Foreword
Introduction

This recommended practice is intended to address developments in the oil and gas industry, particularly the emergence of larger diameter, higher pressure gas gathering lines in shale plays. Most gas gathering lines in the United States do not share these operating characteristics, and the risk-based provisions in this recommended practice are not necessarily appropriate for the smaller diameter, lower pressure gas gathering lines that still predominate throughout industry.

The provisions in this recommended practice are intended to work together and should not be considered in isolation. The provisions for the design, construction, testing, operation, and maintenance of rural gas gathering lines are not necessarily appropriate under different definitions.

Background

In August 2011, DOT published an advance notice of proposed rulemaking (ANPRM) asking for public comment on the need to change the federal pipeline safety standards for gas gathering lines in 49 C.F.R. Part 192. (Docket No. PHMSA-2011-0023; 76 Fed. Reg. 53,086). Adopted in a March 2006 final rule, DOT’s regulations require operators to use the provisions in API Recommended Practice 80, “Guidelines for the Definition of Onshore Gas Gathering Lines,” 1st edition, April 2000, (RP 80), to determine if a pipeline is an onshore gas gathering line, subject to certain additional regulatory limitations in Part 192. If a pipeline is an onshore gas gathering line, DOT’s regulations require operators to determine if the pipeline meets the definition of a “regulated onshore gas gathering line”. Under the March 2006 final rule, regulated onshore gas gathering lines are limited to pipelines in more populated, Class 2, 3, or 4 locations. Onshore gas gathering lines in less populated, Class 1 locations are exempt from regulation.

In April 2016, DOT issued a notice of proposed rulemaking (NPRM) with potential changes to the regulations for onshore gas gathering lines (Docket No. PHMSA-2011-0023; 81 Fed. Reg. 20,721). The proposed changes included new definitions for onshore production and gathering operations and new safety standards for certain gas gathering lines in Class 1 locations. After submitting comments in response to the NPRM, the American Petroleum Institute (API) formed a working group to consider whether to develop a new recommended practice for the safety of onshore gas gathering lines. API decided to move forward with that initiative at the conclusion of the working group’s deliberations.

In January 2018, API convened an initial meeting in Houston, Texas, to discuss the development of a new recommended practice for onshore gas gathering lines. Nearly 100 people participated in the meeting, including representatives from pipeline companies, industry trade organizations, advocacy groups, and regulatory bodies. API held additional meetings throughout 2018 and 2019 before reaching a consensus on the provisions in this recommended practice, which are intended to apply to the design, construction, testing, operation, and maintenance of large diameter gas gathering lines in rural areas.
1 Scope

1.1 General

This recommended practice contains provisions relating to design, construction, testing, corrosion control, operation, and maintenance of onshore gas gathering lines as defined in API RP 80, in Class 1 (3.1.4) or Class 2 locations (3.1.5) that are greater than 12.75 inches in nominal outside diameter.

1.2 New Pipelines

Except where otherwise noted, the provisions of this recommended practice apply to new pipelines.

1.3 Existing Pipelines

The design, construction, and testing provisions in Section 5 do not apply to existing pipelines. Except where otherwise noted, the external and internal corrosion control, and operation and maintenance provisions in Sections 6 and 7 apply to existing pipelines.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the reference document (including any amendment) applies.

API Recommended Practice 80, Guidelines for the Definition of Onshore Gas Gathering Lines

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1.1 active corrosion

Continuing corrosion, which, unless controlled, could result in a condition that is detrimental to public safety or the environment.

3.1.2 building intended for human occupancy

A residential, commercial, or industrial building that is intended to be occupied by people, such as a house, apartment, store, or office.

3.1.3 class location unit

An onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous one-mile (1.6 kilometers) length of pipeline.

3.1.4 class 1 location

A class location unit that has 10 or fewer buildings intended for human occupancy.

3.1.5 class 2 location

Any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

3.1.6 component

Part of a pipeline other than pipe that is subject to system pressure.

3.1.7 existing pipeline
A pipeline placed into service on or before the adoption of this recommended practice.

