

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for copper domestic water service used in the following:
  - .1 Hard drawn copper domestic hot and cold water services inside building.

**1.2 RELATED SECTIONS**

- .1 Division 01 - General Requirements.
- .2 Division 21 05 01 - Common Work Results for Mechanical.
- .3 Section 23 05 05 - Installation of Pipework.
- .4 Section 23 05 23 - Valves - Bronze and Cast Iron.
- .5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

**1.3 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.
- .2 American Society for Testing and Materials International, (ASTM):
  - .1 ASTM B88M-03, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 Canadian Standards Association (CSA International):
  - .1 CSA B242-M1980 (R1998), Groove and Shoulder Type Mechanical Pipe Couplings.
- .4 Department of Justice Canada (Jus):
  - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
  - .1 Material Safety Data Sheets (MSDS).

- .6 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):
  - .1 MSS-SP-70-98, Cast Iron Gate Valves, Flanged and Threaded Ends.
  - .2 MSS-SP-71-97, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- .7 National Research Council (NRC)/Institute for Research in Construction:
  - .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.
- .8 Transport Canada (TC):
  - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

#### **1.4 SUBMITTALS**

- .1 Submittals in accordance with Division 01 - General Requirements.
- .2 Submit product data for valves in accordance with Section 23 05 23 - Valves - Bronze and Cast Iron.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Division 01 - General Requirements and Division 21 - Common Work Results for Mechanical. Indicate VOC's for all adhesives and solvents during application and curing.
- .4 Coordinate submittal requirements and provide submittals in accordance with Division 01 - General Requirements.
- .5 Provide maintenance data for incorporation into manual in accordance with Division 01 - General Requirements.

#### **1.5 HEALTH AND SAFETY**

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

#### **1.6 STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Division 01 - General Requirements and Manufacturer's written instructions.

**1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Division 01 - General Requirements.

**PART 2 PRODUCTS**

**2.1 SUSTAINABLE REQUIREMENTS**

- .1 Materials and resources in accordance with Division 01 - General Requirements.

**2.2 PIPING**

- .1 Domestic hot, cold and recirculation systems, within building:
  - .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

**2.3 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
- .2 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

**2.4 JOINTS**

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5 tin copper alloy, lead free.
- .4 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

**2.5 GATE VALVES**

- .1 NPS 2-1/2 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 23 05 23 - Valves - Bronze and Cast Iron.

## **2.6 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 23 05 23 - Valves - Bronze and Cast Iron.

## **2.7 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 - Valves - Bronze and Cast Iron.

## **2.8 BALL VALVES**

- .1 NPS 2 and under, soldered:
  - .1 To ANSI/ASME B16.18, Class 150 - full port style.
  - .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23 - Valves - Bronze and Cast Iron.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Install in accordance with NPC and local authority having jurisdiction.
- .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 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.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 Insulate as per Section 23 05 23 - Thermal Insulation for Piping.

**3.2 VALVES**

- .1 Isolate equipment, fixtures and branches with gate for piping larger than NPS2 and full port ball valves for piping NPS2 and smaller.

**3.3 PRESSURE TESTS**

- .1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.
- .2 Test pressure: greater of 1-1/2 times maximum system operating pressure or 860 kPa.

**3.4 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 air chambers, expansion compensators are installed properly.

**3.5 START-UP**

- .1 Timing: Start up after:
  - .1 Pressure tests have been completed.
  - .2 Certificate of static completion has been issued.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- .1 The installation of storm drainage, sanitary waste and vent piping.
- .2 Division 01 - General Requirements.
- .3 Division 21 - Common Work Results for Mechanical.

**1.2 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 D2235-01, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  - .4 ASTM D2564-02, Specification for Solvent Cements for Poly (Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International):
  - .1 CAN/CSA-B125, Plumbing Fittings.
  - .2 CSA-Series B1800, Plastic Non-pressure Pipe Compendium.
  - .3 CSA-B181.2, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
  - .4 CSA-B182.1 Plastic Drain and Sewer Pipe and Pipe Fittings.
  - .5 CAN/SCA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.

