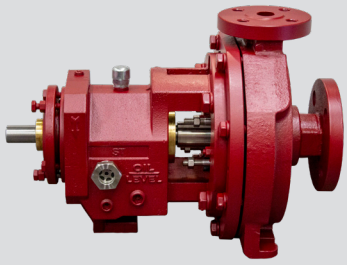
AMERICAN-MARSH PUMPS

A WILO BRAND



460 Series LF OSG
Process End Suction Pumps

Engineering Specification

LF OSG PROCESS END SUCTION PUMP SPECIFICATIONS

1.0 General

1.1 The pumps shall be designed for low flow services and shall be of the horizontal single-stage centrifugal end suction type conforming to ANSI/ASME B73.1-2020 specifications. It shall be provided complete with electric motor, baseplate, coupling, and all necessary appurtenances. It shall be of the flex-coupled design.

2.0 Approved Manufacturers

2.1 American-Marsh Pumps

3.0 References

3.1 ANSI/AWWA E103-21, Horizontal Centrifugal and Vertical Line Shaft Pumps

3.2 ANSI/HI 9.6.4-2016, Rotodynamic Pumps for Vibration Measurement and Allowable Values

3.3 ANSI/HI 14.6-2016, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests

3.4 HI 40.6, Methods for Rotodynamic Pump Efficiency Testing

3.5 ASME B16.42-2021, Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300

3.6 ASME B16.5-2020, Pipe Flanges and Flanged Fittings

3.7 ISO 21940-11, Mechanical Vibration-Rotor Balancing

3.8 ANSI/ASME B73.1-2020, Specifications for Horizontal End Suction Centrifugal Pumps for Chemical Process

4.0 Submittals

4.1 Descriptive literature, catalog information, bulletins, product brochure, and/or equipment specifications. To include, but not limited to, the manufacturer's name, pump model, impeller trim, and total weight of the equipment.

4.2 Pump characteristic curve which shall include the following hydraulic performance data over the entire operating range of the pump from shutoff to runout: capacity, total dynamic head, horsepower, efficiency, speed, and net positive suction head required. The primary design point shall be indicated on the pump characteristic curve.

4.3 General assembly drawing showing all important details of construction and critical dimensions, including anchor bolt locations.

4.4 Complete pump bills of materials which shall include identification of the materials of constuction.

4.5 Sealing arrangement information and descriptive literature such as a product data sheet. To include make, model, size, dimensional drawing, and materials of construction.

4.6 Paint, coating, and finish system information and descriptive literature such as a product data sheet. To include surface preparation, number of coats, dry film thickness (DFT) per coat, and color.

4.7 Complete motor data. To include, but not limited to, nameplate data, performation data, wiring diagram, and dimensional drawing.

4.8 Certified test reports for the factory pump hydraulic performance test and hydrostatic pressure test.

4.9 List of the manufacturer's recommended spare parts including their respective part numbers.

4.10 Manufacturer's installation, operation, and maintenance manual.

4.11 Manufacturer's warranty.

5.0 Quality Assurance

5.1 The pump manufacturer shall be fully certified by the International Standards Organization per ISO 9001:2015.

5.2 The pumps shall operate without excessive noise or vibration, conforming to ANSI/HI 9.6.4-2016 for the allowable pump vibration limits.

5.3 [Optional] The manufacturer shall perform a factory non-witnessed hydraulic performance test on the pump per ANSI/HI 14.6-2016 acceptance grade [??]. The test shall be performed utilizing a factory lab motor. A certified copy of the test results shall be provided to the Buyer prior to shipment.

5.4 [Optional] The manufacturer shall perform a factory non-witnessed hydrostatic pressure test on the pump per ANSI/HI 14.6-2016. The test pressure shall be twice the pressure at rated capacity or 1-1/2 times the shut-off pressure, whichever is greater. A certified copy of the test results shall be provided to the Buyer prior to shipment.

5.5 Factory testing shall be performed at an approved pump test laboratory that is HI 40.6 certified to test end suction pumps.

6.0 Delivery, Storage, and Handling

6.1 Prior to shipment, the equipment shall be inspected to ensure that all components are complete and in compliance with all requirements. The equipment shall be boxed or crated as required by the manufacturer to prevent damage during shipment. All machined surfaces or matching connecting shall be suitably protected to prevent damage.

6.2 Equipment shall be handled, stored, and protected in accordance with the manufacturer's recommendations, provided in the manufacturer's installation, operation, and maintenance manual.

