

SECTION 232123 - 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 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Close-coupled, in-line centrifugal pumps.
 - 2. Separately coupled, base-mounted, end-suction centrifugal pumps.
 - 3. Separately coupled, base-mounted, double-suction centrifugal pumps.
 - 4. Double-suction, vertical split case pumps.
 - 5. Pump specialty fittings.

1.3 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hydronic pumps through one source from a single manufacturer.

Retain first paragraph below to allow drawing details based on one manufacturer's product to establish requirements and still allow competition. Coordinate with Division 01 requirements.

- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of hydronic pumps and are based on the specific system indicated.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- D. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store pumps in dry location.
- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Pump motors shall be 1750 rpm maximum and sized for non-overloading service.
- B. Pumps shall have stainless steel shafts and sleeves, bronze wear rings, and cast iron bases. Bases shall be designed for grouting in place.
- C. Mechanical seals shall be John Crane Type XP662D1, with Viton bellows, tungsten carbide and carbon seal faces.
- D. In special applications where packed pumps are used, packing shall be Chesterton 328 braided teflon, Crane, Durametalllic or equal.
- E. Pumps shall have Woods Dura-Flex or Rexnord Omega elastomeric couplings.
- F. Pumps, in general, shall have a grease lubricated, heavy duty, deep groove ball bearings with a certified rating design of 200,000 hours of average bearing life. Acceptable manufacturers are S.K.F., Fafnir, and New Departure.

2.2 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

Inline pumps may be used for non-critical applications. Limit to 5HP or less.

- A. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 - 1. Bell & Gossett; Div. of ITT Industries; Series 80.
 - 2. Grundfos Pumps Corporation.
 - 3. Taco, Inc.
- B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically. Rate pump for 175-psig (1204-kPa) minimum working pressure and a continuous water temperature of 225 deg F (107 deg C).
- C. Pump Construction:
 - 1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, and threaded companion-flange connections.
 - 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - 3. Pump Shaft: Steel, with copper-alloy shaft sleeve.
- D. Motor: Single speed, with permanently lubricated ball bearings, unless otherwise indicated; and rigidly mounted to pump casing. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

2.3 SEPARATELY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS

- A. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 - 1. Bell & Gossett; Div. of ITT Industries; Series 1510.
 - 2. Buffalo Pumps, Inc.; an Ampco Pittsburgh Co.
 - 3. PACO Pumps.
 - 4. Taco, Inc.
- B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 175-psig (1204-kPa) minimum working pressure and a continuous water temperature of 225 deg F (107 deg C).
- C. Pump Construction:

Not all manufacturers provide volute supports that allow removal and replacement of impeller without disconnecting piping.

- 1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and flanged connections. Provide integral mount on volute to support the casing, and attached piping to allow removal and replacement of impeller without disconnecting piping or requiring the realignment of pump and motor shaft.
- 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.

3. Pump Shaft: Stainless steel.
 - D. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
 - E. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.
 - F. Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
- 2.4 SEPARATELY COUPLED, BASE-MOUNTED, DOUBLE-SUCTION CENTRIFUGAL PUMPS

- A. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 1. Allis Chalmers
 2. Bell & Gossett; Div. of ITT Industries; Series HSC.
 3. Buffalo Pumps, Inc.; an Ampco Pittsburgh Co.
 4. Chicago.
 5. Peerless Pump; a Member of the Sterling Fluid Systems Group.
 6. Taco, Inc.
 7. Weinman Bell & Gossett; Div. of ITT Industries.
- B. Description: Factory-assembled and -tested, centrifugal, impeller-between-bearings, separately coupled, double-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 175-psig (1204-kPa) minimum working pressure and a continuous water temperature of 225 deg F (107 deg C).

C. Pump Construction:

Not all manufacturers provide casing supports that allow removal and replacement of impeller without disconnecting piping. If selecting this option, also select the drop-out coupling described below.

1. Casing: Horizontally split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and ASME B16.1, Class 125 flanges. Casing supports shall allow removal and replacement of impeller without disconnecting piping.
2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
3. Pump Shaft: Stainless steel.
- D. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
- E. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.

- F. Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

2.5 DOUBLE-SUCTION, VERTICAL-SPLIT CASE PUMPS

- A. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 - 1. Bell & Gossett; Div. of ITT Industries; Series VSX.
- B. Description:
 - 1. Single-stage, vertical-split case, and double-suction.
 - 2. Factory aligns and tests pump and motor before shipment.
 - 3. Cast iron casing suitable for 175 psi working pressure, bronze impeller, stainless steel shaft, and mechanical seal.
 - 4. Mount pump and motor on a common base plate of heavy structural steel design and securely welded cross members and open grouting area. Provide flexible, center drop-out, spacer type coupler between the pump and motor, and coupler guard securely fastened to the base.
 - 5. Motors: Meet NEMA specifications with size, voltage and enclosure as called for on the plans.

2.6 PUMP SPECIALTY FITTINGS

- A. Suction Diffuser:
 - 1. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 - a. ITT Bell & Gossett.
 - b. Taco.
 - c. Victaulic.
 - 2. Cast iron, angle-type body with flow straightening device, removable strainer (bronze for start-up, stainless steel for permanent), tapped suction gage port, blow down connection, and adjustable support foot.
 - 3. Rated for maximum working pressure of 175 psi at 250 degree F.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

- A. Comply with HI 1.4.
- B. Install all pumps in strict accordance with manufacturer's instructions. Provide service space around pumps as recommended by the pump manufacturer.
- C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- D. Install continuous-thread hanger rods and spring hangers of sufficient size to support pump weight. Vibration isolation devices are specified in Division 23 Section "Vibration Controls for HVAC Piping and Equipment." Fabricate brackets or supports as required. Hanger and support materials are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- E. Suspend vertically mounted, in-line centrifugal pumps no higher than 5" AFF and independent of piping. Install pumps with motor and pump shafts vertical. Use continuous-thread hanger rods and spring hangers of sufficient size to support pump weight. Vibration isolation devices are specified in Division 21 Section "Vibration Controls for Fire-Suppression Piping and Equipment." Hanger and support materials are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment/Hangers and Supports for HVAC Piping and Equipment."

First paragraph and subparagraphs below are for base-mounted pumps that require design considerations for size, mass, and isolation from other structural members. A foundation is not an inertia base. Design and detail inertia bases on Drawings.

- F. Set base-mounted pumps on concrete foundation. Disconnect coupling before setting. Do not reconnect couplings until alignment procedure is complete.
 - 1. Support pump baseplate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches (19 to 38 mm) between pump base and foundation for grouting.
 - 2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.
- G. Do not mount pumps on walls that are common to critical areas such as offices, conference rooms, classrooms, etc. In-line pumps shall be installed directly in the piping system, and supported independently from the piping.

3.3 ALIGNMENT

- A. Align 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.
- B. Comply with pump and coupling manufacturers' written instructions.

- C. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.
- E. Grout pump mounting base full after piping is connected but before pump drive is aligned. After grouting, align pump drive shaft to 5 mils, even if pump is factory aligned, and conduct vibration test.
- F. Realignment after installation prior to start up will be performed by Owner.

3.4 CONNECTIONS

Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
- D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- E. Install check valve, balancing valve and shutoff valve on discharge side of pumps. Triple duty valve is not acceptable.
- F. Install Y-type strainer and shutoff valve on suction side of pumps. Suction diffusers can be used in lieu of in-line strainers, long radius elbow and spool piece.
- G. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
- H. Install pressure gages on pump suction and discharge, at integral pressure-gage tapping, or install single gage with multiple input selector valve.

Retain first two paragraphs below for automatic condensate pump units.

- I. Install check valve and ball valve on each condensate pump unit discharge.
- J. Install electrical connections for power, controls, and devices.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Perform the following startup checks for each pump before starting:
 - a. Verify bearing lubrication.
 - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - c. Verify that pump is rotating in the correct direction.
5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
6. Start motor.
7. Open discharge valve slowly.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.

END OF SECTION 232123