1. GENERAL

1.01 REFERENCES

.1 Domestic water piping and valves are to comply with following codes, regulations, and standards (as applicable):

.1 applicable local codes and regulations;

.2 CAN/CSA B64, Backflow Preventers and Vacuum Breakers;

.3 CAN/CSA B125.1, Plumbing Supply Fittings;

.4 CAN/CSA B125.3, Plumbing Fittings;

.5 CAN/CSA B137 Series, Thermoplastic Pressure Piping Compendium;

.6 NSF/ANSI 14, Plastics Piping System Components and Related Materials;

.7 NSF/ANSI 61, Drinking Water System Components – Health Effects;

.8 NSF/ANSI 372, Drinking Water System Components – Lead Content.

1.02 SUBMITTALS

.1 Submit shop drawings/product data sheets for all products specified in Part 2 of this Section except for pipe, fittings, and chlorine solution.

1.03 CLOSEOUT SUBMITTALS

.1 Submit laboratory water purity test results indicating chlorine residual prior to application for Substantial Performance of the Work.

.2 Prior Substantial Performance of the Work, submit a minimum of 3 identified keys for key operated hydrants.

.3 Submit signed test results and inspection and test log cards for each backflow preventer as specified in Part 3 of this Section.

.4 Submit anchor drawing(s) to detail fabrication and installation of water piping anchors. Drawing(s) are to be prepared and stamped by a professional structural engineer registered and licensed in jurisdiction of the work.

.5 As specified in Part 3 of this Section, submit a letter from anchor design engineer stating anchor installation has been examined at site and anchors are properly fabricated and installed.

2. PRODUCTS

2.01 PIPE, FITTINGS, AND JOINTS

.1 Soft Copper

.1 Type "K" soft copper to ASTM B88, supplied in a continuous coil with no joints if possible, and complete with, if joints are required, compression type flared joint couplings.

.2 Copper - Solder Joint

.1 Type "L" hard drawn seamless copper to ASTM B88, complete with copper solder type fittings to ASME/ANSI B16.18 and soldered joints using The Canada Metal Co. Ltd. "SILVABRITE 100" or equal lead-free solder for cold water pipe, and 95% tin / 5% Antimony or "SILVABRITE 100" solder for other services.

.3 Copper - Pressure Coupled Joint

.1 Type "L" hard drawn seamless copper to ASTM B88 with Viega "ProPress with Smart Connect feature" copper fittings with EDPM seals, and pressure type crimped joints made by use of manufacturer recommended tool.

.4 Copper - Grooved

.1 Type "L" hard drawn seamless copper to ASTM B88 with Victaulic QuickVic Style 607 non-reducing, bolted connection type suitable and approved for application intended, 2" - 8" for copper tubing consisting of ductile iron cast housings, complete with a Grade P fluoroelastomer gasket of a pressure-responsive design, with plated nuts and bolts to secure unit together.

.5 Semi-Rigid Polyethylene Tubing

.1 Versa Fittings and Mfg. Inc. 12 mm (½") dia., high density, semi-rigid polyethylene tubing, 1380 kPa (200 psi) rated.

.6 Flexible Polyethylene

.1 Flexible polyethylene pipe to CAN/CSA B137.1, 690 kPa (100 psi) rated, complete with insertion type fittings secured with Series 300 stainless steel gear type clamps.

.7 Cross-Linked Polyethylene (PEX) Tubing

.1 Non-barrier type PEX piping in accordance with CAN/CSA B137.5, ASTM F876 and tested for compliance by an independent third-party agency, 25/50 flame spread/smoke developed rated when

tested to CAN/ULC S102.2 and complete with brass inserts and crimp-ring or cold-expansion joint fittings and couplings.

2.02 SHUT-OFF VALVES

.1 Ball Valves

.1 Class 600, 4140 kPa (600 psi) WOG rated, lead-free, full port ball type valves, each complete with a forged brass body with solder ends, forged brass cap, blowout-proof stem, 304 stainless steel ball, "Teflon" or "PTFE" seat, and a removable lever handle. Valves in insulated piping are to be complete with stem extensions.

.2 Manufacturers:

.1 Toyo Valve Co.

.2 Milwaukee Valve Co.

.3 Kitz Corporation.

.4 Apollo Valves.

.5 Watts Industries (Canada) Inc.

.2 Butterfly Valves - Flanged Joint

.1 Non-corrosive, minimum 1200 kPa (175 psi) cold water pressure rated, resilient seated butterfly valves, each complete with a coated cast ductile iron lug type body, stainless steel shaft, bronze disc, and EPDM seat, and each suitable for domestic water bubble-tight dead end service with valve in position and either side of connecting piping removed. Butterfly valves to and including 100 mm (4") dia. are to be equipped with lever handles. Butterfly valves larger than 100 mm (4") dia. are to be equipped with worm gear operators.

.2 Manufacturers:

.1 DeZurik #632L Series;

.2 Kitz Corporation Code #6122EL/EG;

.3 Toyo Valve Co. #918BESL/EG;

.4 Bray Valve and Controls Canada Series 31;

.5 Apollo Valves #141 Series;

.6 Watts Industries (Canada) Inc. #BF-03.

.3 Butterfly Valves – Grooved End

.1 Equal to Victaulic Series 608N, for copper pipe rated to 300 psi and be both bi-directional and dead-end service capable to full rated pressure. Seat material shall be EPDM UL Classified in accordance with ANSI/NSF 61 for ambient +86°F and hot +180°F potable water service and ANSI/NSF 372.

.2 Victaulic Series 461, for stainless steel pipe rated to 300 psi and be both bi-directional and dead-end service capable to full rated pressure. Seat material shall be EPDM UL Classified in accordance with ANSI/NSF 61 for ambient +86°F and hot +180°F potable water service and ANSI/NSF 372.

2.03 CHECK VALVES

.1 Horizontal

.1 Lead-free, Class 125, bronze, 1380 kPa (200 psi) WOG rated horizontal swing type check valves with solder ends.

.2 Manufacturers:

.1 Toyo Valve Co. Fig. 237A-LF;

.2 Milwaukee Valve Co. #UP1509;

.3 Kitz Corporation Code 823;

.4 Apollo Valves #61LF Series.

.2 Vertical

.1 Equal to Kitz Corp. Code 826, lead-free, 1725 kPa (250 psi) WOG rated vertical lift check valve with soldering ends.

2.04 DRAIN VALVES

.1 Minimum 2070 kPa (300 psi) water rated, 20 mm (¾") dia., straight pattern full port bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") dia. garden hose, and a cap and chain. Ball material to be 304 stainless steel.

.2 Manufacturers:

.1 Toyo Valve Co.

.2 Dahl Brothers Canada Ltd.

.3 Kitz Corporation.

.4 Apollo Valves.

.5 Watts Industries (Canada) Inc.

2.05 DOMESTIC HOT WATER PIPING BALANCING VALVES

.1 Equal to Victaulic Series 76X Low Lead Balancing Valve, lead-free and compliant with NSF-61 and NSF-372 for use in potable water applications, automatic flow limiting balancing valve (+/-5% over rated operating pressure range), complete with removable flow cartridge.

2.06 PARTITION STOPS

.1 Equal to Dahl Brothers Canada Ltd. Fig. E2300 Series or equal lead-free partition stops with EDPM packing, slotted spindles, extension tubes, stainless steel access plates, and 3 identified keys.

2.07 PRESSURE REDUCING VALVES

.1 For piping less than or equal to 50 mm (2") diameter, lead-free, non-corrosive, non-ferrous direct spring acting pressure reducing valves to CAN/CSA B356, each factory set at 345 kPa (50 psi) unless otherwise specified or required, each field adjustable from 175 kPa (25 psi) to 520 kPa (75 psi) and each complete with an integral inlet strainer.

.1 Manufacturers:

.1 Apollo Valves #36HLF Series;

.2 Zurn/Wilkins #600XL Series;

.3 Watts Industries (Canada) Inc. #LF25AUB-Z3 Series;

.4 Cash-Acme EB-25 Series;

.5 Bermad Series 935-H.