7.0 Warranty

7.1 The pump manufacturer shall provide a warranty for the pumps to be free from defects in material and workmanship under normal use and service for a period of 1 year from the date of shipment.

8.0 Operating Conditions and Performance Requirements

END SUCTION PUMP SCHEDULE	
Equipment Number	
Number of Pumps	
Primary Rated Capacity (gpm)	
Primary Rated Total Dynamic Head (feet)	
Minimum Efficiency at Primary Rated Capacity (%)	
Rated Speed (rpm)	
Minimum Horsepower (hp)	
NPSHa (feet)	
Suction Inlet Size (inches)	
Discharge Outlet Size (inches)	
Type of Drive (Variable or Constant)	
PUMPED FLUID	
Pumped Fluid	
Temperature (°F)	
Specific Gravity	
Vapor Pressure (psia)	
Viscosity (cp)	
Maximum Solids Diameter (inches)	

9.0 Materials and Construction

9.1 Pumps shall be manufactured with the following materials unless defined otherwise in these specifications:

PART	MATERIAL	SPECIFICATION
Casing	Stainless Steel	Type 316
Casing Adapter	Stainless Steel	Type 316
Impeller	Stainless Steel	Type 316
Impeller O-Ring	PTFE	Teflon
Shaft	Steel	SAE 4140
Shaft Sleeve	Stainless Steel	Type 316
Seal Gland	Stainless Steel	Type 316
Bearing Frame Adapter	Ductile Iron	
Bearing Frame	Cast Iron	
Bearing Housing	Cast Iron	
Bearing Frame Foot	Cast Iron	
Casing Gasket	Aramid Fiber	
O-Rings	Rubber	
Fasteners	Steel or Stainless Steel	

10.0 Casing

10.1 The casing shall be heavy walled of the end suction design with a centerline, self-venting discharge outlet. The casing shall have a concentric circular volute to reduce radial loads during low flow operation. It shall be of Type 316 stainless steel free of blow holes, sand holes, and other detrimental defects. The suction inlet and discharge outlet connections shall be flanged of the raised face type. The flanges shall conform to ASME B16.5 or ASME B16.42 standards for a 150# rating except for the 1.5x3-13 which shall have flanges with a 300# rating. The casing shall be capable of withstanding a hydrostatic pressure equal to twice the pressure at rated

capacity or 1-1/2 times the shut-off pressure, whichever is greater. Support feet shall be integrally cast with the casing. The casing shall be designed to permit the removal of the rotating element from the casing without disturbing the suction and discharge connections or the driver. Tapped holes for jackscrews shall be provided to facilitate disassembly of the casing and casing adapter and to avoid the necessity of drive wedges or prying implements. The casing shall have tapped and plugged holes for draining, and the connection of pressure gauges on the suction and discharge nozzles. The casing shall have a corrosion allowance of at least 0.125".

11.0 Impeller

11.1 The impeller shall be of the open radial vane type with balance holes to reduce axial thrust and minimize stuffing box pressure. It shall be investment cast in one piece of Type 316 stainless steel. The impeller shall be statically and dynamically balanced to ISO 21940-11 Grade G6.3. The impeller shall be threaded to the shaft with rotation to tighten. The shaft threads shall be protected with a Teflon impeller o-ring to prevent contact with the pumping fluid. Means for external adjustment of the impeller axial clearance shall be provided to adjust running clearances between the impeller vanes and the casing.

12.0 Casing Adapter

12.1 The casing adapter shall be of Type 316 stainless steel free of blow holes, sand holes, and other detrimental defects. The casing adapter shall be provided with an integrally cast standard bore design stuffing box, accurately machined for a mechanical seal or packing. Sealing between the casing and the casing adapter shall be accomplished by means of a gasket. The gasket shall be confined on the atmospheric side by the casing to prevent blowout.

12.1.1 A seal gland of Type 316 stainless steel shall be provided, accurately machined and fitted to accommodate an elastomer bellows component mechanical seal. Sealing between the seal gland and the casing adapter stuffing box shall be accomplished by means of a gasket. The gasket shall be confined on the atmospheric side to prevent blowout.

13.0 Shaft

13.1 The pump shaft shall be the sleeved type and shall be heavy duty of high strength SAE 4140 steel of sufficient size to transmit the full driver horsepower with a liberal safety factor. It shall be designed with sufficient stiffness to avoid critical speeds and minimize shaft deflection at the seal faces while in operation. The shaft shall be accurately machined, ground, and polished over the entire length.

14.0 Shaft Sleeve

14.1 The pump shaft shall be fitted with a renewable shaft sleeve to minimize shaft wear. The shaft sleeve shall be of Type 316 stainless steel. The shaft sleeve shall be sealed to the impeller hub by the impeller o-ring to prevent the pumping fluid from leaking under the sleeve, and shall be pinned to prevent it from rotating during pump operation. The use of adhesive compounds to fasten the sleeve to the shaft shall not be acceptable.

15.0 Mechanical Seal

15.1 Shaft sealing shall be accomplished by means of a mechanical seal. The mechanical seal shall be the elastomer bellows component type. It shall be constructed of the following materials: silicon-carbide rotary face, silicon-carbide stationary face, Viton elastomers, and Type 304 stainless steel metal parts.

16.0 Power Frame

16.1 The power frame shall be provided with a cast iron bearing frame, bearing housing, and bearing frame foot. The bearing frame and bearing housing shall have accurately machined housings for heavy duty inboard and outboard ball bearings. The inboard bearing shall be the single row, deep groove type and shall be free to float within the bearing frame to carry radial loading only. The outboard bearing shall be the double row, angular contact type and shall be arranged to carry both radial loading and axial thrust. Both bearings shall be sized to exceed a minimum L_{10h} bearing life of 17,500 hours in the pump allowable operating region (AOR). Each bearing housing in the power frame shall be fitted with a bronze labyrinth oil seal to protect the bearings from contaminents and prevent oil loss. The power frame shall be designed for oil bath lubrication with an integral oil sight glass which is capable of being installed on either or both sides of the bearing frame. Sealing between the bearing frame and the bearing housing shall be accompished by means of an o-ring. The pump shall be supported beneath the power frame by a cast iron foot, bolted to the bearing frame (MTX and LTX) or cast integrally with the bearing frame (STX).

17.0 Baseplate

17.1 The pump and motor shall be mounted on a common groutable rolled steel baseplate. The baseplate shall be of sufficient size, strength, and rigidity to support the pump and motor and prevent harmful vibration.

17.1.1 The pump and motor shall be factory aligned and bolted in place prior to shipment. Final alignment shall be performed at the installation site.

18.0 Coupling

18.1 A torsionally flexible jaw type coupling with a spacer shall be provided to connect the pump shaft to the motor shaft. The coupling shall be of an all metal type with flexible rubber inserts. The entire rotating coupling element shall be enclosed by a coupling guard.

19.0 Paint and Coatings

19.1 The pump and baseplate assembly shall be provided with the manufacturer's standard factory applied paint.

20.0 Motor

20.1 The electric motor shall be of the horizontal footed, NEMA design B, continuous duty, squirrel cage induction design. It shall be premium efficient and inverter duty rated per NEMA MG-1 Part 31 at a 1.00 service factor.

Motor Data	
Horsepower (hp)	
Synchronous Speed (rpm)	
Voltage (V)	
Phase	
Frequency (Hz)	
Enclosure	
Frame Size	
Insulation Class	
Temperature Rise Class	
Service Factor	

20.2 The motor rating shall be sized such that it will not be loaded beyond the nameplate rating at any point along the pump characteristic curve. Use of the motor's service factor will not be acceptable.

20.3 Eyebolts or equivalent lifting points shall be provided to lift the motor safely.

20.4 The motor shall be manufactured by Nidec (US Motors), WEG, Techtop, or equal.

21.0 Spare Parts

21.1 The following spare parts shall be furnished in accordance with the pump manufacturer's recommendations:

21.1.1 (1) Shaft sleeve

21.1.2 (1) Mechanical seal

21.1.3 (1) Set of o-rings and gaskets

21.1.4 (1) Set of ball bearings

21.1.5 (1) Set of labyrinth oil seals

22.0 Installation

22.1 Contractor shall install the pumping equipment in accordance with the manufacturer's instructions and recommendations, provided in the manufacturer's installation, operation, and maintenance manual.

23.0 Field Services

23.1 Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session.

23.1.1 Start-up shall be by the pump manufacturer or a certified factory-trained representative.

23.1.2 Start-up shall include vertification of proper installation, system initiation, adjustment, and fine tuning.

23.1.3 Start-up shall not be considered complete until the sequence of operation has been sufficiently demonstrated to the owner or owner's designated representative.

23.1.4 This job site visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed off on the manufacturer's start-up request form.

END OF SECTION

Revision Record

Rev.	Date	Changed By	Approved By	Description of Change
0	12/08/2023	NA	Bob Conley	NA

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