

## **Part 1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 General requirements for Commissioning of Plumbing equipment and systems.
- .2 Related Sections:
  - .1 Section 01 35 20 LEED Sustainable Requirements
  - .2 Section 01 74 19 Waste Management and Disposal
  - .3 Section 01 91 13 General Commissioning Requirements
  - .4 Section 23 08 00 Commissioning of HVAC
  - .5 Section 25 08 00 Commissioning of Digital Design Controls
  - .6 Section 26 08 00 Commissioning of Electrical Systems
- .3 Acronyms:
  - .1 Cx - Commissioning.
  - .2 CxA - Commissioning Agent

### **1.2 INTENT**

- .1 Provide commissioning of plumbing equipment and systems in accordance with this, Section 01 91 13 General Commissioning Requirements and related sections.
- .2 All items noted in this document are the responsibility of the contractor supplying and installing the equipment, unless noted otherwise.

### **1.3 MANUFACTURER'S SERVICE ON SITE**

- .1 Arrange and pay for qualified Manufacturer's representatives to supervise starting and testing the following mechanical equipment and systems:
  - .1 Pumps
  - .2 Domestic hot water system
  - .3 Instant hot water system
- .2 Use manufacturers factory trained personnel where required to maintain manufacturer's warranty.
- .3 Maintain documentation of all equipment start-up and commissioning and provide to Commissioning Agent.

### **1.4 AIR & HYDRONIC SYSTEM TESTING, ADJUSTING & BALANCING**

- .1 The Contractor will hire a Certified Balancing Agent for completion of the testing, adjusting and balancing of all air handling and hydronic systems.

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## Part 2 Products

### 2.1 TEST EQUIPMENT

- .1 None

## Part 3 Execution

### 3.1 GENERAL

- .1 Commission all equipment and systems installed as part of this contract. Typical required information or actions are listed below for each equipment or system.
- .2 Provide check sheets for equipment not listed in this section.
- .3 Document the commissioning process by completing the System (functional) Tests and Integrated System Tests.
- .4 The following procedures noted below outline generally accepted good practices for hydronic equipment and systems. If these systems do not apply to this building project, then they are not applicable to commissioning.

### 3.2 HYDRONIC EQUIPMENT AND SYSTEMS – PUMPS

- .1 Check that installation is in accordance with drawings, specifications and Manufacturer's recommendations.
- .2 Complete Manufacturer's installation and start-up check sheets and include the following items:
  - .1 Pump is level. Pump is properly aligned and millwright certificate is submitted to Contract Administrator.
  - .2 Isolation valves, strainers, check valve, pressure gauges, by-pass filter and flow meter are installed properly.
  - .3 Pump suction has sufficient length of straight run piping.
  - .4 Air has been completely bled off piping system.
  - .5 Expansion tank is charged and on-line.
  - .6 Strainers have clean screens in place.
  - .7 Where specified for large pumps, check pump base vibration isolation and flexible connections on water pipes are properly installed.
  - .8 Nameplate is readily visible.
  - .9 Check clearance space is adequate for pump servicing and removal.
- .3 Start pumps as recommended by the Manufacturer.
  - .1 Check impeller is rotating in correct direction.
  - .2 Run-in pumps for minimum 12 continuous hours.
  - .3 Ensure flows through parallel pumps are equally balanced.
  - .4 Ensure mechanical seals do not leak; ensure packing gland type seals are wetted.
  - .5 Check pump NPSH - net positive suction head.

- .6 Where vibration isolation is specified, check for correct static deflection of unit vibration isolators and that start-up and shut-down deflection is within resilience limits of isolators and flexible connections.
- .7 Verify that motor has sufficient airflow through casing to provide cooling.
- .4 Provide performance testing to ensure pumps perform as per specifications
- .5 Provide maintenance services.
  - .1 Ensure that all equipment is serviced prior to takeover by The City.
  - .2 Ensure that all equipment is installed so as to provide access for maintenance and removal.
  - .3 Clean strainers.
  - .4 Replace shaft seals if pump has been used to degrease system.

### 3.3 HYDRONIC EQUIPMENT AND SYSTEMS – DOMESTIC WATER

- .1 Check that installation is in accordance with drawings, specifications and Manufacturer's recommendations.
- .2 Complete Manufacturer's installation and start-up check sheets and include the following:
  - .1 Inspect domestic water systems including piping layout, pipe support, expansion provisions, and slope for draining and venting, before pressure testing any section of pipe.
  - .2 Pressure test sections of pipe prior to application of insulation or to concealment.
  - .3 Pressure test each completed system before any equipment is started.
  - .4 Start domestic hot water system's circulator pumps.
  - .5 Balance Domestic Hot Water system return circulation circuits by temperature drop measurement.
  - .6 Sterilize Domestic water systems.
  - .7 Ensure all air chambers and expansion compensators are properly installed.
  - .8 Ensure entire system can be completely drained.
  - .9 Check operation of water hammer arrestors. Let one outlet run for ten seconds, then shut water off quickly. If water hammer occurs, replace water hammer arrestor. Repeat for each outlet and flush valve.
- .3 Provide maintenance services:
  - .1 Ensure that all equipment is serviced prior to takeover by The City.
  - .2 Ensure that all equipment is installed so as to provide easy access for maintenance and removal.

