

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- . 1 Section 01 10 10 General Instructions.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- . 1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- . 2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Province of New Brunswick.
- . 3 Shop drawings to show:
  - . 1 Mounting arrangements.
  - . 2 Operating and maintenance clearances.
- . 4 Shop drawings and product data accompanied by:
  - . 1 Detailed drawings of bases, supports, and anchor bolts.
  - . 2 Acoustical sound power data, where applicable.
  - . 3 Points of operation on performance curves.
  - . 4 Manufacturer to certify current model production.
  - . 5 Certification of compliance to applicable codes.
- . 5 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- . 6 Closeout Submittals:
  - . 1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - . 2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - . 3 Operation data to include:
    - . 1 Description of systems and their controls.
    - . 2 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - . 3 Operation instruction for systems and component.
    - . 4 Description of actions to be taken in event of equipment failure.
    - . 5 Valves schedule and flow diagram.
    - . 6 Colour coding chart.
  - . 4 Maintenance data to 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.
  - . 5 Performance data to include:
    - . 1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    - . 2 Equipment performance verification test results.

- . 3 Special performance data as specified.
- . 4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- . 6 Approvals:
  - . 1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - . 2 Make changes as required and re-submit as directed by Departmental Representative.
- . 7 Site records:
  - . 1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - . 2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
  - . 3 Use different colour waterproof ink for each service.
  - . 4 Make available for reference purposes and inspection.
- . 8 As-built drawings:
  - . 1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - . 2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - . 3 Submit to Departmental Representative for approval and make corrections as directed.
  - . 4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- . 9 Submit copies of as-built drawings for inclusion in final TAB report.

### **1.3 QUALITY ASSURANCE**

- . 1 Quality Assurance: in accordance with Section 01 45 00 – Testing and Quality Control.
- . 2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

### **1.4 MAINTENANCE**

- . 1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
  - . 1 One set of packing for each pump.
  - . 2 One casing joint gasket for each size pump.
  - . 3 One glass for each gauge glass.
- . 2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

**1.5 DELIVERY,  
STORAGE, AND  
HANDLING**

- .1 Waste Management and Disposal:
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- .1 Not Used.

**PART 3 - EXECUTION**

**3.1 CLEANING**

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

**3.2 FIELD QUALITY  
CONTROL**

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 – Testing and Quality Control and submit report as described in PART 1 - SUBMITTALS.
- .2 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

**3.3 DEMONSTRATION**

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 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.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

**3.4 PROTECTION**

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

END OF SECTION

## **PART 1- GENERAL**

### **1.1 SUMMARY**

- . 1 Related Requirements

- . 1 Section 22 05 00 Common Work Results for 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 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.

- . 3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- . 4 Instructions: submit manufacturer's installation instructions.

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

- . 6 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.

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

- . 1 Waste Management and Disposal:

- . 1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
  - . 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 material 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 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 and plastic banding, flatten and place in designated area for recycling.

## **PART 2 - PRODUCTS**

### **2.1 DOMESTIC HOT WATER CIRCULATING PUMPS**

- . 1 Capacity: Refer to schedule on drawings.
- . 2 Construction: closed-coupled, in-line centrifugal, all bronze construction, stainless steel shaft, stainless steel or bronze shaft sleeve, two oil lubricated bronze sleeves or ball bearings
- . 3 Motor: drip-proof, with thermal overload protection.
- . 4 Supports: provide as recommended by manufacturer.

## **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.

### **3.3 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.

### **3.4 START-UP**

- . 1 General:
  - . 1 In accordance with Section 01 91 01 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.
  - . 2 Procedures:
    - . 1 Check power supply.
    - . 2 Start pumps, check impeller rotation.
    - . 3 Check for safe and proper operation.
    - . 4 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
    - . 5 Test operation of hands-on-auto switch.
    - . 6 Test operation of alternator.

- . 7 Run-in pumps for 12 continuous hours.
- . 8 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
- . 9 Adjust alignment of piping and conduit to ensure full flexibility.
- . 10 Eliminate causes of cavitation, flashing, air entrainment.
- . 11 Measure pressure drop across strainer when clean and with flow rates as finally set.
- . 12 Replace seals if pump used to degrease system or if pump used for temporary heat.
- . 13 Verify lubricating oil levels.

### **3.5 REPORTS**

- . 1 In accordance with Section 01 91 01 - 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 22 05 00 Common Work Results for Plumbing.

### **1.2 REFERENCES**

- . 1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
  - . 1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - . 2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
  - . 3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - . 4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- . 2 ASTM International Inc.
  - . 1 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - . 2 ASTM A 536-84(2004)e1, Standard Specification for Ductile Iron Castings.
  - . 3 ASTM B 88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
- . 3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
  - . 1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- . 4 Canadian Standards Association (CSA International)
  - . 1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.
- . 5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - . 1 Material Safety Data Sheets (MSDS).
- . 6 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - . 1 MSS-SP-67-02a, Butterfly Valves.
  - . 2 MSS-SP-70-06, Gray Iron Gate Valves, Flanged and Threaded Ends.
  - . 3 MSS-SP-71-05, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
  - . 4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- . 7 National Research Council (NRC)/Institute for Research in Construction
  - . 1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.

**1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS**

- . 1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- . 2 Product Data:
  - . 1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- . 3 Closeout Submittals:
  - . 1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.4 DELIVERY,  
STORAGE AND  
HANDLING**

- . 1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- . 2 Place materials defined as hazardous or toxic in designated containers.

