

2.3 WATER PIPING on Service Side of water meter inside the Building: Use any of the following piping materials for each size range:

- A. NPS 4 to 6: Steel pipe; grey-iron, threaded fittings and threaded joints.
- B. NPS 1 (DN 25) and Smaller: CPVC - Schedul

- P. NPS 10 and NPS 12: Steel pipe with grooved ends: steel piping, grooved-end fittings, grooved-end pipe couplings and grooved joints

2.6 STORM WATER PIPING, BURIED WITHIN FIVE FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron. Joints: Hub-and spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, Hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665. Fittings: PVC. Joints: ASTM D2855, solvent weld.

2.7 STORM WATER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron. Joints: Hub-and spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, Hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665. Fittings: PVC. Joints: ASTM D2855, solvent weld. (Not allowed in plenums)

2.8 GAS PIPING, BURIED BEYOND FIVE FEET OF BUILDING

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ATM A234 forged steel welding type, with ANSI/AWWA C105 polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape. Joints: ANSI/AWS D1.1, welded.

2.9 NATURAL GAS PIPING, BURIED WITHIN FIVE FEET OF BUILDING

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ATM A234 forged steel welding type, with ANSI/AWWA C105 polyethylene jacket or double layer, half-lapped 10-mil polyethylene tape. Joints: ANSI/AWS D1.1, welded.

2.10 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ANSI/ASME B16.3, malleable iron, or ATM A234, forged steel welding type. Joints: Screwed for pipe two inches and under; ANSI/AWS D1.1, welded, for pipe over two inches.
- B. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, grade 95TA.

2.11 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2" and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2": 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16" thick preformed neoprene bonded.
- C. Grooved and Shouldered Pipe End Couplings: Ductile iron housing clamps to engage and lock, where required, designed to permit some angular deflection, contraction, and expansion; 'C' shape pressure responsive synthetic rubber sealing gasket conforming to ANSI/NSF-61; steel bolts, nuts and washers; galvanized couplings for galvanized pipe.
 - 1. IPS Steel Piping:

- A. Iron body, bronze trim, spring loaded, renewable composition disc, screwed, wafer, or flanged ends.
- B. Ductile iron body, stainless steel trim, spring-assisted, aluminum bronze or elastomer encapsulated ductile iron disc, grooved ends.

2.18 RELIEF VALVES

- A. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.19 ACID WASTE PIPING, BURIED

- A. High Silicon Iron Pipe: ASTM A861. Fittings: Bell and Spigot Joints: Acid resistant sealant.
- B. Polypropylene Pipe: ASTM D2467, D4101. Fittings: Polypropylene ASTM D1785. Joints: Thermofused.
- C. CPVC Pipe: ASTM D1784. Fittings: CPVC. Joints: ASTM F493 Solvent weld (acid grade solvent with yellow die)

2.20 ACID WASTE PIPING, ABOVE GRADE

- A. High Silicon Iron Pipe: ASTM A861. Fittings: Bell and Spigot Joints: Acid resistant sealant.
- B. Fire Resistant Polypropylene Pipe: ASTM D2467, D4101. Fittings: Polypropylene ASTM D1785. Joints: Thermofused.
- C. CPVC Pipe: ASTM D1784. Fittings: CPVC. Joints: ASTM F493 Solvent weld (acid grade solvent with yellow die).
- D. Borosilicate Glass Pipe. Fittings: Plastic ASTM D2146, or Glass. Fittings: Compression.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.

- L. Where type of pipe, joints, couplings and supports are subject to rusting, coat in accordance with Section 09900 – Painting.
- M. Install bell and spigot pipe with bell end upstream.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Install a hose bibb on one lavatory (minimum) per group restroom.
- P. Grooved Joints:
 - 1. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer, and the grooving tools shall be of the same manufacturer.
 - 2. Use gaskets molded and produced by the groove-coupling manufacturer.
 - 3. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
 - 4. Grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products.
 - 5. Factory trained representative shall periodically inspect the product installation.
 - 6. Contractor shall remove and replace any improperly installed products.
 - 7. Pipe shall be certified for use with the manufacturer's system.

3.3 APPLICATION

- A. Use proved mechanical couplings and fasteners only in accessible locations or as approved by engineer.
- B. Install unions or grooved joint couplings downstream of valves at equipment or apparatus connections.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe or ball valves for throttling, bypass, or manual flow control services.
- E. Provide spring loaded check valves on discharge of water pumps.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50-to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15% of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water of 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 5% of outlets and from water entry, and analyze in accordance with AWWA C601.

END SECTION