### 3.4 MISCELLANEOUS EQUIPMENT AND SYSTEMS – TANKS

- .1 Check that installation is in accordance with drawings, specifications and Manufacturer's recommendations.
- .2 Complete Manufacturer's installation and start-up check sheets and include the following:
  - .1 Tank is level on housekeeping base.

- .2 No visible damage to vessel.
- .3 Check PRVs for correct operation and specified relief pressure. Adjust as required.
- .4 Clearances have been provided and piping is flanged for easy removal and servicing.
- .5 Labels are clearly visible.
- .6 Controls, gauges, alarm devices, etc. are operational.
- .7 Access ports/manholes provided.
- .8 Piping sizes - inlets/outlets are correct.
- .9 Lining is intact and not damaged.
- .10 Tank has dielectric unions on piping connections.
- .11 Verify drain line.

.3 Provide maintenance services.

- .1 Adjust thermostat to final setting
- .2 Clean unit
- .3 Confirm that all equipment is accessible for maintenance and operations

3.5 **MECHANICAL EQUIPMENT AND SYSTEMS DEMONSTRATION AND INSTRUCTION**

- .1 Provide demonstrations and instruction in accordance with Section 01 91 13 General Commissioning Requirements.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for plumbing pumps.
  - .2 Sustainable requirements for construction and verification.
- .2 Related Requirements
  - .1 Section 22 08 00 – Commissioning of Plumbing.

**1.2 REFERENCES**

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

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Coordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.
- .3 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
  - .2 Submit WHMIS MSDS in accordance with Section 01 35 20 – LEED Sustainable Requirements. Indicate VOC's for adhesive and solvents during application and curing.
- .4 Shop Drawings.
  - .1 Submit shop drawings to indicate:
    - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
    - .2 Wiring and schematic diagrams.
    - .3 Dimensions and recommended installation.
    - .4 Pump performance and efficiency curves.
- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Instructions: submit manufacturer's installation instructions.
- .7 Manufacturers' Field Reports: manufacturers' field reports specified.
- .8 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, 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.

#### **1.4 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- .2 Construction requirements: in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .3 Verification: contractor's verification in accordance with Section 01 35 20 – LEED Sustainable Requirements.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  - .2 Remove from Site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
  - .4 Divert unused materials from landfill to recycling facility.
  - .5 Unused sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
  - .6 Fold up metal or plastic banding, flatten and place in designated area for recycling.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Materials and resources in accordance with Section 01 35 20 – LEED Sustainable Requirements.

#### **2.2 DOMESTIC HOT WATER CIRCULATING PUMPS**

- .1 Capacity: 3 usgpm against total differential head of 23 ft W.C.
- .2 Pump shall be of horizontal, oil-lubricated type specifically designed for quiet operation. Pump shall be in-line centrifugal, all bronze construction with a polished steel shaft with hardened integral thrust collar. The shaft shall be supported by two horizontal sleeve bearings designed to circulate oil. The pumps are to be equipped with mechanical seal with carbon seal face rotating against a ceramic seat. The motor shall be non-overloading at any point on the curve.
- .3 Maximum operating pressure of 682 kPa (125 psi) and Maximum operating temperature of 107 degrees C (225 F).
- .4 Motor: 1/2 hp at 115V/1/60, 1725 RPM, open drip-proof type with thermal overload protection and include sleeve bearings and rubber mounted construction.

- .5 ¾" flanged connections. Install combination check and isolation valve accessory to mate pump with piping system.
- .6 Supports: provide as recommended by manufacturer.
- .7 Acceptable product: "Bell & Gossett" model PD-35S or approved equal in accordance with B7.

