

## **PART 1        GENERAL**

### **1.1            GENERAL CONDITIONS**

- .1       Division 01, 21, 23 and 25 as applicable; are part of this Section and shall apply as if repeated here.

### **1.2            RELATED SECTIONS**

- .1       Division 01 – General Requirements.
- .2       Section 01 33 00 Submittal Procedures.
- .3       Section 01 45 00 – Testing and Quality Control.
- .4       Section 01 77 00 - Closeout Procedures.
- .5       Section 01 78 00 - Closeout Submittals.
- .6       Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7       Section 22 10 10 - Plumbing Pumps.
- .8       Section 22 11 16 – Domestic Water Piping – Copper.
- .9       Section 22 13 17 – Drainage, Waste and Vent Piping – Cast Iron and Copper.
- .10      Section 22 13 18 – Drainage, Waste and Vent Piping – Plastic.
- .11      Section 22 30 05 – Domestic Water Heaters.
- .12      Section 22 42 01 – Plumbing Specialities and Accessories.
- .13      Section 23 05 00 – Common Work Results – Mechanical.
- .14      Section 23 05 15 – Common Installation Requirements for HVAC Pipework.
- .15      Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .16      Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .17      Section 23 05 53 – Mechanical Identification.
- .18      Section 23 04 93 - Testing, Adjusting and Balancing for HVAC.
- .19      Section 23 07 18 – Thermal Insulation for Equipment.
- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1       National Building Code of Canada - 2015, including latest errata.
- .2       National Plumbing Code of Canada - 2015, including latest errata.
- .3       National Fire Code of Canada - 2015, including latest errata.
- .4       Authorities Having Jurisdiction:
  - .1       Conform to the requirements of the Authority Having Jurisdiction.

### **1.4            SHOP DRAWINGS AND PRODUCT DATA**

- .1       Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

- .2 Provide one (1) digital copy in Adobe PDF of shop drawings (ensure Contractor's markups and stamp is embedded prior to submission) for all equipment specified and/or indicated including but not limited to the following items:
  - .1 Fire stopping Materials (by this Contractor);
  - .2 Floor Drains;
  - .3 Piping (All Types);
  - .4 Cleanouts;
  - .5 Backflow Preventers;
  - .6 Sump Package;
  - .7 Valves (All Types);
  - .8 Hot Water Tanks;
  - .9 Pipe Hangers;
  - .10 Water Meters;
  - .11 Mixing Valves;
  - .12 Trap Primers; and
  - .13 Plumbing Fixtures.
- .3 Contractor is to maintain record drawings on site showing significant deviation from the contract documents and shop drawings.

## 1.5 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Manuals: Provide operation and maintenance data for incorporation into the maintenance manual specified in Section 01 78 00 – Closeout Submittals.
  - .1 Operation and maintenance manual to be approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .2 Operation data to include:
    - .1 Description of actions to be taken in event of equipment failure.
    - .2 Valves schedule and flow diagram.
    - .3 Colour coding chart.
    - .4 Legend of above ceiling identifiers.
  - .3 Maintenance data shall include:
    - .1 Servicing, maintenance, operation and troubleshooting instructions for each item of equipment.
    - .2 Data to include schedules of tasks, frequency, tools required and task time.
  - .4 Performance data to include:
    - .1 Equipment performance verification test results.
    - .2 Special performance data as specified elsewhere.
    - .3 Cross connection and backflow device inspection report for each installed backflow preventer.
  - .5 Additional data:
    - .1 MSDS for all hazardous material installed and left stored on site or with the Departmental Representative.
    - .2 Analysis of hydronic systems water after cleaning and treatment of piping.
  - .6 Provide identification of all valves as required by Section 23 05 53 - Identification for HVAC Piping and Equipment.
  - .7 Provide updated, approved shop drawings for inclusion in the maintenance manuals.
  - .8 Provide certificate indicating that the installation satisfies:

- .1 Local Authority Having Jurisdictions requirements.
    - .9 Approvals:
      - .1 Submit one (1) DIGITAL copy of the draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by Departmental Representative.
      - .2 Make changes as required and resubmit as directed by Departmental Representative.
  - .2 As Built/Record Drawings:
    - .1 Site Records:
      - .1 The Departmental Representative will provide one (1) set of reproducible fire protection drawings. Provide one (1) set of white prints as required for each phase of the work. The contractor shall mark thereon all changes as work progresses and as changes occur.
      - .2 On a (weekly) basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
      - .3 Make available for reference purposes and inspection at all times.
    - .2 As Built/Record Drawings:
      - .1 Identify each drawing in lower right hand corner in letters at least ½" high as follows: "AS BUILT/RECORD DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW PLUMBING SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
      - .2 Submit to Departmental Representative for approval and make corrections as directed.
      - .3 Submit completed reproducible as built/record drawings with each of the Operating and Maintenance Manuals.
      - .4 The Departmental Representative shall use the Contractor's marked up drawings to produce electronic copies of the As-Built/Record Drawings, refer also to Section 01 78 00 - Closeout Submittals.
  - .3 Warranty: Submit warranties in maintenance manuals as specified in Section 01 78 00 – Closeout Submittals.
  - .4 Guarantee:
    - .1 Submit manufacturers' written guarantees to the Departmental Representative for review.
    - .2 Bind guarantees in hard cover report binder suitable for 8½" x 11" sheets. Label cover "Guarantees" and show project name. Provide title sheet and table of contents.
    - .3 Each guarantee shall include:
      - .1 Project name and address.
      - .2 Guarantee time period (commencement date shall be as date shown on Project Final Certificate of Completion unless otherwise indicated).
      - .3 Clear and concise definition of what is guaranteed and remedial action provided.
      - .4 Signatures of Plumbing Trade Contractor and a company officer of the manufacturing firm.
    - .4 Include all extended guarantees (and service contracts) as specified in individual sections.

## **1.6 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.

## **1.7 EQUIPMENT LIST**

- .1 Compile a complete list of equipment and materials to be used on this project and forming part of contract documents by adding manufacturer's name, model number and details of materials, and submit for approval.
- .2 Submit for approval within ten (10) days after award of contract.

## **1.8 TRIAL USAGE**

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

## **1.9 PROTECTION OF OPENINGS**

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

## **1.10 CLEANING**

- .1 To Section 01 74 11 – Cleaning.
- .2 Clean the job site daily. If the site is not cleaned to the Departmental Representative's satisfaction, then the Departmental Representative shall make arrangements for cleaning and charge the cost against the Contract.

## **1.11 PAINTING**

- .1 To Section 09 91 00 - Painting.
- .2 Prime and touch up marred finished paintwork to match original. Touch-up to match original paint. Do not paint over nameplates.
- .3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.
- .4 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated equipment.

**1.12 DEMONSTRATION, OPERATING AND MAINTENANCE INSTRUCTIONS**

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Where specified elsewhere in the specifications, the contractor is to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, as built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Where deemed necessary, the Departmental Representative may record these demonstrations on video tape for future reference.

**1.13 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 33 00 - Submittal Procedures.
- .2 Storage and Protection:
  - .1 Store materials indoors in dry location.
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

**1.14 AS INDICATED**

- .1 Means that the item or items specified are shown on the drawings.
- .2 The word "provide" shall mean "Supply and Install".

**1.15 ACCEPTABLE MANUFACTURER**

- .1 Means that item named and specified by manufacturer and/or catalogue number, forms part of specifications and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.
- .2 Provide materials, equipment, and plant of specified design quality and of current models with published ratings for which replacement parts are readily available.
- .3 The codes and standards referred to in the specifications establish the minimum requirements only. The most stringent requirements of the specifications, drawings, codes and standards shall govern. Refer to the latest editions of all applicable codes and standards.

## **1.16 EQUIPMENT REQUIREMENTS AND INSTALLATION**

- .1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to connecting piping and duct systems and without interference from building structure or other equipment.
- .2 Pipe all drain lines to floor drains.
- .3 Equipment shall be installed on the axis of the building.

## **1.17 ANCHOR BOLTS AND TEMPLATES**

- .1 Supply anchor bolts.
- .2 Drill and grout anchor bolts using templates.
- .3 Installed anchors shall perform to criteria required.

## **1.18 SLEEVES**

- .1 Provide pipe sleeves at all points where pipes pass through masonry or concrete walls or slabs.
- .2 Also refer to Item 1.26 Cutting and Patching and Division 01.
- .3 Sleeves to be primed coated prior to installation.
- .4 Sizes:
  - .1 Provide ½" (13mm) clearance all around between sleeve and pipes or between sleeve and insulation. Clearance around pipes penetrating fire rated walls and floors to be as required for fire stopping.
  - .2 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and all finished areas; and 2" (50mm) above floors in mechanical rooms, service spaces and wet areas such as kitchens, etc.
- .5 Fill voids around pipes.
- .6 Also, refer to Item 1.22 Penetration of Walls and Floor Slabs.
- .7 All fire stopping to be done in accordance with Section 07 84 00 – Firestopping and Smoke Seals.
- .8 Temporarily plug all openings during construction.
- .9 Provide sleeves in all openings in mechanical room and wet area floors.
- .10 Sleeves to be Schedule 40 steel pipe complete with continuous welded fin.
- .11 Sleeves to be installed when concrete is poured.

## **1.19 ESCUTCHEONS AND PLATES**

- .1 Provide on all pipes passing through finished walls, partitions, floors and ceilings.
- .2 Use chrome or nickel plated brass, split type with set screws for ceiling or wall mounting.
- .3 Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.
- .4 Secure to pipe or finished surface but not to insulation.
- .5 Where sleeves extend above finished floor, escutcheons or plates shall cover sleeve extension.

## **1.20 ACCESS DOORS**

- .1 Supply access doors for furred ceilings and duct shafts or spaces for servicing equipment and accessories or for inspection of safety, operating or fire devices for installation under section erecting the walls or ceilings. Also, supply and arrange for installation of access pits and covers for servicing and inspection of valves, devices which are to be installed below grade or below floor in floor slabs.
- .2 General: Prime coated steel.
- .3 Special areas such as tiled or marble surfaces: stainless steel.
- .4 In visible areas, access door locations to be approved by the Departmental Representative prior to installation.

## **1.21 DIELECTRIC COUPLINGS**

- .1 Provide wherever pipes of dissimilar metals are joined.
- .2 Provide insulating unions for pipe sizes 2" (50mm) and under and flanges for pipe sizes over 2" (50mm).
- .3 Provide felt or rubber gaskets to prevent dissimilar metals contact.

## **1.22 PENETRATION OF WALLS AND FLOOR SLABS**

- .1 Wherever pipes and ducts penetrate non-fire rated walls and floor slabs, tightly pack the space between construction and ducts/pipes the full depth with acoustic filler material and seal both sides with acoustic sealant. Where pipes pass through fire rated walls and floor slabs, pack space between the pipe and sleeve with approved fire rated and ULC approved sealant.
- .2 Acoustic Filler:
  - .1 Filler material shall be glass fibre or inorganic mineral.

- .2 Filler material shall not have higher combustion rating than the following:
- .3 Flame Spread Rating = 25
- .4 Smoke Development Rating = 0
- .5 Fuel Contribution Rating = 0
- .3 Acoustic Sealant:
  - .1 Concealed Application: Non-shrinking, non-straining, non-drying and permanently elastic type.
  - .2 Exposed Application: Permanently elastic, paintable acoustic sealant, latex acrylic or acrylic latex type.

### 1.23 PREPARATION FOR FIRE STOPPING

- .1 Fire stopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to be ULC listed and acceptable to the Authority Having Jurisdiction. Installation to be as per manufacturer's recommendations and ULC's testing procedure.
- .2 Uninsulated unheated pipes NOT subject to movement: No special preparation.
- .3 Uninsulated heated pipes subject to movement: Wrap with non-combustible smooth material to permit pipe to move without damaging fire stopping material.
- .4 Insulated pipes and ducts: Ensure integrity of insulation and vapour barrier at fire separation.
- .5 Each Trade contractor shall be responsible for their own fire stopping.
- .6 Fire stopping shall be located at the penetration of the fire separation by a fire stopping System in accordance with ULC-S155 "Fire Tests of Fire Stop Systems" that has a rating of not less than the rating for the fire separation.
- .7 Fire stop systems shall be installed by qualified personnel.

### 1.24 DRAWINGS

- .1 Mechanical drawings are not intended to show structural details or Architectural features.
- .2 The Mechanical drawings are not to be scaled.
- .3 Except where dimensioned, mechanical drawings indicate general Mechanical layouts only. Because of the small scale of Mechanical drawings, it is not possible to show all offsets, fittings and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves and accessories which are required to meet the conditions.
- .4 These specifications are to be considered as an integral part of the drawings which accompany them; neither the drawings nor the specifications shall be used alone. Any item which is omitted in one but which is reasonably implied in the other, shall be considered properly and sufficiently specified and must, therefore, be provided under the Contract. The decision of the Departmental Representative shall be final, if interpretation is required.



- .5 Misinterpretation of drawings and specifications shall not relieve the Plumbing Trade Contractor of responsibility.
- .6 The Plumbing Trade Contractor shall make themselves familiar with the overall intended operation of the fire protection system prior to installation so that all necessary accessories can be installed during the normal progress of the work. Failure to do so will result in the Plumbing Trade Contractor being responsible for providing such devices, at their expense when the need of such devices becomes apparent during start-up.

#### **1.25 EXISTING SITE CONDITIONS**

- .1 The Contractor shall visit the site of the building in order to examine firsthand the existing conditions which may affect his contract. No compensation shall be considered for additional expenditures incurred later through failure to do so.

#### **1.26 CUTTING AND PATCHING**

- .1 Any cutting, coring and patching required shall be done by the Contractor for as per Division 01.
- .2 Holes in slabs shall be by coring and are the responsibility of this Contractor in locations to be approved by the Departmental Representative.
- .3 Where any masonry and concrete saw cutting and coring work is required the Contractor shall wet cut to reduce dust.
- .4 Approvals:
  - .1 Obtain approval from the Authority Having Jurisdiction beginning installation.
  - .2 Contractor to provide stamped shop drawings and piping layout drawings to the Authority Having Jurisdiction.
  - .3 Pay all costs associated with such approvals, including but not limited to checking of documents.

#### **1.27 EXTRA MATERIALS**

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout submittals.

#### **1.28 COMPLETION**

- .1 This Trade shall be held responsible to provide and furnish all necessary labour and to bear all expenses incidental to the satisfactory completion of the work.

#### **1.29 MANUFACTURERS REVIEW**

- .1 It shall be the responsibility of the Contractor to have the equipment supplier or his representative review all proposed connections, clearances, sizes, valves, breakers, etc. including wire and pipe sizes to his equipment before installation commences. At that

time, he shall inform the Departmental Representative of any changes required to make the equipment function satisfactorily.

- .2 Provide the Contractor with a letter accepting all connections as proposed and where required, recommend necessary changes.
- .3 If any changes or additional material and labour are required to make the equipment function properly to capacity and the manufacturer has not pointed out this work prior to commencement of work, the additional and/or corrective work shall then be done at the expense of the equipment supplier.

### **1.30 WARRANTIES**

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

### **1.31 COORDINATION**

- .1 Co-ordinate work with other trades to avoid conflict.
- .2 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.
- .3 Co-ordinate location of pipe drops and risers with trades erecting walls and ceilings to ensure that all pipes and ducts are concealed in walls or ceilings spaces. If space is not available in walls or ceilings, locate pipes so that they can be easily boxed in by the relevant trades. Where pipes are shown rising in concrete block walls, placement of the pipe shall be done in conjunction with the erection of the wall.

### **1.32 GUARANTEE**

- .1 This Plumbing Trade Contractor shall guarantee all their work free from defects for a period of one year, unless specifically noted otherwise, after final acceptance of such work by the Departmental Representative and shall make good all defects other than normal wear and tear during the life of the guarantee.
- .2 This Plumbing Trade Contractor shall guarantee all work and equipment supplied by them to work quietly and satisfactorily and to accomplish the work for which it was installed during the life of the above guarantee.
- .3 At any time during this period, they shall make any necessary changes and adjustments or replacements, to accomplish this at their own expense.

### **1.33 PERMITS AND REGULATIONS**

- .1 The Fire Protection Trade Contractor shall comply with all regulations of authorities having jurisdiction, where applicable, including but not limited to the following:
  - .1 Provincial Department of Labour.
  - .2 Municipal Plumbing Inspector.
- .2 The Plumbing Trade Contractor shall obtain and pay for any permits required by Local Codes and Regulations and arrange for inspections.
- .3 Any additional materials or labour required to conform to any of these rules and regulations will be furnished under the Contract with no additional cost to the Departmental Representative.

### **1.34 TESTS**

- .1 Notice of Tests: Give written notice for a minimum of four (4) working days prior to date when tests will be made.
- .2 Prior Tests: Concealed work shall remain uncovered until completely tested and approved, but if construction schedule requires, arrange for prior tests on parts of system as approved.
- .3 Acceptance Tests: Conduct in presence of the Departmental Representative's representative and representative of the Authorities Having Jurisdiction.
- .4 Costs: Bear all costs in connection with tests conducted.
- .5 Certificates: Obtain acceptance certificates from the authorities having jurisdiction. Work is not considered complete until certificates have been delivered to the Departmental Representative.

### **1.35 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and 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 Fold up metal banding, flatten and place in designated area for recycling.

### **1.36 COMMISSIONING**

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and

will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

**PART 2        PRODUCTS**

**2.1            NOT USED**

.1        Not Used

**PART 3        EXECUTION**

**3.1            NOT USED**

.1        Not Used

END

## **PART 1        GENERAL**

### **1.1            GENERAL CONDITIONS**

- .1        Division 01 and Section 23 05 00 – Common Works Results - Mechanical are both part of this Section and shall apply as if repeated here.

### **1.2            RELATED SECTIONS**

- .1        Division 01 – General Requirements.
- .2        Section 01 33 00 Submittal Procedures.
- .3        Section 01 45 00 – Testing and Quality Control.
- .4        Section 01 77 00 - Closeout Procedures.
- .5        Section 01 78 00 - Closeout Submittals.
- .6        Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
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- .8        Section 22 11 16 – Domestic Water Piping – Copper.
- .9        Section 22 13 17 – Drainage, Waste and Vent Piping – Cast Iron and Copper.
- .10      Section 22 13 18 – Drainage, Waste and Vent Piping – Plastic.
- .11      Section 22 30 05 – Domestic Water Heaters.
- .12      Section 22 42 01 – Plumbing Specialties and Accessories.
- .13      Section 23 05 00 – Common Work Results – Mechanical.
- .14      Section 23 05 15 – Common Installation Requirements for HVAC Pipework.
- .15      Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .16      Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .17      Section 23 05 53 – Mechanical Identification.
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- .19      Section 23 07 18 – Thermal Insulation for Equipment.
- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1        National Plumbing Code of Canada - 2015, including latest errata.
- .2        National Building Code of Canada - 2015, including latest errata.
- .3        National Fire Code of Canada - 2015, including latest errata.
- .4        Authorities Having Jurisdiction:
  - .1        Conform to the requirements of the Authority Having Jurisdiction

### **1.4            SHOP DRAWINGS AND PRODUCT DATA**

- .1        Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

## **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.
- .2 Data to include:
  - .1 Manufacturers name, type, model, year, capacity and serial number.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list with names and addresses.

## **1.6 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.

## **PART 2 PRODUCTS**

### **2.1 SUMP PUMP**

- .1 The pump shall be designed to handle raw sewage and be capable of passing 50 mm (2”) spherical solids.
- .2 The pump shall be capable of handling liquids with temperatures to 60°C (140°F) intermittent and shall be capable of intermittently running dry without damage to the seals or bearings.
- .3 The pump motor shall be of the submersible type, rated for 0.37kW, 208/1/60, 3450 RPM.
- .4 Motor shall be of the permanent split capacitor type with no relays or starting switches.
- .5 The motor shall be capable of operating over the full range of the performance curve without overloading the motor and causing any objectionable noise or vibration.
- .6 The motor pump shaft shall be of 416 stainless steel.
- .7 Ball bearings shall be designed for a B-10 life of 50,000 hours.
- .8 A heat sensor thermostat and overload shall be provided to stop the motor if the motor winding temperature reaches 266°F (130°C).
- .9 The overload thermostat shall reset automatically when the motor cools to a safe operating temperature.
- .10 The motor power cord shall be SJOW/A.

- .11 The motor shall be protected by a rotating mechanical shaft seal. The seal shall have carbon and ceramic seal faces. Metal parts and springs for seals shall be 300 series stainless steel.
- .12 The impeller shall be constructed of ductile iron. The impeller shall be threaded onto the 416 stainless steel pump/motor shaft.
- .13 All castings shall be of high tensile strength Class 30 gray cast iron.
- .14 All exposed fasteners shall be of 300 series stainless steel.
- .15 Controls:
  - .1 Pump to be provide with Control Panel in NEMA-1 enclosure, 120/1/60.
  - .2 Control Panel to be complete with HOA selector switch, run lights and high level alarm contacts.
  - .3 Contractor to include the required floats and associated cords with min 10m (33 feet) length, 120/1/60
  - .4 Alarm Control: Sealed mercury switch in polyurethane float ball with 10m (33 feet) power cord.
  - .5 High Level Alarm: Alarm buzzer with on/off test switch.
- .16 Pump pit, cover and curb frame supplied in underground contract.
- .17 Capacity: 50 gpm @ 28 feet head, 0.37kW, 208/1/60.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Application Tolerances:
  - .1 Flow: plus 10%; minus 0%.
  - .2 Pressure: plus 10%; minus 5%.
- .2 Check removability of pumps for servicing without interfering with installation or operation of other equipment.
- .3 Verify non-clog capability and maximum size of solids, using procedures recommended by manufacturer.
- .4 Reservoir to be installed level and cover to be flush with the finished floor.
- .5 Mechanical contractor to run power cord from control panel to float(s) in sump pit.
- .6 Mechanical contractor is to terminate all wiring as required at float(s) and control panel.

### **3.2 COMMISSIONING**

Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The

Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

END



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- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1        National Plumbing Code of Canada - 2015, including latest errata.
- .2        National Building Code of Canada - 2015, including latest errata.
- .3        National Fire Code of Canada - 2015, including latest errata.
- .4        Authorities Having Jurisdiction:
  - .1        Conform to the requirements of the Authority Having Jurisdiction.
- .5        ANSI B16.15 – 2006 - Cast Bronze Threaded Fittings, Classes 125 and 250.
- .6        ANSI B16.18 – 2001 - Cast Copper Alloy Solder Joint Pressure Fittings.
- .7        ANSI B16.22 – 2001 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

- .8 ANSI B16.24 – 2001 - Cast Copper Alloy Pipe Flanges and Flanged Fittings
- .9 ASTM B88-09 - Specification for Seamless Copper Water Tube.

#### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.
- .2 Data to include:
  - .1 Valves;
  - .2 Grooved Couplings; and
  - .3 Grooved Fittings.

#### **1.6 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.

### **PART 2 PRODUCTS**

#### **2.1 PIPING**

- .1 Domestic hot, cold, and recirculation systems within building:
  - .1 Above ground: copper tube, hard drawn, type L: to ASTM B88.
  - .2 Buried and embedded: copper tube, soft annealed, type K: to ASTM B88, in long lengths and with no buried joints.
- .2 Trap Primer piping:
  - .1 Above floor: Type “L” copper tube to ASTM B88.
  - .2 Buried and embedded: copper tube, soft annealed, type K: to ASTM B88, in long lengths and with no buried joints.

#### **2.2 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI 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 (lead-free).
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 Piping 50mm (2") and larger: Roll grooved to CSA B242, ASTM B75 alloy C12200.

## **2.3 JOINTS**

- .1 Rubber gaskets, 1.6 mm thick: to ANSI/AWWA C111/A21.11.
- .2 Bolts, nuts, hex head and washers: to ASTM A 307, heavy series.
- .3 Solder: tin-antimony to ASTM B32 (lead free); Silfos for piping greater than 1½ diameter.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket, heat treated carbon steel bolts and nuts to ASTM A183.
- .6 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F 492, complete with thermoplastic liner.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Install in accordance with National Plumbing Code of Canada except where specified otherwise.
- .2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
- .3 Assemble all piping using fittings manufactured to ANSI standards.
- .4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
- .5 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.

### **3.2 DISINFECTION**

- .1 Flush out, disinfect and rinse system to requirements of Authority Having Jurisdiction. After testing, provide acceptable water quality test report to Departmental Representative for review.

**3.3 PRESSURE TESTING**

- .1 Test at the greater of 1-1/2 times maximum system operating pressure or 860kPa (125 psig) for four (4) hours without loss of pressure.
- .2 Give Departmental Representative 48 hours' prior notice for witnessing of tests.

END

## **PART 1        GENERAL**

### **1.1            GENERAL CONDITIONS**

- .1       Division 01 and Section 23 05 00 – Common Works Results - Mechanical are both part of this Section and shall apply as if repeated here.

### **1.2            RELATED SECTIONS**

- .1       Division 01 – General Requirements.
- .2       Section 01 33 00   Submittal Procedures.
- .3       Section 01 45 00 – Testing and Quality Control.
- .4       Section 01 77 00 - Closeout Procedures.
- .5       Section 01 78 00 - Closeout Submittals.
- .6       Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7       Section 22 05 00 – Common Work Results for Plumbing.
- .8       Section 22 10 10 - Plumbing Pumps.
- .9       Section 22 11 16 – Domestic Water Piping – Copper.
- .10      Section 22 13 18 – Drainage, Waste and Vent Piping – Plastic.
- .11      Section 22 30 05 – Domestic Water Heaters.
- .12      Section 22 42 01 – Plumbing Specialities and Accessories.
- .13      Section 23 05 00 – Common Work Results – Mechanical.
- .14      Section 23 05 15 – Common Installation Requirements for HVAC Pipework.
- .15      Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .16      Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .17      Section 23 05 53 – Mechanical Identification.
- .18      Section 23 04 93 - Testing, Adjusting and Balancing for HVAC.
- .19      Section 23 07 18 – Thermal Insulation for Equipment.
- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1       National Plumbing Code of Canada - 2015, including latest errata.
- .2       National Building Code of Canada - 2015, including latest errata.
- .3       National Fire Code of Canada - 2015, including latest errata.
- .4       Authorities Having Jurisdiction:
  - .1       Conform to the requirements of the Authority Having Jurisdiction.
- .5       American Society for Testing and Materials (ASTM)
  - .1       ASTM B 32 96, Specification for Solder Metal.
  - .2       ASTM B 306 99, Specification for Copper Drainage Tube (DWV).
  - .3       ASTM C 564 95a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

- .6 CSA B67 1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .7 CAN/CSA B70 97, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .8 CAN/CSA B125 98, Plumbing Fittings.

#### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.

#### **1.6 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.

### **PART 2 PRODUCTS**

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

- .1 Piping:
  - .1 Above grade Sanitary and Vent, 50mm (2") and smaller, Type DWV to: ASTM B306.
- .2 Fittings:
  - .1 Cast brass: to CSA B158.1.
  - .2 Wrought copper: to ANSI B16.29.
  - .3 Solder: lead free.

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

- .1 Piping:
  - .1 Below grade: Sanitary, Storm and Vent: to CAN/CSA B70.
  - .2 Above grade: Sanitary, Storm and Vent, 65mm (2.1/2") and larger: to CAN3-B70.

- .2 Fittings:
  - .1 Mechanical joints:
    - .1 Above grade: Neoprene or butyl rubber compression gaskets with stainless steel clamps.
    - .2 Below Grade: Heavy Duty Neoprene or butyl rubber compression gaskets with stainless steel clamps.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Provide fire stopping at all piping penetrations of fire separations.
- .2 Install buried pipe on 150mm (6") bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 150mm (6") of clean washed sand.
- .3 Install piping parallel and close to walls and ceilings to conserve headroom and space, and to grade indicated.
- .4 Where inverts are not given and pipe size is 75mm (3") and under, pipe shall run at uniform grade of 7mm per 305mm (1/4" per 1'-0"), pipe size 100mm (4") and over, pipe shall run at uniform grade of 3mm per 305mm (1/8" per 1'-0").
- .5 During construction, all open ends of pipe and fittings shall be plugged or capped to keep out debris.
- .6 Run buried drain piping minimum 200mm (8") clear below underside of concrete slabs.
- .7 Ensure that copper pipe does not come in contact with concrete grouting, mortar, etc.
- .8 Install in accordance with National Plumbing Code of Canada.
- .9 A cleanout, easily accessible, shall be provided to each alternate change in direction in main soil or waste pipe and at the base of each stack. All cleanouts shall be of the same nominal size as the pipes up to 100mm (4") and not less than 100mm (4") for larger pipes. The distance between cleanouts in horizontal soil and waste lines shall not exceed 15m (50ft) in pipe 100mm (4") and smaller and 26m (85ft) in pipe 150mm (6") and larger.
- .10 Start laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.

### **3.2 TESTING**

- .1 Complete storm, sanitary and vent piping systems shall be tested with water to withstand a 3.05m (10 foot) head for 60 minutes without leakage. An air test of 103kPa (15 psi) for 120 minutes without leakage is acceptable in freezing conditions.
- .2 Give Departmental Representative 48 hours' prior notice for witnessing of tests.

### **3.3 COMMISSIONING**

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

END



**PART 1        GENERAL**

**1.1            GENERAL CONDITIONS**

- .1        Division 01 and Section 22 05 00 – Common Work Results for Plumbing, are both a part of this Section and shall apply as if repeated here.

**1.2            RELATED SECTIONS**

- .1        Division 01 – General Requirements.
- .2        01 33 00   Submittal Procedures
- .3        01 45 00 - Quality Control
- .4        01 77 00 - Closeout Procedures
- .5        01 78 00 - Closeout Submittals
- .6        01 74 21 - Construction/Demolition Waste Management and Disposal
- .7        22 05 00 - Common Work Results for Plumbing
- .8        22 10 10 - Plumbing Pumps
- .9        22 11 16 - Domestic Water Piping - Copper
- .10      22 13 17 - Drainage, Waste and Vent – Cast Iron and Copper
- .11      22 30 05 - Domestic Water Heaters
- .12      22 42 01 - Plumbing Specialties and Accessories
- .13      23 05 00 - Common Work Results for HVAC
- .14      23 05 05 - Installation of Pipework
- .15      23 05 19 - Thermometers and Pressure Gauges
- .16      23 05 29 – Pipe Hangers and Supports
- .17      23 05 53 - Mechanical Identification
- .18      23 05 93 - Testing, Adjusting and Balancing for HVAC
- .19      23 07 14 - Thermal Insulation for Equipment
- .20      23 07 15 - Thermal Insulation for Piping

- .21 23 08 02 - Cleaning and Startup of Mechanical Piping Systems

### **1.3 REFERENCE STANDARDS**

- .1 National Plumbing Code of Canada - 2015, including latest errata.
- .2 National Building Code of Canada - 2015, including latest errata.
- .3 National Fire Code of Canada - 2015, including latest errata.
- .4 Authorities Having Jurisdiction:
  - .1 Conform to the requirements of the Authority Having Jurisdiction.
- .5 ASTM D 2564 96a, Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems.
- .6 CSA B181.2 M1996, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
- .7 CSA B182.1 M1996, Plastic Drain and Sewer Pipe and Pipe Fittings.

### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.

### **1.6 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 29.06 - Health and Safety Requirements.

## **PART 2 PRODUCTS**

### **2.1 PLASTIC PIPING**

- .1 Below grade: Sanitary drainage and vent piping to CAN/CSA-B181.2-M for PVC DWV.

- .2 Below grade: Storm drainage to be PVC, Type SDR 35.
- .3 Above grade: Sanitary, vent and storm drainage piping to CAN/CSA-B181.2-M for PVC DWV.
- .4 Above grade: Sanitary, vent and storm drainage piping in ceiling plenums to CAN/ULC-S102.2.

## **2.2 JOINTS**

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

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Provide fire stopping at all piping penetrations of fire separations.
- .2 Install buried pipe on 150mm (6") bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 150mm (6") of clean washed sand.
- .3 Install piping parallel and close to walls and ceilings to conserve headroom and space, and to grade indicated.
- .4 Where inverts are not given and pipe size is 75mm (3") and under, pipe shall run at uniform grade of 7mm per 305mm (1/4" per 1'-0"), pipe size 100mm (4") and over, pipe shall run at uniform grade of 3mm per 305mm (1/8" per 1'-0").
- .5 During construction, all open ends of pipe and fittings shall be plugged or capped to keep out debris.
- .6 Run buried drain piping minimum 200mm (8") clear below underside of concrete slabs.
- .7 Install in accordance with National Plumbing Code of Canada – 2015 and local authority having jurisdiction.
- .8 A cleanout, easily accessible, shall be provided to each alternate change in direction in main soil or waste pipe and at the base of each stack. All cleanouts shall be of the same nominal size as the pipes up to 100mm (4") and not less than 100mm (4") for larger pipes. The distance between cleanouts in horizontal soil and waste lines shall not exceed 15m (50ft) in pipe 100mm (4") and smaller and 26m (85ft) in pipe 150mm (6") and larger.
- .9 Start laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.

- .10 Install gaskets in accordance with manufacturer's published instructions. During cold weather store gaskets in heated area to assure flexibility.
- .11 Align pipe carefully before joining. Do not use excessive force to join pipe sections.
- .12 Support pipes as required to assure concentricity until joint is properly completed.
- .13 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, re-install, and lubricate gaskets so disturbed.
- .14 Where deflection at joint is permitted, deflect only after joint is completed. Do not exceed maximum joint deflection recommended by the manufacturer.

### **3.2 TESTING**

- .1 Complete storm, sanitary and vent piping systems shall be tested with water to withstand a 3.048mm (10 foot) head for 60 minutes without leakage. An air test of 103kPa (15 psi) for 120 minutes without leakage is acceptable in freezing conditions.
- .2 Give the Departmental Representative 48 hours' prior notice for witnessing of tests.

END

## **PART 1        GENERAL**

### **1.1            GENERAL CONDITIONS**

- .1        Division 01 and Section 23 05 00 – Common Works Results - Mechanical are both part of this Section and shall apply as if repeated here.

### **1.2            RELATED SECTIONS**

- .1        Division 01 – General Requirements.
- .2        Section 01 33 00   Submittal Procedures.
- .3        Section 01 45 00 – Testing and Quality Control.
- .4        Section 01 77 00 - Closeout Procedures.
- .5        Section 01 78 00 - Closeout Submittals.
- .6        Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7        Section 22 05 00 – Common Work Results for Plumbing.
- .8        Section 22 10 10 - Plumbing Pumps.
- .9        Section 22 11 16 – Domestic Water Piping – Copper.
- .10      Section 22 13 17 – Drainage, Waste and Vent Piping – Cast Iron and Copper.
- .11      Section 22 13 18 – Drainage, Waste and Vent Piping – Plastic.
- .12      Section 22 42 01 – Plumbing Specialities and Accessories.
- .13      Section 23 05 00 – Common Work Results – Mechanical.
- .14      Section 23 05 15 – Common Installation Requirements for HVAC Pipework.
- .15      Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .16      Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .17      Section 23 05 53 – Mechanical Identification.
- .18      Section 23 04 93 - Testing, Adjusting and Balancing for HVAC.
- .19      Section 23 07 18 – Thermal Insulation for Equipment.
- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1        National Building Code of Canada - 2015, including latest errata.
- .2        National Plumbing Code of Canada - 2015, including latest errata.
- .3        National Fire Code of Canada - 2015, including latest errata.
- .4        Authorities Having Jurisdiction:
  - .1        Conform to the requirements of the Authority Having Jurisdiction.
- .5        CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

### **1.4            SHOP DRAWINGS AND PRODUCT DATA**

- .1        Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

## **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.

## **1.6 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.

## **PART 2 PRODUCTS**

### **2.1 ELECTRIC HOT WATER TANKS**

- .1 Water Heater(s) shall have:
  - .1 The CUL seal of certification and be factory equipped with an AGA/ASME rated temperature and pressure relief valve.
  - .2 Tanks shall have a baked enamel finish and be and be equipped with extruded high-density anode rod.
  - .3 Water heater(s) shall meet or exceed the standby loss requirements of latest ASHRAE Standards.
  - .4 Tanks shall have a working pressure of 1035 kPa (150 psi) and shall be completely assembled.
  - .5 Water heaters shall be approved-listed and constructed in accordance with CSA and CUL.
  - .6 Tank shall be insulated with foam insulation.
  - .7 Water heaters shall be provided with 19mm (3/4") inlet and outlet water connections.
  - .8 Water heaters shall be covered by a three (3) year limited warranty against tank leaks.
  - .9 All internal surfaces of the heater exposed to water shall be glass-lined with an alkaline borosilicate composition that has been fused-to-steel.
  - .10 Electric heating elements shall be medium watt density with zinc plated copper sheath.
  - .11 Each element shall be controlled by an individually mounted thermostat and high temperature cut-off switch.
- .2 Capacity:
  - .1 HWT12-1: 23 L (6 gal), 23 L/hour recovery @ 56°C temperature rise (23 L/hour recovery @ 100°F temperature rise), 208/1/60 c/w 1 - 1.5kW immersion element

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**PART 3      EXECUTION**

**3.1            INSTALLATION**

- .1      Tanks to be set level on concrete housekeeping pads. Housekeeping pads to be by this contractor and to be 100mm (4") high and a minimum of 75mm (3") larger all the way around than the equipment.
- .2      Install in accordance with manufacturers recommendations and as indicated.
- .3      Set water heater controls to maintain a water temperature of 60°C (140°F) for domestic use.

**3.2            COMMISSIONING**

- .1      Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

END

## **PART 1        GENERAL**

### **1.1            GENERAL CONDITIONS**

- .1        Division 01 and Section 23 05 00 – Common Works Results - Mechanical are both part of this Section and shall apply as if repeated here.

### **1.2            RELATED SECTIONS**

- .1        Division 01 – General Requirements.
- .2        Section 01 33 00 Submittal Procedures.
- .3        Section 01 45 00 – Testing and Quality Control.
- .4        Section 01 77 00 - Closeout Procedures.
- .5        Section 01 78 00 - Closeout Submittals.
- .6        Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7        Section 22 05 00 – Common Work Results for Plumbing.
- .8        Section 22 10 10 - Plumbing Pumps.
- .9        Section 22 11 16 – Domestic Water Piping – Copper.
- .10      Section 22 13 17 – Drainage, Waste and Vent Piping – Cast Iron and Copper.
- .11      Section 22 13 18 – Drainage, Waste and Vent Piping – Plastic.
- .12      Section 22 30 05 – Domestic Water Heaters.
- .13      Section 23 05 00 – Common Work Results – Mechanical.
- .14      Section 23 05 15 – Common Installation Requirements for HVAC Pipework.
- .15      Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .16      Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .17      Section 23 05 53 – Mechanical Identification.
- .18      Section 23 04 93 - Testing, Adjusting and Balancing for HVAC.
- .19      Section 23 07 18 – Thermal Insulation for Equipment.
- .20      Section 23 07 20 – Thermal Insulation for Piping.
- .21      Section 23 08 01 - Performance Verification Mechanical Piping Systems.
- .22      Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

### **1.3            REFERENCE STANDARDS**

- .1        National Plumbing Code of Canada - 2015, including latest errata.
- .2        National Building Code of Canada - 2015, including latest errata.
- .3        National Fire Code of Canada - 2015, including latest errata.
- .4        Authorities Having Jurisdiction:
  - .1        Conform to the requirements of the Authority Having Jurisdiction
- .5        CAN/CSA B64 Series-01- Backflow Preventers and Vacuum Breakers.
- .6        ASSE 1010-2004 -Water Hammer Arresters



#### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.

#### **1.6 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.

### **PART 2 PRODUCTS**

#### **2.1 BACKFLOW PREVENTERS**

- .1 To CAN/CSA-B64.
- .2 Reduced pressure principle type with shut-off valves and air gap fitting.

#### **2.2 CLEANOUTS**

- .1 Above ground unfinished areas and concealed finished areas: cast iron with brass screws and neoprene gasket.
- .2 Access covers:
  - .1 Wall access: face or wall type, polished nickel bronze square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
- .3 Floor access: Round cast iron body and frame with heavy duty adjustable secured nickel bronze top.

#### **2.3 FLOOR DRAINS**

- .1 All floor drains to have fusion bonded epoxy cast iron bodies and clamp collars, polished nickel bronze adjustable strainer head and grate w/trap primer connections unless noted otherwise:
- .2 FD1 (Heavy Duty Floor Drains):

- .1 Unfinished Spaces & Mechanical Rooms: Cast iron body, heavy-duty non-tilting, lacquered cast iron grate, integral seepage pan, sediment basket, clamping collar and trap seal primer connection where specified.

.3 FFD (Funnel Floor Drains):

- .1 Combination funnel floor drain, cast iron body, integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral oval funnel, sediment basket and trap primer connection.

**2.4 STRAINERS**

.1 50mm and under (2" and under):

- .1 861kPa (125 psig), Y type with 20 mesh, monel, bronze or stainless steel removable screen. Bronze body, screwed ends, with brass cap.

**2.5 TRAP PRIMERS**

.1 TP1:

- .1 Electronic trap priming assembly with enclosure. Trap primer to be complete with air gap, water hammer arrester, solenoid valve, manual override switch, electronic controller and brass/copper distribution unit where required. Assembly to be installed in a 1.6129mm (16 gauge) steel cabinet with access door. Electrical requirements are 115/1/60.

**2.6 VACUUM BREAKERS**

- .1 Atmospheric vacuum breaker: To CAN/CSA B64.

**2.7 VALVES**

.1 Gate Valves:

.1 Soldered/screwed:

- .1 Rising stem: to MSS SP 80, Class 125, 860 kPa (125 psi), bronze body, screw in bonnet, solid wedge disc.

.2 Flanged:

- .1 Rising Stem: to MS SP-70, Class 125, 860 kPa (125 psi), full faced, flanged ends, cast-iron body, bronze trim.

.2 Globe Valves:

.1 Soldered/screwed:

- .1 To MSS SP 80, Class 125, 860 kPa (125 psi), bronze body, renewable composition disc, screwed over bonnet.
- .2 Lockshield handles: as indicated.

.3 Swing Check Valves:

.1 Soldered/screwed:

- .1 To MSS SP-80, Class 125, 860 kPa (125 psi), bronze body, bronze swing disc, screw in cap, regrindable seat.

- .2 Flanged:
  - .1 To MSS SP-71, Class 125, 860 kPa (125 psi), cast iron body, full faced, flanged ends, regrind/removable seat, bronze disc, bolted cap.
- .4 Ball Valves:
  - .1 Soldered/screwed:  
Class 150, Bronze body, chrome plated brass, stainless steel, ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon, Buna N seat, steel lever handle.

## **2.8 WATER HAMMER ARRESTERS**

- .1 Stainless steel construction, bellows type ASSE 1010-2004.

## **2.9 WATER METERS**

- .1 To AWWA and NSF 61 standards and certifications.
- .2 Bronze body construction, remote reader, Compatible with EMCS connection, sized to handle flow rates indicated.
- .3 Provide strainer on inlet prior to meter.
- .4 Low flow accuracy min. 95%.

## **2.10 THERMOSTATIC MIXING VALVE**

- .1 Thermostatic Mixing Valve complete with:
  - .1 1.9 L/min (0.5gpm) minimum flow capacity
  - .2 1/2" (12mm) inlets, 1/2" (12mm) outlet
  - .3 1034 kPa (150 psi) maximum operating pressure
  - .4 Copper encased solid wax hydraulic principle thermostat
  - .5 Temperature adjustment range, 27-49°C (80-120°F)
  - .6 Stainless steel disc and springs
  - .7 Lead free cast copper silicon alloy
  - .8 ASSE 1017, ASSE 1069 and ASSE 1070 and CUPC listed
  - .9 5 psi (35 kPa) pressure drop at 3 gpm (12 L/min) flow rate

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

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

### **3.2 BACKFLOW PREVENTERS**

- .1 Install in accordance with CSA B64.10, where indicated and elsewhere as required by code for proper functioning of equipment and/or systems.
- .2 Pipe discharge to over nearest drain or service sink.

### **3.3 CLEANOUTS**

- .1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders and where indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum 100mm (4").

### **3.4 FLOOR DRAINS**

- .1 Ensure all floor drains are covered and protected during construction.
- .2 Verify operation of trap seal primer.
- .3 Check security, accessibility, removability of strainer.
- .4 Clean out baskets.

### **3.5 STRAINERS**

- .1 Install with sufficient room to remove basket.

### **3.6 TRAP SEAL PRIMERS**

- .1 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space and pipe to floor drain.

### **3.7 VACUUM BREAKERS**

- .1 Simulate reverse flow and back pressure conditions to test operation of vacuum breakers.

### **3.8 VALVES**

- .1 Isolate equipment, fixtures and branches with gate valves.

### **3.9 WATER HAMMER ARRESTERS**

- .1 Install on branch supplies to each fixture or group of fixtures and where indicated.

**3.10 WATER METERS**

- .1 Install water meters to codes.
- .2 Install water meter as indicated.
- .3 Contractor to provide all water meters.

**3.11 MIXING VALVES**

- .1 Mount valves securely above ceiling unless indicated otherwise.
- .2 Ensure valves are accessible.

**3.12 COMMISSIONING**

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.
- .2 After start up, test, adjust and prove operation as indicated, to suit site conditions such as:
  - .1 Clean out strainers periodically until clear.
  - .2 Clean out and prime all floor drain traps using trap seal primers or other means acceptable to the National Plumbing Code of Canada.
  - .3 Clean out roof drains.
  - .4 Prove freedom of movement of cleanouts.
  - .5 Confirm proper operation of backflow preventers, vacuum breakers and trap primers.

END

## **PART 1 GENERAL**

### **1.1 GENERAL CONDITIONS**

- .1 Division 01, 21, 23 and 25 as applicable; are part of this Section and shall apply as if repeated here.

### **1.2 RELATED SECTIONS**

- .1 Division 01 – General Requirements.
- .2 01 33 00 Submittal Procedures.
- .3 01 45 00 - Quality Control.
- .4 01 77 00 - Closeout Procedures.
- .5 01 78 00 - Closeout Submittals.
- .6 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 22 05 00 - Common Work Results for Plumbing.
- .8 22 10 10 - Plumbing Pumps.
- .9 22 11 16 - Domestic Water Piping - Copper.
- .10 22 13 17 - Drainage, Waste and Vent – Cast Iron and Copper.
- .11 22 13 18 - Drainage, Waste and Vent – Plastic.
- .12 22 30 05 – Domestic Water Heaters.
- .13 22 42 02 - Plumbing Specialties and Accessories.
- .14 23 05 00 - Common Work Results for HVAC.
- .15 23 05 05 - Installation of Pipework.
- .16 23 05 19 - Thermometers and Pressure Gauges – Piping System.
- .17 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .18 23 05 53 - Mechanical Identification.
- .19 23 05 93 - Testing, Adjusting and Balancing for HVAC Systems.
- .20 23 07 14 - Thermal Insulation for Equipment.
- .21 23 07 15 - Thermal Insulation for Piping.
- .22 23 08 01 - Performance Verification Mechanical Piping Systems.
- .23 23 08 02 - Cleaning and Startup of Mechanical Piping Systems.

### **1.3 REFERENCE STANDARDS**

- .1 National Plumbing Code of Canada - 2015, including latest errata.
- .2 National Building Code of Canada - 2015, including latest errata.
- .3 National Fire Code of Canada - 2015, including latest errata.
- .4 Authorities Having Jurisdiction:
  - .1 Conform to the requirements of the Authority Having Jurisdiction.
- .5 CAN/CSA B45 Series-02, CSA Standards on Plumbing Fixtures.
- .6 CAN/CSA B125-01, Plumbing Fittings

## **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 22 05 00 – Common Work Results for Plumbing.

## **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit close out documentation in accordance with in accordance with Section 01 77 00 – Closeout Procedures, 01 78 00 – Closeout Submittals and Section 22 05 00 – Common Work Results for Plumbing.

## **1.6 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.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- .1 Plumbing fixtures to be in accordance with CAN/CSA-B45 Series.
- .2 Plumbing fittings to be in accordance with CAN/CSA B125.
- .3 Architectural drawings to govern in determination of number and location of fixtures.
- .4 Exposed plumbing brass to be chrome plated.
- .5 Faucets shall have cold water opening clockwise and hot water counter clockwise.

### **2.2 JANITOR'S SINK**

- .1 JS1 - Janitor Sink
  - .1 Fixture: Free standing, single bowl scullery sink, 16 ga., 18-10, 304 stainless steel, exposed surfaces to have satin finish, center drain connection, 89mm basket strainer and waste, adjustable bullet feet, integral backsplash, front and back radius corners, rolled edges. Overall: 692mm wide x 702mm front to back; Bowl: 610mm wide x 610mm front to back x 356mm deep
    - .1 Novanni Commercial Model 7501-28
  - .2 Trim: Faucet to be polished chrome-plated, 200mm widespread, lead free c/w 136mm centerline swing gooseneck spout, quarter turn ceramic disc cartridges, 0.09L/s Vandal-Resistant Pressure Compensating Female Laminar Flow Outlet, 100mm wrist blade handles, mounting hardware and 13mm coupling nuts for standard lavatory risers.

- .1 Zurn Z831B4-XL-ICT-18F
- .3 Trap: Zurn 8700 Series
- .4 Supplies: Zurn ZH8824-XL-LRLK-Q-PC

### **PART 3 EXECUTION**

#### **3.1 FIXTURE INSTALLATION**

- .1 Connect fixtures complete with chrome plated supplies and escutcheons, drains, trapped, supported level and square. Fixtures on outside walls to have supplies from wall adjacent to fixture, other fixtures to be served from wall. Wall hung fixtures to be securely mounted.
- .2 Mounting heights for wall hung fixtures and showers measures from finished floor:
  - .1 Standard: to comply with manufacturer's roughing-in details unless otherwise indicated or specified by the Departmental Representative.
  - .2 Barrier Free: to comply with the National Building Code of Canada.
  - .3 Provide silicone sealant between all plumbing fixtures and finished walls/floors, colour to match fixture.

#### **3.2 COMMISSIONING**

- .1 Clean aerator screens and strainers.
- .2 Adjust flush valves as necessary for proper operation.

END