**PART 2 - PRODUCTS**

**2.1 PIPING**

- . 1 Domestic hot, cold and recirculation systems, within building.
  - . 1 Above ground: copper tube, hard drawn, type K L M: to ASTM B 88M.
  - . 2 Buried or embedded: copper tube, soft annealed, type K L: to ASTM B 88M, in long lengths and with no buried joints.
- . 2

**2.2 FITTINGS**

- . 1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
- . 2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- . 3 Cast copper, solder type: to ANSI/ASME B16.18.
- . 4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- . 5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
- . 6 NPS 1 ½ and smaller: wrought copper to ANSI/ASME B16.22 cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

**2.3 JOINTS**

- . 1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- . 2 Bolts, nuts, hex head and washers: to ASTM A 307, 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.
  - . 1 .1.
- . 6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

## **2.4 GATE VALVES**

- . 1 NPS 2 and under, soldered:
  - . 1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
- . 2 NPS 2 and under, screwed:
  - . 1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
- . 3 NPS 2 1/2 and over, in mechanical rooms, flanged:
  - . 1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.
- . 4 NPS 2 1/2 and over, other than mechanical rooms, flanged:
  - . 1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

## **2.5 GLOBE VALVES**

- . 1 NPS2 and under, soldered:
  - . 1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.
  - . 2 Lockshield handles: as indicated.
- . 2 NPS 2 and under, screwed:
  - . 1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.
  - . 2 Lockshield handles: as indicated.

## **2.6 SWING CHECK VALVES**

- . 1 NPS 2 and under, soldered:
  - . 1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- . 2 NPS 2 and under, screwed:
  - . 1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
- . 3 NPS 2 1/2 and over, flanged:
  - . 1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, regrind renewable seat, bronze disc, bolted cap

specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

## **2.7 BALL VALVES**

- . 1 NPS 2 and under, screwed:
  - . 1 Class 150.
  - . 2 Bronze Forged Brass body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan TFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
- . 2 NPS 2 and under, soldered:
  - . 1 To ANSI/ASME B16.18, Class 150.
  - . 2 Bronze body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 INSTALLATION**

- . 1 Install in accordance with NPC and local authority having jurisdiction.
- . 2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- . 3 Assemble piping using fittings manufactured to ANSI standards.
- . 4 Install 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 gate butterfly ball valves.
- . 2 Balance recirculation system using lockshield globe 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 copper to Provincial Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

**3.6 PRE-START-UP  
INSPECTIONS**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

**3.7 DISINFECTION**

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction approval of Departmental Representative.
- .2 Coordinate with Section 33 11 17 – Water Mains.
- .3 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

**3.8 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Certificate of static completion has been issued.
  - .4 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
  - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
  - .3 Bring HWS storage tank up to design temperature slowly.
  - .4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
  - .5 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

**3.9 PERFORMANCE  
VERIFICATION**

- .1 Scheduling:
  - .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- .2 Procedures:
  - .1 Verify that flow rate and pressure meet Design Criteria.
  - .2 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 01 - General Commissioning (Cx) Requirements: Reports, using report forms as specified in Section 01 91 01 - General Commissioning (Cx) Requirements: Report Forms and Schematics.
  - . 2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

### **3.10 OPERATION REQUIREMENTS**

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

### **3.11 CLEANING**

- . 1 Clean in accordance with Section 01 74 11 - Cleaning.
- . 2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

## **PART 1- GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 22 05 00 Common Work Results for Plumbing.

### **1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM B 32-08, Standard Specification for Solder Metal.
  - .2 ASTM B 306-02, Standard Specification for Copper Drainage Tube (DWV).
  - .3 ASTM C 564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA International).
  - .1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
  - .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .3 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .4

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, 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 and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 COPPER TUBE AND FITTINGS**

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

### **2.2 CAST IRON PIPING AND FITTINGS**

- .1 Above ground sanitary storm and vent: to CAN/CSA-B70.
  - .1 Joints:
    - .1 Hub and spigot:
      - .1 Caulking lead: to CSA B67.
    - .2 Mechanical joints:
      - .1 Neoprene or butyl rubber compression

gaskets with stainless steel clamps.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 INSTALLATION**

- . 1 In accordance with Section 23 05 01 - Use of HVAC Systems During Construction.
- . 2 Install in accordance with National Plumbing Code and local authority having jurisdiction.

### **3.3 TESTING**

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

### **3.4 PERFORMANCE VERIFICATION**

- . 1 Cleanouts:
  - . 1 Ensure accessible and that access doors are correctly located.
  - . 2 Open, cover with linseed oil and re-seal.
  - . 3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- . 2 Test to ensure traps are fully and permanently primed.
- . 3 Storm water drainage:
  - . 1 Verify domes are secure.
  - . 2 Ensure weirs are correctly sized and installed correctly.
  - . 3 Verify provisions for movement of roof system.
- . 4 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- . 5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

### **3.5 CLEANING**

- . 1 Clean in accordance with Section 01 74 11 - Cleaning.
- . 2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 22 05 00 Common Work Results for Plumbing.

### **1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM D 2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  - .2 ASTM D 2564-04e1, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-Series B1800-06, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.
- .3 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 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

### **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 and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 MATERIAL**

- .1 Maximum VOC limit 70 250 g/L to SCAQMD Rule 1168 GSES GS-36.

### **2.2 PIPING AND FITTINGS**

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

### **2.3 JOINTS**

- . 1 Solvent weld for PVC: to ASTM D 2564.
- . 2 Solvent weld for ABS: to ASTM D 2235.

## **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 National Plumbing Code Provincial Plumbing Code and local authority having jurisdiction.

### **3.3 TESTING**

- . 1 Pressure test buried systems before backfilling.
- . 2 Hydraulically test to verify grades and freedom from obstructions.

### **3.4 PERFORMANCE VERIFICATION**

- . 1 Cleanouts:
  - . 1 Ensure accessible and that access doors are correctly located.
  - . 2 Open, cover with linseed oil and re-seal.
  - . 3 Verify cleanout rods can probe as far as the next cleanout, at least.
- . 2 Test to ensure traps are fully and permanently primed.
- . 3 Ensure fixtures are properly anchored, connected to system and effectively vented.
- . 4 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less).

### **3.5 CLEANING**

- . 1 Clean in accordance with Section 01 74 11 - Cleaning.
- . 2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION



## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for piping, fittings, equipment used in compressed air systems.
- .2 Related Requirements

- .1 Section 22 05 00 Common Work Results for Plumbing.