3.1.8 impracticable
An activity that cannot be accomplished without incurring unnecessary hardship or employing unreasonable measures.

3.1.9 maximum allowable operating pressure
MAOP
The maximum pressure at which a pipeline may be operated.

3.1.10 new pipeline
A pipeline that is placed into service, or an existing pipeline that is replaced or relocated, after adoption of this recommended practice.

3.1.11 pipe
A tube manufactured with metallic or non-metallic (plastic, composite, or other) material.

3.1.12 pipeline
Line pipe and components.

3.1.13 potential impact circle
A circle of radius equal to the potential impact radius (PIR) as measured from the centerline of a pipeline.

3.1.14 potential impact radius
PIR
The radius of a circle as measured from the centerline of a pipeline calculated using Equation 1. See section 4.4.

3.1.15 hain
A small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period (the days and weeks need not be consecutive).

3.1.16 recognized and generally accepted industry practices
Codes, standards, technical reports, or recommended practices that provide established methods for performing pipeline design, construction, testing, operation, or maintenance activities.

4 Risk Categorization

4.1 General
This section contains the provisions for determining whether a pipeline is a Type C gathering line or Type D gathering line.

4.2 Type C Gathering Line Criteria
Figure 1 describes criteria for Type C gas gathering lines.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>MAOP (Metallic)</th>
<th>MAOP (Non-Metallic)</th>
<th>Other</th>
</tr>
</thead>
</table>

Figure 1 - Type C Gathering Line Criteria
4.3 Type D Gathering Line Criteria

All other gathering lines greater than 12.75" in nominal outside diameter that do not meet the Type C criteria can be considered Type D.

4.4 Potential Impact Radius

The operator may calculate the potential impact radius using Equation 1 or assume that PIR is 660 feet (200 meters).

4.4.1 Calculating PIR

The potential impact radius of a pipeline may be determined by Equation 1, where ‘r’ is the radius of a circular area in feet surrounding the point of failure, ‘0.73’ is the factor for rich natural gas, ‘p’ is the MAOP of the pipeline segment in pounds per square inch, and ‘d’ is the nominal diameter of the pipeline in inches.

\[ r = 0.73\sqrt{pd^2} \]  

(1)

Where,

- \( r \) is the radius of a circular area in feet surrounding the potential point of failure
- 0.73 is the rich natural gas factor
- \( p \) is the MAOP of the pipeline segment in pounds per square inch
- \( d \) is the nominal diameter of the pipeline in inches

4.4.1.1 Natural Gas Factor

4.4.1.1.1 The rich natural gas factor of 0.73 shall be used in the potential impact radius calculation, unless the operator determines that the use of the lean natural gas factor of 0.69 is justified.

4.4.1.1.2 To justify the use of the lean natural gas factor in a potential impact radius calculation, an operator shall demonstrate that the gross heating value of the gas composition is less than or equal to 1100 Btu/cubic foot.

4.4.1.3 If an operator uses the lean natural gas factor in a potential impact radius calculation, appropriate documentation justifying that determination should be kept for the life of the pipeline.

4.4.1.4 If the quality of the gas changes from dry to wet gas, requiring a different gas factor, PIR shall be re-calculated for the new composition.

4.4.2 Potential Impact Circle
The operator shall determine whether the potential impact circle contains either of the following:

- One or more buildings intended for human occupancy; or
- One or more occupied sites.

4.4.2.1 In making a determination under Section 4.4, the potential impact circle extends axially along the length of the pipeline from the outermost edge of the first potential impact circle that contains either a building intended for human occupancy or an occupied site to the outermost edge of the last contiguous potential impact circle that contains either a building intended for human occupancy or an occupied site.

4.4.2.2 An operator should incorporate the potential deviation of the pipeline centerline when determining the potential impact circle.

4.4.2.3 Operators should consider potential inaccuracies in potential impact circle factors, including:

- Centerline data
- Geospatial information
- Pipe diameter

4.4.3 Documentation

4.4.3.1 Operators shall document the means by which PIR was calculated and retain this documentation until the next PIR calculation is performed.

