SECTION 23 2123
HYDRONIC PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. System lubricated circulators.
B. In-line circulators.
C. Vertical in-line pumps.
D. Close-coupled pumps.
E. Base-mounted pumps.
F. Dual drive pumping system.

1.02 RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete.
B. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.
C. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
D. Section 22 0716 - Plumbing Equipment Insulation.
E. Section 22 0719 - Plumbing Piping Insulation.
F. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
G. Section 23 0548 - Vibration and Seismic Controls for HVAC.
H. Section 23 0716 - HVAC Equipment Insulation.
I. Section 23 0719 - HVAC Piping Insulation.
J. Section 23 2113 - Hydronic Piping.
K. Section 23 2114 - Hydronic Specialties.
L. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS
A. NEMA MG 1 - Motors and Generators; 2014.
B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.
C. Millwright's Certificate: Certify that base mounted pumps have been aligned.
D. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.
E. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Armstrong Fluid Technology, Inc; ______: www.armstrongfluidtechnology.com/#sle.
   B. Bell & Gossett, a Xylem Inc. brand; ______: www.bellgossett.com/#sle.
   C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 HVAC PUMPS - GENERAL
   A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve. Provide TEFL type motors suitable to application and temperature ranges.
   B. Minimum Quality Standard: UL 778.
   C. Base Mounted Pumps: Aligned by qualified millwright.
   D. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

2.03 SYSTEM LUBRICATED CIRCULATORS
   A. Type: Horizontal shaft, single stage, direct connected with multiple speed wet rotor motor for in-line mounting, for 140 psi maximum working pressure, 230 degrees F maximum water temperature.
   B. Casing: Cast iron with flanged pump connections.
   C. Impeller, Shaft, Rotor: Stainless Steel.
   D. Bearings: Metal Impregnated carbon (graphite) and ceramic.
   E. Motor: Impedance protected, multiple speed, with external speed selector.
   F. Performance:
      1. Flow Capacity: _____ gal/min.
      2. Head: _____ feet.
   G. Electrical Characteristics:
      1. _____ hp.
      2. _____ watts.
      3. 230 volts, single phase, 60 Hz.

2.04 IN-LINE CIRCULATORS
   A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psi maximum working pressure.
   B. Casing: Cast iron, with flanged pump connections.
   C. Impeller: Non-ferrous keyed to shaft.
   D. Bearings: Oil-lubricated bronze sleeve.
   E. Shaft: Alloy steel with bronze sleeve, integral thrust collar.
   F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
   G. Drive: Flexible coupling.
   H. Performance:
      1. Flow Capacity: _____ gal/min.
   I. Electrical Characteristics:
      1. _____ hp.
2. ____ volts, single phase, 60 Hz.
3. Motor: 1750 rpm unless indicated otherwise; refer to Section 22 0513.
4. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

2.05 VERTICAL IN-LINE PUMPS
A. Type: Vertical, single stage, close coupled, radially or horizontally split casing, for in-line mounting, for 175 psi working pressure.
B. Casing: Cast iron, with suction and discharge gauge 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: Carbon steel with stainless steel impeller cap screw or nut and bronze sleeve.
E. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
F. Performance:
   1. Flow Capacity: _____ gal/min.
   2. Head: _____ feet head.
G. Electrical Characteristics:
   1. ____ hp.
   2. ____ volts, single phase, 60 Hz.
   3. Motor: 1750 rpm unless specified otherwise; refer to Section 22 0513.
   4. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
H. Manufacturers:
   2. Syncro Flo, Inc; ______: www.syncroflo.com/#sle.

2.06 CLOSE COUPLED PUMPS
A. Type: Horizontal shaft, single stage, close coupled, radially split casing, for 125 psi maximum working pressure.
B. Casing: Cast iron, with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
C. Impeller: Bronze, fully enclosed, keyed to motor shaft extension.
D. Shaft: Stainless steel.
E. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
F. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
G. Performance:
   1. Flow Capacity: _____ gal/min.
   2. Head: _____ feet head.
H. Electrical Characteristics:
   1. ____ hp.
   2. ____ volts, single phase, 60 Hz.
   3. Motor: 1750 rpm unless specified otherwise; refer to Section 22 0513.
   4. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
I. Manufacturers:
   1. Bell & Gossett, a Xylem Inc. brand; [______]: www.bellgossett.com/#sle.________.
2.07 BASE-MOUNTED PUMPS
A. Type: Horizontal shaft, single stage, direct connected, radially or horizontally split casing, for 125 psi maximum working pressure.
B. Casing: Cast iron, or ductile iron with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
C. Impeller: Bronze, fully enclosed, keyed to shaft.
D. Bearings: Oil lubricated roller or ball bearings.
E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.
F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
G. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 250 degrees F maximum continuous operating temperature.
H. Drive: Flexible coupling with coupling guard.
I. Baseplate: Cast iron or fabricated steel with integral drain rim.
J. Performance:
   1. Flow Capacity: _____ gal/min.
   2. Head: _____ feet head.
K. Electrical Characteristics:
   1. _____ hp.
   2. _____ volts, single phase, 60 Hz.
   3. Motor: 1750 rpm unless specified otherwise; refer to Section 22 0513.
   4. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
L. Manufacturers:
   1. Bell & Gossett, a Xylem Inc. brand; [______]: www.bellgossett.com/#sle.__________.

2.08 DUAL DRIVE PUMPING SYSTEM
A. Pumping System: Horizontal split case, base-mounted pump with two motors, operating at 1750 rpm and 1150 rpm, assembled on integral base with control cabinet.
B. Control Cabinet: NEMA OS 1, UL approved enclosure with individual circuit breakers, magnetic starters with overload protection, running lights, separate 115V fused control circuit, hands-off-automatic switches, motor failure alarm with manual reset, pre-wired.
C. Electrical Characteristics:
   1. 1750 rpm: _____ hp.
   2. _____ volts, single phase, 60 Hz.
   3. Motor:
      a. Comply with NEMA MG 1.
   4. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
D. Manufacturers:
   1. Bell & Gossett, a Xylem Inc. brand; [______]: www.bellgossett.com/#sle.__________.

2.09 IN-LINE WET ROTOR VARIABLE SPEED ECM CIRCULATORS
A. Type: Factory-assembled and tested, self-regulating, in line wet rotor type circulator pump, with synchronous, permanent-magnet type motor and integrated variable speed electronically commutated motor.
B. Construction Features:
   1. Single phase, 120 VAC or 208-230 VAC as scheduled, 60 Hz.
   3. Bearings. Metal impregnated carbon sleeve or ball bearing type.
   4. Connection Style: Flanged
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5. Rating: 145 psig at 230 F

C. Domestic Hot Water: Lead free bronze, glass-filled polypropylene engineered composite or stainless steel impeller; lead free bronze or stainless steel body.

D. C. Hydronic Systems: cast iron, glass-filled polypropylene engineered composite, or stainless steel impeller. System-lubricated, cast iron body.

E. D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. UL 778 listed for motor-operated water pumps, including protection against over/under voltage, thermal over-load (motor and electronics), over current, and protection for locked rotor and dry run/no-load condition.

F. E. Terminal Box to include gasketed cover, NPT power cable/conduit connection, with coded terminal strip indicating common/neutral/ground.

G. Acceptable Manufacturers:
   1. ITT Bell & Gossett.
   2. Wilo.

H. PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close-coupled or base-mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

D. Provide line sized shut-off valve and strainer on pump suction, and line sized soft seat check valve and balancing valve on pump discharge.

E. Provide air cock and drain connection on horizontal pump casings.

F. Provide drains for bases and seals, piped to and discharging into floor drains.

G. Check, align, and certify alignment of base-mounted pumps prior to start-up.

H. Install close-coupled and base-mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place. Refer to Section 03 3000.

I. Lubricate pumps before start-up.

J. Provide side-stream filtration system for closed loop systems. Install across pump with flow from pump discharge to pump suction from pump tappings.

3.02 SCHEDULES

A. See drawings for schedules

B. Pumps:
   1. Drawing Code:
   2. Manufacturer:
   3. Model:
   4. Seal Type:
   5. Flow Capacity:
   6. Head Pressure:
   7. Efficiency:
   8. Impeller Diameter:
   9. Shut-off Head:
10. Motor Size:

END OF SECTION 23 2123