



Description To establish the process for verification and documentation of material properties and attributes of onshore steel transmission pipelines.

Regulatory Applicability

- Regulated Transmission Pipelines
- Regulated Gathering Pipelines (Type A)
- Regulated Gathering Pipelines (Type B)
- Distribution Pipelines

Frequency As needed

Reference

- 49 CFR 192.607 *Verification of Pipeline Material Properties and Attributes: Onshore Steel Transmission pipelines*
- 49 CFR 192.619 *Maximum Allowable Operating Pressure: Steel or Plastic Pipelines*
- 49 CFR 192.620 *Alternative maximum allowable operating pressure for certain steel pipelines*
- 49 CFR 192.624 *Maximum allowable operating pressure reconfirmation: Onshore steel transmission pipelines.*
- LA Title 43 Part XIII 2719 *Maximum Allowable Operating Pressure: Steel or Plastic Pipelines*

Forms / Record Retention

Related Specifications ASME/ANSI B31.8-2003 *Gas Transmission and Distribution Piping Systems*

OQ Covered Task None



Procedure Steps

Steel Transmission Pipeline Segments

1. Documentation of material properties and attributes for each pipeline segment must be maintained for the life of the system. The records must be Traceable, Verifiable, and Complete (TVC). These records include physical pipeline characteristics and attributes, including diameter, wall thickness, seam type, and grade (e.g., yield strength, ultimate tensile strength, or pressure rating for valves and flanges, etc.). If Charpy v-notch toughness values established under this section are used, they are required to meet the requirements of the ECA method at §192.624(c)(3) or the fracture mechanics requirements at §192.712 must be maintained for the life of the pipeline.
2. If the documentation of material properties and attributes for each pipeline system are not Traceable, Verifiable, and Complete (TVC), the following process must be completed. A conducting nondestructive or destructive tests, examinations, and assessments in order to verify the material properties of aboveground line pipe and components, and of buried line pipe and components when excavations occur at the following opportunities: Anomaly direct examinations, *in situ* evaluations, repairs, remediations, maintenance, and excavations that are associated with replacements or relocations of pipeline segments that are removed from service. The procedures must also provide for the following:
 - a) For nondestructive tests, at each test location, material properties for minimum yield strength and ultimate tensile strength must be determined at a minimum of 5 places in at least 2 circumferential quadrants of the pipe for a minimum total of 10 test readings at each pipe cylinder location.
 - b) For destructive tests, at each test location, a set of material properties tests for minimum yield strength and ultimate tensile strength must be conducted on each test pipe cylinder removed from each location, in accordance with API Specification 5L.
 - c) Tests, examinations, and assessments must be appropriate for verifying the necessary material properties and attributes.
 - d) If toughness properties are not documented, the procedures must include accepted industry methods for verifying pipe material toughness.
 - e) Verification of material properties and attributes for non-line pipe components must comply with paragraph (5) of this section.
3. Procedures developed in accordance with paragraph (2) of this section for verification of material properties and attributes using nondestructive methods must:
 - a) Use methods, tools, procedures, and techniques that have been validated by a subject matter expert based on comparison with destructive test results on material of comparable grade and vintage;
 - b) Conservatively account for measurement inaccuracy and uncertainty using reliable engineering tests and analyses; and



- c) Use test equipment that has been properly calibrated for comparable test materials prior to usage.
- 4. To verify material properties and attributes for a population of multiple, comparable segments of pipe without traceable, verifiable, and complete records, an operator may use a sampling program in accordance with the following requirements:
 - a) WTG must define separate populations of similar segments of pipe for each combination of the following material properties and attributes: **Nominal wall thicknesses, grade, manufacturing process, pipe manufacturing dates, and construction dates**. If the dates between the manufacture or construction of the pipeline segments exceeds 2 years, those segments cannot be considered as the same vintage for the purpose of defining a population under this section. The total population mileage is the cumulative mileage of pipeline segments in the population. The pipeline segments need not be continuous.
 - b) In addition to the requirements in paragraph (4)(a) of this section, the WTG must determine material properties at all excavations that expose the pipe associated with anomaly direct examinations, *in situ* evaluations, repairs, remediations, or maintenance, except for pipeline segments exposed during excavation activities pursuant to §192.614, until completion of the lesser of the following:
 - i) One excavation per mile rounded up to the nearest whole number; or
 - ii) 150 excavations if the population is more than 150 miles.
 - c) Prior tests conducted for a single excavation according to the requirements of paragraph (3) of this section may be counted as one sample under the sampling requirements of this paragraph (4).
 - d) If the test results identify line pipe with properties that are not consistent with available information or existing expectations or assumed properties used for operations and maintenance in the past, the WTG must establish an expanded sampling program. The expanded sampling program must use valid statistical bases designed to achieve **at least a 95% confidence level** that material properties used in the operation and maintenance of the pipeline are valid. The approach must address how the sampling plan will be expanded to address findings that reveal material properties that are not consistent with all available information or existing expectations or assumed material properties used for pipeline operations and maintenance in the past. WTG must notify PHMSA in advance of using an expanded sampling approach in accordance with §192.18.
 - e) WTG may use an alternative statistical sampling approach that differs from the requirements specified in paragraph (4)(b) of this section. The alternative sampling program must use valid statistical bases designed to achieve at least a 95% confidence level that material properties used in the operation and maintenance of the pipeline are valid. The approach must address how the sampling plan will be expanded to address findings that reveal material properties that are not consistent with all available information or existing expectations or assumed material properties used for pipeline operations and maintenance in the past. WTG must notify PHMSA in advance of using an alternative sampling approach in accordance with §192.18.



5. For mainline pipeline components other than line pipe, WTG must develop and implement procedures in accordance with paragraph (3) of this section for establishing and documenting the ANSI rating or pressure rating
 - a) WTG is not required to test for the chemical and mechanical properties of components in compressor stations, meter stations, regulator stations, separators, river crossing headers, mainline valve assemblies, valve operator piping, or cross-connections with isolation valves from the mainline pipeline.
 - b) Verification of material properties is required for non-line pipe components, including valves, flanges, fittings, fabricated assemblies, and other pressure retaining components and appurtenances that are:
 - i) Larger than 2 inches in nominal outside diameter,
 - ii) Material grades of 42,000 psi (Grade X-42) or greater, or
 - iii) Appurtenances of any size that are directly installed on the pipeline and cannot be isolated from mainline pipeline pressures.
 - c) Procedures for establishing material properties of non-line pipe components must be based on the documented manufacturing specification for the components. If specifications are not known, usage of manufacturer's stamped, marked, or tagged material pressure ratings and material type may be used to establish pressure rating. WTG must document the method used to determine the pressure rating and the findings of that determination.
6. The material properties determined from the destructive or nondestructive tests required by this section cannot be used to raise the grade or specification of the material, unless the original grade or specification is unknown and MAOP is based on an assumed yield strength of 24,000 psi.