



## K24VK

24" Recessed Impeller High Head Sewage Pump

**KEEN PUMP "K24VK" Series** pumps are designed for demanding wastewater, municipal sewage treatment plants, storm water, industrial, commercial and a wide range of water-handling applications.

**"K24VK" Series** pumps feature a self-contained cooling jacket system, circulating impeller, heat exchanger plate and liquid refrigerant with a high boiling point (195° C). Standard construction allows for submersible and dry pit installations.

**"K24VK" pumps** are equipped with high-efficiency, inverter-duty rated, Class H insulation motors. Electrical features include fully automatic alarm protection system and liquid level control system, protecting the motor from water, oil, phase loss, overheating and grounding.

### CAPABILITIES:

- Flows to 16,000 GPM
- Heads to 26 Feet
- Horsepower 100 HP
- Voltage/Phase Options 460, 3 Phase
- Discharge Connections 24" ANSI 150 Lb. Horizontal Flange
- Motor Speeds 600 RPM
- Solids Handling 6"
- Impeller Balanced, Mixed Flow Enclosed
- Motor Service Factor 1.25



### 1. WATERTIGHT CABLE ENTRANCE

Agency-approved, watertight strain relief cord grips with compression grommets protects outer cord jacket. Epoxy-filled inner cord cap provides anti-wicking moisture protection to the motor even if power cable is cut or damaged. 40' UL power & control cords. Additional sealing accomplished by individually soldered wires.

### 2. MODULAR PUMP DESIGN

Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy-duty ASTM A48, Class 35 cast iron components.

### 3. STRONG MOTOR / COOLING JACKET SYSTEM

Powerful high-torque, Class H motor for reliable pump operation. Overload protection in air-filled chamber. Inverter-duty wire for VFD / soft start operation, continuous duty. Self-contained cooling jacket system with recirculating impeller. Includes heat exchanger plate. Liquid refrigerant coolant supplied.

### 4. SOLID BEARING SUPPORT

Motor / Pump shaft securely held with upper and lower ball bearings rated for 100,000 hour B-10 life.

### 5. SEVERE DUTY DUAL MECHANICAL SEALS

Dual mechanical shaft seals provide twice the moisture and grit protection for the motor. Silicon-Carbide Upper and Tungsten-Carbide Lower seals are housed in a secondary oil-filled seal chamber. Tougher material seals better handle sand, grit and abrasive materials.

### 6. 3-CHAMBER MOISTURE DETECTION

Moisture detection in lower seal chamber, motor housing and upper cord cap housing.

### 7. HIGH EFFICIENCY HYDRAULIC DESIGN

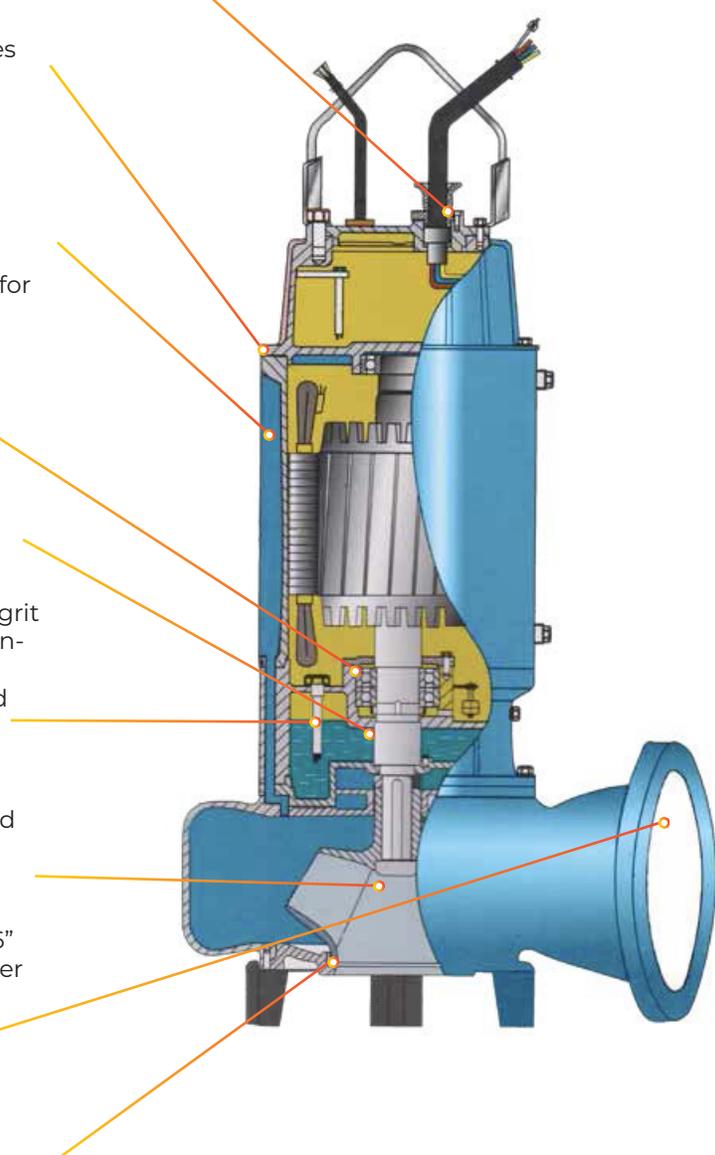
Highly efficient enclosed, mixed-flow impeller easily passes 6" diameter solids without blockage. Strong, ductile iron impeller features backside pump-out vanes, keeping lower seal clean and pressure-compensated for longer life. Dynamically balanced for smooth, quiet operation and long bearing life.

### 8. STANDARD FLANGE CONNECTION

24" Horizontal, 150 Lb., ANSI discharge flange. Industry standard, 20-bolt pattern.

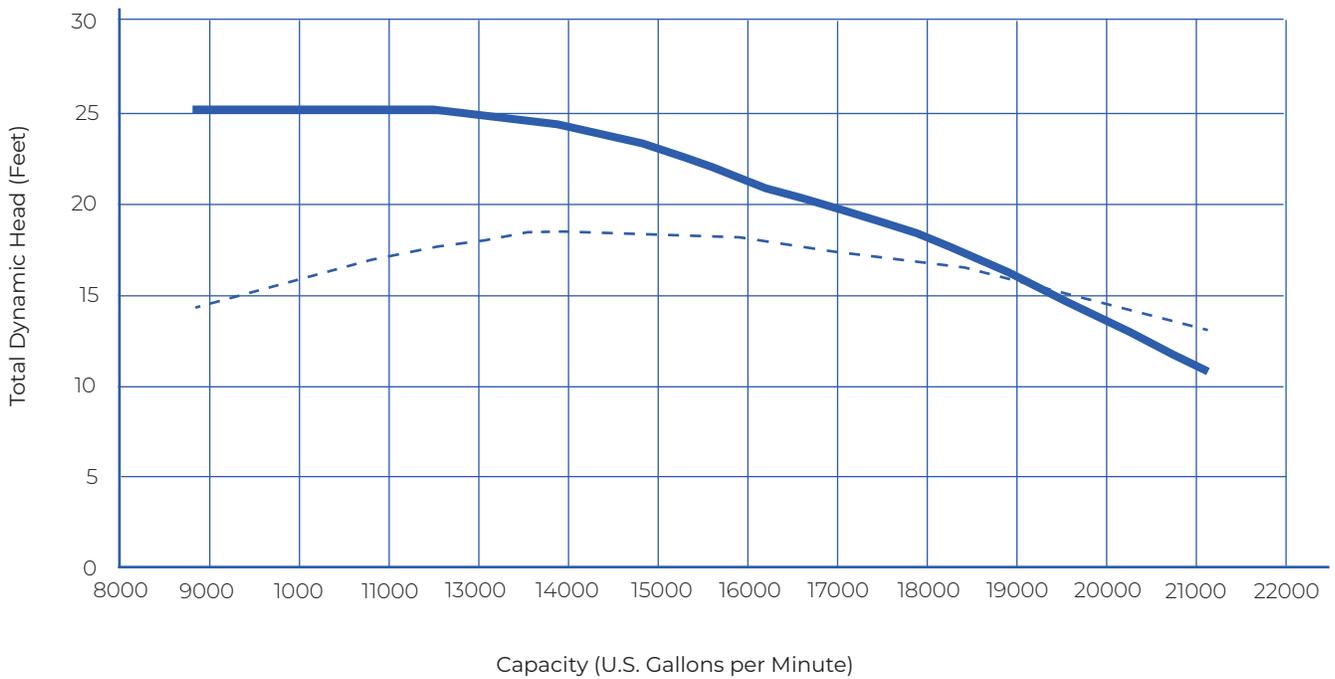
### 9. HIGH PERFORMANCE WEAR RING

Assists impeller in providing higher performance efficiencies and prevention of recirculation losses. Ring will not corrode or deteriorate from liquid being pumped. Ring reduces wear to stronger ductile iron impeller in sandy or gritty applications. Easily serviceable and replaceable.



