

SECTION 15415 - PLUMBING PIPING AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Pipe and pipe fittings.
 - 2. Sanitary, waste and vent piping.
 - 3. Domestic water piping.
- B. Related Sections include the following:
 - 1. Division 15 Section "Plumbing Specialties" for drainage and vent piping system specialties.

1.3 DEFINITIONS

- A. Sanitary Piping: Piping used for conveying sewerage and waste and excludes storm, surface and groundwater.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Sanitary, Waste, and Vent Systems: 10-foot head of water (30 kPa).
 - 2. Domestic Service Entrance: 160 psig (1100 kPa).

1.5 SUBMITTALS

- A. Test Results and Reports: Specified in "Field Quality Control" Article.

1.6 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.

1.7 REFERENCES

- A. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

- B. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
 - C. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications.
 - D. ANSI/ASME B32 - Solder Metal.
 - E. ANSI/AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
 - F. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
 - G. ASTM A74 - Cast Iron Soil Pipe and Fittings.
 - H. ASTM B88 - Seamless Copper Water Tube.
 - I. ASTM B306 - Copper Drainage Tube (DWV).
 - J. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - K. ASTM D2000 - Classification System for Rubber Products in Automotive Applications.
 - L. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- 1.8 QUALITY ASSURANCE
- A. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
 - B. Welders Certification: In accordance with ANSI/ASME Sec 9.
- 1.9 SUBMITTALS
- A. Submit product data under provisions of Section 01340.
 - B. Include data on pipe materials and pipe fittings.

PART 2 - PRODUCTS

- 2.1 SANITARY, WASTE, AND VENT PIPING, BURIED WITHIN 5 FEET OF BUILDING
- A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron.
Joints: Hub-and-spigot, CISPS HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- 2.2 SANITARY, WASTE, AND VENT PIPING, ABOVE GRADE
- A. Cast Iron Pipe: CISPI 301, hubless, service weight.

Fittings: Cast iron.
Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

- B. Copper Pipe: ASTM B306, DWV.
Fittings: ANSI/ASME B16.3, cast bronze, or ANSI/ASME B16.29, wrought copper.
Joints: ANSI/ASTM B32, solder, Grade 50B.
- C. Contractors option to use cast iron or copper piping for 2" and 1 2" sizes.

2.3 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Ductile Iron Pipe: ANSI/AWWA C151.
Fittings: Ductile iron, standard thickness.
Joints: ANSI/AWWA C111, rubber gasket.
Thrust Rods: 3/4 inch (19mm) diameter galvanized steel rods.
- B. Copper tube (piping 2" dia. and smaller): ASTM-B88, type 'K' soft drawn.
Fittings: ANSI/ASME B16.26 cast copper alloy for flared tubes.
Joints: Flared tube.

2.4 FLANGES, UNIONS, AND COUPLINGS

- A. Dielectric Waterway Fittings: Fitting designed to create a dielectric waterway by insulating the inside of the metal casing inhibiting the internal formation of galvanic local cell corrosion between the dissimilar metals in the water. Fittings shall be manufactured for this intent. Materials shall meet ASTM F-492-77.
- B. Pipe wells shall be installed in piping as required for thermometers and temperature sensors. Pipe well material shall be the same as pipe. Pipe fitting for thermometer well shall be larger than adjoining pipe to prevent well and mounting from restricting flow.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- 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.
- H. Slope water and arrange to drain at low points.
- I. Establish elevations of buried water piping outside the building to ensure not less than 5 feet of cover.
- J. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer of Section 09900.
- K. Establish invert elevations, slopes for drainage to 3 inch per foot (two percent) minimum. Maintain gradients.
- L. Install bell and spigot pipe with bell end upstream.

3.3 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install ball valves for throttling, bypass, or manual flow control services.

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 percent 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 is equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C601.

3.5 SERVICE CONNECTIONS

- A. Provide new water service complete from 5 feet outside building. Provide sleeve in foundation wall for service main and support at wall with reinforced concrete bridge. Anchor service main inside to concrete wall. Provide 18 gauge galvanized sheet metal sleeve. Install service main to 5 feet minimum below grade. Seal all penetrations through foundation wall watertight.

3.6 FIELD QUALITY CONTROL - SANITARY WASTE AND VENT

- A. Inspect drainage and vent 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.
- B. Test drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedure, 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 drainage and vent piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
 - 3. Roughing-In Plumbing Test Procedure: Test drainage and vent piping, and outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10 feet of head (30 kPa). Water level must not drop from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gas-tight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of

water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects using new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.7 FIELD QUALITY CONTROL - DOMESTIC

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 service entrance piping and water distribution 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 (345 kPa) 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.



3.8 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, hydrants, 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.
 6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
- 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.
- E. Energize pumps and verify proper operation.
- 3.9 CLEANING AND PROTECTING
- A. Clean interior of piping system. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION