

PART 1 - GENERAL

- 1.1 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 services inside building.
 - .3 Soft copper tubing inside building.
- 1.2 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 35 30 - Health and Safety Requirements.
 - .3 Section 01 78 00 - Closeout Submittals.
 - .4 Section 01 91 13 - General Commissioning (Cx) Requirements.
 - .5 Section 23 05 23.01 - Valves - Bronze.
 - .6 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, 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, 300, 400, 600, 900, 1500 and 2500.
 - .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM B 88M, Standard Specification for Seamless Copper Water Tube (Metric).
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- 1.3 REFERENCES (Cont'd)
- .2 (Cont'd)
 - .3 ASTM F 492, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.
 - .3 American Water Works Association (AWWA).
 - .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - .4 Canadian Standards Association (CSA International).
 - .1 CSA B242, 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) - 1995.
 - .9 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).
- 1.4 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit product data for following: valves.
 - .3 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
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1.5 HEALTH AND SAFETY .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

PART 2 - PRODUCTS

2.1 PIPING .1 Domestic hot, cold and recirculation systems, within building.
.1 Above ground: sizes 25 mm and above copper tube, hard drawn, type K L M: to ASTM B 88M.
.2 Buried or embedded: copper tube, soft annealed, type K L: to ASTM B 88M, in long lengths and with no buried joints.

2.2 FITTINGS .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
.2 Cast bronze threaded fittings, Class 125: 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 NPS 2 and larger: roll grooved to CSA B242.

2.3 JOINTS .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
.2 Bolts, nuts, hex head and washers: to ASTM A 307, heavy series.
.3 Solder: 95/5 tin copper alloy.
.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 F 492, 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.
- 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 23 05 23.01 - Valves - Bronze.
.2 Lockshield handles: as indicated.
.1.
- .2 NPS 2 and under, screwed:
.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.
.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 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, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- 2.7 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.
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- 3.7 START-UP
(Cont'd)
- .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 HWC 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 Sterlize HWS and HWC 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.
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PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A 126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
 - .2 American Water Works Association (AWWA).
 - .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
 - .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
 - .3 AWWA C702, Cold Water Meters-Compound Type.
 - .3 Canadian Standards Association (CSA International).
 - .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
 - .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
 - .3 CSA-B356, 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.
- 1.2 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 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 for all adhesive, and solvents.
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- 1.2 SUBMITTALS
(Cont'd)
- .3 Shop Drawings:
 - .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details and accessories.
 - .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Instructions: submit manufacturer's installation instructions.
 - .6 Manufacturers' Field Reports: manufacturers' field reports specified.
 - .7 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.

PART 2 - PRODUCTS

- 2.1 FLOOR DRAINS
- .1 Floor Drains and Trench Drains: to CSA B79.
 - .2 FD-1: general duty; cast iron body round square as indicated, adjustable head, sediment basket nickel bronze strainer, integral seepage pan, and clamping collar.
- 2.2 CLEANOUTS
- .1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
 - .2 Access Covers:
 - .1 Wall Access: face or wall type, polished nickel bronze or stainless steel square and or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
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- 2.2 CLEANOUTS .2 Access Covers:(Cont'd)
(Cont'd)
- .2 Floor Access: rectangular round cast iron body and frame with adjustable secured nickel bronze top cast box with anchor lugs and:
- .1 Plugs: bolted bronze with neoprene gasket.
 - .2 Cover for Unfinished Concrete Floors: cast iron nickel bronze round or square, gasket, vandal-proof screws.
 - .3 Cover for Terrazzo Finish: polished nickel bronze brass with recessed cover for filling with terrazzo, vandal-proof locking screws.
 - .4 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
 - .5 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.
- 2.3 WATER HAMMER ARRESTORS .1 Stainless steel Copper construction, bellows piston type: to PDI-WH201.
- 2.4 BACK FLOW PREVENTERS .1 Preventers: to CSA-B64 Series, application as indicated, reduced pressure principle type 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 hose connection laboratory faucet intermediate.
- 2.6 TRAP SEAL PRIMERS .1 Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.
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- 2.7 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 cap.
- .3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

