## Part 1 General

### 1.1 RELATED SECTIONS

.1 Section 21 05 01 – Common Work Results for Mechanical.

### 1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

.1 ANSI/ASME B16.15-2011, Cast Bronze Threaded Fittings, Classes 125 and 250.

.2 ANSI/ASME B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ANSI/ASME B16.22-2012, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.24-2011, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.

.1 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM A536-84(2009), Standard Specification for Ductile Iron Castings.

.3 ASTM B88M-05(R2011), Standard Specification for Seamless Copper Water Tube (Metric).

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)

.1 ANSI/AWWA C111/A21.11-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)

.1 CSA B242-05(R2011), Groove and Shoulder Type Mechanical Pipe Couplings.

.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-67-2011, Butterfly Valves.

.2 MSS SP-70-2011, Gray Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS SP-71-2011, Gray Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS SP-80-2013, Bronze Gate, Globe, Angle and Check Valves.

.7 National Research Council (NRC)/Institute for Research in Construction

.1 NRCC, National Plumbing Code of Canada (NPCC) - 2010.

**1.3 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.

**1.4 DELIVERY, STORAGE AND HANDLING**

.1 Packaging Waste Management: remove for reuse and return of pallets, crates, paddling and packaging materials in accordance with Section 01 74 21 - Waste Management.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

**Part 2 Products**

**2.1 PIPING**

.1 Domestic cold.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type L: to ASTM B88M, 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 1/2 and smaller: wrought copper to ANSI/ASME B16.22; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

**2.3 JOINTS**

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

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin or copper alloy.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.

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

**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, regrindable seat as specified in 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 in Section 23 05 23.01 - Valves - Bronze.

**2.5 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 in Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified in Section 23 05 23.01 - Valves - Bronze.

## 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.

.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 DCW piping below and away from heating glycol, DHW, DHWR 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 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.

**3.3 VALVES**

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

.2 Balance recirculation system using lockshield circuit balancing valves. Mark settings and record on as-built drawings on completion.

**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.

**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 to Provincial 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 requirements of authority having jurisdiction and approval of Departmental Representative.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative’s 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 DHW storage tank up to design temperature slowly.

.4 Monitor piping 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 Sterilize DHW and DHWR systems for Legionella control.

.4 Verify performance of temperature controls.

.5 Verify compliance with safety and health requirements.

.6 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.7 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:

.1 In accordance with Commissioning Plan.

.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

**3.10 OPERATION REQUIREMENTS**

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

**3.11 CLEANING**

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management.

**END OF SECTION**

## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 - Joint Sealants.

.2 Section 21 05 01 – Common Work Results for Mechanical.

### 1.2 REFERENCES

.1 ASTM International Inc.

.1 ASTM B32-08, Standard Specification for Solder Metal.

.2 ASTM B306-09 Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-11, Standard 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 CSA-B70-12, Cast Iron Soil Pipe, Fittings and Means of Joining.

.3 CSA-B125.3-12, Plumbing Fittings.

.3 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

### 1.3 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.

### 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Waste Management.

## Part 2 Products

### 2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV, NPS 2 and less to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

.2 Solder: lead free, tin-95:5, to ASTM B32.

### 2.2 PVC

.1 Buried sanitary, storm and vent, NPS 4 and over

.1 Drainage piping, SDR-35 (NPS 8 and over).

.2 Drainage piping, SDR-28 (NPS 4 and NPS 6).

### 2.3 CAST IRON PIPING AND FITTINGS

.1 Sanitary, storm and vent minimum NPS 3, to: CAN/CSA-B70, ASTM-A88, class 4000.

.1 Joints:

.1 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70 and ASTM C564

.2 Stainless steel clamps, CSA, ACNOR B-602.

.2 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Cold caulking compounds.

## 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 Provincial Plumbing Code and local authority having jurisdiction.

### 3.3 TESTING

.1 Pressure test buried systems before backfilling.

.2 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 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).

**3.5 CLEANING**

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management.

**END OF SECTION**

## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 Section 21 05 01 – Common Work Results for Mechanical.

### 1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02 (R2013), Plumbing Fixtures.

.2 CSA B125.3-12, Plumbing Fittings.

.3 CSA B651-12, Accessible Design for the Built Environment.

.2 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

.3 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

### 1.3 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 washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.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.

### 1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual 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.

### 1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Packaging Waste Management: remove for reuse and return of pallets, crates, paddling and packaging materials in accordance with Section 01 74 21 - Waste Management.

## 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 nickel plated.

.4 Number, locations: as indicated.

.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 Closet – Wall-Mounted flushometer toilet (WC-01):

.1 High efficiency, no touch, 4.85 LPF (1.28 GPF) flushometer valve with siphon jet flushing action.
.2 Water surface of 12″x9-1/4″
.3 Wall-mounted outlet.
.4 Elongated front bowl.
.5 1-1/2″ top spud inlet.
.6 Supply with bacterial resistant seat.
.7 Install height as per ADA requirements.

.8 Vanity Sink Fixture (LAV-01):

.1 White rectangular porcelain.
.2 600x1220x100mmm.
.3 Offset basin.
.4 Integrated hidden supports.
.5 As per architectural drawings.

.9 Wall Mounted Faucet Trim:

.1 Brass construction.
.2 Hands free operation.
.3 1.9l/min flow rate.
.4 Insight adaptive infrared technology.
.5 229mm $90^0$ spout.
.6 Mixing Valve - Mechanical Mixing Valve with Thermostatic Limit Stop, with temperature adj. dial and with integral back checks. Set valve temperature at 46° C, shut-off temp. at 48.8° C. Mixer installed in H & CW supplies to provide tempered water to hot side of faucet. ASSE 1070 approved Provide tee, adaptors and flex. copper tubing to suit installation.
.7 Drain, cast brass 1 pc. top, open grid, 32mm tailpiece.

.8 Supply - Supplies, chrome plated, polished brass, rigid horizontal integral copper sweat tube nipples, 12mm I.D. x 127mm long, all brass 1/4 turn ball valve angle stops with combination V.P. loose key handles, escutcheons and flexible copper risers.

.9 P-Trap - 'p' Trap, chrome plated, polished, cast brass adjustable body, 32mm with cleanout plug, seamless brass wall bend and escutcheon.

.10 Carrier - Basin Carrier, with steel pipe legs, block base feet support, concealed arms and pedestal plate.

.10 Lavatory - Countertop Mounted - Vitreous China - Battery Powered Electronic 'No-Touch' Unit Faucet - Exposed Module - Barrier-Free Design & General Use LAV-2

.1 Basin, 102mm centres, 533mm x 445mm x 133-175mm deep, counter mounted, vitreous china, rear overflow, tapered style rim and self-rimming.

.2 Faucet - Battery Powered Electronic'No Touch' Faucet, C.P. 102mm C.C., solid cast brass body with integral proximity sensor, with vandal-resistant 1.9 LPM flow spray pressure compensating outlet, control module, solenoid, strainer, circuitry, housed in exposed module under basin. Tempered water supplied by below deck thermostatic mixing valve with back checks. Flexible conduit from control module to faucet and solenoid and includes 4 C Alkaline Batteries with 'Low Battery' flashing LED light. Provide tee, adaptors and flexible copper tubing to suit installation.

.3 Drain - Basin Drain, C.P., cast brass 1 pc. top, offset open grid with 1.5mm, 32mm tailpiece. Supply - Supplies, C.P., polished brass, rigid horizontal integral copper sweat tube nipples, 12mm I.D. x 127mm long, all brass 1/4 turn ball valve angle stops with combination V.P. loose key handles, escutcheons and flexible copper risers.

.4 P-Trap - 'p' Trap, C.P., 1.5mm, brass adjustable body, 32mm and escutcheon.

.5 Sanitary Covering, of PVC, vandal-resistant flexible seamless construction, anti-microbial, to exposed piping (to protect against heat/contusions) as per local codes.

.11 Fixture piping:

.1 Hot and cold water supplies to fixtures:

.1 Chrome plated rigid supply pipes with handwheel stop, reducers, escutcheon.

.2 Waste:

.1 Brass P trap with clean out on fixtures not having integral trap.

.2 Nickel plated in exposed places.

.12 Chair carriers:

.1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

## 2.2 FINISHES

.1 Co-operate with Section 05 50 10 – Specialized Metal Fabrications, who will disassemble and re-assemble as required to provide nickel plating to all exposed metal under this Section.

## 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 manufacturer's recommendations, measured from finished floor.

.2 Wall-hung fixtures: measured from finished floor.

.3 Barrier free: to most stringent CAN/CSA B651.

### 3.3 ADJUSTING

.1 Conform to water conservation requirements specified in 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 Set controls of automatic flush valves for WCs and urinals to prevent unnecessary flush cycles.

.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.

### 3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management.

**END OF SECTION**