

**SECTION 22 11 00
FACILITY WATER DISTRIBUTION**

PART 1 - GENERAL

1.1 DESCRIPTION

Domestic water systems, including piping, equipment and all necessary accessories as designated in this section.

1.2 RELATED WORK

- A. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 SUBMITTALS

- A. Manufacturer's Literature and Data:
 - 1. Piping.
 - 2. Strainers.
 - 3. All items listed in Part 2 - Products.

1.4 APPLICABLE PUBLICATIONS

- 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. Federal Specifications (Fed. Spec.):
 - A-A-1427C Sodium Hypochlorite Solution
 - A-A-59617 Unions, Brass or Bronze Threaded, Pipe Connections and Solder-Joint Tube Connections
- C. American National Standards Institute (ANSI):
 - American Society of Mechanical Engineers (ASME): (Copyrighted Society)
 - A13.1-96..... Scheme for Identification of Piping Systems
 - B16.3-98..... Malleable Iron Threaded Fittings ANSI/ASME
 - B16.4-98..... Cast Iron Threaded Fittings Classes 125 and 250 ANSI/ASME
 - B16.9-01..... Factory-Made Wrought Steel Buttwelding Fittings ANSI/ASME
 - B16.11-01..... Forged Steel Fittings, Socket-Welding and Threaded ANSI/ASME
 - B16.12-98..... Cast Iron Threaded Drainage Fittings ANSI/ASME
 - B16.15-85(R 1994)..... Cast Bronze Threaded Fittings ANSI/ASME
 - B16.18-01..... Cast Copper Alloy Solder-Joint Pressure Fittings ANSI/ASME
 - B16.22-01..... Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ANSI/ASME Element ANSI/ASME
- D. American Society for Testing and Materials (ASTM):
 - A47-99..... Ferritic Malleable Iron Castings Revision 1989

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- A53-02..... Pipe, Steel, Black And Hot-Dipped, Zinc-coated Welded and Seamless
- A74-03..... Cast Iron Soil Pipe and Fittings
- A183-83(R1998)..... Carbon Steel Track Bolts and Nuts
- A312-03..... Seamless and Welded Austenitic Stainless Steel Pipe
- A536-84(R1999) E1 Ductile Iron Castings
- A733-03..... Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
- B32-03..... Solder Metal
- B61-02..... Steam or Bronze Castings
- B62-02..... Composition Bronze or Ounce Metal Castings
- B75-99(Rev A) Seamless Copper Tube
- B88-03..... Seamless Copper Water Tube
- B584-00..... Copper Alloy Sand Castings for General Applications Revision A
- B687-99..... Brass, Copper, and Chromium-Plated Pipe Nipples
- C564-03 Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- D2000-01 Rubber Products in Automotive Applications
- D4101-03b Propylene Plastic Injection and Extrusion Materials
- D2447-93 Polyethylene (PE) Plastic Pipe, Schedule 40 and 80, Based on Outside Diameter
- D2564-94 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- D2665-94 Revision A Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- D4101-03b Propylene Plastic Injection and Extrusion Materials
- E1120..... Standard Specification For Liquid Chlorine
- E1229..... Standard Specification For Calcium Hypochlorite
- E. American Water Works Association (AWWA):
- C110-03/ A21.10-03..... Ductile Iron and Gray Iron Fittings - 75 mm thru 1200 mm (3 inch thru 48 inches) for Water and other liquids AWWA/ ANSI
- C151-00/ A21.51-02..... Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids AWWA/ ANSI
- C203-02 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied AWWA/ ANSI
- C651-99 Disinfecting Water Mains
- F. American Welding Society (AWS):
- A5.8-92..... Filler Metals for Brazing

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- G. National Association of Plumbing - Heating - Cooling Contractors (PHCC):
National Standard Plumbing Code - 1996
- H. International Association of Plumbing and Mechanical Officials (IAPMO):
Uniform Plumbing Code - 2000
IS6-93..... Installation Standard
- I. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
SP-72-99 Ball Valves With Flanged or Butt Welding For General Purpose
SP-110-96 Ball Valve Threaded, Socket Welding, Solder Joint, Grooved and
Flared Ends
- J. American Society of Sanitary Engineers (ASSE):
1001-02 Pipe Applied Atmospheric Type Vacuum Breakers
1018-01 Performance for trap seal primer valve-water supply fed
1020-04 Vacuum Breakers, Anti-Siphon, Pressure Type
- K. Plumbing and Drainage Institute (PDI):
PDI WH-201 Water Hammer Arrestor

PART 2 - PRODUCTS**2.1 INTERIOR DOMESTIC WATER PIPING**

- A. Pipe: Copper tube, ASTM B88, Type K, drawn. For pipe 150 mm (6 inches) and larger, stainless, steel ASTM A312, schedule 10 may be used.
- B. Fittings for Copper Tube:
 1. Wrought copper or bronze castings conforming to ANSI B16.18 and B16.22. Unions shall be bronze, MSS SP72 & SP 110, Solder or braze joints.
 2. Grooved fittings, 50 to 150 mm (2 to 6 inch) wrought copper ASTM B75 C12200, 125 to 150 mm (5 to 6 inch) bronze casting ASTM B584, CDA 844. Mechanical grooved couplings, ductile iron, ASTM A536 (Grade 65-45-12), or malleable iron, ASTM A47 (Grade 32510) housing, with EPDM gasket, steel track head bolts, ASTM A183, coated with copper colored alkyd enamel.
 3. Mechanically formed tee connection: Form mechanically extracted collars in a continuous operation by drilling pilot hole and drawing out tube surface to form collar, having a height of not less than three times the thickness of tube wall. Adjustable collaring device shall insure proper tolerance and complete uniformity of the joint. Notch and dimple joining branch tube in a single process to provide free flow where the branch tube penetrates the fitting. Braze joints.
- C. Adapters: Provide adapters for joining screwed pipe to copper tubing.
- D. Solder: ASTM B32 Composition Sb5 HA or HB. Provide non-corrosive flux.
- E. Brazing alloy: AWS A5.8, Classification BCuP.

2.2 EXPOSED WATER PIPING

- A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed water 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: Fed. Spec. WW-P-351, standard weight.
 2. Fittings: ANSI B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
 3. Nipples: ASTM B 687, Chromium-plated.
 4. Unions: Mss SP-72, SP-110, Brass or Bronze with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with the PHCC National Standard Plumbing Code and the following:
1. Install branch piping for water from the piping system 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, except for plastic and glass, shall be reamed to full size after cutting.
 3. All pipe runs shall be laid out to avoid interference with other work.
 4. Install union and shut-off valve on pressure piping at connections to equipment.
 5. Pipe Hangers, Supports and Accessories:
 - a. All piping shall be supported per of the National Standard Plumbing Code, Chapter No. 8.
 - 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.
 - c. Floor, Wall and Ceiling Plates, Supports, Hangers:
 - 1) Solid or split unplated cast iron.
 - 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) Hangers and supports utilized with insulated pipe and tubing shall have 180 degree (min.) metal protection shield centered on and welded to the hanger and support. The shield shall be 4 inches in length and be 16 gauge steel. The shield shall be sized for the insulation.
 - 11) Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories. If the vertical distance exceeds 6 m (20 feet) for cast iron pipe additional support shall be provided in the center of that span. Provide all necessary auxiliary steel to provide that support.
6. Install cast escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
- B. Piping shall conform to the following:
1. Domestic Water:
 - a. Where possible, grade all lines to facilitate drainage. Provide drain valves at bottom of risers. All unnecessary traps in circulating lines shall be avoided.
 - b. Connect branch lines at bottom of main serving fixtures below and pitch down so that main may be drained through fixture. Connect branch lines to top of main serving only fixtures located on floor above.

3.2 TESTS

- A. General: Test system either in its entirety or in sections.
- B. Potable Water System: Test after installation of piping and domestic water heaters, but before piping is concealed, before covering is applied, and before plumbing fixtures are connected. Fill systems with water and maintain hydrostatic pressure of 690 kPa (100 psi) gage for two hours. No decrease in pressure is allowed. Provide a pressure gage with a shutoff and bleeder valve at the highest point of the piping being tested.
- C. Reagent Grade Water Systems: Fill system with water and maintain hydrostatic pressure of 690 kPa (100 psi) gage during inspection and prove tight.
- D. All Other Piping Tests: Test new installed piping under 1 1/2 times actual operating conditions and prove tight.

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