

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

SPEC WRITER NOTES:

1. Use this section only for NCA projects.
2. Delete between // // if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Fuel gas systems, including piping, equipment, and all necessary accessories as designated in this section.
- B. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.2 RELATED WORK

SPEC WRITER NOTE: Retain one of two paragraphs below.

- A. //Section 01 00 01, GENERAL REQUIREMENTS (Major NCA Projects).//
- B. //Section 01 00 02, GENERAL REQUIREMENTS (Minor NCA Projects).//
- C. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- D. Section 01 42 19, REFERENCE STANDARDS.
- E. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
- F. //Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.//
- G. Section 07 84 00, FIRESTOPPING: Penetrations in rated enclosures.
- H. Section 07 92 00, JOINT SEALANTS.
- I. Section 09 91 00, PAINTING: Preparation and finish painting and identification of piping systems.

SPEC WRITER NOTE: If Section 13 05 41 is included in this project the section shall be obtained from VA Masters.

- J. //Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic restraints for piping.//
- K. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- L. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING.
- M. //Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//

1.3 APPLICABLE PUBLICATIONS

SPEC WRITER NOTE: Make material requirements agree with requirements specified in the referenced Applicable

Publications. Verify and update the publication list to that which applies to the project, unless the reference applies to all mechanical systems. Publications that apply to all mechanical systems may not be specifically referenced in the body of the specification, but, shall form a part of this specification.

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Civil Engineers (ASCE):
 25-2006.....Earthquake-Actuated Automatic Gas Shutoff
 Devices
- C. American Society of Mechanical Engineers (ASME): (Copyrighted Society)
 B16.3-2011.....Malleable Iron Threaded Fittings: Classes 150
 and 300
 B16.9-2012.....Factory-Made Wrought Steel Buttwelding Fittings
 B16.11-2011.....Forged Fittings, Socket-Welding and Threaded
 B16.15-2013.....Cast Copper Alloy Threaded Fittings: Classes
 125 and 250
 B31.8-2014.....Gas Transmission and Distribution Piping
 Systems
- D. American Society for Testing and Materials (ASTM):
 A47/A47M-1999 (R2014)...Standard Specification for Ferritic Malleable
 Iron Castings
 A53/A53M-2012.....Standard Specification for Pipe, Steel, Black
 And Hot-Dipped, Zinc-coated, Welded and
 Seamless
 A536-1984 (R2014).....Standard Specification for Ductile Iron
 Castings
 A733-2015.....Standard Specification for Welded and Seamless
 Carbon Steel and Austenitic Stainless Steel
 Pipe Nipples
 B43-2015.....Standard Specification for Seamless Red Brass
 Pipe, Standard Sizes
 B687-1999 (R2011).....Standard Specification for Brass, Copper, and
 Chromium-Plated Pipe Nipples
 STP534-1973.....Manual of Industrial Corrosion Standards and
 Control

- E. American Water works Association (AWWA):
 C203-2015.....Coal-Tar Protective Coatings and Linings for
 Steel Water Pipes
- F. International Code Council:
 IFGC-2015.....International Fuel Gas Code
- G. Manufacturers Standardization Society of the Valve and Fittings
 Industry, Inc. (MSS):
 SP-72-2010a.....Ball Valves With Flanged or Butt-Welding For
 General Purpose
 SP-110-2010.....Ball Valves Threaded, Socket-Welding, Solder
 Joint, Grooved and Flared Ends
- H. NACE International (NACE):
 SP0274-2011.....High-Voltage Electrical Inspection of Pipeline
 Coatings
 SP0490-2007.....Holiday Detection of Fusion-Bonded Epoxy
 External Pipeline Coating of 250 to 760 µm (10
 to 30 mil)
- I. National Fire Protection Association (NFPA):
 54-2015.....National Fuel Gas Code
 SPEC WRITER NOTE: Make material
 requirements agree with applicable
 requirements specified in the referenced
 Applicable Publications. Update and
 specify only that which applies to the
 project.

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in
 accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND
 SAMPLES.
- B. Information and material submitted under this section shall be marked
 "SUBMITTED UNDER SECTION 23 11 23, FACILITY NATURAL-GAS PIPING", with
 applicable paragraph identification.
- C. Manufacturer's Literature and Data including: Full item description and
 optional features and accessories. Include dimensions, weights,
 materials, applications, standard compliance, model numbers, size, and
 capacity.
 - 1. Piping.
 - 2. Strainers.
 - 3. All items listed in Part 2 - Products.

- D. Detailed shop drawing of clamping device and extensions when required in connection with the waterproofing membrane or the floor drain.
- E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:
 1. Include complete list indicating all components of the systems.
 2. Include complete diagrams of the internal wiring for each item of equipment.
 3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.
- F. //Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//
- G. //Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//

1.5 AS-BUILT DOCUMENTATION

SPEC WRITER NOTE: Coordinate O&M Manual requirements with Section 01 00 01, GENERAL REQUIREMENTS (Major NCA Projects) or Section 01 00 02, GENERAL REQUIREMENTS (Minor NCA Projects). O&M manuals shall be submitted for content review as part of the close-out documents.

