

## SECTION 23 11 23

### FACILITY NATURAL-GAS PIPING

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes:

1. Natural gas piping above grade.
2. Unions and flanges.
3. Valves/earthquake valves.
4. Strainers.
5. Natural gas pressure regulators/venting.
6. Natural gas pressure relief valves.
7. Underground pipe markers.
8. Bedding and cover materials.

###### B. Related Sections:

1. Division 05- Structural Steel Framing: Product requirements for touch-up painting of structural steel.
2. Division 05 - Steel Joist Framing: Product requirements for touch-up painting of steel joists.
3. Division 07 - Firestopping: Product requirements for firestopping for placement by this section.
4. Division 08 - Access Doors and Frames: Access doors for concealed valves and accessories.
5. Division 09 - Painting and Coating: Product requirements for painting for placement by this section.
6. Division 23 - Hangers and Supports for HVAC and Plumbing Piping and Equipment: Product requirements for pipe hangers and supports for placement by this section.
7. Division 23 - Identification for HVAC and Plumbing Piping and Equipment: Product requirements for valve and pipe identification for placement by this section.

##### 1.02 REFERENCES

###### A. American National Standards Institute:

1. ANSI Z21.15 - Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.

###### B. American Society of Mechanical Engineers:

1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.33 - Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
3. ASME B31.9 - Building Services Piping.
4. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

###### C. ASTM International:

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

- D. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
  - 1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
  - 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
  - 3. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
  - 4. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- F. National Fire Protection Association:
  - 1. NFPA 54 - National Fuel Gas Code.
- G. Underwriters Laboratories Inc.:
  - 1. UL 842 - Valves for Flammable Fluids.

### 1.03 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
- B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.
- C. Provide pipe hangers and supports in accordance with ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.
- D. Use plug valves for shut-off and to isolate equipment, part of systems, or vertical risers.

### 1.04 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
  - 2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
  - 3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
  - 4. Piping Specialties: Submit manufacturers catalog information including capacity, rough-in requirements, and service sizes for the following:
    - a. Strainers.
    - b. Natural gas pressure regulators.
    - c. Natural gas pressure relief valves.
- C. Design Data: Indicate pipe size. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Test Reports: Indicate results of piping system pressure test].
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.
- 1.05 CLOSEOUT SUBMITTALS
- A. Division 01 - Execution and Closeout Requirements: Closeout procedures.
  - B. Project Record Documents: Record actual locations of valves piping system, and system components.
  - C. Operation and Maintenance Data: Submit for valves and gas pressure regulators installation instructions, spare parts lists, and exploded assembly views.
- 1.06 QUALITY ASSURANCE
- A. Perform natural gas Work in accordance with NFPA 54.
  - B. Perform work in accordance with applicable code and local gas company requirements.
  - C. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
  - D. Perform Work in accordance with applicable code, authority having jurisdiction and AWS D1.1 for welding hanger and support attachments to building structure.
  - E. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.
  - F. Maintain one copy of each document on site.
- 1.07 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
  - B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Division 01 - Product Requirements: Product storage and handling requirements.
  - B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
  - C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Furnish temporary protective coating on cast iron and steel valves.
- 1.09 ENVIRONMENTAL REQUIREMENTS
- A. Division 01 - Product Requirements.
  - B. Do not install underground piping when bedding is wet or frozen.
- 1.10 FIELD MEASUREMENTS
- A. Verify field measurements prior to fabrication.

1.11 COORDINATION

- A. Division 01 - Administrative Requirements: Requirements for coordination.
- B. Coordinate trenching, excavating, bedding and backfilling of buried piping systems with requirements of Division 31.

1.12 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for valves excluding packing.

1.13 EXTRA MATERIALS

- A. Division 01- Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two packing kits for each type and size valve.

PART 2 PRODUCTS

2.01 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53 Schedule 40 black in building.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234 forged steel welding type.
  - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
  - 3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 20 mil polyethylene tape, thru concrete
  - 4. Prime pipe and fittings with compatible primer prior to application of tape.
- B. Steel pipe: ASTM A53 Schedule 40 galvanized exposed outside the building.

2.02 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
  - 1. Ferrous Piping: Class 150, malleable iron, threaded.
  - 2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
  - 1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
  - 2. Copper Piping: Class 150, slip-on bronze flanges.
  - 3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.03 PLUG VALVES

- A. Manufacturers:
  - 1. DeZURIK, Unit of SPX Corp.
  - 2. Jenkins Brothers
  - 3. Lunkenheimer Co.

- B. 2 inches and Smaller: MSS SP 78, Class 150, semi-steel construction, square port, full pipe area, regular opening, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.
- C. 2-1/2 inches and Larger: MSS SP 78, Class 150, semi-steel construction, square port, full pipe area, regular opening, pressure lubricated, teflon packing, flanged ends. Furnish worm gear-operated.

2.04 STRAINERS

- A. Manufacturers:
  - 1. Mueller Steam Specialty
  - 2. O.C. Keckley Company
  - 3. Spirax Sarco, Inc.
- B. Provide strainer on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve and as indicated elsewhere.
- C. 2 inch and Smaller: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- D. 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
- E. 5 inch and Larger: Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.05 NATURAL GAS PRESSURE REGULATORS

- A. Manufacturers:
  - 1. Fisher
  - 2. Maxetrol
  - 3. National Meter
- B. Product Description: Spring loaded, general purpose, self-operating service regulator including internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in relation to body.
  - 1. Temperatures: minus 20 degrees F to 150 degrees F.
  - 2. Body: Cast iron or Steel.
  - 3. Spring case, lower diaphragm casing, union ring, seat ring and disk holder: Aluminum.
  - 4. Disk, diaphragm, and O-ring: Nitrile
  - 5. Maximum inlet pressure: 150 psig.
  - 6. Furnish sizes 2 inches and smaller with threaded ends. Furnish sizes 2-1/2 inches and larger with flanged ends.

2.06 NATURAL GAS PRESSURE RELIEF VALVES

- A. Manufacturers:
  - 1. Fisher
  - 2. IAMC
  - 3. Kunkle
- B. Product Description: Spring loaded type relief valve.
  - 1. Body: Aluminum.

2. Diaphragm: Nitrile
3. Orifice: Stainless steel.
4. Maximum operating temperature: 150 degrees F.
5. Inlet Connections: Threaded.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.

### 3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions and flex section.

### 3.03 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Division 23.

### 3.04 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Install natural gas piping in accordance with NFPA 54.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Sleeve pipe passing through partitions, walls and floors. Refer to Division 23.
- H. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Division 07.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed. Valves shall be within 24 inches of access. Coordinate size and location of access doors with Division 08.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer. Refer to Division 05.
- L. Provide support for utility meters in accordance with requirements of utility company. Refer to Division 23.
- M. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood or elbow down.

- N. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Division 09.
- O. Install identification on piping systems including underground piping. Refer to Division 23.
- P. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- Q. Install gas pressure regulator with independent vent full size opening on regulator, terminate outdoors.

### 3.05 PIPE JOINTS

- A. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code, Section IX. Pre-clean piping and weld to prevent slag. Reclean by use of pig and blow out with 150 psi air to remove slag.
- B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:
  - C. Note the internal length of threads and fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.
  - D. Align threads at point of assembly.
  - E. Apply appropriate tape or thread compound to the external pipe threads.
  - F. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
  - G. Damaged Threads: Do not use pipe with threads which are stripped, chipped, corroded, or otherwise damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

### 3.06 VALVE INSTALLATIONS

- A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.
- B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.
- C. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position.
- D. Install valves with stems upright or horizontal, not inverted.

### 3.07 TERMINAL EQUIPMENT CONNECTIONS

- A. Install gas cock upstream and within 6 feet of gas appliance. Install a union or flanged connection downstream from the gas cock to permit removal of controls.
- B. Sediment Traps: Install a tee fitting with the bottom outlet plugged or capped as close to the inlet of the gas appliance as practical. Drip leg shall be a minimum of 3 pipe diameters in length.

3.08 ELECTRICAL BONDING AND GROUNDING

- A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves, electrically continuous and bonded to a grounding electrode, in accordance with NFPA 70 - "National Electrical Code".
- B. Do not use gas piping as a grounding electrode.
- C. Conform to NFPA 70 - "National Electrical Code", for electrical connections between wiring and electrically operated control devices.

3.09 FIELD QUALITY CONTROL

- A. Division 01 - Quality Requirements and Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Pressure test natural gas piping in accordance with NFPA 54.
- C. Inspect, test and purge gas piping in accordance with applicable code.
- D. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

END OF SECTION