PURCHASE AGREEMENT

THIS AGREEMENT is made and entered into this 22nd day of October, 2019, by and between the **CITY OF MISSOULA, MONTANA,** a municipal corporation organized and existing under the laws of the State of Montana, 435 Ryman, Missoula, Montana 59802, hereinafter referred to as "City," and **Falcon Environmental Corp,** whose principal place of business is located at PO Box 710 Fredrick, CO 80530, hereinafter referred to as "Supplier."

In consideration of the mutual covenants and agreements herein contained, the parties agree as follows:

1. **Purpose:** City desires to obtain products as described in the Quotation attached as Exhibit A. The terms and conditions of the Quotation, and any promises, covenants, and warranties made in Proposal are hereby made part of this Agreement.

2. **Effective Date:** This Agreement is effective upon the date of its execution.

3. **Payment:** Upon receipt by the City of the parts in Exhibit A, the City of Missoula shall pay Supplier in accordance with the total price of Fifty-Eight Thousand, Seven Hundred and Eight Dollars ($58,708). The payment shall be full compensation for pump, parts and freight as described on attached quote.

4. **Insurance and Warranties:** Supplier shall provide any insurance or express warranty requirements outlined in the Request for Proposals or as stated in Supplier's Proposal.

5. **Merchantability:** Supplier agrees that the products and services supplied will confirm to the specifications stated in the Supplier's Proposal, and will function and conform to the standards of the industry.

6. **Nondiscrimination and Affirmative Action:** Consultant agrees and shall comply with the following Non-Discrimination and Affirmative Action policies:

NON-DISCRIMINATION. All hiring shall be on the basis of merit and qualification and there shall be no discrimination in employment on the basis of race, ancestry, color, physical or mental disability, religion, national origin, sex, age, marital or familial status, creed, ex-offender status, physical condition, political belief, public assistance status, sexual orientation or gender identity/expression, except where these criteria are reasonable bona fide occupational qualifications.

AFFIRMATIVE ACTION POLICY. Contractors, subcontractors, sub grantees, and other firms doing business with the City of Missoula must be in compliance with the City of Missoula's Affirmative Action Plan, and Title 49 Montana Codes Annotated, entitled "Human Rights" or forfeit the right to continue such business dealings.

The City's Affirmative Action Policy Statement is:

The Mayor of the City of Missoula or the Mayor's designee may adopt an affirmative action plan to provide all persons equal opportunity for employment without regard to race, ancestry, color, handicap, religion, creed, national origin, sex, age, sexual orientation, gender identity or expression or marital status. In keeping with this commitment, we are assigning to all department heads and their staff the responsibility to actively facilitate equal employment opportunity for all present employees, applicants, and trainees. This responsibility shall include assurance that employment decisions are based on furthering the principle of equal employment opportunity by imposing only valid requirements for employment and assuring that all human resource actions are administered on the basis of job necessity.

Specific responsibility for developing, implementing, monitoring and reporting are assigned to the City Personnel staff under the supervision and direction of the Chief Administrative Officer and the Mayor.

It is the policy of the City of Missoula to eliminate any practice or procedure that discriminates illegally or has an adverse impact on an "affected" class. Equal opportunity shall be provided for all City employees during their terms of employment. All applicants for City employment shall be employed on the basis of their qualifications and abilities.

The City of Missoula, where practical, shall utilize minority owned enterprises and shall ensure that subcontractors and vendors comply with this policy. Failure of subcontractors and vendors to comply with this policy statement shall jeopardize initial, continued, or renewed funds.

Our commitment is intended to promote equal opportunity in all employment practices and provide a positive program of affirmative action for the City of Missoula, its employees, program participants, trainees and applicants.

7. Default and Termination: If either party fails to comply with any condition of this Agreement at the time or in the manner provided by Exhibit A, the other party, at its option, may terminate this Agreement and be released from all obligations if the default is not cured within ten days after written notice is provided to the defaulting party. Said notice shall set forth the items to be cured. Additionally, the non-defaulting party may bring suit for damages, specific performance, and any other remedy provided by law. These remedies are cumulative and not exclusive. Use of one remedy does not preclude use of the others.

City may terminate this Agreement at any time by giving 30 days' written notice to

Supplier's liaison of such termination and specifying the effective date thereof at least thirty days before the effective date of such termination. If this Agreement is terminated by City as provided herein, Supplier shall be paid for all products supplied pursuant to this Agreement until the date of termination.

Notices shall be provided in writing and hand-delivered or mailed to the parties at the addresses set forth in the first paragraph of this Agreement.

8. Modification and Assignability: This Agreement may not be enlarged, modified or altered except by written agreement signed by both parties hereto. The Supplier may not subcontract or assign Supplier's rights, including the right to compensation or duties arising hereunder, without the prior written consent of City. Any sub-Supplier or assignee will be bound by all of the terms and conditions of this Agreement.

9. Liaison: City's designated liaison with Supplier is Gene Connell with the City of Missoula's Wastewater Division and Supplier's designated liaison with City is Jordan Jimenez.

10. Applicability: This Agreement and any extensions hereof shall be governed and construed in accordance with the laws of the State of Montana.

11. Venue: Any litigation arising out of the terms of this Agreement shall be conducted in the Fourth Judicial District of Montana, Missoula County. Supplier expressly consents to the jurisdiction of this Court, and agrees to this venue.

12. Signing of Contract: The contract may be signed in counterparts and signed electronically by all parties.

IN WITNESS WHEREOF, the parties hereto have executed this instrument the day and year first above written.

CITY OF MISSOULA **SUPPLIER**

By_____ _____

Mayor John Engen **Falcon Environmental Corp.**

ATTEST

_____

Martha L. Rehbein, CMC, City Clerk

Exhibit A

MISSOULA WWTP

INFLUENT PUMPING

SULZER-ABS SUBMERSIBLE PUMP QUOTE

Area Rep:

303-833-9998

PROJECT: **MISSOULA WWTP INFLUENT PUMPS**

ENGINEER: **MORRISON- MAIERLE**

EQUIPEMENT: **SULZER SUBMERSIBLE**
405MCB2 PE5 PE860/8
MERIDEN, CONNECTICUT
PHONE: 203-238-2700

AREA REP: **FALCON ENVIRONMENTAL**
P.O. BOX 170
FREDERICK, COLORADO

PREPARED BY:
JORDAN JIMENEZ
303-833-9998

September 04, 2019

NOTES TO THE ENGINEER

1. *The same guiderail system can be used*

2. *According to the specification the New Pump can use the existing VFD since the pump only require 141 Full Load Amps. The pump Name plate is 115HP..*

3. *They can use the existing chains or lifting system.*

4. *Multiple curve have been provided for your review*

FALCON ENVIRONMENTAL CORP.
AT LONGMONT

P.O. BOX 710 •, FREDERICK, CO 80530
FAX (303) 833-4009 • TELEPHONE (303) 833-9998

TO: Missoula Wastewater Treatment Plant
ATTN: Don Schmidt & Gene Connell
FROM: Jordan Jimenez
DATE: September 4, 2019
SUBJECT: Influent Pumps

****

The following is our equipment quotation for the above project.

405M-CB2 PE860/8 Cost: **$58,708** (Includes Full Pump With Cooling Jacket, 5m Extra Cable, Powder or Customer approved Coating, Contra Block Style Impeller)

- Full Monitoring w/ (3) RTD's
- 65 ft of cable
- PC441 Controler, CA441 (DI aka seals RTD monitoring module), CA442 (Thermal RTD monitoring module expansion),
- Thermal Switches Embeded in Motor stator to shut down incase of over heating set to open at 140°C +/-5°C (284°F) this is done with or without the monitoring modules.
- Melonite Treatment for minimum of 600HV hardness on Impeller AND Wearplate
- Start up, Training, Inspection and Maintanence according to the specifications included in the price
- Shipping included

A. Lead time:
   3-4 weeks for submittals & 22-23 weeks for equipment delivery
B. Motor Size: **115 HP**
C. Motor Loading: **96 HP at Max duty point**
D. Pump Efficiency: **78.7% WIRE TO WATER**

NOTES:

New warranty on pumps are 5 year warranty 3 year full coverage parts and labor and prorated after 3 years. Old warranty was 2 year full coverage and pro rated after two years. Please see new attached warranty statement.

Instillation not included.

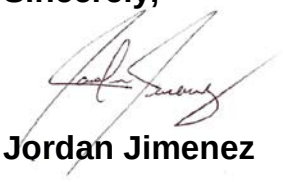
EXCEPTIONS:

None

Warranty: 5-year warranty, 100% 3 years, 75% 4th year, 50% 5th year

Thank you for this opportunity to quote products represented by Falcon Environmental.

Sincerely,



Jordan Jimenez

SULZER

Limited Product Warranty

5 Year Pro-Rated | Municipal

XFP, AFP, AFL(X), VUP(X)* Permanent Type Installation

Manufacturer warrants the above referenced ABS brand equipment ("Products") to be free from defects in workmanship and materials as follows:

The warranty period shall be five (5) years from date of manufacturer provided startup, not to exceed 5 years 6 months from date of shipment. If authorized startup is not performed, the warranty shall be five (5) years from date of shipment. This warranty is contingent upon purchaser's or end user's payment of the applicable percentage of the list price (list price minus covered %) of the following parts in effect at time of replacement.

Warranty Coverage

Months	0 - 36	37 - 48	49 - 60
Percentage	100% Parts / 100% Labor	75% Parts / 75% Labor	50% Parts / 50% Labor

When used in temporary/portable applications, the warranty period shall expire on the earliest of the below dates:

i) one (1) year from date of installation of the Products; or
ii) eighteen (18) months from date of shipment of the Products from Manufacturer.

Products or parts thereof that are replaced or repaired under warranty during the original warranty period, shall be covered under this warranty until the expiration of the original warranty period or ninety (90) days from the date of such replacement or repair, whichever is later. In any event, such extended warranty period shall not exceed ninety (90) days after the expiration of the original warranty period.

The warranties stated above are contingent upon start-up of the equipment on site by an authorized Manufacturer's representative, as verified by receipt of start-up reports completed and signed by an authorized Manufacturer's representative.
If during the warranty period, any Products fail to meet the requirements set out in this warranty, the purchaser or end user shall give written notification to Manufacturer stating the reasons therefor. Upon receipt of prior written authorization from Manufacturer, Products shall be transported to Manufacturer's authorized service center, prepaid, at purchaser or end-user's cost. Manufacturer's sole obligation shall be to repair, modify or replace Products or parts thereof, at Manufacturer's sole option. Products repaired under this warranty will be returned with freight prepaid. Products must be repaired by an authorized Manufacturer repair center for warranty coverage to be considered.

All protection features (such as moisture sensors, bearing monitors, and thermal overloads) incorporated in the Products must be connected and operable for warranty coverage. This warranty is valid only if Manufacturer supplied or authorized alarm monitoring components, cables and control components/panels are used.

This warranty shall not apply to any Products or parts thereof which have been (i) subjected to misuse, misapplication, accident, alteration, neglect, failure to act in a timely manner to address alarms/warnings, or physical damage; (ii) installed, operated, and/or maintained in a manner which is contrary to Manufacturer's written instructions as it pertains to installation, operation and maintenance of the Products, including but without limitation to being operated without being connected to monitoring devices supplied with specific products for protection; (iii) used in an application or for pumping liquids other than the use for which it is intended as specified in Manufacturer's product literature; (iv) damaged due to a defective power supply, improper electrical protection, faulty repair, ordinary wear and tear, corrosion, erosion or chemical attack, an act of God, an act of war or by an act of terrorism; (v) damaged resulting from the use of accessory equipment not sold by Manufacturer or not approved by Manufacturer for use in connection with Manufacturer's products; or (vi) repaired or altered without Manufacturer's written consent.

This warranty does not cover costs for standard and/or scheduled maintenance that is performed, nor does it cover Manufacturer's parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship is determined by Manufacturer. Wear Parts are defined as cutters, cutting plates, seals, bearings, impellers/propellers, diffusers, wear rings (stationary or rotating), volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Manufacturer's equipment.

Manufacturer shall not be liable for any special, indirect, consequential, or punitive damages, or profit loss of any kind. Major components not manufactured by the Manufacturer are covered by the original manufacturer's warranty in lieu of this warranty. In addition to any other special, indirect or consequential damages referenced above, Manufacturer shall not be responsible for travel expenses, rented (replacement) equipment, pump removal fees, installation fees, outside contractors fees, or unauthorized repair shop expenses.

This warranty shall extend only to the initial end user.

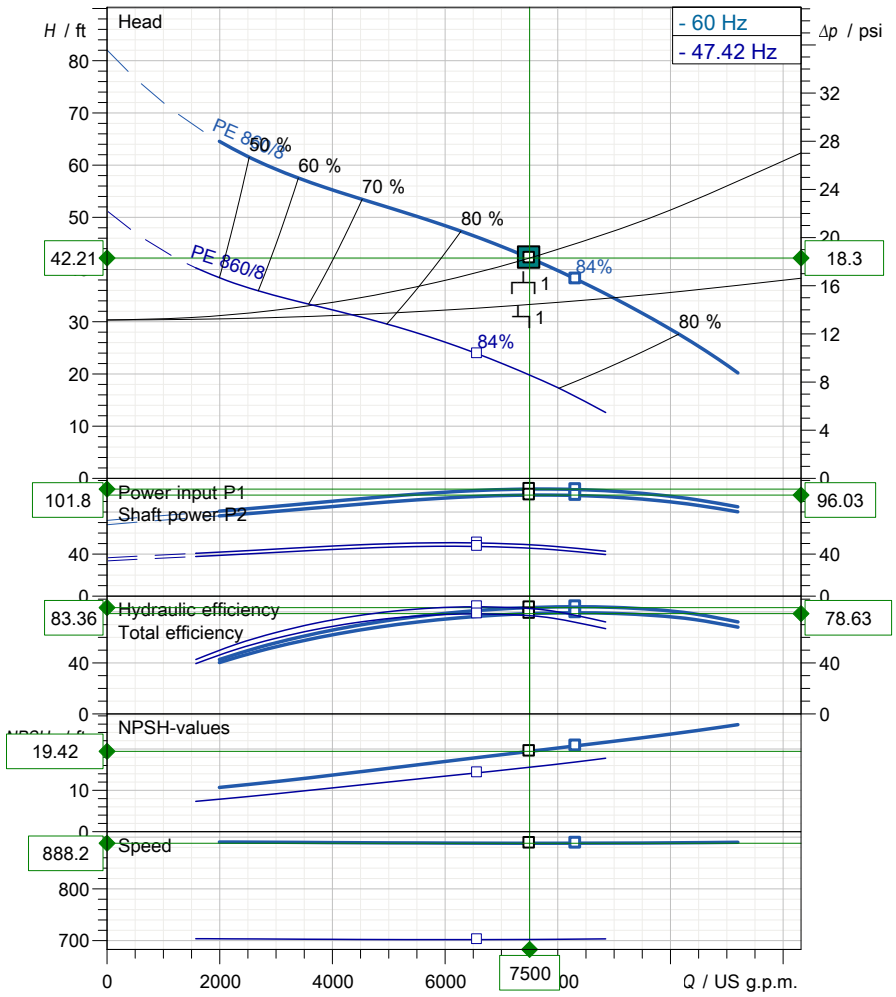
All other warranties, conditions and representation, expressed or implied by statue, common law or otherwise, in relation to the supply of the products including but not limited to the implied warranties or merchantability and fitness for a particular purpose are excluded to the extent permitted by law.

*This warranty is applicable to Products supplied by Sulzer Pumps Solutions Inc. or Sulzer Pumps (Canada) Inc. for installation in the U.S.A. or Canada, unless specifically indicated otherwise in writing by Manufacturer.

DS-Z07-001 REV: 0 DATE: 08/17 Specifications Subject to Change Without Notice

Scan For More Info

XFP 405M-CB2 60 HZ



Testnorm
ISO 9906: 2012, HI 11.6/14.6 Gr 2B

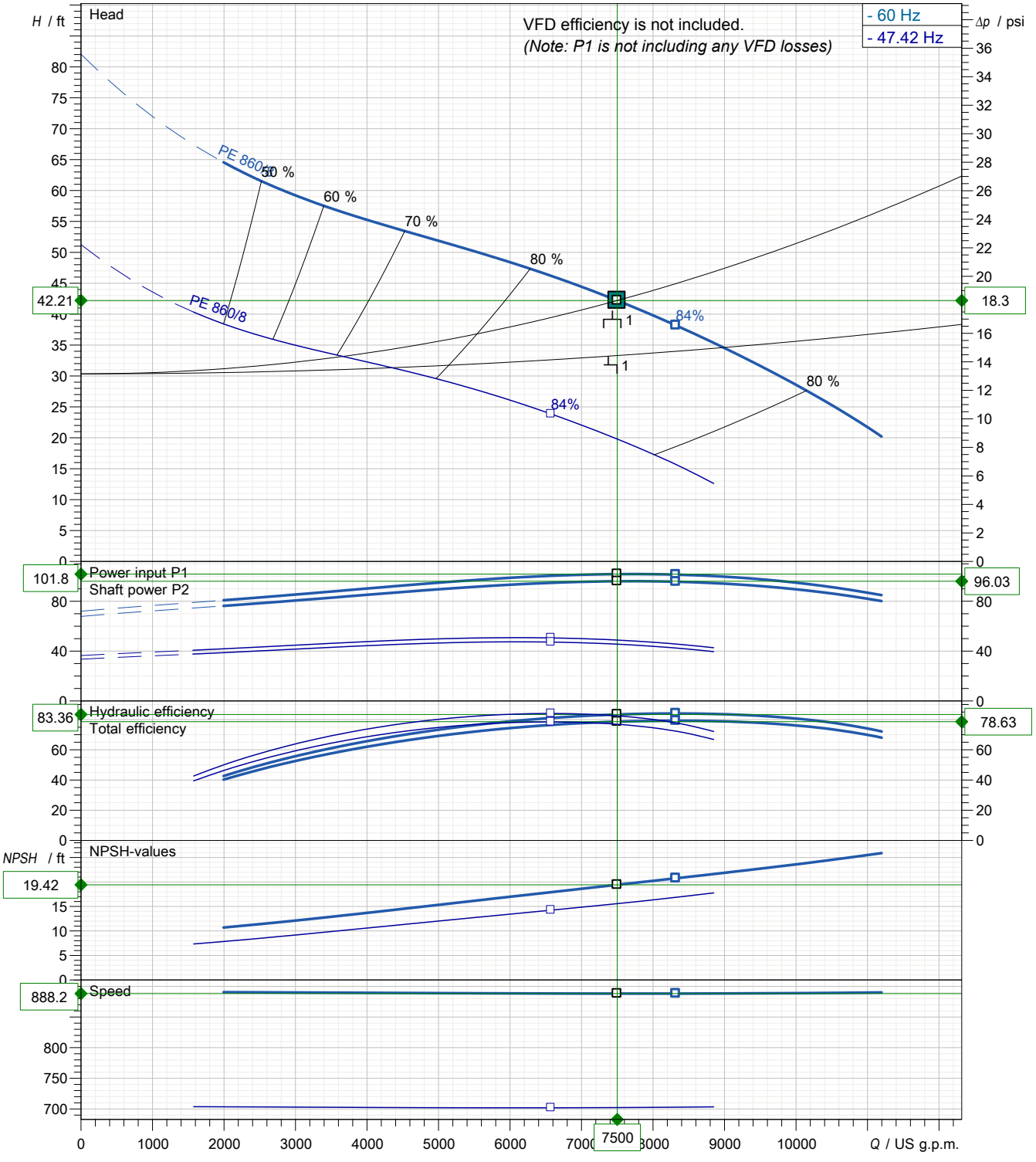
VFD efficiency is not included.
(Note: P1 is not including any VFD losses)