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.
- .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 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 Pipe discharge to terminate over nearest drain and or service sink.
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- 3.6 TRAP SEAL PRIMERS .1 Install for floor drains and elsewhere, as indicated.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.
- .3 Install soft copper tubing to floor drain.
- 3.7 STRAINERS .1 Install with sufficient room to remove basket.
- 3.8 WATER MAKE-UP ASSEMBLY .1 Install on valved bypass.
- .2 Pipe discharge from relief valve to nearest floor drain.
- 3.9 START-UP .1 General:
.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.
- .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.
- 3.10 TESTING AND ADJUSTING .1 General:
.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified.
- .2 Timing:
.1 After start-up deficiencies rectified.
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- 3.10 TESTING AND ADJUSTING
(Cont'd)
- .2 Timing:(Cont'd)
 - .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, removeability 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, removeability 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.
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- 3.10 TESTING AND .10 Water hammer arrestors:
ADJUSTING .1 Verify proper installation of correct
(Cont'd) 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 Grease interceptors:
.1 Activate, using manufacturer's
recommended procedures and materials.
- .15 Commissioning Reports:
.1 In accordance with Section 01 91 13 -
General Commissioning (Cx) Requirements:
Reports, supplemented as specified.
- .16 Training:
.1 In accordance with Section 01 91 13 -
General Commissioning (Cx) Requirements:
Training of O&M Personnel, supplemented as
specified.
.2 Demonstrate full compliance with Design

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:
.1 The supply and installation of commercial washroom fixtures and trim.
- 1.2 REFERENCES .1 Canadian Standards Association (CSA International).
.1 CAN/CSA-B45 Series, Plumbing Fixtures.
.2 CAN/CSA-B125, Plumbing Fittings.
.3 CAN/CSA-B651, Barrier-Free Design.
- 1.3 SUBMITTALS .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
.3 Indicate fixtures and trim:
.1 Dimensions, construction details, roughing-in dimensions.
.2 Factory-set water consumption per flush at recommended pressure.
.3 (For water closets, urinals): minimum pressure required for flushing.
.4 Closeout Submittals:
.1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in 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.
- 1.4 QUALITY ASSURANCE .1 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.
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PART 2 - PRODUCTS

- 2.1 MANUFACTURED UNITS
- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
 - .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
 - .3 Exposed plumbing brass 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 Water closets:
 - .1 WC-1: Wall mounted, concealed flush valve, back spud, barrier free. Bowl to be white vitreous china, siphon jet, elongated rim flush valve to be electronic, hardwired, flush valve stainless steel, activated by infra-red, complete with stainless steel trim, transformer, and manual override button.
 - .8 Washroom Lavatories:
 - .1 L-1: Wall hung, barrier free integral back, vitreous china D-shaped bowl with front over flow, faucet holes on 102 mm centres, concealed arm carrier, nominal size 675 x 500 mm.
 - .9 Washroom Lavatory Trim:
 - .1 L-1 and Trim: Barrier free, blade type handles. Heavy duty cast brass center set faucet, 102 mm centres, two handle with polished chrome plated finish and polished underspout outlet to be vandal resistant 5.7 L/min flow control aerator.
 - .10 Fixture piping:
 - .1 Hot and cold water supplies to fixtures:
 - .1 Chrome plated flexible supply pipes with screw driver stop, reducers, escutcheon.
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- 2.1 MANUFACTURED UNITS (Cont'd)
- .10 Fixture piping:(Cont'd)
 - .2 Waste:
 - .1 Brass P trap with clean out on fixtures not having integral trap.
 - .2 Chrome plated in exposed places.
 - .11 Chair carriers:
 - .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

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: as indicated, measured from finished floor.
 - .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 Adjust flush valves to suit actual site conditions.
 - .4 Adjust urinal flush timing mechanisms.
 - .5 Automatic flush valves for WC's and urinals: set controls to prevent unnecessary flush cycles during silent hours.
 - .3 Checks:
 - .1 Water closets, urinals: flushing action.
 - .2 Aerators: operation, cleanliness.
 - .3 Vacuum breakers, backflow preventers: operation under all conditions.
 - .4 Thermostatic controls:
 - .1 Verify temperature settings, operation of control, limit and safety controls.