FLYGT NP3153.185 SUBMERSIBLE PUMP - TECHNICAL SPECIFICATION

REQUIREMENTS

Furnish 2 submersible non-clog wastewater pump(s). Each pump shall be equipped with a 15HP submersible electric motor, connected for operation on 208 volts, 3-phase, 60 hertz with 50 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

PUMP DESIGN CONFIGURATION (Wet pit installation)

The pump shall be supplied with a mating cast iron 10 inch discharge connection and be capable of delivering 2,500 GPM at 12 FT. TDH. The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. No portion of the pump shall bear directly on the sump floor. Each pump shall be fitted with lifting chain or stainless steel cable. The working load of the lifting system shall be 50% greater than the pump unit weight.

PUMP CONSTRUCTION

Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

COOLING SYSTEM

Each unit shall be provided with an integral motor cooling system. A stainless steel motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket. The cooling liquid shall pass about the stator housing in the closed loop system in turbulent flow providing for superior heat transfer. The cooling system shall have one fill port and one drain port integral to the cooling jacket. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F (40°C). Operational restrictions at temperatures below 104°F are not acceptable. Fans, blowers or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

CABLE ENTRY SEAL

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of dual cylindrical elastomer grommets, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

MOTOR

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180'C (356'F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable. The motor shall be designed for continuous duty while handling pumped media of up to 104'F. The motor shall be capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.
The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.

The motor service factor (combined effect of voltage, frequency and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of+/- 10%. The motor shall be designed for continuous operation in up to a 40'C ambient and shall have a NEMA Class B maximum operating temperature rise of 80'C. A motor performance chart shall be provided upon request exhibiting curves for motor torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.

Motor horsepower shall be sufficient so that the pump is non-overloading throughout its entire performance curve, from shut-off to run-out. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

BEARINGS

The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a two row angular contact ball bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

MECHANICAL SEALS

Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber shall be a leakage-free seal. The upper seal shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide seal ring. The rotating seal ring shall have small back-swept grooves laser inscribed upon its face to act as a pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent ovenflling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are

accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

The area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

A separate seal leakage chamber shall be provided so that any leakage that may occur past the upper, secondary mechanical seal will be captured prior to entry into the motor stator housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a float type switch that will signal if the chamber should reach 50% capacity.

Seal lubricant shall be non-hazardous.

PUMP SHAFT
The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft. Shafts using mechanical couplings shall not be acceptable. The shaft shall be stainless steel -ASTM A479 S43100-T. Shaft sleeves will not be acceptable.

IMPELLER
The impeller shall be of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Re 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

VOLUTE/ SUCTION COVER
The pump volute shall be a single piece grey cast iron, ASTM A-48, Class 358, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

PROTECTION
Each pump motor stator shall incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. Should the thermal switches open, the motor shall stop and activate an alarm. A float switch shall be installed in the seal leakage chamber and will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection.

The thermal switches and float switch shall be connected to a Mini GAS control and status monitoring unit. The Mini GAS unit shall be designed to be mounted in the pump control panel.

North Beach, MD - Storm Water Management Controls Specification

I. INTENT OF SPECIFICATION

A. Is to provide the Community of North Beach, MD with a control System platform which meets the requirements of the application for which it is intended. That being a duplex pump panel for control of the level in the local Storm Water Management Basin; situated at the 5th Street Outfall.

B. The control Platform utilized shall contain all necessary attributes and functions; including: Signal conditioning, set point, control, alternation, logic function, transducer, alarm and all other control functions shall be performed by solid-state modules which shall be standard catalog items of the system manufacturer, with proven field performance.

C. The level sensors shall be standard products manufactured and stocked by the control supplier in order to assure one source responsibility, ready availability, proper system interconnections and reliable, long-term operation.

D. The equipment provided shall be a completely integrated automatic control and monitoring system consisting of the required automation and alarm monitoring equipment in a factory wired and tested assembly. The automatic control and alarm/monitoring system components shall be standard, catalogued, stocked products of the system supplier to assure one source responsibility, immediately available spare/replacement parts, proper system interconnections and reliable long term operation.

E. The Supplier shall include in the bid price for factory-trained service personnel to supervise and assist with the installation and to, adjust all the equipment until the system has been completely accepted.

F. All equipment supplied shall be of the most current and proven design at the time of delivery. The completed System and the equipment provided by the Supplier shall be compatible with the functions required and shall be a complete working System.

G. All electrical components of the System shall operate on 120 volt, single- phase, 60 Hertz current, except as otherwise noted in the specifications and on the drawings.

H. The Supplier shall be SJE/Primex Control Systems, or equal.

II. DOCUMENTATION

A. The complete assembly shall be provided with job-specific wiring diagrams, parts lists, enclosure dimensional and door layout drawings and instructions.

B. Shop Drawings shall be submitted for approval for all equipment herein specified. The Shop Drawing Submittal shall include a Document List. An Order Specification shall be included which shall describe in detail all equipment provided. Each panel shall be provided with a job-specific wiring diagram, parts list, enclosure door layout and enclosure dimension drawing. A Description of Operation shall be provided detailing the operation of the complete system, including the control and alarm handling.