2019-09-04

Operating data specification			
Flow	7500 US g.p.m.	Power input	102 hp
Efficiency	83.4 %	Head	42.2 ft
NPSH	19.4 ft	Rated power	96 hp
Temperature	38 °F	Fluid	Wastewater
No. of pumps	2	Nature of system	Single pumps as parallel circuit
Pump data			
Type	XFP 405M-CB2 60 HZ	Make	SULZER
Series	XFP PE4-PE7	Impeller	Contrablock Plus impeller
N° of vanes	2	Impeller size	18.4 inch
Free passage	6.69 x 5.71 inch	Suction flange	DN400
Discharge flange	DN400	Type of installation	wet well vertical installation 2"
Moment of inertia	67.6 lb ft²		
Motor data			
Rated voltage	480 V	Frequency	60 Hz
Rated power P2	115 hp	Nominal Speed	886 rpm
Number of poles	8	Efficiency	
Power factor	0.814	Rated current	135 A
Starting current	1200 A	Rated torque	684 lbf ft
Starting torque	1910 lbf ft	Degree of protection	IP 68
Insulation class	H(140)	No. starts per hour	10

Curve number	Pump performance curves	SULZER
Reference curve XFP 405M-CB2 60 HZ	**XFP 405M-CB2 60 HZ**	

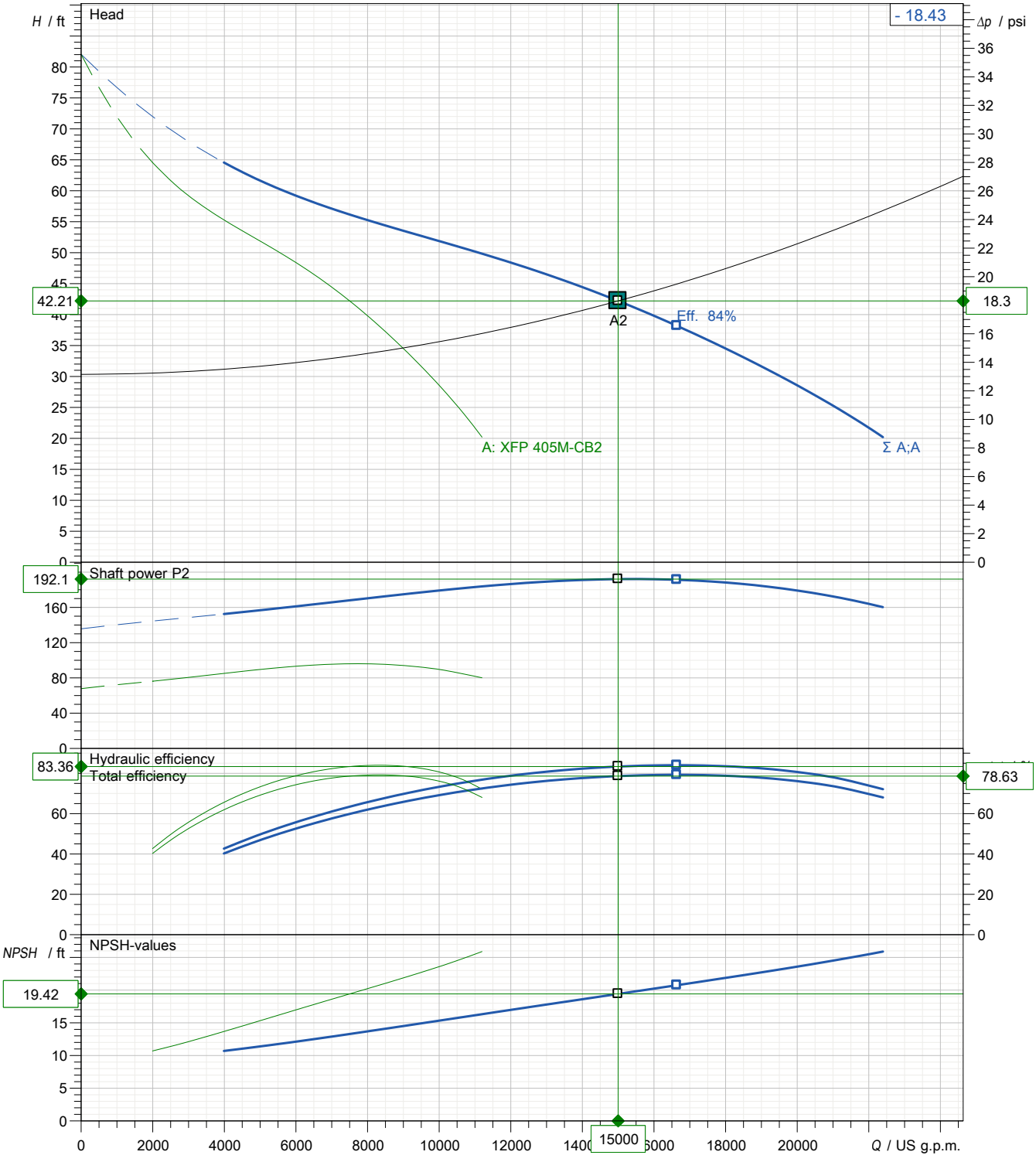
				Discharge DN400	Frequency 60 Hz
Density 62.42 lb/ft³	Viscosity 1.602 mm²/s	Testnorm ISO 9906: 2012, HI 11.6/14.6 Gr 2B		Rated speed 888.2 rpm	Date 2019-09-04
Flow 7500 US g.p.m.	Head 42.2 ft	Rated power 96 hp	Power input 102 hp	Hydraulic efficiency 83.4 %	NPSH 19.4 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
18.4 inch	2	Contrablock Plus impeller	6.69 x 5.71 inch	

Curve number	Pump performance curves	SULZER
Reference curve XFP 405M-CB2 60 HZ	**XFP 405M-CB2 60 HZ**	

				Discharge DN400	Frequency 60 Hz
Density 62.42 lb/ft³	Viscosity 1.602 mm²/s	Testnorm ISO 9906: 2012, HI 11.6/14.6 Gr 2B		Rated speed 888.2 rpm	Date 2019-09-04
Flow 15000 US g.p.m.	Head 42.2 ft	Rated power 96 hp	Power input 102 hp	Hydraulic efficiency 83.4 %	NPSH 19.4 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
18.4 inch	2	Contrablock Plus impeller	6.69 x 5.71 inch	

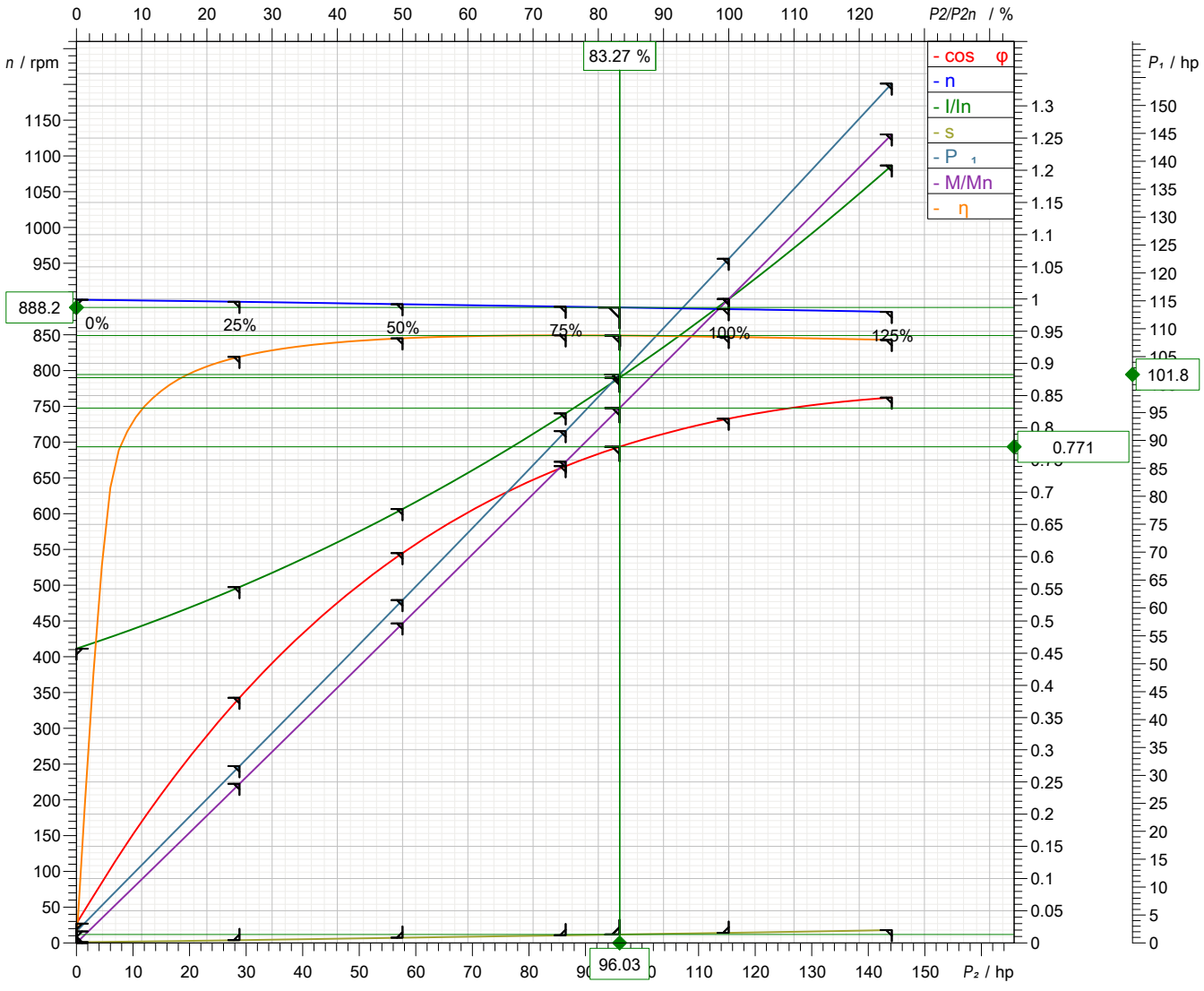
Frequency	PE5
60 Hz	

Motor performance curve

PE 860/8

SULZER

Rated power	Service factor	Nominal Speed	Number of poles	Rated voltage	Date
115 hp	1.3	886 rpm	8	480 V	2019-09-04



