Wilo MVI
Vertical Multi-Stage Pumps

Engineering Specification

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Furnish and install vertical multi-stage pumps consistent with the system's requirements. The booster pumps shall be suitable for the specified system function and capacity.

1.2 REGULATORY

A. Centrifugal pumps shall be rated to a minimum 125 PSI and 194 degrees Fahrenheit and where applicable, bear the approval symbol of the required regulatory body.

B. Electrical assemblies (circuitry, wiring terminals and internal connections) of the centrifugal pumps shall be certified and registered to bear the emblem of UL, CSA or ETL as required. Electrical assembly shall meet codes and standards established by national bodies.

1.3 REFERENCES

A. UL 778 Standard

1.4 SUBMITTALS

A. Provide submittals, warranty information and shop drawings in accordance with the General Requirements and as specified herein. Submit detailed product drawings including wiring schematics. Indicate critical dimensions of the vertical multi-stage booster pumps.

B. Submit manufacturer's technical data in the form of published Installation and Operation and Maintenance Manuals to be supplied with the vertical multi-stage booster pumps at time of installation.

C. Submit catalogue data on all equipment, pipe, fittings, fasteners and associated items supplied by others to complete the installation of the vertical multi-stage booster pumps in the system installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Vertical multi-stage booster pumps are shipped in boxes and are to remain in factory shipping condition until immediately prior to installation.

B. Vertical multi-stage booster pumps are to be stored indoors in a conditioned space, protected from exposure to the elements, and from exposure to other potential contaminants.

C. Factory applied labels are to remain in place and unobscured. These identification tags are to display model numbers, serial numbers, and evidence of certifications/listings.

1.6 WARRANTY

A. Manufacturer shall warrant the vertical multi-stage booster pumps for a period of 2 years from date of purchase, subject to the Terms and Conditions of said Warranty. A copy of the Manufacturer's Warranty shall be provided as part of the Submittals as outlined in Section 1.04 of this specification.

PART 2 – PRODUCTS

2.1 ELECTRICAL

A. All 240 volt wiring shall be of 12 gauge or larger, UL/CSA approved, 300 volts, 220 deg F maximum temperature.

B. All 110 volt wiring shall be of 14 gauge or larger, UL/CSA approved, 300 volts, 220 deg F maximum temperature.

C. The motor shall be a minimum of class H winding insulation as defined by UL 778.

D. Voltage variances shall be less than +/- 10% from rated voltage with pump under load conditions. Amperage variance between phases on three phase systems shall be less than +/- 5%.

2.2 CONTROL, OPERATION AND DIAGNOSTICS

A. Vertical multi-stage booster pumps must be capable of single speed operation. The motor shall be inverter duty.

B. The vertical multi-stage booster pumps shall be suitable for inclusion as part of a DDC or Building Management System as required under Division 23 Controls.

2.3 SERIES MVI, VERTICAL MULTISTAGE CENTRIFUGAL PUMPS

A. Product Description:

Factory-assembled and tested, centrifugal, non-self-priming, vertical-multistage centrifugal pump as defined in Hydraulic Institute (HI) Standards 1.1-1.2 and 1.3; designed to be installed in a horizontal one-pipe system where the suction and discharge ports are in the same horizontal plane and have the same pipe dimensions.

Maximum Operating Pressure:

Pump Casing	Oval Flanges: 230-psig (16 Bar)
	ANSI Flanges 300 lb.: 360-psig (25 Bar)
Maximum Suction Pressure	140-psig (10 Bar)

Operating Temperatures:

Liquid Temperatures	EPDM Version: 5 °F to 250 °F (- 15° to + 120 °C)
	VITON ® Version: 5 °F to 194 °F (- 15° to + 90 °C)
Ambient Temperature	104 °F Max (+ 40 °C)

B. Pump Construction:

1. Pump Base Plate/Foot: cast iron (ASTM A48, class 35) supplied with through holes to mount to a rigid baseplate and threaded studs.

2. Pump Casing: AISI 304 (1.4301) Stainless Steel or optional AISI 316 (1.43404). Two flange types – dependent on model:
    a. 2-bolt oval flange with NPT threaded mating flange
    b. ANSI 300#, 8-bolt round flange

3. Lantern/Motor Stool: cast iron (ASTM A48, class 35), drilled/tapped to secure a NEMA frame vertical motor, coupling guard and pump housing cover. A counter-bored chamber exists to secure upper thrust bearing.

4. Impellers: Stamped AISI 304 (1.4301) Stainless Steel, single-suction type, statically and/or dynamically balanced and keyed to shaft.

5. Intermediate Chambers/Diffusers: Stamped AISI 304 (1.4301) Stainless Steel.

6. Pump Housing Cover: AISI 304 (1.4301) Stainless Steel or optional AISI 316 (1.43404).

7. Pump Housing Bottom Cover: AISI 304 (1.4301) Stainless Steel or optional AISI 316 (1.43404).

8. Shaft: Shall be AISI 304 (1.4301) or 316 Stainless Steel (1.43404) depending on pump model and attached to the motor shaft via cast steel, split coupling.

9. Mechanical Seal: Shall be bellows type carbon/tungsten carbide, SiC/Carbon seal faces, EPDM, stainless steel spring.

10. Pressure Jacket: AISI 304 (1.4301) Stainless Steel or optional AISI 316 (1.43404).

11. Thrust Bearing: Tungsten carbide bearing housed within lantern/motor stool to absorb the thrust loads and keep rotating elements in proper axial alignment.

12. Motor Bearings: Grease lubricated heavy-duty ball bearings housed within motor housing.

13. Split Coupling: Axial-split device capable of absorbing torsional vibration shall be employed between the pump and motor shafts.

14. Coupling Guard: AISI 304 (1.4301) containing viewing windows for inspection of the coupling mounted to the pump end.

15. Motor: Single speed, with permanently lubricated ball bearings, unless otherwise indicated; secured mounting motor stool. Motor meets EISA 2007 requirements and NEMA specifications and shall be the size, voltage and enclosure called for on the plans.

16. Hardware: AISI 304 (1.4301) Stainless Steel

PART 3 EXECUTION

3.1 PREPARATION

A. Prior to commencing work the contractor will have read and understood both the Installation, and Operation and

Maintenance Manuals (IOM) supplied and enclosed with the attendant Vertical multi-stage booster pumps. These are to be supplied in English, French and Spanish.

B. The effectiveness of the system is dependent on the system being designed and installed correctly. Proper consideration of factors such as boost pressure and flow rate is critical.
C. Prior to final connection of the booster pumps as part of the system, the system piping shall be flushed of all contaminants and foreign objects.

3.2 INSTALLATION

A. The vertical multi-stage booster pumps must be installed by a qualified installer/service technician.

B. The vertical multi-stage booster pumps shall be installed in accordance with the relevant requirements of the Local Authority having jurisdiction, as required to meet the performance requirements and function specified for the system.

C. The vertical multi-stage booster pumps must be installed and operated strictly in accordance with the terms set out in both the Installation and Operation and Maintenance Manuals supplied.

D. The pump shall be installed with the motor shaft in a vertical or horizontal plane.

E. The pump must be installed in a way that it is not stressed by the pipework. A minimum of five pipe diameters is recommended on the inlet of the pump. Pressure gauges are recommended.

F. Where antifreeze protection is required, the maximum concentration of heating system glycol is 50% by volume. High concentrations of glycol at lower system design temperatures may require increasing the design operating point. Use of leak sealant products or automotive antifreeze is not permitted.

G. Fluid temperature limitations are -5 (-21 deg C) to 250 deg F (121 deg C). Maximum ambient temperature surrounding the pump shall be 104 deg F (40 deg C).

H. Inlet/suction pressure shall not exceed 140 psi (10 Bar). Minimum inlet pressure shall be 3 feet static water column height above the inlet of the pump.

ISO 9001

ISO stands for the International Organization for Standardization. ISO 9000 is a series of standards that define the requirements for a quality management system. Companies are registered to these standards by an independent registration body. Registration means that an independent organization has evaluated and approved the quality system against the requirements of the appropriate ISO 9000 standard. This standard is:

- ISO 9001:2008 Covers manufacturing, machining and assembly of centrifugal pumps and submersible mixers.

Although complying with ISO registration is voluntary, registration to these standards is becoming recognized and growing World-wide. In many cases it is a customer requirement for trade.

EISA 2007

The Energy Independence and Security Act was passed by Congress in 2007 and applies to motors manufactured after December 19, 2010. EISA establishes efficiency standards for general purpose, 3-phase AC industrial motors from 1-250 HP.

EISA 2007 Full-Load Nominal Efficiency Requirements (%)						
	TEFC			ODP		
HP	3600	1800	1200	3600	1800	1200
1	77.0	85.5	82.5	77.0	85.5	82.5
1-1/2	84.0	86.5	87.5	84.0	86.5	86.5
2	85.5	86.5	88.5	85.5	86.5	87.5
3	86.5	89.5	89.5	85.5	89.5	88.5
5	88.5	89.5	89.5	86.5	89.5	89.5
7-1/2	89.5	91.7	91.0	88.5	91.0	90.2
10	90.2	91.7	91.0	89.5	91.7	91.7
15	91.0	92.4	91.7	90.2	93.0	91.7
20	91.0	93.0	91.7	91.0	93.0	92.4
25	91.7	93.6	93.0	91.7	93.6	93.0
30	91.7	93.6	93.0	91.7	94.1	93.6
40	92.4	94.1	94.1	92.4	94.1	94.1
50	93.0	94.5	94.1	93.0	94.5	94.1
60	93.6	95.0	94.5	93.6	95.0	94.5
75	93.6	95.4	94.5	93.6	95.0	94.5
100	94.1	95.4	95.0	93.6	95.4	95.0
125	95.0	95.4	95.0	94.1	95.4	95.0
150	95.0	95.8	95.8	94.1	95.8	95.4
200	95.4	96.2	95.8	95.0	95.8	95.4
250	95.8	96.2	95.8	95.0	95.8	95.4

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