**1.3 QUALITY ASSURANCE**

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

**1.4 DELIVERY STORAGE AND DISPOSAL**

- .1 Waste Management and Disposal:
  - .1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.

**1.5 SUBMITTALS**

- .1 Submittals in accordance with Division 01 - General Requirements.
- .2 Submit WHMIS MSDS - Material Safety Datasheets in accordance with Division 01 - General Requirements and Division 21 - Common Work Results for Mechanical. Indicate VOC's for all adhesives and solvents during application and curing.

**PART 2 PRODUCTS**

**2.1 MATERIAL**

- .1 Sustainable Requirements:
  - .1 Materials and resources in accordance with Division 01 - General Requirements.

**2.2 COPPER TUBE AND FITTINGS**

- .1 Above ground sanitary 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: lead free, tin-95:5, to ASTM B32.

**2.3 CAST IRON PIPING AND FITTINGS**

- .1 Above ground sanitary and storm: to CAN/CSA-B70. Buried sanitary, storm and vent minimum NPS 3, to CAN/CSA-B70, with one layer of protective coating of asphalt.
  - .1 Joints:
    - .1 Hub and spigot:
      - .1 Caulking lead: to CSA B70.
      - .2 Cold caulking compounds.
    - .2 Mechanical joints:

- .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
- .2 Stainless Steel Clamps.

## **2.4 PLASTIC PIPING AND FITTINGS**

- .1 All buried or DWV piping shall be a minimum Schedule 40 pipe thickness.
- .2 Buried or DWV piping shall be in conformance to:
  - .1 CSA-B1800
  - .2 CSA-B181.1.
  - .3 CSA-B181.2, ASTM D3034.
  - .4 CSA-B182.1.
- .3 Joints:
  - .1 Solvent weld for PVC: to ASTM D2564.
  - .2 Solvent weld for ABS: to ASTM D2235.
  - .3 CSA B182.2.

## **2.5 VOC LIMITS**

- .1 Refer to Division 21 - Common Work Results for Mechanical.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 In accordance with Section 23 05 01 - Installation of Pipework.
- .2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

### **3.2 TESTING**

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

### **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.
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- .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 (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).
  - .6 Ensure that condensing boiler drain material is plastic CPVC piping.

### **3.4 VERIFICATION**

- .1 Verification requirements in accordance with Division 01 - General Requirements.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 REFERENCES**

- .1 ASME B16.11, Forged Fittings, Socket-Welding and Threaded.
- .2 ASTM A53/A53M, Specification for Pipe, Steel Black and Hot-dipped, Zinc-coated Welded and Seamless.
- .3 ASTM A181/181M, Specifications for Carbon Steel Forgings for General Purpose Piping.
- .4 CAN/CSA B51 Boiler, Pressure Vessel and Pressure Piping Code.

**1.2 SHOP DRAWINGS**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 Submittal Procedures.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Fold up metal banding, flatten and place in designated area for recycling.
- .3 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with waste management plan

**PART 2 PRODUCTS**

**2.1 PIPING**

- .1 Copper Tubing and Fittings (up to 2 inches):
  - .1 Tubing: Copper, hard drawn or annealed, ASTM B88, Type L.
  - .2 Fittings: Wrought copper, ASME B16.22.
  - .3 Joints: Solder, ASTM B32, Alloy Sb5 tin-antimony.
- .2 Steel Pipe and Fittings (over 2 inches):
  - .1 Pipe: Black steel, ASTM A53, Schedule 40.
  - .2 Fittings: Steel, ASTM A234, Grade WPB, Schedule 40, butt-welding type, ASME B16.9.
  - .3 Joints: Welded.

## **2.2 VALVES**

- .1 Gate Valves: MSS SP-80 Class 150, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends to suit piping.
- .2 Ball Valves: MSS SP-110 Class 150, bronze, chrome-plated brass ball, full port, Teflon seats and stuffing box ring, lever handle, solder or threaded ends to suit piping.
- .3 Globe Valve: MSS SP-80 Class 150, bronze body, bronze trim, solder or threaded ends to suit piping.
- .4 Swing Check Valve: MSS SP-80 Class 150, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends to suit piping.

