

SECTION 43 23 58 - LOBE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rotary Lobe Pumps
2. Control Panel

B. Related Requirements:

1. Division 26 - Electrical
2. Division 40 – Process Interconnections

1.2 REFERENCE STANDARDS

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. ASME International:

1. ASME B16.5 - Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
2. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded.

C. ASTM International:

1. ASTM A564 - Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
2. ASTM A743 - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit manufacturer information regarding materials of construction and fabrication, wiring diagrams, performance charts, and other details.

C. Shop Drawings:

1. Submit detailed dimensions for materials and equipment, including wiring and control diagrams, performance charts and curves, installation and anchoring requirements, fasteners, and other details.
 2. Include manufacturer's specified vibration displacement tolerances for pumps at operational speed.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
- H. Qualifications Statement:
1. Submit qualifications for manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of lobe pumps.

1.5 QUALIFICATIONS

- A. All equipment must strictly conform to the requirements herein. If there are any exceptions they must be clearly listed. If the equipment is approved for use on this project and is found at any time in the future that exceptions were not listed, the Engineer shall have the right to reject the equipment or require the manufacturer to modify the equipment to bring it into compliance at no increase in cost to the contract.
- B. The equipment manufacturer shall be experienced in manufacturing pumping equipment of this technology as specified and have a record of successful in-service performance. Manufacturer must have at least ten (10) years' experience and 20 similar successful installations.
- C. The equipment shall be 100% manufactured in the U.S. and meet BABAA requirements. All spare parts shall be available for same day shipment and next day delivery. The manufacturer shall maintain a fully equipped shop facility to perform all operations including welding, fabrication, assembly and testing.
- D. All materials shall be designed to withstand the stresses encountered in fabrication, erection and operation. All equipment shall be of corrosion resistant materials or shall be suitably protected by the supplier with corrosion resistant industrial coatings approved by the engineer.
- E. Manufacturer's Representative shall provide a certificate of successful installation

- F. The pump manufacturer must be ISO 9001:2008 revision certified, with scope of registration including design control and service after sales activities.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store pumps and accessories according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.8 TOOLS AND SPARE PARTS

- A. The pump manufacturer shall provide one (1) set of recommended spare parts per pump which shall include the following at minimum:
 - 1. Set of lobes
 - 2. Set of radial liners
 - 3. Front liner
 - 4. Back liner
 - 5. Set of mechanical seals
 - 6. All required fasteners and O-rings
 - 7. Special tools for seal replacement
- B. Manufacturer shall furnish any special tools necessary to disassemble, service, repair and adjust the equipment.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish two-year manufacturer's warranty for lobe pumps.

PART 2 - PRODUCTS

2.1 LOBE PUMPS

A. Manufacturers:

1. Boerger
2. Approval Equal

B. Performance and Design Criteria:

1. Design Flow Rate (per pump): 20 gpm.
2. Discharge Head: 9 ft
3. Number of pumps: 2
4. Suction & Discharge Size: 3", 150 lb Flanged
5. Suction Lift Required: 4 ft.
6. Service Liquid: RAS/WAS (0.5-1.5% solid).
7. Specific Gravity: 1.05.
8. Maximum Motor Horsepower: 1.5
9. Service Factor: 1.15 min.
10. Motor Enclosure: TEFC
11. Electrical Requirements: 230 V/3 Ph/60 Hz

C. Description:

1. Lobe Profile: Tri-lobe, elastomer coated, screw form.
2. Seal Type: Single-acting Mechanical, type LW.
3. Bearings:
 - a. Type: Ball, ABMA 9 or Roller, ABMA 11.
 - b. L10 Life: 50,000 hours.
4. Timing Gears: Helical type.
5. End Connections: Flanged, ASME B16.5.

D. Structural

1. The pumps shall be mounted on structural steel base. The base shall provide adequate structural support for the pump, motor, piping, valves and accessories.
2. The structural steel base shall be designed with such rigidity that the base, when lifted will not deflect more than 1 inch per 180 inches of length or width.

E. Adjustable Back Pressure Valve

1. The pump manufacturer shall provide an adjustable back pressure valve for the pumps as shown on the drawings.
2. The valve shall be of cast iron construction with an elastomeric faced valve disc for positive sealing and silent operation. Valve shall be capable of being mounted either vertically or horizontally.

3. The valve shall incorporate a stainless steel 304 mounting bracket and custom engineered spring allowing pressure adjustment from 2 – 10 psi. When valve is fully opened the back pressure shall not increase more than 3 psi over set pressure.
4. Valve shall be AIS compliant.

F. Control Panel

1. The contractor / pump manufacturer shall be responsible for providing a variable frequency drive duplex control panel for the two RAS/WAS pumps. The panel shall be NEMA 4X SS304 enclosure with inner subpanel and mounting feet (Est. 42x36x16). The panel shall be designed for 230 volt, 3 phase, 60 hertz power.
2. The control panel shall be provided with the following components:
 - a. 30A main circuit breaker disconnect with thru door rotary handle.
 - b. Control power transformer with primary/secondary fusing (230-120).
 - c. (2) 15A branch circuit breaker for pump.
 - d. (2) 1.5HP HD, 230/3/60 A-B PowerFlex 525 variable frequency drive for pump.
 - e. (2) PUMP RUNNING pilot light.
 - f. (2) PUMP FAULT ALARM pilot light.
 - g. (2) PUMP HAND-OFF-AUTO selector switch.
 - h. (2) PUMP SPEED potentiometer.
 - i. (2) HIGH SUCTION PRESSURE ALARM pilot light.
 - j. (2) HIGH DISCHARGE PRESSURE ALARM pilot light.
 - k. ALARM RESET pushbutton.
 - l. EMERGENCY STOP pushbutton.
 - m. (2) Ventilation fan with louver and NEMA 4X rain hoods.
 - n. (2) Thermostat, cooling.
 - o. Timers as required.
 - p. Nameplates and warning stickers as required.
 - q. Dry contacts and interlocks as required.
 - r. Terminal blocks as required.
 - s. Serialized UL508A label.
 - t. Palletized shipping crate.
3. The variable frequency drive shall be Powerflex 525 as manufactured by Allen Bradley. The drives shall be sized for the 1.5HP pump motors and operate on 230 volt/3 phase/60Hz power. The operator keypad shall be mounted to the panel door.

G. Materials:

1. Casing and Head: AGI-600 Austempered Gray Iron.
2. Base and Skid frame: ASTM A36 steel
3. Shafts: AISI 4140 Steel.
4. O-Rings: FKM.
5. Gear Housing: ASTM A48 Gray Iron
6. Rotary Lobe Elastomer: NBR
7. Lobe Core: Steel

2.2 INSTRUMENTATION

A. Pressure Gauges

1. Suction and discharge pressure gauges shall be provided for each pump.
2. Pressure gauges shall be glycerin filled with a built-in pressure snubber
3. Pressure gauges shall have a 4" face
4. Pressure gauges shall be turret style. Case material shall be stainless steel with clear acrylic faces
5. The gauge shall be bottom connected and accept a 1/4" NPT female thread.

B. Pressure Switches

1. Each sludge pump shall be supplied with a pressure switch for the suction and discharge. Pressure switches shall be NEMA 4X and be Ashcroft or equal.

2.3 CORROSION PROTECTION

- A. All surfaces of the exposed steel structure, interior and exterior, shall be grit blasted equal to commercial base cleaning (SSPC-SP6)
- B. The protective coating shall take place immediately after surface preparation
- C. The protective coating shall be two-component, high solids, polyurethane system formulated for high build application having excellent chemical and corrosion resistant properties
- D. The protective coating shall provide in two (2) applications a total dry mil thickness of 8.0 mils

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pumps where indicated on Drawings and according to manufacturer instructions.
- B. Install, level, align, and lubricate pump(s) as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.
- C. Suction pipe connections shall vacuum tight. Fasteners at all pipe connections must be tight. Install pipe with supports to prevent strain and vibration on pump piping. Install and secure all service lines (level control, air release valve or pump drain lines) as required in wet well.
- D. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to control panel.
- E. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

- F. After all anchor bolts, piping and control connections are installed, completely fill the grout dam in the pump station base with non-shrink grout.

3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Prior to acceptance by owner, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.
- D. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than one trip, 1 day (8 hours) on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in operation and maintenance of equipment.
- E. Equipment Acceptance:
 - 1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
 - 2. Make final adjustments to equipment under direction of manufacturer's representative.
- F. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.3 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate pump startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 43 23 58

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