

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data:
 - 1. Pumps
- B. Shop Drawings:
 - 1. Product Data: Include certified performance curves and rated capacities; shipping, installed, and operating weights; furnished specialties; final impeller dimensions; and accessories for each type of product indicated. Indicate pump's operating point on curves. If parallel pumping is used, provide parallel pump operating curve data.
 - 2. Show pump layout and connections. Include Setting Drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 3. Prefabricated Pieces.
- C. Operation and Maintenance Data:
 - 1. Operating and maintenance procedures.

1.02 QUALITY ASSURANCE

- A. UL Compliance: Fabricate and label pumps to comply with UL 778, "Motor-Operated Water Pumps," for construction requirements.
- B. Product Options: drawings indicate size, profiles, connections, and dimensional requirements of pumps and are based on the specific types and models indicated. Other manufacturers' pumps with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- 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.

1.03 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.

1.04 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section Cast-in-Place Concrete.

PART 2 PRODUCTS

2.01 BASE-MOUNTED PUMPS

- A. Acceptable Manufacturers:
 - 1. Armstrong
 - 2. Bell and Gossett
 - 3. Patterson

B. General Pump Requirements:

1. Pump Units: Factory assembled and tested.
2. Motors: Include built-in, thermal-overload protection and grease-lubricated ball bearings. Select each motor to be non-overloading over full range of pump performance curve. If variable speed drives are used, provide inverter duty motors.
3. Motors Indicated to Be Energy Efficient: minimum efficiency as indicated according to IEEE 112, Test Method B. Include motors with higher efficiency than "average standard industry motors" according to IEEE 112, Test Method B, if efficiency is not indicated.

C. Flexible-Coupled, End-Suction Pumps:

1. Description: base-mounted, centrifugal, flexible-coupled, end-suction, single-stage, bronze-fitted, back-pull-out, radially split case design; rated for 175-psig minimum working pressure and a continuous water temperature of 225 deg F.
 - a) Casing: cast iron, with flanged piping connections, drain plug at low point of volute, threaded gage tappings at inlet and outlet connections, and integral feet or other means on volute to support weight of casing and attached piping. Casing shall allow removal and replacement of impeller without disconnecting piping.
 - b) Provide vent and drain plugs and pressure gauge tappings on pump casings.
 - c) Impeller: ASTM B 584, cast bronze, statically and dynamically balanced, closed, overhung, single suction, keyed to shaft, and secured by locking cap screw.
 - d) Wear Rings: replaceable, bronze casing ring.
 - e) Shaft and Sleeve: steel shaft with bronze sleeve.
 - f) Seals: mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and flexible bellows and gasket.
 - g) Seals: stuffing box, with at least four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - h) Coupling: flexible, capable of absorbing torsional vibration and shaft misalignment.
 - i) Coupling Guard: steel, removable, and attached to mounting frame.
 - j) Mounting Frame: welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate for mounting pump casing, coupling guard, and motor. Field-drill motor-mounting holes for field-installed motors.
 - k) Motor: secured to mounting frame, with adjustable alignment.
 - l) Provide complete flushing arrangement for mechanical seals and packing.

2.02 HORIZONTAL SPLIT-CASE PUMPS

A. Acceptable Manufacturers:

1. Bell & Gossett.
2. Armstrong.

B. Description: base-mounted, centrifugal, flexible-coupled, double-suction, single-stage, bronze-fitted, axially split case design; rated for 175-psig minimum working pressure and a continuous water temperature of 225 deg F, with mechanical seals and impeller mounted between bearings.

1. Provide double row outboard ball bearings on horizontal split-case pumps.

2.03 IN-LINE PUMPS

A. Approved Manufacturers:

1. Armstrong
2. Bell and Gossett
3. Grundfos

- 4. Patterson
- 5. Wilo
- B. Description: Horizontal, in-line, centrifugal, single-stage, bronze-fitted, radially split case design; rated for 125-psig minimum working pressure and a continuous water temperature of 225 deg F.

2.04 PUMP SPECIALTY FITTINGS

- A. Suction Diffuser: angle or straight pattern, 175-psig pressure rating, cast-iron body and end cap, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and factory- or field-fabricated support.
- B. Triple-Duty Valve: angle or straight pattern, 175-psig pressure rating, cast-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features.

PART 3 EXECUTION

3.01 INSTALLATION OF PUMPS

- A. Install pumps to provide access for periodic maintenance, including removing motors, impellers, couplings, and accessories.
- B. Support pumps and piping separately so piping is not supported by pumps.
- C. Suspend in-line pumps using continuous-thread hanger rod and vibration-isolation hangers. Install seismic bracing as required by authorities having jurisdiction.
- D. Set base-mounted pumps on concrete foundation. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.
 - 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 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.
- E. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.

3.02 ALIGNMENT

- A. Align pump and motor shafts and piping connections after setting them on foundations, after grout has been set and foundation bolts have been tightened, and after piping connections have been made.
- B. Comply with pump and coupling manufacturers' written instructions.
- C. 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.

3.03 CONNECTIONS

- 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 the 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 and throttling valve on discharge side of in-line circulators.
- F. Install suction diffuser and shutoff valve on suction side of base-mounted pumps.
- G. Install triple-duty valve on discharge side of base-mounted pumps.
- H. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves. Flexible connectors shall not be used to correct for mis-alignment of piping. Provide a spool piece of pipe in place of the flexible connector to insure proper pipe alignment. Then remove spool and install the flexible connector. DPS shall inspect and approve the installation of flexible connectors. The contractor shall

provide documentation that the pump is installed in accordance with the manufacturer's recommended tolerances. The flexible connection braiding shall not be used to compensate for offsets and alignment of the piping. The flexible connector shall not be compressed.

- I. Install pressure gauges on pump suction and discharge. Install at integral pressure-gauge tappings where provided.
- J. Install check valve and gate or ball valve on each condensate pump unit discharge.
- K. Install electrical connections for power, controls, and devices.
- L. Electrical power and control wiring and connections are specified in Division 26 Sections.
- M. Final close-out procedure: Remove start-up strainer and install permanent strainer.
- N. Final close-out procedure: Verify that the pump controls are correct for required application.

3.04 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Refer to Specification Section 23 21 13 Hydronic Piping for additional requirements.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Install shutoff and check valves on inlet of pressure-operated units.
- D. Install inlet strainer and valved bypass to drain at system return connection.
- E. Install check valve, shutoff valve, and throttling valve at pump discharge connections for each pump unit.
- F. Install pipe drain to nearest floor drain for overflow and drain piping connections.
- G. Install full-size vent piping, terminating in 180° elbow at point above highest steam system connection or as indicated.
- H. Install electrical connections for power, controls, and devices.
- I. Electrical power and control wiring and connections are specified in Division 26 Sections.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain pumps as specified below:
 - 1. Train owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining pumps.
 - 2. Schedule training with owner, through architect, with at least seven days' advance notice.

END OF SECTION 23 21 23