**2.3 WEeping TILE SUBMERSIBLE DUPLEX SUMP PUMP PACKAGE, SP-1, SP-2, SP-3 & SP-4, C/W CONTROL PANEL**

- .1 Performance: 3.47 L/s @ 9.14 m TDH (55 usgpm @ 30' TDH) with 50 mm (2") discharge
- .2 Motor to be ½ hp, 3450 RPM, oil filled and hermetically sealed with automatic resets and thermal overload protection.
- .3 Epoxy coated cast iron construction, upper and lower ball bearings and stainless steel motor shaft, screws, bolts and handle.
- .4 Dual mechanical shaft seals: upper to be carbon/ceramic and lower to be silicon carbide/carbon.
- .5 Viton o-ring seals and cover gasket.
- .6 Impeller to be non-clogging bronze vortex design that can pass ¾" solids. No screens to clog.
- .7 Corrosion resistant powder coated epoxy finish
- .8 Power cord shall be 25 ft. UL listed 3 wire neoprene cord.
- .9 Duplex sump pump control panel shall incorporate the following features:
  - Main disconnect Switch
  - Thermomagnetic Motor Protectors
  - Across The Line Contactors
  - 1 only Power on Pilot Light
  - 2 only 'Run' Pilot Lights
  - 2 only H-O-A Selector Switches
  - 4 Float Switches
  - Automatic Transfer to Non Operating Pump on Motor Overload or Short Circuit
  - Electric Alternating Relay
  - Nema 1 Enclosure
  - High Level Alarm Buzzer, c/w Silencer and Pilot Light
  - High Level Alarm Relay for Signal to DDC
- .10 Duplex sump pump basin to be 900 mm diameter x 900 mm deep, constructed of fibreglass complete with steel duplex cover with 50mm discharge and 75mm vent. Basin to come complete with cord seals, 4" inlet hub, inspection plate, gaskets and hardware.
- .11 50mm (2") combination check valve, ball valve and union to have full flow check valve design, threaded union to allow pump removal without disrupting discharge piping, neoprene gasket and replaceable flapper, weighted with stainless steel backing plates and stainless steel rivet, extra wide hinge to reduce stress, can be installed vertically or horizontally and meets plumbing code requiring a ball valve installed in conjunction with a check valve.
- .12 Acceptable product:

Sump Pumps: “Zoeller” model 6161 or approved equal in accordance with B7.

Control Panel: Nothart Duplex Sewage Pump Custom Control Panel, Model # NES-SPS/2x0.5/115/1/60 or approved equal in accordance with B7.

Valve: “Zoeller” Tri-Check, model 30-0101

## **2.4 DOMESTIC HOT WATER EXPANSION TANK, EXP-1**

- .1 Lead free, ASME rated bladder expansion tank with pre-charge air connection and 25 mm system connection.
  - .1 Tank Volume: 57 L (15 gallons)
  - .2 Acceptance Volume: 40 L (10.5 gallons)
  - .3 Fluid: Water
  - .4 Height: 584 mm (23”)
  - .5 Diameter: 406 mm (16”)
  - .6 Maximum Working Pressure: 1034 kPa (150 psi)
  - .7 Maximum Working Temperature: 115°C (240°F)
  - .8 Shell: Carbon Steel
  - .9 Bladder: Butyl (FDA approved)
- .2 Acceptable Product: “Watts” model DETA 30 or approved equal in accordance with B7.

## **2.5 HOT WATER EXPANSION TANK, EXP-2**

- .1 Lead free, ASME rated bladder expansion tank with pre-charge air connection and 19 mm system connection.
  - .1 Tank Volume: 30 L (8 gallons)
  - .2 Acceptance Volume: 12 L (3.1 gallons)
  - .3 Fluid: Water
  - .4 Height: 508 mm (20”)
  - .5 Diameter: 305 mm (12”)
  - .6 Maximum Working Pressure: 1034 kPa (150 psi)
  - .7 Maximum Working Temperature: 115°C (240°F)
  - .8 Shell: Carbon Steel
  - .9 Bladder: Butyl (FDA approved)
- .2 Acceptable Product: “Watts” model DETA 20 or approved equal in accordance with B7.

## **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 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 Align vertical pit mounted pump assembly after mounting and securing cover plate.
- .4 Place [150] mm sand under sump pit tank.

### **3.3 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspection:
  - .1 Check power supply.
  - .2 Check starter protective devices.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.
- .4 Adjust flow from water-cooled bearings.
- .5 Adjust impeller shaft stuffing boxes, packing glands.
- .6 Verification requirements in accordance with Section 01 35 20 LEED Sustainable Requirements, include:
  - .1 Materials and resources.
  - .2 Storage and collection of recyclables.
  - .3 Construction waste management.
  - .4 Resource reuse.
  - .5 Recycled content.
  - .6 Local/regional materials.
  - .7 Certified wood.
  - .8 Low-emitting materials.