PUMP SERIES	K24VK		14" SUBMERSIBLE SEWAGE PUMPS		
Speed	600 RPM	Discharge	24"	Solids	6"

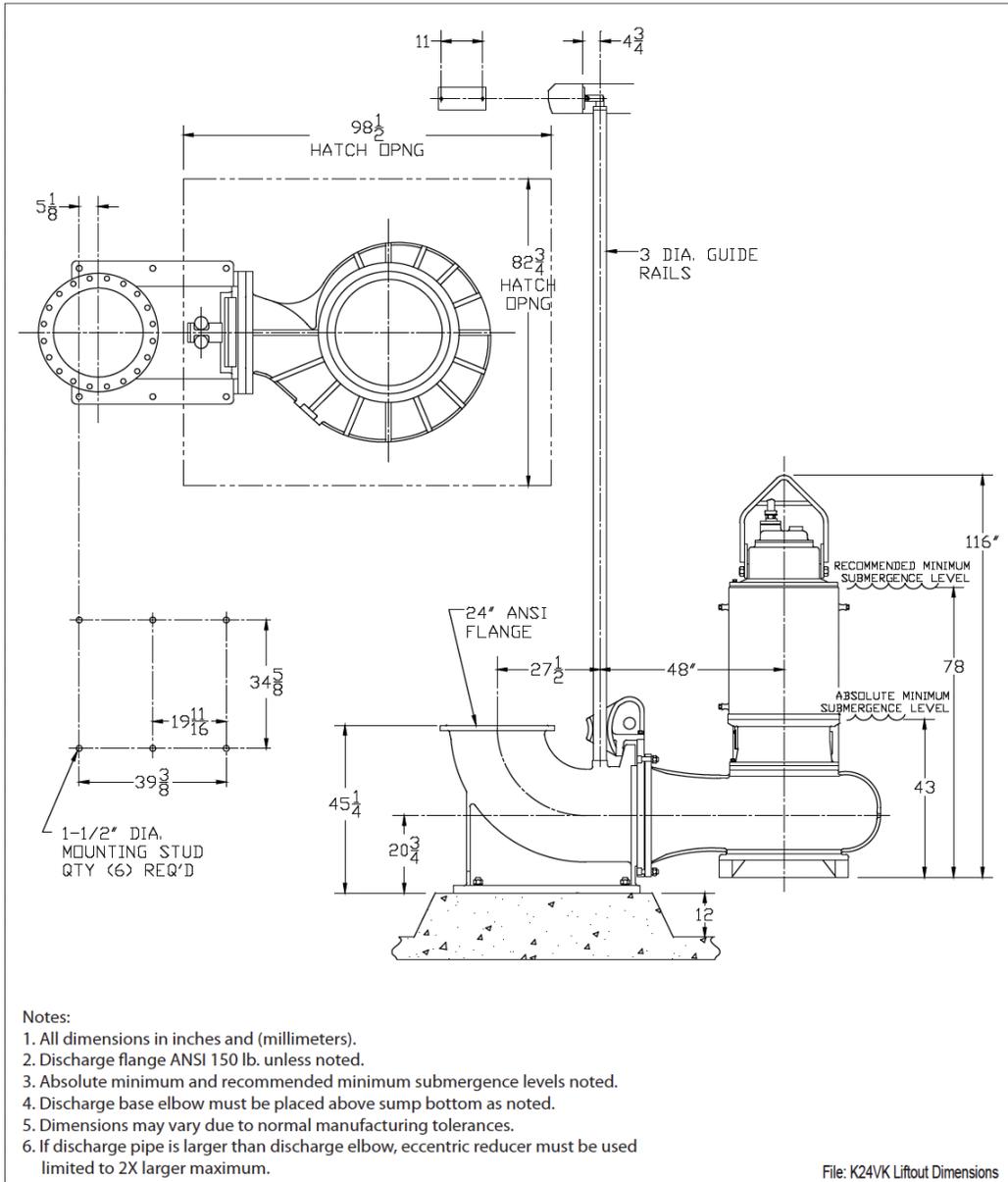
GPM: \_\_\_\_\_ TDH: \_\_\_\_\_



The curves reflect maximum performance characteristics without exceeding full load. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.



PUMP SERIES	K24VK	24" SUBMERSIBLE SEWAGE PUMPS
LIFTOUT DIMENSIONAL DATA		

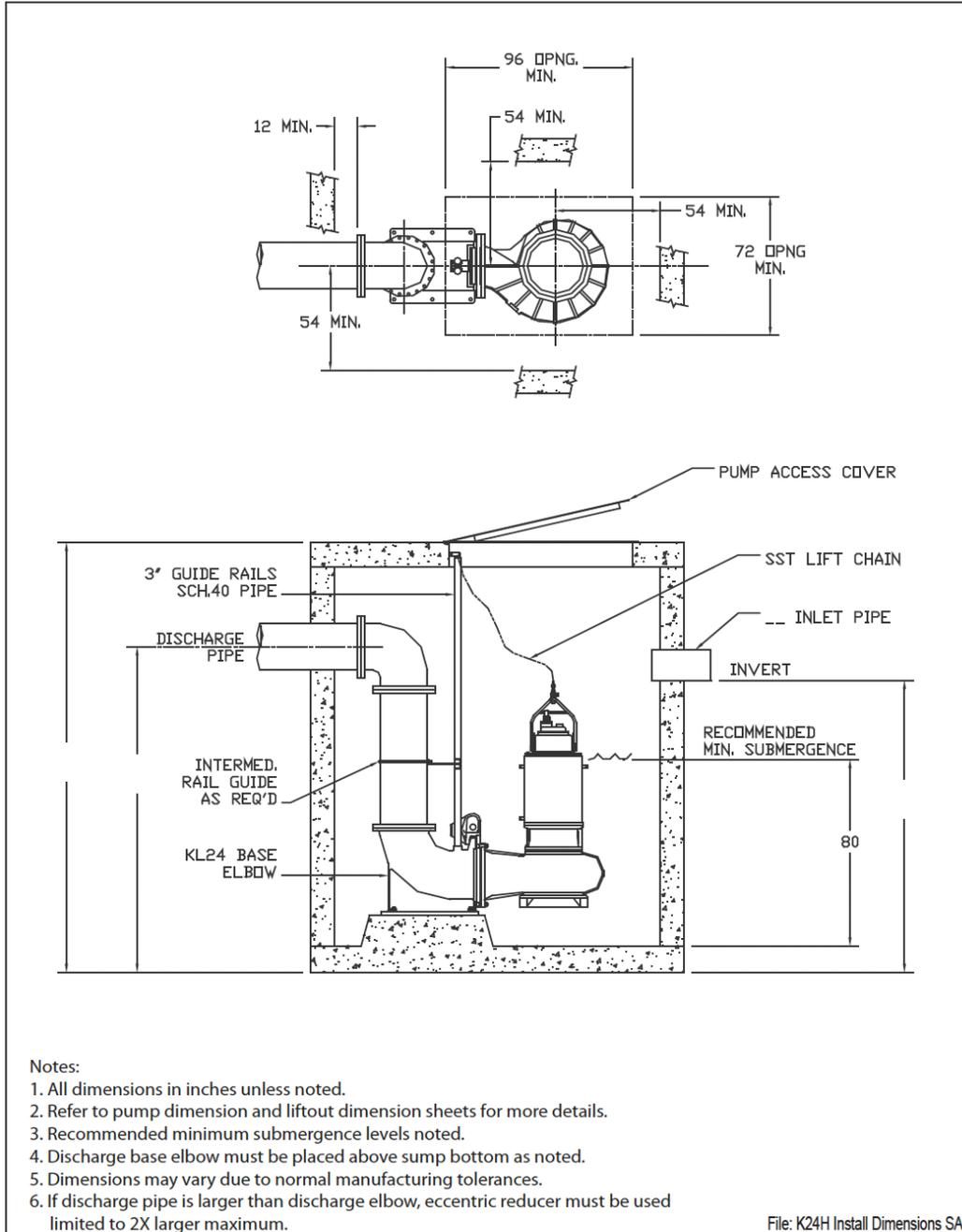


PUMP SERIES

K24H

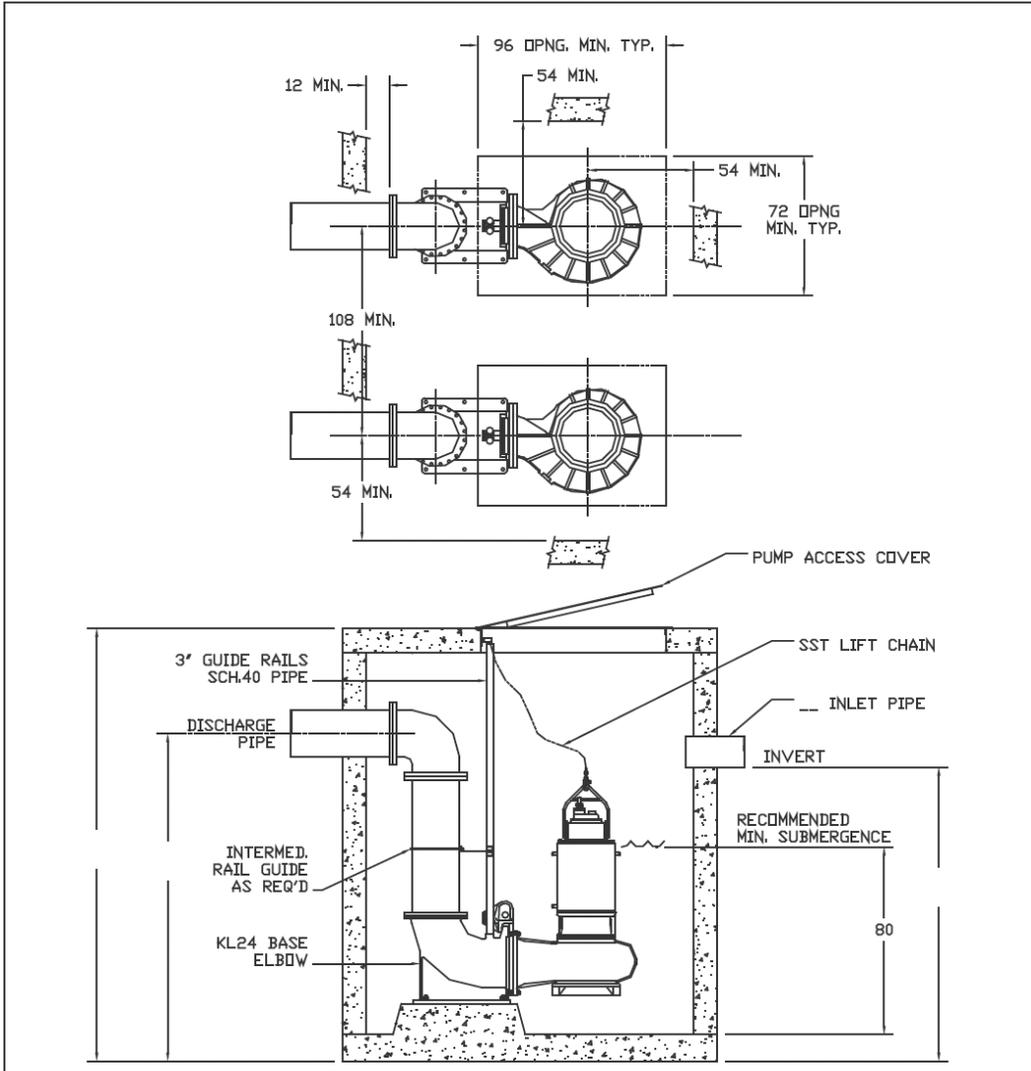
24" SUBMERSIBLE SEWAGE PUMPS

## SIMPLEX INSTALLATION DIMENSIONAL DATA





PUMP SERIES	K24H	16" SUBMERSIBLE SEWAGE PUMPS
DUPLIX INSTALLATION DIMENSIONAL DATA		



- Notes:
1. All dimensions in inches unless noted.
  2. Refer to pump dimension and liftout dimension sheets for more details.
  3. Recommended minimum submergence levels noted.
  4. Discharge base elbow must be placed above sump bottom as noted.
  5. Dimensions may vary due to normal manufacturing tolerances.
  6. If discharge pipe is larger than discharge elbow, eccentric reducer must be used limited to 2X larger maximum.

File: K24H Install Dimensions SA

## KH SERIES

### NON-CLOG SUBMERSIBLE PUMP SPECIFICATION

Furnish and install \_\_\_\_\_ submersible non-clog wastewater pump(s). The KEEN pump(s) shall be equipped with a \_\_\_\_\_ HP close coupled submersible electric motor, connected for operation on \_\_\_\_\_ volts, 3 phase, 60 hertz service, with \_\_\_\_\_ feet of heavy duty submersible electric power cable. Each pump shall be capable of producing \_\_\_\_\_ GPM at \_\_\_\_\_ feet TDH. The shut-off head shall be no less than \_\_\_\_\_ feet.

