

SECTION 22 11 23 – FACILITY NATURAL GAS PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Natural gas piping below grade.
 - 2. Natural gas piping above grade.
 - 3. Unions and flanges.
 - 4. Valves.
 - 5. Pipe hangers and supports.
 - 6. Strainers.
 - 7. Natural gas pressure regulators.
 - 8. Underground pipe markers.
 - 9. Bedding and cover materials.
- B. Related Sections:

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 B16.26 – Cast Copper Alloy Fittings for Flared Copper Tubes.
 - 3. ASME B16.33 – Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
 - 4. ASME B31.9 – Building Services Piping.
 - 5. ASME Section IX – Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- C. ASTM International:
 - 1. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM A234/A234M – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 3. ASTM B88 – Standard Specification for Seamless Copper Water Tube.
 4. ASTM B88M – Standard Specification for Seamless Copper Water Tube (Metric).
 5. ASTM B280 – Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
 6. ASTM B749 – Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
 7. 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. American Water Works Association:
1. AWWA C105 – American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
- F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 – Pipe Hangers and Supports - Materials, Design and Manufacturer.
 2. MSS SP 67 – Butterfly Valves.
 3. MSS SP 69 – Pipe Hangers and Supports - Selection and Application.
 4. MSS SP 78 – Cast Iron Plug Valves, Flanged and Threaded Ends.
 5. MSS SP 89 – Pipe Hangers and Supports - Fabrication and Installation Practices.
 6. MSS SP 110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- G. National Fire Protection Association:
1. NFPA 54 – National Fuel Gas Code.
- H. Underwriters Laboratories Inc.:
1. UL 842 – Valves for Flammable Fluids.
- I. International Code Council:
1. International Fuel Gas Code.

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 or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.04 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings and accessories. Submit manufacturer's catalog information.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
 - 3. Piping Specialties: Submit manufacturer's 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. Test Reports: Indicate results of piping system pressure test.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.05 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 – 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 and International Fuel Gas Code.
- B. Perform work in accordance with International Fuel Gas 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 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.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years of documented experience.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 – 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. Section 01 60 00 – 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. Section 01 30 00 – Administrative Requirements: Requirements for coordination.
- B. Coordinate trenching, excavating, bedding and backfilling of buried piping systems with requirements of Section 31 23 33.

1.12 WARRANTY

- A. Section 01 70 00 – Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish 1-year manufacturer warranty for valves excluding packing.

1.13 EXTRA MATERIALS

- A. Section 01 70 00 – 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 – BELOW GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M forged steel welding type.
 - 2. Joints: ASME B31.9, welded.
 - 3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
- B. Polyethylene Pipe: ASTM D2513, SDR 11.5
 - 1. Fittings: ASTM D2513 or ASTM D2683.
 - 2. Joints: Fusion welded.

2.02 NATURAL GAS PIPING – ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M forged steel welding type.
 - 2. Joints: Threaded for pipe 2 inches and smaller; welded for pipe 2-1/2 inches and larger.

2.03 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints].
 - 3. 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 inches thick preformed neoprene gaskets.

2.04 UNDERGROUND PIPE MARKERS

- A. Plastic Ribbon Tape: Yellow colored, continuously printed, minimum 6 inches wide by 4

mil thick, manufactured for direct burial service.

- B. Trace Wire: Magnetic detectable conductor, yellow colored plastic covering, imprinted with "Natural Gas Service" in large letters.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.
- B. Verify excavations are to required grade, dry and not over-excavated.

3.02 PREPARATION

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

3.03 INSTALLATION – PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.04 INSTALLATION – BURIED PIPING SYSTEMS

- A. Install natural gas piping in accordance with NFPA 54 and International Fuel Gas Code.
- B. Verify connection to existing piping system size, location and invert are as indicated on Drawings.
- C. Establish elevations of buried piping with not less than 18 inches of cover, unless noted otherwise on plans.
- D. Establish minimum separation from other services piping in accordance with International Fuel Gas Code and NFPA 54.
- E. Remove scale and dirt on inside of piping before assembly.
- F. Excavate pipe trench in accordance with Section 31 23 23.
- G. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.
- H. Install pipe on prepared bedding.
- I. Route pipe in straight line.
- J. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- K. Metal Pipe: Install plastic ribbon tape continuous over top of metal pipe buried 6 inches below finish grade, above pipe line; coordinate with Section 31 23 23.

- L. Plastic Pipe: Install plastic ribbon tape continuous over top of plastic pipe buried 6 inches below finish grade, above pipe line and install trace wire directly on top of non-metallic pipe. Coordinate with Section 31 23 23 and Section 31 23 17.
- M. Pipe Cover and Backfilling:
 - 1. Backfill trench in accordance with Section 31 23 23.
 - 2. Maintain optimum moisture content of fill material to attain required compaction density.
 - 3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 12 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
 - 4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
 - 5. Do not use wheeled or tracked vehicles for tamping.
- N. Connections made between plastic piping and metallic piping shall be made only with transition fittings categorized as Category I in accordance with ASTM D2513.

3.05 INSTALLATION – ABOVE-GROUND PIPING SYSTEMS

- A. Install natural gas piping in accordance with NFPA 54 and International Fuel Gas Code.
- 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 Section 22 05 29.
- H. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 07 84 00.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.
- 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 Section 05 12 00.
- L. Provide support for utility meters in accordance with requirements of utility company.
- M. Install vent piping from gas pressure reducing valves to outdoors and terminate in

weatherproof hood.

- N. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 09 90 00.
- O. Install identification on piping systems including underground piping. Refer to Section 23 05 53.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- R. Install medium pressure gas pressure regulator with tee fitting between regulator and upstream shutoff valve. Cap or plug one opening of tee fitting.
- S. Install gas pressure regulator with tee fitting not less than 10 pipe diameters down stream of regulator. Cap or plug one opening of tee fitting.
- T. Install gas pressure regulator with independent vent full size opening on regulator and terminate outdoors.

3.06 FIELD QUALITY CONTROL

- A. Section 01 40 00 – Quality 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 NFPA 54 and the local gas company requirements.
- D. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

END OF SECTION