

**SECTION 23 21 23
HYDRONIC PUMPS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. In-line circulators
- B. Vertical in-line pumps
- C. Base mounted pumps
- D. Side-stream filters
- E. Suction diffuser

1.2 REFERENCES

- A. UL 778 - Motor Operated Water Pumps

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with minimum five years of experience.
- B. Alignment: A qualified millwright shall align the base mounted pumps and certify the alignment.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Submit certified pump curves showing performance and efficiency characteristics with selected pump operating point plotted.
 - 1. Include NPSH curve when applicable.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01 77 00.
- B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00.
- B. Store and protect products under provisions of Section 01 60 00.

1.7 WARRANTIES

- A. Provide a 5-year warranty on all motors, see section 23 05 13.

1.8 COMMISSIONING

- A. Commissioning of a system or systems specified in this section is part of the construction process.
 - 1. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Owner's Representative and the Commissioning Authority.
 - 2. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure.
 - 3. Refer to Section 01 77 00 - Contract Closeout, for substantial completion details.
 - 4. Refer to Section 01 91 00 - Commissioning, for detailed commissioning requirements

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Crane Deming
- B. Bell & Gosset
- C. Peerless

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- D. Aurora
- E. TACO
- F. S.A. Armstrong

2.2 GENERAL CONSTRUCTION REQUIREMENTS

- A. Balance: Rotating parts statically and dynamically
- B. Construction: Designed and built to permit servicing without breaking piping or motor connections.
- C. Pump Motors: Operate at 1800 maximum rpm (Refer to Section 23 05 13)
- D. Pump Connections: Flanged.
- E. Chilled water and condenser water pumps shall be base mounted end suction type.
- F. All pumps operated by a variable frequency drives shall have electric motors that are inverter duty rated, see section 23 05 13.

2.3 IN-LINE CIRCULATORS FRACTIONAL HORSEPOWER

- A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psig maximum working pressure.
- B. Casing: Cast iron
- C. Impeller: Cadmium plated steel, Brass or Bronze, keyed to shaft.
- D. Bearings: Two sets, oil lubricated bronze sleeves.
- E. Shaft: Stainless steel with copper or stainless steel sleeve integral thrust collar.
- F. Seal: Carbon rotating against a stationary ceramic seat, viton fitted 225°F maximum continuous operating temperature.
- G. Drive: Flexible coupling.

2.4 VERTICAL IN-LINE PUMPS

- A. Type: Vertical shaft, single stage, close coupled, radially or horizontally split casing, for in-line mounting, for 175 psig maximum working pressure.
- B. Casing: Cast iron or cast steel, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.
- D. Shaft: Stainless steel
- E. Seal: Carbon rotating against a stationary ceramic seat, viton fitted 225°F maximum continuous operating temperature.

2.5 BASE MOUNTED PUMPS

- A. Type: End suction, horizontal shaft, single stage, long coupling drive; 175 psig maximum working pressure, end suction, back pullout.
- B. Casing: Cast iron, with suction and discharge gage ports, seal flush connection, drain plug, flanged suction and discharge.
 - 1. The casing drain is not to be used as a port.
- C. Impeller: Bronze or stainless steel, fully enclosed keyed to shaft.
- D. Bearings: Grease lubricated roller or ball bearings.
- E. Shaft: Shall be stainless steel with a copper, bronze, or stainless steel shaft sleeve.
- F. Seal: Carbon rotating against a stationary ceramic seat, viton fitted 225°F maximum continuous operating temperature.
- G. Drive: Flexible coupling with coupling guard, woods type.
- H. Base plate: Shall be cast iron or fabricated steel with integral drain rim.

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- I. Provide manufacturer's Model and Serial identification plate specifying GPM and impeller diameter firmly secured to pump assembly.
- J. Pump motors shall be TEFC Premium Efficiency inverter duty rated and suited for the environment in which they are installed.
- K. Pump motor RPM shall be 1800 or less.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service.
 - 1. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 5% of midpoint of published maximum efficiency curve.
- D. Decrease from line size with long radius reducing elbows or reducers.
 - 1. Support piping adjacent to pump so that pump flex-connector and casings do not carry any weight.
 - 2. For close coupled or base mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4" and over.
 - 3. Refer to Section 23 05 48, Vibration Isolation.
- E. Provide line sized shut-off valve and suction diffuser on pump suction, and line sized shut-off valve on pump discharge.
- F. Provide air cock and drain connection on horizontal pump casings.
- G. Provide drains for bases and seals, piped to and discharging into floor drains.
- H. Lubricate pumps before start-up.
- I. Install base mounted pumps on rigid concrete base or on concrete inertia base (refer to plans), with anchor bolts, set and level, and grout in place.
- J. Qualified millwright shall check, align, and certify base mounted pumps prior to start-up.
- K. If pump does not meet designed performance within 5% then upgrade pump at no cost to Owner.
- L. All base mounted pumps shall have vibration isolation provided at both pipe connections.
- M. Install all base mounted pumps with motors facing the center of the room or compound.
- N. Pump and motor metal support frame shall be cleaned, primed, and finish painted in accordance with Sections 09 91 13 or 09 91 26).
- O. Pumps circulating cold water shall be insulated in such a fashion that the insulation can be removed for servicing and re-assembled without damaging the integrity of the insulation assembly.
- P. For larger pumps, provide operating pressure gauge connected to suction and discharge pump ports with isolation valves and pressure bleed. (Refer to piping detail in plans)

3.2 FUNCTIONAL PERFORMANCE TESTING

- A. System Functional Performance Testing is part of the Commissioning Process.
 - 1. The Contractor shall perform the Functional Performance Testing s and the Commissioning Authority shall witness and document the test.
 - 2. Refer to Section 01 91 00, Commissioning, for functional performance tests and commissioning requirements.
- B. Systems Readiness Checklists shall be completed and submitted for each piece of equipment included in this section.

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- C. Include the functional performance testing of HVAC pumps as part of the Chilled Water System Functional Performance testing.

3.3 DEMONSTRATION AND TRAINING

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
 - 1. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
 - 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
 - 3. Refer to Section 01 91 00, Commissioning, for further contractor training requirements
- B. Provide demonstration and training for all types of HVAC Pumps installed in this project.

END OF SECTION