SECTION 15185 – HYDRONIC PUMPS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This Section governs the materials and installation of closed hydronic systems associated with building heating and cooling. The following systems, where applicable, shall be installed as specified herein.

1. Hot Water Heating System
2. Chilled Water Cooling System
3. Dual Temperature Water System
4. Heat Pump Circulating System
5. Closed Circuit Cooling Tower System
6. Run-Around Heat Recovery System

1.2 EQUIPMENT SUBSTITUTION

A. Most items in this DIVISION are eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used. All items eligible for substitution require submission of request for substitution 10 days prior to bid date. This submittal shall include specific models and capacities of equipment and not just manufacturer's literature. Only those manufacturers listed and those receiving written prior approval communicated via addendum shall be considered for review. Verbal approvals will not be given.

1.3 TESTING & APPROVING AGENCIES

A. Where items of equipment are required to be provided with compliance to U.L., A.G.A., or other testing and approving agencies, the contractor may submit a written certification from any nationally recognized testing agency, adequately equipped and competent to perform such services, that the item of equipment has been tested and conforms to the same method of test as the listed agency would conduct.

1.4 SUBMITTAL DATA

A. See Section 01300 for general submittal requirements.

B. Provide manufacturer's literature for all products specified in this Section, which will be installed under this project.

C. Provide performance curves for all pumps. Plot the specified operating point for each pump on its respective curve.

D. Provide complete literature for all components of packaged systems. These include pump performance, heat exchanger calculations, expansion tank capacity, data for all accessories and valves and complete wiring diagrams specific to the exact unit to be supplied. The wiring diagram shall indicate all required field and factory wiring.

PART 2 - PRODUCTS

2.1 PUMPS

A. Vertical Close Coupled Pumps.

1. Pumps shall be Taco Model 1900 or approved equal. The pumps shall be single stage end suction rear pull out design. The seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the plans/schedules.
2. Pump casing shall be a centerline discharge design constructed of ASTM A48 class 30 cast iron. The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections
3. All casings shall be flanged connections.
4. The impeller shall be ASTM C87500 or C89833 bronze and hydraulically balanced. The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted with a holding taper and left handed 431 series stainless steel bolt. The impeller shall be cast by the hydraulically efficient lost foam technique to ensure repeatability of high quality.
5. The pump shall incorporate a dry shaft design to prevent the circulating fluid from contacting the shaft. The pump shaft shall be AISI 1045 carbon steel with field replaceable copper nickel 90-10 shaft sleeve. In order to improve serviceability and reduce the cost of ownership the shaft sleeve must be slip on (press on not allowable) and must be easily replaced in the field.
6. The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250ºF. The pump shall be close coupled to a NEMA standard JM frame motor.
7. In order to both simplify and reduce the total cost of ownership, the manufacturer shall standardize on no more than three sizes of mechanical seals through out the entire range of the family of pumps. The manufacturer shall not use multiple part numbers for the same part.
8. Pump shall be fitted with integral Variable Frequency Drive fastened to adjustable mounting bracket. The integration of the drive shall be done in such a way that it will allow for either vertical drive orientation independent of vertical or horizontal pump orientation.
9. Factory prepackaging of drive shall include drive programming, motor rotation set, and prewiring with VFD shall be electrically connected to the pump motor. Connection wires to be routed via _" Sealtite tubing with 45 degree Sealtite connectors.

B. Integral Variable Frequency Drive
1. Construction
   a. Enclosure shall be rated for IP 20 and NEMA Type 1 with included conduit kit.
2. Application Data
   a. The AC Drive shall be sized to operate a variable torque load.
   b. The speed range shall be from a minimum speed of 1 Hz to a maximum speed of 200 Hz.
3. Environmental Ratings
   a. The AC Drive shall meet IEC / EN61800-3, UL 1995 type 1 plenum rated, and RoHS
   b. The AC Drive shall be designed to operate in an ambient temperature from -10 to 40 °C (+14 to 104 °F) without derating the drive, -10 to 50 °C (+14 to 122 °F) with derating the drive.
   c. The storage temperature range shall be -25 to 70 °C (-13 to 158 °F).

d. The maximum relative humidity shall be 95%, non-condensing or dripping water. Compliant with IEC600068-2-3
e. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 m), the AC Drive current should be derated 1% for every 330 ft (100 m) up to 6,600 ft (2,000 m).
f. IP54 environmental rating shall be available on certain models upon request. (See IP54 ratings) The top of the drive controller shall be IP21 and IP41.
g. Pollution rating shall be 1 HP to 25 HP at 200/240 V, 1 HP to 5 HP at 380/480V: Pollution degree 2 per IEC / EN61800-5-1, 30 HP to 40 HP @ 200/240 V, 30HP to 100 HP @ 380/480 V: Pollution degree 3 per IEC / EN61800-5-1
h. Vibration Resistance shall be 1.5mm to peak from 3 to 13 Hz, 1gn from 13 to 150 Hz, conforming to IEC/EN 60068-2-6.
i. Shock resistance shall be 15 gn for 11 ms conforming to IEC/EN 60068-2-27

4. Ratings
a. The AC Drive shall be designed to operate at 208 Vac ± 10% or 230 Vac ± 10% or 460 Vac ± 10%.
b. The AC Drive shall operate from an input frequency range of 50 to 60 Hz ± 5%.
c. The displacement power factor shall not be less than 0.96 lagging under any speed or load condition.
d. The efficiency of the AC Drive at 100% speed and load shall typically be 95% or greater.
e. The variable-torque rated AC Drive nominal full load current limit shall be not less than 110% for 60 seconds.

5. Protection
a. Upon power-up, the AC Drive power converter shall automatically test for valid operation of memory, valid operation of precharge circuit, loss of communication, DC-to-DC power supply, and control
b. The AC Drive power converter shall be protected against short circuits between output phases and also phase-to-ground.
c. Upon loss of the analog process follower reference signal, the AC Drive power converter shall be programmable to display a detected fault condition signal.
d. The output frequency shall be software enabled to fold back when the motor is in an overcurrent condition.
e. The output switching frequency of the AC Drive power converter shall be selectable from 6 to 16 kHz. Derating of the AC Drive power converter may be required if the factory setting is modified.
f. The AC Drive power converter shall provide an auto reset feature which can provide up to 10 programmable reset attempts after a detected fault has occurred.
g. Lead Length to be 50 meters max out to the motor without a choke.

6. Adjustments and Configurations
a. The AC Drive power converter will be factory programmed to operate all specified optional devices.
b. The acceleration and deceleration ramp times shall be adjustable from 0.1 to 3200 seconds.
c. The AC Drive power converter configuration shall have provisions for an Energy Savings motor type.
d. The AC Drive power converter shall have memory capability to retain and record drive operation and detected fault type for the past four faults.

7. Keypad Display Interface

a. An operator interface shall offer the modification of AC Drive power converter adjustments through a keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, detected fault condition signals, local control, adjustment storage, and diagnostics shall be accessible.
b. The AC Drive power converter software revision, output current, motor frequency, and motor voltage shall be readable through the drive display.

8. Operator Controls
   a. The control power for the digital inputs and outputs shall be 24 Vdc.
   b. The terminal block shall be used for all logic and analog signal connections to the power converter

9. Serial Communication
   a. The AC Drive shall have serial communications capability for the following protocols:
   - ModbusTM (Standard)
   - LonWorks® (Optional)
   - BACnet® (Optional)
   - MetasysTM N2 (Optional)
   - ApogeeTM P1 (Optional)

10. Harmonic Mitigation
    a. Each drive shall include reduced harmonics technology to reduce power system harmonics.
    b. See Addendum A

PART 3 - EXECUTION

3.1 PUMPS

A. General
   1. Contractor shall install pump in accordance with the manufacturer's instructions. Contractor shall level each pump.
   2. Pipe connections to pumps shall be made in such a manner so as not to exert any stress on pump housings. If necessary to meet this requirement, provide additional pipe supports and flex connectors.
   3. Pumps shall **NOT** be run dry to check rotation.

END OF SECTION 15185