

## **SECTION 23 11 23 - FACILITY NATURAL GAS PIPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.

#### **1.2 PERFORMANCE REQUIREMENTS**

**A. Minimum Operating-Pressure Ratings:**

1. Piping and Valves: 100 psig minimum unless otherwise indicated.

**B. Natural Gas System Pressure within Buildings: 0.5 psig or less.**

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Welding certificates.
- C. Field quality control reports.
- D. Operation and maintenance data.

#### **1.4 QUALITY ASSURANCE**

- A. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- B. FM Standard: Provide components listed in FM's "Fire Protection Approval Guide" if specified to be FM approved.
- C. IAS Standard: Provide components listed in IAS's "Directory of A. G. A. and C. G. A Certified Appliances and Accessories" if specified to be IAS listed.
- D. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle

flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

## 1.6 COORDINATION

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than five days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without Owner's Representative's written permission.

## PART 2 - PRODUCTS

### 2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53, black steel, Schedule 40, Type E or S, Grade B.
1. Malleable Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
  2. Wrought Steel Welding Fittings: ASTM A 234 for butt welding and socket welding.
  3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

### 2.2 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. Operating Pressure Rating: 0.5 psig.
  4. End Fittings: Zinc coated steel.
  5. Threaded Ends: Comply with ASME B1.20.1.
  6. Maximum Length: 72 inches.
- B. Quick-Disconnect Devices: Comply with ANSI Z21.41.
1. Copper alloy convenience outlet and matching plug connector.
  2. Nitrile seals.
  3. Hand operated with automatic shutoff when disconnected.
  4. For indoor or outdoor applications.
  5. Adjustable, retractable restraining cable.

## 2.3 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.

## 2.4 MANUAL GAS SHUTOFF VALVES

- A. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33. Include AGA stamp.
  - 1. CWP Rating: 125 psig.
  - 2. Threaded Ends: Comply with ASME B1.20.1.
  - 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
  - 4. Listing: Listed and labeled by an NRTL acceptable to Owner's Representative for valves 1 inch and smaller.
  - 5. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.
- B. Two Piece, Full Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
    - a. BrassCraft Manufacturing Company; a Masco company.
    - b. Conbraco Industries, Inc.; Apollo Div.
  - 2. Body: Bronze, complying with ASTM B 584.
  - 3. Ball: Chrome plated bronze.
  - 4. Stem: Bronze; blowout proof.
  - 5. Seats: Reinforced TFE; blowout proof.
  - 6. Packing: Threaded-body packnut design with adjustable-stem packing.
  - 7. Ends: Threaded, flared, or socket.
  - 8. CWP Rating: 600 psig.
  - 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to Owner's Representative.
  - 10. Service: Suitable for natural gas service with "WOG" indicated on valve body.
- C. Bronze Plug Valves: MSS SP-78.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
    - a. Lee Brass Company.
    - b. McDonald, A. Y. Mfg. Co.
  - 2. Body: Bronze, complying with ASTM B 584.
  - 3. Plug: Bronze.

4. Ends: Threaded or socket.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to Owner's Representative.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

## 2.5 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 and smaller.

### B. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 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 Owner's Representative.
9. Maximum Inlet Pressure: 1 psig.

## PART 3 - EXECUTION

### 3.1 INDOOR PIPING INSTALLATION

- A. Comply with 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 07 Section "Penetration Firestopping."
- 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, and in floor channels unless indicated to be exposed to view.
- Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- R. Connect branch piping from top or side of horizontal piping.

- S. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
- T. Do not use natural-gas piping as grounding electrode.

### 3.2 VALVE INSTALLATION

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

### 3.3 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, 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.

### 3.4 HANGER AND SUPPORT INSTALLATION

- A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes: :
  - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
  - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
  - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

### 3.5 CONNECTIONS

- A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
- B. Install piping adjacent to appliances to allow service and maintenance of appliances.
- C. Connect piping to appliances using manual gas shutoff valves, appliance pressure regulators, and unions. Install valve within 72 inches of each gas fired appliance and equipment. Install union between valve and appliances or equipment.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

### 3.6 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each pressure regulator, and specialty valve.
  - 1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- B. Comply with requirements in Division 23 Section "Identification for Mechanical Piping and Equipment" for piping and valve identification.

### 3.7 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas according to the International Fuel Gas Code, gas utility, and Owner's Representative. Minimum 4 hour duration.
- B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
- C. Report test results promptly and in writing to Owner's Representative.
- D. Verify correct pressure settings for pressure regulators.
- E. Verify that specified piping tests are complete.
- F. Natural gas piping will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

### 3.8 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves in branch piping for single appliance shall be one of the following:
  - 1. Two piece, full port, bronze ball valves with bronze trim.
  - 2. Bronze plug valve.

3.9 FLUSHING OF NATURAL GAS PIPING

- A. Description: After completion of natural gas piping installation, flush interior surfaces by injecting dry nitrogen into open ends of piping just prior to making final connections to equipment and utility services.

3.10 ADJUSTING

- A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

**END OF SECTION 23 11 23**