

HAZARDOUS LOCATION SUBMERSIBLE SEWAGE GRINDER PUMPS

GENERAL

Contractor shall furnish all labor, materials, equipment and incidentals required to provide _____ (qty.) submersible centrifugal hazardous location sewage grinder pump(s) for NEC class 1, division 1, groups C, D Hazardous locations, as specified herein.

OPERATION CONDITIONS

Each pump shall be rated _____ hp, _____ volts, _____ phase, _____ hertz, and _____ rpm. The unit shall produce _____ U.S. GPM at _____ feet TDH.

CONSTRUCTION

Each pump shall be of the sealed submersible type, model _____ as manufactured by Pentair Hydromatic. The pump volute, motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30. All external mating parts shall be machined and Nitrile O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

ELECTRICAL POWER CORD

Electrical power cord shall be SOOW or W, water resistant 600V, 90°C, UL and/or CSA approved and applied dependent on amp draw for size.

The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be fitted with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

The power cord leads shall then be connected to the motor leads with extra heavy connectors having brass inserts with a screwed wire-to-wire connection.

MOTOR

The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation (155°C or 311°F) and a dielectric oil-filled motor, NEMA B design (three-phase), NEMA L design (single-phase).

The pump and motor shall be specifically designed so that they may be operated partially dry or completely submerged in the liquid being pumped.

Stators shall be securely held in place with a removable end ring and threaded fasteners. No special tools shall be required for pump and motor disassembly.

Pump shall be equipped with heat sensors. The heat sensor(s) (one on single-phase, two on three-phase) shall be a low resistance, bimetal disc that is temperature sensitive. It (they) shall be mounted directly in the stator and sized to open at 120°C or 130°C and automatically reset at 30–35°C differential. The sensor shall be connected in series with the motor starter coil so that the starter is tripped if a heat sensor opens. The motor starter shall be equipped with overload heaters so all normal overloads are protected by an external heater block.

BEARINGS AND SHAFT

An upper radial bearing and a lower thrust bearing shall be required. These shall be permanently lubricated by the dielectric oil that fills the motor housing.

The shaft shall be machined from a solid 416 stainless steel and be a design that is of large diameter with minimum overhang to reduce shaft deflection and prolong bearing life.

SEALS AND SENSORS

The rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil-filled seal housing incorporating two type 21 carbon ceramic mechanical seals mounted in tandem. This seal housing shall be equipped with two moisture sensing probes installed between the seals, and the sensing of moisture in the seal chamber shall be automatic, continuous, and not require the pump be stopped or removed from the wet well.

IMPELLERS

Impeller shall be brass multi-vane, semi-open, non-overloading design. They can either be factory or field trimmed to meet specific performance conditions. Impellers shall be dynamically balanced at the factory and machined for threading on to the pump shaft.

GRINDER CUTTERS

The combination centrifugal pump impeller and grinder unit shall be attached to the common motor and pump shaft made of 416 stainless steel. The grinder unit shall be on the suction side of the pump impeller and discharge directly into the impeller inlet, leaving no exposed shaft to permit packing of ground solids. The grinder shall consist of two stages. The cutting action of the second stage shall be perpendicular to the plane of the first cut for better control of the particle size. The grinder shall be capable of grinding normal domestic sewage. Both stationary and rotating cutters shall be made of 440C stainless steel hardened to Rockwell 60C and ground to close tolerance.

The upper (axial) cutter and stationary cutter ring shall be reversible to provide new cutting edges to double life. The stationary cutter ring shall be a slip fit into the suction opening of the volute and held in place by three (3) 300 series stainless steel screws and a retaining ring. The lower (radial) cutter shall macerate the solids against the I.D. of the cutter ring and extrude them through the slots of the cutter ring. The upper (axial) cutter shall cut off the extrusions, as they emerge from the slots of the cutter ring to eliminate any roping effect that may occur in single stage cutting action. The upper (axial) cutter shall fit over the hub of the impeller and the lower (radial) cutter shall be slip fit and secured by means of peg and hole and rotate simultaneously with the rotation of the shaft and impeller. The grinding mechanism shall be locked to the shaft by a 300 series stainless steel countersunk washer in conjunction with a 300 series stainless steel flat head cap screw threaded into the end of the shaft.

TESTING

Commercial testing shall be required and include the following:

The pump shall be visually inspected to confirm that it is built in accordance with the specifications as to hp, voltage, phase and hertz.

The motor and seal housing chambers shall be hi-potted to test for moisture content and/or insulation defects.

Pump shall be allowed to run dry to check for proper rotation.

Discharge piping shall be attached, the pump submerged in water, and amp readings shall be taken in each leg to check for an unbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator will be replaced.

PAINT

The pump shall be painted with waterborne hybrid acrylic/alkyd paint. This custom engineered, quick dry paint shall provide superior levels of corrosion and chemical protection.