SECTION 22 11 00
FACILITY WATER DISTRIBUTION

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

1.2 RELATED WORK
A. Penetrations in rated enclosures: Section 07 84 00, FIRESTOPPING.
B. Preparation and finish painting and identification of piping systems: Section 09 91 00, PAINTING.
C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
D. Pipe Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

1.3 SUBMITTALS
A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. 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 Society of Mechanical Engineers (ASME): (Copyrighted Society)
   A13.1-07 .............. Standard Markers for Pipe Identification
   B16.3-06 .............. Malleable Iron Threaded Fittings ANSI/ASME
   B16.4-06 .............. Cast Iron Threaded Fittings Classes 125 and 250 ANSI/ASME

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B16.15-06 ............... Cast Bronze Threaded Fittings ANSI/ASME
B16.18-01 (R 2005) ..... Cast Copper Alloy Solder-Joint Pressure Fittings ANSI/ASME
B16.22-01 (R 2005) ..... Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ANSI/ASME

A183-03 ............... Carbon Steel Track Bolts and Nuts
B32-08 ............... Standard Specification for Solder Metal
B62-02 ............... Standard Specification for Composition Bronze or Ounce Metal Castings
B75-02 ............... Standard Specification for Seamless Copper Tube
B88-03 ............... Standard Specification for Seamless Copper Water Tube
B584-08a ............. Standard Specification for Copper Alloy Sand Castings for General Applications
B687-99 (R 2005)e1 ..... Standard Specification for Brass, Copper, and Chromium-Plated Pipe Nipples

E. American Water Works Association (AWWA):
C110/ A21.10-08 ........ Ductile Iron and Gray Iron Fittings for Water-75 mm thru 1200 mm (3 inch thru 48 inches) for Water and other liquids AWWA/ ANSI
C151/ A21.51-09 ........ 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
C213-07 ............... Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines
C651-05 ............... Disinfecting Water Mains

F. American Welding Society (AWS):
A5.8-04 ............... Filler Metals for Brazing

I. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
SP-72-99 ............... Ball Valves With Flanged or Butt Welding For General Service
SP-80-08 ............... Bronze Gate, Globe, Angle and Check Valves
PART 2 - PRODUCTS

2.1 WATER SERVICE CONNECTIONS TO BUILDINGS

A. From inside face of exterior wall to a distance of approximately 1500 mm (5 feet) outside of building and underground inside building, material selected shall be the same for the size specified.

B. Pipe sizes larger than 75 mm (3 inch) Diameter: Ductile iron, AWWA C151, 850 kPa (125 pounds) water steam pressure (WSP), exterior bituminous coating, cement lined. Provide flanged and anchored connection to interior piping.
C. Pipe Sizes 75 mm (3 inch) Diameter and smaller: Copper tubing, ASTM B88, Type K, seamless, annealed. Fittings as specified under Article, INTERIOR DOMESTIC WATER PIPING. Use brazing alloys, AWS A5.8, Classification BCuP.

SPEC WRITER NOTES: Use in areas with expansive soils and seismic conditions.

D. Flexible Expansion Joint: Ductile iron with ball joints rated for 1725 kPa (250 psi) working pressure conforming to AWWA/ANSI C153/A21.53, capable of deflecting a minimum of 30 degrees and expanding simultaneously to the amount shown on the drawings. Flexible expansion joint shall have the expansion capability designed as an integral part of the ductile iron ball castings. Pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of AWWA C213 and shall be factory holiday tested with a 1500 volt spark test. Flexible expansion joint shall have flanged connections conforming to AWWA/ANSI C110/A21.11. Bolts and nuts shall be 316 stainless steel and gaskets shall be neoprene.

2.2 INTERIOR DOMESTIC WATER PIPING

A. Pipe: Copper tube, ASTM B88, Type K or L, hard drawn. For pipe 150 mm (6 inches) and larger.

B. Fittings for Copper Tube:
1. Wrought copper or bronze castings conforming to ASME B16.18 and B16.22. Unions shall be bronze, MSS SP72, Solder or braze joints.
2. 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.
3. Notch and dimple joining branch tube in a single process to provide free flow where the branch tube penetrates the fitting. Braze joints.

D. Adapters: Provide adapters for joining screwed pipe to copper tubing.

E. Solder: ASTM B32 Composition Sb5 HA or HB. Provide non-corrosive flux.

F. Brazing alloy: AWS A5.8, Classification BCuP.

2.3 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.

2. Fittings: ANSI B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
4. Unions: Mss SP-72, Brass or Bronze with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.

B. Unfinished Rooms, Mechanical Rooms: Chrome-plated brass piping is not required. Paint piping systems as specified in Section 09 91 00, PAINTING.

2.4 TRAP PRIMER WATER PIPING:

A. Pipe: Copper tube, ASTM B88, type K, hard drawn.
B. Fittings: Bronze castings conforming to ANSI B16.18 Solder joints.

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: See detail shown on drawings.//

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. Water: Basket or "Y" type with easily removable cover and brass strainer basket.
C. Body: Smaller than 80 mm (3 inches), brass or bronze; 80 mm (3 inches) and larger, cast iron or semi-steel.

2.7 DIELECTRIC FITTINGS

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

2.8 STERILIZATION CHEMICALS

A. Liquid Chlorine: ASTM E1120.
B. Hypochlorite: ASTM E1229, or Fed. Spec. AA-1427C, grade B.
2.9 WATER HAMMER ARRESTER:
Closed copper tube chamber with permanently sealed 410 kPa (60 psig) air charge above a Double O-ring piston. Two high heat Buna-N O-rings pressure packed and lubricated with FDA approved Dow Corning No. 11 silicone compound. All units shall be designed in accordance with ASSE 1010 for sealed wall installations without an access panel. Size and install in accordance with Plumbing and Drainage Institute requirements (PDI WH 201). Provide water hammer arrestors at all solenoid valves, at all groups of two or more flush valves, at all quick opening or closing valves.

PART 3 – EXECUTION

3.1 INSTALLATION
A. General: Comply with the ICC International 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 with minimum spacing as required by the ICC International Plumbing Code Section 308.
      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 100 mm (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.

7. 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.

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. **All Other Piping Tests:** Test new installed piping under 1 1/2 times actual operating conditions and prove tight.

**SPEC WRITER NOTES:** Following paragraph shall be included only for new buildings or major additions.

### 3.3 STERILIZATION

A. After tests have been successfully completed, thoroughly flush and sterilize the interior domestic water distribution system in accordance with AWWA C651.

B. Use either liquid chlorine or hypochlorite for sterilization.

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**END**