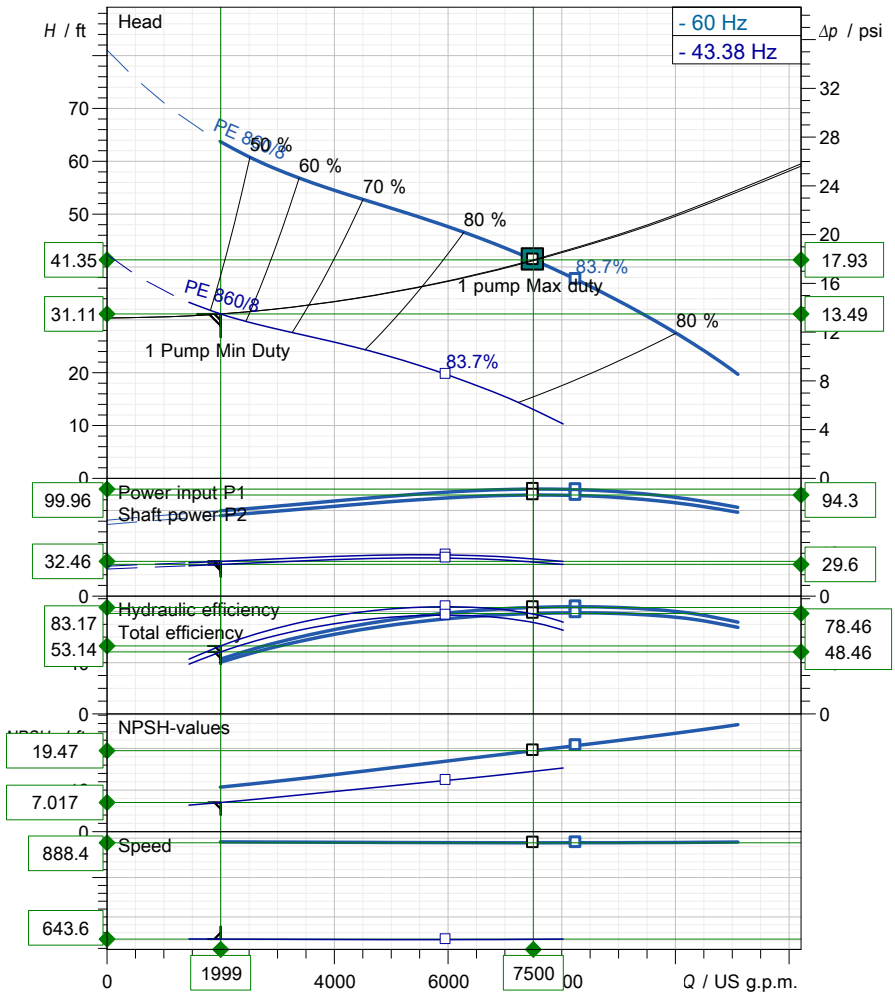
Symbol	No load	25 %	50 %	75 %	100 %	125 %
P₂ / hp	0	28.83	57.66	86.5	115.3	144.2
P₁ / hp	2.067	31.67	61.41	91.67	122.5	153.9
η / %	0	91.03	93.9	94.36	94.11	93.66
n / rpm	899	896.1	892.7	889.3	885.9	882
cos φ	0.03005	0.3808	0.6055	0.7405	0.8142	0.847
I / A	61.7	74.61	90.97	111	135	163
s / %	0.1142	0.429	0.8086	1.191	1.571	1.997
M / lbf ft	0	169	339.3	510.9	683.8	858.5

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current	Starting torque	Moment of inertia	No. starts per hour
1200 A	1910 lbf ft	57.2 lb ft²	10

Spaix® 4, Version 4.3.11 - 2019/01/16 (Build 240
Data version Jan 2019

XFP 405M-CB2 60 HZ



Testnorm
ISO 9906: 2012, HI 11.6/14.6 Gr 2B

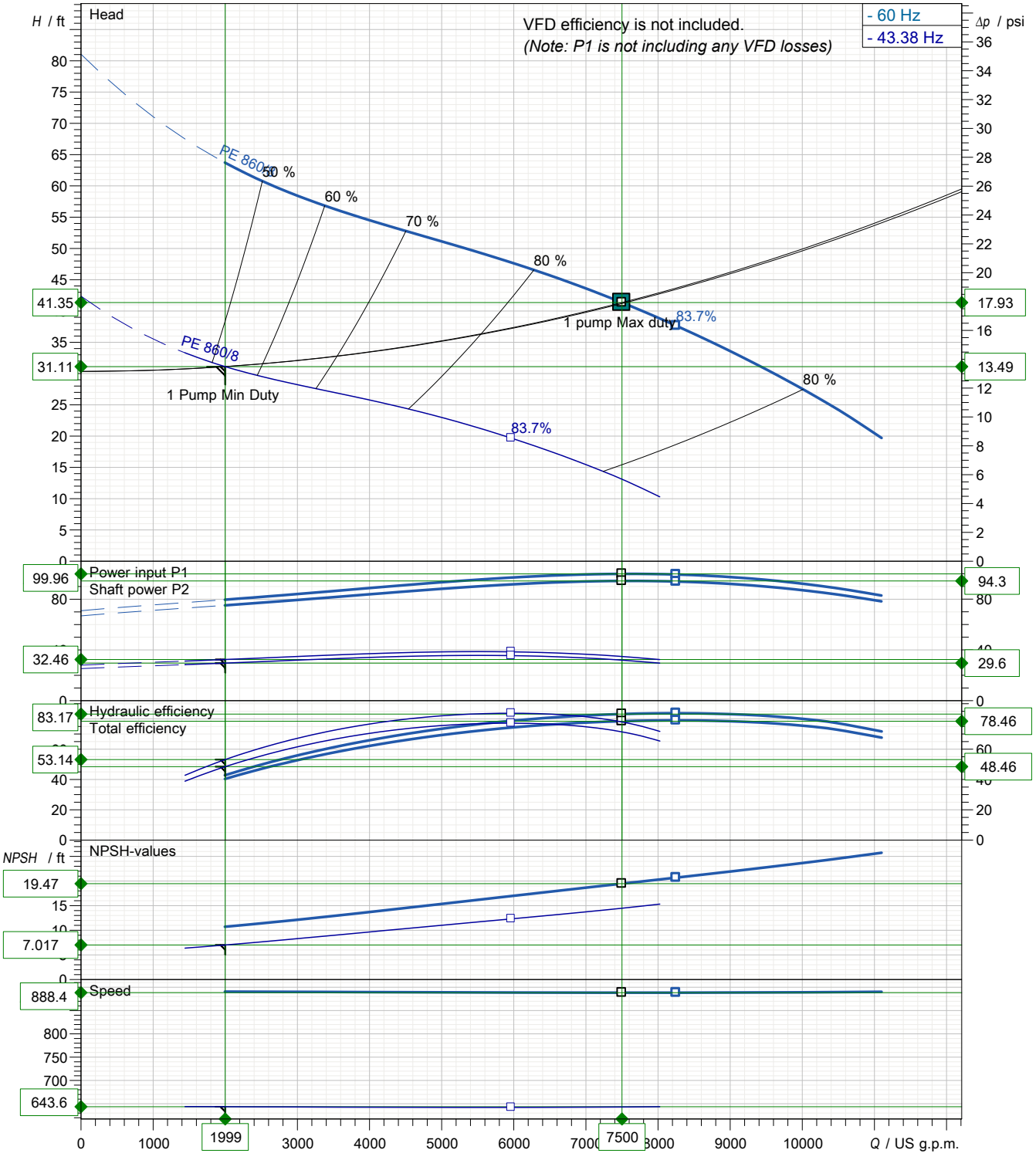
VFD efficiency is not included.
(Note: P1 is not including any VFD losses)

2019-09-04

Operating data specification			
Flow	7500 US g.p.m.	Power input	100 hp
Efficiency	83.2 %	Head	41.3 ft
NPSH	19.5 ft	Rated power	94.3 hp
Temperature	38 °F	Fluid	Wastewater
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 405M-CB2 60 HZ	Make	SULZER
Series	XFP PE4-PE7	Impeller	Contrablock Plus impeller
N° of vanes	2	Impeller size	18.4 inch
Free passage	6.69 x 5.71 inch	Suction flange	DN400
Discharge flange	DN400	Type of installation	wet well vertical installation 2"
Moment of inertia	67.6 lb ft²		
Motor data			
Rated voltage	480 V	Frequency	60 Hz
Rated power P2	115 hp	Nominal Speed	886 rpm
Number of poles	8	Efficiency	
Power factor	0.814	Rated current	135 A
Starting current	1200 A	Rated torque	684 lbf ft
Starting torque	1910 lbf ft	Degree of protection	IP 68
Insulation class	H(140)	No. starts per hour	10

Curve number	Pump performance curves	SULZER
Reference curve XFP 405M-CB2 60 HZ	**XFP 405M-CB2 60 HZ**	

				Discharge	Frequency
				DN400	60 Hz
Density	Viscosity	Testnorm		Rated speed	Date
62.42 lb/ft³	1.602 mm²/s	ISO 9906: 2012, HI 11.6/14.6 Gr 2B		888.4 rpm	2019-09-04
Flow	Head	Rated power	Power input	Hydraulic efficiency	NPSH
7500 US g.p.m.	41.3 ft	94.3 hp	100 hp	83.2 %	19.5 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
18.4 inch	2	Contrablock Plus impeller	6.69 x 5.71 inch	

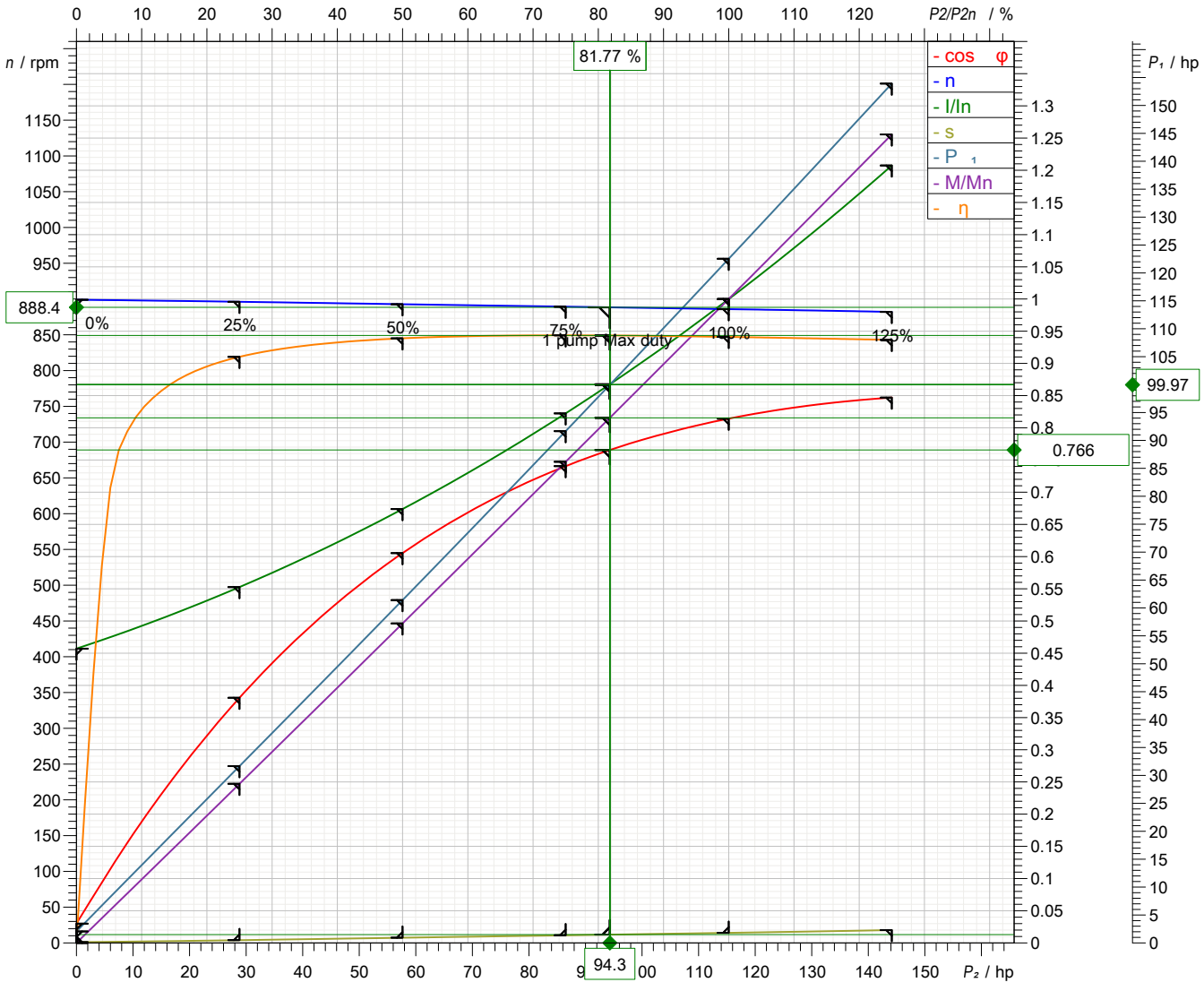
Frequency	PE5
60 Hz	

Motor performance curve

PE 860/8

SULZER

Rated power	Service factor	Nominal Speed	Number of poles	Rated voltage	Date
115 hp	1.3	886 rpm	8	480 V	2019-09-04



Symbol	No load	25 %	50 %	75 %	100 %	125 %
P₂ / hp	0	28.83	57.66	86.5	115.3	144.2
P₁ / hp	2.067	31.67	61.41	91.67	122.5	153.9
η / %	0	91.03	93.9	94.36	94.11	93.66
n / rpm	899	896.1	892.7	889.3	885.9	882
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s / %	0.1142	0.429	0.8086	1.191	1.571	1.997
M / lbf ft	0	169	339.3	510.9	683.8	858.5

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current	Starting torque	Moment of inertia	No. starts per hour
1200 A	1910 lbf ft	57.2 lb ft²	10

Submersible Sewage Pump Type ABS XFP

XFP 405M-CB2 | 16", 8 Pole, 3-Phase, 60 Hz, PE5

Submersible Motor Specifications, PE5 Frame

Motor Design				NEMA design B, squirrel cage induction
Motor Type				Fully enclosed Premium Efficiency submersible, IP68 protection rating
Motor Efficiency Standard and Rating				IEC 60034-30 [2], IE3 rating
Motor Efficiency Test Protocol				IEC 60034-2-1
Insulation Material				Class H, 180ºC (356ºF), copper windings
Motor Filling Medium				Air
Temperature Rise				Class A
Maximum Fluid Temperature				40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Cooling System		OPT		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	Thermal	STD	<100 HP	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF) +/- 5ºC (41ºF) opening temperature
			≥100 HP	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF) +/- 5ºC (41ºF) opening temperature, plus 100Ω RTD (PT100) in winding, upper bearing, and lower bearing
		OPT	<100 HP	STD (<100 HP) plus: upper and lower bearing bimetallic switches **or** 100Ω RTD (PT100) in winding (option of one RTD or three RTDs in stator) and RTDs in lieu of upper and lower bearing bimetallic switches
			≥100 HP	STD (≥100 HP) plus: three 100Ω RTDs (PT100) in windings in lieu of one
	Leakage		<100 HP	Moisture detection probe in seal sensing chamber (for use with appropriate relay)
		STD	≥100 HP	Moisture detection probe in seal sensing chamber, motor housing, and junction chamber (for use with appropriate relay)
		OPT	<100 HP	STD plus: probes in motor housing and junction chamber
	Vibration	OPT		Vibration sensor (4-20 mA) in junction chamber
Sensing Chamber Filling Medium				Oil
Bearing Type	Upper	STD		Cylindrical roller, permanently lubricated
		OPT		STD plus: electrically insulated
	Lower			Dual angular contact ball bearings plus single cylindrical roller bearing, permanently lubricated
Motor Starter Types				Suitable for use with electronic soft starters, and PWM type Variable Frequency Drives [1]
Maximum Starts per Hour				10 evenly spaced w/ soft starters; N/A with PWM type VFDs
Inverter Duty Rating				Motors meet NEMA MG1, part 31 requirements
Maximum Submergence				20 meters (65 feet)
Available Voltages				230, 460, 600 (consult factory for other voltages)
Voltage Tolerance from Rated				+/-10%
Agency Approvals				Factory Mutual, CSA
Explosion Proof Rating				NEC 500 Class 1, Division 1, Group C & D, Class T3C max surface temp

The picture above ma
For illustr

if wanted the CA531 Module will need to be added not included in pricing

[1] Output filters may be required on VFDs. See document **DS-E00-001** for details.
[2] Eight pole motors are not covered by the 1.0, 2008-10 edition of the IEC standard, however the PE series of motors are constructed and tested in accordance with the IEC 60034-30 standard.

Motor Ratings, PE5 Frame

Motor Model	Input Power (P1)	Rated Power Output (P2)	Nominal RPM	Rated Voltage	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	NEMA Service Factor	Motor Efficiency at % Load			Power Factor at % Load		
									100	75	50	100	75	50
PE 430/8	45.8 kW	43 kW 58 HP	888	230 460 600	C/F 73 56	C/F 742 569	M	1.3	93.9	93.8	93.0	.791	.716	.580
PE 520/8	55.1 kW	52 kW 70 HP	889	230 460 600	C/F 85 65	C/F 836 641	L	1.3	94.4	94.6	94.1	.811	.740	.602
PE 630/8	66.8 kW	63 kW 85 HP	889	230 460 600	C/F 108 82	C/F 1118 857	M	1.3	94.3	94.3	93.5	.780	.696	.556
PE 860/8	91.4 kW	86 kW 115 HP	886	230 460 600	C/F 141 108	C/F 1254 961	K	1.3	94.1	94.4	93.9	.814	.741	.605

DS-E02-171 REV: 1 DATE: 10/16 Specifications Subject to Change Without Notice

Submersible Sewage Pump Type ABS XFP

XFP 405M-CB2 | 16", 8 Pole, 3-Phase, 60 Hz, PE5

Cable Data, PE5 Frame

	Motor	Motor Voltage	Cable Qty	Cable Type	Cable Nominal Outside Diameter +/- .5mm (.02")	
					Power	Ground
Power Cable	PE 430/8	230	C/F	C/F	C/F	C/F
		460	1	G-GC 4-3	30.2mm (1.19")	Integrated w/ Power
		600	1	G-GC 6-3	26.7mm (1.05")	Integrated w/ Power
	PE 520/8	230	C/F	C/F	C/F	C/F
		460	1	G-GC 2-3	34.0mm (1.34")	Integrated w/ Power
		600	1	G-GC 4-3	30.2mm (1.19")	Integrated w/ Power
	PE 630/8	230	C/F	C/F	C/F	C/F
		460	1	G-GC 2-3	34.0mm (1.34")	Integrated w/ Power
		600	1	G-GC 4-3	30.2mm (1.19")	Integrated w/ Power
	PE 860/8	230	C/F	C/F	C/F	C/F
		460	1	G-GC 1/0-3	41.9mm (1.65")	Integrated w/ Power
		600	1	G-GC 2-3	34.0mm (1.34")	Integrated w/ Power

	Motor Monitoring Type [3]	Cable Qty	Cable Type	Cable Nominal Outside Diameter +/- .5mm (.02")
Control Cable	Std monitoring	1	SOOW 16/4	10.6mm (0.42")
	Opt full monitoring	1	SOOW 16/8	14.2mm (0.56")
	Opt full monitoring w/ VS [4]	1	SOOW 16/10	17.2mm (0.68")
	Opt full monitoring w/ 3 RTDs	1	SOOW 16/12	17.7mm (0.70")
	Opt full monitoring w/ 5 RTDs	2	SOOW 16/10	17.2mm (0.68")
	Opt full monitoring w/ 3 RTDs & VS [4]	2	SOOW 16/8	14.2mm (0.56")
	Opt full monitoring w/ 5 RTDs & VS [4]	2	SOOW 16/10	17.2mm (0.68")
Cable Length	Standard: 15m (49 feet)	Optional: 5m (16 feet) increments up to 30m (98 feet), Consult Factory for longer lengths		

