PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B16.40	(1985) Mechanically Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems
ASME/ANSI B16.9	(1993) Factory-Made Wrought Steel Butt welding Fittings
ASME B31.8	(1995) Gas Transmission and Distribution Piping Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM D 1598	(1986; R 1991) Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
ASTM D 1599	(1988) Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 2513	(1996; Rev. A) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D 2517	(1994) Reinforced Epoxy Resin Gas Pressure Pipe and Fittings
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-78	(1987; R 1992) Cast Iron Plug Valves, Flanged and Threaded Ends
MSS SP-110	(1996) Ball Valves Threaded Joint.

1.2 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section unless otherwise specified.

1.3 SYSTEM DISTRIBUTION

The gas distribution system includes natural gas piping and appurtenances from point of connection with existing system as indicated to a point approximately 5 feet from the buildings.

1.3.1 Gas Distribution System and Equipment Operation Data

Include maps showing piping layout, locations of system valves, gas line markers and step-by-step procedures for system start up, operation and shutdown.

1.3.2 Gas Distribution System Maintenance Data

Include maintenance procedures and frequency for system and equipment; identification of pipe materials and manufacturer by locations, pipe repair procedures, and jointing procedures at transitions to other piping material or material from a different manufacturer.

1.4 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.4.1 SD-03 Product Data

a. Piping

b. Fittings

c. Valves

d. Pipe coatings

1.4.2 SD-07 Certificates

a. Welders procedures and qualifications (metal and PE)

b. Pipe coating materials and application procedures

1.4.3 SD-10 Operation and Maintenance Data

a. Gas distribution system and equipment operation, Data package 4

b. Gas distribution system maintenance, Data package 4

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data," in three separate packages.

1.5 QUALITY ASSURANCE

Materials and equipment shall conform to ASME B31.8 to the extent specified herein, to local utility requirements, and to other requirements specified.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Delivery and Storage

Inspect materials delivered to the site for damage, and store with a minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.6.2 Handling

Handle pipe, fittings, valves, and other accessories in such manner as to ensure delivery to the trench in sound, undamaged condition. Take special care not to damage coatings on pipe and fittings. Repair damaged coatings to original finish. Handle steel piping with coal-tar enamel coating in accordance with AWWA C203.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS FOR GAS DISTRIBUTION MAINS

Piping shall be polyethylene (HDPE). Provide shutoff valves where indicated.

2.1.1 Welded Joints

Electrodes, joint design, welders procedures and qualifications (metal and PE), and weld examination and testing shall conform to API STD 1104.

2.1.2 Plastic Pipe, Fittings, Joints, and Jointing Materials

2.1.2.1 Thermoplastic (Polyethylene - HDPE)

HDPE pipe and heat fusion fittings shall conform to ASTM D 2513, Grade PE2406 or PE3408, SDR 11. Pipe and fittings shall have heat fusion joints, PE pipe and fitting materials for heat fusion shall be compatible to ensure uniform melting and a proper bond. Fabricated fittings shall not be used for gas/fuel piping. All heat fusion welds shall be performed by welders qualified to the manufacturers procedures.

2.2 PIPING MATERIALS FOR GAS SERVICE LINES

2.2.1 PE Pipe and Heat Fusion Fittings

Conform to ASTM D 2513. Minimum wall thickness shall be as specified in ASTM D 2513. PE pipe and fittings shall have joints as specified for gas distribution main piping.

2.3 GAS MAIN VALVES AND ACCESSORIES

2.3.1 Shut-Off Valves

Manually operated shut-off valves for gas distribution main and regulator station piping with a minimum pressure rating of 150 psig. PE piping shall be rated at 150psig at nominal operating temperature.

2.3.1.1 Plug Valves

MSS SP-78 for cast iron valves. Valves shall be full bore type. Minimum bore size for full bore valves shall be 95 percent of the internal cross sectional area of pipe of the same nominal diameter. Cast iron valves installed on buried PE piping shall have mechanical joint ends Valves not on buried piping shall have ends as indicated. Plug valves shall be lubricated. Lubricating fittings on installed valves shall be accessible for re-lubrication, or extensions shall be provided to make them accessible. Plug valves shall be wrench or gear operated. Wrench operated valves shall have a 2 inch square adaptor securely fastened to the valve stem. Maximum allowable operating torque in foot-pounds shall be limited to:

Nominal Valve Size (Inches)	Torque (Foot Pounds)
1-1/2	25

2.3.1.2 Ball Valves

MSS SP-72 or MSS SP-110. Provide valve body material of carbon steel for installation on steel pipe, and ductile iron for installation on plastic pipe. Valves shall be full bore type. Minimum bore size for full bore valves shall be 95 percent of the internal cross sectional area of pipe of the same nominal diameter. Valves used on buried PE mains shall have mechanical joint ends. Valves not on buried piping shall have ends as indicated. Ball valves shall be lever or gear operated. Maximum allowable operating torque in foot-pounds shall be limited to:

Nominal Valve Size (Inches)	Torque (Foot Pounds)
1-1/2	25

2.3.1.3 Below Ground Polyethylene Valves

ASME/ANSI B16.40. Provide PE valves only with underground PE piping.

2.4 GAS SERVICE LINE VALVES AND ACCESSORIES

2.4.1 Valves

Provide plug or ball valves for service lines as specified for gas main valves.

2.4.2 Valve Boxes

Provide each valve on buried piping with a valve box as specified for gas main valves.

2.4.3 Transition Fittings

a. Provide transition fitting consisting of HDPE fused coating on steel pipe for connection to building service piping. Provide connection to HDPE piping system meeting design pressure rating.

PART 3 - EXECUTION

3.1 LOCATION OF GAS LINES

Do not install gas piping in the same trench with other utilities. The minimum horizontal clearance between gas pipe and parallel utility pipe shall be 2 feet. Do not install gas pipe through catch basins, vaults, manholes or similar underground structures.

3.2 VERIFICATION OF CONDITIONS

Pipe, fittings, valves and accessories will be carefully inspected by the Contracting Officer or the Contracting Officer's authorized representative before and after installation and those found defective will be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition.

3.3 INSTALLATION OF PIPELINES

3.3.1 Pipe Laying and Jointing

Provide proper facilities for lowering sections of pipe into trenches. Cut pipe accurately to measurements established at the site and work into place without springing or forcing. Replace pipe or fittings that do not allow sufficient space for proper installation of jointing material with pipe or fittings of proper dimensions. Grade pipe in straight lines, taking care to avoid the formation of dips and low points. Support pipe at proper elevation and grade, taking care to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and all fittings shall rest solidly on the pipe bed, with recesses excavated to accommodate joints and couplings. Provide anchors and supports where indicated. Keep trenches free of water until joints have been made. Close open ends of pipe temporarily with wood blocks or plastic end closures at the end of each work day. Gas mains shall have a minimum earth cover of 30 inches, except that in rock excavation, minimum earth cover shall be 24 inches. Plastic piping shall be back filled in haul delay. Expose plastic piping shall not be permitted. Cover trench to protect piping if not immediate back filled.

3.3.2 Buried Warning and Identification Tape

Provide color, type and depth of tape as specified in paragraphs "Buried Warning and Identification Tape" in Section 02302, "Excavation, Backfilling, and Compacting for Utilities."

3.3.3 Connections to Existing Pipelines

When it is necessary to make connections to live gas mains, use pressure tight installation equipment. Connections shall be made in accordance with ASME B31.8.

3.3.4 Installation of Valves for Gas Mains

Install valves in accordance with applicable installation requirements specified in ASME B31.8 and as indicated. Install valve stems on buried piping vertically with a minimum of 8 inches clearance from stem top to finished grade. Valves installed in PE piping shall be restrained as indicated so that no turning torque is transmitted to the pipe.

3.3.5 Special Requirements for PE Gas Main Piping Installation

Install pipelines as specified herein and in accordance with the applicable requirements of ASME B31.8 and ASTM D 2774.

3.3.5.1 Placement

Maintain a minimum of 12 inches clearance between PE pipe and heating system piping. Install a No. 10 gage copper tracer wire with buried PE pipe to facilitate location with an electronic detector. Install wire 8 to 12 inches above pipeline and terminate 3 to 4 inches above grade. Do not wrap wire around pipe.

3.3.5.2 Earthwork for Plastic Gas Main Piping

Earthwork shall be in accordance Section 02302, "Excavation, Backfilling, and Compacting for Utilities" and ASTM D 2774. Where practicable, plastic pipe and tubing shall be under an internal pressure of 15 psig during backfill operations. Employ hand excavation within 5 feet of existing gas pipelines or other underground structures.

3.3.5.3 Plastic Gas Main Piping Joints

Make joints for PE pipe or tubing and fittings in accordance with ASME B31.8 and the recommendations of the manufacturer of the pipe or tubing and fittings.

3.3.6 Special Requirements for Gas Service Piping Installation

Work shall include the connection to the building piping where the building piping has been installed. Where building piping has not been installed, terminate service lines with a temporary cap approximately five feet from the building line at a point directed by the Contracting Officer or the Contracting Officer's authorized representative. Installation shall be in accordance with the applicable requirements of ASME B31.8. Installation of PE pipe or tubing shall further be in accordance with the applicable requirements of ASTM D 2774. Minimum earth cover for service lines shall be 24 inches. Install an electrically conductive No. 10 gage wire with buried PE pipe or tubing to facilitate location with an electronic detector. Install wire 6 to 8 inches above service line and terminate 3 to 4 inches above grade. Do not wrap wire around pipe.

3.3.6.1 Service Connections

Make service connections at the top of the main, whenever the depth of the main is sufficient to allow top connections. When service connections cannot be made at the top of the main, they shall be made on the side of the main as close to the top as possible. Service connections shall not be

Make joints for PE pipe or tubing and fittings in accordance with ASME B31.8 and the recommendations of the manufacturer of the pipe or tubing and fittings.

3.3.6.2 Gas Service Piping Joints

a. Steel Pipe: Make joints for steel service line piping as specified for steel distribution main piping.

b. PE Pipe or Tubing: Make joints for PE pipe or tubing and fittings in accordance with ASME B31.8 and the recommendations of the manufacturer of the pipe or tubing and fittings.

3.3.6.3 Valve Installation on PE Service Lines

Restrain curb cocks installed on PE service lines as indicated so that no turning torque can be transmitted to the pipe. Support curb boxes as indicated.

3.4 PAINTING

Exposed metal gas piping, valves, and other accessories not specified as being shop coated or otherwise finished shall be cleaned in accordance with SSPC SP 3, painted as specified in Section 09900, Paints and Coatings." Touch up damaged shop coatings as required to restore them to original finish.

3.5 FIELD QUALITY CONTROL

Do not coat, bury, cover or conceal joints and fittings until they have been inspected, tested and approved.

3.5.1 Inspection of Welds

Inspect quality of welded joints visually on a sampling basis. Repair defective welds or remove from the line and reweld piping.

3.5.2 Testing of Pipe Coatings

Check coated pipe for discontinuities in the coating with use of an electrical holiday detector at 10,000 volts prior to lowering into trench. Repair holidays in the pipe coating in accordance with paragraph entitled "Application of Plastic Tape."

3.5.3 Piping Strength and Tightness Tests

Test gas distribution system piping for leaks with air at 100 psig after construction and before being placed in service. Disconnect piping under test from live gas piping systems. Where possible, test main and service pipe as a unit. Service line connections or Pipe joints which are not included in the pressure test shall be given a leakage test at normal operating pressure after the piping system is placed in operation. Maintain a permanent written record of pressure test performed.

3.6 PURGING LINES

Purge mains and service lines before placing in service in accordance with ASME B31.8.

3.7 FINAL CLEAN-UP

Upon completion of the work, remove and dispose of excess spoil and leave the areas in a clean condition. Restore service line trenches as nearly as possible to the original appearance and condition.

END OF SECTION