### **1.2 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME Boiler and Pressure Vessel Code Section VIII Pressure Vessels.
    - .1 BPVC-VIII B - 2004, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 1.
    - .2 BPVC-VIII-2 B - 2004, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 2 - Alternative Rules.
    - .3 BPVC-VIII-3 B - 2004, BPVC Section VIII - Rules for Construction of Pressure Vessels Division 3 - Alternative Rules High Press Vessels.
  - .2 ASME B16.5-03, Pipe Flanges and Flanged Fittings.
  - .3 ASME B16.11-01, Forged Fittings, Socket-Welding and Threaded.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 53/A 53M-04, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A 181/A 181M-01, Standard Specification for Carbon Steel Forgings for General Purpose Piping.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.
- .4 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 Shop Drawings:
  - .1 Submit shop drawings to indicate project layout including layout, dimensions and extent of piping system.
    - .1 Vertical and horizontal piping locations and elevations and connections details.
    - .2 Other details including:.
  - .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

- . 4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- . 5 Instructions: submit manufacturer's installation instructions.
- . 6 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals

**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.

**1.5 DELIVERY,  
STORAGE AND  
HANDLING**

- . 1 Waste Management and Disposal:
  - . 1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

**PART 2 - PRODUCTS**

**2.1 AIR COMPRESSOR**

- . 1 Supplied by Owner. Piped by Plumbing Contractor.

**2.2 PIPING**

- . 1 Piping: to ASTM A 53/A 53M, schedule 80 seamless black steel.
- . 2 Fittings:
  - . 1 NPS2 and smaller: to ASME B16.11, schedule 80 steel, socket welded.
  - . 2 NPS2 1/2 and larger: to ASME B16.11, schedule 80 steel, butt or socket welded.
- . 3 Couplings: to ASME B16.11, socket welded or threaded half coupling type.
- . 4 Unions: 1000 kPa malleable iron with brass-to-iron ground seat.
- . 5 Dissimilar metal junctions: use dielectric unions.
- . 6 Flanges:
  - . 1 NPS2 and smaller: to ASME B16.5, forged steel, raised face and socket welded.
  - . 2 NPS2 1/2 and larger: to ASME B16.5, forged steel, raised face and slip-on or weld neck.
- . 7 Joints:
  - . 1 NPS2 and smaller: socket welded.
  - . 2 NPS2 1/2 and larger: butt welded.

**2.3 BALL VALVES**

- . 1 Three piece design or top entry for ease of in-line maintenance.
  - . 1 To ASTM A 181/A 181M, Class 70, carbon steel body socket welded or screwed ends, carbon steel ball and associated trim suitable for compressed air application.
  - . 2 To withstand 1034 kPa maximum pressure.

## **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 datasheet.

### **3.2 COMPRESSOR STATION**

- . 1 Install on vibration isolators on housekeeping pad as indicated.

### **3.3 COMPRESSED AIR LINE FILTER**

- . 1 Install on discharge line from refrigerated air dryer.

### **3.4 MAIN AIR PRESSURE REGULATORS**

- . 1 Install at air compressor station.
- . 2 Install additional regulators on connections to equipment as indicated.

### **3.5 COMPRESSED AIR PIPING CONNECTIONS AND INSTALLATION**

- . 1 Install flexible connection in accordance with Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping.
- . 2 Install shut-off valves at outlets, major branch lines and in locations as indicated.
- . 3 Install quick-coupler chucks and pressure gauges on drop pipes.
- . 4 Install unions to permit removal or replacement of equipment.
- . 5 Install tees in lieu of elbows at changes in direction of piping. Install plug in open ends of tees.
- . 6 Grade piping at 1% slope minimum.
- . 7 Install compressed air trap and pressure equalizing pipe at moisture collecting points. Drain pipe to nearest floor drain.
- . 8 Make branch connections from top of main.
- . 9 Install compressed air trap at bottom of risers and at low points in mains, piped to nearest drain. Distance between drain points to be 30 m maximum.
- . 10 Provide drain from refrigerated air dryer.
- . 11 Weld steel piping in accordance with Section 23 05 17 - Pipe Welding and;
  - . 1 To ASME code and requirements of authority having jurisdiction.
  - . 2 Weld concealed and inaccessible piping regardless of size.
- . 1 Site Tests/Inspection:
  - . 1 Testing: pressure test in accordance with requirements of Section 21 05 01 - Common Work Results for Mechanical, for 4 h minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

### **3.6 FIELD QUALITY CONTROL**

- . 2 Manufacturer's Field Services:
  - . 1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.
  - . 2 Provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
  - . 3 Schedule site visits to review work at stages listed:
    - . 1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
    - . 2 Twice during progress of work at 25% and 60% complete.
    - . 3 Upon completion of Work, after cleaning is carried out.
- . 3 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

### **3.7 CLEANING**

- . 1 Refer to Section 23 08 01 - Performance Verification of Mechanical Piping Systems and Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping System.
- . 2 Cleaning: blow out piping to clean interior thoroughly of oil and foreign matter.
- . 3 Check entire installation is approved by authority having jurisdiction.
- . 4 Perform cleaning operations as specified in Section and in accordance with manufacturer's recommendations.
- . 5 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Section 22 05 00 Common Work Results for Plumbing.

**1.2 REFERENCES**

- .1 American National Standards Institute/Canadian Standards Association (ANSI/CSA)
  - .1 ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
  - .2 ANSI Z21.10.1A-2006/CSA 4.1A-2006, Addenda 1 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
  - .3 ANSI Z21.10.1b-2006/CSA 4.1b-2006, Addenda 2 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
  - .4 ANSI Z21.10.3A-2007/CSA 4.3-2007, Gas Water Heaters - Volume III - Storage Water Heaters, with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA B51-03(R2007), Boiler, Pressure Vessel, and Pressure Piping Code.
  - .2 CAN/CSA-B139-04, Installation Code for Oil Burning Equipment.
  - .3 CAN/CSA-B140.0-03, Oil Burning Equipment: General Requirements.
  - .4 CAN/CSA-B149.1-05, Natural Gas and Propane Installation Code.
  - .5 CAN/CSA-B149.2-05, Propane Storage and Handling Code.
  - .6 CSA B140.12-03, Oil-Burning Equipment: Service Water Heaters for Domestic Hot Water, Space Heating, and Swimming Pools.
  - .7 CAN/CSA C22.2 No.110-94(R2004), Construction and Test of Electric Storage Tank Water Heaters.
  - .8 CAN/CSA-C191-04, Performance of Electric Storage Tank Water Heaters for Household Service.
  - .9 CAN/CSA-C309-M90(R2003), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

**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,**

- .1 Deliver, store and handle in accordance with Section 01 61 00 -

**STORAGE AND  
HANDLING**

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 and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

**1.6 WARRANTY**

. 1 For the Work of this Section 22 30 05 - Domestic Water Heaters, 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 INDIRECT WATER HEATER**

. 1 Provide an indirect water heater for the production of domestic hot water using hot water from the facilities central plant.

. 2 Performance shall be as per the schedule on the drawings.

. 3 The heater shall consist of two concentric tanks. The inner tank shall contain the domestic hot water and the outer tank shall contain the heating system water.

. 4 The inner tank shall be 304L corrugated stainless steel and shall have a maximum working pressure of 150psi and shall be able to withstand a hydrostatic test pressure of 300psi.

. 5 The outer tank shall be of carbon steel and have a maximum pressure of 45psi.

. 6 Connection on the tank shall include: cold water inlet, hot water outlet, auxiliary connection for temperature/pressure relief.

. 7 The outside of the tanks shall be covered with minimum of 50mm of CFC/HCFC-free rigid polyurethane foam insulation with an equivalent "R" value of 16 and covered with an exterior jacket that resists damage to the unit.

. 8 Temperature control:

. 1 A drywell shall be inserted into and extend the full length of the inner tank.

. 2 Within the drywell shall be a remote sensing bulb attached to a low voltage thermostat that senses the water temperature.

. 3 The thermostat shall be adjustable from 32°C to 90°C.

**2.2 TRIM AND  
INSTRUMENTATION**

. 1 Drain valve: NPS 1 with hose end.

. 2 Thermometer: 100 mm dial type with red pointer and thermowell filled with conductive paste.

. 3 Pressure gauge: 75 mm dial type with red pointer, syphon, and shut-off cock.

. 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 control valve, having discharge terminating over floor drain and visible to operators.

## **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 insulation between tank and supports.

### **3.3 FIELD QUALITY CONTROL**

. 1 Manufacturer's factory trained technician 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 and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- . 1 Section Includes:
  - . 1 Materials and installation for plumbing specialties and accessories.
- . 2 Related Requirements:
  - . 1 Section 22 05 00 Common Work Results for Plumbing

### **1.2 REFERENCES**

- . 1 American Society for Testing and Materials International (ASTM).
- . 2 ASTM A 126-(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- . 3 ASTM B 62-02, Specification for Composition Bronze or Ounce Metal Castings.
- . 4 American Water Works Association (AWWA).
- . 5 AWWA C700-02, Cold Water Meters-Displacement Type, Bronze Main Case.
- . 6 AWWA C701-02, Cold Water Meters-Turbine Type for Customer Service.
- . 7 AWWA C702-1-01, Cold Water Meters-Compound Type.
- . 8 Canadian Standards Association (CSA International).
- . 9 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
- . 10 CSA-B79-(R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
- . 11 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- . 12 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- . 13 Material Safety Data Sheets (MSDS).
- . 14 Plumbing and Drainage Institute (PDI).
- . 15 PDI-G101-96, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- . 16 PDI-WH201-92, Water Hammer Arresters Standard.



**1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS**

- . 1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- . 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 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- . 4 Instructions: submit manufacturer's installation instructions.
- . 5 Manufacturers' Field Reports: manufacturers' field reports specified.
- . 6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals:

**1.4 DELIVERY,  
STORAGE AND  
HANDLING**

- . 1 Waste Management and Disposal:
  - . 1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

**PART 2 - PRODUCTS**

**2.1 FLOOR DRAINS**

- . 1 Floor Drains and Trench Drains: to CSA B79.
- . 2 FD-1: general duty; cast iron body, round adjustable head, 125 mm, sediment basket nickel bronze strainer, integral seepage pan and clamping collar, trap primer connection.
  - . 1 Acceptable Product: Zurn ZN-415-B5-P, Jay R. Smith, MIFAB, Watts.
- . 3 FD-2: combination funnel floor drain; coated cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral oval funnel, trap primer connection.
  - . 1 Acceptable Product: Zurn ZN-415-BF-P, Jay R. Smith, MIFAB, Watts.

**2.2 AREA DRAINS**

- . 1 Area drains to CSA B79.
- . 2 AD-1: 225x225 square area drain complete with coated cast iron body with 100mm bottom outlet, sediment bucket, medium duty grate.
  - . 1 Acceptable Product: Zurn Z611, Jay R. Smith, MIFAB, Watts.

**2.3 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.
- . 2 Access Covers:
  - . 1 Wall Access: face or wall type, 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 and:
  - . 1 Plugs: bolted bronze with neoprene gasket.
  - . 2 Cover for Unfinished Concrete Floors: nickel bronze round or square, gasket, vandal-proof screws.
  - . 3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

## **2.4 NON-FREEZE WALL HYDRANTS**

- . 1 Recessed with integral vacuum breaker, integral backflow preventer, NPS  $\frac{3}{4}$  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 Z-1300-PB-WC, Jay R. Smith, MIFAB, Watts.

## **2.5 WATER HAMMER ARRESTORS**

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

## **2.6 BACK FLOW PREVENTERS**

- . 1 Preventers: to CSA-B64 Series, application reduced pressure principle type, double check valve assembly.

## **2.7 VACUUM BREAKERS**

- . 1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric.

