

SECTION 44 42 56.14

LOBE PUMPS

PART 1 GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Bearing Manufacturers' Association (ABMA).
 2. American Iron and Steel Institute (AISI).
 3. American National Standards Institute (ANSI).
 4. ASTM International (ASTM):
 - a. A48/A48M, Standard Specification for Gray Iron Castings.
 - b. D2240, Standard Test Method for Rubber Property—Durometer Hardness.
 5. Hydraulic Institute Standards (HIS): 9.6.4, Rotodynamic Pumps for Vibration Analysis and Allowable Values.
 6. National Building Code of Canada (NBCC).
 7. National Electrical Manufacturers' Association (NEMA): MG 1, Motors and Generators.

1.2 DEFINITIONS

- A. Terminology pertaining to pumping unit performance and construction shall conform to ratings and nomenclature of the Hydraulic Institute Standards.

1.3 SUBMITTALS

- A. Shop Drawings:
1. Make, model, weight, and horsepower of each equipment assembly.
 2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
 3. Performance data curves showing head, capacity, horsepower demand, and pump efficiency over entire operating range of pump, from shutoff to maximum capacity. Indicate separately the head, capacity, horsepower demand, and overall efficiency at guarantee point.
 4. Detailed drawings showing equipment dimensions, size, and locations of connections and weights of associated equipment.
 5. Power and control wiring diagrams, including terminals and numbers.
 6. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and including motor modifications.
 7. Factory finish system.
 8. Written certification from professional engineer licensed in the Province of Manitoba stating that support systems, anchorage, and equipment have been designed for post-disaster structures in accordance with the requirements of the 2010 National Building Code of Canada and the 2011 Manitoba Amendments, at time of shop drawing submittals.

1.4 QUALITY ASSURANCE

- A. Rotary lobe pump manufacturer shall be ISO 9001 certified.

1.5 EXTRA MATERIALS

- A. Furnish, tag, and box for shipment and storage the following spare parts, special tools, and materials:

Item	Quantity
Bearings	One complete set
Gaskets and seals	One complete set
Keys, dowels, pins	One complete set
Mechanical seal	One
Drive V-belts	One complete set
Wear plates	One complete set
Housing segments or radial liners	One complete set
Rotors	One pair
Special tools required to maintain or dismantle pump	One complete set

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
1. Vogelsang.
 2. Boerger.
 3. LobePro.

2.2 ROTARY LOBE POSITIVE DISPLACEMENT PUMP

- A. General:
1. Coordinate pump requirements with drive manufacturer and be responsible for pump and drive requirements.
 2. Where adjustable speed drives are required, furnish a coordinated operating system complete with pump, drive, and speed controller.
 3. Pumping units required under this section shall be complete.
- B. Pump Design:
1. Some specific requirements are attached to this section as supplements.
 2. Designed and fabricated for 24-hour continuous duty at any and all points within specified range of operation, without overheating and without excessive vibration or strain.

3. Parts shall be designed and proportioned to have liberal strength, stability, and stiffness and to be especially adapted for service to be performed. Provide space for inspection, repairs, and adjustment.
4. Working parts of pumps and motors, such as bearings, wearing rings, shaft, sleeves shall be interchangeable between like units and such that City may, at any time in future, obtain replacement and repair parts for those furnished in original equipment.
5. Nameplate ratings of motors shall not be exceeded, nor shall design service factor be reduced when pump is operating at point on its characteristic curve up to maximum flow specified herein.
6. Provide mechanical equipment, including drives and electric motors in accordance with applicable OSHA regulations. Unless otherwise specified, provide rigid painted steel or stainless steel guards on rotating assemblies. Guards shall be removable only by use of a tool.
7. Noise level of pump system, unless otherwise noted, shall not exceed limits established by HI 3.1-3.5-2008 paragraph 3.3.17.3.
8. Lubrication fitting shall be brought to outside of equipment so they are readily accessible from outside without necessity of removing covers, plates, housings, or guards.
9. Mechanical seals, wear plates and rotors shall be replaceable by removing front cover of rotor housing without disassembly of pump unit or pipe system.

