

SECTION 15195 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes:
1. Pipes, tubes, and fittings.
  2. Piping specialties.
  3. Piping and tubing joining materials.
  4. Valves.
  5. Pressure regulators.

1.02 REFERENCES:

- A. Applicable Standards (latest editions):
1. American Gas Association/International Code Council (AGA/ICC):
    - a. 2003 International Fuel Gas Code.
  2. American National Standards Institute (ANSI):
    - a. B109.1 - Diaphragm-Type Gas Displacement Meters (500 Cubic Feet per Hour Capacity and Under).
    - b. B109.2 - Diaphragm-Type Gas Displacement Meters (over 500 Cubic Feet per Hour Capacity).
    - c. B109.3 - Rotary-Type Gas Displacement Meters.
    - d. Z21.18 - Gas Appliance Pressure Regulators.
    - e. Z21.21 - Automatic Valves for Gas Appliances.
    - f. Z21.24 - Metal Connectors for Gas Appliances.
    - g. Z21.41 - Quick Disconnect Devices for Use with Gas Fuel Appliances.
    - h. Z21.69 - Connectors for Movable Gas Appliances.
    - i. Z21.75 - Connectors for Outdoor Gas Appliances and Manufactured Homes.
    - j. Z21.80 - Line Pressure Regulators.
  3. American National Standards Institute/International Approval Services (ANSI/IAS):
    - a. LC 1 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST).
  4. American Society of Civil Engineers (ASCE):
    - a. 25 - Earthquake Actuated Automatic Gas Shutoff Devices.
  5. American Welding Society (AWS):
    - a. A5.8/A5.8M - Specifications for Filler Metals for Brazing and Braze Welding.
    - b. D1.1/D1.1M - Structural Welding Code - Steel.
    - c. D10.12/D10.12M - Guide for Welding Mild Steel Pipe.
    - d. AWS Brazing Handbook. Ch. 22, "Pipe and Tube."
  6. ASME International (ASME):
    - a. B16.5 - Pipe Flanges and Flanged Fittings.
    - b. B16.20 - Metallic Flat Gaskets for Pipe Flanges: Ring Joint Spiral Wound and Jacketed.
    - c. B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
    - d. B16.24 - Cast Copper Alloy Pipe Flanges, Class 150, 300, 400, 600, 900, 1500, and 2500, and Flanged Fittings, Class 150 and 300.
    - e. B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
    - f. B16.33 - Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes 1/2 through 2).

- g. B16.38 - Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2-1/2 to 12, 125 psig Maximum).
  - h. B16.40 - Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems.
  - i. B18.2.1 - Square and Hex Bolts and Screws, Inch Series.
  - j. MFC-4M - Measurement of Gas Flow by Turbine Meters.
  - k. 2004 ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
7. ASTM International (ASTM):
- a. A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - b. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  - c. A234/A234M - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderated and High Temperature Service.
  - d. A240/A240M - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - e. B88 - Seamless Copper Water Tube.
  - f. B88M - Seamless Copper Water Tube [Metric].
  - g. B210 - Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
  - h. B241/B241M - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
  - i. B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
  - j. B584 - Copper Alloy Sand Castings for General Applications.
  - k. B837 - Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution System.
  - l. C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
  - m. D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
  - n. D2657 - Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
  - o. D2683 - Socket-Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
  - p. D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
  - q. E84 - Test Method for Surface Burning Characteristics of Building Materials.
8. CSA International (CSA):
- a. B149.1 - Natural Gas and Propane Installation Code.
9. Manufacturers Standardization Society of The Valve and Fittings Industry, Inc. (MSS):
- a. SP-69 - Pipe Hangers and Supports - Selection and Application.
10. National Electric Manufacturers Association (NEMA):
- a. ICS 6 - Industrial Control and Systems Enclosures.
11. National Fire Protection Association (NFPA):
- a. 54 - National Fuel Gas Code (ANSI).
  - b. 70 - National Electric Code.
12. SAE International (SAE):
- a. J513 - Refrigeration Tube Fittings.
13. Underwriters Laboratory (UL):
- a. 429 - Electrically Operated Valves.

1.03 DEFINITIONS:

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.04 PERFORMANCE REQUIREMENTS:

- A. Minimum Operating-Pressure Ratings:
  - 1. Piping and Valves: 100 psig (690 kPa) minimum unless otherwise indicated.
- B. Natural-Gas System Pressure within Buildings: More than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa).
- C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.05 SUBMITTALS:

- A. General: Submit the following in accordance with SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS.
- B. Product Data: For each type of the following:
  - 1. Piping specialties.
  - 2. Corrugated, stainless-steel tubing with associated components.
  - 3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
  - 4. Pressure regulators. Indicate pressure ratings and capacities.
- C. Qualification Data: For qualified professional engineer.
- D. Welding certificates.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For motorized gas valves and pressure regulators to include in emergency, operation, and maintenance manuals.

