any adjustments or repairs to prove that it meets Section 192.739 (a) (1)
- The inspection/repair history of pressure relief/regulation equipment need be reviewed where over or underpressure events occur to ensure the operator has acted on and documented appropriately past equipment failures.



Operators must appropriately select, install, maintain, inspect, repair, document, monitor, and act as required to ensure pressure regulation and relief equipment are operating safely





Questions?



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