

SECTION 23 20 20**HVAC PUMPS****PART 1 - DESIGN DIRECTIVES****1.1 DESIGN CRITERIA**

- A. The Designer shall indicate sizes, profiles, connections, and dimensional requirements of pumps, which are based on the specific manufacturer types and models indicated.
- B. The designer is responsible for laying out the mechanical room in such a manner that the pumps are serviceable and will not require suction diffusers. Five line size pipe diameters are required at the inlet of the pump.
- C. When designing domestic hot water circulators, the designer shall incorporate a control scheme that will save energy. This can be done through the DDC system or via a strap-on aquastat wired in series with the pump.

1.2 SUBMITTALS

- A. Submit data specific for the project, including certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

1.3 QUALITY ASSURANCE

- A. UL Compliance: Provide HVAC pumps which are listed and labeled by UL, and comply with UL Standard 778, "Motor Operated Water Pumps".

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store pumps in a dry location.
- B. Retain shipping flange protective covers and protective coatings during storage.

PART 2 - PRODUCTS**2.1 DOMESTIC HOT WATER RECIRCULATION PUMPS**

- A. Circulators shall be inline, centrifugal, system lubricated, all bronze construction rated for 125 psig working pressure and 225°F continuous water temperature.
- B. Provide threaded companion flanges for piping connections.
- C. Circulator motor shall be a non-overloading permanent split capacitor motor with impedance protection.
- D. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. "Bronze Fox NBF Circulator" Bell & Gossett, ITT.
 - 2. "00 Series" Taco, Inc.

2.2 INLINE CIRCULATORS

- A. Circulators shall be horizontal inline, centrifugal, separately-coupled, single-stage, bronze-fitted, radially split case design, with mechanical seals, and rated for 125 psig working pressure and 225°F continuous water temperature.
- B. Cast iron casings, with threaded companion flanges for piping connections smaller than 2 1/2", and threaded gage tappings at inlet and outlet connections.
- C. Statically and dynamically balanced impeller, closed, overhung single-suction, fabricated from cast bronze or bronze conforming to ASTM B 584, and keyed to steel shaft. Provide slinger on motor shaft between motor and seals to prevent liquid that leaks past pump seals from entering the motor bearings.
- D. Mechanical seals shall be carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket. Pump shaft bearings shall be oil-lubricated, bronze journal, and thrust bearings. Flexible pump couplings, capable of absorbing torsional vibration and shaft misalignment. Motors shall be resiliently mounted to the pump casing.
- E. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong Pumps, Inc. - 1000 Series
 - 2. Aurora Pump - 326A Series
 - 3. Bell & Gossett Series 60
 - 4. Taco, Inc - 1600 Series

2.3 VERTICAL INLINE PUMPS

- A. Pumps shall be centrifugal, close-coupled, single-stage, bronze-fitted, radially split case design, with mechanical seals, and rated for 175 psig working pressure and 225°F continuous water temperature.
- B. Cast iron casings, with threaded companion flanges for piping connections smaller than 2-1/2", and threaded gage tappings at inlet and outlet connections.
- C. Statically and dynamically balanced impeller, closed, overhung, single-suction, cast bronze, conforming to ASTM B 584, and keyed to shaft. Ground and polished steel shaft, with bronze sleeve and integral thrust bearing. Provide slinger on motor shaft between motor and seals to prevent liquid that leaks past pump seals from entering the motor bearings. Mechanical Seals consisting of carbon steel rotating ring, stainless steel spring, ceramic seat, and Buna-N bellows and gasket.
- D. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. Grundfos CR or VL Series
 - 2. Bell & Gossett - Series 80 & 90
 - 3. Taco, Inc. – KV Series

2.4 BASE-MOUNTED, SEPARATELY-COUPLED, END-SUCTION PUMPS

- A. Pumps shall be base-mounted, centrifugal, separately-coupled, end-suction, single-stage, bronze-fitted, radially split case design, and rated for 175 psig working pressure and 225°F continuous water temperature. Pumps fabrication shall conform with the Hydraulics Institute (HI) Standards.
- B. Cast iron casings, with flanged piping connections, and threaded gage tappings at inlet and outlet flange connections. Statically and dynamically balanced impeller, closed, overhung, single-suction, fabricated from cast bronze conforming to ASTM B 584, keyed (steel) to shaft and secured by a

stainless steel locking cap screw. Provide replaceable bronze wear rings, steel pump shaft, with bronze sleeve.

- C. Mechanical seals consisting of stainless steel metal parts, Ni-resist seat, and flexible Buna-N bellows and gasket. Pump bearing housing assembly shall have oil lubricated bearings replaceable without disturbing piping connections.
- D. Provide flexible pump couplings, capable of absorbing torsional vibration and shaft misalignment; complete with metal coupling guard. Coupling shall be spacer type that allows the coupling to be removed without disturbing the piping or the motor. Spacers shall be Lovejoy flex shaft type couplings with EPDM rubber inserts or Woods equivalent.
- E. Provide certified pump curves for all pumps with a capacity of 400 gpm or greater.
- F. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. Aurora Pumps, Inc. –320 Series
 - 2. Bell & Gossett – 1510 series
 - 3. Taco – FI Series

2.5 BASE-MOUNTED, HORIZONTAL SPLIT CASE PUMPS

- A. Pumps shall be base-mounted, centrifugal, separately-coupled, side-suction & discharge, single-stage, bronze-fitted, and rated for 175 psig working pressure and 225°F continuous water temperature. Pumps fabrication shall conform with the Hydraulics Institute (HI) Standards.
- B. Cast iron casings, with flanged piping connections, and threaded gage tappings at inlet and outlet flange connections. Statically and dynamically balanced impeller, closed, overhung, double-suction, fabricated from cast bronze conforming to ASTM B 584, keyed (steel) to shaft and secured by a stainless steel locking cap screw. Provide replaceable bronze wear rings, steel pump shaft, with bronze sleeve.
- C. Mechanical seals consisting of stainless steel metal parts, Ni-resist seat, and flexible Buna-N bellows and gasket. Pump bearing housing assembly shall have oil lubricated bearings replaceable without disturbing piping connections.
- D. Provide flexible pump couplings, capable of absorbing torsional vibration and shaft misalignment; complete with metal coupling guard. Coupling shall be spacer type that allows the coupling to be removed without disturbing the piping or the motor. Spacers shall be Lovejoy flex shaft type couplings with EPDM rubber inserts or Woods equivalent.
- E. Provide certified pump curves for all pumps with a capacity of 400 gpm or greater.
- F. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. Aurora Pumps, Inc. –410 Series
 - 2. Bell & Gossett – HSC series
 - 3. Taco TA Series

2.6 ELEVATOR PIT SUMP PUMP

- A. Provide pump and control systems capable of pumping water while containing oil. The system shall function automatically and shall provide for an alarm and separate LED lights in the event of (a) the presence of oil in the sump, (b) high liquid in the sump, or (c) high amps or a locked rotor condition. LED lights shall be provided for (1) power and (2) pump run function.

- B. The pump shall be a submersible type, approved to UL 778 standards and shall include thermal and overload protection. The motor shall be fractional horsepower, and capable of operating continuously or intermittently. The motor housing shall be constructed of #304 stainless steel. Mechanical seats shall be housed in a separate oil-filled compartment.
- C. The main control shall be approved to UL 508 standards and housed in a gasketed NEMA 4X enclosure with a see-through window for observation of operating functions. The control shall be equipped with an 8-pin twist lock receptacle, dual solid state Oil-Minder relays with variable sensitivity settings, an over current relay, self-cleaning stainless steel sensor probe, high decibel warning horn with alarm silencing switch, dual floats, clearly marked terminal board and remote monitoring contact. A NEMA 4X junction box with 8-pin twist-lock electrical receptacle and mating 8 conductor cable shall be provided. The control unit, junction box, pump, floats and sensor shall be factory assembled as a complete, ready-to-use system and shall be tested and approved as a complete system by a nationally recognized testing laboratory. The system shall allow for the main control to be located outside of the elevator hoistway to be monitored for all functions without having to enter the elevator shaft.
- D. Manufacturers:
 - 1. Stancor, Inc. – SE series pump with oil-Minder control system

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with the manufacturer's written installation instructions.
- B. Install pumps in locations and arranged to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- C. Support pumps and piping separately so that the weight of the piping system does not rest on the pump.
- D. Suspend inline pumps using threaded hanger rod and vibration isolation hangers of sufficient size to support the weight of the pump independent from the piping system.
- E. End suction pumps shall have five line size diameters of pipe to the inlet of the pump.

3.2 ALIGNMENT

- A. Arrange for factory authorized agent to align pump and motor shafts and piping connections after setting on foundations, after grout has been set and foundations bolts have been tightened, and after piping connections have been made. Adjust alignment of pump and motor shafts for angular and parallel alignment by one of the two methods specified in the Hydraulic Institute "Centrifugal Pumps - Instructions for Installation, Operation and Maintenance" and per the manufacturer's written instructions.
- B. After alignment is correct, tighten the foundation bolts evenly, but not too firmly. Fill the base plate completely with non-shrink, nonmetallic grout, with metal blocks and shims or wedges in place. After grout has cured, fully tighten foundation bolts.

END OF SECTION 23 20 20