5 Design, Construction, and Testing

5.1 General

This section contains design, construction, and testing provisions for new gathering pipelines.

5.2 Requirements for Type C Gathering Line Systems

5.2.1 Type C gathering line systems shall be designed, constructed, and tested in accordance with 49 CFR 192.9(d)(1).

5.2.2 An operator shall keep appropriate records documenting the design of pipe and components for the life of the pipeline.

5.3 Requirements for Type D Gathering Line Systems

5.3.1 General

An operator shall follow the requirements given in 5.3.2 to 5.3.7 for Type D Gathering Line systems.

5.3.2 Material Requirements

5.3.2.1 Materials for pipe and components shall be:

- Capable of maintaining structural integrity,
- Compatible with product to be transported, and
- Qualified for use in accordance with recognized and generally accepted industry practices.

5.3.2.2 An operator should keep appropriate records documenting the materials for pipe and components for the life of the pipeline.

5.3.3 Design Requirements

5.3.3.1 Pipe and components shall be designed in accordance with recognized and generally accepted industry practices to withstand internal pressures and external loads.

5.3.3.2 An operator should keep appropriate records documenting the design of pipe and components for the life of the pipeline.

5.3.4 Construction Requirements
5.3.4.1 A pipeline shall be constructed in accordance with recognized and generally accepted industry practices.

5.3.4.2 An operator should keep appropriate construction records for the life of the pipeline.

5.3.5 Cover Requirements

5.3.5.1 If a pipeline is buried at the time of installation, an operator should consider providing at least 30” of cover in normal soil and 18” of cover in consolidated rock for the purpose of integrity management and damage prevention.

5.3.5.2 If a pipeline is buried at the time of installation, an operator should consider providing additional cover or additional protective measures at rail, road, or water crossings.

5.3.5.3 If a pipeline is not buried at the time of installation, or a pipeline is buried with less cover than recommended in Section 5.3.5.1, an operator should consider implementing other measures to protect the pipeline from potential threats.

5.3.6 Location

An operator should keep appropriate records documenting the location of pipe and components for the life of the pipeline.

5.3.7 Testing

5.3.7.1 A pipeline shall be tested in accordance with recognized and generally accepted industry practices to substantiate MAOP.

5.3.7.2 Testing to substantiate MAOP for a component shall not be required if a component carries a pressure rating established in accordance with recognized and generally accepted industry practices, including a manufacturer’s certification.

5.3.7.3 Appropriate records documenting the medium, pressure, and duration of a test to substantiate MAOP should be kept for the life of the pipeline.

6 Corrosion Control

This section contains corrosion control and cathodic protection provisions for metallic Type C gathering lines.

6.1 External Corrosion Control for Buried or Submerged Pipelines

6.1.1 Cathodic Protection

6.1.1.1 General

A buried metallic pipeline shall have a cathodic protection system that is consistent with recognized and generally accepted industry practices, unless the operator demonstrates any of the following by tests, investigations, or experience:

— A corrosive environment does not exist,
— The pipe material is suitable for its design life without cathodic protection, or
— The installation of a cathodic protection system is impractical.

6.1.1.2 Test Stations

If a pipeline is under cathodic protection, the operator shall have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection.

6.1.1.3 Unprotected Pipelines

An operator shall evaluate a buried metallic pipeline that does not have a cathodic protection system at least once every 5 years and apply appropriate protective measures in areas where active corrosion is found.
6.1.1.4 Monitoring
A pipeline under cathodic protection shall be tested for adequate levels of cathodic protection at least once every 2 calendar years not to exceed 27 months.

6.1.1.4.1 A rectifier or other impressed current power source shall be inspected for proper operation at least four times each calendar year at intervals not exceeding three and a half months.

6.1.1.4.2 A reverse current switch, diode, and interference bond whose failure would jeopardize structure protection shall be electrically checked for proper performance at least four times each calendar year at intervals not exceeding three and a half months.

6.1.1.5 Remedial Action
An operator shall take remedial action to correct any deficiencies indicated by the monitoring performed in accordance with Section 6.1.1.4. The remedial actions shall be completed within a timeframe commensurate with the identified threat.

