

Part 1 General

1.1 SCOPE

- .1 The manufacturer shall furnish air powered well pumps for use in a landfill leachate collection system to remove accumulated leachate from manholes.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for pumps and include:
 - .1 Physical dimensions, weight, materials of construction, general specifications and accessories.
 - .2 Performance curves indicating rated flow range and air consumption.
 - .3 Connections, piping, and fittings, strainers, control assemblies and ancillaries, identifying factory and field assembled components and recommended installation.
 - .4 Installation and operation manuals.
 - .5 Warranty coverage.

1.3 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for pumps.
 - .1 Include:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details on operation, servicing and maintenance.
 - .3 Recommended spare parts list and addresses of representatives.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

Part 2 Products

2.1 MANHOLE MH02 (P-3) AND MH03 (P-2) LEACHATE PUMPS

- .1 Operating Conditions:
 - .1 Air Supply Pressure: 552 kPa (80 psig)
 - .2 Capacity:
 - .1 P-2: 341 L/min (90 usgpm)
 - .2 P-3: 189 L/min (50 usgpm)
 - .3 Manholes:
 - .1 Pump shall be capable of meeting the capacity requirements based on pumping elevations at each manhole. Refer to drawings.
- .2 Operation:

- .1 The control panel monitors the liquid level in the sump and controls the flow of air in and out of the pump chamber via the level control line.
 - .2 The level control line is an open ended air line connected to the panel. The panel will cycle the pump anytime there is 2 in. of liquid over the end of the level control line. Where the end of that control line is placed determines the operating level in the sump.
 - .3 When the level control line is submerged in 2 in. of water, the control panel will begin a fill stroke followed by a discharge stroke. This makes for one complete pumping cycle. After one complete cycle, the panel checks for the presence of liquid and cycles again if required.
- .3 Pump Construction:
- .1 Body: 316 stainless steel
 - .2 Check valves: 316 Stainless steel
 - .3 Seats: Kynar
- .4 Control Panel:
- .1 All pneumatic control panel, gravity fed.
 - .2 Controls shall include, but may not be limited to, the following:
 - .1 Control box, exhaust valve, piloted discharge pressure regulator, main airline connection, level control line connection, pilot air supply filter and control pressure regulator, control logic, discharge pressure regulator, piloting quick exhaust valve, airline and isolation valve to pump.
 - .3 All control components shall be installed in an epoxy coated weatherproof enclosure suitable for outdoor installation and include a hinged and lockable access door.
- .5 Accessories:
- .1 Main air line and level control line nitrile tubing. Length as required to suit manhole depth and control panel location.
 - .2 Stainless steel lifting cable fastened to pump to permit pump installation and removal from manhole. Provide swaged ball end and wire rope keeper at top of manhole. Length to suit manhole depth and additional length for connection to lift equipment outside manhole.
- .6 Acceptable Products:
- .1 P-2: Chicago Industrial Pump Pitbull Model S4X4S/AP300G6 or approved equivalent in accordance with B7
 - .2 P-3: Chicago Industrial Pump Pitbull Model or approved equivalent in accordance with B7

2.2 CELL 31 LEACHATE SUMP PUMP (P-4)

- .1 Operating Conditions:
 - .1 Air Supply Pressure: 552 kPa (80 psig)
 - .2 Capacity: 38 L/min (10 usgpm)
 - .3 Sump:
 - .1 Pump shall be capable of meeting the capacity requirements based on pumping elevations. Refer to drawings.
- .2 Process Description:

- .1 A pneumatic displacement pump alternately fills and discharges. During the fill cycle, the pump chamber is vented to atmosphere and liquid fills the pump through the inlet check valve under hydrostatic pressure. During the discharge cycle, air pressure is applied to the pump chamber, which closes the inlet check valve and displaces the liquid within the pump through the discharge check valve and discharge tubing.
- .2 In an automatic controllerless pneumatic displacement pump, cycling between the fill and discharge cycles is controlled by an internal float that rises and falls with the liquid level inside the pump. At the top of the float travel, the internal air valve mechanism is actuated to apply air pressure. When the liquid is fully discharged from the pump chamber, the float reaches the bottom of its travel, which closes the air supply to the pump and opens the air exhaust line, venting the pressurized air and allowing the pump to fill again. The pump only cycles when there is sufficient liquid in the well to raise the float above the pump actuation point.
- .3 The maximum drawdown level in the well is determined by the pump position and its actuation point. The maximum flow rate of the pump is determined by the pump depth, submergence (liquid head above pump inlet), and the air pressure and volume supplied to the pump.
- .4 Pump design and performance shall meet the following requirements and must be able to operate under the following conditions:
 - .1 Temperature up to 180° F (82° C)
 - .2 Air pressures up to 120 psi (8.4 kg/cm²)
 - .3 Free floating or dissolved common fuels (diesel, gasoline, JP1-JP6, #2 heating oils)
 - .4 pH range 4 - 9
 - .5 BTEX (Benzene, Toluene, Ethyl Benzene, Xylene) and MTBE
 - .6 Landfill liquids – leachate and condensate
- .3 Equipment Design Requirements:
 - .1 Standard product design shall include complete pump assembly, including casing, end caps, tubing/hose fittings, O-rings, check valves, inlet, and float/actuator assembly, to meet the following specifications:
 - .1 The pump and all related components at the well shall operate on compressed air. No electricity shall be required at the well head.
 - .2 Pumps shall have integral on/off level control; no bubbler tubes or in-well sensors shall be required to provide on/off level control.
 - .3 Pump system shall be controllerless, requiring no surface-mounted controllers, in-line control devices, or factory-set control cycle timers within or external to the pump.
 - .4 Pumps shall be available in both top and bottom filling versions. Manufacturer shall stock Inlet Conversion Kits that allow field conversions from top to bottom fill or vice versa.
 - .5 Pumps shall be designed and constructed to allow disassembly of all major pump components in as little as two minutes using only a nut driver or socket wrench to remove the pump inlet bolts, allowing for quick, easy field cleaning and maintenance. The internal float mechanism shall be removable using only standard pliers to release the lower actuator rod stop.
 - .6 Pumps shall be designed and constructed to fit in standard 4" diameter well casing, with a minimum required submergence of 678 mm 26.7".

- .7 Pumps shall not require an additional downwell air line to evacuate liquid from the pump to the surface (to reduce the pump's weight for removal from the well).
- .2 Pump casing shall be Fiberglass Reinforced Plastic to eliminate denting and corrosion, and to withstand temperatures to 180° F (82° C).
 - .1 Pump casing shall not be unfinished standard pipe stock. Casing ends shall be machined to assure precise fit of end cap O-rings for proper seal and easy disassembly and reassembly without O-ring damage. The entire ID of the pump casing shall be precision worked for a smoother surface to reduce accumulation of mineral scale.
 - .2 For ease of pump disassembly, the intake and head o-rings shall be located no farther than 0.187" from the ends of the pump casing.
 - .3 The fluid inlet check valve shall be a poppet type (or ball type for top-loading pumps) and the discharge check valve shall be a rotating ball. Valves shall exhibit a self-cleaning action and be able to pass coarse solids and viscous liquids without clogging. The inlet and discharge check balls shall be located in a housing that allows passage of solids up to 1/8" diameter. The fluid discharge shall have a ball-type check valve that is affixed above the casing of the pump and is serviceable using hand tools. No flapping or sliding valves subject to clogging or improper seating are allowed.
 - .4 Pump head and frame shall be constructed of 304 Stainless Steel.
 - .5 Pumps shall have a 3" intake screen constructed of 316 stainless steel with holes rather than slots for fluid to pass.
 - .6 The fluid intake check valve seat shall be constructed of 304 stainless steel.
 - .7 The discharge tube shall be a minimum of 1" 304 stainless steel to maximize flow rate and reduce clogging/fouling.
 - .8 All non-metallic internal components of the pump shall be constructed of PVDF for maximum strength at elevated temperatures, and chemical resistance.
 - .9 Air and liquid fittings shall be available in sizes to accommodate either tubing or hose.
 - .10 Internal floats shall have proven performance and compatibility with landfill leachate and condensate at elevated temperatures.
 - .11 Pumps shall be designed such that the pump casing can be removed by removing four bolts.
 - .12 Stainless steel castings shall be incorporated into the pump intake assembly to reduce the number of components needed.
 - .13 Air intake and exhaust seats shall not be machined into the pump head. The seats shall be separate components so that they can be replaced without necessitating replacement of the entire pump head.
 - .14 Pump weight shall be less than 17 lbs (7.71kg) to facilitate removal from wells.
- .3 The following accessories shall be provided with the pump:
 - .1 Pumps shall be equipped with air and liquid tubing as follows:
 - .1 Tubing shall be constructed of a material that is suitable for landfill leachate (refer to attached typical leachate properties) and is rated for temperatures to 180° F (82°C).

