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

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.

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.

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