

## **Close Coupled Vertical In-Line Pump Specifications**

### **Part I – GENERAL**

#### **1.1 WORK INCLUDED**

A. Contractor shall furnish and install Grundfos In-line close coupled pump, PACO Model VL complete with pump and motor in accordance with manufacturer's recommendations and plans.

#### **1.2 REFERENCE STANDARDS**

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

- A. HI – Hydraulic Institute
- B. ANSI – American National Standards Institute
- C. ASTM – American Society for Testing and Materials
- D. IEEE – Institute of Electrical and Electronics Engineers
- E. NEMA – National Electrical Manufacturers Association
- F. NEC – National Electrical Code
- G. ISO – International Standards Organization
- H. UL – Underwriters Laboratories, Inc.
- I. CSA –Canadian Standards Association
- J. OSHA – Occupational Safety & Health Administration
- K. ASME – American Society of Mechanical Engineers
- L. IEC– International Electrotechnical Commission
- M. ETL – Electrical Testing Laboratories
- N. NSF – National Sanitation Foundation

### **Part 2 – PRODUCTS**

#### **2.1 Close Coupled In-Line Pumps**

- A. Furnish and install close coupled in-line pumps as per plans and pump schedule.
- B. The pump and electric motor shall be factory assembled at the pump manufacturer's facility. The pump manufacturer shall have complete unit responsibility.

##### **2.1.1 PUMPS**

- A. The pumps shall be close coupled, single stage, in-line design, cast iron bronze fitted construction.
- B. The pumps shall have the following features:
  - 1. All pumps shall be of the back pull-out design so that the rotating element can be removed from the casing without disconnecting the suction or discharge piping. The casing material

shall be close-grained cast iron ASTM A48 - Class 30 with a minimum tensile strength of 30,000 P.S.I. Pumps larger than 12.2" impeller shall have casing material of ductile iron ASTM A536- Class 65 with a minimum tensile strength of 65,000 P.S.I. Volute shall have integrally cast suction and discharge connections, gauge ports at nozzles, and vent and drain ports. Pumps suction and discharge shall be of same size. Pumps with 3" and above suction/discharge sizes shall have double volute casing and shall have suction splitter to reduce pre-rotation and improve efficiency. Casings shall be designed for scheduled working pressure and can withstand hydrostatic test at 150% of the maximum working pressure under which the pump could operate at design speed.

2. Pumps shall be fitted with bronze renewable case wear rings.
3. Suction and discharge flanges shall be drilled to ANSI Class 125# standards and be machined flat face.
4. The motor shaft shall be of cold rolled steel AISI 1024 with bronze sleeves covering the wetted area of the shaft. Motors with 56J frame shall have a motor shaft of stainless steel AISI 416.
5. The pump manufacturer shall recommend the proper mechanical seal based on the pressure, temperature and liquid outlined on the equipment schedule. Mechanical seals, at a minimum, shall have ceramic stationary seats, carbon rotating rings, buna elastomers and stainless steel hardware. Application of a mechanical seal shall be internally flushed type, without requiring external flushing lines. Seals shall be capable of being inspected and easily replaced without removing the piping or volute.
6. Recirculation line of nylon tubing with brass fitting shall be provided to vent the mechanical seal.
7. Impeller shall be of the enclosed francis vane type, single suction design, made of silicon bronze, ASTM B584 C87600, both hydraulically and dynamically balanced to ISO 1940-1:2003 balance grade G6.3 and keyed to the shaft. The impeller shall be trimmed to meet the specific hydraulic requirements.
8. Pump Construction. The standard material of construction for the pump shall be as below. Special material shall be available as option to suit the liquid pumped.
  - Volute: Cast Iron ASTM A48 - Class 30 or Ductile Iron ASTM A536- Class 65
  - Case Wear ring: Tin Bronze ASTM B584-90500
  - Impeller: Silicon Bronze ASTM B584 C87600
  - Shaft: Cold Roll Steel AISI 1024 or Stainless Steel AISI 416
  - Shaft Sleeve: Bronze III932 C89835
  - Mechanical Seals: Carbon – Ceramic with Buna Elastomers and Stainless Steel hardware
  - Recirculation Line: Nylon Tubing with Brass Fittings

- C. Pump rotation shall be clockwise as viewed from the motor end.
- D. Optional Supports: Pump shall be mounted on a heavy duty cast iron support stand or on steel flange supports for floor mounting.
- E. Pump shall be of a maintainable design for ease of maintenance and should use machine fit parts that are easily disassembled.
- F. Each pump shall be painted with one coat of high quality factory approved paint and name-plated before shipment from the factory.
- G. Where noted on schedule the pump shall also be NSF-50 or NSF-61 certified.
- H. Pumps shall be manufactured and assembled in an ISO-9001 certified facility.

### **2.1.2 MOTORS**

- A. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory assembled.
- B. Motors shall be suitably sized per ISO5199 and shall meet NEMA specifications and conform to the standards outlined in EISA 2007.

### **2.2 INSTALLATION**

The pump shall be installed per manufacturer's recommendations and according to the standards of the Hydraulics Institute.

### **2.3 TESTING**

Where noted on schedule, pumping equipment may require one or more of the following:

Certified Performance test

Hydro static test

NPSH Test

Any other factory test as noted in the pump Schedule

The testing shall be in accordance with Hydraulic Institute level B or the latest HI standard as noted in the pump schedule.

### **2.4 WARRANTY**

The warranty period shall be a non-prorated period of 12 months from date of installation, not to exceed 18 months from date of manufacture. Warranty shall cover against defective material and/or faulty workmanship.

**END OF SECTION**