

# HORIZONTAL FRAME MOUNTED REDI-PRIME END SUCTION CENTRIFUGAL PUMPS

## PART I - GENERAL

### 1.01 DESCRIPTION

The Contractor shall furnish materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and appurtenances, as indicated on the contract drawings and as herein specified.

### 1.02 INSTALLATION

The Contractor shall insure that the pumps and motors are properly installed with no pipe strain transmitted to the pump casing.

### 1.03 RESPONSIBILITY

To assure a properly integrated and compatible system, all equipment described in this section shall be furnished by the Pump Manufacturer, who shall assume full responsibility for the proper operation of the pumps and associated equipment.

### 1.04 SUPERVISION

The Contractor shall arrange for the Pump Manufacturer to provide a factory-trained representative as required for the purpose of supervising installation, start-up, final field acceptance testing, and providing instruction to the owner's operating personnel in the proper operation and maintenance of the equipment in this section.

### 1.05 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

- Hydraulic Institute Standards
- IEEE Standards
- NEMA Standards
- OSHA Rules and Regulations

## PART II - PRODUCTS

### 2.01 GENERAL DESCRIPTION

The pump shall be a centrifugal horizontal flexible-coupled end suction pump, Cornell Pump Company, Model \_\_\_\_\_ or pre-approved equal. Pre-approval must be obtained a minimum of ten days before bid date.

### 2.02 MATERIALS OF CONSTRUCTION

Casing.....Cast Iron (ASTM A48, Class 30)  
Impeller.....Cast Iron (ASTM A48) or Bronze (SAE 40, ASTM B584, C83600)  
Shaft.....Steel (AISI C1045)  
Case Wear Ring.....Bronze (ASTM B144-3B, C93200)  
Shaft Sleeve.....Bronze (ASTM B144-3B, C93200)

### 2.03 CASING

The casing will be of the end suction design with tangential or centerline discharge outlet. For suction piping diameters of 2" or less and discharge piping diameters of 1.5" or less, the suction and discharge connections shall be NPT threaded. For suction piping diameters of 2" or greater, the suction inlet shall be a flat-faced flange connection and the discharge outlet shall be a bolt through flange connection. Flange connections shall be ANSI 125# rated. The casing shall have tapped and plugged holes for priming and draining. The casing bore shall be large enough to allow "back pullout" of the impeller without disturbing the casing or suction and discharge piping. The casing shall be supported by the bearing frame.

### 2.04 IMPELLER

The impeller shall be of the enclosed type, cast in one piece. It shall be finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. The impeller shall be statically balanced. The impeller will be keyed to the shaft, and fastened with a washer, gasket and cap screw.

### 2.05 CASE WEARING RING

The pump casing shall be fitted with a case wear ring to minimize abrasive and corrosive wear to the casing. The case wear ring shall be of the radial type, press fitted into the casing.

### 2.06 Mechanical Seal

A dished style backplate with deflector vanes constructed of ASTM A48 Class 30 Grey iron shall be provided, including a single mechanical seal. The design shall allow for continuous operation without the need for external flush water or venting. Double seals or cartridge seals with a water flush are not acceptable. Seal system shall be Cycloseal, as manufactured by

Cornell Pump Co. A standard hardened stainless steel shaft sleeve design shall be provided with an o-ring seal. The shaft sleeve will be Heat Treated 420 stainless steel.

The seal shall have a 316 stainless steel rotating spring. The faces will be tungsten/ silicon carbide and Viton "O" ring. Seal shall be John Crane.

## 2.07 SHAFT

The outboard shaft extension shall be machined with a keyway to accept a coupling to the driving unit. Water slingers shall be furnished on the inboard shaft extensions.

## 2.09 SHAFT SLEEVE

The pump shaft shall be fitted with a shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring (solids handling only, press fit for clean water), (and shall be positively driven by a pin, key or set screws ( wastewater, verify with Factory) to the keyway.) and installed with a shrink fit(clean water). The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.

## 2.10 Bearing FRAME

The bearing frame shall house a single-row outboard regreaseable thrust bearing. Both bearings shall be selected for a 20,000 hour minimum life at maximum load. The inboard bearing shall not be locked in order to accommodate thermal expansion of the shaft. Lubrication fittings shall be provided in convenient location.

## 2.11 FOOT SUPPORTS

The pump unit shall be supported from beneath the mounting bracket and the power frame by mounting feet.

## 2.12 BASEPLATE

The pump and motor shall be mounted on a groutable formed steel baseplate or a drip rim baseplate with integral drip channels incorporated on each side. Each channel shall include an NPT drain connection and plug. The base shall be sufficiently rigid to support the pump and the motor without the use of additional supports or members.

## 2.13 COUPLING

A flexible coupling shall be provided to connect the pump shaft to the motor shaft. The coupling shall be of an all metal type with a flexible rubber insert. The entire rotating coupling assembly shall be enclosed by a coupling guard.

## 2.14 MOTOR

The motor shall be a NEMA configuration in accordance with the latest standards, and shall have the following characteristics:

Enclosure.....Open Drip Proof/TEFC/X-Proof  
Number of Phases..... phase  
Cycles..... 60 Hz.  
Voltages..... Volt  
Speed..... RPM  
Horsepower..... HP

Each motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency.

## PART III - PERFORMANCE

### 3.01 CONDITIONS OF SERVICE

The following conditions of service shall be strictly adhered to:

Number of Units.....  
Type of Drive.....(variable or constant)  
Discharge Size.....  
Suction Size.....  
Design Capacity..... US gpm  
Design Head..... ft  
Efficiency at Design.....%, minimum  
Rotative Speed.....RPM, maximum  
Shut-off Head....., minimum  
Drive Horsepower....., minimum  
NPSHR at Design..... ft, maximum

### 3.02 INSPECTION AND FACTORY TESTS

Each centrifugal pump furnished under these specifications shall be tested at the factory to verify individual performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.

### 3.03 INSTALLATION AND ACCEPTANCE TESTS

A. The pumping units shall be installed in accordance with the instructions of the manufacturer

and as shown on the drawings by the Contractor.

B. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.