[3] See motor protection on page 1. Optional full monitoring systems with RTD options do not include bearing bi-metallic switches. [4] VS = Vibration Sensor

Pump Data

Discharge Size		16" flanged, compatible with 16" class 125 ANSI flanges					
Suction Size (Wet-Pit / Dry-Pit) [5]		16" undrilled / 16" flanged, compatible with 16" class 125 ANSI flanges, threaded for 16x1-8 UNC screws, 36mm (1.4") deep					
Volute Pressure Rating		10 bar (145 psi)					
Impeller Type		Semi-open, 2-vane, w/ Contrablock plus w/ Seal Protection					
Impeller	Code	-	-	-	-	-	-
	Diameter, mm (in.)	430 (16.9)	440 (17.3)	450 (17.7)	460 (18.1)	470 (18.5)	482 (19.0)
Solids Passage Size, mm (in.)		170x145 (6.7x5.7)	170x145 (6.7x5.7)	170x145 (6.7x5.7)	170x145 (6.7x5.7)	170x145 (6.7x5.7)	170x145 (6.7x5.7)
Min. Recommended Flow, GPM [6]		3000	3300	3600	4000	4200	4400

[5] Wet-pit version can be drilled to dry-pit specifications upon request. Consult factory for details. [6] Recommend minimum continuous flow. Co

these min flow only apply when running at 60HZ disregard please since VFD will be applied

Materials of Construction

		Standard	Optional
Power/Control Cable Jacket		Chlorinated Polyethylene (CPE)	Chlorinated Polyethylene (CPE) w/ Viton® Sleeve
Lifting Hoop		Ductile Iron EN-GJS-400-18 (ASTM A-536; 60-40-18)	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
Cable Connection Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cooling Jacket		Steel 1.0036 (ASTM A-570, Grade D)	Stainless Steel 1.4571 (AISI 316Ti)
Intermediate Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate/Cooling Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420)	Duplex Stainless Steel 1.4462 (UNS S31803)
Impeller		Cast Iron EN-GJL-250 (~~ASTM A-48, Class 35B~~) [7]	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
Wear Parts	Impeller Wear Ring	N/A	
	Volute Wear Ring	N/A	
	Bottom/Wear Plate	Cast Iron EN-GJL-250 (~~ASTM A-48, Class 35B~~) [7]	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
	Shroud	N/A	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
External Hardware		Stainless Steel 1.4401 (AISI 316)	
O-Rings and Cable Glands		Nitrile (Buna-N)	Viton®
Mechanical Seals	Lower	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	Silicon Carbide / Silicon Carbide, Viton®, 316 SS
	Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal		Nitrile (Buna-N)	
Coating/Protection		~~Two-part epoxy, blue, 100µm (3.9 mil) DFT~~	Two-part epoxy, blue, 200 µm (7.9 mil) or 360 µm (14.2 mil); Coal tar epoxy, blue, 200 µm (7.9 mil); Non-toxic epoxy, blue, 200 µm (7.9 mil); Zinc Anodes

[7] Hardening of bottom edge of impeller vane and wear plate surface available. Consult factory for details.

General Data (Standard Materials of Construction & Cable Length)

	PE 430/8	PE 520/8	PE 630/8	PE 860/8		
Overall Height	1950mm (76.8")	2070mm (81.5")	2070mm (81.5")	2070mm (81.5")		
≈ Pump Weight (Non-Cooled)	1585 kg (3495 lb)	1655 kg (3649 lb)	1685 kg (3715 lb)	1715 kg (3782 lb)		

Custom: to be coated with customer preference coating

included in price

No: M-02.2865 - 01	2
Dat/Nam.: 19.05.2016 / K. Srb	
Cad Code: M_022865	
Technical changes reserved Änderungen vorbehalten Sous réserve de modifications	

XFP 405M-CB2

Dimension sheet PE5 WET WELL Installation

Maßblatt PE5 Nassinstallation

Plan d'encombrement PE5 installation submersible

SULZER

Type Typ Type 50Hz	Type Typ Type 60Hz	Weight Gewicht Poids OK		Weight Gewicht Poids MK		H		Size
		(~kg)	(~lb)	(~kg)	(~lb)	(mm)	(inch)	
PE 550/6-M		1835	4046	1965	4333	2079	81.9	B
PE 750/6-M	PE 860/6-M-60	1930	4256	2055	4531			
PE 900/6-M	PE 1040/6-M-60	1975	4355	2105	4642			
PE 370/8-M	PE 430/8-M-60	1775	3914	1890	4167	1959	77.1	A
PE 450/8-M	PE 520/8-M-60	1875	4134	2005	4421	2079	81.9	B
PE 550/8-M	PE 630/8-M-60	1920	4234	2050	4520			
PE 750/8-M	PE 860/8-M-60	1965	4333	2090	4608			

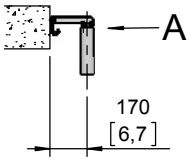
Weight: Includes pump, slider bracket and 10m cable
Gewicht: Beinhaltet Pumpe, Halterung und 10m Kabel
Poids: Pompe, coulisseau et 10m de câble

For different cable length see IOM, chapter 1.5
Für abweichende Kabellänge siehe EBA, Kapitel 1.5
Pour des longueurs supérieures, voir la section 1.5 du manuel

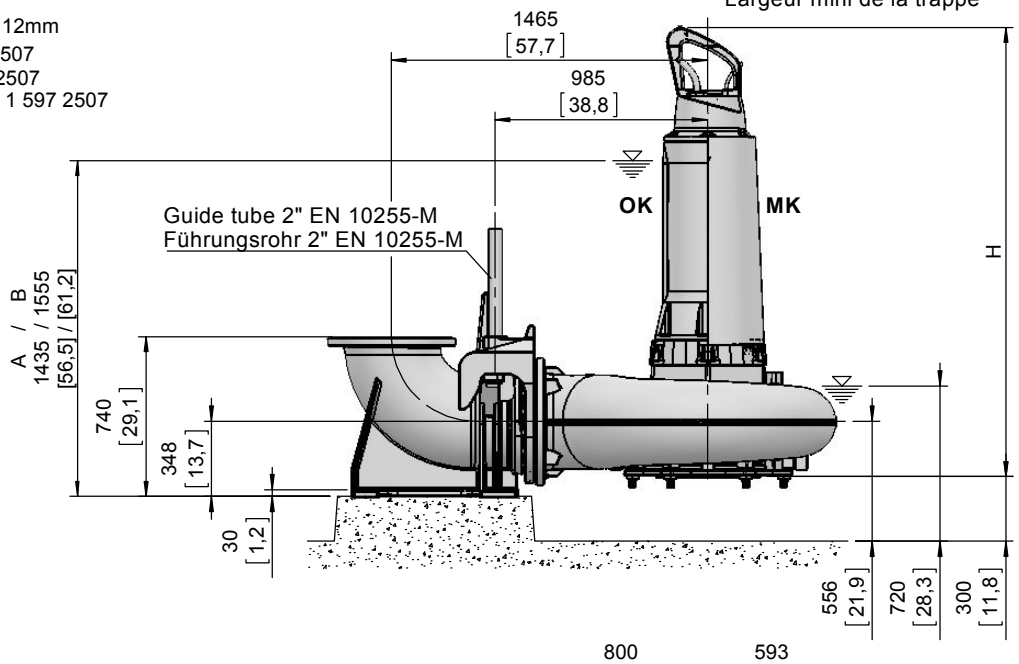
For hex.-woodscrew 0,4*2,8 plug 0,5 DIA
Für Skt.-Holzschr.10*70 Dübel Ø12mm
Pour vis à bois hexagonale 10*70 trou de 12mm

Installation instructions "pedestal" 1 597 2507
Installationsanweisung "Fußstück" 1 597 2507
Instruction d'installation du "pied d'assise" 1 597 2507

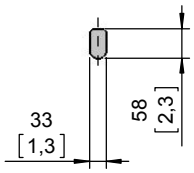
2100 x 1585 (1pump/Pumpe/pompe)
2100 x 3170 (2pumps/Pumpen/pompes)
[82,7] x [62,4] (1pump/Pumpe/pompe)
[82,7] x [124,6] (2pumps/Pumpen/pompes)

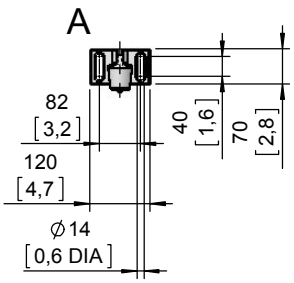


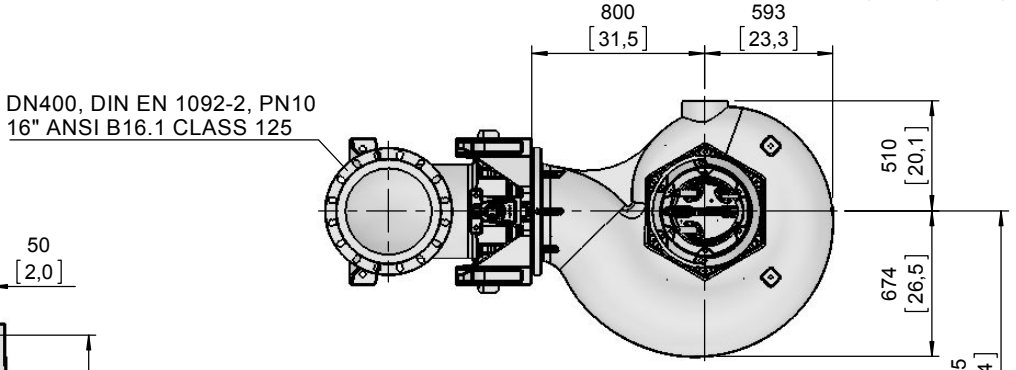
min. sump opening
min. Schachtöffnung
Largeur mini de la trappe

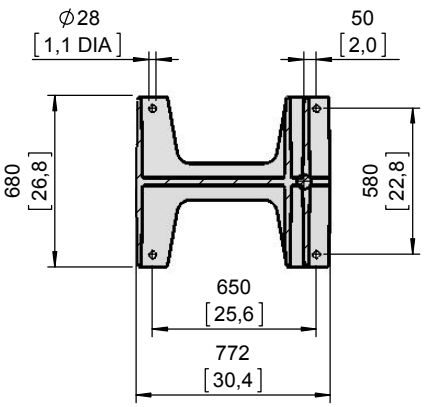


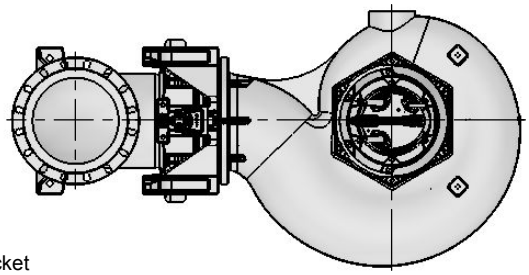
Lifting hoop cross section
Fangbügel-Querschnitt
Section de l'anse de levage











[mm / [inch]]

OK = Ohne Kühlmantel
Without cooling jacket
Sans enveloppe de refroidissement

MK = Mit Kühlmantel
With cooling jacket
Avec enveloppe de refroidissement

Submersible Sewage Pump Type ABS XFP

XFP 405M-CB2 | 16", 8 Pole, 3-Phase, 60 Hz, PE5

Scope

Furnish 1, non-clog, Submersible Sewage Pump(s) Type ABS XFP 405MCB2.470. The pump(s) shall be supplied with a mating 16 inch discharge connection and be capable of delivering 7500 U.S. GPM at a total dynamic head of 42 feet. An additional point on the same curve shall be 2000 U.S. GPM at a total dynamic head of 31.12 feet. Shut off head shall be a minimum of _____ feet. The motor shall be an integral part of the pump unit. The motor shall be 115 HP, 8 pole, connected for operation on a 460 volt, 3 phase, 60 hertz electrical supply service. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards. Pumps intended for wet-pit installation shall be supplied with a single cast iron guide rail system with ASTM 16 inch discharge elbow. Each pump unit shall be fitted with a _____ assembly, _____ feet long for lifting the pump. The working load rating of the lifting system shall be a minimum of 50% greater than the pump weight. Pumps intended for dry-pit installation shall be supplied with a steel mounting frame.

The heavy duty submersible wastewater pump(s) shall be capable of handling raw unscreened sewage, storm water, and other similar solids-laden fluids without clogging. The pump(s) shall be driven by a High Efficiency motor, providing high levels of operational reliability and energy efficiency.

Submersible Pump Construction

Major pump components shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be of stainless steel, 1.4401 (AISI 316). All metal surfaces coming into contact with the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of zinc phosphate primer followed by a high solids two-part epoxy paint finish on the exterior of the pump. The pump shall be equipped with an open lifting hoop suitable for attachment of standard chain fittings. The hoop shall be of ductile iron, EN-GJS-400-18 (ASTM A-536, Grade 60-40-18), with the option of upgrading to duplex stainless steel, 1.4470 (ASTM A890, CD3MN Grade 4A), and shall be rated to lift a minimum of four times the pump weight.

Sealing design for the pump/motor assembly shall incorporate machined surfaces fitted with Nitrile (Buna-N) rubber O-rings, with the option of upgrading to Viton®. Sealing will be the result of controlled compression of rubber O-rings in two planes of the sealing interface. Housing interfaces shall meet with metal-to-metal contact between machined surfaces, and sealing shall be accomplished without requiring a specific torque on the securing fasteners. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds shall be required or used.

nitride treated

Wet End

Impeller: The Sulzer Contrablock Plus impeller shall be of gray cast iron, EN-GJL-250 (~~ASTM A-48~~, Class 35B), with the option of upgrading to duplex stainless steel, 1.4470 (~~ASTM A890, CD3MN Grade 4~~A). The impeller shall be of the semi-open, non-clogging, two-vane design, meeting the Ten State Standards requirement for minimum solids passage size of 3 inches. The impeller shall be capable of passing a minimum of 6.7 x 5.7 inch oblong solids that are commonly found in wastewater. The impeller shall have a slip fit connection onto the motor shaft, driven by a shaft key, and shall be securely fastened to the shaft by a stainless steel screw. A positively engaged, ratcheting washer assembly shall prevent the screw from loosening. The head of the impeller screw shall be effectively recessed within the impeller bore to prevent disruption of the flow stream and loss of hydraulic efficiency. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth, vibration-free operation. Impeller designs which do not meet the Ten State Standards requirement for 3 inch solids passage size, those that rely on retractable impeller designs to pass 3 inch solids, or those that rely on fins or pins protruding into the suction path to assist in the handling of fibrous material shall not be considered equal.

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Self-Cleaning Wear Plate: The Sulzer Contrablock Plus wear plate shall be of gray cast iron, EN-GJL-250 (ASTM A-48, ~~Class 35B~~), with the option of upgrading to duplex stainless steel, 1.4470 (~~ASTM A890, CD3MN Grade 4A~~). The wear plate shall be designed with a smooth surface incorporating strategically placed intercepting slots on the side facing the impeller, to shred and force any stringy solids which attempt to become lodged between the impeller and wear plate outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with four stainless steel securing screws and four stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. Adjustment to allow for wear and restore peak pumping performance shall be easily accomplished using standard tools, and without requiring disassembly of the pump. The use of fixed or non-adjustable wear plates or rings, or systems that require disassembly of the pump or shimming of the impeller to facilitate adjustment, shall not be considered equal. The suction flange shall be integrated into the wear plate and its bolt holes shall be drilled and tapped to accept standard 16 inch ANSI class 125/150 flanged fittings.

nitride treated

Pump Volute: The pump volute shall be a single-piece, gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B), with the option of upgrading to duplex stainless steel, 1.4470 (ASTM A890, CD3MN Grade 4A), non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter through the impeller. The discharge size shall be 16 inches. The discharge flange design shall permit attachment to standard ANSI and DIN flanges/appurtenances. The discharge flange shall be drilled to accept either 16 inch ANSI class 125/150 or metric DN400 flanged fittings. Proprietary or nonstandard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

High Efficiency Motor

The motor shall be designed in accordance with the efficiency standards IEC 60034-30:2008 and NEMA Premium*. Motor rating tests shall be conducted in accordance with IEC 60034-2-1 requirements and shall be certified accurate and correct by a third party certifying agency. A certificate shall be available upon request.

** IE3 and NEMA Premium efficiency do not specifically apply to 8, 10, and 12 pole motors, only 2, 4, and 6 pole motors. The PE motors are designed to meet expected IE3 efficiency levels for 8 pole motors in future revisions of the IEC 60034-30 standard.*

The motor shall be housed in a water-tight gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B), enclosure, capable of continuous submerged operation underwater to a depth of 20 meters (65 feet) and shall have an IP68 protection rating. The motor shall be of the squirrel-cage induction design, NEMA type B. The copper stator windings shall be insulated with moisture resistant, Class H insulation material, rated for 180°C (356°F). The stator shall be press fitted into the stator housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is unacceptable. The rotor bars and short circuit rings shall be made of cast aluminum.

The motor shall be designed for continuous duty. The maximum continuous temperature of the pumped liquid shall be 40°C (104°F), and intermittently up to 50°C (122°F). The motor shall be capable of handling up to 10 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be 1.3. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase-to-phase voltage imbalance tolerance of 1%. The motor shall have a NEMA Class A temperature rise, providing cool operation under all operating conditions. The motor shall be FM approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C. The motor shall meet the requirements of NEMA MG1 Part 30 and 31 for operation on PWM type Variable Frequency Drives.

Optional Cooling System: The factory installed closed-loop cooling system shall be of steel, 1.0036 (ASTM A-570, Grade D), with the option of upgrading to stainless steel, 1.4571 (AISI 316Ti), adequately designed to allow the motor to run continuously under full load while in an unsubmerged (dry-pit) or minimally submerged condition without the need for de-rating or reduced duty cycle. A cooling jacket shall surround the stator housing, and an environmentally safe nontoxic propylene glycol solution shall be circulated through the jacket by an axial flow circulating impeller attached to the main motor shaft. The coolant shall be pumped through an integrated heat exchanger in the base of the motor whenever the motor is running, allowing excess heat to be transferred to the process liquid. Cooling

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systems that circulate the pumped medium through the cooling jacket, or those that use a toxic cooling liquid shall not be acceptable. The use of external heat exchangers, fans, or the supply of supplemental cooling liquid shall not be required.

Thermal Protection: Each phase of the motor shall contain a normally closed bi-metallic temperature monitor switch imbedded in the motor windings. These thermal switches shall be connected in series and set to open at 140°C +/- 5°C (284°F). They shall be connected to the control panel to provide a high stator temperature shutdown signal, and are used in conjunction with external motor overload protection. As an option, normally closed bi-metallic temperature switches shall be installed in the upper and lower bearing housings to monitor the temperature of the bearings and provide high bearing temperature warning signals. As an option for pumps less than 100HP and standard for pumps over 100HP, RTD (PT100) type temperature measuring devices shall be supplied for the motor winding and bearings to provide actual temperature measurement at these locations. As an additional option, RTDs shall be provided for each stator phase winding in lieu of a single phase. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the windings. The bi-metallic system must be connected to the control to provide positive shutdown of the motor in the event of an overheat condition. This is required in order to conform to FM rules for explosion-proof equipment.

Vibration Monitoring Protection: As an option, the pump shall be supplied with a vibration sensor to allow continuous measurement of the pump's vibration magnitude. The sensor shall be a direct current, single axis velocity transducer with a 4 – 20 mA output which is directly proportional to the vibration level. The vibration sensor shall be mounted inside the motor's connection chamber and positioned perpendicular to the motor shaft. A visual display and/or monitor, installed in the control panel, shall monitor the vibration level and energize a warning light, or optionally, cause the pump to shut down in the event of excessive vibration. Externally mounted vibrations sensors attached to outside of the pump or motor shall not be acceptable.

Mechanical Seals: Each pump shall be equipped with a triple seal system consisting of tandem mechanical shaft seals, plus a radial lip seal; providing three complete levels of sealing between the pump wet end and the motor. The mechanical seal system shall consist of two totally independent seal assemblies operating in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of nonproprietary design, and shall be manufactured by a major independent manufacturer specializing in the design and manufacture of mechanical seals. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring and one rotating industrial duty solid silicon-carbide seal ring. The stationary ring of the primary seal shall be installed in a seal holding plate of gray cast iron EN-GJL-250 (ASTM A-48, Class 35B). The seal holding plate shall be equipped with swirl disruption ribs to prevent abrasive material from prematurely wearing the seal plate. The upper, secondary seal unit, located between the lubricant chamber and the sensing chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring, and one rotating industrial duty solid silicon-carbide seal ring. Each seal interface shall be held in contact by its own spring system. A radial lip seal shall be positioned above the sensing chamber, preventing any liquid which accumulates in the sensing chamber from entering the lower bearing and motor. The seals shall not require routine maintenance, or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. Lubricant in the chamber shall be environmentally safe nontoxic material.

The following seal types shall not be considered equal: Seal systems with less than three complete levels of sealing between the pump wet end and the motor. Seals of proprietary design, or seals manufactured by other than major independent seal manufacturing companies. Seals requiring set screws, pins, or other mechanical locking devices to hold the seal in place, conventional double mechanical seals containing either a common single or double spring

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acting between the upper and lower seal faces, or any system requiring a pressure differential to seat the seal and ensure sealing.

Mechanical Seal Protection System: The primary mechanical seal shall be protected from interference by particles in the wastewater, including fibrous materials, by an active Seal Protection System integrated into the impeller. The back side of the impeller shall be equipped with a sinusoidal cutting ring, forming a close clearance cutting system with the lower submersible motor housing or seal plate. This sinusoidal cutting ring shall spin with the pump impeller providing a minimum of 75 shearing actions per pump revolution. Large particles or fibrous material which attempt to lodge behind the impeller or wrap around the mechanical seal, shall be effectively sheared by the active cutting system into particles small enough to prevent interference with the mechanical seal. The Seal Protection System shall operate whenever the pump operates, and shall not require adjustment or maintenance in order to function. Submersible pump designs which do not incorporate an active cutting system to protect the primary mechanical seal shall not be considered acceptable for wastewater service.

Seal Failure Early Warning System: The integrity of the mechanical seal system shall be continuously monitored during pump operation and standby time. An electrical probe shall be provided in a sensing chamber positioned above the mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be oil-filled, and shall have a drain / inspection plug with a positive anti-leak seal which is easily accessible from the outside of the pump. A solid-state relay mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe, continuously monitoring the conductivity of the liquid in the sensing chamber. If sufficient water enters the sensing chamber, the probe shall sense the increase in conductivity and signal the solid state relay in the control panel. The relay shall then energize a warning light on the control panel, or optionally, cause the pump shut down. This system shall provide an early warning of mechanical seal leakage, thereby preventing damage to the submersible motor, and allowing scheduled, rather than emergency, maintenance. Systems utilizing float switches or any other monitoring devices located in the stator housing rather than in a sensing chamber are not considered to be early warning systems, and shall not be considered equal.

As an option for pumps less than 100HP and standard for pumps over 100HP, two additional moisture sensing probes, one in the electrical connection chamber, and one in the motor chamber shall be provided. These probes shall send separate signals to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the respective sensing chambers.

Shaft: The pump shaft and motor shaft shall be an integral, one piece unit adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall have a full shutoff head design safety factor of 1.7, and the maximum shaft deflection shall not exceed .05 mm (.002 inch) at the lower seal during normal pump operation. Each shaft shall be of stainless steel, 1.4021 (AISI 420), with the option of upgrading to duplex stainless steel, 1.4462 (UNS S31803), and shall have a polished finish with accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel, chrome plated, or multi-piece welded shafts shall not be considered adequate or equal.

Bearings: Each pump shaft shall rotate on high quality, permanently lubricated, greased bearings. The upper bearing shall be a cylindrical roller bearing. As an option, the upper bearing can be electrically isolated from the bearing housing to prevent bearing damage from circulating currents when the pump is operated on a variable frequency drive. The lower bearings shall be a matched set of at least three heavy duty bearings; two angular contact ball bearings and one cylindrical roller bearing. All three lower bearings shall have identical outer race diameters to provide maximum bearing load capacity. Designs which utilize a roller bearing with a smaller outer diameter than the other bearings in the assembly do not provide maximum load capacity and shall not be considered equal. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. L-10 bearing life shall be a minimum of 100,000 hours at flows ranging from ½ of BEP flow to 1½ times BEP flow (BEP is best efficiency point). The bearings shall be manufactured by a major internationally known manufacturer of high quality bearings, and shall be stamped with the manufacturer’s name and size designation on

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the race. Generic or unbranded bearings from other than major bearing manufacturers shall not be considered acceptable.

Power Cable: The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be of chlorinated polyethylene (CPE) and be oil, water, and UV resistant, capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry/Junction Chamber: The cable entry design shall not require a specific torque to insure a watertight seal. The cable entry shall consist of cylindrical elastomer grommets, flanked by stainless steel washers. A cable cap incorporating a strain relief and bend radius limiter shall mount to the cable entry boss, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

Accessories

Guide Rail Base Assembly (wet pit installation): There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). In a wet [illegible] harge base & elbow assembly shall be permanently installed in the wet well and connected to [illegible] order to prevent binding or separation of the pump from the guide rail system, the pump(s) s[illegible] rail base automatically and firmly, guided by one 2 inch guide pipe (two 2 inch pipes optional) extending from the base elbow to the top of the station. As an option, 3 inch single rail systems are available. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard pump flanges, so that the pump mounting is nonproprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or nonstandard flange dimensions shall not be considered acceptable.

using existing

A field replaceable Nitrile (Buna-N) rubber profile gasket or O-ring shall accomplish positive sealing of the pump flange/guide rail bracket to the discharge elbow. Base assemblies which rely solely on metal-to-metal contact between the pump flange and discharge base elbow as a means of sealing are inherently leak prone, and shall not be considered equal. No portion of the pump shall bear directly on the floor of the sump. The guide rail system shall be available in an optional non-sparking version, approved by Factory Mutual for use in NEC Class 1, Division 1, Group C&D hazardous locations.

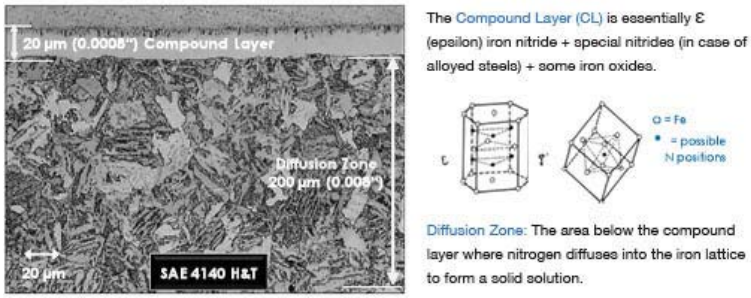
Base Assembly (dry-pit installation): In a dry-pit installation, the pump shall be secured to a steel support stand attached to cast concrete support pillars (concrete support pillars supplied by others) of suitable strength to support the weight of the pump and resist any expected torsion, bending, or vibration forces. The pump shall be suitable for either vertical or horizontal dry-pit installation without requiring any internal modifications.

DS-E02-172 REV: 0 DATE: 10/16 Specifications Subject to Change Without Notice

✔ MELONITE QPQ TREATMENT

Liquid nitriding is a subcritical surface enhancement process with one of the longest track records of success of any case hardening technology. It is widely used to enhance the wear and corrosion resistance of low alloy steels and stainless steels.

In a liquid nitriding bath which is maintained between 500 - 630°C (930 - 1165°F), nitrogen-bearing salts produce a controlled and highly uniform release of nitrogen at the interface of the workpiece. Nitrogen diffuses into, and chemically combines with, nitride-forming elements in the metal, producing, through a catalytic reaction, a tough, ductile compound layer with exceptional engineering and wear properties. This compound layer has wear properties that are 200% to 1000% greater than the original material, and greatly enhanced resistance to corrosion, galling and scuffing. Below the compound zone is another distinctive region, the diffusion zone. This results from the progressive diffusion of nitrogen and the formation of a solid solution of nitrogen in the base material. The diffusion zone contributes a critical fourth benefit of salt bath nitriding: substantial enhancement of fatigue strength, typically 20% to 100%.



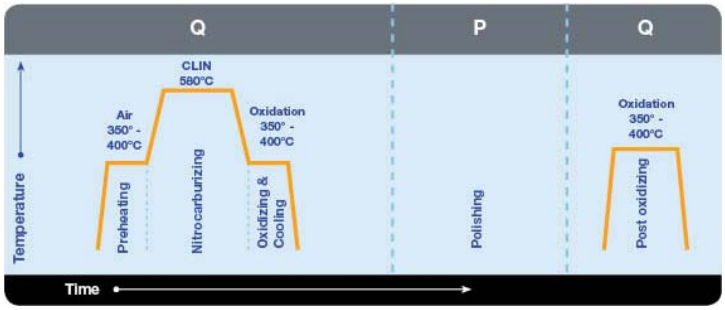
Benefits that can be realized through liquid nitriding treatments include:

- Superior wear resistance
- Excellent friction properties
- Good scuffing/seizure protection (adhesive wear) thanks to ceramic characteristics of the surface
- Excellent corrosion protection
- Good surface fatigue resistance
- Decorative black surface
- No deformation or distortion of the part; treatment done on finished parts
- Environmentally sound

MELONITE, and its synonymous trade-name, Tufftride (or Tenifer), is a relatively straight-forward, flexible process to operate and maintain, and produces exceptionally uniform case hardening. The MELONITE process begins with the placement of parts in a re-circulating air preheat furnace, followed by immersion for 60-240 minutes in a molten nitrogen-rich salt solution contained in an aerated furnace. After nitriding, parts are treated in an oxidizing bath, water-cooled and rinsed.

An alternative series of post-nitriding steps involves a Quench-Polish-Quench (QPQ) sequence after liquid nitriding. For many applications, this finishing process provides a surface condition that protects against corrosion and wear better than hard chrome or nickel plating.

How Melonite Works: Treatment Cycle



All information from: http://www.hefusa.net