- .2 Multiple-tube assemblies shall be jacketed in a continuous Nylon 12 sheath to prevent hang-ups, loops, and kinks during installation or removal. Loose or cable-tied tubing is not allowed.
 - .2 Cycle counters shall be available to allow monitoring of pump operation, and fluid flow.
 - .3 Filter/regulator kit comprised of a 5-micron final air filter with autodrain to remove moisture and a pressure regulator to allow air pressure adjustment.
 - .4 Leachate-compatible quick-release pump fittings made of 316 stainless steel with Hastelloy C retaining clips and dual O-ring seals to allow quick disconnection and reconnection of tubing/hose without the need to shorten pump tubing/hose length or remove and replace tubing clamps when removing pump from service.
- .4 Operation and Performance Parameters:
- .1 Pumps shall be capable of the following benchmark flow rates:
 - .1 Pumps shall deliver flow up to 14 usgpm at a depth of 20 feet with 10 feet of submergence, when equipped with 1" discharge fittings and tubing, and operating at 100 psi.
 - .2 Pumps shall have a maximum lift of at least 250 feet.
 - .3 Pumps shall function properly over an operating pressure range of 5 to 120 psi.
 - .4 Pumps shall automatically conserve air and minimize air consumption costs by operating only when the liquid level in the well is high enough for pumping to occur based on the pump location in the well and the pump's specified actuation point.
 - .5 Pump design shall prevent air from entering discharge tubing or hose under normal operating conditions.
 - .6 Pumps shall be capable of operation in wells under pressure or vacuum without requiring any pump modifications.
- .5 Acceptable Product:
- .1 QED Environmental Systems Inc. AutoPump Model AP4+ Long Bottom Inlet or approved equivalent in accordance with B7

Part 3 Execution

3.1 INSTALLATION

- .1 Install pumps in accordance with manufacturer's written instructions.

3.2 PIPING

- .1 Pipe system as indicated on the drawings.

3.3 INSPECTION, TESTING AND COMMISSIONING

- .1 Inspect, test and commission new equipment in accordance with manufacturer's recommendations including demonstration and training of operation and maintenance of the equipment with The City.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Electric Code (CEC)
- .2 Canadian Standards Association (CSA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for pumps and include:
 - .1 Physical dimensions, weight, materials of construction, general specifications and accessories.
 - .2 Performance curves indicating rated flow range and head.
 - .3 Connections, piping, and fittings, strainers, control assemblies and ancillaries, identifying factory and field assembled components and recommended installation.
 - .4 Wiring as assembled and schematically.
 - .5 Installation and operation manuals.
 - .6 Warranty coverage.

1.3 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for pumps.
 - .1 Include:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details on operation, servicing and maintenance.
 - .3 Recommended spare parts list and addresses of representatives.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

Part 2 Products

2.1 LEACHATE LOADOUT PUMP (P-1)

- .1 Operating Conditions:
 - .1 Capacity: 1500 L/min @ 3.05 m TDH (400 usgpm @ 10 ft TDH)
 - .2 Motor: 5 hp
 - .3 Power: 240 V / 1 ph / 60 Hz
 - .4 Speed: 3450 rpm
- .2 Pump: Submersible 6" vertical stainless steel
- .3 Materials:
 - .1 Major components made of 304 stainless steel

- .2 Built –in check valve with non-metallic seat
- .3 E-Glide™ bearings and seals.
- .4 Stainless steel shaft rotating on E-Glide™ bearings that are fluid lubricated.
- .5 The diffuser chambers for each impeller shall be 304 stainless steel and fitted with E-Glide™ impeller seal rings.
- .6 The motor shall be a Franklin submersible, stainless steel, hermetically sealed and capable of sustaining up to 100 starts per day.
- .7 The motor shall be connected to the pump by a motor adaptor and coupling of 304 stainless steel.
- .8 The motor lead shall be 50 ft of non -splice with waterproof and chemically resistant jacket over 600-Volt insulation.
- .4 Accessories:
 - .1 Provide 50 ft of stainless steel suspension cable of sufficient strength with stainless steel connections.
 - .2 Provide pump guide rail assembly as shown on the drawings including:
 - .1 3” stainless steel guide rail disconnect.
 - .2 Top bracket, foot mount and intermediate wall support brackets.
 - .3 Two (2) 1-1/4” diameter stainless steel guide rails.
 - .3 Air vent check valve and 50 ft of tubing.
- .5 Acceptable Product: EPG Model VSD 61-1 SurePump

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with the drawings and manufacturer’s written instructions.

3.2 PIPING

- .1 Pipe system as indicated on the drawings.

3.3 INSPECTION, TESTING AND COMMISSIONING

- .1 Inspect, test and commission new equipment in accordance with manufacturer’s recommendations including demonstration and training of operation and maintenance of the equipment with The City.

END OF SECTION