2.08 DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

.1 Lawler Manufacturing Co. Inc. 800 Series "High-Low Thermostatic Mixer" factory assembled rough bronze thermostatic mixing valve assembly complete with rotatable union end inlet piping with check stops and stainless steel strainer screens, union outlet piping with thermometer connection, all sized as shown, and following:

.1 mixing valve with liquid motor, stainless steel piston and liner, tamper-resistant control adjustment, and 3-way protection against runaway temperatures, thermal shock, and scalding;

.2 dial type thermometer conforming to requirement specified in Section 20 05 00 – Common Work Results for Mechanical;

.3 ball type outlet shut-off valve conforming to valve requirements specified in this section;

.4 surface wall mounting enamelled steel cabinet with hinged door, key lock, and permanent identification;

.5 recessed wall mounting type 304 stainless steel cabinet with a #4 finish, hinged door, key lock, and permanent identification.

.2 Manufacturers:

.1 Lawler Manufacturing Co. Inc.;

.2 Leonard Valve Co.;

.3 Symmons Industries Inc.

2.09 FLOOR DRAIN TRAP SEAL PRIMERS

.1 Primer Valve Type

.1 Precision Plumbing Products Inc. Model P2-500 trap primer valve, constructed of brass, adjustable to high or low water pressures and complete with "O" ring seals, 12 mm (½") threaded inlet and outlet connections, and, for priming two traps from the same primer, a DU-2 dual outlet distribution unit.

.2 Primer Valve Type with Manifold

.1 Precision Plumbing Products Inc. Model P1-500 trap primer valve constructed as specified above for the Model P2-500 primer valve, complete with a Model DU-3 or DU-4, 3 or 4 outlet distribution unit for priming 3 or 4 traps, and at Model "YS-8" supply tube with combinations of Model DU-3 and DU-4 distribution units for priming from 5 to 6 traps.

.3 Electronic Type

.1 Precision Plumbing Products #PT Series surface wall mounting, CSA certified, 115 volt, 1-phase, 60 Hz., electronic, automatic trap priming manifolds, each sized to suit the number of drain traps or interceptors serviced, and each complete with:

.1 galvanized steel cabinet with door;

.2 20 mm (¾") dia. NPT copper pipe inlet with shut-off valve and water hammer arrestor;

.3 solenoid valve, an atmospheric vacuum breaker, and a discharge manifold with 12 mm (½") dia. compression type copper tube connections on 40 mm (1-½") centres with quantity to suit the number of items to be primed;

.4 control panel with circuit breaker, 5 ampere fuse, 24 hour timer, and manual override toggle switch.

2.10 SHOCK ABSORBERS

.1 Type 304 stainless steel piping shock absorbers, each complete with a nesting type bellows and a casing of sufficient displacement volume to dissipate kinetic energy generated in piping system, and each sized to suit connecting water pipe and equipment it is provided for.

.2 Manufacturers:

.1 Watts Industries (Canada) Inc. "SG" Series.

.2 Jay R. Smith 5000 Series "HYDROTROL";

.3 Zurn #Z1700 "SHOKTROL";

.4 Mifab "HAMMERGUARD" WHB Series;

2.11 WATER HAMMER ARRESTORS

.1 Piston type, sealed, all stainless steel construction, pressurized water hammer arrestors suitable for either vertical or horizontal installation, each complete with a pressurized compression chamber, welded nesting-type expansion bellows surrounded by non-toxic mineral oil, and a male treaded nipple connection.

.2 Manufacturers:

.1 Jay R. Smith 5000 Series;

.2 Precision Plumbing Products "SS" Series.

.3 Piston type, sealed, pressurized water hammer arrestors suitable for either horizontal or vertical installation, each complete with a hard drawn copper body, "O"-ring piston seals, an air charge, and an inlet opening equal to diameter of pipe in which arrestor is required.

.4 Manufacturers:

.1 Watts Industries (Canada) Inc. LF05 or LF15M2;

.2 Zurn #Z1260;

.3 Precision Plumbing Products Inc. SC Series;

.4 Mifab MWH Series.

2.12 BACKFLOW PREVENTERS

.1 Double Check Valve Assembly

.1 Minimum 1205 kPa (175 psi) rated lead-free dual check valve assembly backflow preventer to CAN/CSA B64 (including supplements), complete with tight-closing resilient seated shut-off valves, test cocks and strainer.

.2 Manufacturers:

.1 Watts Industries Canada;

.2 Zurn/Wilkins;

.3 Apollo Valves (Conbraco Industries).

2.13 PIPING EXPANSION COMPENSATORS AND GUIDES

.1 Pressurized type, selected to withstand system pressure and to suit calculated movement from -5°C (23°F) to maximum operating temperature plus 25% safety factor, complete with stainless steel bellows and shroud, copper tube sweat type female ends, anti-torque device, and proper and suitable alignment guides for both sides of each compensator.

.2 Manufacturers:

.1 Senior Flexonics Series HB;

.2 Hyspan Precision Products Series 8500.

2.14 PIPE ANCHORS

.1 Welded structural black steel anchors of a design, size, and type to securely anchor pipe at point shown. Each anchor is to withstand 150% axial thrust, and is to be designed and detailed by a professional structural engineer registered and licensed in jurisdiction of the work. Submit anchor design and fabrication shop drawings, stamped by design engineer.

2.15 LAVATORY SUPPLY FITTING TEMPERING VALVES

.1 Equal to Powers "HydroGuard" Series 490, model LM490 12 mm (½") dia. or model LM491 20 mm (¾") dia. as required, each CSA B125 certified, forged brass, tamper-proof thermostatic mixing valves, adjustable for water supply between 29°C and 49°C (85°F and 120°F), sized to suit number of lavatories in grouping, and complete with a stop and check valve and a lockable handle.

.2 Each mixing valve is to be complete with a stainless steel flush wall mounting cabinet with vandal-proof hinged door.

2.16 AIR VENTS

.1 Equal to ITT Hoffman Specialty No. 78 cast brass, 1035 kPa (150 psi) rated, 20 mm (¾") straight water main vent valves, each tapped at the top for a 3.2 mm (1/8") safety drain connection.

2.17 DOMESTIC WATER THERMAL EXPANSION TANK

.1 Pre-charged domestic water thermal expansion tank in accordance with Section VIII of the ASME Boiler and Pressure Code, carbon steel outer shell construction and complete with fixed butyl rubber bladder to prevent water from contacting shell interior, top NPT stainless steel system connection, 7.6 mm to 813 mm (0.301" to 32") charging valve connection and prime painted exterior.

.2 Manufacturers:

.1 Watts Industries (Canada) Inc. Series DETA;

.2 Zurn/Wilkins Model WTTA.

3. EXECUTION

3.01 DEMOLITION

.1 Refer to demolition requirements specified in Section 20 05 05 – Selective Demolition for Mechanical.

3.02 UNDERGROUND MUNICIPAL SERVICE CONNECTION

.1 Make required arrangements with Municipality for installation of domestic water service piping from Municipal main to property line.

.2 Pay charges levied by Municipality for service connection work.

.3 Municipal charges for underground street service connection work will be paid out of a prime cost allowance. Submit original copies of invoices issued by Municipality for street service connection work.

3.03 PIPING INSTALLATION REQUIREMENTS

.1 Provide required domestic water piping.

.2 Piping, unless otherwise specified, is as follows:

.1 for underground piping 100 mm (4") dia. and larger outside and/or inside the building – rigid PVC;

.2 for underground piping less than 100 mm (4") dia. inside building – Type "K" soft copper;

.3 for pipe 75 mm (3") dia. and larger inside building and above ground – Schedule 10 stainless steel;

.4 for 12 mm (½") dia. trap seal primer tubing located underground or in concrete or masonry construction – semi-rigid polyethylene;

.5 for pipe inside building and aboveground in sizes to 100 mm (4") dia., except in vertical shafts and through fire barriers – rigid CPVC;

.6 for branch hot and cold piping aboveground from mains and risers to fixtures and equipment where fire rated construction is not penetrated – at your option, PEX tubing installed and joined in strict accordance with manufacturer's instructions; when installed in unfinished areas, ensure piping is protected from ultra-violet light exposure.

.7 for underground piping outside building to fixtures/outlets at grade level – flexible polyethylene, snaked in the trench and in a continuous length wherever possible;

.8 for pipe inside building and aboveground in sizes to 100 mm (4") dia. – Type "L" hard copper with solder joints.

.1 Option: Type "L" hard copper with pressure coupled mechanical joints.

.2 Option: Type "L" hard copper with grooved end mechanical joints.

.1 Grooved pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. All couplings will meet Victaulic standards for visual inspection sizes 2" to 8". The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Install in accordance with manufacturer's latest recommendations. A Victaulic factory trained representative shall periodically visit the job site and review the installation for best practices. The installing Contractor shall correct any identified deficiencies. Victaulic product that has been examined and has not met the visual inspection

criteria for proper installation must be corrected and re-examined by Victaulic prior to the completion of the project.

.3 Brace and secure underground water service pipe at bends, tees, and similar fittings with restraint devices, and provide concrete thrust blocks in accordance with Municipal standards and details. Regardless of what is specified elsewhere in this Specification regarding provisions of concrete, provide thrust block concrete. Paint restraint devices with 2 coats of corrosion resistant black asphalt base coating prior to backfilling.

.4 Lay pipes true to line and grade with bells upgrade. Fit sections together so that, when complete, pipe has a smooth and uniform invert. Keep pipe thoroughly clean so jointed compound will adhere. Inspect pipe for defects before being lowered into trench.

.5 Slope piping so it can be completely drained.

.6 Provide cast brass dielectric type adapters/unions at connections between ferrous and copper pipe or equipment.

3.04 INSTALLATION OF SHUT-OFF AND CHECK VALVES

.1 Refer to Part 3 of Section 20 05 00 – Common Work Results for Mechanical.

.2 For shut off valves installed on solder joint copper piping up to and including 75 mm (3") diameter, provide ball type valves, and for flanged joints copper or stainless steel piping larger than 75 mm (3") diameter provide butterfly type valves.

3.05 INSTALLATION OF DRAIN VALVES

.1 Provide a drain valve at the bottom of domestic water piping risers, at other piping low points, and wherever else shown.

.2 Locate drain valves so they are easily accessible.

3.06 INSTALLATION OF DOMESTIC HOT WATER PIPING BALANCING VALVES

.1 Provide balancing valves in domestic hot water recirculation piping where shown or required.

.1 for pipe 25 mm (3/4") dia. and less ground – equal to Victaulic Series 76X

.2 for pipe greater than 25 mm (3/4") dia. – equal to Victaulic TA Series 78BL

.2 Locate each valve so it is easily accessible.

3.07 INSTALLATION OF PARTITION STOPS

.1 Provide partition stops in domestic water piping to each group of suite washroom plumbing fixtures. Locate partition stops in piping near floor level in inconspicuous but accessible locations. Confirm exact locations prior to roughing-in.

3.08 INSTALLATION OF PRESSURE REDUCING VALVES

.1 Provide domestic water pressure reducing valves. Install so each valve is readily accessible. Whenever possible, provide pressure reducing valves factory pre-set to required pressures.

.2 Check and test operation, and adjust as required.

3.09 INSTALLATION OF DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

.1 Provide a domestic hot water thermostatic mixing valve assembly and wall mount.

.2 Adjust each valve to design requirements and check and test operation. Set maximum temperature limit stops.

.3 Identify each valve and its water temperature delivery setting with an engraved nameplate.

3.10 INSTALLATION OF TRAP SEAL PRIMERS

.1 Provide required accessible trap seal primers to automatically maintain a water seal in floor drain traps, whether shown on drawings or not.

.2 Water closet flush valves may be used for priming washroom floor drain traps if flush tube is properly tapped and primer tubing exposed in washroom is chrome plated.

.3 Provide trap primer valves to prime single or multiple (1 to 6) traps. Install trap primer valves in domestic cold water piping to frequently used plumbing fixtures. Where from 2 to 6 traps are to be primed from same primer valve, provide appropriate supply and distribution tube assemblies. Ensure primer valves are accessible.

.4 Provide 115 volt, electronic, surface wall mounting trap primer assemblies for multiple (4 to 30) traps. Include for a 115 volt 15 ampere panel breaker and wiring in conduit from closest panelboards to primer assembly, all to wiring standards of Electrical Division. Adjust primer water flow and timing to suit number of traps served.

.5 Ensure trap primer piping is secured to floor drain primer tappings and not terminated through the tapping in the throat of the drain.

3.11 INSTALLATION OF SHOCK ABSORBERS

.1 Provide accessible shock absorbers in make-up water piping to equipment.

.2 Ensure size of each shock absorber is properly selected to suit size of water pipe and equipment pipe is connected to.

.3 Install down stream of backflow preventor.

3.12 INSTALLATION OF WATER HAMMER ARRESTORS

.1 Provide accessible water hammer arrestors in domestic water piping in locations as follows:

.1 in headers at groups of plumbing fixtures;

.2 at top of risers;

.3 at ends of long horizontal runs of piping;

.4 in piping connecting solenoid valves or equipment with integral solenoid valves;

.5 wherever else shown or required by Code.

.2 Install each unit in a piping tee either horizontally or vertically in the path of potential water shock in accordance with manufacturer's instructions and details.

3.13 INSTALLATION OF BACKFLOW PREVENTERS

.1 Provide a reduced pressure zone assembly backflow preventer on incoming DCW service and in each direct domestic water connection to equipment other than plumbing fixtures and fittings.

.2 Provide a double check valve assembly backflow preventer on incoming DCW service. Provide a reduced pressure zone assembly backflow preventer in each direct domestic water connection to equipment other than plumbing fixtures and fittings.

.3 Locate each backflow preventer on floor or wall between 765 mm (30") and maximum 1.5 m (60") above floor such that it is easily accessible for maintenance and testing.

.4 Test operation of each backflow preventer in accordance with requirements of CAN/CSA B64 by personnel certified for such testing by governing authorities, and submit signed test results and a properly and clearly identified and marked inspection and test record card for each backflow preventer.

3.14 INSTALLATION OF EXPANSION COMPENSATORS, GUIDES, AND ANCHORS

.1 Provide expansion compensators in domestic water piping.

.2 Ensure pipe ends are properly aligned. Provide alignment guides on each side of expansion compensators, properly secured to building structure.

.3 Provide anchors to secure domestic water piping to structure. Locate anchors generally where shown but with exact locations to suit piping as installed and requirements of reviewed anchor shop drawings.

.4 When installation of anchors is complete, arrange, and pay for anchor design engineer to visit site to review anchor installation. Submit a letter from design engineer confirming each anchor is properly installed.

3.15 INSTALLATION OF LAVATORY SUPPLY FITTING TEMPERING VALVES

.1 Provide thermostatic water tempering valves for hot water supply to public washroom lavatory supply fittings. Conceal valves and piping.

.2 Provide a flush wall mount panel for each valve. Confirm exact location prior to roughing-in.

.3 Install in accordance with manufacturer's instructions and set mixing valves to deliver 32°C (90°F) tempered water.

3.16 INSTALLATION OF AIR VENTS

.1 Provide accessible air vents in domestic water piping to prevent air binding.

.2 Extend copper indirect drain piping from top drain connection of each vent to nearest suitable drain.

.3 Locate exact vent locations on as-built record drawings.

3.17 INSTALLATION OF DOMESTIC WATER THERMAL EXPANSION TANKS

.1 Provide domestic water thermal expansion tanks.

.2 Unless otherwise specified, mount at least 450 mm (18") from cold water inlet to domestic water heater.

.3 Adjust pre-charge to match incoming water pressure after installation.

.4 Install in accordance with manufacturer's instructions and as per local governing Codes and Regulations.

3.18 FLUSHING AND DISINFECTING PIPING

.1 Flush and disinfect all new and/or reworked domestic water piping after leakage testing is complete.

.2 Isolate new piping from existing piping prior to flushing and disinfecting procedures.

.3 Flush piping until all foreign materials have been removed and flushed water is clear. Provide connections and pumps as required. Open and close valves, faucets, hose outlets, and service connections to ensure thorough flushing.

.4 When flushing is complete, disinfect the piping with a solution of chlorine in accordance with AWWA C601.

.5 When disinfecting is complete, submit water samples to a certified laboratory for purity testing and, when testing indicates pure water in accordance with governing standards, submit a copy of test results and fill the systems.

End of Section