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be //in electronic version on CD or DVD// inserted into a three ring binder. All aspects of system operation and maintenance procedures, including applicable piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the

owner will be required to employ shall be inserted into the As-Built documentation.

- C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them in Auto-CAD version //____// provided on CD or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.
- D. Certification documentation shall be provided to COR 10 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and certification that all results of tests were within limits specified.

1.6 SYSTEM PRESSURE

- A. Natural gas systems //unless otherwise noted// are designed and materials and equipment selected to prevent failure under gas pressure of // // kPa (// // psig) //entering Government property// // // kPa (// // psig) //at downstream side of pressure regulator//.

PART 2 - PRODUCTS

2.1 FUEL GAS SERVICE CONNECTIONS TO BUILDING

- A. From inside face of exterior wall to a distance of approximately 1.5 m (5 feet) outside of building, use coated piping.
- B. Pipe: Black steel, ASTM A53/A53M, Schedule 40. Shop-applied pipe coating shall be one of the following types:
 1. Coal Tar Enamel Coating: Exterior of pipe and fittings shall be cleaned, primed with Type B primer, and coated with hot-applied coal tar enamel with bonded layer of felt wrap in accordance with AWWA C203. Asbestos felt is prohibited. Felt material shall be fibrous glass mat as specified in AWWA C203.
 2. Adhesive-thermoplastic Resin Coating: ASTM STP534, Type I.
 3. Thermosetting Epoxy Coating: Fed. ASTM STP534, Type II.
 4. Field-applied plastic tape material used on pipe joints and for repairing damaged areas of shop-applied coatings, ASTM STP534, Type I, 10 mils nominal thickness for pipe joints, and Type II, 20 mils nominal thickness for coating repairs.

C. Holiday Inspections:

1. Procedures for Holiday Inspection: Holiday inspection shall be conducted on all coatings to determine the presence and number of discontinuities in those coatings. Holiday inspection shall be performed in a manner spelled out in the Tinker & Rasor operating instructions and at a voltage level recommended by the coating manufacturer or applicable standard such as NACE SP0274 or NACE SP0490 in the case thermosetting epoxy coating.
2. Holiday Detectors shall be calibrated and supplied with a certificate of calibration from the factory. A calibration of the Holiday Detector shall be performed once every 6 months to verify output voltages are true and correct.

D. Fittings:

1. Butt weld fittings, wrought steel, ASME B16.9.
2. Socket weld and threaded fittings forged steel, ASME B16.11.
3. Grooved End: Ductile iron (ASTM A536, Grade 65-45-12), malleable iron (ASTM A47/A47M, Grade 32510), or steel (ASTM A53/A53M, Type F or Type E or S, Grade B).

E. Joints: Welded, ASME B31.8.

SPEC WRITER NOTE: Use the following paragraph only in Seismic Area A.

F. //Earthquake Valve:

1. Valve: Cast from aluminum, ASCE 25.
2. Valve actuator: Actuated by one stainless steel ball, incorporated with a bubble level, vertically mounted, and have a single step manual reset level.
3. Operating ambient temperature range: minus 40 degrees C (minus 40 degrees F) to 65 degrees C (150 degrees F)
4. Maximum allowable pressure: 414 kPa (60 psig).//

2.2 FUEL GAS PIPING

A. Pipe: Black steel, ASTM A53/A53M, Schedule 40.

B. Nipples: Steel, ASTM A733, Schedule 40.

C. Fittings:

1. Steel Welded: Schedule 40.
 - a. Smaller than 50 mm (2 inches), ASME B16.3, threaded malleable iron.
 - b. 50 mm to 100 mm (2 inches to 4 inches), ASME B16.11, socket welded.

- c. Over 100 mm (4 inches), ASME B16.9, butt welded.
- 2. Grooved End: Ductile iron (ASTM A536, Grade 65-45-12), malleable iron (ASTM A47/A47M, Grade 32510), or steel (ASTM A53/A53M, Type F or Type E or S, Grade B).

D. Joints: Provide welded or threaded joints.

2.3 EXPOSED FUEL GAS PIPING

- A. Finished Room: Use full iron pipe size chrome-plated brass piping for exposed fuel gas piping connecting fixtures, casework, cabinets, equipment, and reagent racks when not concealed by apron including those furnished by the Government or specified in other sections.
 - 1. Pipe: ASTM B43, standard weight
 - 2. Fittings: ASME B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
 - 3. Nipples: ASTM B687, Chromium-plated.
 - 4. Unions: 50 mm (2 inches) and smaller MSS SP-72, MSS SP-110, brass or bronze, threaded with chrome finish. Unions 65 mm (2-1/2 inches) and greater shall be flange type with approved gaskets.
 - 5. Valves: MSS SP-72, MSS SP-110, brass or bronze, with chrome finish.
- B. Unfinished Rooms and Mechanical Rooms: Chrome-plated brass piping is not required. Paint piping systems as specified in Section 09 91 00, PAINTING.

2.4 VALVES

- A. Ball Valve: Bronze body, rated for 1034 kPa at 185 degrees C (150 psig at 365 degrees F), 1724 kPa at 121 degrees C (250 psig at 250 degrees F), reinforced TFE seat, stem seal, and thrust washer; end entry, threaded ends, UL listed for natural or LP gas shut off service when used on those services.
- B. Gas Vent Cocks: Type 701, bronze body, tee handle, rated for 207 kPa at 38 degrees C (30 psig at 100 degrees F), ground plug, rated for tight shut-off on fuel gas service.

2.5 WATERPROOFING

- A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.
- B. Floors: Provide cast iron stack sleeve with flashing device and an underdeck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.

- C. Walls: Provide cast iron sleeve with flashing device and a mechanical link seal. After pipe is passed through sleeve, provide a waterproofed caulked joint at inside wall face and escutcheon.

2.6 STRAINERS

- A. Provide on high pressure side of pressure reducing valves, on suction side of pumps, on inlet side of indicating and control instruments, and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping.
- B. Gas Lines: "Y" type with removable mesh lined brass strainer sleeve.
- C. Body: Smaller than 75 mm (3 inches), brass or bronze; greater than 75 mm (3 inches), cast iron or semi-steel.

2.7 DIELECTRIC FITTINGS

- A. Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.8 GAS EQUIPMENT CONNECTORS

- A. Flexible connectors with Teflon core, interlocked galvanized steel protective casing, AGA certified design.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.
- B. General: Comply with the ICC IFGC and the following:
 1. Install branch piping for fuel gas and connect to all fixtures, valves, cocks, outlets, casework, cabinets, and equipment, including those furnished by the Government or specified in other sections.
 2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe shall be reamed to full size after cutting.
 3. All pipe runs shall be laid out to avoid interference with other work.
 4. Install valves with stem in horizontal position whenever possible. All valves shall be easily accessible.
 5. Install union and shut-off valve on pressure piping at connections to equipment.
 6. Pipe Hangers, Supports, and Accessories:
 - a. All piping shall be supported per ICC IFGC.
 - b. Shop Painting and Plating: Hangers, supports, rods, inserts, and accessories used for Pipe supports shall be shop coated with red

lead or zinc Chromate primer paint. Electroplated copper hanger rods, hangers, and accessories may be used with copper tubing. Painting shall comply with Section 09 91 00, PAINTING.

- c. Floor, Wall and Ceiling Plates, Supports, Hangers:
 - 1) Solid or split unplated cast iron, chrome-plated in finished areas.
 - 2) All plates shall be provided with set screws.
 - 3) Pipe Hangers: Height adjustable clevis type.
 - 4) Adjustable Floor Rests and Base Flanges: Steel.
 - 5) Concrete Inserts: "Universal" or continuous slotted type.
 - 6) Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two removable nuts at each end for positioning rod and hanger, and locking each in place.
 - 7) Riser Clamps: Malleable iron or steel.
 - 8) Rollers: Cast iron.
 - 9) Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.
 - 10) Miscellaneous Materials: As specified, required, directed, or as noted in the contract documents for proper installation of hangers, supports, and accessories.
- 7. Install chrome-plated cast escutcheon with set screw at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork.
- 8. Penetrations:
 - a. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke, and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between raceways and openings with the fire stopping materials.
 - b. Waterproofing: At floor penetrations, completely seal clearances around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.
- C. Fuel Gas Piping shall conform to the following:
 - 1. Entire fuel gas piping installation shall be in accordance with requirements of NFPA 54 and ICC IFGC.
 - 2. Install fuel gas piping with plugged drip pockets at low points.

SPEC WRITER NOTE: Use the following paragraph only in Seismic Area A.

3. //Install automatic shutoff valve (earthquake valve) on building side of meter. Valve shall positively shut off supply of gas in case of pressure failure, remain shut off until manually reopened, and be provided with outside adjustment for reset.//

3.2 CLEANING OF SYSTEM AFTER INSTALLATION

- A. Clean all piping systems to remove all dirt, coatings and debris. //Remove all valves, controls etc., and reinstall after piping system has been cleaned.//

3.3 STARTUP AND TESTING

- A. Make tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.
- C. Test system either in its entirety or in sections. Test shall be made in accordance with the ICC IFGC. The system shall be tested at a minimum of 1.5 times maximum working pressure, but not less than //21 kPa (3 psig)// //690 kPa (100 psig)//.
- D. //The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.//

3.4 //COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
- B. Components provided under this section of the specification will be tested as part of a larger system.//

3.5 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative for //four// // // hour//s// to instruct each VA personnel responsible in the operation and maintenance of units.
- B. //Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//

- - - E N D - - -