1.06 QUALITY ASSURANCE:

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Handling Flammable Liquids: 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 PE pipes and valves from direct sunlight.

1.08 PROJECT CONDITIONS:

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
  - 1. Notify Contracting Officer no fewer than two days in advance of proposed interruption of natural-gas service.
  - 2. Do not proceed with interruption of natural-gas service without Contracting Officer written permission.

1.09 COORDINATION:

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in DIVISION 8.

PART 2 - PRODUCTS

2.01 PIPES, TUBES, AND FITTINGS:

- A. Steel Pipe: ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
  - 1. Wrought-Steel Welding Fittings: ASTM A234/A234M for butt welding and socket welding.
  - 2. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, 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: Butt welding to match pipe.
    - c. Lapped Face: Not permitted underground.
    - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
  - 3. Mechanical Couplings:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - (1) Dresser Piping Specialties; Division of Dresser, Inc.
      - (2) Smith-Blair, Inc.
    - b. Steel flanges and tube with epoxy finish.
    - c. Buna-nitrile seals.
    - d. Steel bolts, washers, and nuts.
    - e. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
    - f. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

2.02 PIPING SPECIALTIES:

- A. Appliance Flexible Connectors:
  - 1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
  - 2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
  - 3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
  - 4. Corrugated stainless-steel tubing with polymer coating.
  - 5. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
  - 6. End Fittings: Zinc-coated steel.
  - 7. Maximum Length: 72 inches (1830 mm).
- B. Y-Pattern Strainers:
  - 1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
  - 2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
  - 3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50% free area.
  - 4. CWP Rating: 125 psig (862 kPa).
- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.03 JOINING MATERIALS:

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 MANUAL GAS SHUTOFF VALVES:

- A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.
- B. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.
  - 1. CWP Rating: 125 psig (862 kPa).
  - 2. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
  - 3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  - 4. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
  - 5. Service Mark: Valves 1-1/4-inches (32-mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.
- C. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with ASME B16.38.
  - 1. CWP Rating: 125 psig (862 kPa).
  - 2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
  - 3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  - 4. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Conbraco Industries, Inc.; Apollo Div.
    - b. Perfection Corporation; a subsidiary of American Meter Company.
  2. Body: Bronze, complying with ASTM B584.
  3. Ball: Chrome-plated brass.
  4. Stem: Bronze; blowout proof.
  5. Seats: Reinforced TFE; blowout proof.
  6. Packing: Separate packnut with adjustable-stem packing threaded ends.
  7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  8. CWP Rating: 600 psig (4140 kPa).
  9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
  10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- E. Bronze Plug Valves: MSS SP-78.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Lee Brass Company.
  2. Body: Bronze, complying with ASTM B584.
  3. Plug: Bronze.
  4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  5. Operator: Square head or lug type with tamperproof feature where indicated.
  6. Pressure Class: 125 psig (862 kPa).
  7. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
  8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- F. Cast-Iron, Lubricated Plug Valves: MSS SP-78.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Flowserve.
    - b. Mueller Co.; Gas Products Div.
    - c. R&M Energy Systems, A Unit of Robbins & Myers, Inc.
  2. Body: Cast iron, complying with ASTM A126, Class B.
  3. Plug: Bronze or nickel-plated cast iron.
  4. Seat: Coated with thermoplastic.
  5. Stem Seal: Compatible with natural gas.
  6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  7. Operator: Square head or lug type with tamperproof feature where indicated.
  8. Pressure Class: 125 psig (862 kPa).
  9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
  10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.05 MOTORIZED GAS VALVES:

- A. Electrically Operated Valves: Comply with UL 429.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ASCO Power Technologies, LP; Division of Emerson.
    - b. Eclipse Combustion, Inc.
    - c. Goyen Valve Corp.; Tyco Environmental Systems.
    - d. Magnatrol Valve Corporation.
    - e. Parker Hannifin Corporation; Climate & Industrial Controls Group; Skinner Valve Div.
    - f. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
  2. Pilot operated.
  3. Body: Brass or aluminum.
  4. Seats and Disc: Nitrile rubber.
  5. Springs and Valve Trim: Stainless steel.
  6. 120-V ac, 60 Hz, Class B, continuous-duty molded coil, and replaceable.
  7. NEMA ICS 6, Type 4, coil enclosure.
  8. Normally closed.
  9. Visual position indicator.
- 2.06 PRESSURE REGULATORS:
- A. General Requirements:
    1. Single stage and suitable for natural gas.
    2. Steel jacket and corrosion-resistant components.
    3. Elevation compensator.
    4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2-1/2 (DN 65) and larger.
  - B. Appliance Pressure Regulators: Comply with ANSI Z21.18.
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - a. Canadian Meter Company Inc.
      - b. Eaton Corporation; Controls Div.
      - c. Harper Wyman Co.
      - d. Maxitrol Company.
      - e. SCP, Inc.
    2. Body and Diaphragm Case: Die-cast aluminum.
    3. Springs: Zinc-plated steel; interchangeable.
    4. Diaphragm Plate: Zinc-plated steel.
    5. Seat Disc: Nitrile rubber.
    6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
    7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
    8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
    9. Maximum Inlet Pressure: 2 psig (13.8 kPa).
- 2.07 LABELING AND IDENTIFYING:
- A. Detectable Warning Tape: 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

3.01 EXAMINATION:

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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.

3.03 INDOOR PIPING INSTALLATION:

- A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in DIVISION 7.
- L. Verify final equipment locations for roughing-in.
- M. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- N. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
  - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm)



long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

- O. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- P. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- Q. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
  - 1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
  - 2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
    - a. Exception: Tubing passing through partitions or walls does not require striker barriers.
  - 3. Prohibited Locations:
    - a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    - b. Do not install natural-gas piping in solid walls or partitions.
- R. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- S. Connect branch piping from top or side of horizontal piping.
- T. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- U. Do not use natural-gas piping as grounding electrode.
- V. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
- W. Install pressure gauge upstream and downstream from each line regulator. Pressure gauges are specified in SECTION 15122 - METERS AND GAUGES.

3.04 VALVE INSTALLATION:

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
- B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.05 PIPING JOINT CONSTRUCTION:

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
  - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
  - 2. Cut threads full and clean using sharp dies.
  - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
  - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
  - D. Welded Joints:
    1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
    2. Bevel plain ends of steel pipe.
    3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- 3.06 HANGER AND SUPPORT INSTALLATION:
- A. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in SECTION 15071 - MECHANICAL VIBRATION AND SEISMIC CONTROLS.
  - B. Comply with requirements for pipe hangers and supports specified in SECTION 15060 - HANGERS AND SUPPORTS
  - C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
    1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches (2438 mm); minimum rod size, 3/8-inch (10-mm).
    2. NPS 1-1/4 (DN 32): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8-inch (10-mm).
    3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8-inch (10-mm).
    4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet (3 m); minimum rod size, 1/2-inch (13-mm).
- 3.07 CONNECTIONS:
- A. Connect to utility's gas main according to utility's procedures and requirements.
  - B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
  - C. Install piping adjacent to appliances to allow service and maintenance of appliances.
  - D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
  - E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.
- 3.08 LABELING AND IDENTIFYING:
- A. Comply with requirements in SECTION 15075 - MECHANICAL IDENTIFICATION for piping and valve identification.
  - B. 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.
- 3.09 PAINTING:
- A. Comply with requirements in DIVISION 9 for painting interior and exterior natural-gas piping.
  - B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
    1. Alkyd System: MPI EXT 5.1D.

- a. Prime Coat: Alkyd anticorrosive metal primer.
    - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    - c. Topcoat: Exterior alkyd enamel (flat).
    - d. Color: Gray.
  - C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.
- 3.10 FIELD QUALITY CONTROL:
- A. Perform tests and inspections.
  - B. Tests and Inspections:
    - 1. Test, inspect, and purge natural gas according to NFPA 54 and the International Fuel Gas Code and authorities having jurisdiction.
  - C. Natural-gas piping will be considered defective if it does not pass tests and inspections.
  - D. Prepare test and inspection reports.
- 3.11 DEMONSTRATION:
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.
- 3.12 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG (3.45 KPA) AND LESS THAN 5 PSIG (34.5 KPA):
- A. Aboveground, branch piping NPS 2 (DN 50) and smaller shall be the following:
    - 1. Steel pipe with malleable-iron fittings and threaded joints.
  - B. Aboveground, distribution piping shall be the following:
    - 1. Steel pipe with malleable-iron fittings and threaded joints.
- 3.13 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE:
- A. Valves for pipe sizes NPS 2 (DN 50) and smaller at service meter shall be one of the following:
    - 1. One-piece, bronze ball valve with bronze trim.
    - 2. Bronze plug valve.
  - B. Valves in branch piping for single appliance shall be one of the following:
    - 1. One-piece, bronze ball valve with bronze trim.
    - 2. Bronze plug valve.

END OF SECTION 15195

