

Part 1 General

1.1 GENERAL REQUIREMENTS

- .1 The Contractor shall be responsible to carry out all the Work set out or referred to in this Section 22 11 18.

1.2 SECTION INCLUDES

- .1 Materials and installation for copper domestic water service used in the following:
 - .1 Copper incoming domestic water service, up to NPS 3.
 - .2 Hard drawn copper domestic hot and cold water.
 - .3 Soft copper tubing inside building.
 - .4 Soft copper buried tubing outside building, as in between potable water source and meter inside building.
- .2 Sustainable requirements for construction, verification and operation:
 - .1 See General Specs.

1.3 RELATED SECTIONS

- .1 Division 01 – General Requirements.
- .2 Section 23 05 05 - Installation of Pipework.
- .3 Section 23 05 23.01 - Valves - Bronze.
- .4 Section 23 05 23.02 - Valves - Iron
- .5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.4 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME):
 - .1 ANSI/ASME B16.15-02, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 American Society for Testing and Materials International, (ASTM):
 - .1 ASTM A307-03, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM B88M-03, Standard Specification for Seamless Copper Water Tube (Metric).
 - .3 ASTM F492-95, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.

- .4 ASTM A536-84 (1999) e1, Standard Specification for Ductile Iron Castings.
- .3 American Water Works Association (AWWA):
 - .1 AWWA C111-00, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - .2 AWWA C606-97, Grooved and Shouldered Joints.
- .4 Canadian Standards Association (CSA International):
 - .1 CSA B242-M1980 (R1998), Groove and Shoulder Type Mechanical Pipe Couplings.
- .5 Department of Justice Canada (Jus):
 - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).
- .7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):
 - .1 MSS-SP-67-02, Butterfly Valves.
 - .2 MSS-SP-70-98, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71-97, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - .4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- .8 National Research Council (NRC)/Institute for Research in Construction:
 - .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 2005.

1.5 SUBMITTALS

- .1 Submittals in accordance with Division 01 – General Requirements.
- .2 Submit product data for all valves, pipe and equipment.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets.
- .4 Coordinate submittal requirements and provide submittals required by Division 01 – General Requirements.
- .5 Provide maintenance data for incorporation into manual specified in Division 01 – General Requirements.

1.6 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Division 01 – General Requirements.

1.7 STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Division 01 – General Requirements.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Separate for reuse and recycling and place in designated containers.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

General Note: All components used for the domestic water system shall be lead-free.

2.1 PIPING

- .1 Domestic hot, cold, recirculation and trap primer 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: in accordance with ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: in accordance with ANSI/ASME B16.15.
- .3 Cast copper, solder type: in accordance with ANSI/ASME B16.18
- .4 Wrought copper and copper alloy, solder type: in accordance with ANSI/ASME B16.22.

2.3 JOINTS

- .1 Rubber gaskets, 1.6 mm thick: in accordance with AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: containing less than 0.2% lead.
- .4 Teflon tape: for threaded joints.
- .5 Dielectric connections between dissimilar metals: dielectric fitting in accordance with ASTM F492, complete with thermoplastic liner.

2.4 GATE VALVES

- .1 NPS 2 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 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 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 23 05 23.01 - Valves - Bronze.
- .3 NPS 2-1/2 and over, flanged:
 - .1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Iron.

2.5 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, re-grindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, screwed:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, re-grindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- .3 NPS 2-1/2 and over, flanged:
 - .1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Iron.

2.6 BALL VALVES

- .1 NPS 2 and under, screwed:
 - .1 Class 150.
 - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, soldered:
 - .1 To ANSI/ASME B16.18, Class 150.
 - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and BunaN seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with National Plumbing Code and Applicable Laws.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
- .5 Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be moulded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for Contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
- .6 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
- .7 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .8 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 ball valves.
- .2 Balance recirculation system using lock shield globe valves. Mark settings and record on as-built drawings on completion.
- .3 Install extension stems for insulated piping.

3.3 PRESSURE TESTS

- .1 Test pressure: greater of 1 time's maximum system operating pressure or 860 kPa. for 24 hours, no appreciable loss.

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 to verify that system is clean copper to Provincial potable water guidelines. 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 Applicable Laws and approval of Engineer.
- .2 Upon completion, provide laboratory test reports on water quality to Engineer.

3.7 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 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 Bring HWS storage tank (if any) up to design temperature slowly.
 - .4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
 - .5 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 DHWR (if applicable) in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .4 Sterilize DHW and DHWR 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 of 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 Division 01 – General Requirements.
 - .2 Include certificate of water flow and pressure tests conducted.
- .4 Verification requirements in accordance with Division 01 – General Requirements, include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Local/regional materials.
 - .6 Low-emitting materials.

3.9 OPERATION REQUIREMENTS

- .1 Operational requirements in accordance with Division 01 – General Requirements shall include:
 - .1 Cleaning materials and schedules.
 - .2 Repair and maintenance materials and instructions.

END OF SECTION