C. Pump Castings:

1. Fabricated of ASTM A48, Class 30 or higher cast iron.
2. Pump Rotor Housing: Multi-piece to allow adjustment of rotor running clearance at least twice or shall include radial liners that can be replaced to restore running clearance.

D. Wear Plates:

1. Rear of pump rotor casing and front cover shall be protected with replaceable wear plates having a minimum Brinell hardness of 500.
2. Front cover wear plate shall be reversible.
3. Wear Plate Bolts: Bolts that secure wear plates to castings inside pump assembly shall be stainless steel, hex head type.

E. Rotors:

1. Driven through positive timing gears running in oil.
2. Solid cast-iron rotor cores shall be covered with a layer of Buna-N at an average durometer hardness of 70 as per ASTM D2240. Alternatively, pump may utilize rotors with replaceable Buna-N 70 durometer tips.
3. Geometry:
 - a. Rotor core shall be same as that of finished rotor.
 - b. Helical with three or four lobes to provide a near pulseless flow.
4. Designed for pumping sludge containing organic solids, small inorganic particles, and grit.

F. Shafts:

1. Fabricated of alloy steel AISI A4140.
2. Protected from wetting by fluid being pumped or fabricated of carbon steel with ceramic coated stainless steel sleeves through seal area.

- G. Mechanical Seals:
1. Mechanical style with silicon carbide or tungsten carbide seal faces. Cartridge style or component type mechanical seals that use bushings to permanently place seals are acceptable.
 2. Seal Holders: Fabricated of materials that are suitable for prolonged corrosion and chemical resistance.
 3. Pumps that utilize packing glands or require external flushing for lubrication and cooling are not acceptable.
- H. Quench/Blocking Chamber:
1. Oil-filled quench/blocking chamber located behind mechanical seal, and in front of bearing housing lip seal shall be molded into casting of pump.
 2. Chamber shall be suitable for fill, from side of pump, through nipples and have an external sight glass or oil bottle for visual inspection of status of mechanical seal operation.
 3. Oil shall provide lubrication and cooling of seals.
- I. Flanges:
1. Port Connection: ANSI 125-pound or 150-pound rated or greater.
 2. Inlet and outlet ports shall be constructed of grey iron, fittings and flanges bolted to rectangular ports on pump casting.
 3. Ports shall be oriented horizontally without offset unless otherwise shown on Drawings.
- J. Pump Front Cover:
1. Provide access to pump chamber without disconnecting pipe work or bearings.
 2. When opened shall provide unhindered access to rotors, wear plate, and mechanical seals.
- K. Bearings:
1. Sized to withstand maximum radial or axial load carried by shafts for continuous duty.
 2. Minimum ABMA L10 Bearing Life:
 - a. Running at Steady or Constant Speed, Load, Pressure and Temperature: 100,000 hours.
 - b. Operated with Variable Frequency Drive: 50,000 hours.
- L. Timing Gears and Gear Housing:
1. Meet AGMA Class 8 quality minimum.
 2. Keyed and timed to prevent contact between rotors and provide smooth and quiet transmission of load.
 3. Located in separate oil-filled, cast-iron gear box fitted with built-in sight glass to monitor oil level.
- M. Gear Reducer (if used):
1. In-line gear reducer designated for continuous duty at moderate shock load.
 2. Meet AGMA Class II, with service factor of 1.4 minimum for pump applications with moderate shock, continuous duty and AGMA Class III, with service factor of 2.0 minimum for heavy shock, continuous duty operation.