## **2.8 BACKWATER VALVES**

- . 1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.
- . 2 Access:
  - . 1 Surface access.
  - . 2 Access pipe with cover: maximum [300] mm depth.
  - . 3 Steel housing with gasketed steel cover.
  - . 4 Concrete access pit with cover, as indicated.

## **2.9 HOSE BIBBS AND SEDIMENT FAUCETS**

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

## **2.10 WATER MAKE-UP ASSEMBLY**

- . 1 Complete with [backflow preventer] pressure gauge on [inlet and] outlet, pressure reducing valve to CSA B356, pressure relief valve on low pressure side and gate valves on inlet and outlet.

## **2.11 WATER METERS**

- . 1 Displacement type to AWWA C700.

## **2.12 TRAP SEAL PRIMERS**

- . 1 Up to 12 floor drains: Electronic trap priming manifold with:
  - . 1 Vacuum breaker
  - . 2 Pre-set 24 hour time clock
  - . 3 Manual override switch
  - . 4 120V solenoid valve
  - . 5 120V or 3 wire connection.
  - . 6 NPS  $\frac{3}{4}$  inlet connection.
  - . 7 Calibrated manifold.
  - . 8 Water hammer arrestor

- . 9 Mounted in steel cabinet
- . 10 Compression outlet fittings
- . 11 Inlet shut off valve
- . 12 Supplies minimum 59 ml @ 138 kPa.

## **2.13 STRAINERS**

- . 1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- . 2 NPS2 and under, bronze body, screwed ends, with [brass] cap.
- . 3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

## **2.14 GREASE INTERCEPTORS**

- . 1 Dura coated interior and exterior fabricated steel low type grease interceptors rated as indicated with grease holding capacity as indicated. Unit shall be supplied complete with internal air relief bypass, bronze cleanout plug and trap seal with removable combination pressure equalizer/flow diffusing baffles, extensions as required, gasketed secured cover.
- . 2 Provide optional enzyme port in cover.
- . 3 Provide internal or external flow control for field installation. External flow control with orifice sized to suit rated flow as outlined above. External flow control to have inlet/outlet connections as indicated.
- . 4 Supply grease interceptor with one (1) year supply of poly-enzyme.
- . 5 Grease interceptor shall carry the PDI label.
- . 6 Acceptable Product: Zurn Low Profile Grease Interceptor size as indicated, Jay R. Smith, MIFAB, Watts.

## **2.15 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, 50 mm above floor, for floors above grade.
- . 9 Acceptable Product: Metraseal MS Series, Link Seal.

**2.16 CHEMICAL PIPING**

- .1 Piping used for:
  - .1 Peroxyacetic acid;
  - .2 Quaternary sanitizer;
  - .3 Dish detergent;
  - .4 Floor concentration process cleaner; and
  - .5 Multipurpose concentration process cleaner.
- .2 Piping and fittings shall be CPVC.
- .3 Joints shall be glued.

**2.17 TEMPERED WATER  
ASSEMBLY**

- .1 Quantity: as indicated
- .2 Hi/Lo combination assembly mounted in wall mounted (surface) stainless steel cabinet.
- .3 Capacity:
  - .1 High capacity: as indicated @ 310 kPa differential pressure (maximum flow).
  - .2 Low capacity: as indicated @ 34 kPa differential pressure (minimum flow).
- .4 Provide check stops on hot/cold water inlet to each valve.
- .5 Provide a pressure regulating valve that responds to varying flow requirements.
- .6 Each tempered water valve to be thermostatic mixing type with liquid filled thermostatic motors that sense and control water temperature.
- .7 Assembly shall be capable of maintaining water temperature to within 8°C above setpoint within the range of 4°C to 71°C.
- .8 Valves to be bronze body.
- .9 Valves to be ASSE and CSA approved.
- .10 Provide pressure gauges on inlet/outlet of high capacity valve.
- .11 Provide dial thermometer at discharge of tempered water assembly.
- .12 Acceptable Product: Powers Hydroguard Simmons, RADA Mechanical Products Ltd. Or approved equal.

**2.18 EMERGENCY EYE WASH**

- .1 Concealed, barrier free, swing down, eye/face wash complete with universal wall sign, p-trap and SS cabinet. Bradley S19-292PT
- .2 Emergency thermostatic mixing valve, Bradley S19-2000EFX.

**2.19 WATER SOFTENER**

- .1 Commercial duplex cation exchanger (sodium zeolite) water softening equipment: factory assembled and disassembled, as necessary for shipment with connecting components clearly identified.

- . 2 System includes softener tanks, brine tanks, brine forming system, brine distribution system, regenerating manifolding and controller systems.
- . 3 System resin capacity per tank: 0.085 cu. m.
- . 4 Critical application flow rate: 0.95 LPS.
- . 5 Flow Rate: 1.83 LPS @ 15psi drop.
- . 6 Max flow to drain: 0.32 LPS
- . 7 Mineral tank: 356mm x 1651mm
- . 8 Brine tank: 610mm x 1271mm
- . 9 Pressure drop: kPa maximum.
- . 10 Watergroup Model TMI 90-1-1/2"
- . 11 Minimum requirements:
  - . 1 Ensure backwash drains to open funnel as indicated.
  - . 2 Gravel bed: washed and graded silica gravel sized to retain zeolite and to provide complete distribution of water when backwashing.
  - . 3 Piping: as indicated.
    - . 1 Include piping and regenerating valves within softener and brine tanks.
    - . 2 Sampling cock: on soft water line from softener.
    - . 3 Header system: for multiple tank units.
- . 12 Pressure gauges for each softener tank: two, 89 mm dia compound pressure and vacuum gauges giving entering and leaving readings.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- . 1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

### **3.2 INSTALLATION**

- . 1 Install in accordance with National Plumbing Code of Canada and local authority having jurisdiction.
- . 2 Install in accordance with manufacturer's instructions and as specified.

### **3.3 CLEANOUTS**

- . 1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as 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 NPS4.

