

Part 1 General**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 00 10 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing pumps, piping material and accessories.
- .3 Shop Drawings:
 - .1 Submit drawings stamped in accordance with Section 01 00 10 – General Instructions.
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Points of operation on performance curves.
 - .3 Manufacturer to certify current model production.
 - .4 Certification of compliance to applicable codes.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 00 10 – General Instructions.
- .2 Operation and Maintenance Data: submit operation and maintenance data for plumbing pumps.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Description of systems and their controls.
 - .2 Operation instruction for systems and component.
 - .3 Description of actions to be taken in event of equipment failure.
 - .3 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.
 - .4 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.

- .5 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.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .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.
 - .2 Transfer information 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.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 00 10 – General Instructions.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions Section 01 00 10 – General Instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of crates, padding, packaging materials, pallets, as specified in Section 01 00 10 – General Instructions.

Part 2 Products**2.1 NOT USED**

- .1 Not used.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

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 Trial usage to apply to following equipment and systems:
 - .1 Plumbing pumps.
- .3 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.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.

- .6 Departmental Representative will record these demonstrations on video tape for future reference.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 – General Instructions.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 00 10 – General Instructions.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 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 RELATED SECTIONS**

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

1.2 REFERENCE STANDARDS

- .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 00 10 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
- .3 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.
- .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 Manufacturers' Field Reports: manufacturers' field reports specified.
- .7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 00 10 – General Instructions, 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 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting prior to beginning on-site installations in accordance with Section 01 00 10 – General Instructions:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.

- .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal plastic, polystyrene, paper, corrugated cardboard packaging material in appropriate on-site bins provided by Contractor 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, plastic banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUBMERSIBLE WASTE WATER PUMPS

- .1 Pump: Effluent, nonautomatic operation, powder epoxy coated finish, 15mm spherical solids handling, Class B insulation, cast iron pump housing, cast iron motor housing, permanent split capacitor, duplex, electrical, submersible motor type, 1/3HP motor, 115Volts, 60 Hz, 3450 RPM, AISI 1215 cold rolled steel motor shaft, auto reset thermal overload, 54°C maximum operating temperature, stator temperature, non-clogging vortex impeller type, engineered thermoplastic impeller, single carbon and ceramic mechanical seal, sleeve upper bearing, lower ball bearing, oil filled cooling, engineered plastic base. UL listed power cord, 6m standard cord length, neoprene gasket, stainless steel hardware, cast iron cap. Variable level control systems.
- .2 Duplex control panel, NEMA 4X watertight enclosure with lockable latch, magnetic starter, 115Volts, single phase, circuit breaker for each pump, 7-15 amps, motor protection switch with overload protection, dry auxiliary contacts for remote alarm devices, hands-off-auto toggle switch for each pump, top-mounted red alarm beacon light, alarm horn at 83 to 85 decibel rating, horn silence and alarm test toggle switches, three 6.1m float switches with 3 variable level control operation, alternating mechanism.
- .3 Capacity: 1.26L/s at 69 kPa head.

Part 3 Execution**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .2 Ensure pump and motor assembly do not support piping.
- .3 Align vertical pit mounted pump assembly after mounting and securing cover plate.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Check power supply.
 - .2 Check starter protective devices.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.
- .4 Adjust flow from water-cooled bearings.
- .5 Adjust impeller shaft stuffing boxes, packing glands.

3.4 START-UP

- .1 General:
 - .1 In accordance with manufacturer's instructions and« procedures outlined below.
- .2 PV Procedures:
 - .1 Fill sump at rate slower than capacity of pump #1.
 - .2 Record levels at which pump #1 starts and stops. Determine flow rate by observing time taken to down water level.
 - .3 Fill sump at rate faster than capacity of pump #1 but slower than capacities of pumps #1 and #2 operating in parallel.
 - .4 Record levels at which pumps start and stop - water level rising and water level falling.
 - .5 Verify operation of alternator.
 - .6 Adjust water level controls as necessary.
 - .7 Fill sump at rate faster than capacities of pumps #1 and #2 operating in parallel.
 - .8 Record levels at pump starts and stops - water level rising and falling.
 - .9 Check operation of alternator.
 - .10 Adjust level controls as necessary.
 - .11 Check level at which high water level alarm starts and stops. Adjust as necessary.

