

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. Flexible braided stainless steel hose assembly.
5. Valves.
6. Pressure regulators.
7. Seismic automatic gas shut off valve.
8. **KROGER DIRECT BUY PROGRAM:** Owner supplied /Contractor installed.

a. The Kroger Company will supply the following:

- 1) Automatic Valves for gas fired appliances

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

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

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

C. Welding certificates.

D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Interior and Exterior Building Distribution Piping (including rooftop piping):

1. Piping from Outside Foundation Wall to Gas Fired Equipment Connections: Black steel pipe.
 - a. Pipe Size 2-inches (51-mm) and Smaller: Black steel pipe
 - 1) Pipe Weight: Schedule 40
 - 2) Fittings: Malleable iron threaded
 - b. Pipe Size 2-1/2-inches (63.5-mm) and Larger: Black steel pipe
 - 1) Pipe Weight: Schedule 40
 - 2) Fittings:
 - a) Wrought-steel butt welding.
 - b) Press-Connect fittings: Carbon steel, cold-pressed, ANSI LC4/CSA 6.32.
2. Gas Fired Cooking Equipment Connections to Allow for Movement of Appliances for Cleaning and Service (Only Permitted Use).
 - a. Flexible Braided Stainless Steel Hose Assembly: 5 foot (1525 mm) long, 3/4 inch (19 mm) diameter braided stainless steel hose assembly, 3/4-14 male MNPT pipe connection on each end.
 - 1) Basis-of-Design Product: Penflex; Model FTG-12-A-A-CS-60.
 - 2) Distributor: W.W. Grainger, Inc.; Item #4DyD1.
3. Accessories
 - a. Pounds-to-Inches Line Pressure Regulators: ANSI Z21.80 or a recognized national standard for pressure regulators.
 - 1) Sizes:
 - a) REG 3: 1/2 inch threads
 - b) REG 5A: 3/4 inch threads
 - c) REG 7: 1-1/4 inch threads
 - 2) Mounting: Mount regulators in an accessible location.
 - 3) Venting:
 - a) Regulators with included approved vent-limiting device (REG 3 and REG 5A) do not require venting to atmosphere provided they are mounted in a ventilated location (e.g. near a gas appliance which also requires placement in a ventilated area).

- b) Ventilated locations include (but not limited to) mechanical rooms, attics, garages, and basements.
- c) Vent limiting device: Limit the fuel gas leakage to 2.5 cc per hour in the event of a diaphragm failure.

- b. Overpressure protection devices must be installed for elevated systems higher than 2-PSI and up to 5-PSI to prevent downstream pressure from exceeding 2-PSI in the event of regulator failure.

2.2 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.
- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.3 GAS COCKS:

- A. Manufacturers:
 - 1. The William Powell Co.
 - 2. Walworth Co.
- B. Gas Cocks 2-inches (51-mm) and Smaller: 150 psi non-shock WOG, bronze straightway ground plug shut-off cock, flat or square head, threaded ends.
- C. Gas Cocks 2-1/2-inches (63.5-mm) and Larger: 125 psi non-shock WOG, iron body bronze mounted, straightway ground plug shut-off cock, square head, flanged ends.

2.4 AUTOMATIC VALVES

- A. Appliance Automatic Shut Off Valves: Owner supplied / Contractor installed.
 - 1. Verify with Owner the proper size automatic gas valve required to shut off the gas service to cooking appliances located under exhaust hood.
- B. Seismic Automatic Gas Supply Shut Off Valves (Contractor supplied/Contractor installed):
 - 1. Provide valves that will automatically turn off the supply of natural or LP gas to a building in the event of a strong seismic event to prevent a fire or explosion due to accumulation of gas in the building.
 - 2. Provide seismic automatic gas supply shut off valves that meet the requirements of the authorities having jurisdiction and are sized for main gas line on load side of gas meter.
 - 3. Provide for all buildings in seismic design categories D, E, and F.

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. Line Pressure Regulators: Comply with ANSI Z21.80

1. Manufacturers:

- a. Actaris Metering Systems
- b. American Meter Company.
- c. Eclipse Combustion, Inc.
- d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
- e. Invensys.
- f. Maxitrol Company.
- g. Richards Industries; Jordan Valve Div.

C. Appliance Pressure Regulators: Provided by manufacturer of appliance. Appliance pressure regulator will comply with ANSI Z21.18.

2.6 ACCESSORIES

A. Pipe Stands: Provide one of the following:

1. Preformed polycarbonate
 - a. Basis of Design Product: Miro Industries; Model 1.5
2. Pressure treated wood as specified in Division 06 Section "Miscellaneous Carpentry."

PART 3 - EXECUTION

3.1 INSPECTION:

- #### A.
- Examine areas and conditions under which natural gas air systems and equipment are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Owner's Representative.

3.2 EXTERIOR PIPING INSTALLATION (INCLUDING ROOFTOP PIPING)

- #### A.
- Arrange with utility company to provide gas service. Terminate at meter location indicated on Drawings. Verify the extent of the utility company's work. Pay for all required fees and permits required for the work and obtain permits. Refer to Drawings for additional work included.
- #### B.
- Install automatic seismic shut off valve (for projects located in seismic design categories D, E, and F) on the main gas line immediately after the gas meter on the load side of meter.

