

**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 2 1/2.
  - .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 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 47 15 - Sustainable Requirements: Construction.
- .4 Section 01 35 29 06 - Health and Safety Requirements.
- .5 Section 01 78 00 - Closeout Submittals.
- .6 Section 01 91 13 – General Commissioning (CX) Requirements.
- .7 Section 23 05 05 - Installation of Pipework.
- .8 Section 23 05 23.01 - Valves - Bronze.
- .9 Section 23 05 23.02 - Valves - Iron
- .10 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 Section 01 33 00 - Submittal Procedures.
- .2 Submit product data for all valves, pipe and equipment.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .4 Coordinate submittal requirements and provide submittals required by Section 01 47 15 - Sustainable Requirements: Construction.
- .5 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.6 HEALTH AND SAFETY**

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 06 - Health and Safety Requirements.

**1.7 STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .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**

**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: in accordance with ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125: in accordance with ANSI/ASME B16.15.
- .3 Cast copper, in accordance with ANSI/ASME B16.18 or wrought copper, ANSI/ASME B16.22; with 301 stainless steel internal components, EPDM seal, and push-to-connect joints. Victaulic PermaLynx.
- .4 Wrought copper and copper alloy, solder type: in accordance with ANSI/ASME B16.22.

- .5 NPS 2 and larger: roll grooved in accordance with CSA B242. Cast bronze to ANSI/ASME B16.18 or wrought copper ANSI/ASME B16.22. Victaulic Co. of Canada CTS fittings:
  - .1 Fittings shall be manufactured to copper-tube dimensions (flaring of tube or fitting ends to accommodate IPS sized couplings is not permitted).

## **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: 95/5 tin copper alloy.
- .4 Push-to-connect: EPDM gasket, UL classified in accordance with ANSI/NSF-61 for potable water service:
  - .1 Victaulic PermaLynx.
- .5 Teflon tape: for threaded joints.
- .6 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket:
  - .1 Victaulic Style 606.
  - .2 Victaulic Style 607 Quick Vic Push to connect coupling.
- .7 Dielectric connections between dissimilar metals: dielectric fitting in accordance with ASTM F492, complete with thermoplastic liner:
  - .1 Victaulic Style 47.

## **2.4 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 and under, push-to-connect, lift-disc type:
  - .1 To MSS-SP-80, 200 psig (1380 kPa) CWP, bronze body, stainless steel disc, spring, and shaft, suitable for installation in horizontal or vertical lines.
  - .2 Victaulic PermaLynx 510.
- .4 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.

## **2.5 BALL VALVES**

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body, chrome plated brass 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, push-to-connect:
  - .1 200 psig CWP.
  - .2 Bronze body, full port chrome plated brass ball, TFE packing, reinforced TFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
  - .3 Victaulic PermaLynx PL-300-SL.
- .3 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 Victaulic PermaLynx piping: Prepare copper tube and install in strict accordance with Victaulic installation instructions. Pipe ends shall be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool as supplied by NVent to clean and make installation mark. Push copper tube into fittings to installation depth mark, per Victaulic installation instructions. Keep fittings free of dirt and oil.
- .7 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.
- .8 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .9 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.

### **3.3 PRESSURE TESTS**

- .1 Test pressure: greater of 1 times 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 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 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 Section 01 91 19 – General Commissioning (CX) Requirements.
  - .2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

- .4 Verification requirements in accordance with Section 01 47 15 - Sustainable Requirements: Construction, 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 Section 01 47 15 - Sustainable Requirements: Construction shall include:
  - .1 Cleaning materials and schedules.
  - .2 Repair and maintenance materials and instructions.

**END OF SECTION**



**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 13 17.

**1.2 SUMMARY**

- .1 Section includes:
  - .1 The installation of storm drainage, sanitary waste and vent piping.
- .2 Related Sections:
  - .1 Section 01 74 21 – Construction/Demolition Waste Management And Disposal.
  - .2 Section 01 47 15 Sustainable Requirements: Construction.
  - .3 Section 01 35 29 06 - Health and Safety Requirements.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM):
  - .1 ASTM B32-03, Specification for Solder Metal.
  - .2 ASTM B306-02, Specification for Copper Drainage Tube (DWV).
  - .3 ASTM C564-03a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA International):
  - .1 CSA B67-1972 (R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
  - .2 CAN/CSA-B70-02, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .3 CAN/CSA-B125-01, Plumbing Fittings.

**1.4 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Construction occupational health and safety in accordance with Section 01 35 29 06 - Health and Safety Requirements.

**1.5 DELIVERY STORAGE AND DISPOSAL**

- .1 Waste Management and Disposal:
  - .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management And Disposal.
  - .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 Sustainable Requirements:
  - .1 Materials and resources in accordance with Section 01 47 15 – Sustainable Requirements: Construction.

### **2.2 COPPER TUBE AND FITTINGS**

- .1 Above ground sanitary, storm and vent Type DWV to: ASTM B306:
  - .1 Fittings:
    - .1 Cast brass: to CAN/CSA-B125.
    - .2 Wrought copper: to CAN/CSA-B125.
  - .2 Solder: tin-lead, 50:50, type 50A, to ASTM B32.

### **2.3 PLASTIC PIPING AND FITTINGS**

- .1 For buried and above ground PVC DWV piping to:
  - .1 CSA-B181-1.
  - .2 CSA-B181-2.
  - .3 CSA-B182-1.
- .2 Joints:
  - .1 Solvent weld for PVC: to ASTM D2564.
  - .2 Solvent weld for ABS: to ASTM D2235.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with Canadian Plumbing Code, Provincial Plumbing Code and Applicable Laws.
- .3 Install with expansion/compensating offsets.

### **3.2 TESTING**

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions. Monitor levels for min. 24 hour

### **3.3 PERFORMANCE VERIFICATION**

- .1 Cleanouts:
  - .1 Ensure accessible and that access doors are correctly located.
  - .2 Open, cover with linseed oil and re-seal.
  - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.

- .2 Test to ensure traps are fully and permanently primed.
- .3 Storm water drainage:
  - .1 Verify domes are secure.
  - .2 Ensure weirs are correctly sized and installed correctly.
  - .3 Verify provisions for movement of roof system.
- .4 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

### **3.4 VERIFICATION**

- .1 Verification requirements in accordance with Section 01 47 15 – Sustainable 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.

**END OF SECTION**

**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 30 05.

**1.2 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management And Disposal.
- .3 Section 01 78 00 - Closeout Submittals.

**1.3 REFERENCES**

- .1 Canadian Gas Association (CGA).
- .2 Canadian Standards Association (CSA International):
  - .1 CSA B51-97, Boiler, Pressure Vessel, and Pressure Piping Code.
  - .2 CAN/CSA-C309-M90 (R1998), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

**1.4 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

**1.5 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management And Disposal and with Waste Reduction Workplan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Engineer.

## **Part 2 Products**

### **2.1 INSTANTANEOUS DOMESTIC WATER HEATER – (PROPANE) – DHW-1**

- .1 Tankless, condensing type DHW heated.
- .2 Input: 199 MBH.
- .3 Energy star qualified, CSA approved.
- .4 Electrics: 120V/1Ø plug and cord.
- .5 Acceptable Material: A.O. Smith ATI-540H-N.
- .6 Acceptable Alternate Manufacturer: Rinnai.
- .7 Complete with sidewall vent termination kit.

### **2.2 TRIM AND INSTRUMENTATION**

- .1 Drain valve: NPS 1 with hose end.
- .2 Thermometer: 100 mm dial type with red pointer and thermowell filled with conductive paste.
- .3 Pressure gauge: 75 mm dial type with red pointer, syphon and shut-off cock.
- .4 Thermowell filled with conductive paste for control valve temperature sensor.
- .5 ASME rated temperature and pressure relief valve sized for full capacity of heater, having discharge terminating over floor drain and visible to operators.

### **2.3 ANCHOR BOLTS AND TEMPLATES**

- .1 Supply for installation by other Divisions.
- .2 Size anchor bolts to withstand seismic zone 4 acceleration and velocity forces.

### **2.4 DOMESTIC HOT WATER EXPANSION TANK EXP-2**

- .1 Steel pressure tank; polypropylene, butyl diaphragm, brass fitting.
- .2 Tank Volume: 2.0 gal, Acceptance Volume: 0.9 gal.
- .3 Acceptable Material: Amtrol Therm-X-Trol ST-5.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.
- .2 Locate as shown on insulated base.

**3.2 FIELD QUALITY CONTROL**

- .1 Manufacturer's factory trained, certified technician to start up and commission domestic water heaters.

**END OF SECTION**

**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 42 00.

**1.2 SUMMARY**

- .1 Section Includes:
  - .1 The supply and installation of Plumbing Fixtures and Trim.
- .2 Sustainable requirements for construction and verification.
- .3 Products Installed but not Supplied Under this Section:
  - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
  - .2 Equipment installed by others:
    - .1 Connect with unions.
  - .3 Equipment not installed:
    - .1 Capped for future connection by others.
- .4 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .3 Section 01 47 15 – Sustainable Requirements: Construction.
  - .4 Section 01 35 29 06 - Health and Safety Requirements.
  - .5 Section 01 78 00 - Closeout Submittals.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CAN/CSA-B45 Series-02, Plumbing Fixtures.
  - .2 CAN/CSA-B125-01, Plumbing Fittings.
  - .3 CAN/CSA-B651-95 (R2001), Barrier-Free Design.
  - .4 CSA 317.1-09: Special requirements for plumbing installations in Health Care Facilities.

**1.4 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 62 00.01 - Hazardous Materials:
  - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
    - .1 Indicate, for all fixtures and trim:
      - .1 Dimensions, construction details, roughing-in dimensions.

- .3 Closeout Submittals:
  - .1 Submit maintenance data in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Include:
    - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
    - .2 Details of operation, servicing, maintenance.
    - .3 List of recommended spare parts.

## **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 06 - Health and Safety Requirements.

## **1.6 DELIVERY STORAGE AND DISPOSAL**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 Sustainable Requirements:
  - .1 Materials and resources in accordance with Section 01 47 15 – Sustainable Requirements: Construction.

### **2.2 GENERAL**

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass and escutcheons to be chrome plated.
- .4 Number, locations: architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Bring hot and cold piping to each fixtures as required min. NPS ½" copper unless noted.



- .8 Each fixture shall have heavy chrome plated copper flexible supply risers c/w screw driver stop, reducer, escutcheon.
- .9 Specifications indicate "American Standard" as standard of acceptance. "Zurn" and "Crane" will be considered equal provided the products meet the specifications.

## **2.3 FIXTURES**

- .1 ***Refer to Schedule on Drawings.***

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Mounting heights:
  - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
  - .2 Wall-hung fixtures: To NBC heights, or as indicated on Architectural details.
  - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.

### **3.2 ADJUSTING**

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Checks:
  - .1 Aerators: operation, cleanliness.
  - .2 Vacuum breakers, backflow preventers: operation under all conditions.
  - .3 Wash fountains: operation of flow-actuating devices.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

### **3.3 VERIFICATION**

- .1 Verification requirements in accordance with Section 01 47 15 – Sustainable Requirements: Construction, 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.

**END OF SECTION**

**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 42 01.

**1.2 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for plumbing specialties and accessories.
  - .2 Sustainable requirements for construction and verification.
- .2 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 06 - Health and Safety Requirements.
  - .3 Section 01 45 00 - Quality Control.
  - .4 Section 01 47 15 - Substantial Requirements: Construction.
  - .5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .6 Section 01 78 00 - Closeout Submittals.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM):
  - .1 ASTM A126-95 (2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA):
  - .1 AWWA C700-02, Cold Water Meters-Displacement Type, Bronze Main Case.
  - .2 AWWA C701-02, Cold Water Meters-Turbine Type for Customer Service.
  - .3 AWWA C702-1-01, Cold Water Meters-Compound Type.
- .3 Canadian Standards Association (CSA International):
  - .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
  - .2 CSA-B79-94 (R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
  - .3 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
  - .1 Material Safety Data Sheets (MSDS).
- .5 Plumbing and Drainage Institute (PDI):
  - .1 PDI-G101-96, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.

- .2 PDI-WH201-92, Water Hammer Arresters Standard.

#### **1.4 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Co-ordinate submittal requirements and provide submittals required by Section 01 47 15 - Substantial Requirements: Construction.
- .3 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
  - .2 Indicate dimensions, construction details and materials for specified items.
  - .3 Submit WHMIS MSDS in accordance with Section 01 47 15 - Substantial Requirements: Construction. Indicate VOC's for adhesive and solvents during application and curing.
- .4 Shop Drawings:
  - .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details and accessories for following: soap dispensing system.
- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Instructions: submit manufacturer's installation instructions.
- .7 Manufacturers' Field Reports: manufacturers' field reports specified.
- .8 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
  - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

#### **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 06 - Health and Safety Requirements.
- .2 Construction requirements: in accordance with Section 01 47 15 - Substantial Requirements: Construction.
- .3 Verification: contractor's verification in accordance with Section 01 47 15 - Substantial Requirements: Construction.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Section 01 47 15 - Substantial Requirements: Construction.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  - .4 Divert unused metal materials from landfill to metal recycling facility.
  - .5 Fold up metal and plastic banding, flatten and place in designated area for recycling.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Materials and resources in accordance with Section 01 47 15 - Substantial Requirements: Construction.

### **2.2 FLOOR DRAINS**

- .1 Refer to Plumbing Fixture Schedule on drawings.

### **2.3 CLEANOUTS**

- .1 Line Cleanouts: heavy cast iron pipe with taper thread cover secured to body with full size pipe opening. Smith Series 4420.
- .2 Stack Cleanout: In base of cast iron stacks with neoprene gasketed secured cover. Where cleanouts are concealed behind finished walls access to be made by round stainless steel plate and slotted flat head screws, Smith Series 4510.
- .3 Floor Cleanouts:
  - .1 In unfinished areas and outside areas, Duco coated cast iron body with integral clamp device and removable positive seal closure plug and heavy duty 150mm diameter adjustable cover secured with stainless steel screws. And C.O. cast in cover for waterproof areas provide 'flange with flashing clamp. Smith 'Twist to Floor' Series 4220.
  - .2 In tiled areas same as above with square nickel bronze cover and frame recessed for tile. Cover to be adjustable to suit floor lines when installing in finished floor. Mosaic tile provide 4160 cover. Smith Series 4140
  - .3 In terrazzo areas, same as above with square nickel bronze cover and frame recessed for terrazzo. Cover to be adjustable to suit floor lines when installing in finished floor. Smith Series 4180.
  - .4 In carpeted areas: same as above with nickel bronze cover and frame. Smith Series 4020Y

- .5 Finished areas: same as above with nickel bronze frame and cover for medium traffic load. Smith Series 4020.
- .6 For heavy traffic areas: same as above with extra heavy nickel bronze cover and frame Smith Series 4100.

## **2.4 WATER HAMMER ARRESTORS**

- .1 Brass piston in a type K copper casing sized in accordance with manufacturer's recommendations to eliminate water hammer and shock from piping systems. Provide on hot, cold and non potable water lines to all quick valves, solenoids and plumbing fixtures and locate in an upright position between the last two fixtures on a line or horizontally at the end of line closest to supply source.
- .2 Acceptable Manufacturer:
  - .1 Zurn Z1700 Size No. 100.
  - .2 Amtrol Diatrol 536.
  - .3 Enpoco.
  - .4 Precision Plumbing Products.
  - .5 J. R. Smith.
  - .6 Approved equal.

## **2.5 BACK FLOW PREVENTERS**

- .1 Preventers: to CSA-B64 Series, application as indicated reduced pressure principle type or double check valve assembly back flow preventer with intermediate atmospheric vent or vacuum breaker.
- .2 Acceptable Manufacturer:
  - .1 Small Backflow Preventer:
    - .1 BFP-1: Watts 009 QT Reduced Pressure Principle.
    - .2 BFP-2: Watts 007 QT Double Check Principle.
    - .3 BFP-3: Watts 800M QT Pressure Vacuum Breaker.
  - .2 Approved equal: Conbraco, Wilkins.

## **2.6 VACUUM BREAKERS**

- .1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric.

## **2.7 PRESSURE REGULATORS**

- .1 Capacity: as indicated:
  - .1 Inlet pressure: to 100 psi.
  - .2 Outlet pressure: 45 psi.
- .2 Up to NPS1-1/2 bronze bodies, screwed: to ASTM B62.
- .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B.
- .4 Semi-steel spring chambers with bronze trim.

## **2.8 TRAP SEAL PRIMERS**

- .1 Refer to plumbing fixture schedule on drawings.

## **2.9 STRAINERS**

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS2 and under, bronze body, screwed ends, with brass drain valve piped to drain.
- .3 NPS2 1/2 and over, cast iron body, flanged ends, with ball drain valve piped to drain.

## **2.10 NON-FREEZE WALL HYDRANTS**

- .1 Zurn Z1300 Ecolotrol wall hydrant, non-freeze, encased, anti-syphon, automatic draining.
- .2 Backflow Prevention Device:
  - .1 DCW supply to P-13 to be complete with BFP-2. Refer to Section 22 42 01 – Plumbing Specialties and Accessories.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

### **3.2 INSTALLATION**

- .1 Install in accordance with National Plumbing Code of Canada, Provincial Codes and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

### **3.3 CLEANOUTS**

- .1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required, by code, and as indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

### **3.4 NON-FREEZE WALL HYDRANTS**

- .1 Install 600 mm above finished grade unless otherwise indicated.

### **3.5 WATER HAMMER ARRESTORS**

- .1 Install on branch supplies to fixtures or group of fixtures where indicated.

### **3.6 BACK FLOW PREVENTERS**

- .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Exact location of BFP to be determined on site with Engineer.
- .3 Pipe discharge to terminate over nearest drain or service sink (above p-trap) as indicated on drawing.
- .4 All backflow preventers to be accessible.

### **3.7 BACKWATER VALVES**

- .1 Install in main sewer lines where indicated and at weeping tile connection in pit provided at building cleanout.
- .2 Install in access pit as indicated.

### **3.8 HOSE BIBBS AND SEDIMENT FAUCETS**

- .1 Install at bottom of risers, at low points to drain systems, and as indicated.

### **3.9 TRAP SEAL PRIMERS**

- .1 Install for floor drains and elsewhere, as indicated.
- .2 Install on cold water.
- .3 Install soft copper tubing to floor drain.

### **3.10 STRAINERS**

- .1 Install with sufficient room to remove basket.

### **3.11 START-UP**

- .1 General:
  - .1 In accordance with Section 01 91 19 – General Commissioning (CX) Requirements.
- .2 Timing: start-up only 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.
- .3 Provide continuous supervision during start-up.

### **3.12 FIELD QUALITY CONTROL**

- .1 Verification requirements in accordance with Section 01 47 15 – Sustainable Requirements: Construction, include:
  - .1 Materials and resources.

- .2 Storage and collection of recyclables.
- .3 Construction waste management.
- .4 Resource reuse.
- .5 Recycled content.
- .6 Local/regional materials.
- .7 Wood.
- .8 Low-emitting materials.

### **3.13 TESTING AND ADJUSTING**

- .1 General:
  - .1 In accordance with Section 01 91 00 - Commissioning.
- .2 Timing:
  - .1 After start-up deficiencies rectified.
  - .2 After certificate of completion has been issued by authority having jurisdiction.
- .3 Application tolerances:
  - .1 Pressure at fixtures: +/- 70 kPa.
  - .2 Flow rate at fixtures: +/- 20%.
- .4 Adjustments:
  - .1 Verify that flow rate and pressure meet design criteria.
  - .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .5 Floor drains:
  - .1 Verify operation of trap seal primer.
  - .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
  - .3 Check operations of flushing features.
  - .4 Check security, accessibility, removability of strainer.
  - .5 Clean out baskets.
- .6 Vacuum breakers, backflow preventers, backwater valves:
  - .1 Test tightness, accessibility for O&M of cover and of valve.
  - .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
  - .3 Verify visibility of discharge from open ports.
- .7 Roof drains:
  - .1 Check location at low points in roof.
  - .2 Check security, removability of dome.
  - .3 Adjust weirs to suit actual roof slopes, meet requirements of design.
  - .4 Clean out sumps.
  - .5 Verify provisions for movement of roof systems.



- .8 Access doors:
  - .1 Verify size and location relative to items to be accessed.
- .9 Cleanouts:
  - .1 Verify covers are gas-tight, secure, yet readily removable.
- .10 Water hammer arrestors:
  - .1 Verify proper installation of correct type of water hammer arrester.
- .11 Wall, Ground hydrants:
  - .1 Verify complete drainage, freeze protection.
  - .2 Verify operation of vacuum breakers.
- .12 Pressure regulators, PRV assemblies:
  - .1 Adjust settings to suit locations, flow rates, pressure conditions.
- .13 Strainers:
  - .1 Clean out repeatedly until clear.
  - .2 Verify accessibility of cleanout plug and basket.
  - .3 Verify that cleanout plug does not leak.
- .14 Commissioning Reports:
  - .1 In accordance with Section supplemented as specified.
- .15 Training:
  - .1 In accordance with Section supplemented as specified.
  - .2 Demonstrate full compliance with Design Criteria.

**END OF SECTION**