

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specifications, apply to this section, and the other sections of Division 23.

1.2 SUMMARY

- A. Section includes:
 - 1. End suction closed coupled pumps (base mounted).
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 23 Section: "Common Motor Requirements": Product requirements for motors for placement by this section.
 - 2. Division 23 - Hydronic Piping: Execution requirements for connection to pumps specified by this section.
 - 3. Division 23 Section: "Vibration Controls for HVAC Piping and Equipment": Product requirements for vibrations isolators installed with pumps.
 - 4. Division 23 Section: "Pipes and Tubes for HVAC Piping and Equipment": Execution requirements for connection to pumps specified by this section.
 - 5. Division 23 Section: "General-Duty Valves for HVAC Piping": Product requirements for valves used in hydronic piping systems.
 - 6. Division 26 Section: "Low Voltage Electrical Power Conductors & Cables": Execution requirements for electrical connections to pumps specified by this section.
 - 7. Division 26 Section: "Raceways and Boxes for Electrical Systems"

1.3 REFERENCES

(Unless otherwise noted, references apply to "latest editions.")

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. Underwriters Laboratories Inc.:
 - 1. UL 778 - Motor Operated Water Pumps.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide pumps to operate at system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.5 SUBMITTALS

- A. Division 01 Section – "Submittal Procedures": Submittal Procedures.

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- B. Product Data: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes, and finishes.
- C. Manufacturer's Installation Instructions: Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Submission of all submittals shall be made electronically via email with PDF attachments to submit@kibart.com

1.6 CLOSEOUT SUBMITTALS

- A. Division 01 Section – “Execution and Closeout Requirements”: Closeout procedures.
- B. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience and approved by manufacturer.

1.8 PRE-INSTALLATION MEETINGS

- A. Division 01 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum two weeks prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 Section – “Product Requirements”: Product storage and handling requirements.
- B. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 WARRANTY

- A. Division 01 Section – “Execution and Closeout Requirements”: Product warranties and product bonds.

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- B. Furnish five year manufacturer warranty for pumps.

1.12 EXTRA MATERIALS

- A. Division 01 Section – “Execution and Closeout Requirements”: Spare parts and maintenance products.
- B. Furnish one set of mechanical seals for each pump.
- C. Furnish two sets of cartridges for each side-stream filter.

PART 2 PRODUCTS

2.1 END SUCTION LONG COUPLED PUMPS (BASE MOUNTED)

- A. Manufacturer:
 - 1. Pumps shall meet model numbers, types, sizes, capacities, and electrical characteristics as indicated on the Contract Drawings.
 - 2. Basis of Design: Grundfos
 - 3. Other acceptable manufacturers: Bell & Gossett, Taco, Armstrong or Wilo.
- B. End Suction Long Coupled Pump (Base Mounted):
 - 1. The pumps shall be long coupled, base mounted, single stage, end suction, vertical split case design, in cast iron bronze fitted construction specifically designed for quiet operation. Suitable standard operations at 225°F and 175 PSIG working pressure. Working pressures shall not be de-rated at temperatures up to 250°F. The pump internals shall be capable of being serviced without disturbing piping connections, electrical motor connections or pump to motor alignment.
 - 2. The pumps shall be composed of three separable components a motor, bearing assembly, and pump end (wet end). The motor shaft shall be connected to the pump shaft via a replaceable flexible coupler.
 - 3. A bearing assembly shall support the shaft via two heavy-duty regreaseable ball bearings. Bearing assembly shall be replaceable without disturbing the system piping and shall have foot support at the coupling end. Pump bearings shall be regreaseable without removal of the bearings from the bearing assembly. Thermal expansion of the shaft toward the impeller shall be prevented via an inboard thrust bearing.
 - 4. The bearing assembly shall have a solid SAE1144 steel shaft. A non-ferrous shaft sleeve shall be employed to completely cover the wetted area under the seal.
 - 5. Pump shall be equipped with an internally flushed mechanical seal assembly installed in an enlarged tapered seal chamber. Application of an internally flushed mechanical seal shall be adequate for seal flushing without requiring external flushing lines. Seal assembly shall have a brass housing, Buna bellows and seat gasket, stainless steel spring, and be of a carbon ceramic design with the carbon face rotating against a stationary ceramic face.
 - 6. Bearing assembly shaft shall connect to a Stainless Steel impeller. Impeller shall be both hydraulically and dynamically balanced to ANSI/HI 1.1-1.5-1994, section 1.4.6.1.3, figure 1.106, balance grade G6.3 and keyed to the shaft and secured by a stainless steel locking cap screw or nut.

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7. Pump shall be designed to allow for back pull-out allowing access to the pump's working components.
8. A center drop-out type coupling shall be employed between the pump and motor. Pumps for variable speed application shall be provided with a coupler sleeve. Coupler shall allow for removal of pump's wetted end without disturbing pump volute or movement of the pump's motor and electrical connections. On variable speed applications the coupler sleeve should be constructed of an EPDM material to maximize performance life.
9. An ANSI and OSHA rated coupler guard shall shield the coupler during operation. Coupler guard shall be dual rated ANSI B15.1, Section 8 and OSHA 1910.219 compliant coupling guard and contain viewing windows for inspection of the coupling. No more than .25 inches of either rotating assembly shall be visible beyond the coupling guard.
10. Pump volute shall be of a cast iron design for heating systems with integrally cast pedestal volute support, rated for 175 PSIG with integral cast iron flanges drilled for 125# ANSI companion flanges. Volute shall include gauge ports at nozzles, and vent and drain ports.
11. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pumps and motors shall be factory aligned, and shall be realigned after installation by the manufacturer's representative. Motors shall be non-overloading at any point on the pump curve and shall meet NEMA specifications and conform to the current standards. **Motor shall be VFD ready with shaft grounding rings.** Motors shall be premium efficient and a minimum class F insulation rating.
12. Base plate shall be of structural steel or fabricated steel channel configuration fully enclosed at sides and ends, with securely welded cross members and fully open grouting area (for field grouting). The minimum base plate stiffness shall conform to ANSI/HI 1.3.4-1997 for Horizontal Baseplate Design standards.
13. The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 1.1-1.5-1994, section 1.4.6.1.1 for recommended acceptable unfiltered field vibration limits (as measured per H.I. 1.4.6.5.2, Figure 1.108) for pumps with rolling contact bearings. Pump manufacturer shall be ISO-9001 certified.
14. The seismic capability of the pump shall allow it to withstand a horizontal load of 0.5g, excluding piping and/or fasteners used to anchor the pump to mounting pads or to the floor, without adversely affecting pump operation.
15. Each pump shall be factory tested and name-plated before shipment.
16. Pump shall conform to ANSI/HI 9.6.3.1 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall confirm to the ANSI/HI 9.6.1-1997 standards for Centrifugal and Vertical Pumps for NPSH Margin.
17. For chilled water applications provide a **drain pan** under pump and pipe to nearest floor drain.
18. Pump shall meet the latest minimum efficiency as set forth by the **DOE.**

C. Accessories:

1. Provide pumps with EPT Tungsten/Carbide seal (250°F maximum operating temperature), Viton seal, or Teflon seal should be used in lieu of the Buna standard seal (225°F maximum operating temperature).

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PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings. For close coupled or base mounted pumps, install supports under elbows on pump suction and discharge line sizes 4 inches and over.
- C. Install pumps on vibration isolators. Refer to Division 23 Section: "Vibration and Seismic controls for HVAC Piping and Equipment".
- D. Install flexible connectors at or near pumps where piping configuration does not absorb vibration. Refer to Division 23 Section: "Vibration and Seismic controls for HVAC Piping and Equipment".
- E. Provide valves and piping specialties as indicated on details on the Contract Drawings.
- F. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump so no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and larger.
- G. Provide air cock and drain connection on horizontal pump casings.
- H. Provide drains for bases and seals.
- I. Check, align, and certify alignment of base mounted pumps prior to start-up.
 - 1. Align (laser) pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
 - 2. Adjust pump and motor shafts for angular offset alignment by methods specified in the Hydraulics Institute Standard 1.1 – 1.5. "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation".
 - 3. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill base plate with non-shrink nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.
 - 4. Comply with pump and coupling manufacturer's written instructions.
- J. Install close coupled and base mounted pumps on 4" high concrete housekeeping pad, with anchor bolts, set and level, and grout in place, dimensions per contract drawings.
- K. Lubricate pumps before start-up.
- L. Install Work in accordance with all applicable codes, standards, and local authorities having jurisdiction requirements.

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- M. Control wiring for remote mounted transmitting sensors, switches, etc. shall be provided by controls contractor. All wiring shall be performed per manufacturer's instructions and applicable State, Federal and local codes.

3.2 FIELD QUALITY CONTROL

- A. Division 01 Section – "Quality Requirements": Field inspection, testing, adjusting, and balancing.
- B. Inspect for alignment of base mounted pumps.
- C. Inspect, test, adjust and balance all pumps to meet scheduled capacities.

3.3 COMMISSIONING

- A. Provide support for Commissioning Activities and Functional Performance Testing.
- B. Contractor shall provide copies of final reports to the Commissioning Agent (CxA) for review and inclusion with final Cx project documentation as applicable

END OF SECTION