6.1.2 Coating

6.1.2.1 If cathodic protection is applied, a new metallic pipeline shall have an external protective coating.

6.1.2.2 If cathodic protection is applied, an operator shall protect external protective coating from damage resulting from adverse ditch conditions or damage from supporting blocks.

6.1.3 Electrical Isolation

6.1.3.1 A buried or submerged metallic pipeline should be electrically isolated where necessary to facilitate the application of corrosion control.

6.1.3.2 A cathodically protected pipeline should be electrically isolated from metallic casings that are part of an underground system where corrosion is a threat, unless other measures are taken to minimize corrosion of the pipeline inside the casing.

6.1.3.3 Inspection and electrical tests should be made to ensure that electrical isolation is adequate.

6.1.3.4 An isolation device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.

6.1.3.5 Where a buried or submerged metallic pipeline is near electrical transmission tower footings, ground cables, or counterpoise, the pipeline should be protected against damage due to fault currents or lightning and protective measures should be taken at isolating devices.

6.1.4 Stray currents
If a pipeline is subjected to stray currents, the operator shall address the detrimental effects of such currents. An impressed current-type cathodic protection system or galvanic anode system shall be designed and installed to minimize any adverse effects on existing adjacent underground metallic structures.

6.2 Internal Corrosion Control
If a corrosive gas stream is transported in a buried metallic pipeline, the operator shall take steps to minimize corrosion or demonstrate that the level of corrosivity is acceptable. An operator should conduct monitoring to determine the effectiveness of the steps taken.

6.3 Atmospheric Corrosion Control
At least once every 3 calendar years, not to exceed 39 months, an operator shall inspect a pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion. If atmospheric corrosion is found that could affect the safe operation of the pipeline, the operator shall take appropriate remedial action.

6.4 Determining the Remaining Strength of Pipe
An operator may determine the strength of pipe based on actual remaining wall thickness in accordance with recognized and generally accepted industry practices. If the actual remaining wall thickness is insufficient to maintain the safe operation of the pipeline, the operator shall take appropriate remedial action.
6.5 Corrosion Control Records
An operator shall keep records documenting the adequacy of corrosion control measures for at least five years.

6.6 Implementation
The operator of a new pipeline should implement the provisions of Section 6 within 12 months of completion of construction. Unless the operator of an existing pipeline finds that a later implementation date is justified, the operator should implement the provisions of this section within 24 months of determining that the pipeline is a Type C gathering line.

7 Maximum Allowable Operating Pressure

7.1 The operating pressure shall not exceed the MAOP of the pipeline as determined in accordance with recognized and generally accepted industry practices.

7.2 For a new pipeline, the MAOP shall not exceed the lowest of the following pressures, as applicable:
   — The design pressure of the pipeline.
   — The test pressure of the pipeline.
   — The maximum safe pressure after considering the history of the pipeline, particularly known corrosion and the actual operating pressure.

7.3 For an existing pipeline, the maximum allowable operating pressure shall not exceed the lowest of the following pressures, as applicable:
   — The highest actual operating pressure that the pipeline experienced in the five years prior to implementation of this recommended practice unless the pipeline is tested to substantiate the maximum allowable operating pressure or is uprated to increase the previously established MAOP.
   — The maximum safe pressure after considering the history of the pipeline, particularly known corrosion and the actual operating pressure.

7.3.1 An operator should keep appropriate records documenting established MAOP for the life of the pipeline.

7.4 Uprating
7.4.1 The previously established MAOP of a pipeline may be increased if the operator implements a written procedure that meets the following conditions and is otherwise consistent with recognized and generally accepted industry practices.

7.4.1.1 The design, construction, testing, operation, and maintenance history of the pipeline is reviewed to determine if the higher MAOP is safe.

7.4.1.2 The pipeline is inspected for physical defects and operating conditions that could reasonably be expected to impair the integrity of the pipeline.

7.4.1.3 Any physical defects and operating conditions discovered during an inspection are repaired or corrected.

7.4.1.4 Records are available to demonstrate that the pipeline previously received an adequate test to a pressure greater than or equal to the higher MAOP.

7.4.1.5 If records are not available to demonstrate that the pipeline previously received an adequate test, the pressure of the pipeline is increased in appropriate increments to substantiate the higher MAOP, provided that appropriate action is taken after each incremental increase to detect and remediate leaks.

7.4.1.6 The higher MAOP does not exceed the MAOP permitted for a new line of the same design in the same location.
7.4.2 Appropriate records of any investigations, tests, repairs, replacements, and alterations performed in uprating the previously established MAOP of a pipeline should be kept for the life of the pipeline.

8 Operations and Maintenance

8.1 General
This section contains operations and maintenance provisions for new and existing pipelines.

8.2 Implementation
8.2.1 Existing Pipelines
An operator of an existing pipeline should develop and implement a program to comply with the operations and maintenance provisions in this section within 24 months of determining that the pipeline is a Type C.

8.2.2 New Pipelines
An operator of a new pipeline should develop and implement a program to comply with the operations and maintenance provisions of this section when the pipeline is placed into service.

8.2.3 General
An operator of a Type C Gathering Line shall carry out the requirements of section 5.1.1.

8.2.4 Damage Prevention Program
An operator shall participate in an applicable one-call system or damage prevention program.

8.2.5 Line Markers
8.2.5.1 Location
Buried pipelines shall have a line marker placed at the crossing of a public roadway, an active railway, or any other location deemed appropriate by the operator such as areas where there is a likelihood for damage.

8.2.5.2 Warning
A new or replaced line marker shall include a warning notifying the public about the presence of a gas pipeline, the operator’s name and a telephone number where the operator can be reached at all times.

8.2.5.3 Inspection
An operator shall inspect line markers where practicable during the performance of other field activities. If the inspection indicates that a line marker is missing or contains inaccurate information, appropriate remedial action should be taken.

8.2.5.4 Aboveground Installations
Markers or other signs may be placed at above-ground piping or facilities.

8.2.6 Public Awareness
An operator shall develop and implement a public awareness program to educate the public, emergency responders, and persons engaged in excavation-related activities on the essential elements identified in Section 8.2.6.1. Refer to API 1162 for further information on public awareness programs.

8.2.6.1 Essential Elements
A public awareness program shall include provisions that address the following topics:

— Use of a one-call notification system prior to excavation;
— Indications that a release of a gas from a pipeline may have occurred;
— Possible hazards associated with unintended releases of gas from a pipeline;
Steps that can be taken to protect the public if gas is released from a pipeline; and
— Procedures for reporting an unintentional release of gas from a pipeline.

8.2.6.2 Local Knowledge
An operator may use local knowledge to identify the affected stakeholders covered in a public awareness program.

8.2.6.3 Operator Discretion
An operator may exercise discretion in determining the appropriate means of educating affected stakeholders, given local conditions.

8.2.7 Leak Surveys & Mitigation
8.2.7.1 Leak Survey
A leak survey shall be conducted at least once every three calendar years, not to exceed 39 months, or more frequently if deemed necessary by the operator based on local knowledge or leak history.

8.2.7.2 Leak Mitigation
An operator shall mitigate a leak that presents an immediate hazard to the public.

8.2.8 Emergency Response
An operator shall have a means for receiving notifications and responding to a pipeline emergency.

8.2.9 Repair
An operator shall make repairs in a safe manner in accordance with recognized and generally accepted industry practices.

9 Conversion to Service
9.1 Conversion
A pipeline previously used to transport a substance other than gas may be converted to use under this RP if the operator implements a written procedure that meets the following conditions and is otherwise consistent with recognized and generally accepted industry practices:

- The design, construction, operation, and maintenance history of the pipeline shall be reviewed and, where sufficient historical records are not available to demonstrate fitness, appropriate tests performed to determine if the pipeline is fit for service.
- The pipeline right-of-way, all aboveground segments of the pipeline, and appropriately selected underground segments should be visually inspected for physical defects and operating conditions which reasonably could be expected to impair the strength or tightness of the pipeline.
- All known unsafe defects and conditions shall be corrected in accordance with this RP.

9.2 An operator shall keep appropriate records of any investigations, tests, repairs, replacements, or alterations performed as part of a conversion to service for the life of the pipeline.

10 Change of Service
10.1 If a Type D gathering line becomes a Type C gathering line, the operator should review their procedures with regards to the reclassified pipeline's Type C requirements.

Bibliography
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- AGA Catalog No. XR0603: Plastic Pipe Manual for Gas Service
• Gas Piping Technology Committee’s Guide Material Appendix G-192-15, Design of Uncased Pipeline Crossings of Highways and Railroads
• Directional Drilling Damage Prevention Guidelines for the Natural Gas Industry

API Standards
• API Spec 5L: Specification for Line Pipe
• API RP 5L1, Recommended Practice for Railroad Transportation of Line Pipe
• API RP 5LW, Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels
• API RP 17B, Recommended Practice for Flexible Pipe
• API RP 500, Recommended Practices for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
• API RP 1102, Steel Pipelines Crossing Railroads and Highways
• API RP 1110, Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide
• API Spec 6D, Specification for Pipeline and Piping Valves
• API Spec 17J, Specification for Unbonded Flexible Pipe
• API Std 1104, Welding of Pipelines and Related Facilities

ASME Standards
• ASME B31G, Manual for Determining the Remaining Strength of Corroded Pipelines: Supplement to ASME B31 Code for Pressure Piping
• ASME B31.3, Process Piping
• ASME B31.8S, Managing System Integrity of Gas Pipelines
• ASME BPV Code: Section II, Materials; Section VIII, Rules for Construction of Pressure Vessels; and Section IX, Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators
• ASME PCC-2, including Supplement 1, Repair of Pressure Equipment and Piping

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• ASTM A105/A105M, Standard Specification for Carbon Steel Forgings for Piping Applications
• ASTM A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
• ASTM A125, Standard Specification for Steel Springs, Helical, Heat-Treated
• ASTM A134 , Standard Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
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ASTM A181/A181M, Standard Specification for Carbon Steel Forgings, for General-Purpose Piping
ASTM A182/A182M, Standard Specification for Forged or Rolled Alloy and Stainless-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service
ASTM A193/A193M, Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature or High-Pressure Service and Other Special Purpose Applications
ASTM A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A197/A197M-00, Standard Specification for Cupola Malleable Iron
ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A320/A320M, Standard Specification for Alloy Steel and Stainless Steel Bolting for Low-Temperature Service
ASTM A216/A216M, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service
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ASTM A575, Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
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- ASTM A1006/A1006M, Standard Specification for Steel Line Pipe, Black, Plain-End, Laser Beam Welded
- ASTM B21/B21M, Standard Specification for Naval Brass Rod, Bar, and Shapes
- ASTM B42, Standard Specification for Seamless Copper Pipe, Standard Sizes
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- ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings
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- ASTM B584, Standard Specification for Copper Alloy Sand Castings for General Applications
- ASTM D1598, Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
- ASTM D2513, Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings
- ASTM D2517, Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings
- ASTM D2837, Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
- ASME F1041, Standard Guide for Squeeze-Off of Polyolefin Gas Pressure Pipe and Tubing
- ASTM F1563, Standard Specification for Tools to Squeeze-Off Polyethylene (PE) Gas Pipe or Tubing
- ASTM F2817 Standard Specification for Poly (Vinyl Chloride) (PVC) Gas Pressure Pipe and Fittings for Maintenance or Repair
- ASTM F2945 Standard Specification for Polyamide 11 Gas Pressure Pipe, Tubing, and Fittings

CGA Standards
- Best Practices Guide

EPRI Standards
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GPA Standards
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- GPA Standard 2265-68, Determination of Hydrogen Sulfide and Mercaptan Sulfur in Natural Gas (Cadmium Sulfate Iodometric Titration Method)
- GPA Plant Operations Test Manual, Section C, Test for Hydrogen Sulfide in LPG and Gases (Tutweiler Method)

**GRI Standards**

- GRI-00/0154, Design Guide for Polyethylene Gas Pipes Across Bridges
- GRI-00/0192.01, GRI Guide for Locating and Using Pipeline Industry Research. Section 1: Fracture Propagation and Arrest
- GRI-00/0192.02, GRI Guide for Locating and Using Pipeline Industry Research. Section 2: Defect Assessment
- GRI-00/0192.03, GRI Guide for Locating and Using Pipeline Industry Research. Section 3: Identifying Types of Defects and Causes of Pipeline Failures
- GRI-00/0192.04, GRI Guide for Locating and Using Pipeline Industry Research. Section 4: Hydrostatic Testing
- GRI-00/0192.05, GRI Guide for Locating and Using Pipeline Industry Research. Section 5: Line Pipe
- GRI-00/0192.06, GRI Guide for Locating and Using Pipeline Industry Research. Section 6: Welding
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- GRI-00/0192.09, GRI Guide for Locating and Using Pipeline Industry Research. Section 9: Mechanical Damage
- GRI-00/0192.10, GRI Guide for Locating and Using Pipeline Industry Research. Section 10: Corrosion
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- GRI-00/0192.14, GRI Guide for Locating and Using Pipeline Industry Research. Section 14: In-Line Inspection
- GRI-00/0192.15, GRI Guide for Locating and Using Pipeline Industry Research. Section 15: Special Situations
- GRI-00/0192.16, GRI Guide for Locating and Using Pipeline Industry Research. Section 16: Risk Assessment
- GRI-00/0192.17, GRI Guide for Locating and Using Pipeline Industry Research. Section 17: Geographical Information Systems

**MSS Standards**

- MSS SP-6, Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
- MSS SP-25, Standard Marking System for Valves, Fittings, Flanges, and Unions
- MSS SP-44, Steel Pipeline Flanges
- MSS SP-61, Pressure Testing of Valves
- MSS SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends
- MSS SP-71, including Errata through February 2013, Gray Iron Swing Check Valves, Flanged and Threaded Ends
- MSS SP-75, High-Strength, Wrought, Butt-Welding Fittings
- MSS SP-78, Gray Iron Plug Valves, Flanged and Threaded Ends
• MSS SP-115 Excess Flow Valves, 1 ¼ NPS and Smaller, for Natural Gas Service

**NACE Standards**
- ANSI/NACE MR0175/ISO 15156, Petroleum and Natural Gas Industries — Materials for Use in H2S Containing Environments in Oil and Gas Production - Parts 1, 2, and 3
- NACE SP0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems
- NACE SP0177, Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems

**NFPA Standards**
- NFPA 30, Flammable and Combustible Liquids Code (including Errata 1)
- NFPA 70, National Electrical Code (including Amendments 1-8)
- NFPA 220, Standard on Types of Building Construction

**PPI Standards**
- Handbook of Polyethylene Pipe
- TR-3, Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe
- TR-4, Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe
- TR-33, Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe
- TR-41, Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping

**PRCI Standards**
- PRCI PR-185-9734 (PRCI Catalog L51782), Guidelines for Weld Deposition Repair on Pipelines
- PRCI PR-186-0324 (PRCI Catalog L52047), Updated Pipeline Repair Manual
- PRCI PR-218-05404 (PRCI Catalog L52314), Pipeline Defect Assessment — A Review and Comparison of Commonly Used Methods
- PRCI PR-218-9307 (PRCI Catalog L51716), Pipeline Repair Manual

**Other**
- Horizontal Directional Drilling — Good Practices Guidelines Publisher: HDD Consortium, available through North American Society for Trenchless Technology (NASTT), 7745 Morgan Road, Liverpool, NY 13090 ([www.nastt.org](http://www.nastt.org))
- PRCI PR-227-03110, Installation of Pipelines Using Horizontal Directional Drilling, — An Engineering Design Guide. Publisher: Pipeline Research Council International (PRCI), 3141 Fairview Park Drive, Falls Church, VA 22042 ([www.prci.org](http://www.prci.org))