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SITHE *Submersible Chopper Pumps*

SCOPE: Furnish and install_____ submersible chopper pump(s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; and _____ U.S. GPM at _____TDH, with a shut off head of _____TDH (minimum) and _____% minimum efficiency at _____U.S.GPM at _____TDH (operating point). The pump motor shall be _____RPM, _____HP (maximum), _____Phase, 60 Hertz, _____Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of submersible units for a minimum of five (5) years. The pump (s) shall be SITHE by Barnes® Pumps model 4SCM_____.

PUMP DESIGN: Each pump shall be capable of handling raw, unscreened domestic sewage consisting of water, fibrous materials, and solids at heavy consistencies. The pump shall be able to chop / macerate solids without clogging with chopped solid size not less than 1 inch, and the chopping mechanism shall be an integral part of the pump. The pump(s) shall be capable of handling liquids with temperatures up to 104 degrees F continuous, 160 degrees F intermittent. Bearings shall be oil-lubricated and designed for 50,000 hours operating at minimum flow. Product shall be furnished with oil filled Inverter Duty Motors per NEMA MG-1, Part 31 with stator winding of the open type with Class H spike resistant magnet wire.

PUMP CONSTRUCTION: The volute, seal plate, adapter, motor housing and motor housing cap shall be constructed of high quality, ASTM A-48 Class 30 cast iron. Impeller shall be furnished in ASTM A-536 ductile iron (ASTM A-532 class III Type A White Iron for abrasive applications) with a keyed, tapered shaft bore. Pump(s) shall be coated with two coats of Axalta™ amido amine modified polymer satin gloss epoxy with a total 10 mil minimum thickness in the manufacturer's standard color. All exposed hardware shall be 300 series stainless steel including the lifting bail. Discharge connection shall be a standard 125 pound 4" flange, slotted to accommodate 4" ANSI or 100mm ISO flanges. The suction side of the volute shall contain 16 points of attachment for accessories and additional configurations including attachment of a 4" ANSI or 100mm ISO flange.

The pump shaft shall be 416 stainless steel with a tapered impeller fit to reduce rotor imbalance and minimize stress risers associated with stepped shafts. All gaskets shall be of the angular gland compression O-ring type eliminating critical slip fits and the possibility of damage during service associated with sliding O-ring sealing arrangements. The impeller shall be a mono vane design with pump out vanes.

The chopping mechanism shall consist of a stationary striker plate and a rotating slicing blade. Both blades shall only be constructed of high quality, ASTM A276 440C stainless steel, heat treated to 53-60 HRC. The slicing blade shall be press-fitted on to the impeller and secured to the impeller by four stainless steel pins. The striker plate shall be fixed to the volute in eight locations. The striker plate shall be adjustable to maintain a clearance of 0.001" to 0.008" between the striker plate and slicing blade. The bladed impeller assembly shall be dynamically balanced to ISO G6.3 specifications. The striker plate shall be sealed internally against the volute with an O-ring. To upgrade from a submersible solids non clog pump into a chopper pump, the pump manufacturer shall be able to provide the bladed stationary plate, the rotating blade and all other necessary components.

The chopping mechanism shall consist of dual wear ring system. The slicing blade shall operate as a wear ring for the impeller along the outer diameter of the impeller assembly. The matching volute shall be provided with an external replaceable bronze wear ring at the inlet.

The tandem mechanical shaft seals shall be of the single spring design operating in an intermediate oil-filled seal cavity. Pump-out vanes on back side of the impeller shroud shall be large enough to efficiently expel solids away from the seal area. The materials of construction shall be silicon carbide vs. silicon carbide for the pump-end seal and carbon vs. ceramic for the motor-end seal, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and Buna-N elastomeric parts. The pump-end seal shall be pinned in place to prevent rotation of the stationary seat and shall seal to the pump housing via an O-ring to maximize heat transfer. Cup mounted seats shall not be considered equal. The seal shall be commercially available and not a pump manufacturer's proprietary design. A moisture sensor detection system consisting of two probes shall be integrated within the oil-filled seal chamber which is isolated from the motor chamber. Units sensing moisture within the motor chamber are not acceptable. Moisture sensing devices utilizing one probe and grounding through the pump case or utilizing a float device are not acceptable.

The leads for the moisture detector and temperature sensors shall be contained within the power cable, except that for 1/0 cables, the sensor leads will be in a separate cable.

The pump motor shall be sized to be non-overloading throughout the entire system operating range. The rotor and stator assembly shall be of the standard frame design and the stator pressed into the motor housing for mechanical stability. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil. Manufacturer to supply submergence requirements for continuous operation.

Motors shall be dielectric oil filled for optimal thermal management and maximum bearing life. Air-filled motors with grease-filled bearings shall not be acceptable. The motor windings shall be of Class H, spike-resistant insulation. The motor shall meet the NEMA Design B standard and be Inverter Duty Rated per NEMA MG1, part 31.

The pump shaft shall be of 416 stainless steel, keyed and tapered for the matching impeller. The lower bearing shall be of the double row ball type, locked in position to accept radial and axial thrust loads, and the upper bearing of the single ball type for radial loads. Bearings shall operate in an oil bath environment for superior lubrication, cooling and life.

THREE PHASE: Three thermal sensors (one per phase) shall be embedded in the end coil of the stator windings, wired in series and used to monitor stator temperatures. This shall be used in conjunction with an external motor overload protection device and wired to the control panel through the single power cable.

The pump shall be equipped with (30/50/75/100) ft. of a CSA-qualified submersible quick connect power cable constructed in accordance with type W guidelines and shall include the moisture and temperature sensor leads. The pump shall have dual or tri voltage motors, that will provide the ability to change voltage by just changing the power cable. For 18 and 21 Frame pumps, the cable entry system shall consist of a voltage-selectable expanding elastomeric plug held in place by a cast stainless steel plate indicating voltage and max amps. For 28 Frame pumps, cord connection shall be a pump mounted plug and a rigid cord socket contained by a cast iron housing bolted to the motor with epoxy-potted cable connections and sealed by compressed O-rings.

PUMP TEST: The pump manufacturer shall perform a standard three point performance test at the minimum. If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards. Additionally,

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. A performance curve from the production line test showing head versus flow shall be included in the Installation and Operation Manual shipped with each pump.
4. A written report shall be available showing the aforementioned tests have been performed in accordance with the specifications.

START-UP: The pump(s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump(s).

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of_____ sets of standard submittal data; Standard submittal data consist of:

1. Pump catalog data;
2. Pump performance curve;
3. Break Away Fitting (BAF) data;
4. Access cover data;
5. Typical installation drawing;
6. Control panel data
7. Panel wiring schematic;
8. Accessory data;
9. Installation & Operation Manuals with Parts List.

Typical Specifications

4SCD Submersible Chopper Pumps

BARNES®

www.cranepumps.com

SITHE *Submersible Chopper Pumps*

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SCOPE: Furnish and install_____ submersible chopper pump(s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; and _____ U.S. GPM at _____TDH, with a shut off head of _____TDH (minimum) and _____% minimum efficiency at _____U.S.GPM at _____TDH (operating point). The pump motor shall be _____RPM, _____HP (maximum), _____Phase, 60 Hertz, _____Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of submersible units for a minimum of five (5) years. The pump (s) shall be SITHE by Barnes® Pumps model 4SCD_____

PUMP DESIGN: Each pump shall be capable of handling raw, unscreened domestic sewage consisting of water, fibrous materials, and solids at heavy consistencies. The pump shall be able to chop/ macerate solids without clogging with chopped solid size not less than 1 inch, and the chopping mechanism shall be an integral part of the pump. The pump(s) shall be capable of handling liquids with temperatures to 104 degrees F continuous, 160 degrees F intermittent. Bearings shall be oil-lubricated and designed for 50,000 hours operating at minimum flow. Product shall be furnished with oil filled Inverter Duty Motors per NEMA MG-1, Part 31 with stator winding of the open type with Class H spike resistant magnet wire.

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The pump shaft shall be 416 stainless steel with a tapered impeller fit to reduce rotor imbalance and minimize stress risers associated with stepped shafts. All gaskets shall be of the angular gland compression O-ring type eliminating critical slip fits and the possibility of damage during service associated with sliding O-ring sealing arrangements. The impeller shall be a dual vane design with pump out vanes on back side.

The chopping mechanism shall consist of a stationary striker plate and a rotating slicing blade. Both blades shall only be constructed of high quality, ASTM A276 440C stainless steel, heat treated to 53-60 HRC. The slicing blade shall be press-fitted on to the impeller and secured to the impeller by four stainless steel pins. The striker plate shall be fixed to the volute in eight locations. The striker plate shall be adjustable to maintain a clearance of 0.001" to 0.008" between the striker plate and slicing blade. The bladed impeller assembly shall be dynamically balanced to ISO G6.3 specifications. The striker plate shall be sealed internally against the volute with an O-ring. To upgrade from a submersible solids non clog pump into a chopper pump, the pump manufacturer shall be able to provide the bladed stationary plate, the rotating blade and all other necessary components.

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