- 3.4 NON-FREEZE WALL  
HYDRANTS** .1 Install 600 mm above finished grade unless otherwise indicated.
- 3.5 WATER HAMMER  
ARRESTORS** .1 Install on branch supplies to fixtures or group of fixtures where indicated.
- 3.6 BACK FLOW  
PREVENTORS** .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- 3.7 BACKWATER  
VALVES** .1 Install in main sewer lines.
- 3.8 HOSE BIBBS AND  
SEDIMENT FAUCETS** .1 Install at bottom of risers, at low points to drain systems, and as indicated.
- 3.9 TRAP SEAL  
PRIMERS** .1 Install for floor drains and elsewhere, as indicated.  
.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.  
.3 Install plastic tubing to floor drain.
- 3.10 STRAINERS** .1 Install with sufficient room to remove basket.
- 3.11 GREASE  
INTERCEPTORS** .1 Install with sufficient space, as indicated, for ease of maintenance.  
.2 Provide extensions as required to finished floor elevation.
- 3.12 WATER METERS** .1 Install water meter provided by local water authority.  
.2 Install water meter as indicated.
- 3.13 WATER MAKE-UP  
ASSEMBLY** .1 Install on valved bypass.  
.2 Pipe discharge from relief valve to nearest floor drain.
- 3.14 START-UP** .1 General:  
.1 In accordance with Section 01 91 01 - General Commissioning (Cx) Requirements.  
.2 Timing: start-up only after:  
.1 Pressure tests have been completed.  
.2 Disinfection procedures have been completed.  
.3 Certificate of static completion has been issued.  
.4 Water treatment systems operational.  
.3 Provide continuous supervision during start-up.
- 3.15 TESTING AND  
ADJUSTING** .1 General:  
.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements.

- . 2 Timing:
  - . 1 After start-up deficiencies rectified.
  - . 2 After certificate of completion has been issued by authority having jurisdiction.
- . 3 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, removeability of strainer.
  - . 5 Clean out baskets.
- . 4 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.
- . 5 Access doors:
  - . 1 Verify size and location relative to items to be accessed.
- . 6 Cleanouts:
  - . 1 Verify covers are gas-tight, secure, yet readily removable.
- . 7 Water hammer arrestors:
  - . 1 Verify proper installation of correct type of water hammer arrester.
- . 8 Wall hydrants:
  - . 1 Verify complete drainage, freeze protection.
  - . 2 Verify operation of vacuum breakers.
- . 9 Pressure regulators, PRV assemblies:
  - . 1 Adjust settings to suit locations, flow rates, pressure conditions.
- . 10 Strainers:
  - . 1 Clean out repeatedly until clear.
  - . 2 Verify accessibility of cleanout plug and basket.
  - . 3 Verify that cleanout plug does not leak.
- . 11 Grease interceptors:
  - . 1 Activate, using manufacturer's recommended procedures and materials.

END OF SECTION

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- . 1 Section 22 05 00 Common Work Results for Plumbing.

### **1.2 REFERENCES**

- . 1 Canadian Standards Association (CSA International)
  - . 1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
  - . 2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - . 3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

### **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.

### **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, labeled with manufacturer's name, address.
- . 3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURED UNITS**

- . 1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- . 2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- . 3 Exposed plumbing brass to be chrome plated.
- . 4 Number, locations: as indicated on drawings.
- . 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.

### **2.2 FIXTURES**

- . 1 WC-1:
  - . 1 White vitreous china with antimicrobial surface floor mounted, siphon jet flush action, operates in the range of 4.2L to 6L per flush, condensate channel, 54mm fully glazed internal trapway, floor outlet, bolt caps, 38mm dia. top spud. (Level of acceptance: American Standard Madera Flowise Elongated 381mm high #3451.001.020 HET Toilet).



- . 2 Heavy duty toilet seat, for elongated bowl open front, white solid plastic, with cover, reinforced stainless steel check hinges, metal flat washers stainless steel posts and nuts. (Level of acceptance: Centoco #500SCC.001)
  - . 3 Exposed manual flush valve for top spud toilet, chrome plated, 4.8L factory set flow, quiet action diaphragm type with dual filter by-pass, non-hold open feature, A. D. A triple seal oscillating handle, smooth design stop cap on back-check angle stop (screwdriver operated), flush tube for 292mm rough-in, high pressure vacuum breaker. (Level of acceptance: Sloan Royal #111-1.28-CP)
  - . 4 Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.
- . 2 WC-2 (ADA):
- . 1 White vitreous china with antimicrobial surface floor mounted, siphon jet flush action, operates in the range of 4.2L to 6L per flush, condensate channel, 54mm fully glazed internal trapway, floor outlet, bolt caps, 38mm dia. top spud. (Level of acceptance: American Standard Madera Flowise Right Height Elongated 419mm high #3461.001.020 HET Toilet).
  - . 2 Heavy duty toilet seat, for elongated bowl open front, white solid plastic, with cover, reinforced stainless steel check hinges, metal flat washers stainless steel posts and nuts. (Level of acceptance: Centoco #820STS.001)
  - . 3 Exposed manual flush valve for top spud toilet, chrome plated, 4.8L factory set flow, quiet action diaphragm type with dual filter by-pass, non-hold open feature, A. D. A triple seal oscillating handle, smooth design stop cap on back-check angle stop (screwdriver operated), flush tube for 292mm rough-in, high pressure vacuum breaker. (Level of acceptance: Sloan Royal #111-1.28-CP)
  - . 4 Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.
- . 3 LAV-1:
- . 1 521mm x 464mm x 308mm high, vitreous china, for carrier with concealed arms, front overflow, self-draining faucet ledge, contoured back and side splash shield. (Level of acceptance: American Standard Lucerne #0356.421)
  - . 2 Single lever faucet, center hole only, lead free cast brass body, 121mm long cast spout, with vandal resistant 5.7LPM, aerator outlet, lever handle. (Level of acceptance: Chicago Faucets Marathon #2200-ABCP-E34VP)
  - . 3 Open grid drain, chrome plated cast brass one piece top, 1.5mm thick tubular 32mm tailpiece. (Level of acceptance: McGuire #155AC)
  - . 4 Faucet Supplies, chrome finish polished brass, heavy duty angle stops, 10mm (3/8") I. P. S. Inlet x 76mm (3") long rigid horizontal nipple, V. P. Loose key, escutcheon and flexible copper riser. (Level of acceptance: McGuire #H165LKN3)
  - . 5 P-trap, heavy cast brass adjustable body, with slip nut, 32mm size, shallow wall flange and seamless tubular wall bend. (Level of acceptance: McGuire #8872C)
  - . 6 Carrier, mounted on concrete floor, with epoxy coated cast

iron concealed arms with sliding adjustable arm brackets, heavy gauge steel uprights with integral welded feet. Minimum space required: for one unit: 102mm for two to six units in a row: 152mm (6") finished block wall to back of pipe space. (Level of acceptance: Watts #TCA-411)

