SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water and distilled and deionized water piping inside the building.

B. See Division 22 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

C. See Division 23 Section "Meters and Gages for Piping" for thermometers, pressure gages, and fittings.

1.2 SUBMITTALS

A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Hard Copper Tube, 2 Inch and Smaller: ASTM B 88, Type L, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.22, wrought- copper, solder-joint fittings.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
4. Joints: Solder, no lead, 95-5 tin-antimony.

D. Hard Copper Tube, 2-1/2 Inch and Larger: ASTM B 88, Type L, water tube, drawn copper.

1. Couplings: Roll grooved, mechanical bolted type, cast of ductile iron conforming to ATSM A536 (Grade 65-45-12) with copper alkyd enamel paint coating. Victaulic Company of America Style 606 or approved equal.
2. Coupling Gasket: For water services from minus 30 deg F to plus 230 deg F, Grade “E” EPDM compound, with copper color code, molded of materials conforming to AMTS D-2000, designation 2CA615A15B44F17Z, Victaulic Company of American or approved equal.
3. Flanged Connections: Flange adaptors, engaging directly into roll grooved copper tubes and fittings and bolted directly to ANSI Class 125 cast iron and Class 150 steel flanged components: ductile iron conforming to ASTM A536 (Grade 65-45-12) with copper alkyd enamel point coating. Victaulic Company of America Style 641 or approved equal.
4. Fittings: Full flow fittings designed to accept grooved end couplings. Up to 4 inch shall be copper per ASTM B alloy C12200. 5 to 6 inch shall be bronze sand castings per ASTM B-584 copper alloy CDA 844 (81-3-7-9), Victaulic Company of America or approved equal.

E. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.

F. Distilled and Deionized Water:

1. Pipe and Fittings: ASTM D 2447, polypropylene Schedule 40, 18 megaohm purity, Orion "White Line" or approved equal.
2. Joints: Electric coil fusion joint.

2.2 VALVES

A. Balancing and drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

B. Bronze and cast-iron, general-duty valves are specified in Division 23 Section "General-Duty Valves."

C. Distilled and Deionized Water Valves: Polypropylene, 150 psig ball type, Orion "White Line" or approved equal.

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.

D. Request shut-down before attempting to connect to existing services. Freezing of water lines not allowed.

3.2 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Aboveground Domestic Water Piping: Hard copper tube, Type L copper pressure fittings; and soldered joints. All sizes.

D. Under-Building-Slab, Domestic Water Piping: Soft copper tube, Type K; all sizes no joints allowed.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use bronze ball or globe valves.
3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains, risers, and branches.
2. Install stop-and-waste drain valves where indicated.

D. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Calibrated balancing valves are specified in Division 22 Section "Domestic Water Piping Specialties."

3.4 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 23 Section "Common Work Results for Mechanical."

B. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

3.5 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 23 Section "Common Work Results for Mechanical."

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support devices are specified in Division 23 Section "Hangers and Supports for Mechanical Piping and Equipment."

1. Vertical Piping: MSS SP-69 Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet and Less: MSS SP-69 Type 1, adjustable, steel clevis hangers.
    b. Longer than 100 Feet: MSS SP-69 Type 43, adjustable roller hangers.
    c. Longer than 100 Feet: MSS SP-69 Type 49, spring cushion rolls, if indicated.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS SP-69 Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS SP-69 Type 52, spring hangers.

B. Install supports according to Division 23 Section "Hangers and Supports for Mechanical Piping and Equipment."

C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8 inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8 inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8 inch rod.
4. NPS 2-1/2: 108 inches with 1/2 inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2 inch rod.
6. NPS 6: 10 feet with 5/8 inch rod.

D. Install supports for vertical copper tubing every 10 feet.

E. Install polypropylene with continuous support by means of angle or channel and locate hangers with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. NPS 3: Maximum span, 60 inches; minimum rod size, 3/8 inch.
3. NPS 4: Maximum span, 72 inches; minimum rod size, 3/8 inch.

F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Install piping adjacent to equipment and machines to allow service and maintenance.

B. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:

1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by Owner’s Representative.
2. Should work be covered up or enclosed prior to testing, inspections and approvals, uncover work as required and, after completely tested, inspected and approved, make repairs and replacements with such material as necessary to meet the approval of the Owner, at no additional cost to the Owner.
3. During installation, notify Owner’s Representative at least 24 hours before inspection must be made. Perform tests specified below in presence of Owner’s Representative:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

4. Reinspection: If Owner’s Representative find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
5. Reports: Prepare inspection reports and have them signed by Owner’s Representative.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Furnish all equipment and apparatus necessary for the tests. Rectify all defects disclosed by the tests without additional cost to the Owner. Make tests in the presence of the Engineer. Keep record of each test, initialed by test witness.

3. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
4. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
5. Remove or valve off from the system all gauges, traps and other apparatus which may be damaged by the test pressure. Install a calibrated test pressure gauge to observe any loss in pressure.
6. Cap and subject piping to static water pressure of 150 psig, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
7. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
8. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping for 8 hours with 50 ppm chlorine concentrate. Open each valves 2 times during that period with minimum of 4 hours between each operation. Follow by flushing with clean water until residual chlorine is less than 0.2 ppm.

B. Following disinfection procedure, submit water samples in sterile bottles and successful test results to Owner's Representative and EH&S for approval. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities.

END OF SECTION 22 11 16