3. C-face, mounted with C-face drive motor to form integral gearmotor combination.
- N. V-Belt Drive (if used):
1. Motor shall be mounted above pump on adjustable base that allows adjustment of belt tension.
 2. Drive shall consist of pulleys with separate hubs attached to shafts with keys.
 3. For motors larger than 3 hp, provide a minimum of two belts.
 4. Belts and pulleys shall be enclosed in removable metal guard that meets OSHA requirements. Guard shall allow measurement of pump rpm with strobe or contact meter without removing guard.
- O. Structural Base: Rotary lobe pump, gear reducer, motor or gearmotor shall be mounted on a structural steel baseplate, with structural channel supports as necessary, complete with couplings, guards, and mounting hardware.

2.3 ACCESSORIES

- A. Refer to Section 01 61 00, Common Product Requirements.

2.4 FACTORY FINISHING

- A. Prepare, prime, and finish coat in accordance with Section 09 90 00, Painting and Coating.

2.5 SOURCE QUALITY CONTROL

- A. Functional Test:
1. Conduct on each pump.
 2. Perform manufacturer's standard production tests.
- B. Performance Test:
1. Conduct on each pump.
 2. Perform under simulated operating conditions.
 3. Test for a continuous 3-hour period without malfunction.
- C. Motor Test: In accordance with Section 26 20 00, Low-Voltage AC Induction Motors.
- D. Hydrostatic Test: Pump casing tested at 150 percent of shutoff head. Test pressure maintained for not less than 5 minutes.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The pumps will be installed by Installation Contractor. Contractor shall inspect the installation to ensure it is in accordance with manufacturer's printed instructions.

3.2 FIELD FINISHING

- A. Equipment as specified in Section 09 90 00, Painting and Coating and Section 01 61 00, Common Product Requirements.

3.3 FIELD QUALITY CONTROL

- A. Functional Tests:
 - 1. Conduct on each pump.
 - 2. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
- B. Performance Test: In accordance with Hydraulic Institute Standards.

3.4 MANUFACTURER'S SERVICES

- A. See Section 01 43 33, Contractors' Field Services and 46 43 80, High Rate Clarification System.

3.5 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification.
 - 1. Pump Data Sheet.

END OF SECTION

LOBE PUMP DATA SHEET, 44 42 56.14

Tag Numbers: _____

Pump Name: _____

Manufacturer and Model Number: (1) _____

(2) _____

SERVICE CONDITIONS

Corrosive? _____

Solids Size (Maximum hard solid size/Maximum soft solid size): _____/_____

Liquid Pumped (Material and Percent): _____

Pumping Temperature (degrees C): Normal: _____ Max _____ Min _____

Specific Gravity @ 20 Degrees C: _____ Viscosity Range: _____

Vapor Pressure @ 20 Degrees C: _____ Liquid pH: _____

Abrasive (Y/N) _____ Possible Scale Buildup (Y/N): _____

Total Suspended Solids (mg/L) _____

Suction Pressure (m): Maximum _____ Rated _____ at Vacuum (in. Hg) _____

Altitude (m): _____ Area Classification: _____ Location (indoor/outdoor): _____

PERFORMANCE REQUIREMENTS AT PRIMARY DESIGN POINT

Capacity (L/s): Rated _____

Total Dynamic Head (m): Rated _____

Minimum Hydraulic Efficiency (%): _____

Maximum Shutoff Pressure (kPag): _____

Minimum Continuous Flow (L/s): _____

Maximum Pump Speed at Design Point (rpm): _____

Constant (Y/N): _____ Adjustable (Y/N): _____

Maximum Power (kW): _____ Rated Power (kW): _____

PERFORMANCE REQUIREMENTS AT SECONDARY DESIGN POINT

Capacity (L/s): _____ Capacity (L/s): _____

Total Dynamic Head (m): _____ Total Dynamic Head (m): _____

Min. Hydraulic Eff. (%): _____ Min. Hydraulic Eff. (%): _____

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

kW: _____ Voltage: _____ Phase: _____ Synchronous Speed (rpm) _____

Service Factor: _____ Inverter Duty: _____

Enclosure: EXP _____ ODP _____ TEFC _____ TENV _____

REMARKS _____