- . 4 LAV-2 (ADA):
  - . 1 Basin, 540mm x 520mm x 165mm high, vitreous china, for carrier with concealed arms, rear overflow, recessed self-draining faucet ledge, semi-pedestal P-trap cover. (Level of acceptance: American Standard Murro with Everclean #0955.001EC/0059.020EC)
  - . 2 Single lever faucet, center hole only, lead free cast brass body, 121mm long cast spout, with vandal resistant 5.7LPM, aerator outlet, lever handle. (Level of acceptance: Chicago Faucets Marathon #2200-ABCP-E34VP)
  - . 3 Open grid drain, chrome plated cast brass one piece top, 1.5mm thick tubular 32mm tailpiece. (Level of acceptance: McGuire #155AC)
  - . 4 Faucet Supplies, chrome finish polished brass, heavy duty angle stops, 10mm I. P. S. inlet x 76mm (3") long rigid horizontal nipple, V. P. Loose key, escutcheon and flexible copper risers. (Level of acceptance: McGuire #H165LKN3RB)
  - . 5 P-Trap, heavy cast brass adjustable body, with slip nut, 32mm size, shallow wall flange and seamless tubular wall bend. (Level of acceptance: McGuire #8872C)
  - . 6 Carrier, mounted on concrete floor, with epoxy coated cast iron concealed arms with sliding adjustable arm brackets, heavy gauge steel uprights with integral welded feet. Minimum space required: for one unit: 102mm for two to six units in a row: 152mm finished block wall to back of pipe space. (Level of acceptance: Watts #TCA-411)
- . 5 Shower SH-1:
  - . 1 Single piece, 914mm x 914mm, white open top, three-sided shower made from vacuum formed acrylic with fiberglass reinforcement, high gloss finish. (Level of acceptance: Mirolin Melrose 3)
  - . 2 Provide heavy duty shower rod fastened to the block wall and heavy duty shower curtain.
  - . 3 Shower Valve, solid brass body construction, pressure balancing, washerless ceramic drip-free disc valve cartridge, metal wall escutcheon, 9.5LPM maximum flow rate '620A' ball joint showerhead with arm and flange. (Level of acceptance: Chicago Faucets #1902-CP)
  - . 4 Floor Drain, 51mm outlet, epoxy coated cast iron, anchor flange, adjustable round nickel bronze strainer, reversible clamping collar with primary & secondary weepholes (Level of acceptance: Watts #FD-100-A)
  - . 5 Provide P-trap, same material as the connecting pipe drain.
- . 6 Shower SH-2:
  - . 1 Single piece, 978mm x 978mm, white open top corner shower made from vacuum formed acrylic with fiberglass reinforcement, high gloss finish. (Level of acceptance: Mirolin

- Sorrento 38)
- . 2 Provide heavy duty curved shower rod fastened to the wall and heavy duty shower curtain.
- . 3 Shower Valve, solid brass body construction, pressure balancing, washerless ceramic drip-free disc valve cartridge, metal wall escutcheon, 9.5LPM maximum flow rate '620A' ball joint showerhead with arm and flange. (Level of acceptance: Chicago Faucets #1902-CP)
- . 4 Floor Drain, 51mm outlet, epoxy coated cast iron, anchor flange, adjustable round nickel bronze strainer, reversible clamping collar with primary & secondary weepholes (Level of acceptance: Watts #FD-100-A)
- . 5 Provide P-trap, same material as the connecting pipe drain.
- . 7 Kitchen Sink SK-1:
  - . 1 Single bowl countertop mount sink, 3 holes, 203mm center, 521mm (20-1/2") x 508mm (20") x 203mm (8") deep, counter mounted, backledge, manufactured from 18-10 type 302 20 gauge (0.9mm) stainless steel, satin finish rim and bowl, mounting kit, fully undercoated to reduce condensation and resonance, factory applied rim seal, 89mm vandal resistant grid with 38 mm tailpiece. (Level of acceptance: Franke Commercial #LBS6808-1300G/3)
  - . 2 Two handle manual faucet, 203mm centerset, lead free solid brass body construction, ceramic 1/4 turn cartridge, 203mm swing cast brass spout. With Vandal Resistant 5.7LPM, aerator outlet, metal red and blue index buttons 51mm long canopy lever handle with vandal resistant screw. (Level of acceptance: Chicago Faucets #1100-ABCP-E35VP-1000VP-XK-L8)
  - . 3 Faucet supplies, chrome finish polished brass, heavy duty angle stops, 10mm I. P. S. Inlet x 76mm long rigid horizontal nipple, V. P. Loose key, escutcheon and flexible copper riser. (Level of acceptance: McGuire #H165LKN3.)
  - . 4 Provide P-trap, adjustable all metal construction, 38mm size, and escutcheon.
- . 8 Wash Trough SK-2:
  - . 1 Trough sink, 508mm x 1829mm x 457mm deep, wall hung, type 304, 14 gauge (2.0mm) stainless steel, rim and bowl polished to a #4 satin finish, 254mm high backsplash, radius coved bowl corners and rolled radius rim, wall hanger, 89mm crumb cup waste assembly with 38mm brass tailpiece, (Level of acceptance: Franke Commercial #WTS2072-1)
  - . 2 Wall mounted electronic faucet, chrome finish brass construction body with 158mm dia. Wall flange, 5.7LPM non-aerating laminar spray outlet, infrared sensor with screw adjustable range, undercounter filtered solenoid valve with serviceable strainer filter, module control assembly with splash proof junction box and mounting kit, vandal proof box, 12" (305mm) sq. Recessed metal box with 13" (330mm) sq. V. P. S. S face, located in wall under basin. Flexible copper supply, point of use thermostatic water mixing valve, nickel plated bronze body, temperature adjusting spindle, 10 mm inlet and outlet FNPT connection, integral checks, offer

- temperature range between 95 C and 46 C. Set valve temperature at 46 C. (Level of acceptance: Sloan Optima #ETF-800-VPB-BDT)
- . 3 Box mount hard wired transformer, 120VA / 24VA 50A. (Level of acceptance: Sloan #EL-154)
- . 4 Provide P-Trap, adjustable all metal construction, 38mm size, and escutcheon.
- . 5 Carrier, three steel hanger plates, heavy gauge epoxy coated steel uprights with welded feet. Minimum space required: 150mm finished block wall to back of pipe space. (Level of acceptance: Watts #CA-421-3)
- . 6 Note: Provide 4 sets of faucets
- . 9 Hand Wash SK-3
  - . 1 Hand wash sink, without overflow , 470mm x 483mm x 273mm high, manufactured from 18-8 type 302 20 gauge (0.9mm) stainless steel, polished satin finish rim, for carrier with steel plate, faucet ledge, 95mm high backsplash, wall hanger. (Level of acceptance: Franke Commercial #WHB1819-7/1)
  - . 2 Electronic faucet, center hole only, chrome finish brass construction body, 8.3LPM non-aerating laminar spray outlet, 110mm (4-1/2") reach gooseneck spout, infrared sensor with screw adjustable range, undercounter filtered solenoid valve with serviceable strainer filter, module control assembly with splashproof junction box and mounting kit, 305mm sq. Recessed metal box with 330mm sq. V. P. S. S face, located in wall under basin. Flexible copper supply, point of use thermostatic water mixing valve, nickel plated bronze body, temperature adjusting spindle, 10 mm inlet and outlet FNPT connection, integral checks, offer temperature range between 95 C and 46 C. Set valve temperature at 46 C. (Level of acceptance: Sloan Optima #ETF-700-VPB-BDT)
  - . 3 Box mount hard wired transformer, 120VA / 24VA 50A. (Level of acceptance: Sloan #EL-154)
  - . 4 Open grid drain, chrome plated cast brass one piece top, 1.5mm (1/16") thick tubular 32mm (1-1/4") tailpiece, less overflow holes. (Level of acceptance: McGuire #PRODRAIN)
  - . 5 P-Trap, heavy cast brass adjustable body, with slip nut, 32mm size, shallow wall flange and seamless tubular wall bend. (Level of acceptance: McGuire #8872C)
  - . 6 Carrier, steel hanger plate, heavy gauge epoxy coated steel uprights with welded feet. Minimum space required: for one unit: 152mm finished block wall to back of pipe space. (Level of acceptance: Watts #CA-421)
- . 10 Service Sink SS-1
  - . 1 Square service / Mop sink, 914mm x 914mm x 305mm deep, floor mounted, terrazzo composed of pearl gray marble chips and Portland cement ground smooth, sealed to resist stain, one piece stainless steel cast integral on all sides, 152mm drop front, cast brass drain with stainless steel strainer, 75mm outlet. (Level of acceptance: Stern Williams #HL-2010)
  - . 2 Wall mounted Two handle manual faucet, 203mm centerset,

- solid brass exposed body construction, ceramic 1/4 turn cartridge, unrestricted hose end outlet, 200mm reach, integral atmospheric vacuum breaker, metal red and blue index buttons 60mm long lever handle with vandal resistant screw. Wall brace support. (Level of acceptance: Chicago Faucets #897-XK-369VP)
  - . 3 Hose and Wall Hook hose 914mm long with 19mm chrome coupling, stainless steel wall bracket. (Level of acceptance: Stern Williams T-35)
  - . 4 Mop Hanger stainless steel #4 finish, 610mm long with 3 rubber spring loaded clips. (Level of acceptance: Stern Williams T-40)
  - . 5 Gasket 76mm for XHCl, plastic and steel pipe. (Level of acceptance: Stern Williams TC-3)
  - . 6 Provide P-trap, same material as the connecting pipe drain.
- . 11 Service Sink SS-2
- . 1 Rectangular service / Mop sink, 914mm x 600mm x 305mm deep, floor mounted, terrazzo composed of pearl gray marble chips and Portland cement ground smooth, sealed to resist stain, one piece stainless steel cast integral on all sides, 152mm drop front, cast brass drain with stainless steel strainer, 75mm outlet. (Level of acceptance: Stern Williams #HL-2100)
  - . 2 Wall mounted Two handle manual faucet, 203mm centerset, solid brass exposed body construction, ceramic 1/4 turn cartridge, unrestricted hose end outlet, 200mm reach, integral atmospheric vacuum breaker, metal red and blue index buttons 60mm long lever handle with vandal resistant screw. Wall brace support. (Level of acceptance: Chicago Faucets #897-XK-369VP)
  - . 3 Hose and Wall Hook hose 914mm long with 19mm chrome coupling, stainless steel wall bracket. (Level of acceptance: Stern Williams T-35)
  - . 4 Mop Hanger stainless steel #4 finish, 610mm long with 3 rubber spring loaded clips. (Level of acceptance: Stern Williams T-40)
  - . 5 Gasket 76mm for XHCl, plastic and steel pipe. (Level of acceptance: Stern Williams TC-3)
  - . 6 Provide P-trap, same material as the connecting pipe drain.

## **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 as indicated, measured from finished floor.
  - . 2 Wall-hung fixtures: as indicated, measured from finished floor.
  - . 3 Barrier free: to most stringent NBCC 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.
- . 2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION