

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 22 05 00 - Plumbing - General Requirements Concerning Work Results.
- .2 Section 22 11 16 - Domestic Water Pipes.

1.2 REFERENCES

- .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME).
 - .1 ANSI/ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, 250 and 800.
 - .2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.
 - .3 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
 - .4 ANSI/ASME B16.9, Factory-Made Wrought Steel Buttwelding Fittings.
 - .5 ANSI/ASME B18.2.1, Square and Hex Bolts and Screws.
 - .6 ANSI/ASME B18.2.2, Square and Hex Nuts.
- .2 American National Standards Institute/American Water Works Association (ANSI/AWWA).
 - .1 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- .3 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A47M, Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
 - .3 ASTM A536, Specification for Ductile Iron Castings.
 - .4 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .4 Canadian Standards Association (CSA)/CSA International.
 - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

- .2 Shop drawings:
 - .1 Shop drawings must include the following:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
 - .2 Wiring and schematic diagrams.
 - .3 Dimensions and recommended installation.
 - .4 Pump performance and efficiency curves.
 - .5 The exact location, on site, of the control equipment, pipework, valves, and any connections sent separately by the material's supplier.
 - .3 Technical sheets:
 - .1 Submit manufacturer's printed product literature, specifications, and datasheet for fixtures and equipment.
 - .4 Certificates:
 - .1 Submit certificates signed by the manufacturer certifying that the products and materials comply with specified performance characteristics and physical properties.
 - .5 Instructions:
 - .1 Submit manufacturer's installation instructions.
 - .6 Submit detailed wiring diagrams of the control systems, established by the manufacturer, indicating the cabling and material installed in factory for one-piece items or required for the control devices on auxiliary equipment, accessories, and regulators.
 - .7 Submit the pumps performance curves indicating the operating point for verification purposes.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit product data and maintenance sheets for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operating and Maintenance Sheets:
 - .1 Operation and maintenance sheets must include the following:
 - .1 Manufacturer's name, type, year of manufacture, capacity, flow rate, head, and serial number;
 - .2 Details of operation, servicing, and maintenance;
 - .3 Recommended spare parts list.

1.5 HEALTH AND SAFETY

- .1 Perform and/or adhere to all safety and security measures as outlined in 01 35 29.06 – Health and Safety.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - 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 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.

1.7 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

Part 2 Products

2.1 DOMESTIC HOT WATER CIRCULATING PUMP

- .1 Centrifuge type pump, direct drive and connected directly to pipes (in line).
- .2 Bronze volute, equipped with flanged or threaded connections on both sides of the pump.
- .3 Cast bronze impellor, dynamically balanced, and with a minimum of play.
- .4 Stainless steel shaft with stainless steel or bronze shaft sleeve, equipped with bronze bushings and integral backing ring. Oil lubricated extra-long shaft (supply spout required).
- .5 Carbon and ceramic mechanical seal appropriate for liquid reaching 105°C.
- .6 Spring mounted, auto-aligning, flexible coupling.
- .7 Drip-proof motor equipped with thermal protection against overloads.
- .8 High energy efficient motors, according to NEMA MG1-12.54.1 and CSA C390 (Energy Efficiency Levels for Three-phase Induction Motors) Standards. The motors must be manufactured according to CSA C22.2 and AMEEC M1-6 Standards and must have a service factor of 1.15. Overheat protection will be provided by thermistors "PTC" mounted in factory, one for each phase, installed in the motor's junction box.
- .9 Supports as recommended by the manufacturer.
- .10 Pump capable of operating at a gauge pressure of 860 kPa at a temperature of 105°C.
- .11 Acceptable Products:
 - .1 Bell & Gossett;
 - .2 Armstrong;

- .3 Grundfos;
- .4 Replacement materials or products: approved by addendum according to Instructions to bidders.
- .12 Characteristics:
 - .1 Make: Armstrong;
 - .2 Model: E7.2B;
 - .3 Flow rate: 0.63 L/s;
 - .4 Total differential pressure: 74.6 kPa;
 - .5 Motor: $\frac{1}{6}$ HP;
 - .6 Electricity: 115 V/1 ph/60 Hz.

2.2 **SUBMERSIBLE SUMP PUMP WITH PREFABRICATED BASIN (PS-1 AND PS-3)**

- .1 Simplex installation, CSA approved, housing epoxy coated cast iron, stainless steel shaft, polymer vortex type impeller, and mechanical shaft seal.
- .2 Connected to power outlet located outside the sump.
- .3 Controls: Integrated level regulator with PVC float.
- .4 Fiber-glass, pre-fabricated basin 610 mm dia. x 1 220 mm with a NPS 3 connection at -800 mm from the slab (PS-1), NPS 4 connection at -800 mm from the slab (PS-3) and a NPS 2 connection at -300 mm from the slab (vent), Fiber-glass cover with anti-float collar.
- .5 PVC, Schedule 80 supply pipe, NPS 1- $\frac{1}{2}$ with factory pre-assembled glued joints, check valve and stop valve.
- .6 Audible and visual alarm (103 db) with 9 V battery emergency power supply, CEMA 1 box, power supply cord with 115 V outlet, level detector fitted to the NPS 1- $\frac{1}{2}$ discharge pipe, and auxiliary contact.
- .7 Characteristics:
 - .1 Flow rate: 1.262 L/s.
 - .2 Discharge pressure: 89 kPa.
 - .3 Supply pipe: NPS 1 $\frac{1}{2}$.
 - .4 Motor: $\frac{1}{2}$ HP, hermetically sealed, and protected against overload.
 - .5 Electrical: 120 V/1 phase/60 Hz, 3,450 tpm
 - .6 Acceptable Products:
 - .1 Pump: LibertyPumps, model 283.
 - .2 Basin: 2448 Series.
 - .3 Check valve: QCV-150.
 - .4 Stop valve: BCV-150.
 - .5 Alarm: ALM-P1.

- .6 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.3 SUBMERSIBLE SUMP PUMP (PS-2 AND PS-8)

- .1 Simplex installation, CSA approved, housing epoxy coated cast iron, stainless steel shaft, polymer vortex type impeller, and mechanical shaft seal.
- .2 Connected to power outlet located outside the sump.
- .3 Controls: integrated level regulator with PVC float.
- .4 Check valve and stop valve.
- .5 Audible and visual alarm (103 db) with 9 V battery emergency power supply, CEMA 1 box, power supply cord with 115 V outlet, level detector fitted to the NPS 1½ discharge pipe, and auxiliary contact.
- .6 Characteristics:
 - .1 Flow rate: 1.262 L/s.
 - .2 Discharge pressure: 89 kPa.
 - .3 Supply pipe: NPS 1½.
 - .4 Motor: ½ HP, hermetically sealed, and protected against overload.
 - .5 Electrical: 120 V/1 phase/60 Hz, 3,450 tpm.
 - .6 Acceptable Products:
 - .1 Pump: LibertyPumps, model 283.
 - .2 Basin: 2448 Series.
 - .3 Check valve: QCV-150.
 - .4 Stop valve: BCV-150.
 - .5 Alarm: ALM-P1.
 - .6 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.4 SUBMERSIBLE SUMP PUMP WITH PREFABRICATED BASIN (PS-4 AND PS-7)

- .1 Simplex installation, CSA approved, housing epoxy coated cast iron, stainless steel shaft, polymer vortex type impeller, and mechanical shaft seal.
- .2 Connected to power outlet located outside the sump (7.6 m long power cord).
- .3 Controls: Integrated level regulator with PVC float.
- .4 Fiber-glass, pre-fabricated basin 610 mm dia. x 2 133 mm with a NPS 3 connection at -1 650 mm from the slab (PS-4), NPS 4 connection at -1700 mm from the slab (PS-7) and a NPS 2 connection at -300 mm from the slab (vent), Fiber-glass cover with anti-float collar.
- .5 PVC, Schedule 80 supply pipe, NPS 2 with factory pre-assembled glued joints, check valve, and stop valve.