### **3.4 START-UP**

- .1 General:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.
  - .2 Procedures:
    - .1 Check power supply.
    - .2 Check starter O/L heater sizes.
    - .3 Start pumps, check impeller rotation.
    - .4 Check for safe and proper operation.
    - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
    - .6 Test operation of hands-on-auto switch.
    - .7 Test operation of alternator.
    - .8 Adjust leakage through water-cooled bearings.
    - .9 Adjust shaft stuffing boxes.
    - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
    - .11 Check base for free-floating, no obstructions under base.
    - .12 Run-in pumps for 12 continuous hours.

- .13 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
- .14 Adjust alignment of piping and conduit to ensure full flexibility.
- .15 Eliminate causes of cavitation, flashing, air entrainment.
- .16 Measure pressure drop across strainer when clean and with flow rates as finally set.
- .17 Replace seals if pump used to degrease system or if pump used for temporary heat.
- .18 Verify lubricating oil levels.

### **3.5 REPORTS**

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: reports, supplemented as specified.
- .2 Include:
  - .1 PV results on approved PV Report Forms.
  - .2 Product Information report forms.
  - .3 Pump performance curves (family of curves) with final point of actual performance.

### **3.6 TRAINING**

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O M Personnel, supplemented as specified.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 20 - LEED Sustainable Requirements
- .2 Section 01 74 19 – Waste Management and Disposal

**1.2 REFERENCES**

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
  - .1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 ASTM International Inc.
  - .1 ASTM A536, Standard Specification for Ductile Iron Castings.
  - .2 ASTM B88M, 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, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 Canada Green Building Council (CaGBC)
  - .1 LEED Canada-LEED 2009 New Construction, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addenda).
- .5 Canadian Standards Association (CSA International)
  - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .6 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .8 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .9 National Research Council (NRC)/Institute for Research in Construction
  - .1 NRCC 38728, National Plumbing Code of Canada (NPC).
- .10 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

**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 Sustainable Design Submittals:
    - .1 LEED Submittals: in accordance with Section 01 35 20 - LEED Sustainable Requirements.
  - .4 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 Store and manage hazardous materials in accordance with Section 01 35 20 – LEED Sustainable Requirements.
  - .2 Packaging Waste Management: remove for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
  - .3 Place materials defined as hazardous or toxic in designated containers.
  - .4 Handle and dispose of hazardous materials in accordance with applicable regulations.
- 1.5 SUSTAINABLE REQUIREMENTS**
- .1 Construction:
    - .1 Construction requirements detailed in 01 35 20 – LEED Sustainable Requirements form integral part of this project including materials and products of this Section. Sustainable construction requirements include:
      - .1 Specific construction requirements for project.
      - .2 Specification text to ensure that project will comply with green design process and sustainability requirements.
      - .3 Administrative, temporary and procedural requirements for the use of materials and methods of construction.
- Part 2 Products**
- 2.1 SUSTAINABLE REQUIREMENTS**
- .1 Materials and products in accordance with Section 01 35 20 – LEED Sustainable Requirements
- 2.2 PIPING**
- .1 Domestic hot, cold and recirculation systems, within building.
    - .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.
    - .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.
- 2.3 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 and smaller: wrought copper to ANSI/ASME B16.22 cast copper to ANSI/ASME B16.18.

## **2.4 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 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.

## **2.5 SWING CHECK VALVES**

- .1 NPS 50 mm and under, soldered:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.
- .2 NPS 50 mm and under, threaded:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.

## **2.6 BALL VALVES**

- .1 NPS 50 mm and under, threaded:
  - .1 Class 150.
  - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle.
- .2 NPS 50 mm 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.

## **2.7 BACKFLOW PREVENTER (DCVA) , BFP-1:**

- .1 NPS 50 mm, double check valve assembly (DCVA) backflow preventer shall be ASSE Listed 1015, and supplied with full port ball valves. The main body shall be Nylon. The housing shall be reinforced Nylon and the seat disc elastomers shall be silicone (FDA approved). The first and second checks shall be accessible for maintenance without removing the device from the line.
- .2 Acceptable Product: "Zurn" model 350XL or approved equal in accordance with B7.

## **2.8 BACKFLOW PREVENTER (RPP), BFP-2:**

- .1 NPS 50 mm, reduced pressure principle assembly shall consist of an internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in

both check modules and the relief valve. There shall be no threads or screws in the water way exposed to line fluids. Service of all internal components shall be through a single access bronze cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves, four resilient seated test cocks and an air gap drain fitting.

- .2 Acceptable Product: "Watts" model Series 009 or approved equal in accordance with B7.

### **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 Manitoba Plumbing Code.
- .2 Install pipework 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 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.
- .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 circuit setter 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. 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.
- .2 Upon completion, provide laboratory test reports on water quality for Authority Having Jurisdiction 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 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
  - .4 Sterilize HWS and HWC systems for Legionella control.
  - .5 Verify performance of temperature controls.
  - .6 Verify compliance with safety and health requirements.
  - .7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
  - .8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.
- .3 Reports:

- .1 In accordance with Section 01 91 13 - General Commissioning Requirements, using report forms as specified in Section 01 91 13 - General Commissioning Requirements.
- .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.
- .2 Operational requirements in accordance with Section 01 35 20 – LEED Sustainable Requirements. Include:
  - .1 Cleaning materials and schedules.
  - .2 Repair and maintenance materials and instructions.

**3.11 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 20 - LEED Sustainable Requirements.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 20 - LEED Sustainable Requirements
- .2 Section 01 74 19 – Waste Management and Disposal

**1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM D2564, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada-LEED 2009 New Construction, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addenda).
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-Series B1800, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.
- .4 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-36, Commercial Adhesives.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**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 piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Sustainable Design Submittals:
  - .1 LEED Submittals: in accordance with Section 01 35 20 - LEED Sustainable Requirements.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to Site in original factory packaging, labelled with manufacturer's name, address.
- .3 Store at temperatures and conditions recommended by manufacturer.
- .4 Packaging Waste Management: remove for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

**Part 2 Products**

**2.1 MATERIAL**

- .1 Sustainable Requirements: materials and products in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .2 Adhesives and Sealants: in accordance with Section 07 92 00 - Joint Sealants and 01 35 20 - LEED Sustainable Requirements.

**2.2 PIPING AND FITTINGS**

- .1 For buried and above ground DWV piping to:
  - .1 CAN/CSA B1800.

**2.3 JOINTS**

- .1 Solvent weld for PVC: to ASTM D2564.

**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 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with Manitoba Plumbing Code.

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

- .5 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less). Refer to specification 23 05 54 Mechanical Identification for more details.

**3.5 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 20 - LEED Sustainable Requirements.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 20 - LEED Sustainable Requirements
- .2 Section 01 74 19 – Waste Management and Disposal

**1.2 REFERENCES**

- .1 American National Standards Institute/Canadian Standards Association (ANSI/CSA)
  - .1 ANSI Z21.10.3A/CSA 4.3, Gas Water Heaters - Volume III - Storage Water Heaters, with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada-LEED 2009 New Construction, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addenda).
- .3 Canadian Standards Association (CSA International)
  - .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
  - .2 CAN/CSA-B149.1, Natural Gas and Propane Installation Code.

**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 domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Indicate:
    - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.
- .4 Sustainable Design Submittals:
  - .1 LEED Submittals: in accordance with Section 01 35 20 - LEED Sustainable Requirements.

**1.4 CLOSEOUT SUBMITTALS**

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

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to Site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

**1.6 WARRANTY**

- .1 For the Work of this Section, 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to number of years specified for each product.
- .2 Contractor hereby warrants domestic water heaters in accordance with CCDC2, but for number of years specified for each product.

**Part 2 Products**

**2.1 COMPONENTS**

- .1 Sustainable Requirements:
  - .1 Materials and products in accordance with Section 01 35 20 – LEED Sustainable Requirements.

**2.2 DOMESTIC HOT WATER TANK, HWT-1:**

- .1 Natural gas water heater shall be up to 96% thermal efficiency, have a storage capacity of 151 Liters (40 gallons), an input rating of 35 kW (120 Btu/hr), a recovery rating of 523 LPH (138 gph) at 56°C (100°F) rise and a maximum hydrostatic working pressure of 1103 kPa (160 PSI).
- .2 Water heater shall have seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded, meet or exceed the thermal efficiency and/or standby loss requirements of ASHRAE/IESNA 90.1, have foam insulation and a CSA Certified and ASME rated T&P relief valve, have a down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up, and be approved for 0" clearance to combustibles.
- .3 Heater shall be supplied with maintenance-free powered anode.
- .4 The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphic user interface, fault history display, and shall have digital temperature readout.
- .5 Heaters to be design-certified by CSA International, according to ANSI Z21.10.3 - CSA 4.3 standards governing storage-type water heaters. Heaters shall also meet or exceed the thermal efficiency and standby loss requirements of ASHRAE/IESNA 90.1. Complies with SCAQMD Rule 1146.2 and other air quality management districts with similar requirements.
- .6 Water heater shall be suitable for power direct venting using a 100 mm diameter PVC pipe for a total distance of 120 equivalent feet of vent piping and 120 equivalent feet of intake air piping.
- .7 Water heater should incorporate the iCOMMTM system for remote monitoring, leak detection and fault alert.
- .8 Acceptable Product: "A.O. Smith" Cyclone Xi model BTH-120 or approved equal in accordance with B7.