## **PART 3 EXECUTION**

### **3.1 COMPRESSED AIR PIPING CONNECTIONS AND INSTALLATION**

- .1 Install shut-off valves at outlets, major branch lines and elsewhere as indicated.
- .2 Install quick-coupler chucks and pressure gauges on drop pipes as indicated on plans.
- .3 Install unions to permit removal or replacement of equipment.
- .4 Grade piping at minimum 1% slope.
- .5 Install compressed air trap and pressure equalizing pipe at moisture collecting points. Drain pipe to nearest floor drain.
- .6 Make branch connections from top of main.
- .7 Install compressed air trap at bottom of risers and at low points in mains, piped to nearest drain.
- .8 Distance between drain points to be 30 m maximum.
- .9 Provide drain from refrigerated air dryer.
- .10 Testing: Pressure test for 4h minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

**3.2 COMMISSIONING**

- .1 Commission system and demonstrate operation to satisfaction of Department Representative.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Division 01 - General Requirements.
- .2 Division 21 - Common Work Results for Mechanical.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International):
  - .1 CSA B51-97, Boiler, Pressure Vessel, and Pressure Piping Code.
  - .2 CAN/CSA C22.2 No. 110-94 (R1999), Construction and Test of Electric Storage Tank Water Heaters.
  - .3 CAN/CSA-C191 Series-00, Performance of Electric Storage Tank Water Heaters for Household Service.
  - .4 CAN/CSA-C309-M90 (R1998), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

**1.3 SHOP DRAWINGS**

- .1 Submit Manufacturer printed shop drawings in accordance with Division 01 - General Requirements.
- .2 Indicate:
  - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance and engineering data for incorporation into manual in accordance with Division 01 - General Requirements.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.

**Part 2 Products**

**2.1 ELECTRIC**

- .1 To CSA C191-13 with a recovery rate of 53 L/h based on 56°C rise and 3,000 W input. Standby loss not to exceed 48 watts.

- .2 Tank: 108 L, glass lined steel, 560 mm dia. x 760 mm high 50 mm fibreglass insulation, enamelled steel jacket.
- .3 6 year limited tank warranty, 1 year parts warranty.
- .4 Acceptable material: A. O. Smith Space Saver or approved equal provided technical specifications are satisfied.

## **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 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 heater, having discharge terminating over floor drain and visible to operators.
- .6 Magnesium anodes adequate for 20 years of operation and located for easy replacement.
- .7 Vacuum breaker.

## **2.3 ANCHOR BOLTS AND TEMPLATES**

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

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.
- .2 Install natural gas fired domestic water heaters in accordance with CSA-B149.1.

**3.2 FIELD QUALITY CONTROL**

- .1 Manufacturer's factory trained, certified Engineer to start up and commission DHW heaters. Manufacturer to provide certificate of start-up, commissioning and training to Engineer and Commissioning Agent.

**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 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.
- .3 Related Sections:
  - .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 35 29 - Health and Safety Requirements.
  - .3 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
  - .4 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.

**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 -



- .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.
- .2 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.

## **1.6 QUALITY ASSURANCE**

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

## **1.7 DELIVERY STORAGE AND DISPOSAL**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - 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 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 prepared as part of existing design 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. ½" copper unless noted.
- .8 Each fixture shall have heavy chrome plated copper flexible supply risers c/w screw driver stop, reducer, escutcheon.
- .9 Requests for alternate product manufacturer to be forwarded to Departmental Representative for approval no later than 1 week prior to tender close.