C. Provide As-built Drawings and Instruction Manuals. These manuals shall include corrected Shop Drawings. In addition, a detailed Programming and Operations Manual for the Microprocessor-based Controller Unit shall be included. The manual shall include all information as detailed for the Shop Drawing Submittals above.

III. GENERAL EQUIPMENT REQUIREMENTS

A. U.L. SERIALIZED LABEL

1. The control panel shall be constructed in compliance with Underwriter's Laboratories Category UL 508. The control panel shall bear the Underwriter's Laboratories serialized label for "Enclosed Industrial Control Panel."

B.WIRING

1. All wiring shall be minimum 600 volt UL type MTW or AWM and have a current-carrying capacity of not less than 125% of the full load current.

2. All control wiring shall be contained within plastic/PVC wiring duct with covers. The wire groupings shall be bundled and tied not less than every 3 inches with nylon self-locking cable ties as manufactured by Panduit or equal.

3. Every other cable tie shall be fastened to the enclosure door or inner device panel with a cable tie mounting plate with pressure tape. Where wiring crosses hinged areas such as when trained from the inner device panel to the enclosure door, spiral wrap shall be used.

C. INCOMING SERVICE AND LIGHTNING ARRESTOR

1.. The power supply will be 208 volts, 3 phase, 4 wire, 60 Hertz.

2. A lightning arrestor shall be supplied in the control system and connected to each line of the load side of main power disconnect.

3. Each panel shall be supplied with a properly sized control power circuit breaker. The breaker shall supply power to all control wiring within the enclosure.

D. NAMEPLATES

1. All major components and sub-assemblies shall be identified as to function with laminated, engraved bakelite nameplates, or similar approved means.

IV. CONTROL SYSTEM AND CONTROL PANEL

A. ENCLOSURE

1. The described equipment shall be housed in a NEMA 4X 304 Stainless Steel enclosure. The enclosure door shall be provided with a 3 point padlock-able latch and aluminum dead front operator's inner door.

2. This weatherproof, rain-tight enclosure shall be designed specifically for mounting in an unprotected outdoor location. It shall have a gasketed, hinged, front weather door with locking capability, and an internally mounted hinged dead front panel so that all the components normally actuated by Operating Personnel are accessible without opening the dead front and yet are not exposed to the elements or to unauthorized personnel.

B. INCOMING POWER CIRCUIT INTERRUPTS

1. The control panel shall include a thermal magnetic main circuit breaker to provide an incoming power disconnect means and short circuit/overcurrent protection for the control panel equipment

2. The circuit breaker must have a minimum symmetrical RMS ampere interrupting capacity of 25,000 kA @ 240 volts. The circuit breaker shall be operable through the operator's door of the enclosure and shall have a trip rating to allow full voltage starting and continuous operation of the motors.

C. PHASE FAILURE/UNDERVOLTAGE PUMP PROTECTION

1. A power monitor shall be provided to monitor incoming voltage and provide protection to the motors. The power monitor shall detect incoming service abnormalities including phase-loss, unbalance, reversal, over voltage, under-voltage and rapid cycling protection and provide automatic cutout of pumps and provide local alarm. Upon detection that incoming power has returned to normal, the unit will restore pump operation and discontinue alarm.

D. BRANCH CIRCUIT BREAKERS AND MOTOR STARTERS

1. A thermal magnetic circuit breaker shall be supplied as branch circuit protection for each pump motor. The circuit breaker must have the same minimum ampere interrupting capacity as the main breaker. The circuit breakers shall be operable through the operator's door of the enclosure and shall have a trip rating to allow full voltage starting and continuous operation of the motors.

2. A NEMA rated, full-voltage, across-the-line magnetic motor starter with ambient-compensated, quick-trip class 10 overload sensing for submersible pumps in each phase to provide over current and running protection, shall be provided for each pump motor. The overload trip setting shall be operator adjustable within normal pump operating ranges.

3. 120 VAC control power for each motor starter coil and H-O-A selector switch shall be provided.

4. A control power circuit breaker shall be provided and operable through the operator's door of the control panel to provide a disconnect means and short circuit protection for any 120 VAC devices not powered from motor starter circuits.

5. Combination motor starters shall be furnished for TWO (2) motors: 15 HP at 208 volts; rated 49 amps at full load.

E. PUMP CONTROL SELECTOR SWITCHES AND "RUN" LIGHTS

1. The control panel shall have three position selector switches mounted on the front door for Hand-Off-Auto operation of each pump.

2. Selector Switch(s) shall be industrial rated heavy duty NEMA 4 with modular contact block assemblies. Each contact block shall meet "touchsafe" requirements of IEC.

3. Unless specified otherwise, Selector Switch(s) shall be of the maintained position.

4. An operator's door mounted, 22 mm diameter, NEMA Type 4X oil tight pilot light with a "Green" lens and replaceable bulb shall be provided for each pump to indicate a "pump running" condition.

5. Light shall be push to test type to permit operator testing of bulb illumination.

F. PUMP RUNNING TIME METERS

1. An operator's door mounted, 120 VAC powered running time meter measuring hours and tenths of hours of operation up to 99999.9 hours shall be furnished for each pump motor indicated.

G. PRIMARY CONTROLLER

1. The PUMP CONTROL shall be furnished for monitoring and automatically controlling the pumps in a pump down mode of operation in response to a Level process variable as based on preconfigured set points.

2. The Pump Controller shall be specifically designed for water and wastewater pumping automation. "One of a kind" systems using custom software with a generic programmable controller will not be acceptable.

3. The operating program shall b .resident in non-volatile FLASH rrremory and include full-scale ranging and pump-upldown determination. The controller shall be arranged to operate up to three (3) pumps plus high and low (analog) alarms. The ON and OFF adjustments of each pump and alarm setpoint shall be full-range adjustable through use of an authorized operator access code and a keypad. The controller display shall show the operation of each control stage.

4. The controller shall include keypad adjustable on-delay timing logic to provide staggered pump starting following a power failure condition. Keypad adjustable off delay timing for each pump control stage shall provide smooth transition between control stages.

5. The Pump Controller shall be able to operate on either 120 AC or 10-30 VDC power sources. The unit shall be battery backed to provide continued system monitoring and alarm annunciation in the event of primary power failure. Unit shall have built in battery charging circuitry to maintain and charge battery. Battery shall be sized to provide a minimum of 4 hours of back up power. Back up battery power will extend to necessary process sensors, local alarm lights, horns and telemetry equipment. A power on LED shall be built on board providing local indication that power is available to the unit.

6. The Pump Controller shall be furnished with a user friendly "View-At-A-Glance™" operator interface allowing adjustment and viewing of all system parameters and status. The operator interface shall be suitable for front door mounting including locations requiring wash-down and moisture protection.

- *The display unit shall incorporate a high contrast LCD panel allowing for viewing of higher level functions including the following:*
  - *Process display to XX.X of the full scale process range.*
  - *Time and Date Stamped Alarms & Events*
  - *Pump Statistics (Including Run Time, Number of Starts, Daily Average Number of Starts)*
  - *System diagnostics*
  - *Controller Security*
  - *Unauthorized Station Entry Detection*

7. Pump Controller shall provide on board 24 VDC loop power output for external loop powered sensor. A built-in Analog Supply Voltage Status LED shall indicate availability of loop power. Unit shall be able to monitor a user selectable 4-20 mA signal from a transducer.

8. The Pump Controller shall have the ability to monitor up to 16 digital inputs to be uc;P.d to provide monitoring of local station status. Each discrete input shall provide optical isolation from the main board to the field device.

9. The Pump Controller shall have the ability to provide a 4-20 mA output signal for interface to external equipment including VFDs, Chart Recorders or other monitoring devices. Analog output can be configured to provide output representing process variable for retransmission or as a process control output for interface to VFDs, Valves, or other process controlled device.

10. The Pump Controller shall support contact closure inputs from float or pressure switches representing high and low level. The Pump Controller shall annunciate these inputs as alarms and use them to provide back up control in the event the primary sensor fails. Unit will provide local alarm indication and utilize the inputs to cycle pumps on and off to maintain system operation.

11. The Pump Controller shall have built-in standard operator adjustable alternation functions allowing for sequencing and equalizing wear of the pumps

12. Unit shall be constructed for industrial applications for use in harsh environments. Unit shall have a Temperature Operating range of -40 to+ 85 Deg C, and be able to operate in environments with 10-90% non-condensing humidity.

13. The Pump controller shall be the Evoqua Water Technologies LC-150, or approved equal.

I. CONVENIENCE RECEPTACLE

1. An operator's door mounted 120 VAC duplex ground fault interrupter (GFI) type, convenience receptacle rated at 15 amperes shall be supplied for the operation of a trouble light, drill, etc. It shall be protected by a separate 15 ampere trip rated circuit breaker accessible from the operator's door.

J. CONDENSATION PROTECTIVE HEATER

1. A 100 watt, 120 VAC condensation protective heater and adjustable high temperature cutout thermoswitch shall be supplied in the control panel. The heater's surface area for heat dissipation shall be large enough to prevent a skin burn (if an operator's hand should inadvertently come in contact with the unit when energized).

K. FLOAT SWITCH -

1. The bidder shall furnish, 4 float switches for control.

2. Each float shall have molded polyethylene body, internal redundant polyurethane foam flotation, potted switch and cable connections and fine-stranded AWG #18 cable with heavy-duty synthetic rubber jacket in lengths as required to run unspliced to the control panel. The floats shall include internal weight allowing suspended operation without the use of special pipe or suspension mounting systems.

3. The float switches shall be Muni-Floats as manufactured by SJE-Rhombus, or approved equal.

L. OVER-TEMPERATURE PUMP PROTECTION & PUMP SEAL FAILURE ALARM

1. Over-temperature protection shall be provided in the control panel to operate in conjunction with the over-temperature switch in each pump motor. The control shall provide pump operation lockout upon the occurrence of high temperature.

2. Seal Failure Relays, and over-temperature relays shall be provided to the pump control panel supplier; from the pump supplier selected for this project. It is the control panel supplier's responsibility to coordinate the application of these devices in accordance with the needs of the pump supplier, to assure the best suitable protection for the pumps.

V. FIELD SUPERVISION

1. The services of a factory trained, qualified representative shall be provided to inspect the completed installation, make all adjustments necessary to place the system in trouble-free operation and instruct the operating personnel in the proper care and operation of the equipment.

VI. TRAINING

1. The Supplier shall provide systems training for operations staff totaling no less than 4 hours.

VII. GUARANTEE

1. All equipment shall be guaranteed against defects in material and workmanship for a period of one year from the date Owner's final inspection and acceptance to the effect that all defective equipment shall be repaired • or replaced without cost or. Obligation to the Owner.

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Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

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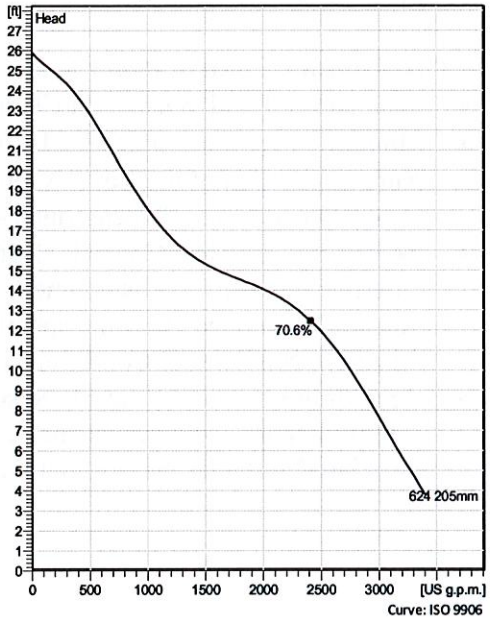
Technical specification

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Configuration

Motor number
N3153.185 21-18-6AA-W 15hp

Installation type
P - Semi permanent, Wet

Impeller diameter
205 mm

Discharge diameter
10 inch

Pump information

Impeller diameter
205 mm

Discharge diameter
10 inch

Inlet diameter
250 mm

Maximum operating speed
1155 rpm

Number of blades
3

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

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- Spare Parts (none specified)
- Guide Rails & cable holder
- Anchor Bolts
- Lifting Hoist/Davit Crane
- Access Hatches
- Gauges & valves
- Installation

PART B – Duplex Control Panel & all related equipment & services

- Installation, Field Wiring, and Terminations are not included.
- Mounting hardware, brackets, Unistrut & anchor bolts are not included.
- **Note – 1**: In lieu of the Level View Pump Controller, SL provides a PLC Controller with a 5.7" local touch screen Operator Interface.
- Regarding Electrical Controls System – Part 1-E (page 10 of the specification) – a "lifetime warranty" is listed under the specified Level Rat submersible level transducer on page 10 of the specification. We can offer a 5 year warranty for this item, per General Conditions item 4.8.
- Regarding Electrical Controls System – Part 3- G – Furnished Controller to have communication capabilities specified, however dial-up and/or Cell Modems with associated antennas are not included.

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Technical specification

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Motor - General

Motor number N3153.185 21-18-6AA-W 15hp	**Phases** 3~	**Rated speed** 1155 rpm	**Rated power** 15 hp
ATEX approved No	**Number of poles** 6	**Rated current** 49 A	**Stator variant** 4
Frequency 60 Hz	**Rated voltage** 208 V	**Insulation class** H	**Type of Duty** S1
Version code 185			

Motor - Technical

Power factor - 1/1 Load 0.73	**Motor efficiency - 1/1 Load** 87.0 %	**Total moment of inertia** 3.16 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.66	**Motor efficiency - 3/4 Load** 88.0 %	**Starting current, direct starting** 225 A	
Power factor - 1/2 Load 0.54	**Motor efficiency - 1/2 Load** 87.5 %	**Starting current, star-delta** 75 A	

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Performance curve

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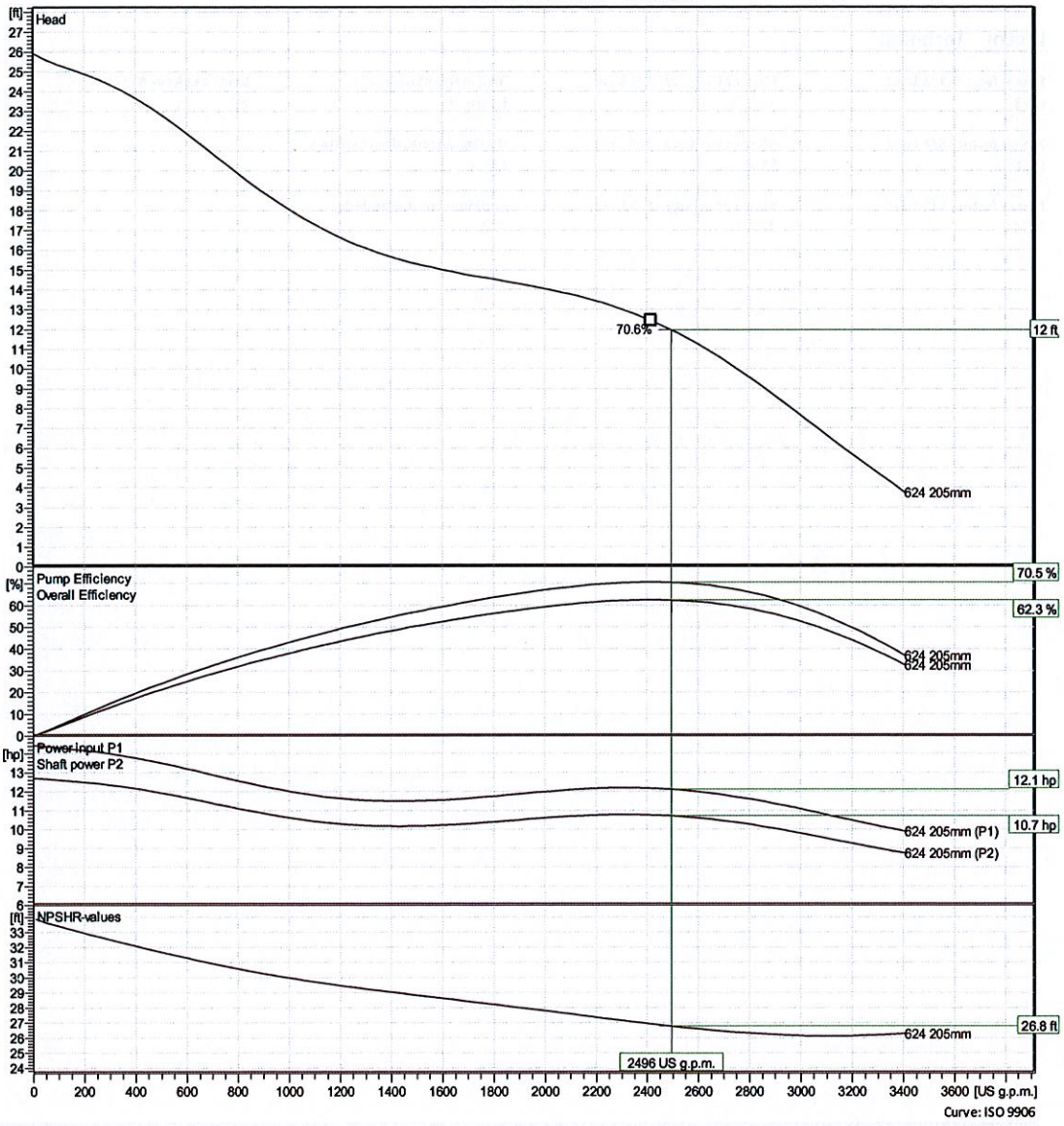
Duty point

Flow	Head
2500 US g.p.m.	12 ft

Curves according to: Water, pure 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Curve: ISO 9906

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Duty Analysis

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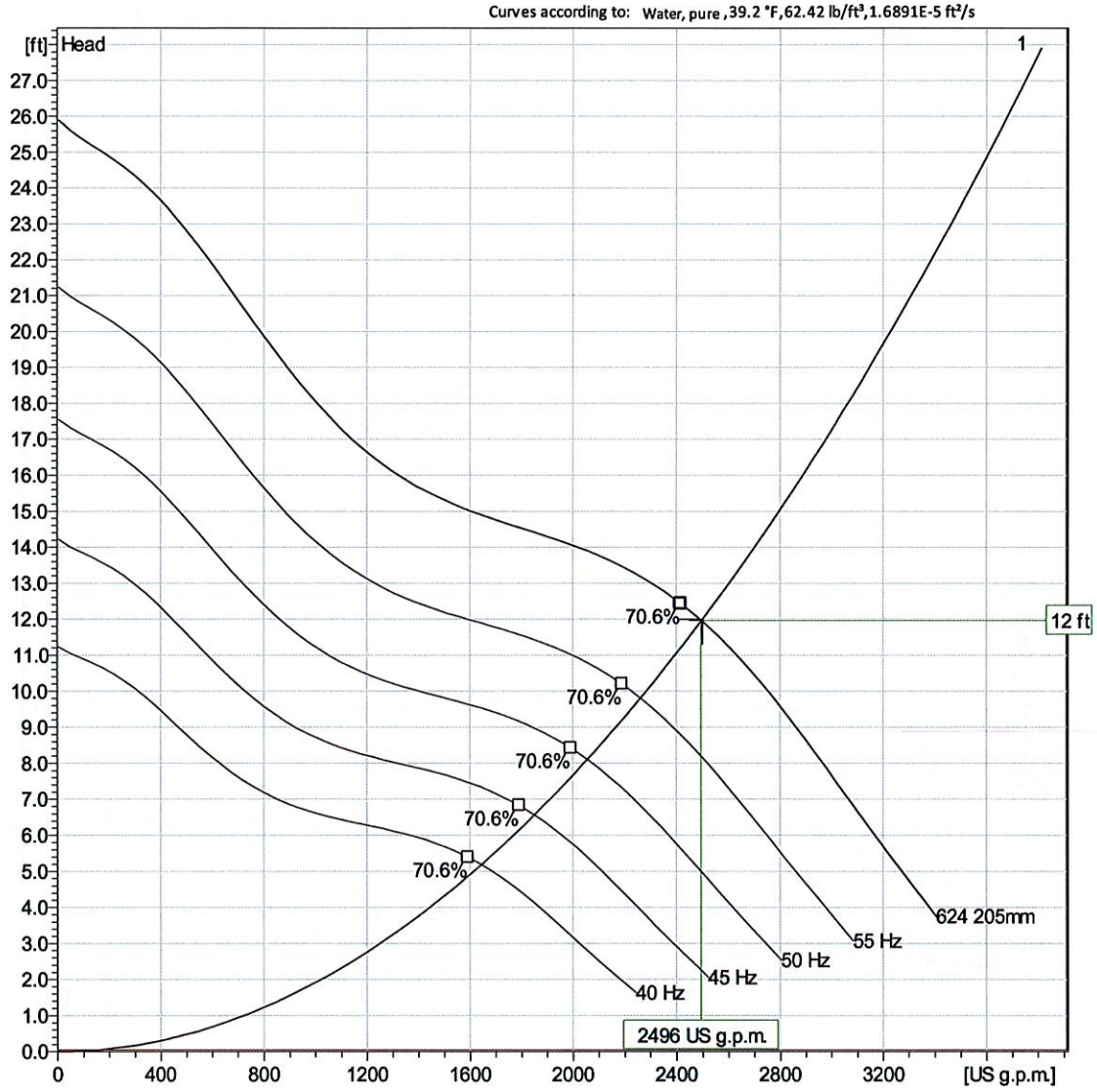
Curves according to: Water, pure , 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	2500 US g.p.m	12 ft	10.7 hp	2500 US g.p.m	12 ft	10.7 hp	70.5 %	60.3 kWh/US M	26.8 ft

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VFD Curve

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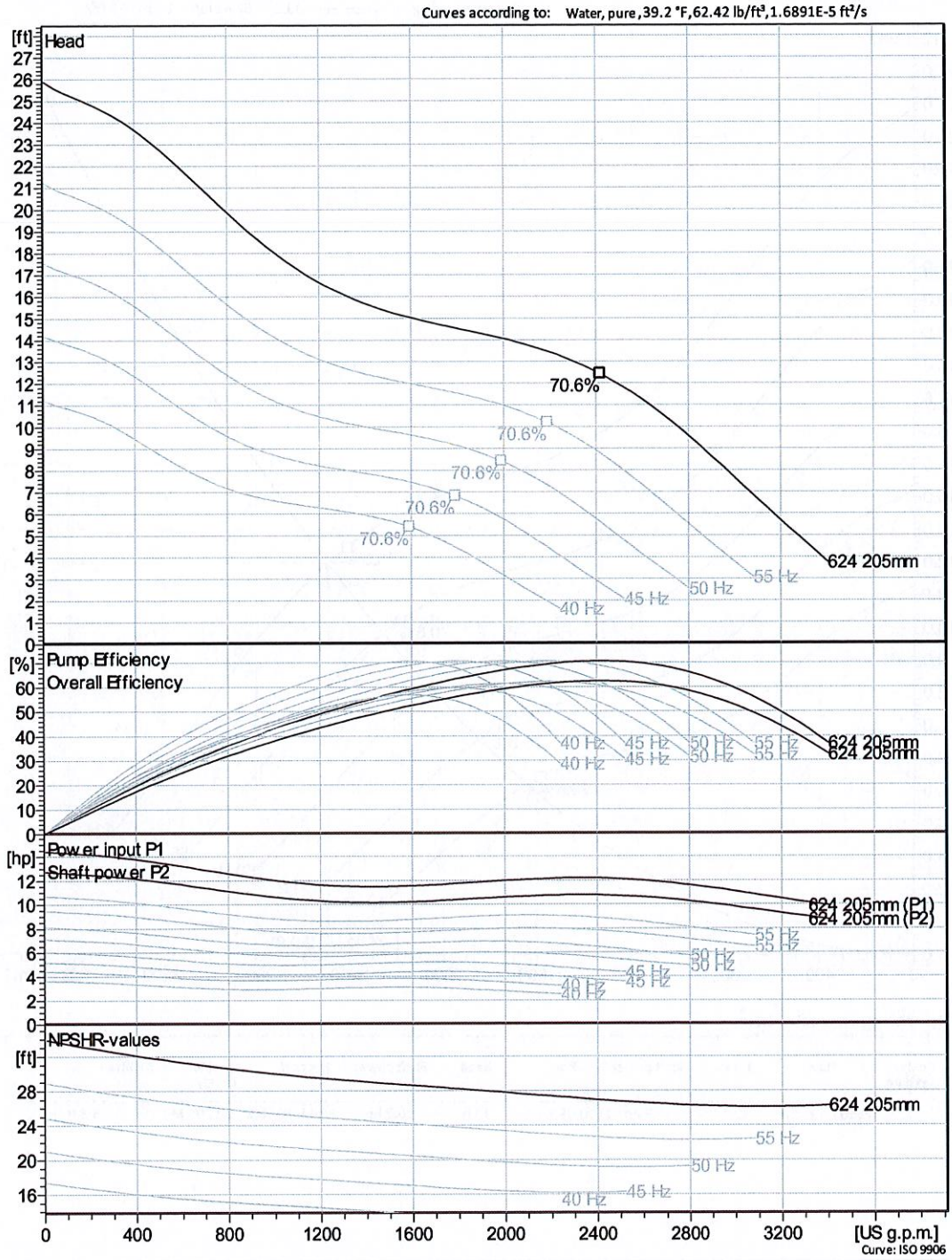

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VFD Analysis

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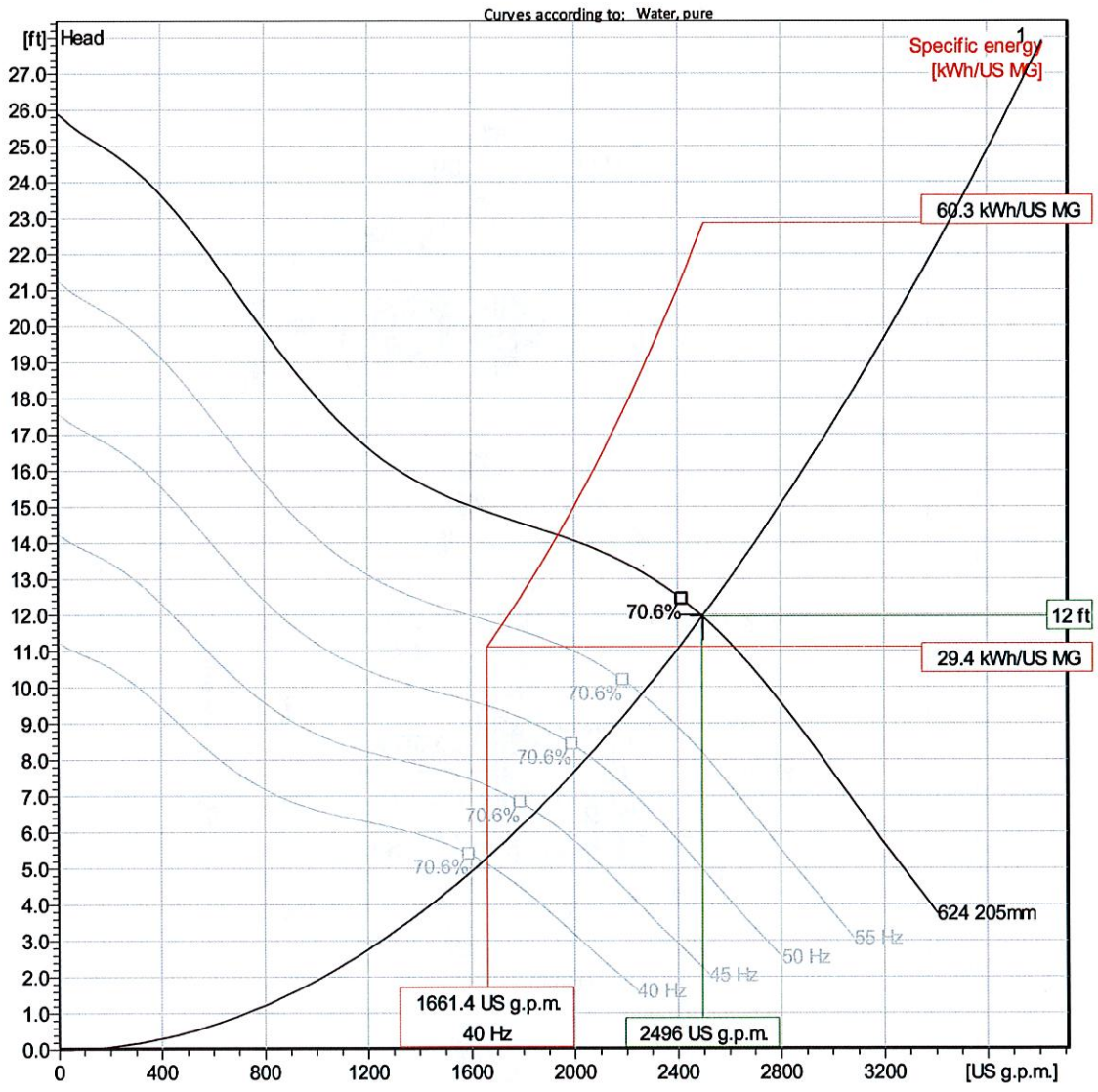
a xylem brand



Operating characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	60 Hz	2500 US g.p.m	12 ft	10.7 hp	2500 US g.p.m	12 ft	10.7 hp	70.5 %	60.3 kWh/US M	26.8 ft
1	55 Hz	2280 US g.p.m	10 ft	8.22 hp	2280 US g.p.m	10 ft	8.22 hp	70.5 %	50.7 kWh/US M	23.2 ft
1	50 Hz	2080 US g.p.m	8.28 ft	6.17 hp	2080 US g.p.m	8.28 ft	6.17 hp	70.5 %	42.5 kWh/US M	19.9 ft
1	45 Hz	1870 US g.p.m	6.71 ft	4.5 hp	1870 US g.p.m	6.71 ft	4.5 hp	70.5 %	35.5 kWh/US M	16.9 ft
1	40 Hz	1660 US g.p.m	5.3 ft	3.16 hp	1660 US g.p.m	5.3 ft	3.16 hp	70.5 %	29.4 kWh/US M	14 ft

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Dimensional drawing

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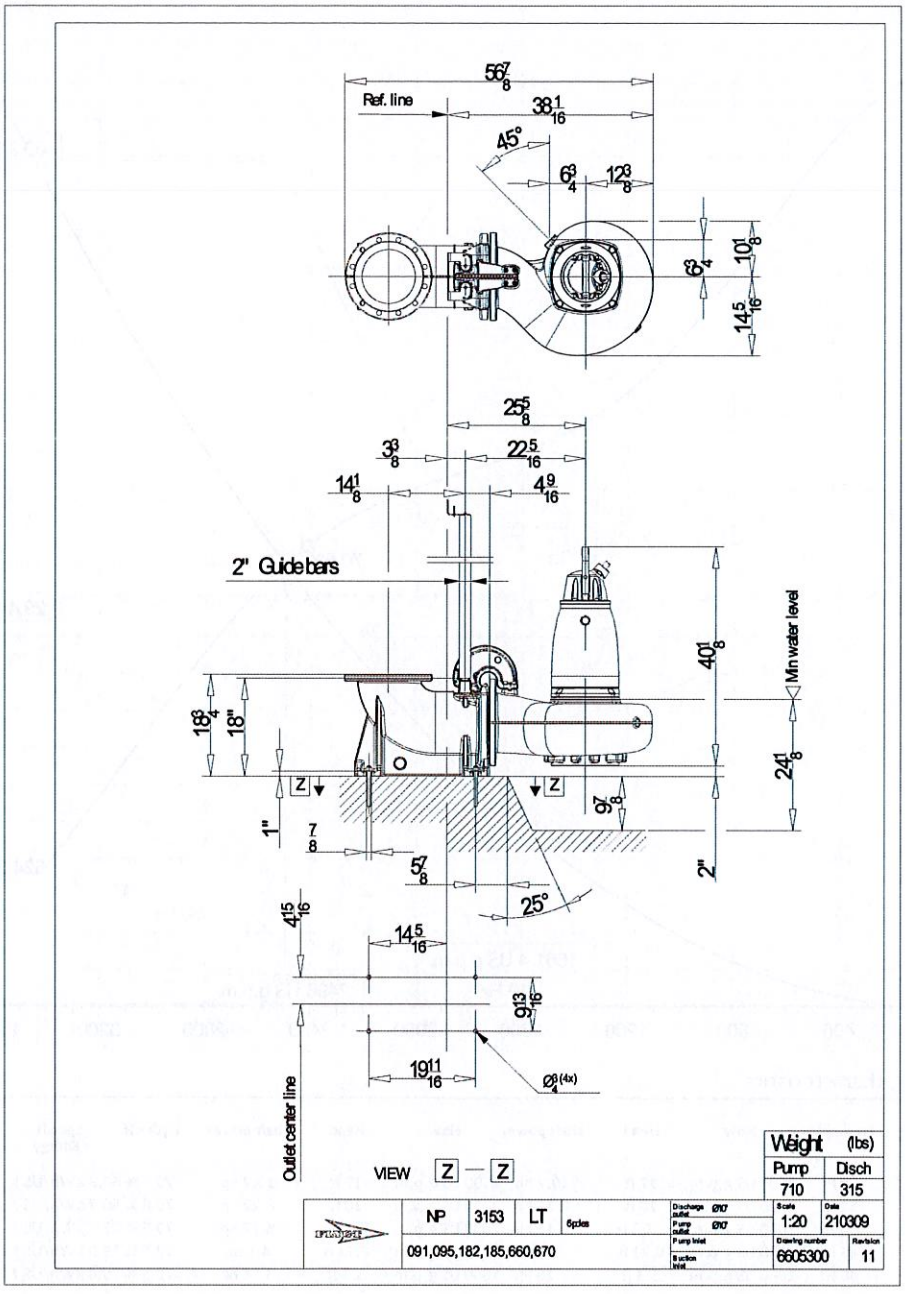
a xylem brand



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