

# RGS2012E1E/ RGS2012E1S

## SUBMERSIBLE GRINDER PUMP RETROFIT

### GENERAL

Furnish and install a fully assembled Retrofit centrifugal core grinder pump consisting of the grinder pumps, internal discharge piping, check valves, shut-off valves, lifting rope, two (2) floats, junction box. Factory assembled except inlet fitting(s) and externally mounted control panel.

### QUALIFICATIONS

All pump manufacturers must be pre-qualified by the engineer in order to qualify as acceptable manufacturers. Pre-qualification shall be no later than two (2) weeks prior to published bid date for this project. Failure to pre-qualify will be grounds for disqualification after the bid opening date. All decisions of qualification shall reside with the engineer of record at time of bidding.

### WARRANTY

The grinder pump manufacturer shall provide a standard limited warranty on complete retrofit kit, for a period of 12 months from the date of installation, or 18 months from the date of shipment, whichever occurs first. Any material or craftsmanship defects not associated with faulty installation, operation or maintenance found during the warranty period will be corrected by the Manufacturer at no cost to the Owner.

### GRINDER PUMP MODEL DESIGN

The pumps shall incorporate an integrally built-in grinder unit and submersible type motor. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, small wood, plastic and the like to a fine slurry that easily pass through the pump and the discharge pipe. Pump discharges shall be standard 1¼" threaded discharge.

### OPERATING CONDITIONS

The pump shall have a capacity of \_\_\_\_\_ GPM at a total head of \_\_\_\_\_ feet, and shall use a motor rated at 2 HP and 3450 RPM.

### PUMP GRINDER ASSEMBLY

The grinder assembly shall consist of two hardened components mounted directly below the impeller. The two components shall be the rotating cutter and reversible cutter ring both of which shall be constructed of type 440C stainless steel hardened to 55-60 Rockwell "C" scale value. The rotating cutter shall be threaded to the pump shaft. The cutter ring shall be pressed into the casing directly below the suction opening of the pump. The cutter ring shall then be secured by three type 300 series stainless steel screws for corrosion resistance. The stationary cutter ring shall be reversible such that once wear has occurred the ring can be turned over and new, unused surfaces exposed. Each component shall be designed for long life and ease of service. All hardware shall be series 300 stainless steel.

### PUMP MECHANICAL SHAFT SEALS

The motor shall be protected by a mechanical shaft seal mounted on the pump shaft. The mechanical seal faces shall be constructed of silicon carbide contacting silicon carbide. The spring system shall be constructed of series 300 stainless steel metal components and Buna-N elastomers. Seal face materials other than silicon carbide shall not be allowed.

### PUMP IMPELLER

The impeller shall be semi-open, non-clog, with ejector (pump out) vanes on the top of the impeller shroud for protection of the mechanical seal and to improve hydraulic balance. Only single plane dynamic balancing shall be required for smooth operation. The impeller shall be threaded to the shaft and not key driven. The impeller shall be designed such that the rotating cutter vanes can be accurately aligned to the impeller vanes for proper solids passage through the pump.

### PUMP CASING

The casing shall be cast from ASTM A48 class 30 gray cast iron of sufficient thickness to withstand 1.5 times the shut off pressure generated by the largest impeller available for this model in accordance with current revision of the Hydraulic Institute Standards. The discharge connection shall be a standard 1¼ inch NPT suitable for direct connection to the station piping, without the use of any external fittings or adapters for vertical orientation of the discharge direction.

### MAJOR PUMP CASTING MATERIALS

The casing, bearing housing and motor cover shall be of ASTM A48 class 30 high-quality cast iron for strength and long life. The bronze impeller shall be cast from ASTM B584 UNS C87600 as standard.

### PUMP CORROSION PROTECTION

The pump/motor shaft wetted-end shall be series 300 stainless steel. Both inner and outer surfaces of cast iron shall be electrocoat-painted with thermo-painted with thermo-setting Acrylic Enamel baked at 400° F, after castings are completely machined.

## **PUMP MOTOR**

The integral motor shall be completely sealed from the environment by use of circular cross section o-rings accurately fitted into machined grooves which shall provide designed compression of metal to metal fits. Designs which require a specific torque on the casing bolts or which require rectangular gaskets or sealing rings shall not be allowed. The motor shall be rated for continuous duty under full nameplate load while at partial submergence in the station. The motor shall be provided at the specified site conditions of 208/230 V, single phase. The single phase 2 HP motor shall be capacitor start design. Motors shall be equipped with on winding thermostats connected in line to provide automatic reset operation.

The stator winding shall be open type with Class F insulation suitable for operation in clean dielectric oil for efficient heat transfer and lubrication of the ball bearings. The stator shall be a register fit into the bearing housing to ensure positive alignment, and bolted for ease of serviceability. The motor shall be provided with ball type anti-friction bearings which shall support the heavy-duty rotor shaft and to handle all radial and axial loads imposed by the impeller while limiting shaft deflection at the mechanical seal faces. Sleeve type bearings shall not be considered equal and shall not be allowed. The ball bearings shall be designed for a B-10 life of 30,000 hours minimum. The motor shall be designed and tested to withstand an 18-day locked-rotor operation without damage.

## **PUMP POWER CABLE**

The power cable shall be sealed at the motor end as it enters the motor casing by a two part barrier to moisture intrusion. The barrier shall be the compression of the oil and chemical resistant grommet which shall seal the outer jacket of the power cord. In the event that the outer jacket of the power cord should become damaged, then the second line of defense shall be the epoxy poured isolated conductors within the jacketed cable itself. The insulation shall be removed from the individual conductors and the epoxy shall be allowed to form a leak-proof seal against wicking of the power cable between the outer jacket and the insulation of the individual conductors. The outer jacket of the power cord shall be oil resistant and water resistant. The power cable shall be rated for NEC severe service "S", type "STOW". Power cable shall be wired to the installed junction box.

## **ELECTRICAL QUICK DISCONNECT**

The grinder pump core shall include a factory-installed NEMA 6P electrical quick disconnect (EQD) for all power and control functions. The Junction box will include a wired 6' lead with Electrical quick disconnect. The connection shall be 6 pin connection to connect to electrical quick disconnect of existing panel. The EQD shall require no tools for assembly, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. Junction boxes are not acceptable due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required.

## **PUMP APPROVALS**

The pump(s) shall be UL or CSA approved. The pump nameplate shall have the approved markings and labels according to these approval agencies.

## **CHECK VALVE**

The check valve shall contain a free flowing sealing method, unobstructive to the flow of liquids and solids within the discharge piping. The valve design shall allow for operation when negative heads up to 5 feet are encountered. The valve shall contain a maintenance access port capable of servicing the valve without disrupting the existing piping. The valve shall be designed to operate at all pressures within the sewer system created by the grinder pumps.

## **DISCHARGE PIPING**

The discharge flange shall be manufactured of stainless steel. The discharge flange shall have 1¼" connection for attaching external discharge piping.

## **LEVEL CONTROLS**

Pump on, off and alarm levels shall be controlled by two mechanical floats. Switches shall be sealed in a corrosion-resistant polypropylene housing and shall use a minimum of 18 gauge, 2-wire, SJOW/A jacketed cable. A removable float tree is also acceptable. Level controls shall be UL/CSA listed.

## **JUNCTION BOX AND CONNECTION**

The NEMA 6 junction box shall be constructed of structural plastic for corrosion resistance and of adequate thickness to provide stability and mechanical strength. The junction box shall have a fully gasketed cover that is held in place by four captive stainless steel screws with heads of adequate size so that they may be easily installed and removed without the use of special tools. An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of a non-corrosive material, such as PVC or nylon, and shall make an effective seal around the wire jacket. The cord grips shall seal to the junction box with an O-ring or gasket.

The junction box shall have a PVC solvent weld socket type conduit hub of adequate size to accommodate the number of wires required for the pump and level control operation. The incoming wires shall be sealed by an external EY type seal-off (supplied by others) so condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation. The wires running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors for easy installation replacement. Connection to existing twist lock connection in station.

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