

Vertical Mounted Split-Case Pump Specifications

Part I – GENERAL

1.1 WORK INCLUDED

- A. Contractor shall furnish and install vertical mounted, Grundfos Split-Case pump, PACO Model KPV complete with pump, motor, and coupling 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

Part 2 – PRODUCTS

2.1 VERTICALLY MOUNTED SPLIT-CASE PUMPS

- A. Furnish and install vertically mounted Split-case pumps as per plans and pump schedule.
- B. The pump, base, coupling, 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 long coupled, vertical mounted, single stage, double suction, axial split case design, in cast iron bronze fitted construction specifically designed for quiet operation.

- B. Pumps shall have the casing divided on the horizontal centerline. The casing halves shall be accurately machined, bolted and doweled together. A non-asbestos type gasket material shall be furnished between the casing halves. The casing material shall be close-grained cast iron ASTM A48 - Class 35 with a minimum tensile strength of 35,000 P.S.I. Pumps shall be fitted with lead-free bronze renewable case wear rings indexed with a dowel pin for fixed positioning. Removal of the upper casing half and bearing housings shall permit removal of the complete rotating assembly without disturbing piping connections. Volute shall have integrally cast support feet, gauge ports at nozzles, and vent and drain ports. Pumps with larger than 4-inch discharge flanges shall be of the double volute design extending to both upper and lower half of the casing. Casings shall be designed for scheduled working pressure and shall be hydrostatically tested at 150% of the maximum working pressure under which the pump could operate at design speed. Suction and discharge flanges shall be drilled to ANSI Standards and be machined flat face. Flanges shall be extra heavy-duty design and will be of 250# thickness while capable of being drilled for 125# ANSI flat face use.
- C. Pumps shall be provided with removable bearing housings which will permit inspection and/or replacement of the mechanical seals, shaft sleeves, and bearings without removing the rotating assembly or upper half of the casing. Straightening vanes shall be cast in both the bearing housings and casing to reduce pre-rotation of fluid prior to entry into the impeller.
- D. The upper bearing housing shall be removable and supply support for heavy-duty single row grease lubricated ball bearings, with provision for purging or flushing if desired. The lower bearing housing shall be removable and supply support for the sleeve bearing, with required provision for purging or flushing. The pump shaft shall be adequately supported by the pump bearings to limit the shaft deflection to 0.002 inches. Ball bearings shall be ball type, grease lubricated and locked to the shaft with positive locks of ample size to withstand any axial thrust loads. Sleeve bearing shall be graphite material. Each bearing housing shall be bolted to the upper and lower casing halves for a full 360-degree support registered fit to insure positive alignment. Ball bearings shall provide a minimum L_{10} life of 10 years when calculated at the duty point for the scheduled pump.
- E. The pump shaft shall be of solid, stress-proof steel AISI1144 with sleeves covering the wetted area of the shaft. Upper sleeve shall be bronze and lower sleeve shall be stainless steel.
- F. 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 seats, 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 upper half of the casing. The pump should be available with an option of no mechanical seal at the bottom, for easy maintenance.

- G. Impeller shall be of the enclosed Francis Vane type, double 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 locked in position by threaded shaft sleeves. The impeller shall be trimmed to meet the specific hydraulic requirements.
- H. A coupling, capable of absorbing torsional vibration and of operating in variable speed applications, shall be employed between the pump and motor.
- I. The pump shall be supported from below by a cast iron mounting stand, which shall be bolted directly to the bottom of the casing. Supporting the casing from the side or top shall not be required, nor allowed.
- J. Lower pump bearing will be of sleeve bearing design. It shall eliminate the need for a lower mechanical seal and replace radial ball bearing with a journal bearing.
- K. Pump rotation shall be clockwise or counter-clockwise as viewed from the pump's motor end.
- L. Pump shall be of a maintainable design for ease of maintenance and should use machine fit parts which are easily disassembled.
- M. The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 1.1-1.5, section 1.4.6.1.1 for recommended acceptable unfiltered field vibration limits (as measured per HI 1.4.6.5.2, Figure 1.108) for pumps with rolling contact bearings.
- N. Each pump shall be painted with one coat of high quality factory approved paint and name-plated before shipment from the factory.
- O. Where noted on schedule the pump shall also be NSF-50 and NSF-61 certified.
- P. Pump manufacturer shall be ISO-9001 certified.
- Q. Standard Pump Construction Casing: Cast iron ASTM A48 – Class 35
 - Case wear ring: Lead-Free Bronze, ASTM B584-90500
 - Impeller: ASTM B584 C87600
 - Shaft: Stress-proof steel, AISI1144
 - Mechanical Seals: Carbon–Ceramic with Buna elastomers and stainless steel hardware
 - Bearings/Sleeve-Upper: Grease lubricated Heavy duty Ball bearing/Bronze, III932, C89835
 - Bearings/Sleeve-Lower: Sleeve bearing- Graphalloy grade GM 343.3/Stainless Steel, AISI 416
 - Optional special material shall be available based on requirements

2.1.2 MOTORS

- A. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory aligned, and shall be realigned after installation by the manufacturer's representative.
- 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 pumps shall be realigned by the contractor, according to the standards of the Hydraulics Institute, after grouting of the base and connection of piping.

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