



## SPECIFICATIONS

### **2HP Grinder Pumps**

### **Model Nos. KHHG(X)2(H)**

**Pump Model** – Pump shall be of the centrifugal type, **KHHG(X)2(H)** (High Head and High Performance), with an integrally built-in grinder unit and submersible type motor. **KHHG(X)2(H)** series pump and motor assembly shall be FM3615 listed for Class 1, Division 1, Groups C & D hazardous location service.

**Operating Conditions** – The pump shall have a non-overloading maximum capacity of \_\_\_GPM, a maximum total dynamic head of \_\_\_ feet, and shall use a motor rated at 2 HP and 3450 RPM. The grinder unit shall be capable of macerating all material in typical domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, sanitary wipes, floor pads, small wood, plastic and the like to fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

**Construction** – Major pump components shall be of gray cast iron, ASTM A-48, Class 35, with smooth surfaces devoid of blowholes or other irregularities. All exposed nuts or bolts shall be 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel, shall be protected by a factory applied spray coating of primer and an air dry acrylic paint finish to the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with O-rings, designed and constructed to meet FM3615 for Class 1, Division 1, Groups C & D standards. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides (rabbet joint construction) without the requirement of a specific torque limit. **No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.**

**Pump Impeller** – Pump impeller shall be ductile iron and threaded onto a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids. Impeller must be dynamically balanced to specification ISO 1940G 6.3 standard.

**Radial Cutter Grinder Construction** – Provided as a proven cutting method, both grinder impeller and shredding ring shall be of 440 stainless steel hardened to 58-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a stainless steel screw and washer. The shredding ring shall be secured by a retaining ring which is bolted into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 27,000 cuts / second.

**Seals** – Type 21, domestic manufactured, dual mechanical seal construction mounted in tandem, shall protect the motor. Standard construction of primary seal shall be silicon / carbide with Viton® elastomers. Standard construction of secondary seal shall be silicon / carbide with Viton® elastomers. The seal face shall be lapped to a flatness of one light band. Dual electrodes with resistor shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required. **Lip seal arrangements shall not be considered equal.**

**Motor** – The pump motor construction shall be per NEMA MG-1 1.15 standard and shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, 208, 230 or 240 volt, single-phase operation. Three-phase operation shall be 208, 230 or 460 volt. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and starting switch for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.



The stator winding shall be of the open type with Class F insulation. **Any other construction shall not be considered equal.** The stator shall be pressed into the cast iron motor housing. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Maximum skin temperature of motor assembly shall not exceed a T-4 rating per FM3615 standards. **Any motor assembly T-code per FM3615 standard that exceeds a T-4 rating shall be considered not equal.**

**KEEN I.C.E.** oil ensures industry-low operating temperatures. **KEEN I.C.E.** oil is a synthetic blend with wear-additives, specifically engineered for submersible pump motors. **Air-filled motors, which do not have the superior heat dissipating capabilities of oil-filled motors, shall not be considered equal.**

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature.

Three-phase motors contain temperature sensors with (2) two wires for attachment to the control panel.

**Bearings / Shaft** - The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Bearings shall be designed to an ABEC<sup>®</sup> System 1 or better. The upper bearing shall be a Conrad type, single-row, deep groove ball bearing designed to adequately handle the required radial loads. The lower bearing shall be a single-row, deep groove ball bearing designed to adequately compensate for the axial loads and radial forces. Bearings shall be designed to deliver a minimum L-10 bearing life of 100,000 hours when operation is within the limitations of the manufacturer's performance curve. The bearings shall be lubricated in oil and will not require maintenance as described in ANSI/HI 1.4-2010 A.6.

**Power Cord** - The motor power cord shall be 10 Ga. Type SOOW, UL listed, CSA approved cable. The control cord shall be 18 Ga. The cable jacket shall be sealed at the motor entrance by means of an agency-approved rubber compression washer and compression nut. An epoxy-filled cord cap seals the outer cable jacket and individual leads to prevent water from entering the motor housing. **Compression fittings with quick disconnect molded pins shall not be considered equal.** Cord shall withstand a pull strain to meet FM requirements.