**DESIGN** – The KEEN pump(s) shall be capable of handling raw, unscreened sewage and shall be automatically and securely connected to the permanent discharge connection, guided by no less than two guide rails extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge base elbow shall be accomplished by machined metal to metal watertight contact. The pump(s) shall be easily removed for inspection and service without the need for personnel to enter the wet-well. The entire pumping unit, including electric cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 60 feet. No portion of the pump shall bear directly on the sump floor.

**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 enamel 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. Fittings will be the result of controlled compression of rubber o-rings in two planes and o-ring contact of four sides without the requirement of a specific torque limit. No secondary sealing compounds, elliptical o-rings, grease or other devices shall be used.

**COOLING SYSTEM** – Each unit shall be provided with an integral, self-supplying internal cooling system. The cooling system shall encircle the stator housing, providing for dissipation of the motor heat regardless of type of installation. The closed cooling system shall consist of a cooling jacket, circulator impeller, liquid refrigerant and drain / fill plugs. The circulating impeller shall be attached to the motor shaft, turning at the same speed of the motor. The liquid refrigerant has a high boiling point (195 degree C, 383 degree F) and low freezing point (-40 degree C). The circulating impeller shall provide the necessary circulation of the cooling liquid through the cooling system. The closed cooling system shall provide for continuous submerged or completely non-submerged pump operation in liquid or ambient temperatures up to 40 degree C or 104 degree F, in accordance with NEMA standards.

**CABLE / ENTRY SEAL** – The power cable shall be sized in accordance with NEC standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket has a compression grommet compressing the exterior of the cable entry system. The cable wires are individually stranded in epoxy in the cord cap assembly for a second permanent seal.

**MOTOR** – The pump motor shall be an induction type, NEMA B design with a squirrel cage rotor, shell type design, housed in an air-filled, watertight chamber. The motor shall be inverter duty rated. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated. The stator shall be dipped and baked in Class H varnish and shall be heatshrink fitted into the motor housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable up to 15 evenly spaced starts per hour.



The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have voltage tolerance of plus or minus 10% and frequency tolerance of plus or minus 5%. The motor horsepower shall be adequate so that the pump is not overloading throughout the entire pump performance curve from shut-off through run-out. Thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The motor and pump shall be designed and assembled by the same manufacturer.

**BEARINGS** – The pump shaft shall rotate on two bearings. The motor bearings shall be double shielded and permanently lubricated with high temperature grease. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to compensate for axial thrust and radial forces. Single row lower bearings shall not be considered acceptable. The minimum L-10 bearing life shall be 100,000 hours at any useable portion of the pump curve.

**MECHANICAL SEAL** – Each pump shall be provided with a mechanical shaft seal system consisting of two assemblies. The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the seal faces at a constant rate. The lower primary seal, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, silicon-carbide ring. The upper, secondary seal, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, silicon-carbide seal ring. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal. For special applications, other seal face materials shall be available. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside. The seal system shall not rely upon the pumped media to operate dry without damage while pumping under load.

**PUMP SHAFT** – The pump shaft and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft; couplings shall not be acceptable. The pump shaft shall be 410 stainless steel.

**IMPELLER** – The enclosed, 2-vane impeller shall be of ductile iron, Class 35B, dynamically balanced, double shrouded non-clogging design having long through-let without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other material found in wastewater. The impeller shall be keyed to the shaft, retained with an impeller bolt, capable of passing a 3-inch diameter solid. Mass moment of inertia calculations shall be provided by the pump manufacture upon request. Ceramic coating on impeller for anti-abrasion wear.

**VOLUTE** – The pump volute shall be gray cast iron, ASTM A-48, Class 35, single piece design with smooth passages large enough to pass any solids that may enter the impeller. A replaceable bronze wear ring system shall be utilized to provide efficient sealing between the volute and impeller suction inlet. Ceramic coating inside volute for anti-abrasion wear.

**PROTECTION** – All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 260°F (125°C) the thermal switches shall open to signal the control to stop the motor and activate the alarm. A leakage sensor shall be installed in the lubricant chamber to detect seal leakage prior to entry and contamination of the lower bearing and motor stator housing.