

SECTION 15411 - WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes water distribution piping from locations indicated to fixtures and equipment inside building.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for excavation.
 - 2. Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
 - 3. Division 15 Section "Hangers and Supports" for installation hangers and supports.
 - 4. Division 15 Section "Valves" for general-duty valves.
 - 5. Division 15 Section "Plumbing Specialties" for special duty valves.

1.03 DEFINITIONS

- A. Service Entrance Piping: Water piping at entry into building between water service piping and water distribution piping.
- B. Water Distribution Piping: Water piping inside building that conveys water to fixtures and equipment throughout the building.
- C. The following are industry abbreviations for plastic piping materials:
 - 1. CPVC: Chlorinated polyvinyl chloride.
 - 2. PVC: Polyvinyl chloride.
 - 3. PEX: Cross-linked polyethylene.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Service Entrance Piping: 160 psig.
 - 2. Water Distribution Piping: 125 psig.

1.05 SUBMITTALS

- A. Water Samples, Test Results, and Reports: Specified in "Field Quality Control" and "Cleaning" articles.

1.06 QUALITY ASSURANCE

- A. Provide listing/approval stamp, label, or other marking on piping made to specified standards.
- B. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water piping components. Include marking "NSF-pw" on plastic potable-water piping.

- D. Comply with NSF 61, "Drinking Water System Components--Health Effects," Sections 1 through 9 for potable-water piping and components.
- E. Comply with ASTM F877, "Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems"

PART 2 PRODUCTS

2.01 PIPES AND TUBES

- A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.
- B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.
- C. CPVC Plastic Pipe System: ASTM D 2846, B. F. Goodrich "FlowGuard Gold".
- D. PVC Plastic Pipe: ASTM D 1785, Schedule 40.
- E. PEX Pipe System: ASTM F 877, ViegaPEX Cross-linked Polyethylene.
- E. PEX Pipe: ASTM F 876/F 877, SDR-9.

2.02 PIPE AND TUBE FITTINGS

- A. General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.
- B. Copper, Solder-Joint Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper.
- C. Copper Unions: ASME B16.18, cast-copper-alloy, hexagonal-stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends. Include threads conforming to ASME B1.20.1 on threaded ends.
- D. Schedule 40, CPVC Threaded Fittings: ASTM F 437.
- E. Schedule 40, CPVC Socket Fittings: ASTM F 439.
- F. Schedule 40, CPVC Socket Fittings: ASTM F 438.
- G. CPVC Plastic-Tubing-System Socket Fittings: ASTM D 2846; B. F. Goodrich "FlowGuard Gold"; brass threaded transitions on hot water systems.
- H. Schedule 40, PVC Socket Fittings: ASTM D 2467.
- I. SDR-9 CTS, Bronze, PEX Crimp Fittings: ASTM F 877.
- J. SDR-9 CTS, Bronze Zero Lead Press Fittings: ASTM F 877.
- K. SDR-9 CTS, Metallic Zero Lead PEX Press Fittings: ASTM F 1807.
- L. SDR-9 CTS, PolyAlloy PEX Crimp Fittings: ASTM F 2159.
- M. SDR-9 CTS, PEX Press Polymer Fittings: ASTM F877.

2.03 JOINING MATERIALS

- A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.
- B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for commonly used

joining materials.

- C. Solder: ASTM B 32, Alloy Sn95, Sn94, or E; lead free.
- D. Cement: ASTM F493, NSF approved and labeled.
- E. Press: ASTM F877, NSF approved and labeled.
- F. Crimp: ASTM F 1807/ F 2159, NSF approved and labeled.