## 2.2 **FIXTURES**

- .1 L-1: Washroom Lavatory:
  - .1 Sink: American Standard Colony Model 0346.403
  - .2 Trim: American Standard Colony Pro Model 7075.202 complete with pop up drain.
- .2 WC-1: Water Closet:
  - .1 Water Closet: American Standard Cadet Pro Right Height, Model 215BA.104
  - .2 Seat: American Standard Everclean Model 5320.110
- .3 MP-1: Multi Purpose Sink:
  - .1 Sink: Zurn MS2623-F Floor Mounted Multi Purpose Sink
  - .2 Trim: Zurn Aquaspec Z812J4-XL-G, complete with grid strainer drains
- .4 EEF-1: Emergency Eye / Face Wash:
  - .1 Eye Wash: Haws Axion 7260BT

- .2 Trim: Haws Axion Thermostatic Mixing Valve  
9201EFE

### **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 NBCC 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 shall include:
  - .1 Materials and resources.
  - .2 Storage and collection of recyclables.
  - .3 Construction waste management.
  - .4 Resource reuse.

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- .5 Local/regional materials.
- .6 Low-emitting materials.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for plumbing specialties and accessories.
- .2 Related Sections:
  - .1 Division 01 - General Requirements.

**1.2 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.
- .3 Canadian Standards Association (CSA International):
  - .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
  - .2 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
  - .3 CAN/CSA-B45 Series-02, CSA Standards on Plumbing Fixtures.
  - .4 CAN/CSA-B125-01, Plumbing Fittings.
  - .5 CAN/CSA-B651-95 (R2001), Barrier-Free Design.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
  - .1 Material Safety Data Sheets (MSDS).
- .5 Plumbing and Drainage Institute (PDI):
  - .1 PDI-WH201-92, Water Hammer Arresters Standard.
- .6 Air-Conditioning and Refrigeration Institute (ARI):
  - .1 ARI 1010-02, Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.

### **1.3 SUBMITTALS**

- .1 Submittals in accordance with Division 01 - General Requirements.
- .2 Co-ordinate submittal requirements and provide submittals required by Division 01 - General Requirements.
- .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 Division 01 - General Requirements and Division 21 - Common Work Results for Mechanical. Indicate VOC's for adhesive and solvents during application and curing.
- .4 Shop Drawings:
  - .1 Submit Manufacturer printed shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details and accessories.
- .5 Closeout submittals: submit maintenance and engineering data for incorporation into manual in accordance with Division 01 - General Requirements.
  - .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.

### **1.4 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.
- .2 Construction requirements: in accordance with Division 01 - General Requirements.

- .3 Verification: contractor's verification in accordance with Division 01 - General Requirements.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Division 01 - General Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Division 01 - General Requirements.

## **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 Floor Drains: to CSA B79.
- .2 Refer to plans for specifications.

### **2.3 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.

### **2.4 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.

### **2.5 VACUUM BREAKERS**

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

**2.6 PRESSURE REGULATORS**

- .1 Up to NPS1 1/2 bronze bodies, screwed: to ASTM B62.
- .2 NPS2 and over, semi steel bodies, Class 125, flanged to ASTM A126, Class B.
- .3 Semi-steel spring chambers with bronze trim.

**2.7 TRAP SEAL PRIMERS**

- .1 24V solenoid valve, complete with air gap fitting, EMCS for operation on timed sequence.
- .2 For up to 4 drains, provide distribution unit c/w air gap fitting.

**2.8 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.

**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 WATER HAMMER ARRESTORS**

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

**3.5 BACK FLOW PREVENTORS**

- .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 Departmental Representative.
- .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.

**3.6 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.

**3.7 STRAINERS**

- .1 Install with sufficient room to remove basket.

**3.8 START-UP**

- .1 General:
  - .1 In accordance with Division 01 - Commissioning Sections.
- .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.

### **3.9 TESTING AND ADJUSTING**

- .1 General:
  - .1 In accordance with Division 01 - Commissioning Sections.
- .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 Pressure regulators, PRV assemblies:
  - .1 Adjust settings to suit locations, flow rates, pressure conditions.
- .12 Strainers:
  - .1 Clean out repeatedly until clear.
  - .2 Verify accessibility of cleanout plug and basket.
  - .3 Verify that cleanout plug does not leak.
- .13 Commissioning Reports:
  - .1 In accordance with Section supplemented as specified.
- .14 Training:
  - .1 In accordance with Section supplemented as specified.
  - .2 Demonstrate full compliance with Design Criteria.

**END OF SECTION**