

**PART 1**      **GENERAL****1.1**      **RELATED SECTIONS**

- .1 Section 01330 - Submittal Procedures. Section 01780 - Closeout Submittals.
- .2 Section 01355 - Waste Management and Disposal
- .3 Section 01780 - Closeout Submittals.
- .4 Section 01810 - Commissioning.
- .5 Section 02511 - Water Mains.
- .6 Section 15101 - Installation of Pipe Work.
- .7 Section 01355 - Waste Management and Disposal
- .8 Section 15111 - Valve-Bronze.
- .9 Section 15112 - Valves- Cast Iron: Gate, Globe, Check.
- .10 Section 15115 - Butterfly Valves.
- .11 Section 15141 - Domestic Water Supply Piping - Ductile Iron - Incoming Water Service.
- .12 Section 15183 - Hydronic Systems - Steel
- .13 Section 15461 - Packaged Potable Water Conditioning.
- .14 Section 15950 - Testing, Adjusting and Balancing (TAB) of Mechanical Systems.

**1.2**      **REFERENCES**

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  - .1 ANSI/ASME B16.15 Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150 and 300.
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .2 ASTM B88M, Specification for Seamless Copper Water Tube (Metric).

- .3 ASTM F492, Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.
- .3 American Water Works Association (AWWA)
  - .1 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron and Fittings.
- .4 Canadian Standards Association (CSA)
  - .1 CSA B242 Groove and Shoulder Type Mechanical Pipe Couplings and General Instructions No.1 .
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)
  - .1 MSS-SP-67, Butterfly Valves.
  - .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-71, Cast Iron Swing Check Valves Flanged and Threaded Ends.
  - .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

**1.3 PRODUCT DATA**

- .1 Submit product data in accordance with Section 01330 - Submittal Procedures.
- .2 Submit data for following: valves.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for incorporation into manual specified in Section 01780 - Closeout Submittals.

**PART 2 PRODUCTS****2.1 PIPING**

- .1 Domestic hot, cold and recirculation systems, within building.
  - .1 Above ground: copper tube, hard drawn, type L : to ASTM B88M.
  - .2 Buried or embedded: copper tube, soft annealed, type K : to ASTM B88M, in long lengths and with no buried joints.

**2.2 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS2 and larger: roll grooved to CSA B242.

**2.3 JOINTS**

- .1 Rubber gaskets, 1.6 mm thick: to ANSI/AWWA C111/A21.11.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5 lead free.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

**2.4 GATE VALVES**

- .1 NPS2 and under, soldered:
  - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 15111.
- .2 NPS2 and under, screwed:
  - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 15111.
- .3 NPS2-1/2 and over, in mechanical rooms, flanged:
  - .1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 15112.
- .4 NPS2-1/2 and over, other than mechanical rooms, flanged:
  - .1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 15112.

**2.5 GLOBE VALVES**

- .1 NPS2 and under, soldered:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 15111.
  - .2 Lockshield handles: as indicated.
- .2 NPS2 and under, screwed:
  - .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section.
  - .2 Lockshield handles: as indicated.

**2.6 SWING CHECK VALVES**

- .1 NPS 2 and under, soldered:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 15111.
- .2 NPS2 and under, screwed:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 15111.
- .3 NPS2-1/2 and over, flanged:
  - .1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, or renewable seat, bronze disc, bolted cap specified Section 15112.

**2.7 BALL VALVES**

- .1 NPS2 and under, screwed:
  - .1 As specified Section 15111.
- .2 NPS2 and under, soldered:
  - .1 As specified Section 15111.

**2.8 BUTTERFLY VALVES**

- .1 NPS2 1/2 and over, wafer or lug:
  - .1 To MSS-SP-67, Class 200, 1.4 MPa.
  - .2 As specified in Section 15115.
- .2 NPS2 1/2 and over, grooved ends:
  - .1 Class 300, 2.1 MPa as specified in Section 15115.

**2.9 BALANCING VALVES**

- .1 As per Section 15183.

**PART 3 EXECUTION****3.1 INSTALLATION**

- .1 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.
- .2 Install pipe work in accordance with Section 15101 supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.

- .4 Install CWS piping below and away from HWS and HWR and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 Buried Tubing
  - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
  - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

### **3.2 VALVES**

- .1 Isolate equipment, fixtures and branches with butterfly or ball valves.
- .2 Balance recirculation system using balancing valves. Mark settings and record on as-built drawings on completion.

### **3.3 PRESSURE TESTS**

- .1 Conform to requirements of Section 15010- Mechanical General Requirements.
- .2 Test pressure: greater of 1 1/2 times maximum system operating pressure or 860 kPa.

### **3.4 FLUSHING AND CLEANING**

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 h. Let stand for 24 h, then draw one sample off longest run. Submit to testing laboratory for bacteriological testing to verify that system is clean. Let system flush for additional 2 h, then draw off another sample for testing.

### **3.5 PRE-START-UP INSPECTIONS**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

### **3.6 DISINFECTION**

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Engineer/Architect.
- .2 Coordinate with Section 02511 and Section 15141.
- .3 Upon completion, provide bacteriological laboratory test reports on water quality for Engineer/Architect.

**3.7 START-UP**

- .1 Timing: Start up after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
  - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
  - .3 Commission water conditioning specified Section 15461 - Packaged Potable Water Conditioning.
  - .4 Bring HWS storage tank up to design temperature slowly.
  - .5 Monitor HWS and HWR piping systems for freedom of movement, pipe expansion as designed.
  - .6 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

**3.8 PERFORMANCE VERIFICATION**

- .1 Timing:
  - .1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
- .2 Procedures:
  - .1 Verify that flow rate and pressure meet Design Criteria.
  - .2 TAB HWR in accordance with Section 15950 - Testing Adjusting and Balancing (TAB) of Mechanical Systems.
  - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
  - .4 Sterilize HWS and HWR systems for Legionella control.
  - .5 Verify performance of temperature controls.
  - .6 Verify compliance with safety and health requirements.
  - .7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
  - .8 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
- .3 Reports:

- .1 In accordance with Section 01810 - Commissioning: using report forms as specified in Section 01810- Commissioning.
- .2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow, pressure and water quality.

**END OF SECTION**