

SECTION 33 51 00**NATURAL-GAS DISTRIBUTION****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This section specifies materials and procedures for the construction of outside underground gas distribution system for natural gas, complete, ready for operation, including cathodic protection if required, all appurtenant structures, and connections to existing gas supply. This specification does not apply to LPG distribution systems.
- B. Contractor shall relocate existing steel natural-gas lines that conflict with the new storm drainage pipe.

1.2 RELATED WORK

- A. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 00, EARTHWORK.
- B. Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1.3 DEFINITIONS

- A. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 ABBREVIATIONS

- A. HDPE: High-density polyethylene plastic
- B. PE: Polyethylene plastic
- C. WOG: Water, oil and gas
- D. NRTL: National recognized testing laboratory

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
- B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
- D. Protect stored pipes.

1.6 COORDINATION

- A. Coordinate connection to natural-gas main with Utility Company.
- B. Coordinate any required shutdown with VA and Utility Company.

1.7 QUALITY ASSURANCE:**A. Products Criteria:**

1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

- B. Comply with the rules and regulations of the Utility Company having jurisdiction over the connection to public natural-gas lines and the extension, and/or modifications to public utility systems.

1.8 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred in the text by basic designation only. The latest edition of the publication shall apply.

B. American National Standards Institute (ANSI):

- B31.8-2010.....Gas Transmission and Distribution Piping
Systems
- B109.1-92.....Diaphragm-Type Gas Displacement Meters (Under
500-Cubic-Feet-per-hour Capacity)
- B109.2-2000.....Diaphragm-Type Gas Displacement Meters (500-
Cubic-Feet-per-hour Capacity and over)
- B109.3-92.....Rotary-Type Gas Displacement Meters
- IAS LC 1-2005.....Fuel Gas Piping Systems Using Corrugated
Stainless Steel Tubing (CSST)
- Z21.18-07/CSA 6.3-07....Gas Appliance Pressure Regulators
- Z21.21-2005/CSA 6.5.....Automatic Valves for Gas Appliances
- Z21.41-2003/CSA 6.9.....Quick Disconnect Devices for Use with Gas Fuel
Appliances
- Z21.75-2007/CSA 6.27....Connectors for Outdoor Gas Applications and
Manufactured Homes

Z21.80a-2005/CSA 6.22a..Line Pressure Regulators, Addenda 1 to Z21.80-
2003/CSA 6.22

C. American Petroleum Institute (API):

Spec 6D-2010.....Pipeline Valves

D. American Society of Civil Engineers (ASCE):

25-06.....Earthquake Actuated Automatic Gas Shutoff
Devices

E. American Society of Mechanical Engineers (ASME):

B1.20.1-1983.....Pipe Threads, General Purpose, Inch

B1.20.3-2008.....Dryseal Pipe Threads (Inch)

B16.3-2006.....Malleable Iron Threaded Fittings: Classes 150
and 300

B16.5-2009.....Pipe Flanges and Flanged Fittings: NPS 1/2
through NPS 24 Metric/Inch Standard

B16.9-2007.....Factory-Made Wrought Buttwelding Fittings

B16.11-2009.....Forged Fittings, Socket-Welding and Threaded

B16.20-2007.....Metallic Gaskets for Pipe Flanges: Ring-Joint,
Spiral-Wound, and Jacketed

B16.26-2006.....Cast Copper Alloy Fittings for Flared Copper
Tubes

B16.33-2002.....Manually Operated Metallic Gas Valves for use
in Gas Piping Systems up to 125 psi (Sizes NPS
1/2 through NPS 2)

B16.34-2009.....Valves - Flanged, Threaded and Welded End

B16.38-2007.....Large Metallic Valves for Gas Distribution
Manually Operated, NPS 2-1/2 (DN 65) to NPS 12
(DN 300), 125 psig (8.6 bar) Maximum

B16.39-2009.....Malleable Iron Threaded Pipe Unions: Classes
150, 250, and 300

B16.40-2008.....Manually Operated Thermoplastic Gas Shutoffs
and Valves in Gas Distribution Systems

B18.2.1-2010.....Square, Hex, Heavy Hex, and Askew Head Bolts
and Hex, Heavy Hex, Hex Flange, Lobed Head, and
Lag Screws (Inch Series)

B31.8-2010.....Gas Transmission and Distribution Piping
Systems

MFC-4M-1986.....Measurement of Gas Flow by Turbine Meters

F. American Society of Safety Engineers (ASSE):

1079-2005.....Dielectric Pipe Unions

G. American Society for Testing and Materials (ASTM):

A53/A53M-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated,
Welded and Seamless

A126-042009).....Gray Iron Castings for Valves, Flanges, and
Pipe Fittings

A234/A234M-11.....Piping Fittings of Wrought Carbon Steel and
Alloy Steel for Moderate and High Temperature
Service

A312/A312M-11.....Seamless, Welded, and Heavily Cold Worked
Austenitic Stainless Steel Pipes

B210-04.....Aluminum and Aluminum-Alloy Drawn Seamless
Tubes

B241/B241M-10.....Aluminum and Aluminum-Alloy Seamless Pipe and
Seamless Extruded Tube

B584-11.....Copper Alloy Sand Castings for General
Applications

D2513-11e1.....Polyethylene (PE) Gas Pressure Pipe, Tubing,
and Fittings

D2517-06.....Reinforced Epoxy Resin Gas Pressure Pipe and
Fittings

D2683-10.....Socket-Type Polyethylene Fittings for Outside
Diameter-Controlled Polyethylene Pipe and
Tubing

D2774-08.....Underground Installation of Thermoplastic
Pressure Piping

D3261-10a.....Butt Heat Fusion Polyethylene (PE) Plastic
Fittings for Polyethylene (PE) Plastic Pipe and
Tubing

E84-11.....Standard Test Method for Surface Burning
Characteristics of Building Materials

H. American Water Works Association (AWWA):

C203-08.....Coal-Tar Protective Coatings and Linings for
Steel Water Pipelines - Enamel and Tape - Hot
Applied

I. American Welding Society (AWS):

A5.8/A5.8M:2004.....Filler Metals for Brazing and Braze Welding

D10.12/D10.12M:2000.....Guide for Welding Mild Steel Pipe

J. Manufacturers Standardization Society (MSS):

SP-78-2005.....Gray Iron Plug Valves Flanged and Threaded Ends

SP-110-2010.....Ball Valves Threaded, Socket-Welding, Solder
Joint, Grooved and Flared Ends

K. National Fire Protection Agency (NFPA):

54-2009.....National Fuel Gas Code

70-2011.....National Electric Code

L. Society of Automotive Engineers (SAE):

J513-199901.....Refrigeration Tube Fittings - General
Specifications *HS-150/2000*

M. Underwriters Laboratories (UL):

UL 429-2010.....Electrically Operated Valves

1.9 WARRANTY

A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of two years from final acceptance. Further, the Contractor will furnish all manufacturer's and supplier's written

guarantees and warranties covering materials and equipment furnished under this Contract.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: Steel pipe shall be as per ASTM A53, black steel, Schedule 40, Type S, Grade B. Copper tubes are not allowed by code for natural gas distribution in the United States.

B. Fittings:

1. Malleable-Iron Threaded Fittings shall meet ASME B16.3, Class 150, standard pattern. Threaded joints are not permitted except at valve connections.
2. Butt weld fittings shall be wrought steel, per ASME B16.9.
3. Wrought-Steel Welding Fittings shall meet ASTM A234 for butt welding and socket welding.
4. Unions shall be ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
5. Forged-Steel Flanges and Flanged Fittings shall be ASME B16.5 or ASME B16.11, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections shall be threaded or butt welded to match pipe.
 - c. Lapped Face is not permitted underground.
 - d. Gasket Materials shall be ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - e. Bolts and Nuts shall be ASME B18.2.1, carbon steel aboveground and stainless steel underground.
6. Protective Coating for Underground Piping:
 - a. Factory-applied, three-layer coating of epoxy, adhesive, and polyethylene (PE).
 - b. Coal Tar Enamel Coating on exterior of pipe and fittings shall be cleaned, primed with Type B primer and coated with hot-applied coal-tar enamel with bonded layer of felt wrap in accordance with AWWA C203. Asbestos felt shall not be used; felt material shall be fibrous-glass mat as specified in Appendix Sec. A2.1 of AWWA C203.
 - c. Joint cover kits shall include epoxy paint, adhesive, and heat-shrink PE sleeves.
7. Mechanical Couplings shall include:

- a. Stainless-steel flanges and tube with epoxy finish.
 - b. Buna-nitrile seals.
 - c. Stainless-steel bolts, washers, and nuts.
 - d. Couplings shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
8. Steel Mechanical Couplings shall be capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe. Include:
- a. Stainless-steel flanges and tube with epoxy finish.
 - b. Buna-nitrile seals.
 - c. Stainless-steel bolts, washers, and nuts.
 - d. Factory-installed anode for steel-body couplings installed underground.

2.2 JOINING MATERIALS

- A. Joint Compound and Tape shall be suitable for natural-gas.
- B. Welding filler metals shall comply with AWS D10.12 for appropriate wall thickness and chemical analysis of steel pipe being welded.
- C. Brazing filler metals shall be alloy with a melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.3 DIELECTRIC FITTINGS

- A. Dielectric Unions shall comply with ASSE 1079 and have a pressure rating of 150 psi (1035 kPa).
- B. Dielectric Flanges shall comply with ASSE 1079 and have a pressure rating of 150 psi (1035 kPa).
- C. Dielectric-Flange insulating kits shall have a pressure rating of 150 psi (1035 kPa).

2.4 LABELING AND IDENTIFYING

- A. Detectable warning tape shall be acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored yellow.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Close equipment shutoff valves before turning off natural-gas to premises or piping section.
- B. Inspect natural-gas piping according to NFPA 54 and the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.
- C. Comply with NFPA 54 and the International Fuel Gas Code requirements for prevention of accidental ignition.

3.2 METALLIC PIPING INSTALLATION

- A. Heating trenches, storm and sanitary sewer lines, and water mains shall have right of way.
- B. Warning tape shall be continuously placed 12 inches (300 mm) above buried gas lines.
- C. Main services and main service shut off valves shall have a 24 inch (600 mm) minimum cover or as recommended by local utility.
- D. Service lines shall have an 24 inch (600 mm) minimum cover or as recommended by local utility.
- E. Where indicated, the main shall be concrete-encased.
- F. Connections between metallic and plastic piping shall be made only outside, underground, and with approved transition fittings.

3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Install underground, natural-gas piping buried at least 36 inches (900 mm) below finished grade.
- C. Install fittings for changes in direction and branch connections.

3.4 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.

3.5 LABELING AND IDENTIFYING

- A. Install detectable warning tape directly above gas piping, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.6 PIPE CLEANING

- A. All pipe sections shall be blown down with 100 psi (690 kPa) air to remove all sand, soil and debris.

- B. Blow down procedure shall be done after system is complete, but before valves are installed.

3.7 TESTS

- A. Piping System: Inspection, testing and purging shall be in accordance with NFPA 54 and ASME B31.8. Maximum working pressure will be 14 psi.

3.8 OUTDOOR PIPING SCHEDULE

- A. Underground natural-gas piping shall be the following:
 - 1. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.
- B. Containment conduit shall be steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

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