- .6 System of guides and rails for use in lifting the pump, base in grey cast iron with baked on paint, guide, and accessories in stainless steel.
- .7 Stainless steel lifting chain.
- .8 Audible and visual alarm (82 db), CEMA 3R box, direct 115 V power connection, PVC alarm float with 6.1 m supply cord and auxiliary contact.
- .9 Characteristics:
 - .1 Flow rate: 0.63 L/s.
 - .2 Discharge pressure: 60 kPa.
 - .3 Supply pipe: NPS 2.
 - .4 Motor: $\frac{4}{10}$ HP, hermetically sealed, and protected against overload.
 - .5 Electrical: 120 V/1 phase/60 Hz, 1,725 tpm.
 - .6 Acceptable Products:
 - .1 Pump: LibertyPumps, model LE-41A-2.
 - .2 Basin: 2484 Series.
 - .3 Check valve: QCV-200.
 - .4 Stop valve: BCV-200.
 - .5 Alarm: ALM-2W.
 - .6 Guide and rails: GR-22S.
 - .7 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.5 SUBMERSIBLE SUMP PUMP WITH PREFABRICATED BASIN (PS-5)

- .1 Simplex installation, CSA approved, housing epoxy coated cast iron, stainless steel shaft, polymer vortex type impeller, and mechanical shaft seal.
- .2 Connected to power outlet located outside the sump.
- .3 Controls: integrated level regulator with PVC float.
- .4 Fiber-glass, pre-fabricated basin 610 mm dia. x 1 524 mm with a NPS 4 connection at -900 mm from the slab and a NPS 2 connection at -300 mm from the slab (vent), Fiber-glass cover with anti-float collar.
- .5 PVC, Schedule 80 supply pipe, NPS 2 with factory pre-assembled glued joints, check valve, and stop valve.
- .6 System of guides and rails for use in lifting the pump, base in grey cast iron with baked on paint, guide, and accessories in stainless steel.
- .7 Stainless steel lifting chain.
- .8 Audible and visual alarm (82 db), CEMA 3R box, direct 115V power connection, PVC alarm float with 6.1 m supply cord, and auxiliary contact
- .9 Characteristics:
 - .1 Flow rate: 1.262 L/s.

- .2 Discharge pressure: 69 kPa.
- .3 Supply pipe: NPS 2.
- .4 Motor: ½ HP, hermetically sealed, and protected against overload.
- .5 Electrical: 120 V/1 phase/60 Hz, 1,725 tpm.
- .6 Acceptable Products:
 - .1 Pump: LibertyPumps, model LE-51A.
 - .2 Basin: 2460 Series.
 - .3 Check valve: QCV-200.
 - .4 Stop valve: BCV-200.
 - .5 Alarm: ALM-2W.
 - .6 Guide and rails: GR-22S.
 - .7 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.6 SUBMERSIBLE SUMP PUMP WITH PREFABRICATED BASIN (PS-6)

- .1 Duplex installation, CSA approved, non-clog pumps, heavy-duty housing in epoxy coated cast iron, stainless steel shaft, stainless steel impeller, and mechanical shaft seal.
- .2 The elements must form a compact unit, including a cover, controls, a control panel and all required accessories. Cabling between the control panel and the components is the responsibility of the pump installer.
- .3 Connections with a CEMA 4X junction box installed on the basin.
- .4 The control panel is a CEMA I box, including:
 - .1 A master breaker with fuses;
 - .2 One magnetic starter per pump with overheat protection;
 - .3 A "Manual-Auto-Stop" selector per pump;
 - .4 A control transformer and power on and pump run indicator lights;
 - .5 An audible and visual high level alarm;
 - .6 Pump alternator using electric relays to permit simultaneous or alternating pump operation;
 - .7 Auxilliary alarm contact.
- .5 Pump operation is controlled by three mechanical floats with N.O. contacts connected to the control panel. The float cables are to be 6 m in length. A fourth float is used to detect high water level in the pit and trigger an alarm.
- .6 Fiber-glass, pre-fabricated basin 915 mm dia. x 2 440 mm with a NPS 6 connection at -1200 mm from the slab and a NPS 2 connection at -300 mm from the slab (vent), black steel cover with neoprene trim, aluminum swinging door with aluminum flat turning handle which does not overhang the cover, retaining arm for holding open the cover with a red vinyl covering on the release handle. Stainless steel hinges with stainless steel tamper-proof screws, sealed, and with an anti-float collar.

- .7 PVC, Schedule 80 supply pipe, NPS 2 with factory pre-assembled glued joints, check valve, and stop valve.
- .8 System of guides and rails for use in lifting the pump, base in grey cast iron with baked on paint, guide, and accessories in stainless steel.
- .9 Stainless steel lifting chain.
- .10 Characteristics:
 - .1 Flow rate:
 - .1 Simplex: 2.40 L/s at 120 kPa.
 - .2 Duplex: 3.15 L/s at 120 kPa.
 - .2 Supply pipe: NPS 2.
 - .3 Motor: 2 HP, hermetically sealed, and protected against overload.
 - .4 Electrical: 575 V/3 ph/60 Hz, 3,450 tpm.
 - .5 Acceptable Products:
 - .1 Pump: LibertyPumps, model LSGX-205M.
 - .2 Basin: 3696 Series.
 - .3 Check valve: QCV-200 (2x).
 - .4 Stop valve: BCV-200 (2x).
 - .5 Alarm: AE54 = 4-161.
 - .6 Guide and rails: GR-20 (2x).
 - .7 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.7 SUBMERSIBLE SUMP PUMP FOR STORM DRAINAGE (PP-1 AND PP-2)

- .1 Duplex installation, CSA approved, housing epoxy coated cast iron, stainless steel shaft, polymer vortex type impeller, and mechanical shaft seal.
- .2 Connections with a CEMA 4X junction box installed on the basin.
- .3 The control panel is a CEMA I box, including:
 - .1 A master breaker with fuses;
 - .2 One magnetic starter per pump with overheat protection;
 - .3 A "Manual-Auto-Stop" selector per pump;
 - .4 A control transformer and power on and pump run indicator lights;
 - .5 An audible and visual high level alarm;
 - .6 Pump alternator using electric relays to permit simultaneous or alternating pump operation;
 - .7 Auxilliary alarm contact.
- .4 Pump operation is controlled by three mechanical floats with N.O. contacts connected to the control panel. The float cables are to be 6 m in length. A fourth float is used to detect high water level in the pit and trigger an alarm.

- .5 Cabling between the control panel and the components is the responsibility of the pump installer.
- .6 Characteristics:
 - .1 Flow rate:
 - .1 Each: 2.52 L/s at 75 kPa.
 - .2 Supply pipe: NPS 2.
 - .3 Motor: 3/4 HP, hermetically sealed, and protected against overload.
 - .4 Electrical: 208 V/3 ph/60 Hz, 1,725 tpm.
 - .5 Acceptable Products:
 - .1 Pump: LibertyPumps, model LE73M2-2.
 - .2 Check valve: QCV-200 (2x).
 - .3 Stop valve: BCV-200 (2x).
 - .4 Alarm: AE34 = 4-191.
 - .5 Replacement materials or products: approved by addendum according to Instructions to bidders.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .2 Ensure pump and motor assembly do not support piping.
- .3 Align vertical pit mounted pump assembly after mounting and securing cover plate.
- .4 Place 150 mm of sand under sump pit tank.
- .5 Make sure the pump turns in the right direction.
- .6 Install and adjust control components.

3.3 FIELD QUALITY CONTROL

- .1 Check power supply.
- .2 Check starter protective devices.
- .3 Start-up, check for proper and safe operation.
- .4 Check settings and operation of "manual-off-auto" selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature, and other protective devices.

- .5 Adjust flow from water-cooled bearings.
- .6 Adjust impeller shaft stuffing boxes, packing glands.

3.4 START-UP

- .1 Procedure:
 - .1 Check power supply.
 - .2 Check starter O/L heater sizes.
 - .3 Start pumps, check impeller rotation.
 - .4 Check for safe and proper operation.
 - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
 - .6 Test operation of “Manual – Off – Auto” switch.
 - .7 Test operation of alternator.
 - .8 Adjust leakage through water-cooled bearings.
 - .9 Adjust shaft stuffing boxes.
 - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
 - .11 Check base for free-floating, no obstructions under base.
 - .12 Run-in pumps for 12 continuous hours.
 - .13 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - .14 Adjust alignment of piping and conduit to ensure full flexibility at all times.
 - .15 Eliminate causes of cavitation, flashing, and air entrainment.
 - .16 Measure pressure drop across strainer when clean and with flow rates as finally set.
 - .17 Replace seals if pump used to degrease system or if pump used for temporary heat.
 - .18 Verify lubricating oil levels.

3.5 PERFORMANCE VERIFICATION – SANITARY PUMPS

- .1 Application Tolerances:
 - .1 Flow: Plus 10%, minus 0%.
 - .2 Pressure: Plus 10%, minus 5%.
- .2 Procedure:
 - .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 draw 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.
- .4 Verify non-clog capability and maximum size of solids, using procedures recommended by manufacturer.

3.6 REPORTS

- .1 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 marked thereon.

END OF SECTION