**2.3 INSTANTANEOUS HOT WATER HEATER, IWH-1,2:**

- .1 Performance: 199,900 Btu/hr input, indoor direct vent, 85°F to 185°F temperature range, 0.26 gpm minimum flow, 0.40 activation gpm, 4.9 gpm @ 77°F temperature rise, 9.5 max gpm, 94% efficient.

- .2 Unit to include stainless steel condensing heat exchanger, electronic controls to increase energy efficiency and safety, self-diagnostic system for easy installation and service, digital display, two-pipe direct vent system designed for PVC pipe and built in blower.
- .3 Twelve year warranty on heat exchanger, 5 year on parts.
- .4 Acceptable Product: "Rheem" model RTGH-95DVLN or approved equal in accordance with B7.

**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 manufacturer's recommendations and authority having jurisdiction.
- .2 Provide structural steel for instantaneous heaters.
- .3 Provide insulation between tank and supports.
- .4 Install natural gas fired domestic water heaters in accordance with CAN/CSA-B149.1.

**3.3 FIELD QUALITY CONTROL**

- .1 Manufacturer's factory trained, certified personnel to start up and commission DHW heaters.

**3.4 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal 01 35 20 - LEED Sustainable Requirements.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 20 - LEED Sustainable Requirements
- .2 Section 01 74 19 – Waste Management and Disposal

**1.2 REFERENCES**

- .1 Canada Green Building Council (CaGBC)
  - .1 ARI 1010, Self Contained, Mechanically Refrigerated Drinking-Water Coolers
  - .2 LEED Canada-LEED 2009 New Construction, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addenda).
- .2 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-B45 Series, Plumbing Fixtures.
  - .2 CAN/CSA-B125.3, Plumbing Fittings.
  - .3 CAN/CSA-B651, Accessible Design for the Built Environment.
- .3 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-36, 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 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.
- .4 Sustainable Design Submittals:
  - .1 LEED Submittals: in accordance with Section 01 35 20 - LEED Sustainable Requirements.

**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, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to Site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

**Part 2 Products**

**2.1 SUSTAINABLE MATERIAL**

- .1 Sustainable Requirements:
  - .1 Materials and resources in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .2 Adhesives and sealants: In accordance with Section 01 35 20 - LEED Sustainable Requirements.

**2.2 P-1 WATER CLOSET**

- .1 White, vitreous china, 3.0Lpf, BSB flushing technology, 51mm trap diameter, 305mm rough in, 10 year warranty on parts, 1 year warranty on valves. To meet or exceed ASME A112.19.2, IAPMO/UPC, and CSA B35.
- .2 Seat & Supply: Soft close toilet seat
- .3 Minimum MAP rating: 800 grams.
- .4 Acceptable Product: "Proficiency", Water Matrix model N7717 as specified or approved equal in accordance with B7.

**2.3 P-2 BARRIER FREE WATER CLOSET**

- .1 ADA compliant, white, vitreous china, 3.0Lpf, BSB flushing technology, 51mm trap diameter, 305mm rough in, 10 year warranty on parts, 1 year warranty on valves. To meet or exceed ASME A112.19.2, IAPMO/UPC, and CSA B35.
- .2 Seat & Supply: Soft close toilet seat
- .3 Minimum MAP rating: 800 grams.
- .4 Acceptable Product: "Proficiency", Water Matrix model N7717 as specified or approved equal in accordance with B7.

**2.4 P-3 LAVATORY**

- .1 Sink: 18-gauge 304 Stainless Steel, self-rimming, 146 mm (5-3/4") bowl depth, satin finish, protected underside to prevent condensation and deaden sound, 406 mm x 318mm (16" x 12-1/2") overall dimensions, 41 mm (1-5/8") drain opening, overflow assembly, complies with ANSI A112.19.3M.
- .2 Faucet: Cast brass one piece body with integral water proof sensor and connector, 102 mm (4") spout, vandal resistant 1.9 LPM (0.5 USGPM) flow control non-aerating spray outlet, serviceable filter upstream of the solenoid valve, metal hold-down package, adjustable sensing range and timeout, chrome finish, CSA certified, complies to ASME A112.18.1/CSA B125.1, ADA compliant.



- .3 Aerator: 1.3 LPM (0.35 USGPM) max, vandal proof, pressure compensating for constant flow from 138 to 552 kPa (20 to 80 PSI), anti-clogging dome screen, acetal body material, EPDM o-ring, EPDM washer, 66°C (150°F) working temperature, 862 kPa (125 PSI) working pressure, meets or exceeds ANSI/NSF 61.
- .4 Acceptable Products: Sink “Elkay” model LLVR1310, faucet “Delta” 591T0258TR and aerator “NEOPERL”, or approved equal in accordance with B7.

## **2.5 P-4 BARRIER FREE LAVATORY**

- .1 Sink: 18-gauge 304 Stainless Steel, self-rimming, 146 mm (5-3/4”) bowl depth, satin finish, protected underside to prevent condensation and deaden sound, 406 mm x 318mm (16” x 12-1/2”) overall dimensions, 41 mm (1-5/8”) drain opening, overflow assembly, complies with ANSI A112.19.3M.
- .2 Faucet: Cast brass one piece body with integral water proof sensor and connector, 102 mm (4”) spout, vandal resistant 1.9 LPM (0.5 USGPM) flow control non-aerating spray outlet, serviceable filter upstream of the solenoid valve, metal hold-down package, adjustable sensing range and timeout, chrome finish, CSA certified, complies to ASME A112.18.1/CSA B125.1, ADA compliant.
- .3 Aerator: 1.3 LPM (0.35 USGPM) max, vandal proof, pressure compensating for constant flow from 138 to 552 kPa (20 to 80 PSI), anti-clogging dome screen, acetal body material, EPDM o-ring, EPDM washer, 66°C (150°F) working temperature, 862 kPa (125 PSI) working pressure, meets or exceeds ANSI/NSF 61.
- .4 Acceptable Products: Sink “Elkay” model LLVR1310, faucet “Delta” 591T0258TR and aerator “NEOPERL”, or approved equal in accordance with B7.

## **2.6 P-5 KITCHEN SINK**

- .1 Sink: Triple compartment sink with faucet edge, 18 gauge, type 304 18-10 stainless steel, self-rimming, exposed surfaces are satin finished, undercoated to reduce condensation and resonance, 89 mm (3-1/2”) crumb cub waste assembly, compartment size: 457 x 406 x 254 mm (18” x 16” x 10”), overall size 573 x 1330 mm (22-9/16” x 52-3/8”).
- .2 Faucet: Single handle, deck mounted, all metal fabricated body, 221 mm (8-11/16”) long spout, 180° swing, 5.7 LPM (1.5 USGPM) aerator, lever handle shall return to neutral when faucet is turned off, red and blue on handle to indicate hot/cold, diamond coated ceramic cartridge control mechanism, adjustable handle limit stop, complies with ASME A112.12.1/CSA B125.1, NSF 61.
- .3 Acceptable Products: Sink “Kindred” model LBT8610P-1/1 and faucet “Delta” model 101LF-HDF, or approved equal in accordance with B7.

## **2.7 P-6 HANDWASH SINK**

- .1 Sink: Single compartment sink with faucet edge, 18 gauge, type 304 18-10 stainless steel, self-rimming, exposed surfaces are satin finished, undercoated to reduce condensation and resonance, factory applied rim seal, 89 mm (3-1/2”) crumb cup waste assembly, compartment size 305 x 432 x 203 mm (12” x 17” x 8”), overall size 432 x 486 mm (17”x 19-1/8”).
- .2 Faucet: 406 mm (16”) high, 229 mm (9”) long, spout swings 360°, lever handle, diamond embedded ceramic disk cartridge control mechanism, control shall return to neutral position when faucet is turned off, 2 function stream/spray head, red and blue graphics to indicate hot/cold, magnetic docking system secures sprayer to spout, 5 year limited warranty, complies with ASME A112.18.1/CSA B125.1, ASME A112.18.6.

- .3 Aerator: 1.3 LPM (0.35 USGPM) max, vandal proof, pressure compensating for constant flow from 138 to 552 kPa (20 to 80 PSI), anti-clogging dome screen, acetal body material, EPDM o-ring, EPDM washer, 66°C (150°F) working temperature, 862 kPa (125 PSI) working pressure, meets or exceeds ANSI/NSF 61.
- .4 Acceptable Products: Sink “Kindred” model LBS2708P-1/1, faucet “Delta” model 9158-DST and aerator “NEOPERL” or approved equal in accordance with B7.

## **2.8 P-7 WALL MOUNTED LAVATORY**

- .1 Sink: Wall mounted, stainless steel, satin finish, seamless welded bowl, bowl dimensions 400x300x135mm (16” x 12” x 5-5/16”), 102mm (4”) faucet ledge, front panel with 45° angles, pre-welded mounting brackets, overflow, includes screws and dowels.
- .2 Faucet: Cast brass one piece body with integral water proof sensor and connector, 102 mm (4”) spout, vandal resistant 1.9 LPM (0.5 USGPM) flow control non-aerating spray outlet, serviceable filter upstream of the solenoid valve, metal hold-down package, adjustable sensing range and timeout, chrome finish, CSA certified, complies to ASME A112.18.1/CSA B125.1, ADA compliant.
- .3 Acceptable Products: “Franke” model WT500C-8 or approved equal in accordance with B7.

## **2.9 P-8 FLOOR DRAIN**

- .1 50 mm (2”) dura-coated cast iron body with bottom outlet, adjustable “Type B” polished nickel bronze round strainer. Include trap primer connection and vandal proof secured top.
- .2 Acceptable Product: “Zurn” ZN-211-B or approved equal in accordance with B7.

## **2.10 P-9 DRINKING FOUNTAIN**

- .1 Dual 14 gauge stainless steel basins, wall mounted, front mounted push-button activation, built-in 100 micron strainer, low flow chrome plated brass bubbler, heavy duty galvanized steel frame, perforated galvanized steel screens, 30.2 LPH (8 GPH) high efficiency chiller. ADA compliant, NSF 61 approval, cUL approval, CSA B45 approval.
- .2 Acceptable Product: “Franke” model KEPGV8ACSL-14G or approved equal in accordance with B7.

## **2.11 P-10 URINAL**

- .1 Urinal: White, vitreous china, 0.47 LPF (0.125 GPF), flushing rim, elongated 356 mm (14”) rim from finished wall, extended sides, 19mm (3/4”) inlet spud, 51mm (2”) inside NPTF outlet connection, strainer included, nominal dimensions 359 x 479 x 664 mm (14-1/8” x 18-7/8” x 26-1/8”).
- .2 Flush Valve: 0.47 LPF (0.125 GPF), manual urinal flush valve shall feature self-cleaning brass piston valve with integral wiper spring in bypass orifice to prevent clogging. Valve remains closed and does not need to be reset after loss of water pressure. Includes cast brass valve body and cover with chrome finish and vandal resistant stop cap. Includes sweat solder kit with wall flange and cover tube. 19 mm angle stop with back-flow protection and vacuum breaker included.
- .3 Acceptable Products: Urinal “American Standard” model 6590.530 and flush valve “American Standard” model 6045.013.002, or approved equal in accordance with B7.

**2.12 P-11 MOP SINK**

- .1 Basin: Overall dimensions 610 x 610 x 254 mm (24" x 24" x 10"), one piece body, includes stainless steel combination dome strainer and lint basket, factory installed stainless steel drain body to accept 76 mm (3") pipe.
- .2 Faucet: Chrome plated, vacuum breaker, integral stops, adjustable wall brace, body inlets 203 mm (8") center to center, red/blue indicator colors for hot and cold, 19 mm (3/4") hose thread on spout, meets or exceeds the requirements of CSA B125, CSA B64.1.1 and CSA B64.0.
- .3 Acceptable Products: Basin "Fiat" model MSB 2424 and faucet "Fiat" model 830-AA or approved equal in accordance with B7.

**2.13 P-12 FUNNEL FLOOR DRAIN**

- .1 50mm (2") Dura-coated cast iron body with bottom outlet, adjustable "Type BF" polished nickel bronze round strainer, secured open throat oval funnel with 83 x 203 mm (3-1/4"x 8") funnel size
- .2 Acceptable Product: "Zurn" ZN-211-BF or approved equal in accordance with B7.

**2.14 GREASE INTERCEPTOR, GI-1:**

- .1 Flow rating of 15 LPM (4 USGPM) with grease capacity of 3.6 kg (8 lbs).
- .2 Fabricated steel, epoxy coated inside and outside.
- .3 Unit shall include one piece removable baffle assembly, code approved deep seal trap, secured gasketed non slip cover and standard inlet and outlet.
- .4 Acceptable Product: "Watts" WD-104 or approved equal in accordance with B7.

**2.15 P-13 INTERIOR HOSE BIBB**

- .1 13mm (1/2"), exposed, anti-siphon, wall faucet for use in moderate climate installation, complete with external backflow preventer, all bronze interior components, vandal-resistant operating stem, rough bronze exterior and male hose connection (Conform to ASME B1.20.7).
- .2 Acceptable Product: "Zurn" model Z1341-BFP or approved equal in accordance with B7.

**2.16 HOSE REEL, HS-1:**

- .1 Electric hose reel with a 3-way hose guide, 76m (250 ft) long 25 mm (1") I.D. hose and wall bracket. Include stainless steel fluid path material.
- .2 Provide four-way hose guide HR1059 at exterior wall penetration. Layout of mechanical room may require additional guides.
- .3 Mechanical contractor to provide shut-off valve and back-flow prevention.
- .4 Acceptable Product: "Reelcraft" Nordic Series Model 3900-31-16 or approved equal in accordance with B7.

**2.17 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: 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.

**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.
  - .2 Wall-hung fixtures: as indicated.
  - .3 Barrier free: to most stringent standard (Manitoba Building Code, 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 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.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 20 - LEED Submittal Requirements.

**END OF SECTION**