- .3 Check removability of pumps for servicing without interfering with installation or operation of other equipment.

3.5 TRAINING

- .1 In accordance with Section 01 00 10 – General Instructions.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 22 05 00 – Common Work Results for Plumbing.
- .2 Section 23 05 05 – Installations of Pipework.

1.2 REFERENCE STANDARDS

- .1 ASTM International Inc.
 - .1 ASTM B32-08, Standard Specification for Solder Metal.
 - .2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .2 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-B125.3-05, Plumbing Fittings.
- .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.
- .4 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada 2015 (NPC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 – General Instructions.
- .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 00 10 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of crates, packaging materials, pallets, padding in accordance with Section 01 00 10 – General Instructions.

Part 2 Products**2.1 SUSTAINABLE MATERIAL**

- .1 Adhesives and Sealants:
 - .1 Maximum VOC limit 250 GSES GS-36.

2.2 COPPER TUBE AND FITTINGS

- .1 Above ground sump pump discharge Type DWV to: ASTM B306.
 - .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, to ASTM B32.

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 Provincial Plumbing Code, 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 Affix applicable label (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 00 10 – General Instructions.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 00 10 – General Instructions.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

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

1.2 REFERENCE STANDARDS

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.5-03, Pipe Flanges and Flanged Fittings.
 - .2 ASME B16.11-01, Forged Fittings, Socket-Welding and Threaded.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A53/A53M-04, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A181/A181M-01, Standard Specification for Carbon Steel Forgings for General Purpose Piping.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 00 10 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.
- .3 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.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting prior to beginning on-site installations in accordance with Section 01 00 10 – General Instructions.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal polystyrene, plastic, paper, corrugated cardboard packaging material in appropriate on-site bins for recycling provided by Contractor.
 - .4 Separate for recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan (WMP).
 - .5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal, regulations.
 - .6 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

Part 2 Products**2.1 PIPING**

- .1 Piping: to ASTM A53/A53M, schedule 80 seamless black steel.
- .2 Fittings:
 - .1 NPS2 and smaller: to ASME B16.11, schedule 80 steel, 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.
- .7 Joints:
 - .1 NPS2 and smaller: socket welded.

2.2 BALL VALVES

- .1 Three piece design or top entry for ease of in-line maintenance.
 - .1 To ASTM A181/A181M, Class 70, carbon steel body socket welded ends, carbon steel ball and associated trim suitable for compressed air application.
 - .2 To withstand 1034 kPa maximum pressure.

2.3 COUPLERS/CONNECTORS

- .1 Industrial interchange series, full-bore.
- .2 Maximum inlet pressure: 1700 kPa.

- .3 Valve seat: moulded nylon.
- .4 Body: zinc plated steel.
- .5 Threads: NPT.

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 COMPRESSED AIR PIPING CONNECTIONS AND INSTALLATION

- .1 Install shut-off valves at outlets, major branch lines and in locations as indicated.
- .2 Install quick-coupler chucks and pressure gauges on drop pipes.
- .3 Install unions to permit removal or replacement of equipment.
- .4 Install tees in lieu of elbows at changes in direction of piping. Install plug in open ends of tees.
- .5 Grade piping at 1% slope minimum.
- .6 Install compressed air trap and pressure equalizing pipe at moisture collecting points. Drain pipe to nearest floor drain.
- .7 Make branch connections from top of main.
- .8 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.
- .9 Weld steel piping:
 - .1 To ASME code and requirements of authority having jurisdiction.
 - .2 Weld concealed and inaccessible piping regardless of size.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Testing: pressure test in accordance with requirements of Section 22 05 00 - Common Work Results for Plumbing for 4 hours minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

3.4 CLEANING

- .1 Refer to Section 01 00 10 – General Instructions.
- .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 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION