PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
- .1 ANSI/ASME B16.15-2013, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22-2013, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24-2016, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.
- .1 ASTM A 307-2014, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM B 88M-2013, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
- .1 ANSI/AWWA C111/A21.11-2017, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)
- .1 CSA B242-05 (R2016), Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-80-2013, Bronze Gate, Globe, Angle and Check Valves.

.6 National Research Council (NRC)/Institute for Research in Construction
- .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 2015.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

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

PART 2 - PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
.1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M.
.2 Buried or embedded: copper tube, soft annealed, type K: 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: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 ½ and smaller: wrought copper to ANSI/ASME B16.22 or cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

2.3 JOINTS

.1 Rubber gaskets, latex-free 1.6mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A 307, heavy series.

.3 Solder: 95/5.

.4 Teflon tape: for threaded joints.

.5 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 BALL VALVES

.1 NPS 2 and under, screwed:
.1 Class 150.
.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and Bunan seat, steel lever handle.

.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.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with NPC and local authority having jurisdiction.

.2 Assemble piping using fittings manufactured to ANSI standards.

.3 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.

.4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.5 Install on Pipe Supports in accordance with Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.

3.3 VALVES

.1 Isolate equipment, fixtures and branches with ball valves.

3.4 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa for a minimum of 2 hours.

3.5 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Provincial or Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.6 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.

3.7 DISINFECTION

.1 Flush out, disinfect and rinse system to approval of Departmental Representative. Submit disinfection process for review.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.8 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.

3.9 PERFORMANCE VERIFICATION

.1 Scheduling:
.1 Verify system performance after pressure and leakage tests and disinfection are 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 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
.3 Verify performance of temperature controls.
.4 Verify compliance with safety and health requirements.
.5 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.
.6 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

3.10 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products.

.2 Operational requirements include:
.1 Cleaning materials and schedules.
.2 Repair and maintenance materials and instructions.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International Inc.
.1 ASTM B 32-2014, Standard Specification for Solder Metal.
.2 ASTM B 306-2013, Standard Specification for Copper Drainage Tube (DWV).

.2 Canadian Standards Association (CSA International).
.1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
.2 CAN/CSA-B70-2016, Cast Iron Soil Pipe, Fittings and Means of Joining.
.3 CAN/CSA-B125.3-2012, Plumbing Fittings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary, storm and vent Type DWV to: ASTM B 306.
.1 Fittings.
.1 Cast brass: to CAN/CSA-B125.3.
.2 Wrought copper: to CAN/CSA-B125.3.
.2 Solder: 50:50, lead free, 95:5, to ASTM B 32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Above ground sanitary, storm and vent: to CAN/CSA-B70.
.1 Joints:
.1 Mechanical joints:
.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code and local authority having jurisdiction.

3.3 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.4 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 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Plumbing and Drainage Institute (PDI)
.1 PDI-WH201-R2010, Water Hammer Arresters Standard.
.2 National Plumbing Code of Canada - 2015

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details.

.4 Instructions: submit manufacturer's installation instructions.

.5 Manufacturers' Field Reports: manufacturers' field reports specified.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.
.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 WATER HAMMER ARRESTORS

.1 Copper construction, bellows piston type: to PDI-WH201.

2.2 DOMESTIC HOT WATER HEATER

.1 HWT-1: Shall be porcelain enamel tank with polyurethane foam insulation, combination temperature and pressure relief valve and adjustable thermostat control with 16 deg C to 60 deg C range. Electrical and pipe connections shall be from side of unit. Capacity shall be 6 gallons, 1.5 kW, 120V.

2.3 WATER LEAK SAFETY VALVE

.1 Shall be electronically actuated resettable shut-off valve, to be installed on the cold water supply to the domestic hot water heaters. The valve shall be full flow and automatically close upon detection of a water leak. Valve construction shall be lead free.

.2 The System shall be supplied with an electronic sensing type water leak detector, to be installed within a pan below the hot water heater, with cable to connect to the system controller. The drain pan shall either be a pre-manufactured unit, or custom fabricated to suit tank selection. Pan shall have a side drain connection, to be extended to a floor drain.

.3 The system controller shall provide a visual and audible indication of actuation. The controller shall have the ability to be monitored by a building alarm or building automation system.

.4 The system shall be supplied with a power cut-off module to interrupt the power to the electric, gas, or oil fired domestic water heaters.

.5 The shut-off valve diameter shall match the diameter of the cold water supply pipe serving the domestic water heater. Wherever the domestic cold water supply pipe diameter exceeds the diameter of the largest available motorized shut-off valves, provide multiple shut-off valves piped in parallel to equal

the cross sectional area of the domestic cold water supply pipe.

.6 The system shall be supplied with a battery back-up module to maintain the operation of the system during a power outage. In the event that a battery back-up option is unavailable from the manufacturer, provide a separate UPS battery back-up power supply providing a minimum of 12 hours of operation.

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 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures or group of fixtures.

3.4 START-UP

.1 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.

.2 Provide continuous supervision during start-up.

3.5 TESTING AND ADJUSTING

.1 Water hammer arrestors:
.1 Verify proper installation of correct type of water hammer arrester.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-B45 Series-02(R2013), Plumbing Fixtures.
.2 CAN/CSA-B125.3-2012, Plumbing Fittings.
.3 CAN/CSA-B651-2012 (R2017), Accessible Design for the Built Environment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data in accordance with Section 01 78 00 - Closeout Submittals.

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.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: architectural drawings to govern.

.5 Fixtures to be product of one manufacturer.

.6 Trim to be product of one manufacturer.

.7 Stainless steel counter-top sinks.
.1 SK-1: single compartment, ledge-back.
.1 From 1.0mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 520 x 410 x 130mm.
.2 Trim: chrome plated brass, with swing spout, aerator, single lever handle, washerless controls, accessories to limit maximum flow rate to 8.35 litres/minute at 413 kPa, spray fitting. Provide thermostatic mixing valve.

.8 Fixture piping:
.1 Hot and cold water supplies to each fixture:
.1 Chrome plated rigid supply pipes each with screwdriver stop, reducers, escutcheon.
.2 Waste:
.1 Brass P trap with clean out on each fixture not having integral trap.
.2 Chrome plated in all exposed places.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Mounting heights:
.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
.2 Wall-hung fixtures: as per the NBCC, measured from finished floor.
.3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA-B651.

3.3 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.

.4 Thermostatic controls:
.1 Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION