PART 1 – GENERAL

1.1 DESCRIPTION OF SYSTEMS

.1 Provide complete plumbing system including:
.1 Sanitary waste, vent, storm, hot and cold water, trap primer water piping systems including fixtures, specialties and accessories.

.2 Provide NPS½ priming lines to floor drain traps as indicated.

.3 Do all work in accordance with the 2010 Canadian Plumbing Code and the local authorities having jurisdiction.

.4 All underground drains to be a minimum of NPS 2.

.5 Ensure that a minimum 50mm clearance is maintained between finished piping, including insulation.

.6 Provide piping sleeves for piping penetrating concrete floor slabs.

1.2 FIXTURES AND FITTINGS

.1 In case of discrepancy between Architectural and Mechanical drawings as to the number and location of fixtures, the Architectural drawings shall govern.

1.3 RELATED WORK PERFORMED BY THIS SECTION

.1 Caulking:
.1 Caulking is the responsibility of the appropriate Section of Division 07.
.2 Perform caulking in compliance with the requirements of Division 07.

.2 Welding:
.1 All welding to be performed by Division 22 for all mechanical piping and structural supports and hangers.
.2 All welding shall be performed by certified welders in accordance with the Provincial Labour Requirements and By-Laws of Nova Scotia.

.3 Cutting and Patching:
.1 Cutting of all openings in concrete floors and walls and patching for mechanical work included in Division 22 shall be the responsibility of Division 22, unless otherwise indicated on the structural drawings.

1.4 FIXTURES AND FITTINGS

.1 Equipment assemblies comprised of electro-mechanical components shall be CSA approved where possible and shall bear the appropriate label. If the equipment in question is not CSA approved as an assembly, the manufacturer shall arrange and pay for Spot approval and labelling of the equipment prior to installation.

1.5 EQUIPMENT INSTALLATION

.1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to piping systems without interfering with other equipment.

.2 Provide means of access for servicing equipment including permanently lubricated lifetime bearings.

.3 Pipe equipment drains to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.6 PIPE INSULATION

.1 Pipe insulation shall be per Section 23 07 19.

1.7 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by others.

1.8 TRIAL USAGE

.1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.9 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.10 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 22.

.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of Section 05 12 23. Submit structural calculations with shop drawings.

.3 Mount base mounted equipment on "Type B1" chamfered edge housekeeping pads, minimum of 100mm high and minimum 100mm larger than equipment dimensions all around. Concrete specified in a separate package.

.4 Pipe hangers shall be as specified in Division 23.

1.11 SLEEVES

.1 Pipe sleeves:
- .1 Through masonry, concrete or fire rated assemblies: nominal 0.912mm (20 ga.) galvanized steel.
- .2 Through foundation walls: Schedule 40 steel pipe with annular in continuously welded at midpoint of wall.

.3 Provide 25mm clearance all around service piping or ducting for building settlement/ movement.

.2 Terminate pipe sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25mm above other floors.

.3 Fill voids around pipes:
.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof, fire retardant, non-hardening mastic.
.2 Where sleeves pass through walls or floors, provide space for firestopping to maintain fire rating integrity.
.3 Where sleeves pass through interior walls not fire-rated, provide acoustic caulking.
.4 Allow for no contact between copper tube or pipe and ferrous sleeve.
.5 Fill future-use sleeves with lime plaster or other easily removable filler.
.6 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CAN/CGSB-1.181.

1.12 PREPARATION FOR FIRESTOPPING

.1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation: specified in Section 07 84 00.

.2 Uninsulated unheated pipes not subject to movement: no special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe to move without damaging firestopping material.

.4 Insulated pipes and ducts: cut back insulation at fire separation to allow proper firestopping.

.5 Firestopping material for piping and duct penetrations to Section 07 84 00.

1.13 ESCUTCHEONS

.1 On pipes passing through walls, partitions, floors and ceilings in finished areas.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.14 TESTS

.1 Give 24 hour written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Departmental Representative.

.3 Conduct tests in presence of the Departmental Representative.

.4 Bear costs including retesting and making good.

.5 Piping:
.1 General: maintain test pressure without loss for two (2) hours unless otherwise specified.

.2 Test drainage, waste and vent piping to the National Building Code, the Canadian Plumbing Code, and the authorities having jurisdiction.

.3 Test domestic hot, cold, and recirculation water piping at 1-1/2 times system operating pressure or minimum 862 kPa, whichever is greater.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.15 PAINTING

.1 Finish painting as specified in Section 09 91 00 except where specified elsewhere in Division 22.

.2 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Prime and touch up marred finished paintwork to match original.

.4 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.16 SPARE PARTS

.1 Furnish spare parts in accordance with Section 01 78 00 and as follows:

- .1 One (1) set of packing for each pump.
- .2 One (1) casing joint gasket for each size pump.
- .3 Six (6) gaskets for plumbing cleanout plugs (each size).
- .4 One (1) set of seats, washers, and o-rings for all flush valves, faucets, hose bibs, etc.
- .5 Two (2) vandal-proof screw tools.
- .6 As specified elsewhere.

1.17 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00.

1.18 ACCESS DOORS

.1 Supply access doors to concealed plumbing equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600mm x 600mm for body entry and 300mm x 300mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Provide fire-rated access doors where penetrating fire-rated construction. Maintain fire rating integrity of construction.

.3 Material:

- .1 Special areas only such as tiled surfaces: use stainless steel with #4 satin finish.
- .2 Remaining areas: use prime coated steel.
- .3 Nominal 1.897mm (14 ga.) material.

.4 Installation:

- .1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.
.3 Installation is specified in applicable sections.

.5 Acceptable Manufacturers: Acudor, Buensod, LeHage, Zurn.

1.19 DIELECTRIC COUPLINGS

.1 General:
.1 To be compatible with and to suit pressure and temperature rating of piping system.
.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 2 and under: isolating unions.

.3 Pipes NPS 2-1/2 and over: isolating flanges.

.4 Acceptable Manufacturers: EBCO, Walter Valiet Co.

1.20 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS 3/4 unless otherwise specified: bronze, ball valve with hose end male thread, complete with cap and chain.

.3 No water from any drain or relief valve shall discharge on the floor. Pipe drains to hub drains or funnel floor drains.

1.21 OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Provide demonstrations and instructions in conjunction with the appropriate equipment manufacturer's representatives.

.3 Use operation and maintenance manual, record drawings, audio visual aids, etc. as part of instruction materials.

.4 Instructions in maintenance and operating of the following equipment shall be given by factory trained personnel and for the time period specified. The time specified does not include the time for start-up of systems and equipment:
.1 Give instruction on the operation and maintenance of all mechanical components including but not limited to pumps, fixtures and domestic hot water system. The instruction period must be for a period of not less than two (2) working days. Review for an additional 90 days after the acceptance of the building by the Departmental Representative.
.2 Where more detailed instructions for some equipment or systems are called for in other sections of the specifications, those sections of the specifications shall take precedence over this section.

1.22 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Provide supplier and service company's contact information.

.3 Operation and maintenance manual to be approved by and final copies deposited with Departmental Representative before final inspection.

.4 Operation data to include:
- .1 Description of each system and its controls.
- .2 Operation instruction for each system and each component.
- .3 Description of actions to be taken in event of equipment failure.
- .4 Valve schedule and flow diagram.
- .5 Colour coding chart; identification system.

.5 Maintenance data shall include:
- .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
- .2 Data to include schedules of tasks, frequency, tools required and task time.

.6 Performance data to include:
- .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
- .2 Equipment performance verification test results.
- .3 Special performance data as specified elsewhere.
- .4 Testing, adjusting and balancing reports as specified in Section 23 05 95.
- .5 Piping pressure test results.

.7 Approvals:
- .1 Submit three (3) copies of draft Operation and Maintenance Manual to the Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by the Departmental Representative.
- .2 Make changes as required and re-submit as directed by the Departmental Representative.

.8 Additional data: Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.23 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Shop drawings and product data shall show:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances. (e.g. access door swing spaces).

.3 Shop drawings and product data shall be accompanied by:
- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Points of operation on performance curves.
- .3 Manufacturer to certify as to current model production.
- .4 Certification of compliance to applicable codes.

1.24 CLEANING

.1 Clean interior and exterior of all systems including strainers.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.25 WARRANTIES

.1 Make good all defects other than normal wear and tear during the life of the warranty period. Warrant all work and installed equipment to work quietly and satisfactorily and to accomplish the work for which it was installed during the life of the warranty. At any time during this period, make any necessary changes and adjustments, or replacements, to accomplish this at no additional cost to the project.

.2 Submit written extended Warranties in Maintenance Manual as specified in Section 01 78 00.

1.26 PERMITS AND REGULATIONS

.1 Comply with all regulations and authorities having jurisdiction where applicable, including but not limited to the following:
- .1 Department of Labour and Workforce Development.
- .2 Fire Marshall.
- .3 Plumbing Inspector.
- .4 Provincial Board of Insurance Under-writers.
- .5 National Building Code.
- .6 Occupational Health & Safety Act.
- .7 NFPA

.3 Obtain and pay for any permits required by local codes and regulations and arrange for inspections applicable to the Contractor responsibilities.

.4 Any additional materials or labour required to conform to any of these rules and regulations will be furnished under the Contract with no additional cost to the Contract.

1.27 REFERENCE STANDARDS

.1 Use the following latest editions and amendment of reference standards in effect on date of tender call:

ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
AST	American Society of Testing & Materials
AWS	American Welding Society
AWWA	American Water Works Association
CEMA	Canadian Electrical Manufacturers Association
CGSB	Canadian Government Specification Board
CFUA	Canadian Fire Underwriters' Association
CHVAC	Canadian Heating, Ventilation & Air Conditioning Code (NCR) Fire Underwriters
CMB	Construction Materials Board
CSA	Canadian Standards Association
CUA	Canadian Underwriters Association
HRA	Heating, Refrigeration & Air Conditioning Institute of Canada

NBC	National Building Code of Canada
NBFU	National Board of Fire Underwriters'
NBS	National Bureau of Standards
NFPA	National Fire Protection Association
TIMA	Thermal Insulation Manufacturers Association
UL	Underwriters' Laboratories
ULC	Underwriters' Laboratories of Canada

1.28 ELECTRICAL

.1 Electrical work to conform to Division 26 including the following:
.1 Control wiring and conduit is specified in Division 26. Refer also to Division 26 and for wiring associated with control systems.

PART 2 - PRODUCTS Not Applicable.

PART 3 - EXECUTION Not Applicable.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 21 05 01 - Mechanical General Requirements

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Indicate:
- .1 Equipment, including connections, fittings, control assemblies and ancillaries.
- .2 Dimensions and recommended installation.
- .3 Pump curves, head and RPM.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Data to include:
- .1 Manufacturers name, type, model year, capacity and serial number.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list with names and addresses.

PART 2 - PRODUCTS

2.1 DOMESTIC HOT WATER CIRCULATING PUMPS

.1 Capacity: see pump schedule.

.2 Construction: wet rotor, in-line circulator, all bronze or stainless steel construction, stainless steel or ceramic shaft, stainless steel or bronze shaft sleeve, carbon bearings lubricated by the circulating fluid. Design for 860 kPa wp and 105°C continuous service.

.3 Motor: drip proof, with thermal overload protection.

.4 Supports: provide as recommended by manufacturer.

.5 Acceptable Product: Bell & Gossett, Armstrong, , Paco/Grundfos.

2.2 SUBMERSIBLE SUMP PUMP

.1 Construction: duplex pumps, CSA approved, housing epoxy coated cast iron, stainless steel shaft, non-clog impeller, mechanical shaft seal. Lift out guides to facilitate removal of sump pumps.

.2 Motor: as indicated hermetically sealed, with automatic thermal overlay protection.

.3 Control integral mercury switches and duplex control and alarm box. Control panel shall be complete with IEC contractors, alternating relay, manual over ride relay, HOA switch, pump run lights, terminal blocks for float controls, alarm light, alarm buzzer, NEMA 1 steel enclosure.

.4 Performance: as indicated on the drawings.

.5 Electrical: as indicated on the drawings.

.6 Acceptable Material: Myers; Berkeley Pump; Darling Duro; G.S.W. Ltd., Marley Pump.

2.3 OTHER PLUMBING PUMPS

.1 Refer to Plumbing Drawings and Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Make piping and electrical connections to pump and motor assembly and controls as indicated.

.2 Ensure pump and motor assembly do not support piping.

.3 Confirm pump rotation is correct.

.4 Set up and adjust controls.

.5 Check starter protective devices.

.6 Check power supply.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Installation of Pipework: Section 23 05 05

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM B32-08(R2014), Specification for Solder Metal.
- .2 ASTM B 306-2013, Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-2014, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 CAN/CSA B70-2012, Cast Iron Soil Pipe, Fittings and Means of Joining.

.3 CAN/CSA B125.3-2012, Plumbing Fittings.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B 306.
- .1 Fittings:
  - .1 Cast brass: to CAN/CSA-B125.
  - .2 Wrought copper: to CAN/CSA-B125.3.
- .2 Solder: tin-lead, 50:50, type 50A lead free, tin- 95:5, type TA , to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Buried sanitary and vent minimum NPS 2, to: CAN/CSA-B70, with one (1) layer of protective coating of bitumous.
- .1 Joints:
  - .1 Mechanical joints:
    - .1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA-B70.
    - .2 Stainless steel clamps.
  - .2 Hub and spigot:
    - .1 Neoprene gasket : to CSA B70.
    - .2 Cold caulking compounds.

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

2.3 PLASTIC PIPING AND FITTINGS

.1 Aboveground sanitary and vent to CSA B181.2. Pipe and fittings to be listed to S102.2 to exhaust a flame spread rating of not greater than 25 and a smoke development of not greater than 50. All pipe and fittings to be of one type and installed as per manufacturer's instructions.

.2 Standard of Acceptance:
- .1 IPEX XFR.
- .2 Royal Pipe HRS.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 In accordance with Section 23 05 05.

.2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

.3 Install piping parallel and close to walls to conserve headroom and space, and grade as indicated.

.4 Wherever possible coordinate the exact location of underground drain pipes to avoid structural footings. Where drain pipes pass perpendicular to footings coordinate, prior to tender award, to ensure that the footings are stepped down to accommodate the pipes. Sleeve the pipes through the wall or grade beam just above the footing with a minimum of 25mm clear space around the pipe. Fill the clear space with soft insulation prior to back-fill.

.5 Install buried pipe on 150 mm bed of crusher dust to Section 31 23 10, shaped to accommodate fittings to line and grade (slope) as indicated. Backfill with minimum 150 mm of crusher dust to Section 31 23 10 and upper 150 mm of rock free soil backfill.

.6 Provide pipe firestop barriers and/or collars on the underside of fire-rated floors and both sides of fire-rated partitions that are penetrated.

.7 Install cast iron to CSA B70 for sanitary serving the boiler room.

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 Confirm cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Confirm fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (sanitary, vent, pump discharge etc.) complete with directional arrows every floor or 4.5 m (whichever is less).

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Submittal Procedures: Section 01 33 00

.2 Closeout Submittals: Section 01 78 00

.3 Thermometer and Pressure Gauges: Section 23 05 20

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No.110-94(R2014), Construction and Test of Electric Storage Tank Water Heaters.
- .2 CAN/CSA C191-2013 Series, Performance of Electric Storage Tank Water Heaters for Household Service.
- .3 CAN/CSA C309-M90(R2014), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.
- .4 CSA B51-2014, Boiler, Pressure Vessel, and Pressure Piping Code.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Indicate:
- .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled, installation procedures.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00.

.2 For the Work of this Section, warrant work for five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 HOT WATER HEAT EXCHANGER, STORAGE TANK

.1 Tank: 316L stainless steel, 50mm CFC-free polyurethane insulation, NPT SS domestic inlet and outlet connections, T&P relief valve port, stainless steel control well.

.2 Heat Exchanger: Cupronickel heat exchanger, 1” NPT connections.

.3 Acceptable Manufacturers: HTP, A.O. Smith, Viessmann.

2.2 TRIM AND INSTRUMENTATION

.1 Drain valve: NPS 1 with hose end.

.2 Thermometer: to Section 23 05 20.

.3 Pressure gauge: to Section 23 05 20.

.4 Thermowell filled with conductive paste for control valve temperature sensor.

.5 ASME rated temperature and pressure relief valve sized for full capacity of 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.

2.3 ANCHOR BOLTS AND TEMPLATES

.1 Supply for installation as required.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.

END OF SECTION

PART 1 – GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A126-04(R2014), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62-09, Specification for Composition Bronze or Ounce Metal Castings.

.2 American Water Works Association (AWWA)
- .1 AWWA C700-09, Cold Water Meters- Displacement Type, Bronze Main Case.
- .2 AWWA C701-2012, Cold Water Meters- Turbine Type for Customer Service.
- .3 AWWA C702-10, Cold Water Meters- Compound Type.

.3 American National Standards Institute (ANSI)
- .1 ANSI Z358.1-04 Emergency eyewash and shower equipment.

.4 Canadian Standards Association (CSA)
- .1 CSA-B64 Series-2011, Backflow Preventers and Vacuum Breakers.
- .2 CSA-B356-2010, Water Pressure Reducing Valves for Domestic Water Supply Systems.

.5 Health Canada/Workplace Hazardous Materials Information Systems (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.6 Plumbing and Drainage Institute (PDI)
- .1 PDI-G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- .2 PDI-WH201, Water Hammer Arresters Standard.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.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 Shop Drawings:
- .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details and accessories.
- .2 Instructions: submit manufacturer's installation instructions.
- .3 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00. Include:
  - .1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging materials in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 FLOOR DRAINS

.1 Floor drains.
- .1 Minimum size for all floor drains must be 75mm, including for shower drains.
- .2 Trap primers shall be provided for all floor drains.
- .3 Acceptable material: Zurn, Jay R. Smith, MIFAB, Watts.

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.
- .1 Acceptable Product: Zurn, Jay R. Smith, MIFAB, Watts.

.2 Access covers:
- .1 Wall access: face or wall type, or stainless steel square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
- .2 Floor access: round cast iron body and frame with adjustable secured nickel bronze top.
  - .1 Plugs: bronze with neoprene gasket.
  - .2 Cover for unfinished concrete floors: cast iron round, 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.
  - .6 Cover for finished concrete floors: polished bronze, flush to finished floor, vandal-proof locking screws.

.3 Acceptable materials: Zurn, Jay R. Smith, MIFAB, Watts.

2.3 NON-FREEZE WALL HYDRANTS

.1 Recessed with integral vacuum breaker, integral backflow preventer NPS hose outlet, removable operating key, polished bronze finish, encased, non-freeze, anti- siphon, automatic draining, wall clamp, replaceable bronze seat and washer.

.2 Acceptable Product: Zurn, Jay R. Smith, MIFAB, Watts, Woodford.

2.4 WATER HAMMER ARRESTORS

.1 Stainless steel or copper construction, bellows or piston type: to PDI-WH201.

.2 Acceptable Product: Zurn, Jay R. Smith, MIFAB, Precision Plumbing Products, Watts.

2.5 BACK FLOW PREVENTERS

.1 To CSA-B64 Series.

.2 Application: domestic service entrance and fire protection system service entrance.
- .1 Domestic water:
  - .1 Reduced pressure principle type consisting of a pressure differential relief valve located between two independently operated spring-loaded centre guided check valves.
  - .2 Ductile iron construction with FDA approved fusion epoxy coat inside and out.
  - .3 Compound check.
  - .4 Single access cover.
  - .5 Maximum temperature range: 0.5°C to 60°C.
  - .6 Maximum pressure: 1205 kPa.
  - .7 CSA certified.
  - .8 Acceptable Product: Wilkins Model 375L, Watts, Zurn.

.3 Fire protection water:
- .1 Same as above except without compound check and with FM and ULC approval for fire protection service.
- .2 Acceptable Product: Wilkins Model 975L, Watts, Zurn.

2.6 VACUUM BREAKERS

.1 To CSA-B64 Series.

.2 Atmospheric vacuum breaker (inlet to domestic hot water tanks):
- .1 Plain brass body with silicone disc.
- .2 Suitable for temperatures up to 82°C.
- .3 Maximum operating pressure: 860 kPa.
- .4 Size: NPS ½.
- .5 Acceptable Product: Watts Series 288a, Wilkins, Jay R. Smith, MIFAB.

.3 Pressure vacuum breaker: Watts N36, FEBCO, Wilkins, Jay R Smith, Complete with shutoff Zau valve.

.4 Hose connection vacuum breaker:
- .1 NPS female hose thread inlet, NPS ½ male hose threat outlet, brass finish.
- .2 Acceptable Product: Watts 8, FEBCO, Wilkins, Jay R. Smith.

2.7 HOSE BIBBS AND SEDIMENT FAUCETS

.1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, chrome plated in finished areas, and caps on chains.

2.8 WATER METERS

.1 Technical Data:
- .1 Register:
  - .1 Magnetic drive, low torque registration ensures accuracy.
  - .2 Impact-resistant register.
  - .3 High resolution, low flow leak detection.
  - .4 Bayonet style register mount allows in-line serviceability.
  - .5 Tamperproof seal pin deters theft.
  - .6 Date of manufacture, size and model stamped on dial face.

.2 No-Lead Maincase:
- .1 Made from no-lead high copper alloy.
- .2 ANSI/NSF 61 Certified.
- .3 Lifetime guarantee.
- .4 Resists internal pressure stresses and external damage.
- .5 Handles in-line pipe in variations and stresses.
- .6 No-lead high copper alloy provides residual value vs. plastic.
- .7 Electrical grounding continuity.

.3 Nutating Disc Measuring Chamber:
- .1 Positive displacement.
- .2 Widest effective flow range from maximum revenue.
- .3 Proprietary polymer materials maximize long term accuracy.
- .4 Floating chamber design is unaffected by meter position of in- line piping stresses.

.4 Acceptable Material: Neptune, Watts.

2.9 TRAP SEAL PRIMERS

.1 Up to 12 floor drains: Electronic trap priming manifold with:
- .1 Vacuum breaker
- .2 Two-way ball valve controlled by the building control system complete with manual override switch.
- .3 Inlet strainer.
- .4 NPS inlet connection.
- .5 Calibrated manifold.
- .6 Water hammer arrestor
- .7 Mounted in steel cabinet
- .8 Compression outlet fittings
- .9 Inlet shut off valve
- .10 Supplies minimum 59 ml @ 138 kPa.
- .11 Twenty-four (24) hour timer.
- .12 Acceptable Product: Mifab, PPP PT

.2 Provide wall access panels/doors to conceal trap primer valves.

2.10 STRAINERS

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

2 Under NPS1, bronze body, screwed ends, with brass cap, tapped blowoff and plug.

.3 NPS1 to NPS2, bronze body, screwed ends, with brass cap, tapped blow-off connection with capped bronze ball valve.

.4 NPS2½ and over, cast iron body, flanged ends, with bolted cap, tapped blow-off connection with capped bronze ball valve.

2.11 PIPE WALL AND FLOOR PENETRATION SEAL

.1 Application:
- .1 Pipes penetrating exterior concrete walls below grade and concrete floors on grade.
- .2 Seal material to be EPDM.
- .3 Pressure plates to be glass- reinforced plastic.
- .4 Bolts and nuts to be stainless steel 18-8.
- .5 Suitable temperature range to be -40°C to 121°C.
- .6 Wall sleeves to be Schedule 40 black iron pipe. Sleeves in exterior walls to be galvanized.
- .7 Floor sleeves to be Schedule 40 black iron pipe.
- .8 Wall and floor sleeves to be sufficiently long to mount flush with interior and exterior walls and flush with finished floor of slab-on-grade floors.
- .9 Acceptable Product: Metraseal MS Series, Link Seal.

2.12 STRAINERS

.1 862 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

.2 NPS 2 and under, bronze body, screwed ends, with brass cap.
- .1 Acceptable material: Armstrong F4SC; Braukmann FY32; Crane 988-1/2; Leitch BE; Spirax BT; Toyo 380; Watts 777 Series.

.3 NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.
- .1 Acceptable material: Armstrong F4FL; Braukmann FY33, Crane 989-1/2; Leitch 528 pipeline basket type; Spirax Fig 3; Toyo 381A; Watts 77F Series.

2.13 DOMESTIC HOT WATER EXPANSION TANKS/BACKFLOW ACCOMODATORS

.1 Compliance: Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation.
- .1 Diaphram type charged. Designed in accordance with the ASME code; for use on potable domestic hot water systems up to 862kPa and 83°C max.
- .2 Provide stainless steel system connection, air valve, butyl rubber diaphragm, acrylic primer finish.
  - .1 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.
- .3 Tanks must be insulated.
- .4 Acceptable material: Amtrol, Bell & Gossett, Wessells, HG Specialties.

2.14 THERMOSTATIC MIXING VALVE

.1 Thermostatic cartridge with strainer, thermal motor with bellows element mounted out of water.

.2 Install in accordance with manufacturer's instructions and as specified.

.3 See drawings for inlet and outlet connection sizes.

.4 Adjustable setting from 30°C to 70°C, set at 60°C.

.5 Acceptable materials: Watts, Armstrong, Bell & Gossett, Zurn, Wilkins, Lawler.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.2 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.2 NON FREEZE WALL HYDRANTS

.1 Install 600 mm above finished grade unless otherwise indicated.

3.3 WATER HAMMER ARRESTORS

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

3.4 CLEANOUTS

.1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders and where 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 NPS 4.

.4 For sinks and lavatory basins, provide cleanout in branch waste/stack or provide removable trap dip - no cleanout plug in bottom of dip.

.5 Provide common cleanout in stack which serves two sinks or lavatory basins by using a double sanitary tee.

3.5 BACK FLOW PREVENTORS

.1 Install in accordance with CSA-B64, where indicated and elsewhere as required by code.

.2 Reduced pressure type where backflow would constitute a health hazard.

3.6 HOSE BIBBS AND SEDIMENT FAUCETS

.1 Install at bottom of risers, at low points to drain systems, and as indicated.

3.7 TRAP SEAL PRIMERS

.1 Install for floor drains and elsewhere, as indicated.

.2 Install on cold water supply in concealed space, to approval of WFN Representative.

3.8 STRAINERS

.1 Install with sufficient room to remove basket.

3.9 WATER METERS

.1 Install water meter provided by local water authority.

.2 Install water meter as indicated.

3.10 START-UP AND COMMISSIONING

.1 General:
  .1 In accordance with Contractors Commissioning Plan in Section 01 91 00 and supplemented as specified herein.

.2 Timing: Start-up only after:
  .1 Pressure tests have been completed.
  .2 Disinfection procedures have been completed.

.3 Provide continuous supervision during start-up.

3.11 TESTING AND ADJUSTING

.1 General:
  .1 In accordance with Contractors Commissioning Plan and supplemented as specified herein.

.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 one (1) maximum and two (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 Access doors:
- .1 Verify size and location relative to items to be accessed.

.8 Cleanouts:
- .1 Verify covers are gas-tight, secure, yet readily removable.

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

.10 Wall, Ground hydrants:
- .1 Verify complete drainage, freeze protection.
- .2 Verify operation of vacuum breakers.

.11 Strainers:
- .1 Clean out repeatedly until clear.
- .2 Verify accessibility of cleanout plug and basket.
- .3 Verify cleanout plug does not leak.

.12 Hose bibbs, sediment faucets:
- .1 Verify operation and at all low points.

.13 Water meters:
- .1 Verify calibration certificate.

.14 Backflow preventers:
- .1 Provide formal commissioning by licensed technician.
- .2 Provide written report and certification.

.15 Commissioning:
- .1 In accordance with the Commissioning Plan and supplemented as specified herein.

.16 Training:
- .1 As specified herein.
- .2 Demonstrate full compliance with Design Criteria.

END OF SECTION