

**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.
- D. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

**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](http://www.armstrongfluidtechnology.com/#sle).
- B. Bell & Gossett, a Xylem Inc. brand; \_\_\_\_\_: [www.bellgossett.com/#sle](http://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 tylpe motors suitable to application and temperatur s 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:
  1. Armstrong Fluid Technology, Inc; Design Envelope 4300:  
www.armstrongfluidtechnology.com/#sle.
  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.\\_\\_\\_\\_\\_](http://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.\\_\\_\\_\\_\\_](http://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.
  - 2. Pump Shaft: Stainless steel.
  - 3. Bearings. Metal impregnated carbon sleeve or ball bearing type.
  - 4. Connection Style: Flanged

- 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.
  - 3. Grundfos.
- 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 tapings.

### **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**