- C. Provide shutoff in gas service distribution pipe at entry in building, extend pipe to gas meter location indicated; provide parts and accessories required by utility to connect meter.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- D. Install fittings for changes in direction and branch connections.
- E. Install gas piping above roof on pipe supports. Guide the pipes with clamp one size larger than the pipe. Provide either preformed polycarbonate or pressure treated lumber supports as detailed on the Drawings at intervals in accordance with specification Division 20 Section "Hangers and Supports for Facility Services" and Drawings and at each change in direction.
- F. Exterior-Wall Pipe Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- H. Paint exterior facility natural gas piping as specified in Division 09 Section "Painting."

3.3 INDOOR PIPING INSTALLATION

- A. Provide necessary hanger rods, standard hangers and special hangers of approved type and size to support overhead and vertical gas piping for type of construction as shown on the plans and as indicated in Division 20 Sections.
- B. Attach hangers to the top cord of joists/joist girder panel points.
- C. Use sealant on metal gas piping threads, which are chemically resistant to natural gas. Use sealant sparingly, and apply only to male threads of metal joints.
- D. Remove cutting and threading burrs before assembling pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- F. 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.
- G. 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.
- H. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
- I. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
- J. Press-Connect Joints:
1. Install press-connect fittings in accordance with manufacturer's instructions.
 2. Welding Near an Existing Press Connection: All welds in the system are to be completed before any press connections are made.
 3. Threaded Fitting Near Press Connections: Threaded connections need to be tightened prior to pressing in line fittings.
 4. Underground Burial: Fittings are to be approved for underground installation in accordance with applicable codes. Underground joints should be wrapped in tape, or a comparable impermeable coating system designed to protect joints from moisture, debris, corrosion, and other soil stresses.
 5. Painting: Proper care must be taken to avoid any oil-based paints from pooling inside the fitting ends.
 6. Seal Lubrication: If additional seal lubrication is required, silicon or non-petroleum based lubricants are preferred.
- K. Do not install defective piping or fittings. Do not use pipe with threads, which are chipped, stripped or damaged. Do not use bushings.
- L. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or until equipment connections are completed. Ground gas piping electrically and continuously within project and bond tightly to grounding connections.
- M. Install drip-legs in gas piping where indicated and where required by code or regulation.
- N. Install "tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.
- O. Use unions only on final connections to equipment. No other unions will be permitted. Proper reducing fittings shall be used. Bushings will not be accepted.
- P. Use dielectric unions where dissimilar metals are joined together.
- Q. For piping running through ducts or air plenums, install in welded conduit, ventilated on both ends.
- R. Locate valves for easy access.

- S. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- T. Conceal pipe installations in walls, pipe spaces, utility spaces, and above ceilings unless indicated to be exposed to view. Do not run gas piping under floor.
- U. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- V. Connect branch piping from top or side of horizontal piping.
- W. Do not use natural-gas piping as grounding electrode.
- X. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
- Y. Connect gas fired cooking equipment to wall mounted gas shut off valve with **5 foot (1525 mm)** long flexible braided stainless steel hose assembly to allow for movement of appliances for cleaning and service.

3.4 VALVE INSTALLATION

- A. Gas Cock: Provide at connection to gas line for each gas-fired equipment item; and on risers and branches where indicated.
 - 1. Locate gas cocks where easily accessible, and where they will be protected from possible injury.
- B. Gas Shut-Off Valves: Install automatic gas shut-off valve for gas piping servicing all cooking equipment under exhaust hoods. Owner's fire suppression installer will install and connect mechanical cable.
- C. Install seismic automatic gas supply shut off valves where indicated on Drawings.
- D. Install underground valves with valve boxes.
- E. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- F. Pressure Regulating Valves:
 - 1. Pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream of each pressure-regulating valve.
 - 2. Valve inlet and outlet piping to each regulator with American Gas Association approved valves.
 - 3. Regulators with Relief Vents: Pipe vents to outside, maintaining a minimum clearance of **15 feet (4.6 m)** to any door opening, window opening, louver, or outside air intake.
 - 4. Separately vent regulators full size to the exterior, with a turndown elbow and insect screen. Do not terminate vent outlet next to a combustion or fresh air intake.
 - 5. Valves for Generators (Emergency/Back-up): Verify manufacturer's requirements and gas supply checklist to confirm piping, valve placement, and pressure requirements.

a. Location:

- 1) Unless otherwise noted in the manufacturer's requirements, locate step down pressure regulators near the generator to allow longer pipe runs at higher pressure.
- 2) Valve must be at least 10 feet (3 m) away from the generator connection to avoid regulator oscillations.

G. Install anode for metallic valves in underground PE piping.

3.5 CONNECTIONS

A. General: Install gas-piping run-outs to mechanical gas-fired equipment and food preparation gas-fired equipment, including equipment supplied by Owner and equipment supplied and installed by Owner.

1. Install piping full-size (as indicated on the Drawings) to each unit's gas inlet connection, burner, regulator, etc.
2. Provide gas cock and make final connections.
3. Include a drip leg and shutoff gas cock for connections to each gas-fired equipment item.
4. Connections to Each Gas-Fired Equipment Item: Include a drip leg and shutoff gas cock. Install per equipment manufacturer's instructions.
5. Connections to gas-fired rooftop equipment:
 - a. Provide roof penetration and repair roof in accordance with roof manufacturer's instructions so as to not void warranty.
 - b. Install gas piping through the roof in a location that has been coordinated with the HVAC installer.

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 (1829-mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with 4-inch pipe with capped nipple in bottom to form trap, as close as practical to inlet of each appliance.

3.6 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.
- B. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 23 11 23