2.04 VALVES

- A. Refer to Division 15 Section "Valves" for general-duty valves.
- B. Refer to Division 15 Section "Plumbing Specialties" for special-duty valves.
- C. CPVC Plastic Valves: CPVC plastic body material similar to CPVC plastic piping system with seats, seals, and other components suitable for potable-water service rated for 125 psig at 150 deg.
 - F. Comply with the following:
 - 1. Ball Valves, 1-Inch NPS and Smaller: Union type with socket or threaded ends.
 - 2. Check Valves, 1-Inch NPS and Smaller: Ball type with socket ends.
- D. PEX Valves: PEX body material similar to PEX piping system with other components suitable for potable water service rated for maximum 100 psig at 180 deg.
 - F. Comply with the following:
 - 1. Ball Valves, NPS 1-Inch and smaller: Union type with press or crimp connection.
 - 2. Stop Valves, NPS 1-Inch and smaller: Union type with press or crimp connection.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- B. Underground, Service Entrance Piping: Do not use flanges or valves underground. Use the following:
 - 1. 2-Inch NPS and Smaller: CPVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; solvent-cemented joints.
- C. Aboveground, Water Distribution Piping:
 - 1. 1-1/2-Inch NPS and Smaller: SDR 11, CPVC tubing; CPVC, Schedule 40 socket fittings; and solvent-cemented joints.
 - 2. Hot & Tempered Water: B. F. Goodrich "FlowGuard Gold."
 - 3. PEX Piping: Viega, EVERPEX, or equivalent

3.03 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 ball valves.
 - 2. Throttling Duty: Use globe or ball valves.
- B. Plastic CPVC ball, and check valves may be used with plastic piping.
- C. PEX Piping: Ball, and check valves may be used with PEX piping

3.04 PIPING INSTALLATION, GENERAL

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

3.05 SERVICE ENTRANCE PIPING INSTALLATION

- A. Extend service entrance piping to exterior water service piping in sizes and locations indicated for service entrances into building. Refer to Division 2 Section "Water Systems" for water service piping.

3.06 WATER DISTRIBUTION PIPING INSTALLATION

- A. Install piping level without pitch.
- B. Install CPVC in strict accordance with manufacturer's installation instructions.
- C. Install PEX located absent to any UV source and in strict accordance with manufacturer's installation instructions

3.07 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Solvent-Cemented, Thermoplastic Pipe and Fitting Joints: Handle cleaners, primers, and solvent cements according to ASTM F 402; use cements and primers approved by the manufacturer.

3.08 VALVE INSTALLATION

- A. Shutoff Valves: Install shutoff valve on each water supply to equipment, on each supply to plumbing fixtures without supply stops, and where indicated. Use ball valves for piping 2-inch NPS and smaller.
- B. Drain Valves: 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.

3.09 HANGER AND SUPPORT INSTALLATION

- A. Install supports according to Division 15 Section "Hangers and Supports."
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- D. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:
 - 1. 3/4-Inch NPS and Smaller: Maximum horizontal spacing, 60 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
- E. Install hangers for CPVC plastic piping with the maximum 36 inch spacing in accordance with manufacturer's installation instructions.
- G. Support piping and tubing not listed above according to MSS SP-69 and CPVC manufacturer's written instructions.

3.10 CONNECTIONS

- A. Connect service entrance piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

- B. Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:
 - 1. Water Heaters: Connect cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Connect hot- and cold-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures.
 - 3. Equipment: Connect hot- and cold-water supply piping as indicated. Provide shutoff valve and union for each connection.

3.11 FIELD QUALITY CONTROL

- A. Inspect water distribution piping as follows:
- B. Inspect service entrance piping and water distribution piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 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 for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Test water piping as follows:
 - 1. 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.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
 - 3. Cap and subject piping to static water pressure of 50 psig above operating pressure, 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.
 - 4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.

3.12 CLEANING

- A. Clean and disinfect water piping as follows:
 - 1. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, procedure described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of

- chlorine. Isolate and allow to stand for 3 hours.
- c. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.
- B. Prepare and submit reports for purging and disinfecting activities.
- C. Clean interior of piping system. Remove dirt and debris as work progresses.

3.13 COMMISSIONING

- A. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- B. Perform the following steps before putting into operation:
 - 1. Close drain valves and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 - 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
- C. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- D. Check plumbing specialties and verify proper settings, adjustments, and operation.

END OF SECTION 15411