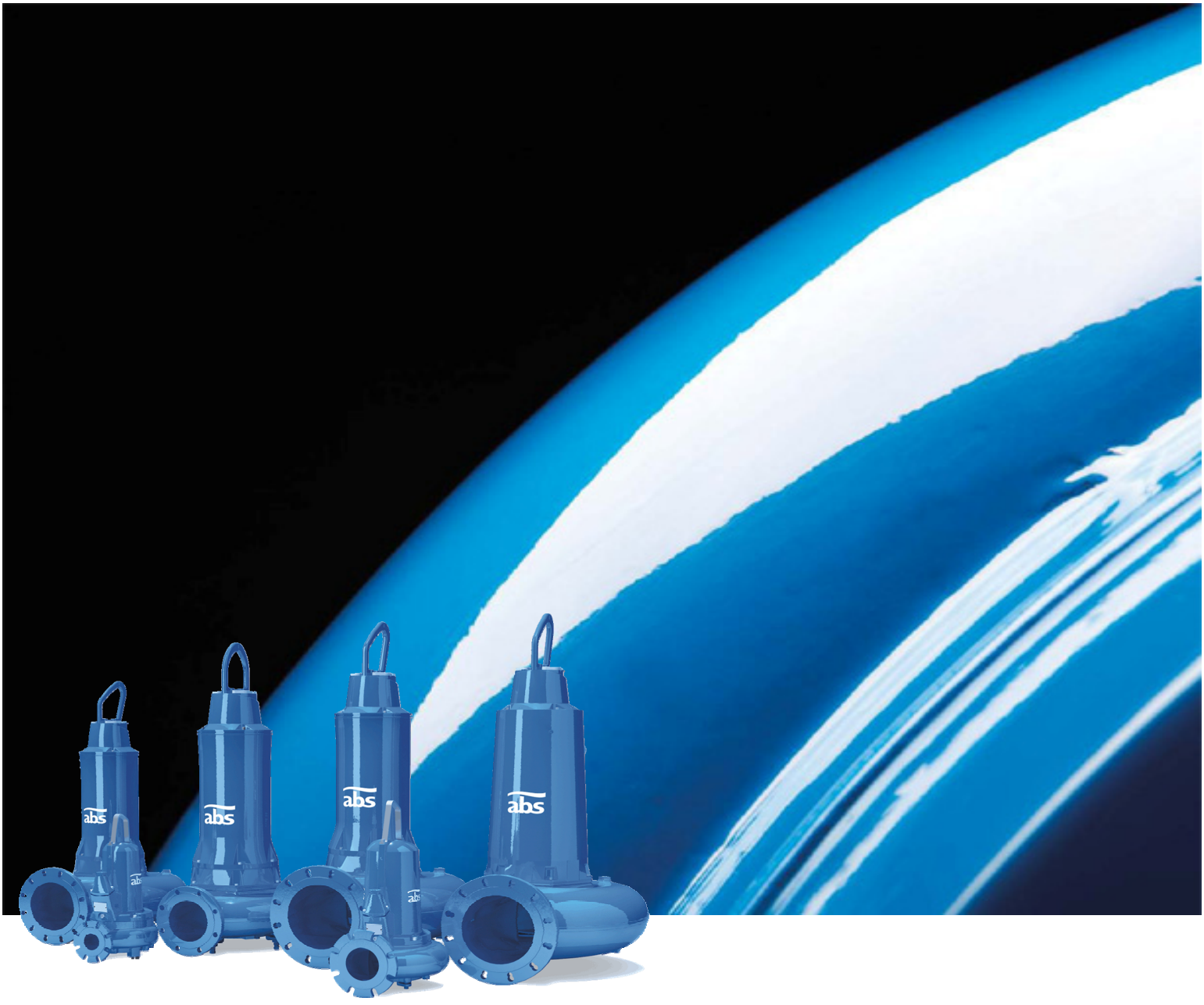
SULZER

Building Trades Products

Domestic & Commercial Wastewater



abs

SULZER

BUILDING TRADES PRODUCTS

Contents:

- **Scavenger Submersible Effluent & Sewage Ejector Pumps**
  - Scavenger Effluent Pumps
  - Scavenger Ejector Pumps
- **Piranha Submersible Grinder Pumps**
  - Piranha 09
  - Piranha S Series
  - Piranha PE Series
- **AS Submersible Wastewater Pumps**
- **Robusta Light Drainage Pumps**
- **ABS EffeX Submersible XFP Sewage Pumps**
- **RW 200 Submersible Mixers**
- **Package Systems**
- **Control Panels**

abs

ABS SCAVENGER® SUBMERSIBLE EFFLUENT AND SEWAGE EJECTOR PUMPS

60 Hz

Rugged Submersible pumps for residential and commercial applications.

ABS submersible pumps series Scavenger are suitable for two main applications:

- Effluent Models - used for both low and high pressure dosing systems and light duty industrial sumps.
- Ejector Models - used for septic tanks and sewage systems, light agricultural usage and residential, industrial commercial light trash handling.

1/3, 4/10 & 1/2 HP

- High torque capacitor motors.
- 2" NTP vertical discharge, vortex impellers
- Rugged cast iron housing
- Stainless steel fasteners and motor shaft
- Oil filled motors (non-toxic oil)
- Integrated clip for float switch cable
- Available with or without ABS piggyback float switch

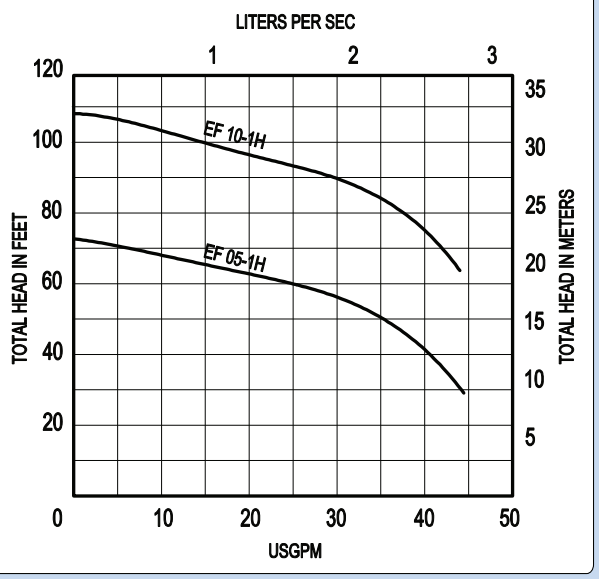
3/4 HP & above

- Unique triple seal design
- ABS Patented ContraBlock® impeller with adjustable wear plate system, for clog-free operation
- Single phase models through 5HP, Three phase models through 10HP
- Discharges, 1 1/4 to 4"
- Oil filled motors (non-toxic oil)
- High torque capacitor start single phase motors
- Rugged cast iron construction with stainless steel fasteners and motor shaft

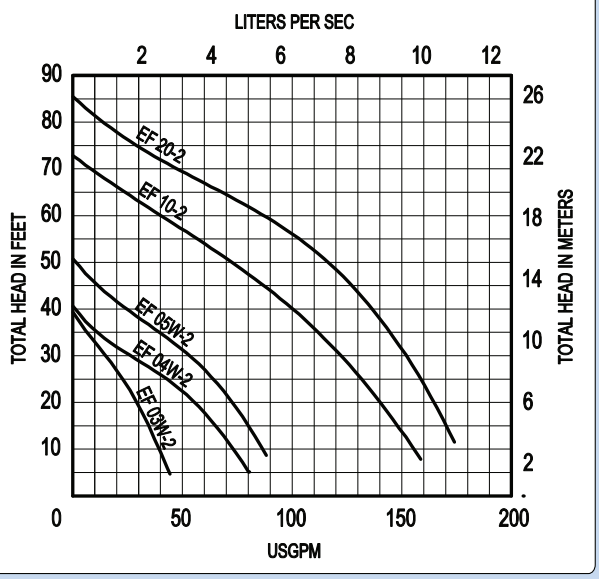
C SP® US

ABS SCAVENGER® SUBMERSIBLE EFFLUENT AND SEWAGE EJECTOR PUMPS

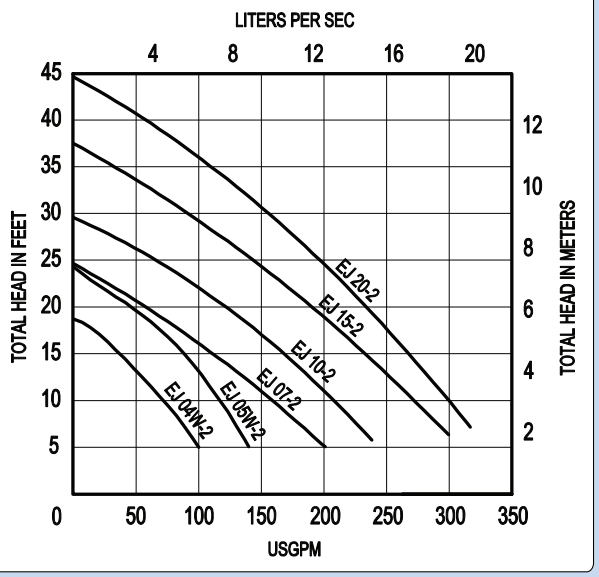
Effluent Pumps 1 1/4 Inch



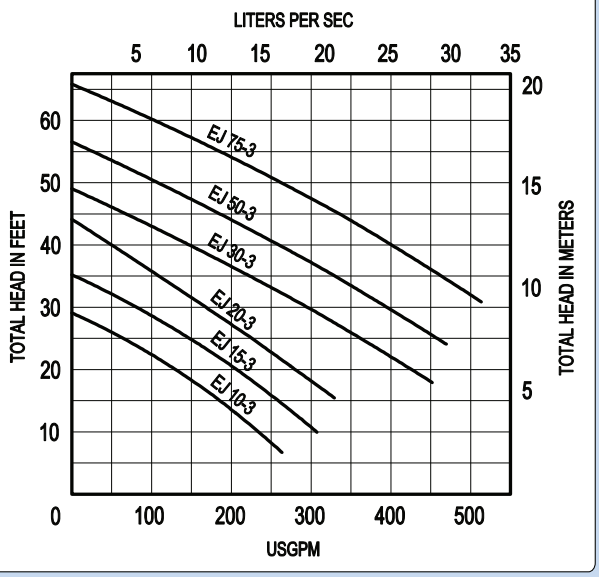
Effluent Pumps 2 Inch



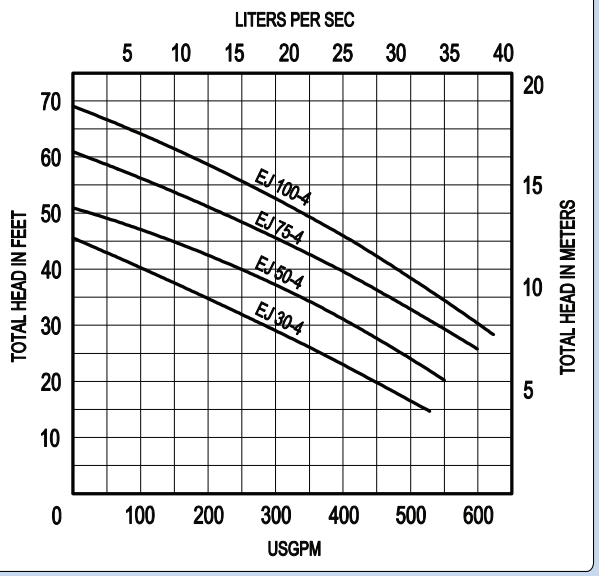
Sewage Ejectors 2 Inch



Sewage Ejectors 3 Inch



Sewage Ejectors 4 Inch



Notes

- Single phase pumps from 0.3 HP through 2 HP have capacitor and thermal protection built in the pump.
- Single phase pumps from 3 HP through 5 HP require an external capacitor start box or control panel, with overload protection.
- All three phase pumps require a control panel with overload protection.

Limitations

- Maximum ambient temperature: +40°C (104°F).
- Maximum submergance depth: 66ft (20m).

ABS SCAVENGER® SUBMERSIBLE EFFLUENT AND SEWAGE EJECTOR PUMPS

Effluent Pumps

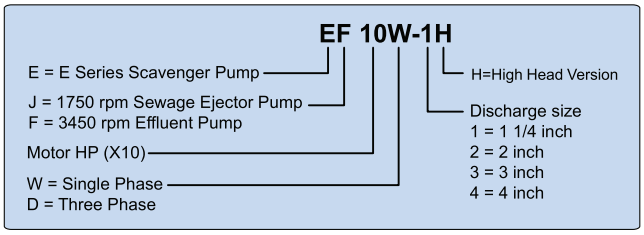
Model	HP	Phase	RPM	Voltage	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EF 03W	0.3	1	3450	115	7.2	2"NPT Vertical	3/4"	37	40	21.6
EF 04W	0.4	1	3450	115	9.1	2"NPT Vertical	5/8"	40	80	28.6
EF 05W	0.5	1	3450	115/208-230	13.2/6.6	2"NPT Vertical	5/8"	50	88	35.8
EF 05W-1H	0.5	1	3450	115/208-230	15/7.5	1 1/4" Horiz. NPT	5/8"	73	44	68
EF 10W-1H	1	1	3450	208-230	13	1 1/4" Horiz. NPT	5/8"	108	44	70
EF 10W-2	1	1	3450	208-230	13	2"NPT Vertical	3/4"	73	160	72
EF 10D-2	1	3	3450	208-230/460,575	5.8/2.9,2.3	2"NPT Vertical	3/4"	73	160	57
EF 20D-2	2	3	3450	208-230/460,575	7.6/3.8,3.0	2"NPT Vertical	3/4"	85	175	68

Sewage Pumps

Model	HP	Phase	RPM	Voltage	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EJ 04W	0.4	1	1750	115	6.6	2"NPT Vertical	2"	18	100	31.9
EJ 05W	0.5	1	1750	115/208-230	10.6/4.9	2"NPT Vertical	2"	24	140	35.2
EJ 07W	0.7	1	1750	115/208-230	13.8/6.9	2"Horiz. Flange*	2"	24	200	77
EJ 07D	0.7	3	1750	208-230/460,575	5.0/2.5,2.0	2"Horiz. Flange*	2"	24	200	70
EJ 10W-2	1	1	1750	208-230	10	2"Horiz. Flange*	2"	30	240	77
EJ 10D-2	1	3	1750	208-230/460,575	5.0/2.5,2.0	2"Horiz. Flange*	2"	30	240	70
EJ 15W-2	1.5	1	1750	208-230	15	2"Horiz. Flange*	2"	37	300	90
EJ 15D-2	1.5	3	1750	208-230/460,575	7.0/3.5,2.8	2"Horiz. Flange*	2"	37	300	84
EJ 10W-3	1	1	1750	208-230	10	3"Horiz. Flange	2 ½"	30	265	77
EJ 10D-3	1	3	1750	208-230/460,575	5.0/2.5,2.0	3"Horiz. Flange	2 ½"	30	265	70
EJ 15W-3	1.5	1	1750	208-230	15	3"Horiz. Flange	2 ½"	35	300	90
EJ 15D-3	1.5	3	1750	208-230/460,575	7.0/3.5,2.8	3"Horiz. Flange	2 ½"	35	300	84
EJ 20W-2	2	1	1750	208-230	19.0	2"Horiz. Flange*	2"	45	320	90
EJ 20D-2	2	3	1750	208-230/460,575	9.0/4.5,3.6	2"Horiz. Flange*	2"	45	320	84
EJ 20W-3	2	1	1750	208-230	19	3"Horiz. Flange	2 ½"	44	330	90
EJ 20D-3	2	3	1750	208-230/460,575	9.0/4.5,3.6	3"Horiz. Flange	2 ½"	44	330	84
EJ 30W-3	3	1	1750	208-230	23.0	3"Horiz. Flange	2 ½"	50	450	147
EJ 30D-3	3	3	1750	208-230/460,575	13.0/6.5,5.2	3"Horiz. Flange	2 ½"	50	450	143
EJ 30W-4	3	1	1750	208-230	23.0	4"Horiz. Flange	3"	46	525	154
EJ 30D-4	3	3	1750	208-230/460,575	13.0/6.5,5.2	4"Horiz. Flange	3"	46	525	150
EJ 50W-3	5	1	1750	208-230	27.0	3"Horiz. Flange	2 ½"	57	470	161
EJ 50D-3	5	3	1750	208-230/460,575	19.0/9.5,7.6	3"Horiz. Flange	2 ½"	57	470	154
EJ 50W-4	5	1	1750	208-230	27.0	4"Horiz. Flange	3"	52	550	165
EJ 50D-4	5	3	1750	208-230/460,575	19.0/9.5,7.6	4"Horiz. Flange	3"	52	550	158
EJ 75D-3	7.5	3	1750	208-230/460,575	23.0/11.5,9.2	3"Horiz. Flange	2 ½"	67	525	161
EJ 75D-4	7.5	3	1750	208-230/460,575	23.0/11.5,9.2	4"Horiz. Flange	3"	61	600	165
EJ 100D-4	10	3	1750	208-230/460,575	28.0/14.0,11.2	4"Horiz. Flange	3"	70	620	170

*includes elbow to convert to 2" Vertical NPT

Identification Code



Materials of construction

Motor	Standard
Seal chamber	Cast iron ASTM A-48 Class 35B (GG 25)
Motor housing	Cast iron ASTM A-48 Class 35B (GG 25)
Motor shaft	Stainless steel AISI 420 (1.4021)
Fasteners (medium contact)	Stainless steel AISI 304 (1.4301)
Hydraulics	**Standard**
Volute	Cast iron ASTM A-48 Class 35B (GG 25)
Impeller	Cast iron ASTM A-48 Class 40 (GG 25), Polybutylene Terephthalate (PBT) with 30% of glass fiber on small pumps (EF 03/04/05 and EJ 04/05)
Bottom plate	Cast iron ASTM A-48 Class 35B (GG 25)
Pedestal	Cast iron ASTM A-48 Class 35B (GG 25)
Fasteners	Stainless steel AISI 304 (1.4301)

Motor

Submersible single phase and three phase squirrel cage induction motors. Effluent pumps use 2 pole (3450 rpm) motors. Sewage ejector pumps use 4 pole (1750 rpm) motors.

Voltage: 115 and 208-230 V for single phase, 208-230, 460 or 575 V for three phase.
Insulation class B or F depending on the model.
Protection type IP68.

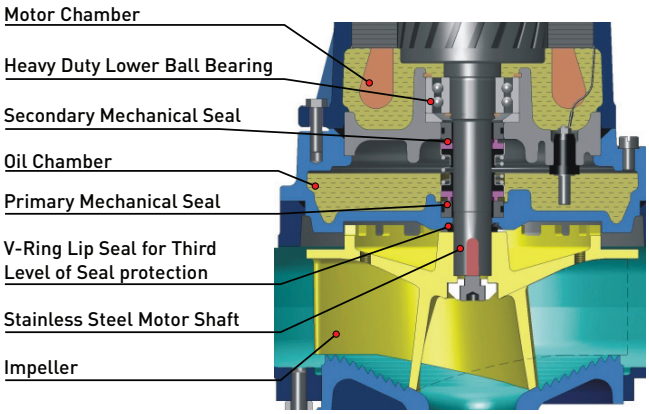
Standard and option

Description	Standard	Option
Protection type	IP 68	-
Max. ambient temperature	40°C (104°F)	-
Main voltage	115, 208-230, 460 and 575V	-
Voltage tolerance	+-10%	-
Insulation class	B or F depending on model	-
Approval	CSA(U)	-
Cables	SEOOW, SJEOOW, SJTOW	-
Cable length	20'	On request
Mechanical Seal	Double – Carbon/Ceramic	SiC/SiC

The Scavenger Triple Seal System

This ABS exclusive design provides three levels of sealing for outstanding reliability.
A double mechanical seal located inside the oil chamber provides two full levels of sealing. An additional V-Ring type lip seal between the oil chamber and pump volute provides a third extra larger level of sealing, and enhanced mechanical seal protection.

**The Scavenger Triple Seal System is only available on scavengers ¾ hp and above.



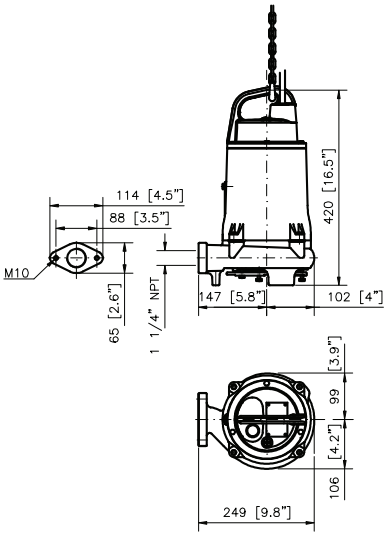
ABS Monitoring System

Scavenger 3HP - 10HP includes the ABS Monitoring System.This system provides normally closed thermal overload switched in the motor winding, and the ABS Sealminder moisure detection probe in the mechanical seal chamber. Wires for the sensors emerge from the pump in a separate control cable. These wires must be connected to the control panel for sensor operation (ABS Sealminder relay required in the panel for moisure detection alarm).

Effluent Pumps 1 1/4 Inch

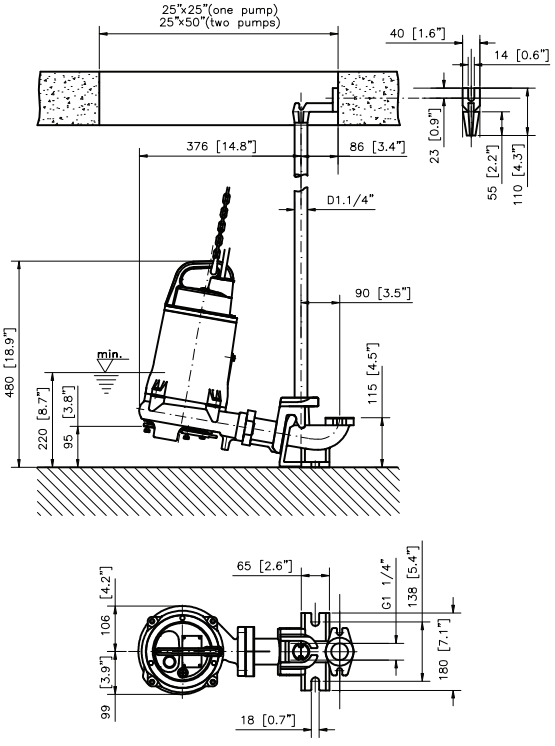
Transportable Installation

Type	Weight (lb)
EF 05W - 1H	68
EF 10W - 1H	68



Wet-well Installation

Type	Weight (lb)
EF 05W - 1H	68
EF 10W - 1H	68



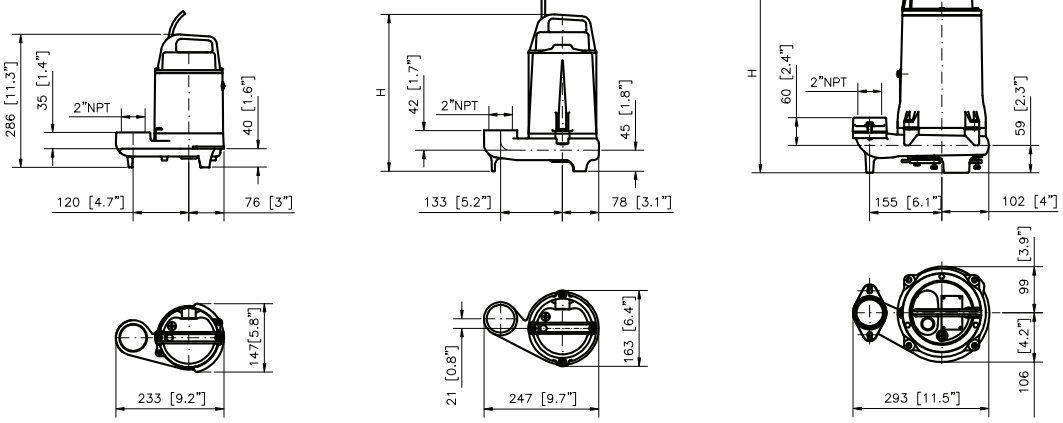
Effluent Pumps 2 Inch

Transportable Installation

Type	Weight (lb)
EF 03W - 2	22

Type	Weight (lb)	H mm (in)
EF 04W - 2	28.6	312 (12.3")
EF 05W - 2	35.8	337 (13.3")

Type	Weight (lb)	H mm (in)
EF 10D - 2	57	401 (15.8")
EF 10W - 2	62	420 (16.5")
EF 10W - 2	68	464 (18.3")

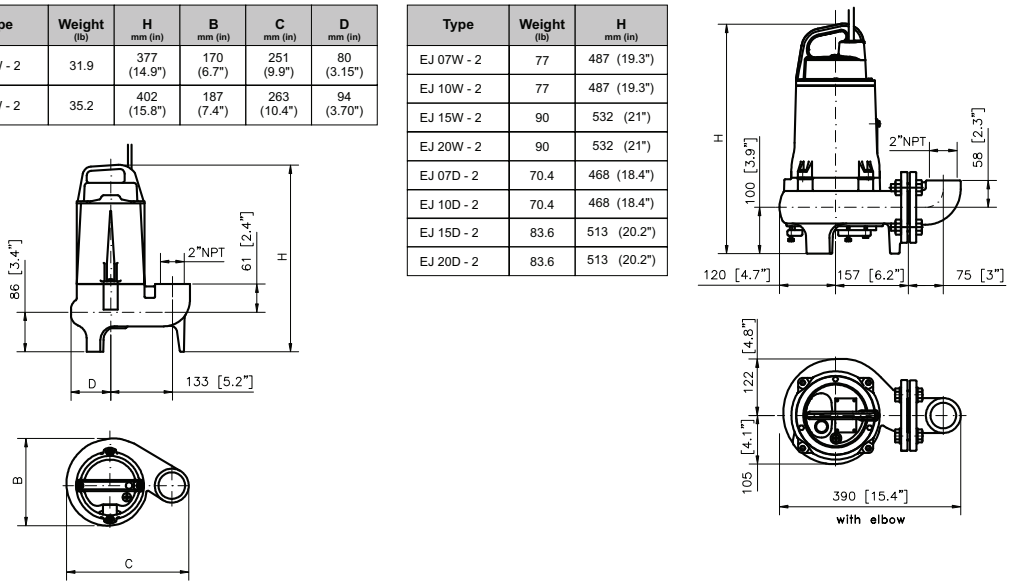


Sewage Ejectors 2 Inch

Transportable Installation

Type	Weight (lb)	H mm (in)	B mm (in)	C mm (in)	D mm (in)
EJ 04W - 2	31.9	377 (14.9")	170 (6.7")	251 (9.9")	80 (3.15")
EJ 05W - 2	35.2	402 (15.8")	187 (7.4")	263 (10.4")	94 (3.70")

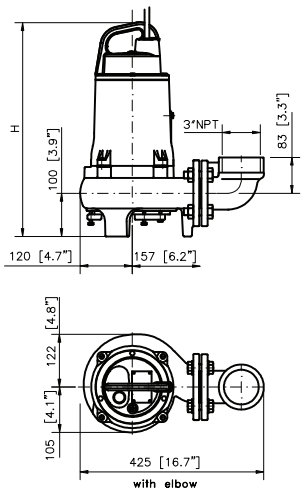
Type	Weight (lb)	H mm (in)
EJ 07W - 2	77	487 (19.3")
EJ 10W - 2	77	487 (19.3")
EJ 15W - 2	90	532 (21")
EJ 20W - 2	90	532 (21")
EJ 07D - 2	70.4	468 (18.4")
EJ 10D - 2	70.4	468 (18.4")
EJ 15D - 2	83.6	513 (20.2")
EJ 20D - 2	83.6	513 (20.2")



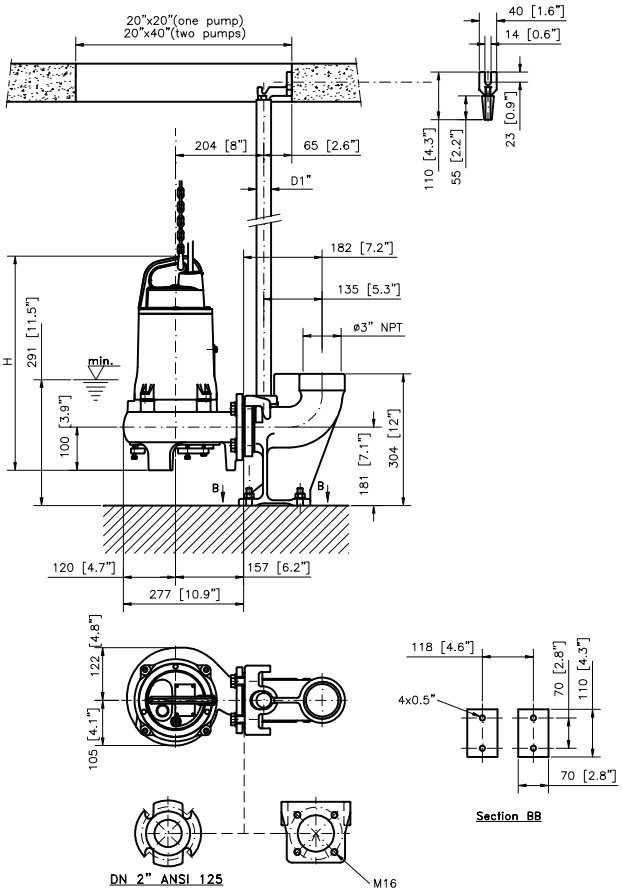
Sewage Ejectors 2x3 Inch

Transportable Installation

Type	Weight (lb)	H mm (in)
EJ 07W - 2	77	487 (19.2")
EJ 10W - 2	77	487 (19.2")
EJ 15W - 2	90	532 (21")
EJ 20W - 2	90	532 (21")
EJ 07D - 2	70.4	468 (18.4")
EJ 10D - 2	70.4	468 (18.4")
EJ 15D - 2	83.6	513 (20.2")
EJ 20D - 2	83.6	513 (20.2")



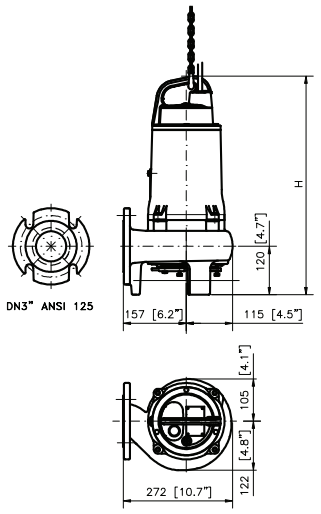
Wet-well Installation



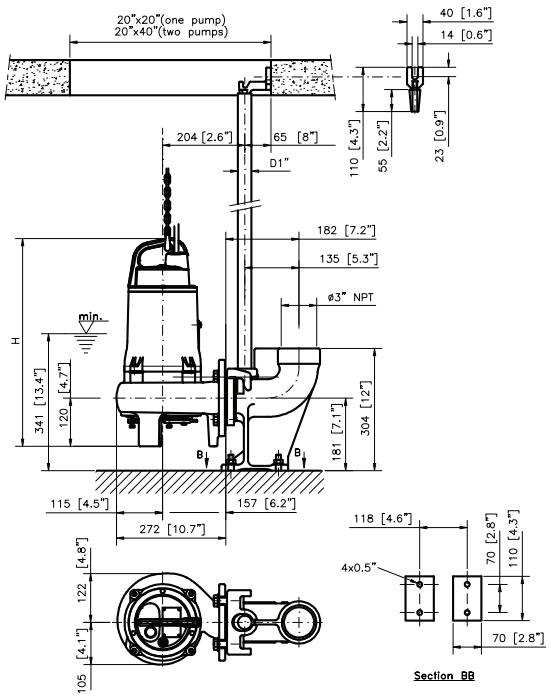
Sewage Ejectors 3 Inch

Transportable Installation

Type	Weight (lb)	H mm (in)
EJ 10W - 3	77	509 (20")
EJ 15W - 3	90.2	553 (21.8")
EJ 20W - 3	90.2	553 (21.8")
EJ 10D - 3	70.4	485 (19")
EJ 15D - 3	83.6	534 (21")
EJ 20D - 3	83.6	534 (21")



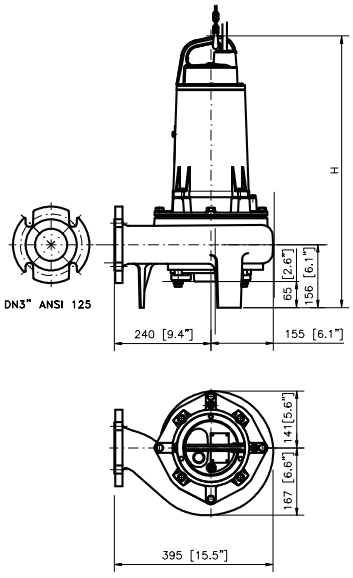
Wet-well Installation



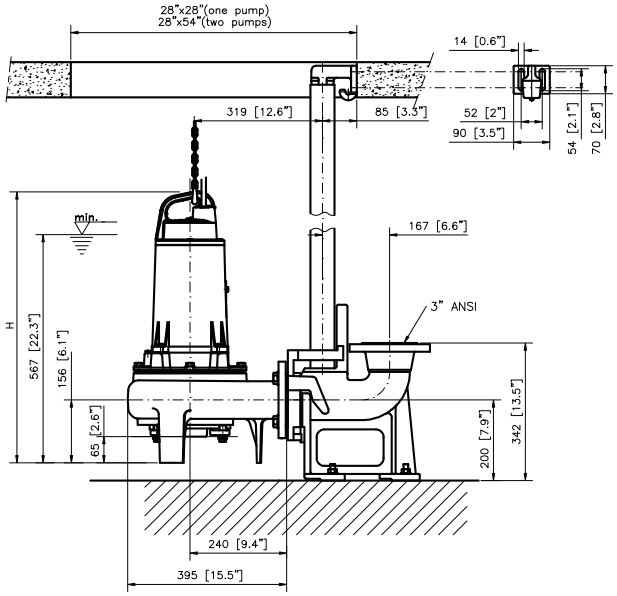
Sewage Ejectors 3 Inch

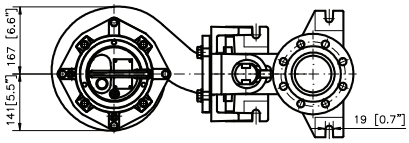
Transportable Installation

Type	Weight (lb)	H mm (in)
EJ 30W - 3	147.4	685 (27")
EJ 50W - 3	160.6	685 (27")
EJ 30D - 3	154	665 (26.2")
EJ 50D - 3	160.6	685 (27")
EJ 75D - 3	138.6	685 (27")



Wet-well Installation

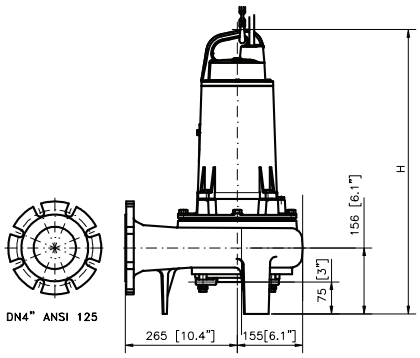


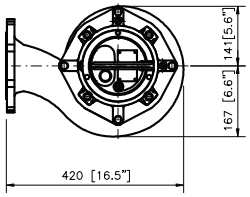


Sewage Ejectors 4 Inch

Transportable Installation

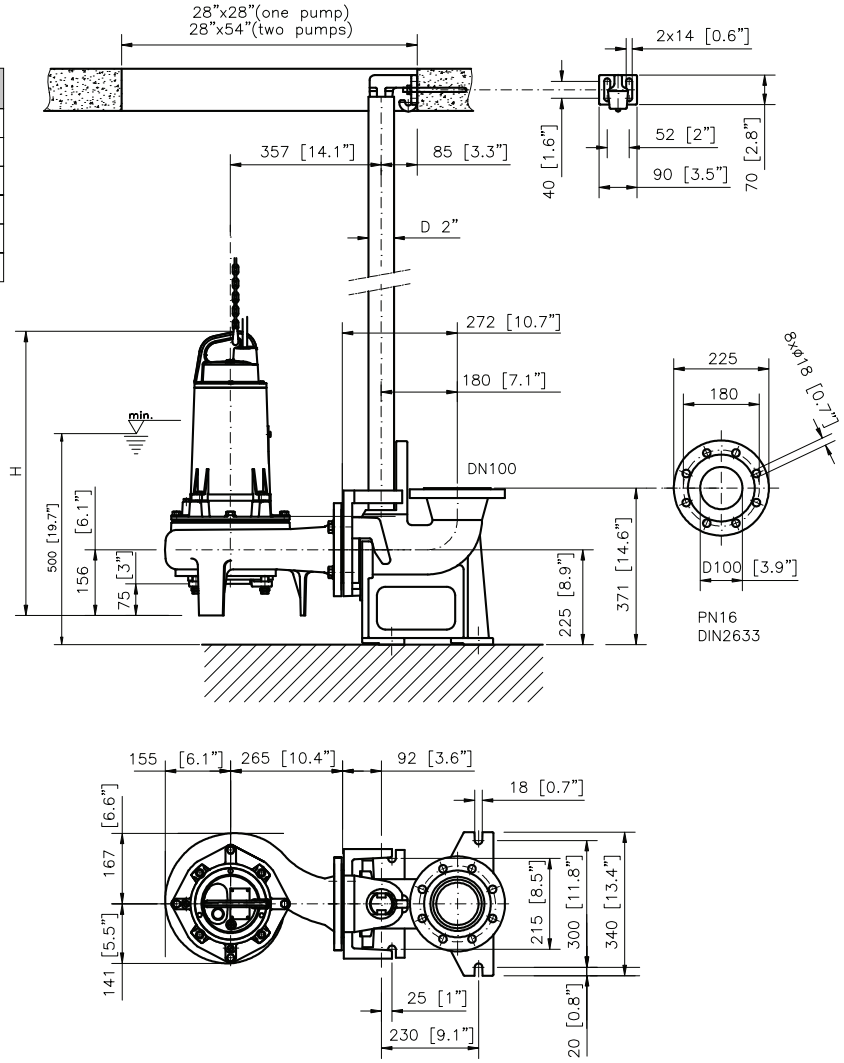
Type	Weight (lb)	H mm (in)
EJ 30W - 4	154	685 (27")
EJ 50W - 4	165	685 (27")
EJ 30D - 4	149.6	665 (26.2")
EJ 50D - 4	158.4	685 (27")
EJ 75D - 4	165	685 (27")
EJ 100D - 4	165	685 (27")





Wet-well Installation

Type	Weight (lb)	H mm (in)
EJ 30W - 4	154	685 (27")
EJ 50W - 4	165	685 (27")
EJ 30D - 4	149.6	685 (27")
EJ 50D - 4	158.4	685 (27")
EJ 75D - 4	165	685 (27")
EJ 100D - 4	165	685 (27")



GENERAL

Furnish and install _____ ABS Model EF 03W Scavenger submersible pump(s) to deliver _____USGPM against a total head of _____ feet. The motor shall be 0.33 HP and 3450 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN

The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA22.2-108 standards.

PUMP CONSTRUCTION
Impeller: The impeller shall be PTB Vortex impeller capable of passing ¾ inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120° C. The motor upper lid shall be constructed of polycarbonate with glass fiber reinforcement 20% and house the start capacitor and stator connections. Power cable shall be 20 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

Specifications subject to change without notice

Specifications subject to change without notice

GENERAL

Furnish and install _____ ABS Model EF 04W Scavenger submersible pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 0.4 HP and 3450 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN

The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA22.2-108 standards.

PUMP CONSTRUCTION

Impeller: The impeller shall be PTB Vortex impeller capable of passing ¾ inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120••C. The motor upper lid shall be constructed of gray cast iron and house the start capacitor and stator connections. Power cable shall be 15 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

GENERAL

Furnish and install _____ ABS Model EF 05W Scavenger submersible pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 0.5 HP and 3450 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN

The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA22.2-108 standards.

PUMP CONSTRUCTION

Impeller: The impeller shall be PTB Vortex impeller capable of passing ¾ inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120••C. The motor upper lid shall be constructed of gray cast iron and house the start capacitor and stator connections. Power cable shall be 15 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

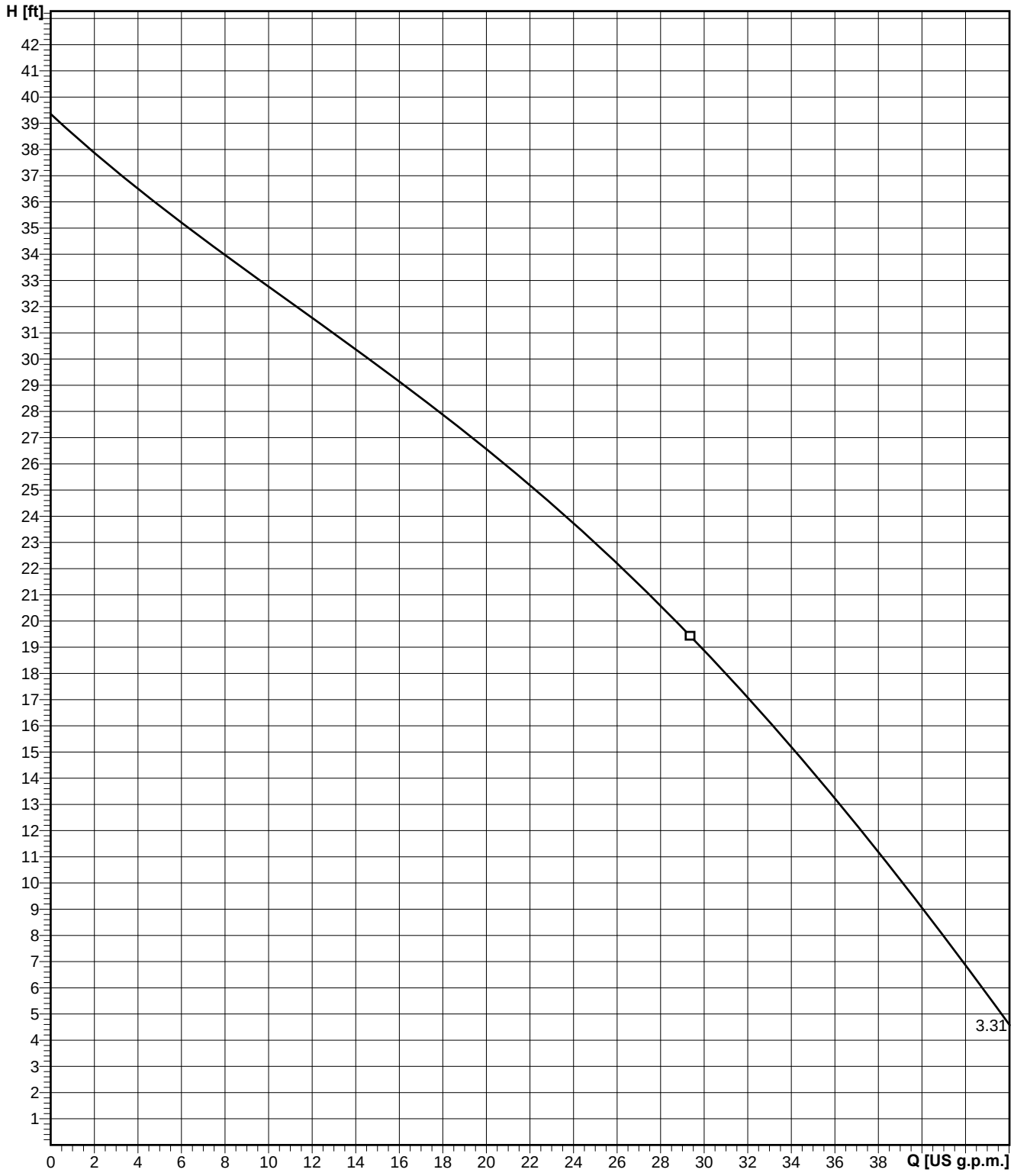
O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

SULZER

Pump performance curves
EF 03W-2 60HZ

				Curve number
				Reference curve EF 03W-2
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3600 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 3.31 inch	N° of vanes 6	Impeller Vortex impeller	Solid size 3/4"	Revision 2009-04-13

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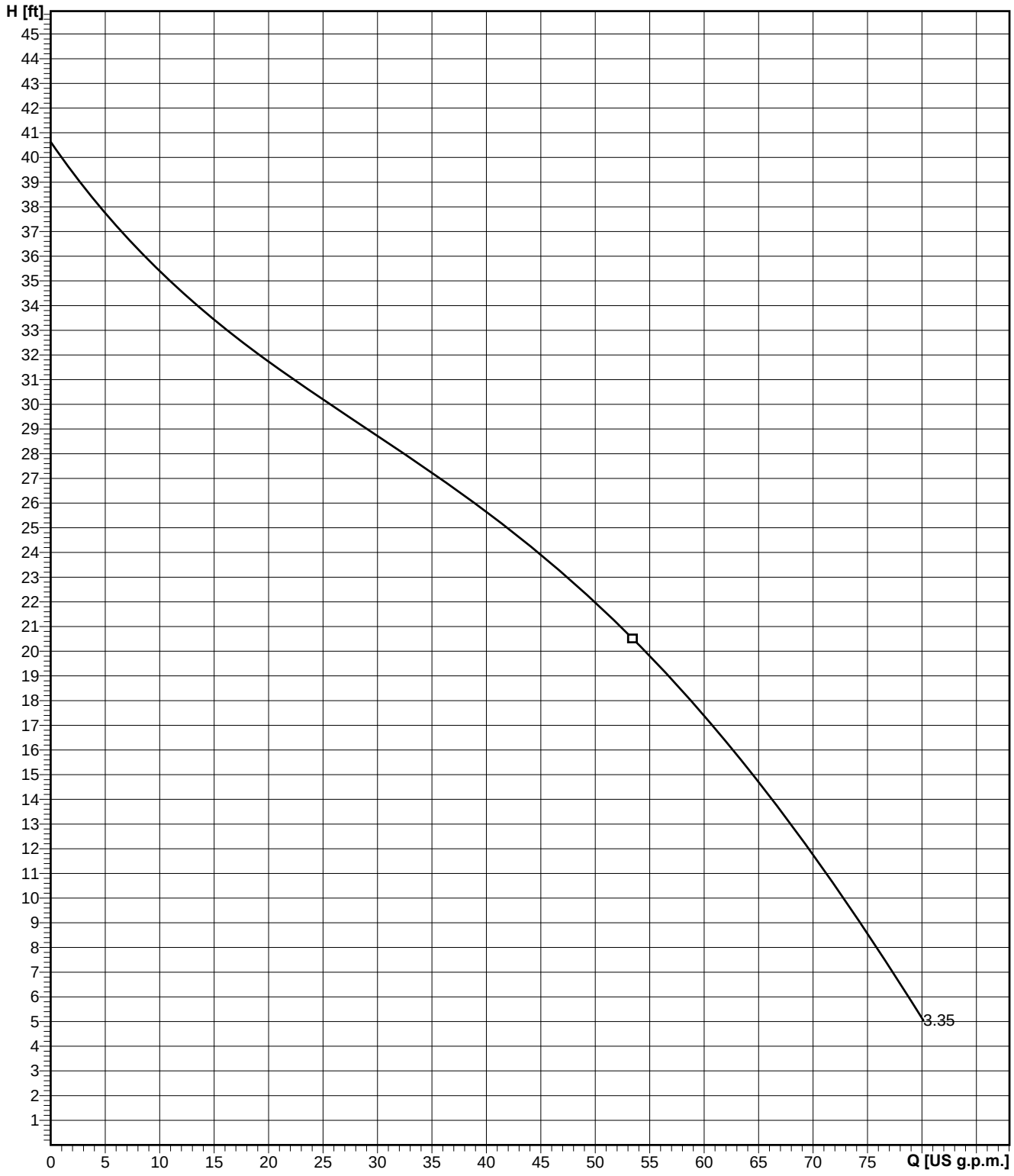
SULZER

Pump performance curves
EF 04W-2 60HZ

Curve number	
Reference curve	EF 04W-2

			Discharge	Frequency
			2"	
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3480 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision 2009-04-13
3.35 inch	6	Vortex impeller	3/4"	

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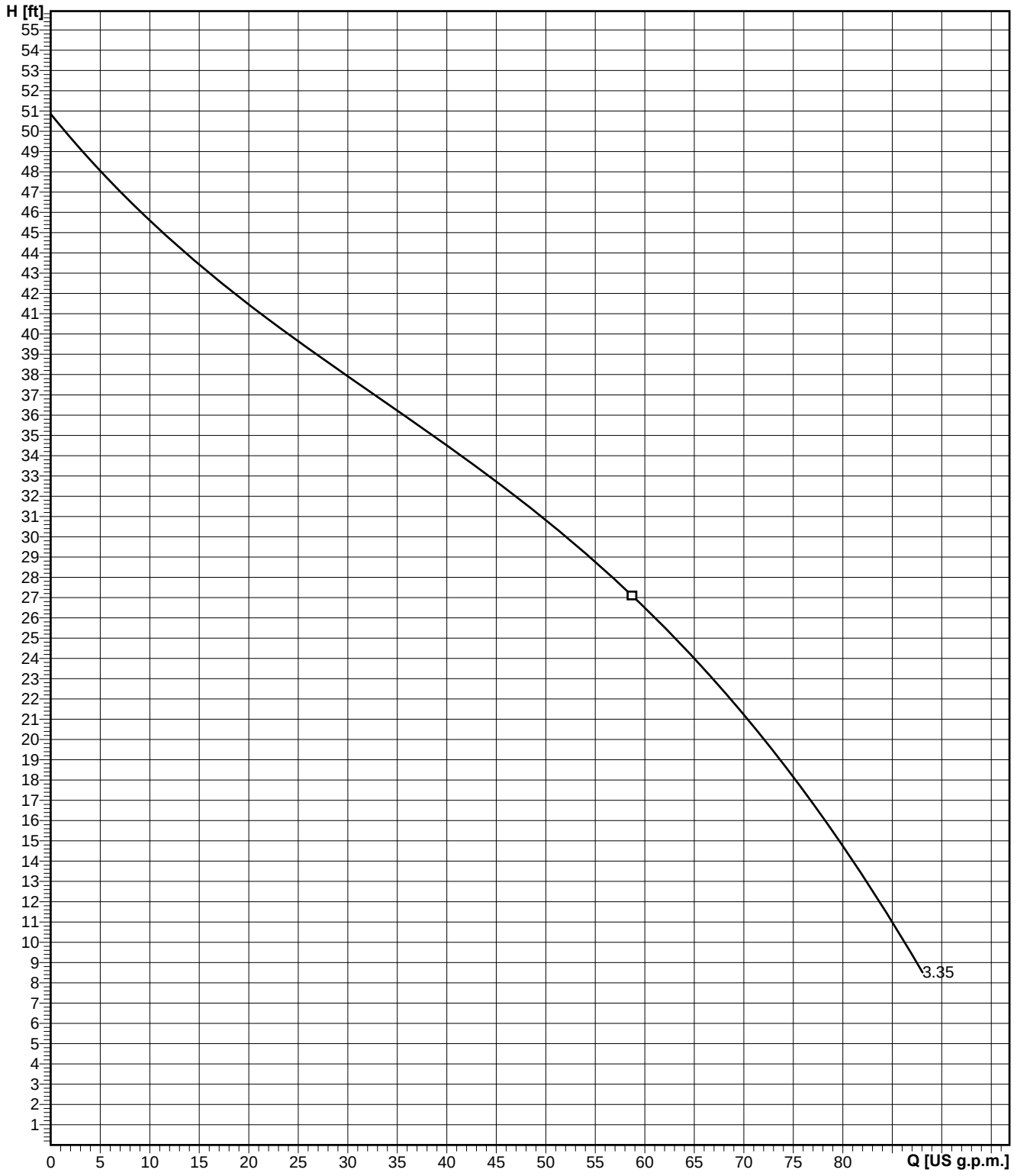
SULZER

Pump performance curves
EF 05W-2 60HZ

				Curve number
				Reference curve EF 05W-2
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3480 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 3.35 inch	N° of vanes 6	Impeller Vortex impeller	Solid size 3/4"	Revision 2009-04-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 03W	1	0.33	115	7.2	19.5	N	0.80	52	2/3450

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30B
Volute	Cast Iron ASTM A48 Class 30B
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	21.6
Maximum submergence (feet)	66
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 03W	1 - 16/3 SJTOW-A or equiv. 115V w/ 3 prong plug	20	Thermoplastic elastomer

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 04W	1	0.4	115	9.1	37.5	N	0.79	43	2/3450

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30B
Volute	Cast Iron ASTM A48 Class 30B
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	28.6
Maximum submergence (feet)	66
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 04W	1 - 16/3 SJTOW-A or equiv. 115V w/ 3 prong plug	20	Thermoplastic elastomer

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	••10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 05W	1	0.5 Hp	115	13.2	58.5	P	0.85	50	2/3450
	1	0.5 Hp	208/230*	7.3/6.6	38.9/35.2	S	0.85	50	2/3450

*** 230 volt motor can be operated on 208 volts without modification.**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	36
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 05W	115 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug 208/230 volt - 16/3 SJEOOW or equiv. w/3 prong plug	20	Thermoplastic elastomer

EF03W-2, EF04W-2, EF05W-2 Dimensional Drawing

Type	*Weigth w/ cable*	A	B	C	H	D
EF 03W	22 lb	11.3 in	9.2 in	5.8 in	3 in	2" NPT
	10 kg	287 mm	234 mm	147 mm	76 mm	
EF 04W*	*28.6 lb	12.3 in	9.7 in	6.4 in	3,4 in	2" NPT
	*13 kg	312 mm	247 mm	163 mm	87 mm	
EF 05W*	*35.8 lb	13.3 in	9.7 in	6.4 in	3,4 in	2" NPT
	*16.3 kg	337 mm	247 mm	163 mm	87 mm	

** Upper lid material:*
EF 03W - Plastic
EF 04W - Cast Iron (ASTM 48)
EF 05W - Cast Iron (ASTM 48)

Single phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 1¼" NPT horizontal discharge with an integrated ABS Piranha® type bolting flange. The motor shall be _____HP connected for operation on a _____ volts, single phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle, without clogging, clean water, contaminated water, wastewater effluent, storm water, and other similar non corrosive liquids which may contain small solids. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a $^{5}/_{8}$" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with vertical discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard 1¼" NPT pipe fittings. Discharge flange shall also incorporate an ABS Piranha type bolt pattern to allow the pump to bolt to ABS Piranha accessories.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty single row, deep grooved ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 30k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class B insulation rated for 130°C (266° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.15. Single phase motors shall be rated 208-230 volts, and shall utilize a capacitor start circuit with a solid state voltage sensing start relay. The start circuit shall be integrated into the top of the motor. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

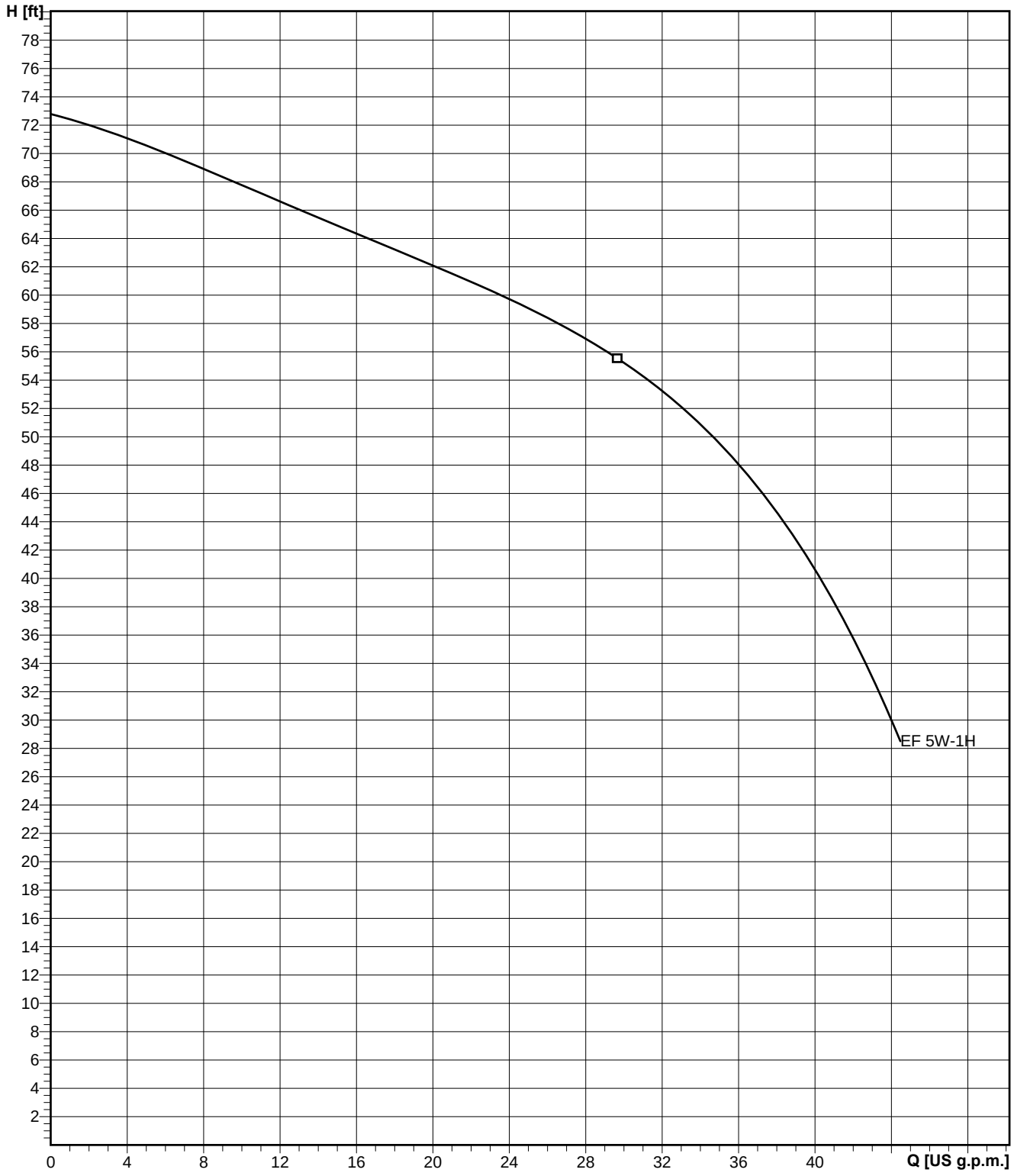
Power Cable: The power cable shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

SULZER

Pump performance curves
EF 05W-1H 60HZ

			Curve number	
			Reference curve EF 05W-1H	
			Discharge 1-1/4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3490 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 4.06 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 5/8"	Revision 2009-04-13

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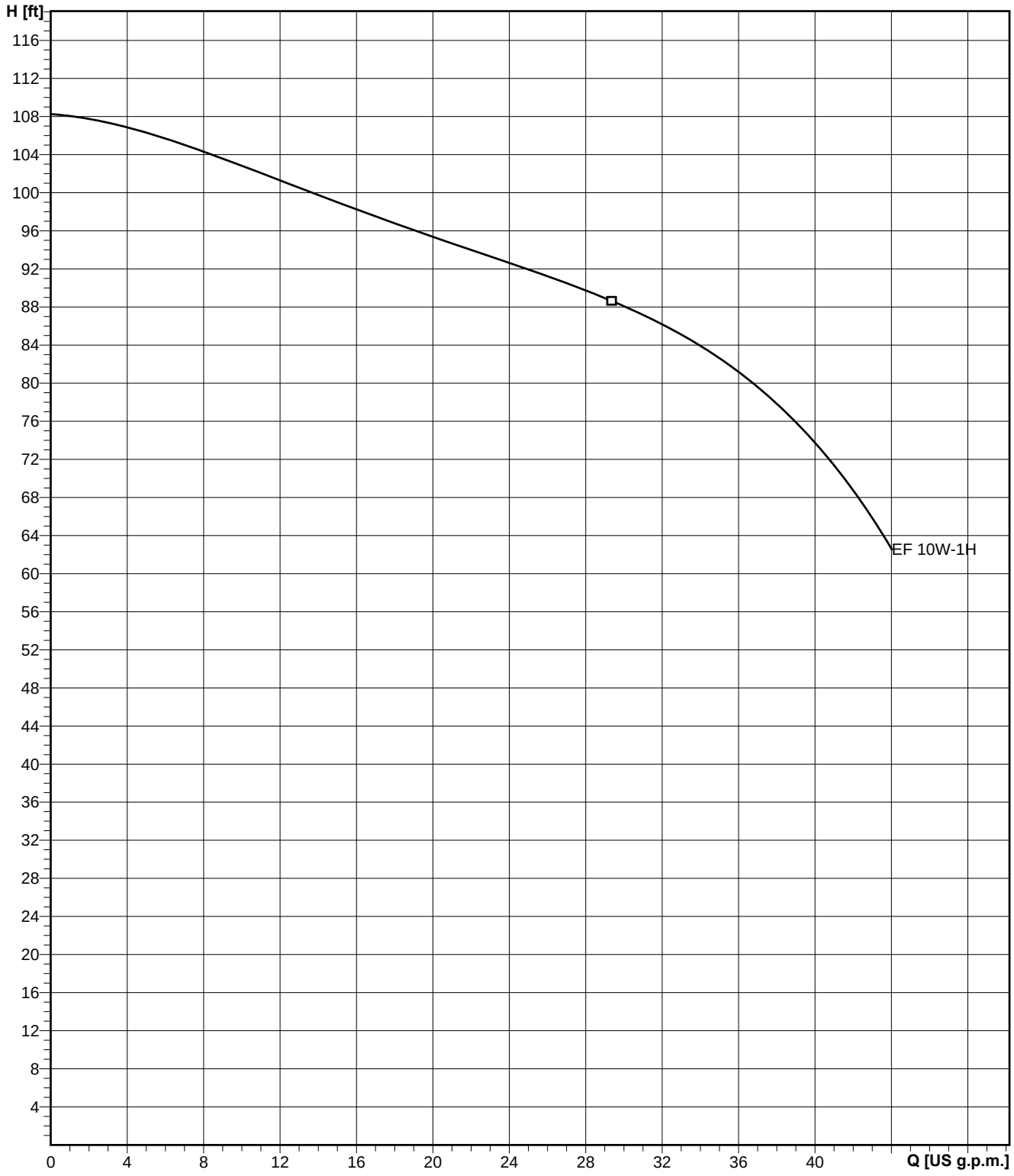
SULZER

Pump performance curves
EF 10W-1H 60HZ

			Discharge 1-1/4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3490 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH

Curve number

Reference curve
EF 10W-1H



Impeller size 5.08 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 5/8"	Revision 2009-04-13

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MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EF 05W-1H	1*	0.5	115	15.0	91	U	2/3450
	1*	0.5	230	7.5	45.5	U	2/3450

* Start switch and capacitor integrated into top of pump.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	68 (31)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	1 ¼ inch horizontal
Discharge type	NPT female thread, plus ABS Piranha type bolting flange
Maximum temp. of pumped fluid	40•C continuous, 50•C intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW	0.36in (9.2mm)	20ft (6m)	Thermoplastic elastomer

Note: Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EF 10-1H	1*	1.0	230	13.0	45.5	M	2/3450

* Start switch and capacitor integrated into top of pump.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	70 (32)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	1 ¼ inch horizontal
Discharge type	NPT female thread, plus ABS Piranha type bolting flange
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW	0.36in (9.2mm)	20ft (6m)	Thermoplastic elastomer

Note: Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

OUTLINE DIMENSIONS	SCAVENGER E SERIES	EF-1H

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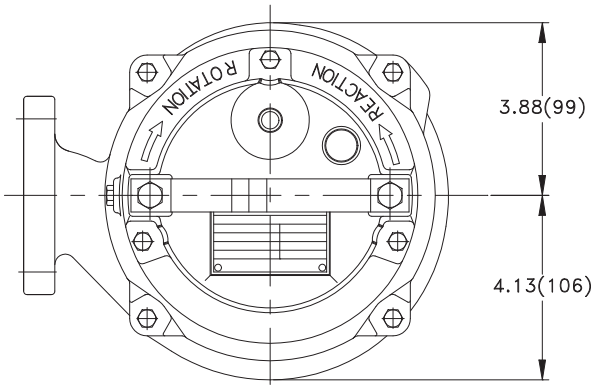
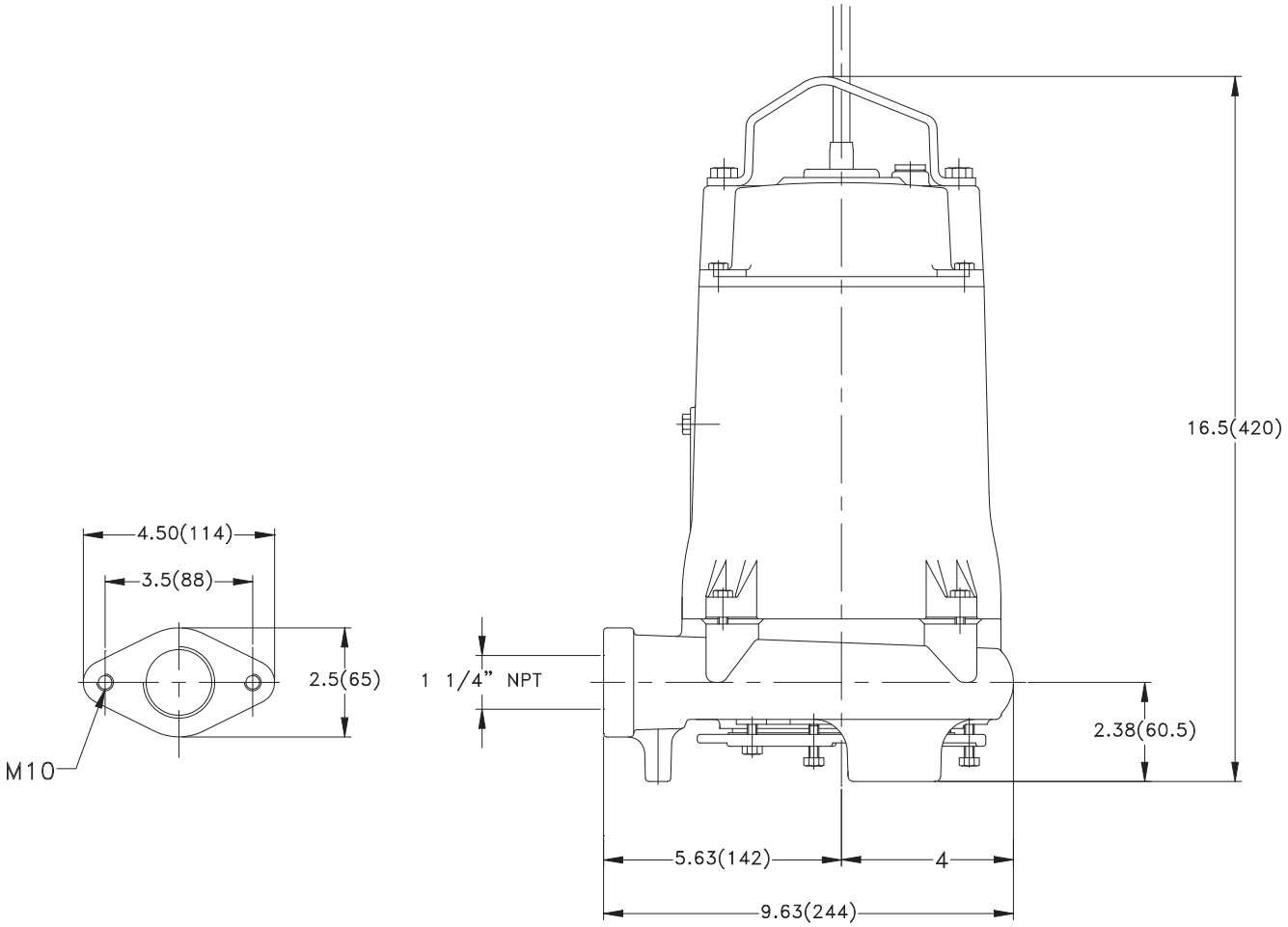
Pump	*Weight*
EF05W-1H	68 lbs.
EF10W-1H	70 lbs.





Note: Dimensions in inches and ( ) in millimeters.
Specifications subject to change without notice

SULZER

abs

INSTALLATION DIMENSIONS	WET PIT	SCAVENGER EF-1H

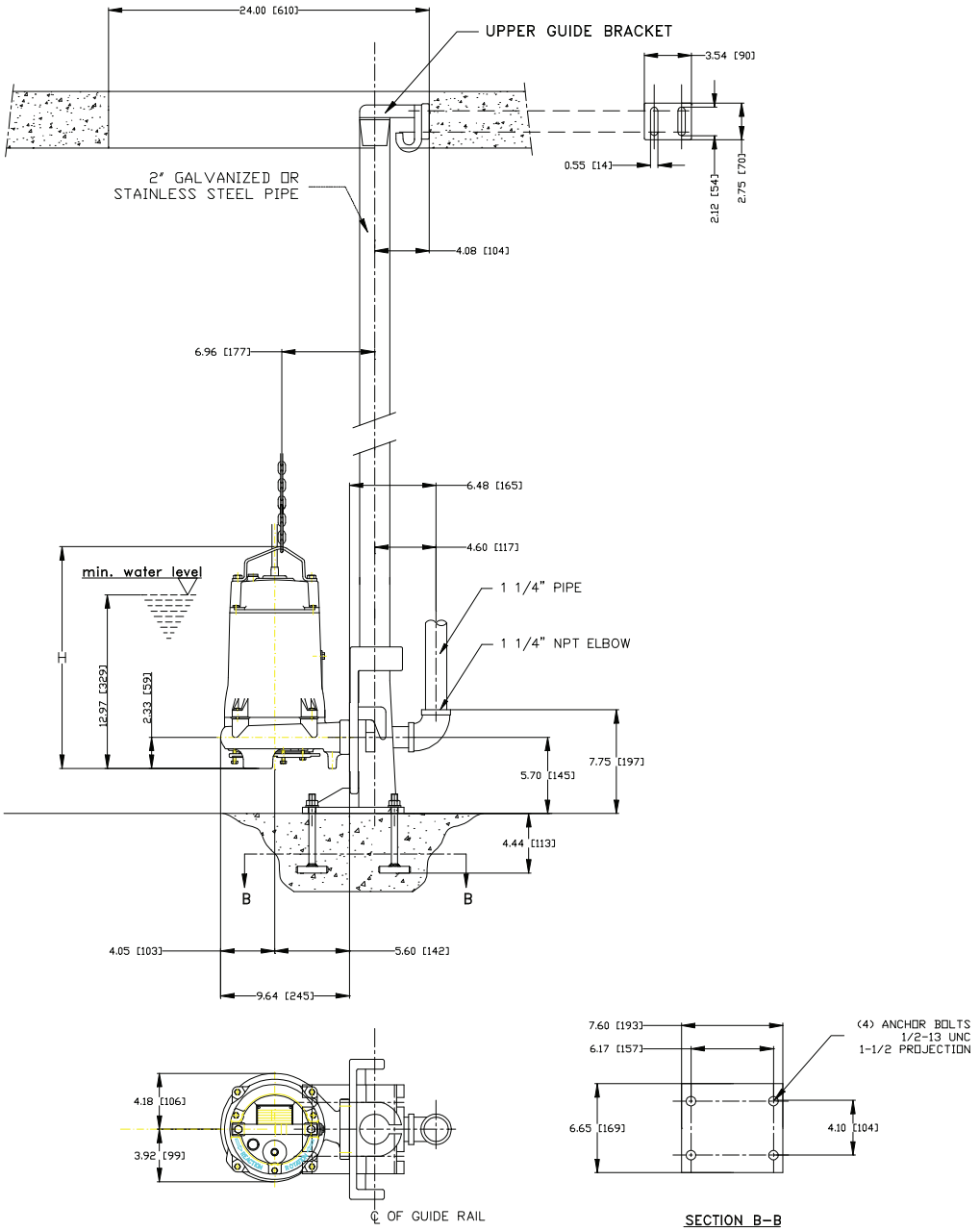
Doc No: DS-S08-037 **Rev:** **Date:** 02/07/03 **Section** Scavenger **Tab** Effluent **Page**

1-1/4" inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EF 05-1H	16.5 [420]	68.2 [31]

Pump	H in. [mm]	Weight lbs. [kg]
EF 10-1H	16.5 [420]	68.2 [31]

Guide rail system
Part number 62320501



Note: Dimensions in millimeters and [ ] in inches.
Specifications subject to change without notice

SULZER

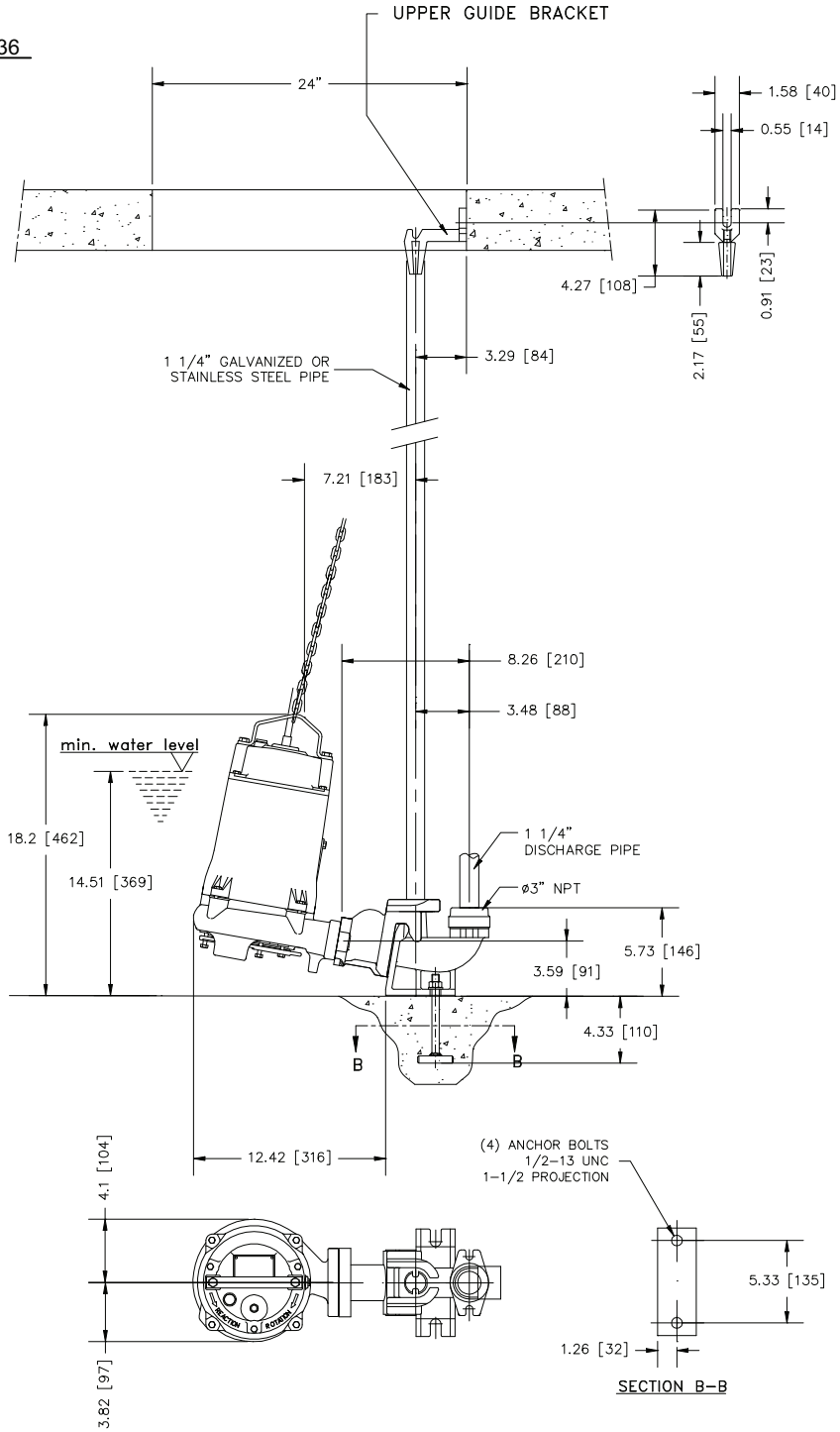
abs

1-1/4" inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EF 05-1H	16.5 [420]	68.2 [31]

Pump	H in. [mm]	Weight lbs. [kg]
EF 10-1H	16.5 [420]	68.2 [31]

Guide rail system
Part number 62320674 & 62320536



Note: Dimensions in millimeters and [ ] in inches.

Specifications subject to change without notice

SULZER abs

Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 2" NPT vertical discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle, without clogging, clean water, contaminated water, wastewater effluent, storm water, and other similar non corrosive liquids which may contain small solids. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a ¾" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with vertical discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard 2" NPT pipe fittings. A bolt–on 2" X 3" NPT adapter shall be available to convert the pump to 3" NPT vertical discharge.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty single row, deep grooved ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 30k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class B insulation rated for 130°C (266° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.15. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start circuit with a solid state voltage sensing start relay. The start circuit shall be integrated into the top of the motor. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

Power Cable: The power cable 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 oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 2" NPT vertical discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved to CSA UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle, without clogging, clean water, contaminated water, wastewater effluent, storm water, and other similar non corrosive liquids which may contain small solids. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a ¾" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with vertical discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard 2" NPT pipe fittings. A bolt–on 2" X 3" NPT adapter shall be available to convert the pump to 3" NPT vertical discharge.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty single row, deep grooved ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 30k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class B insulation rated for 130°C (266° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.15. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start circuit with a solid state voltage sensing start relay. The start circuit shall be integrated into the top of the motor. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

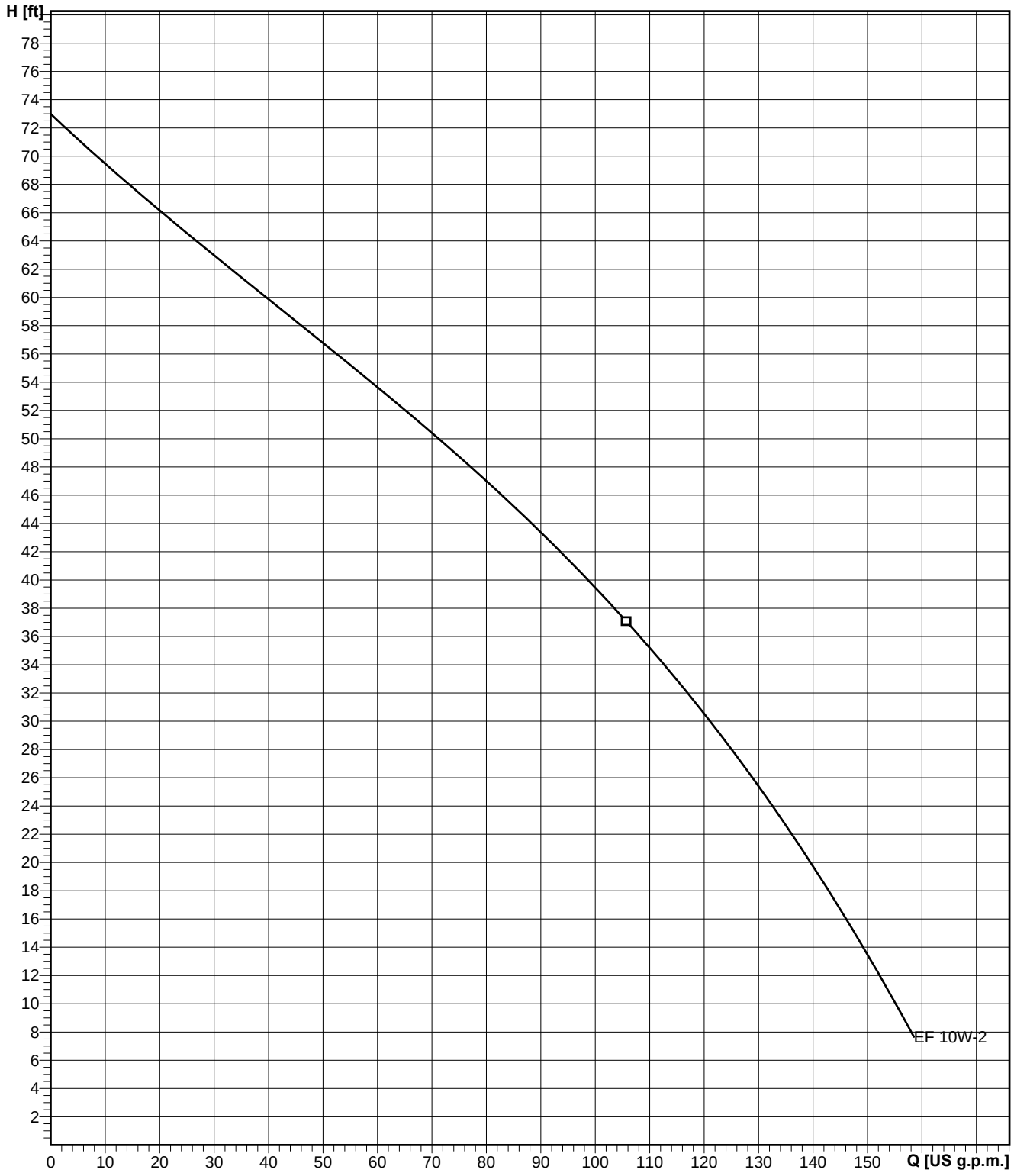
Power Cable: The power cable shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

SULZER

Pump performance curves
EF 10W-2 60HZ

			Curve number	
			Reference curve EF 10W-2	
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3490 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 4.17 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3/4"	Revision 2009-04-13

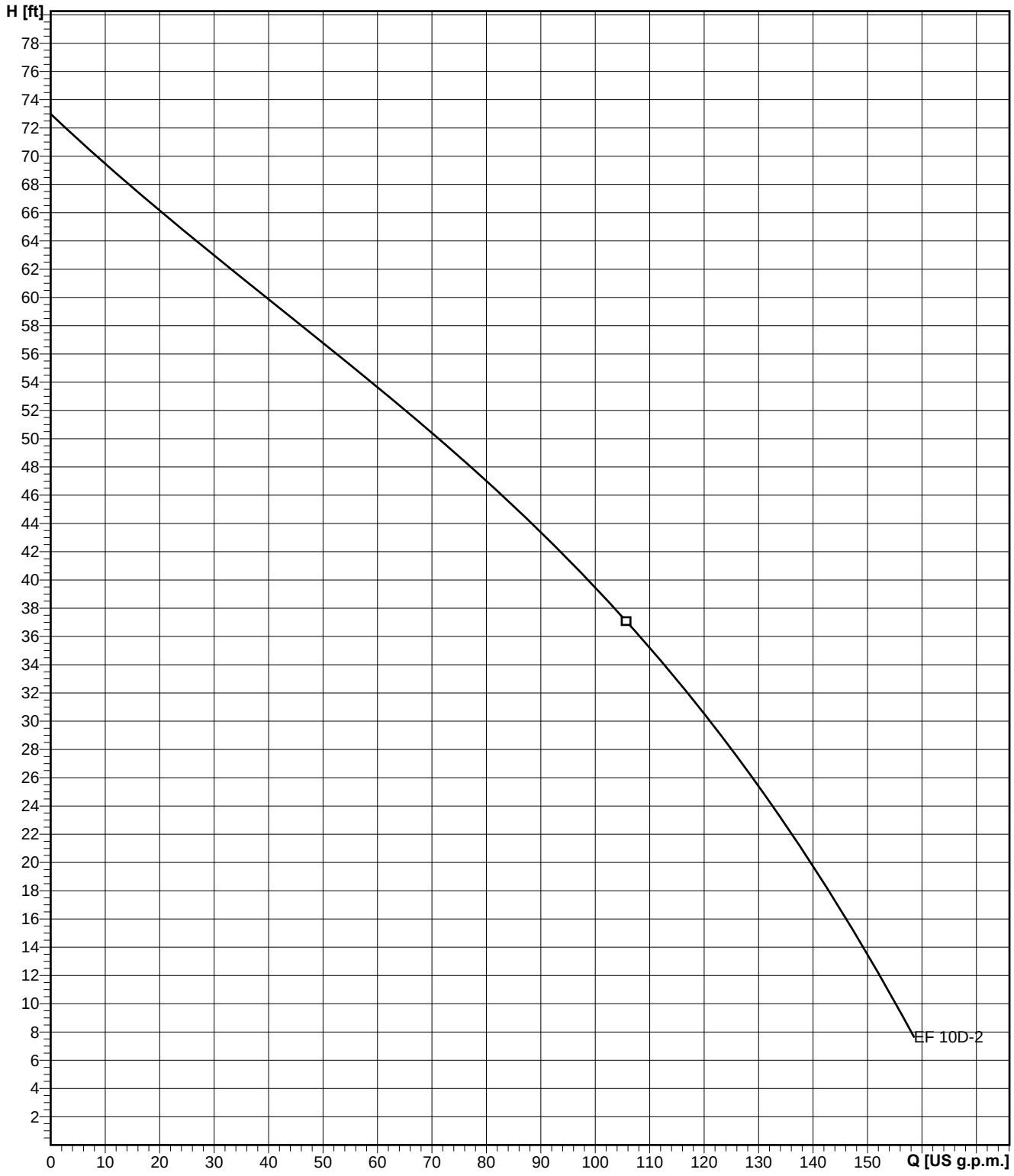
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EF 10D-2 60HZ

			Curve number	
			Reference curve EF 10D-2	
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3490 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 4.17 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3/4"	Revision 2009-04-13

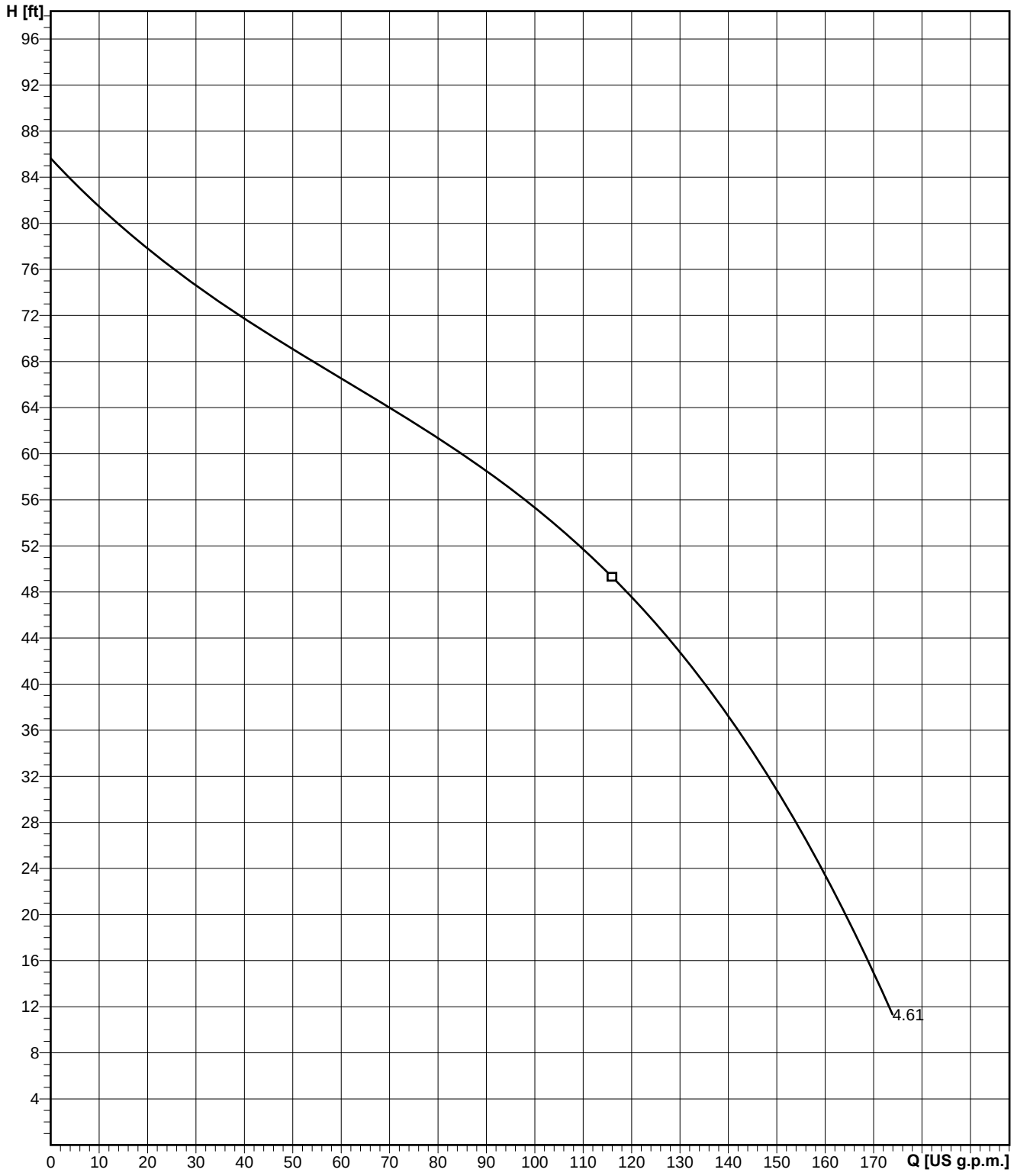
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EF 20D-2 60HZ

			Curve number	
			Reference curve EF 20D-2	
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3600 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 4.61 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3/4"	Revision 2009-04-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EF 10W-2	1*	1.0	230	13.0	45.5	M	2/3450
EF 10D-2	3**	1.0	208-230	6.4-5.8	24-21.8	K	2/3450
	3**	1.0	460	2.9	10.9	K	2/3450
	3	1.0	575	2.3	8.7	K	2/3450

* Start switch and capacitor integrated into top of pump.
** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	62 (28) [EF 10W-2], 57 (26) [EF 10D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch vertical
Discharge type	NPT female thread. Can accept 2 x 3” bolt on adapter accessory.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW (EF 10W-2)	230	0.36in (9.2mm)	20 ft (6m)	Thermoplastic elastomer
16/4 SEOOW (EF 10D-2)	208-230/460/575	0.43in (10.9mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EF 20D-2	3*	2.0	208-230	6.8-6.1	44.7-40.4	K	2/3450
	3*	2.0	460	3.1	20.2	K	2/3450
	3	2.0	575	2.4	18.8	K	2/3450

* These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

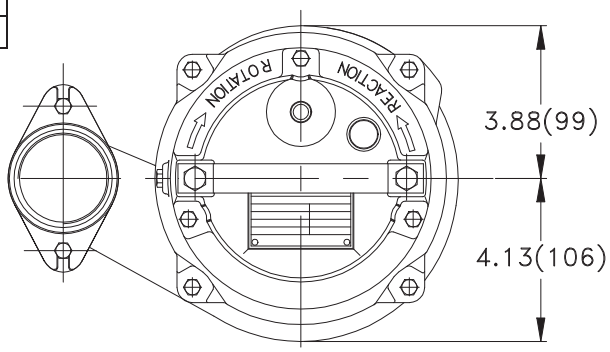
DIMENSIONS, WEIGHT, AND MISC.

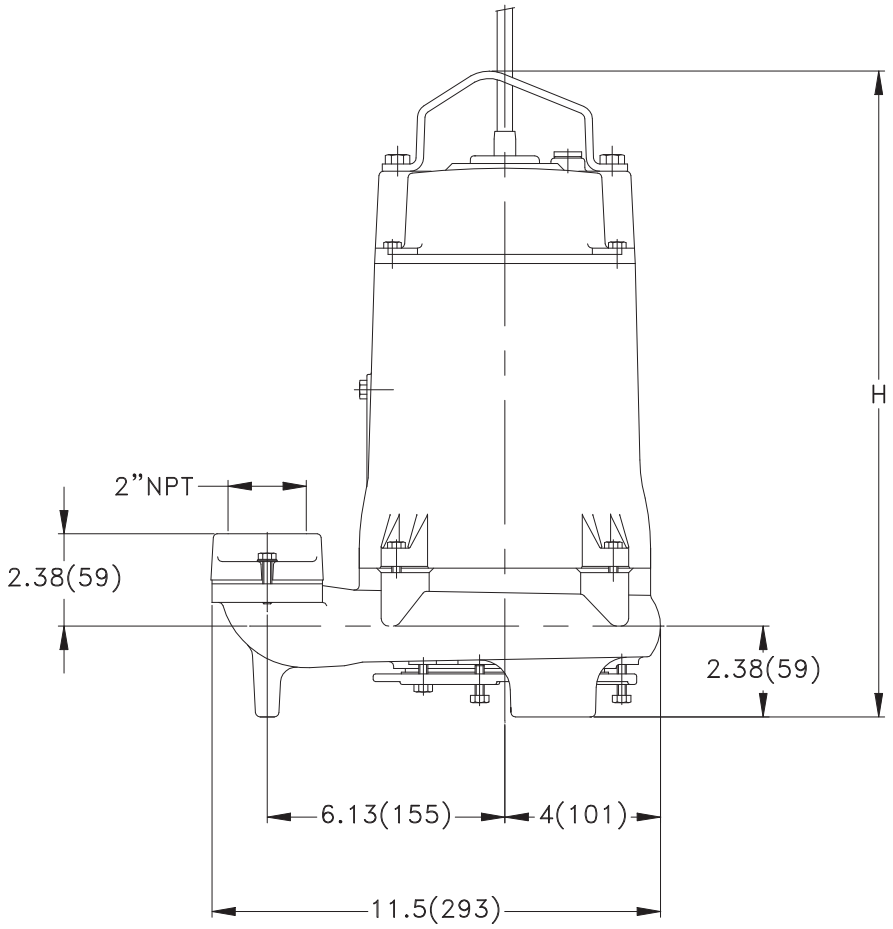
Pump weight, lb. (kg)	68 (31)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch vertical
Discharge type	NPT female thread. Can accept 2 x 3” bolt on adapter accessory.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
16/4 SEOOW	208-230/460/575	0.43in (10.9mm)	20 ft (6m)	Thermoplastic elastomer

Pump	*H*	*Weight*
EF10W-2	16.53(420)	62 lbs.
EF10D-2	15.78(401)	57 lbs.
EF20D-2	18.27(464)	68 lbs.





Note: Dimensions in inches and ( ) in millimeters.

Specifications subject to change without notice

SULZER

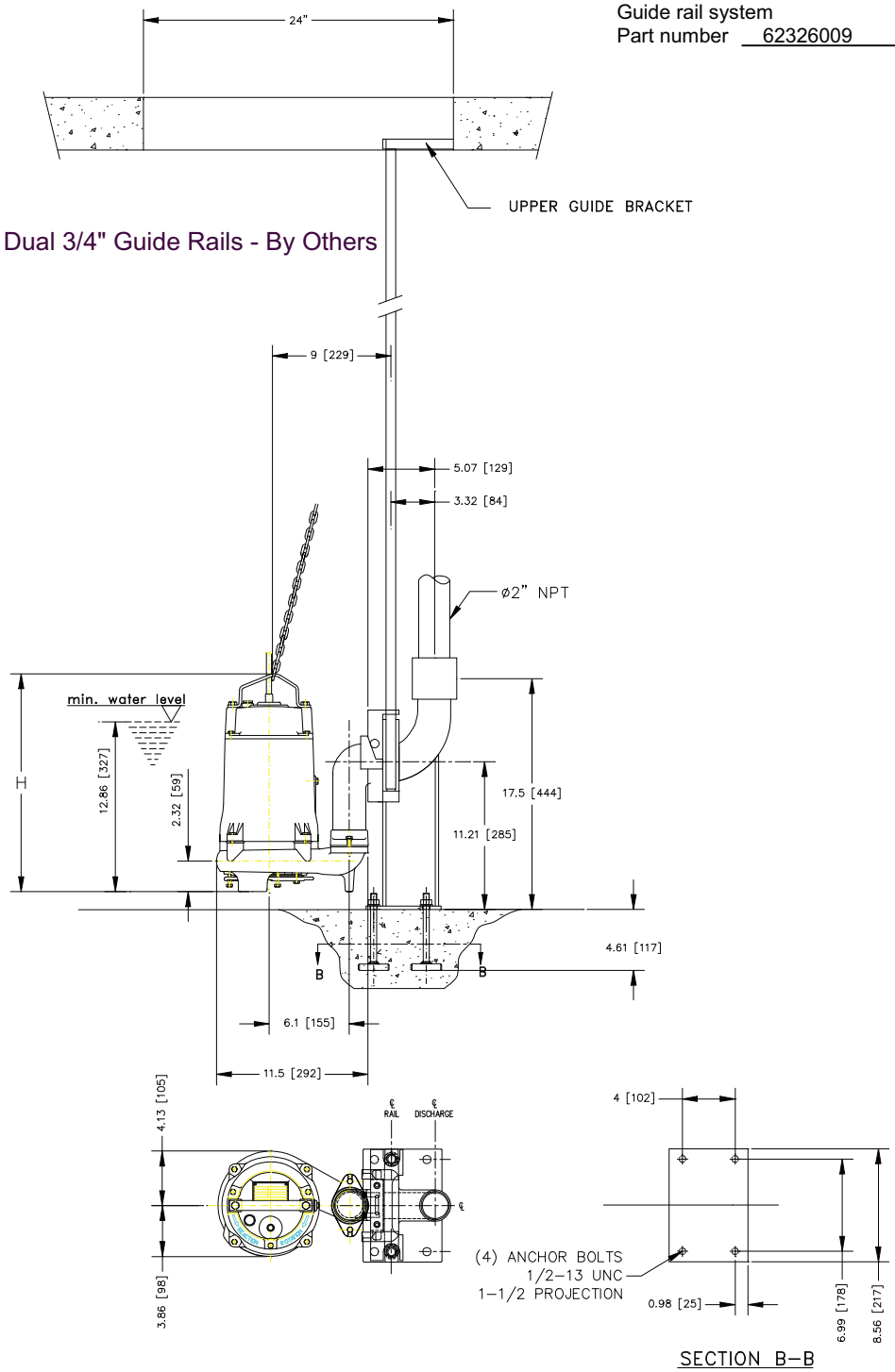
abs

Two inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EF 10D-2	15.8 [401]	57 [26]

Pump	H in. [mm]	Weight lbs. [kg]
EF 10W-2	16.5 [420]	57 [26]

Guide rail system
Part number 62326009



SECTION B-B

Note: Dimensions in millimeters and [ ] in inches.

Specifications subject to change without notice

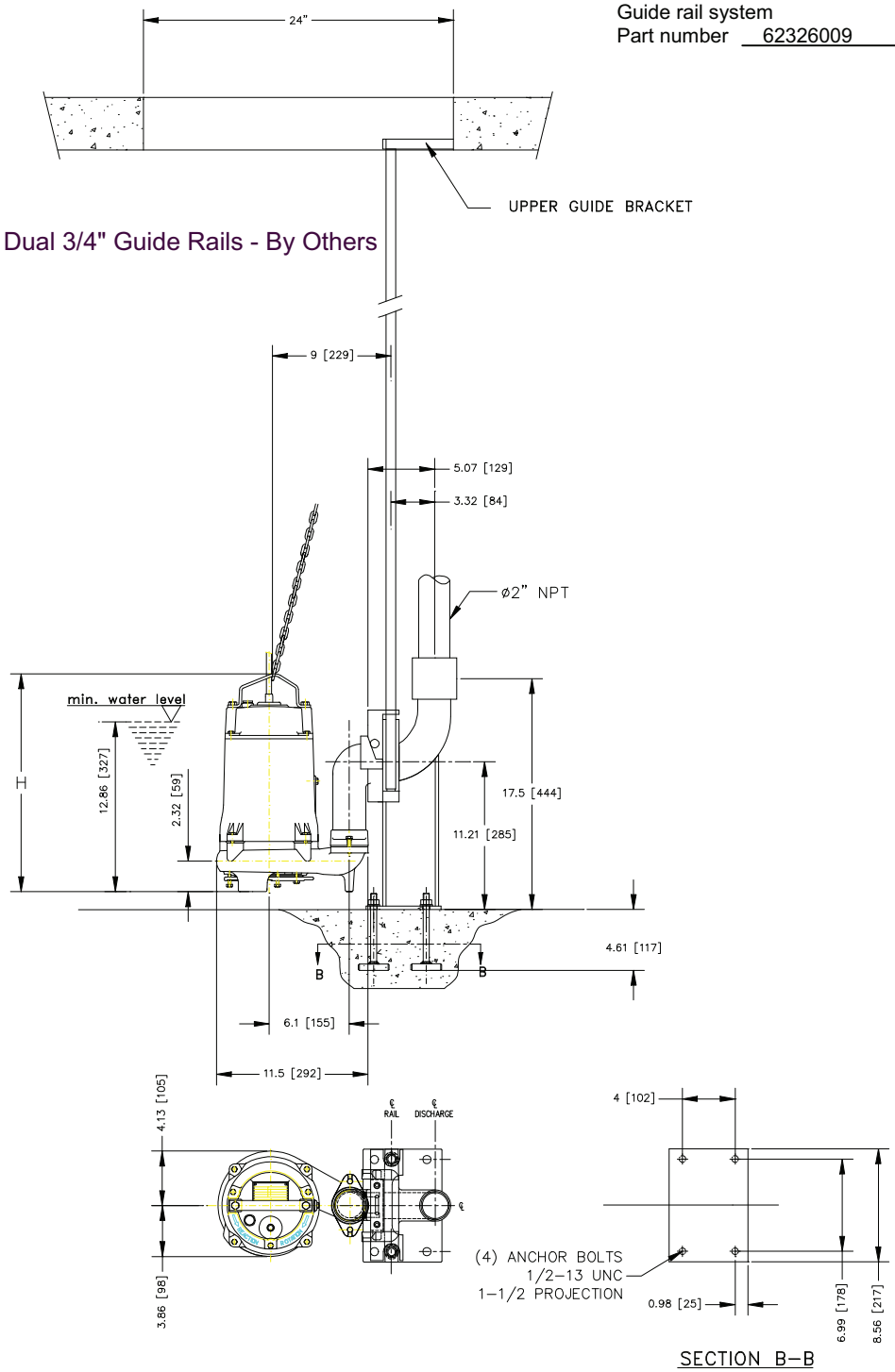
SULZER

abs

Two inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EF 20D-2	18.3 [464	68 [31]

Guide rail system
Part number 62326009



Note: Dimensions in millimeters and [ ] in inches.

Specifications subject to change without notice

SULZER

abs

GENERAL

Furnish and install _____ ABS Model EJ 04W Scavenger submersible pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 0.4 HP and 1750 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN

The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA22.2-108 standards.

PUMP CONSTRUCTION

Impeller: The impeller shall be PTB Vortex impeller capable of passing 2 inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120••C. The motor upper lid shall be constructed of gray cast iron and house the start capacitor and stator connections. Power cable shall be 15 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

GENERAL

Furnish and install _____ ABS Model EJ 05W Scavenger submersible pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 0.5 HP and 1750 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN

The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA 22.2-108 standards.

PUMP CONSTRUCTION

Impeller: The impeller shall be PTB Vortex impeller capable of passing 2 inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120••C. The motor upper lid shall be constructed of gray cast iron and house the start capacitor and stator connections. Power cable shall be 15 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

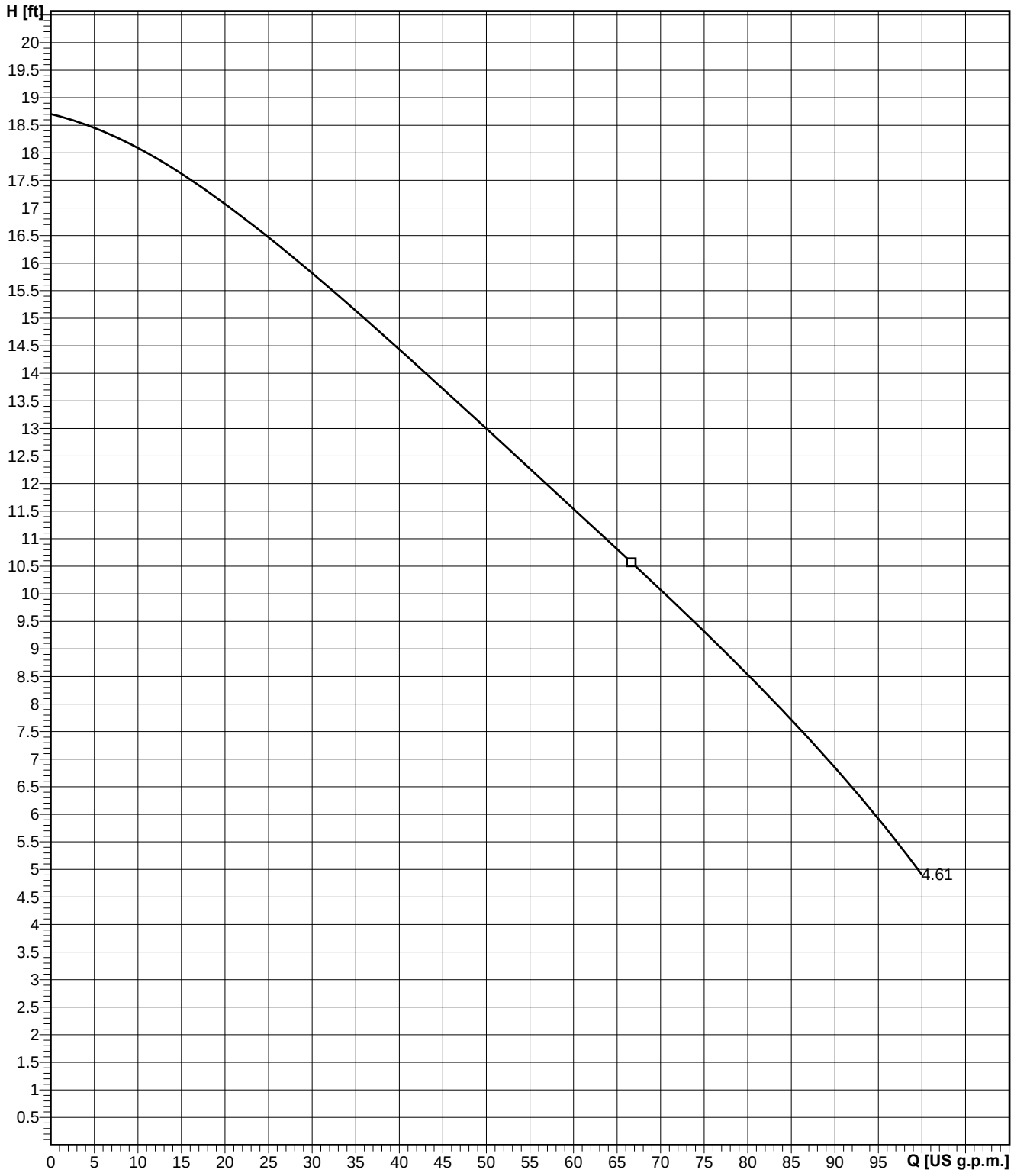
Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

SULZER

Pump performance curves
EJ 04W-2 60HZ

Curve number	
Reference curve	EJ 04W-2

			Discharge	Frequency
			2"	
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1780 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision 2009-04-13
4.61 inch	6	Vortex impeller	2"	

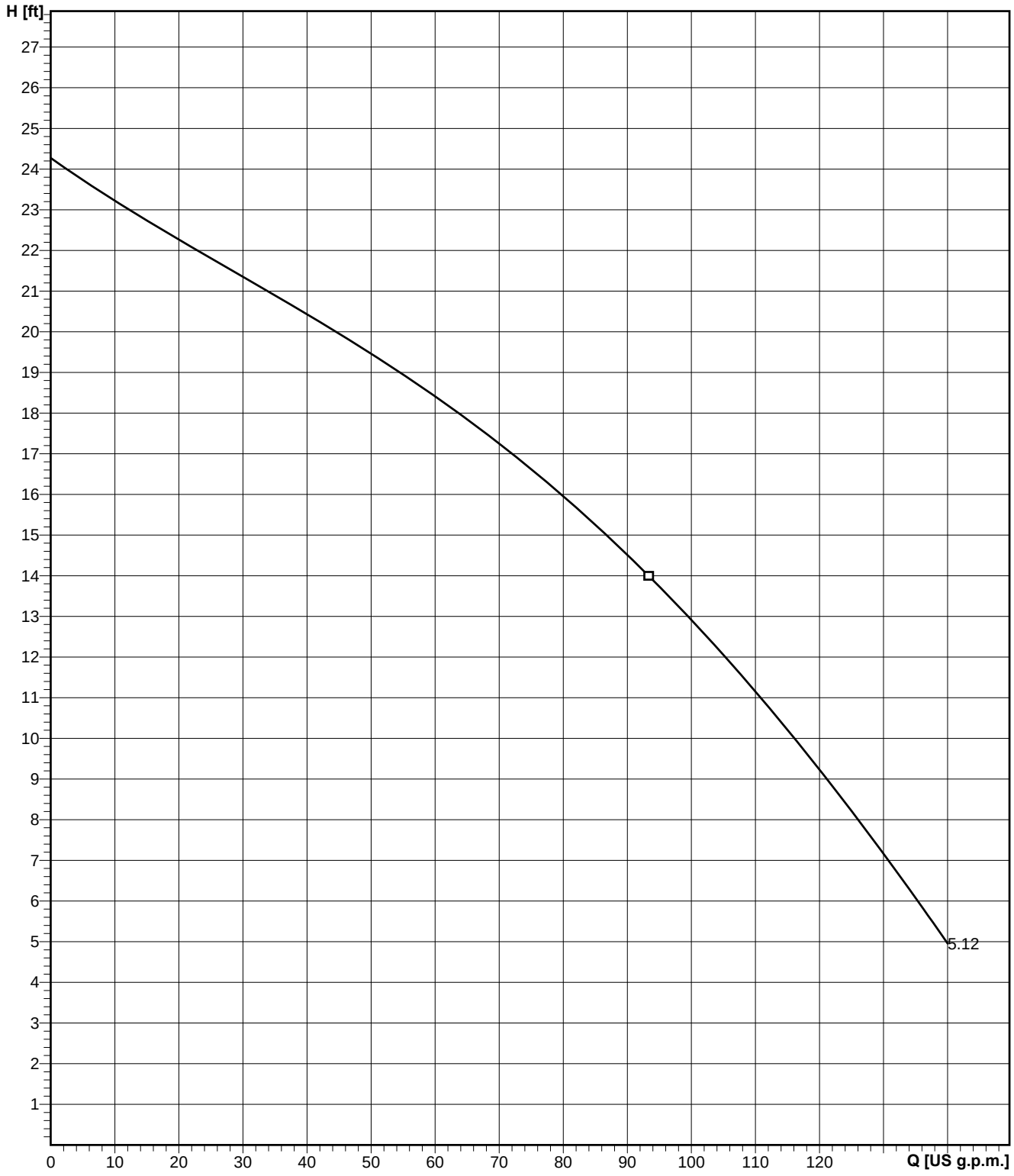
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ 05W-2 60HZ

Curve number				
Reference curve EJ 05W-2				
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1780 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 5.12 inch	N° of vanes 6	Impeller Vortex impeller	Solid size 2"	Revision 2005-06-14

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abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	••10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EJ 04W	1	0.4 Hp	115	6.6	17.7	F	0.92	57	4/1750

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	35
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EJ 04W	1 - 16/3 SJTOW-A or equiv. 115V w/ 3 prong plug	20	Thermoplastic elastomer

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	••10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EJ 05W	1	0.5 Hp	115	10.6	21.4	E	0.87	59	4/1750
	1	0.5 Hp	230	5.3	10.5	E	0.87	59	4/1750

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	37
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EJ 05W	115 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug 230 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug	20	Thermoplastic elastomer

SULZER

Maßblatt EJ 05W

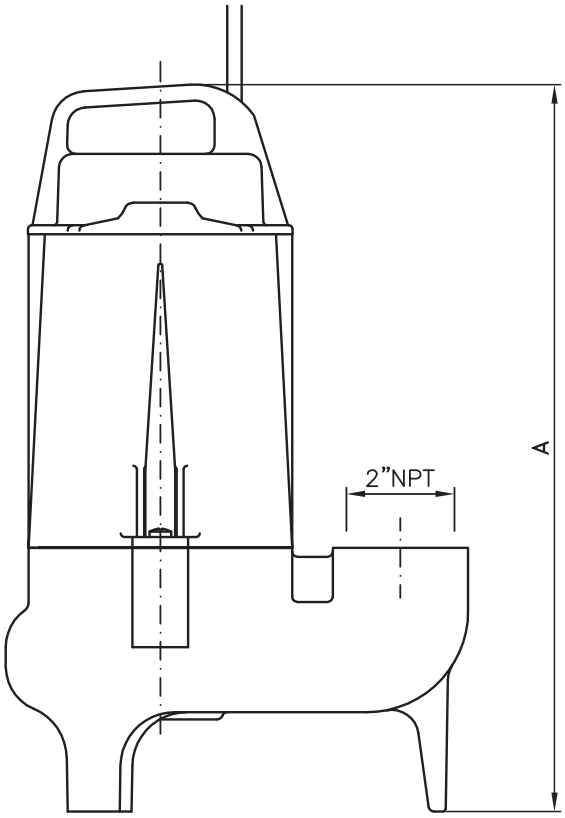
Dimension sheet

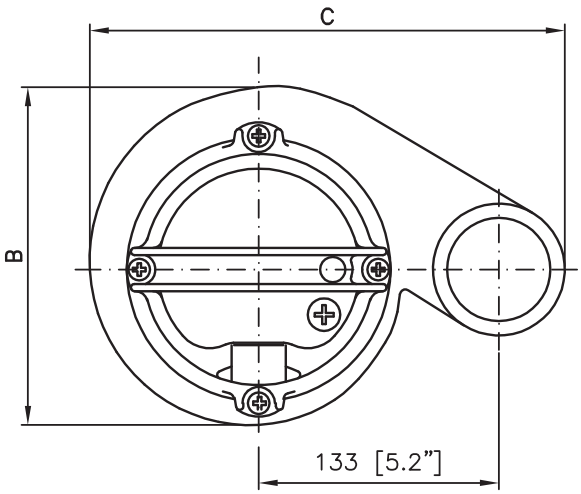
Plan d'encombrement

No.: F40–058
2004.03.03/ROR
Cad Code:F40–058
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous reserve de modification

Typ Type Tipo	Gewicht Weight Poids w.cable	A	B	C
EJ 04W	31.9 lb	14.9 inch	6.7 inch	9.9 inch
	14.5 kg	377 mm	170 mm	251 mm
EJ 05W	35.2 lb	15.8 inch	7.4 inch	10.4 inch
	15 kg	402 mm	187 mm	263 mm

60 Hz



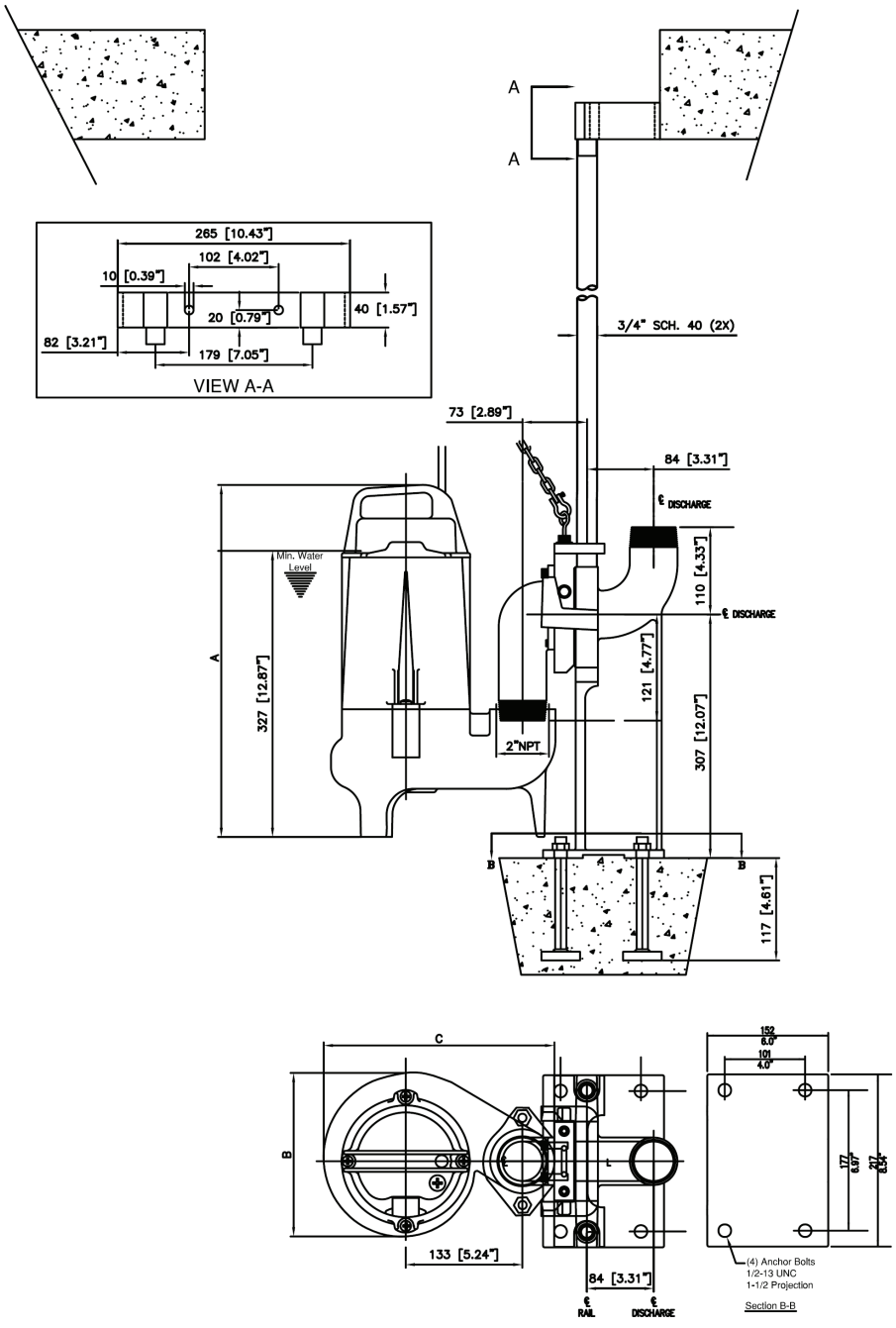


abs

EZ OUT GUIDE RAIL ASSEMBLY

Guide Rail System Part Number
62326009

Pump	*Weight*	*A*	*B*	*C*
EJ 04W	31.9 lb	14.9 inch	6.7 inch	9.9 inch
	14.5 kg	377 mm	170 mm	251 mm
EJ 05W	35.2 lb	15.8 inch	7.4 inch	10.4 inch
	15 kg	402 mm	187 mm	263 mm



Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 2" ANSI horizontal discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle clean or solids contaminated water, raw sewage, wastewater effluent, storm water, and other similar non corrosive, solids-laden fluids, without clogging. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well. The Guide Rail System shall be cast iron, have an integrated discharge elbow, and shall utilize a single guide rail pipe to guide the pump into place.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a 2" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard ANSI 2" flanges.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty single row, deep grooved ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 25k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class B insulation rated for 130°C (266° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.15. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start circuit with a solid state voltage sensing start relay. The start circuit shall be integrated into the top of the motor. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

Power Cable: The power cable 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 oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

Single phase and three phase versions

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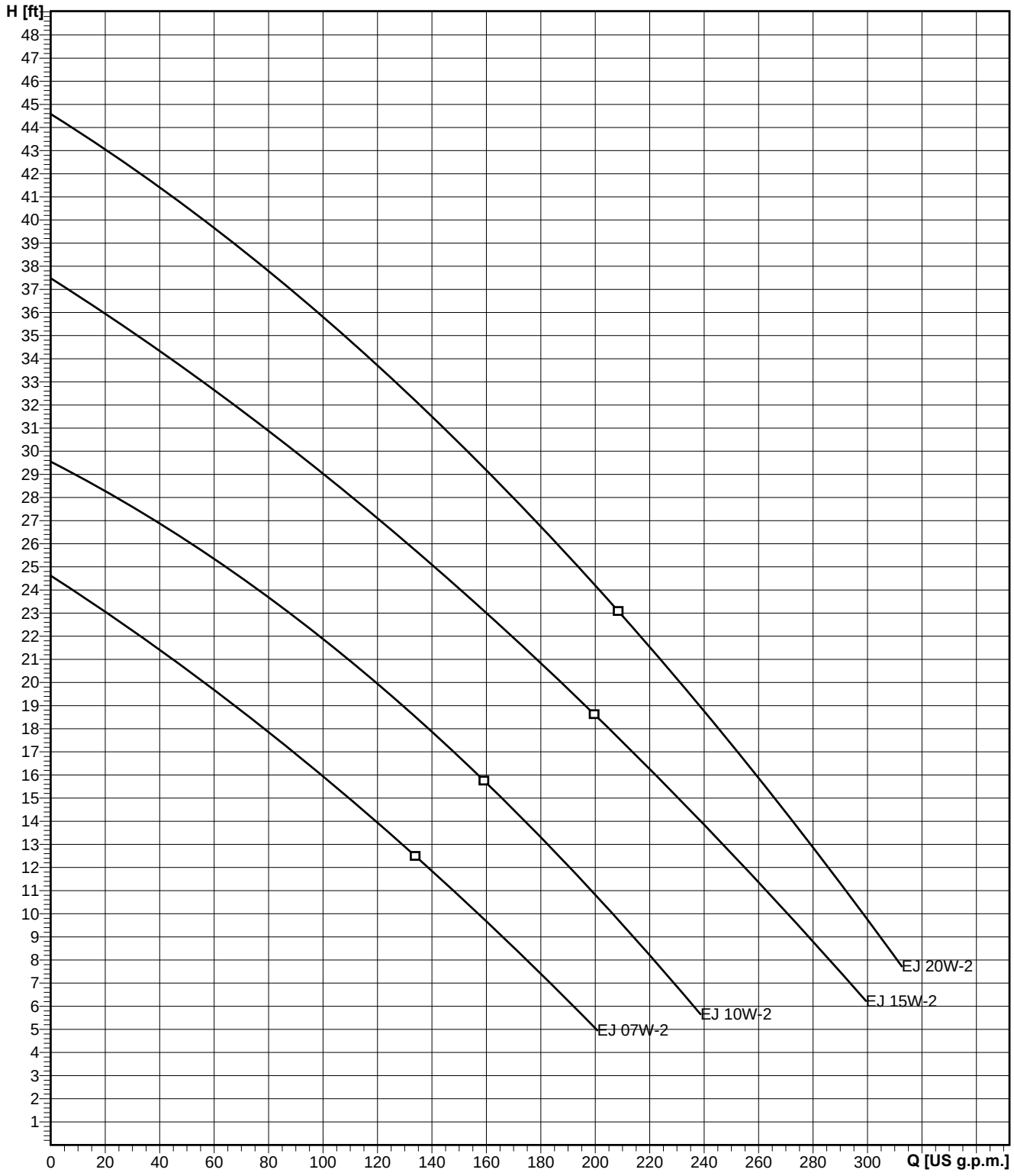
SULZER

Pump performance curves
EJ W-2 60HZ

			Curve number	
			Reference curve EJ W-2	
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1710..1715 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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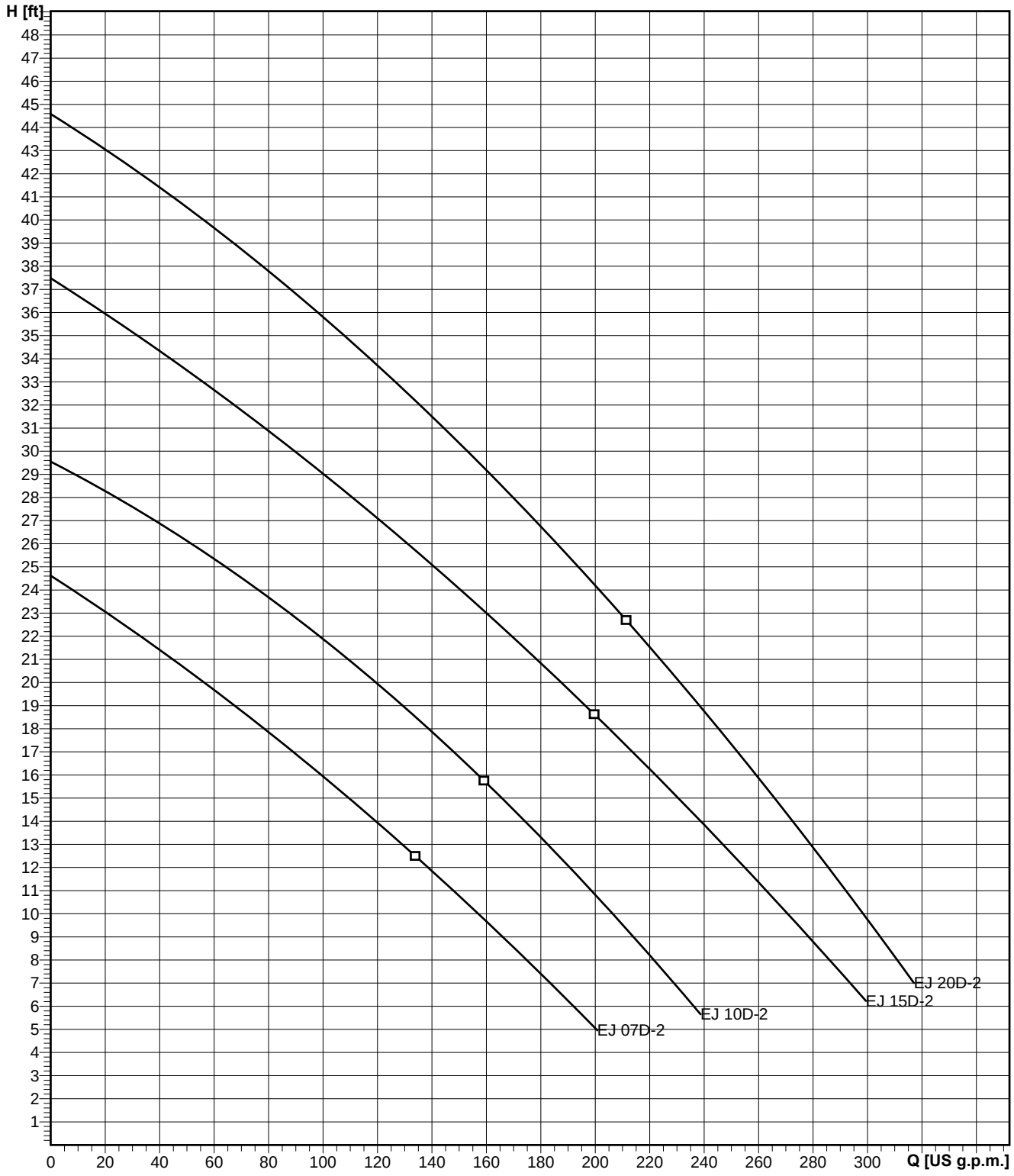
abs

SULZER

Pump performance curves
EJ D-2 60HZ

				Curve number
				Reference curve EJ D-2
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1710..1715 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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SULZER

Pump performance curves
EJ W-2 60HZ

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			Discharge 2"	Frequency
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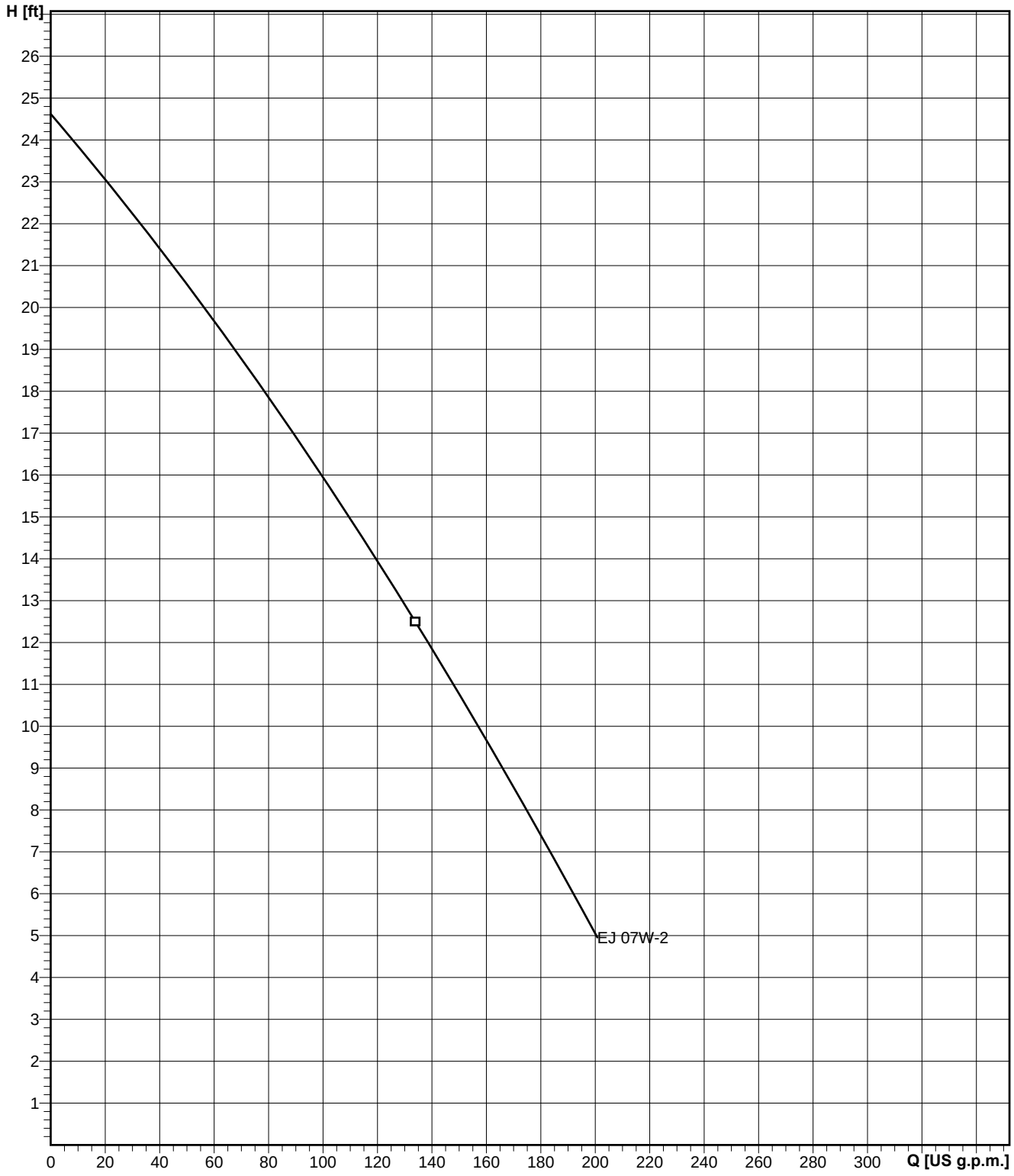
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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SULZER

Pump performance curves
EJ D-2 60HZ

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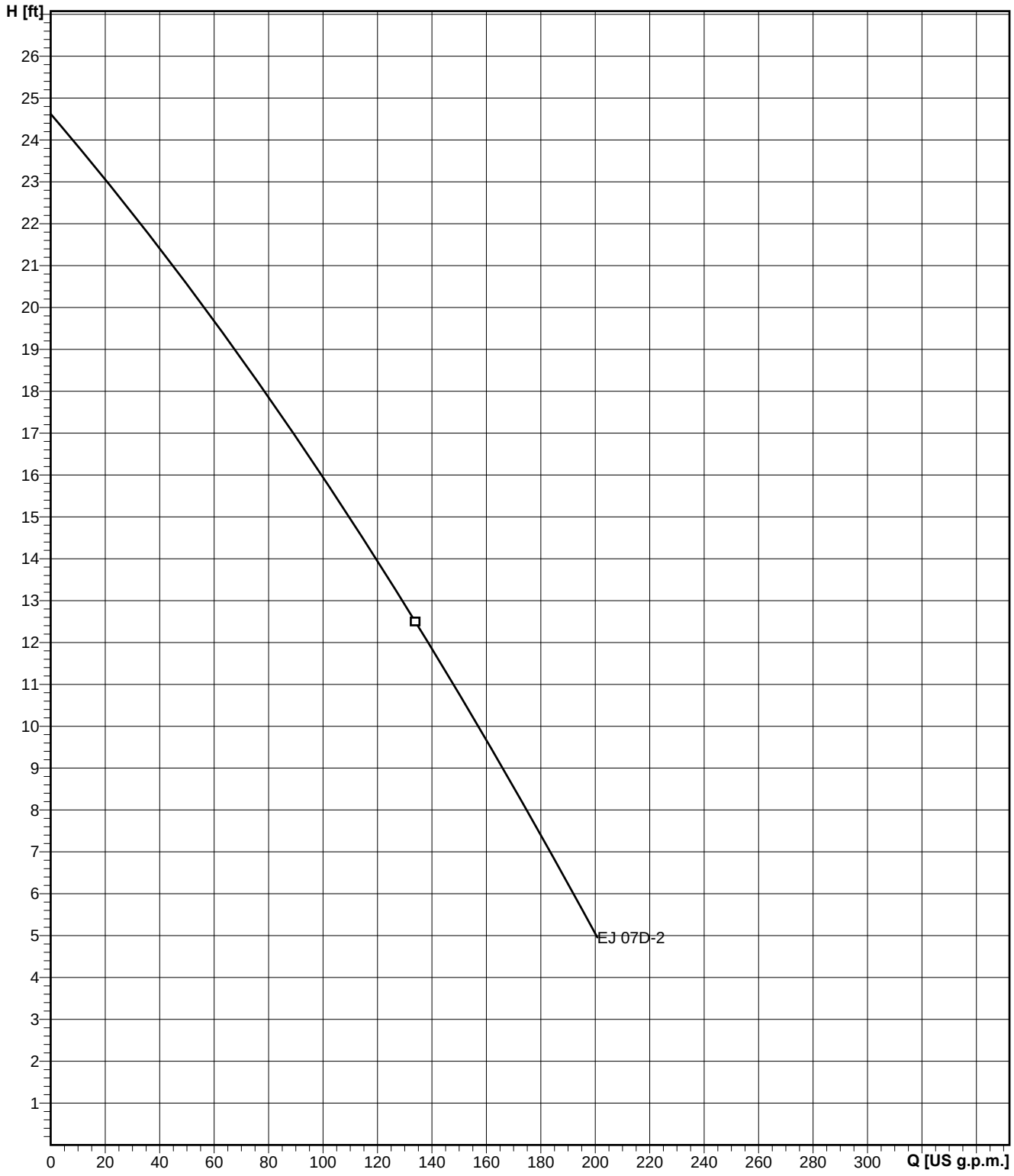

Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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SULZER

Pump performance curves
EJ W-2 60HZ

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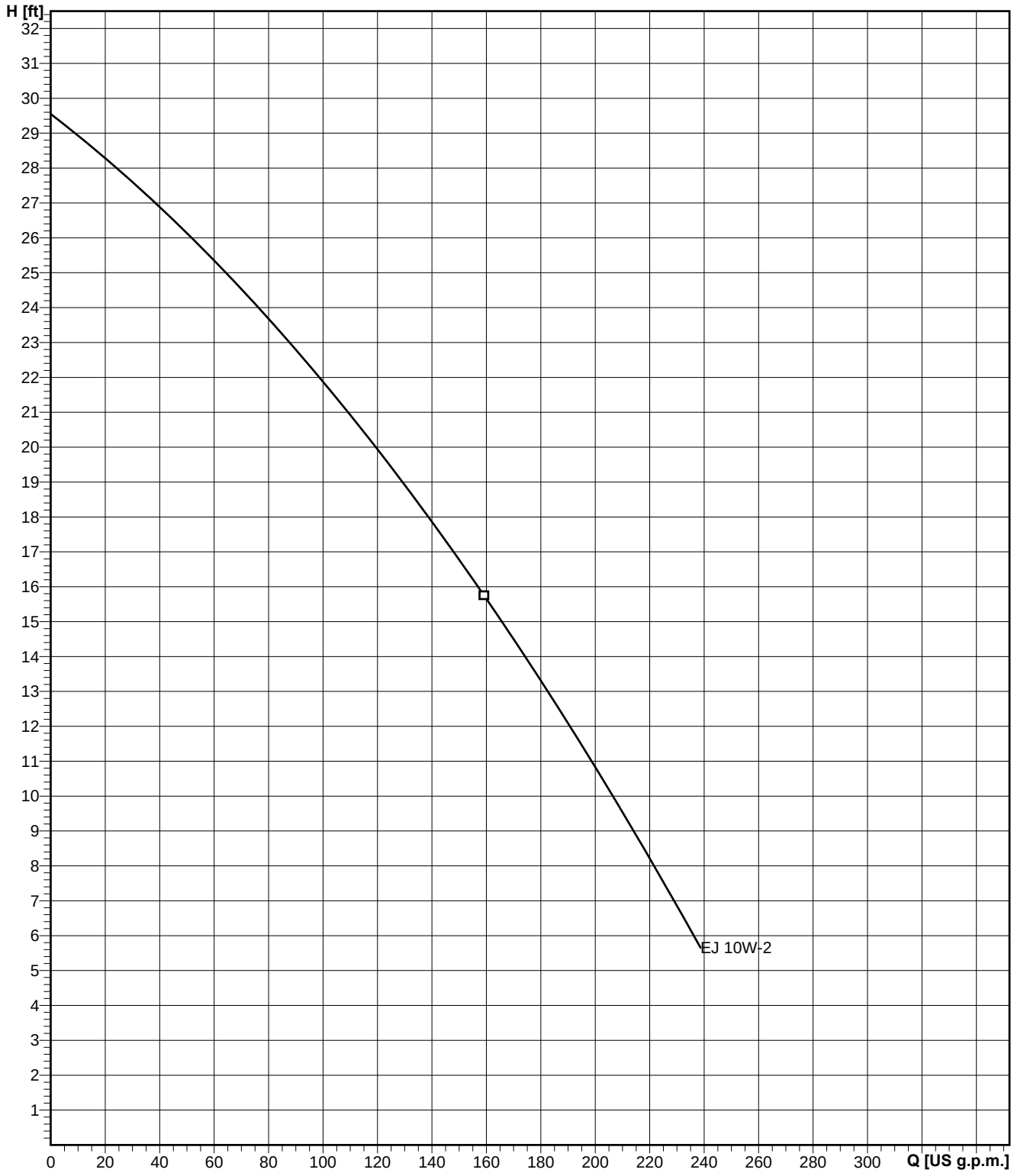

Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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SULZER

Pump performance curves
EJ D-2 60HZ

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				Reference curve EJ D-2
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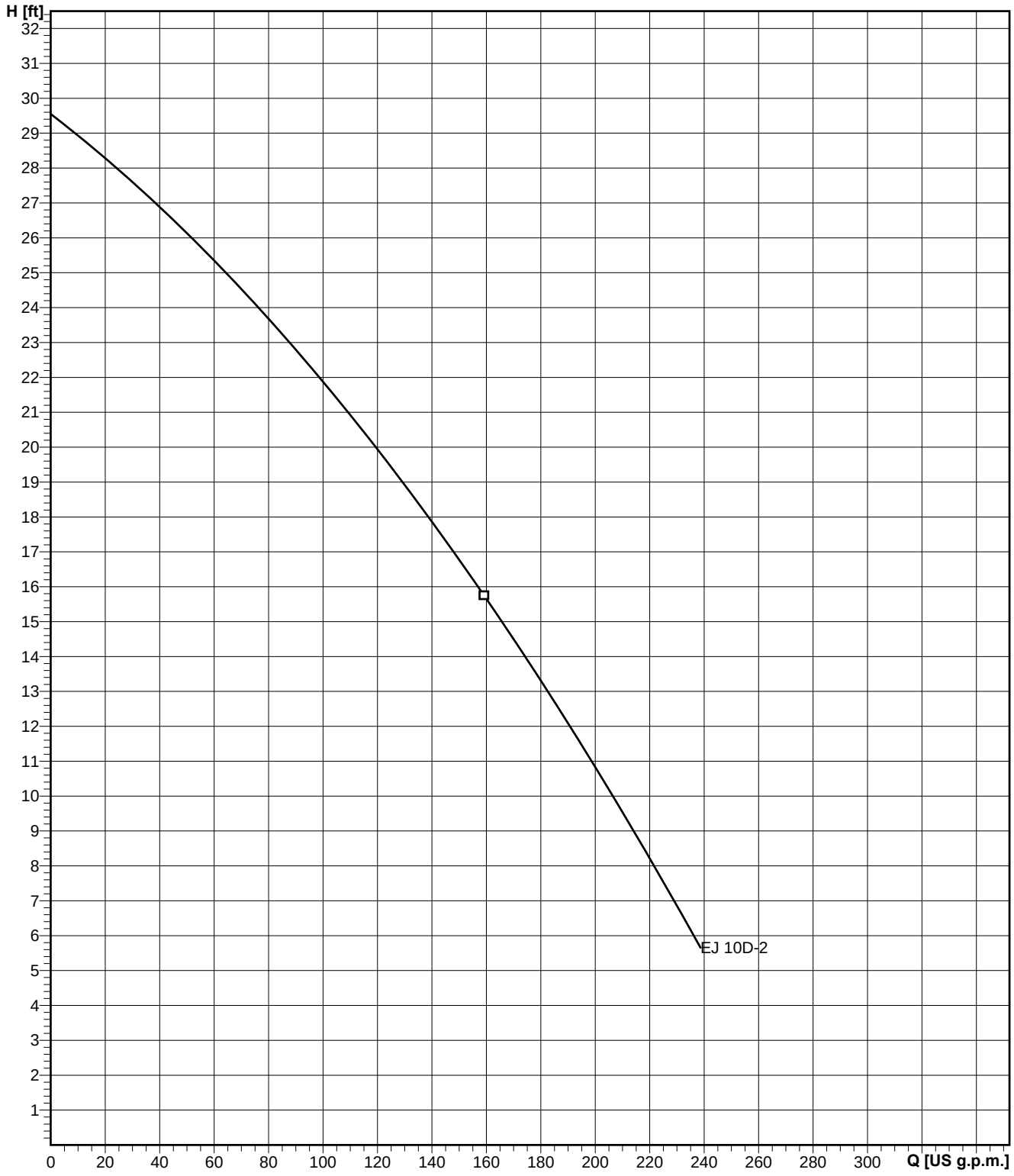

Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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abs

SULZER

Pump performance curves
EJ W-2 60HZ

				Curve number
				Reference curve EJ W-2
			Discharge 2"	Frequency
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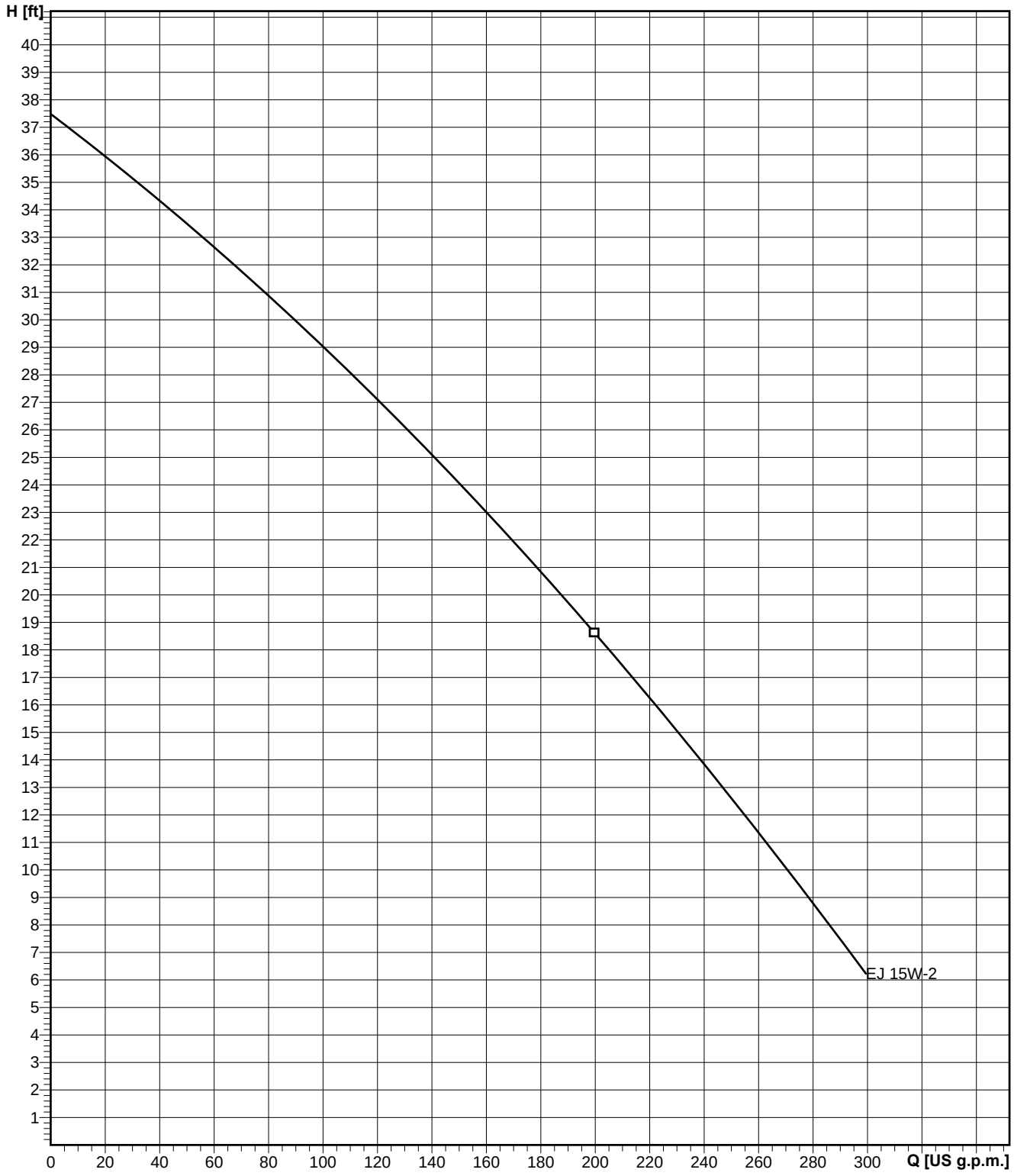

Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

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Pump performance curves
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			Curve number	
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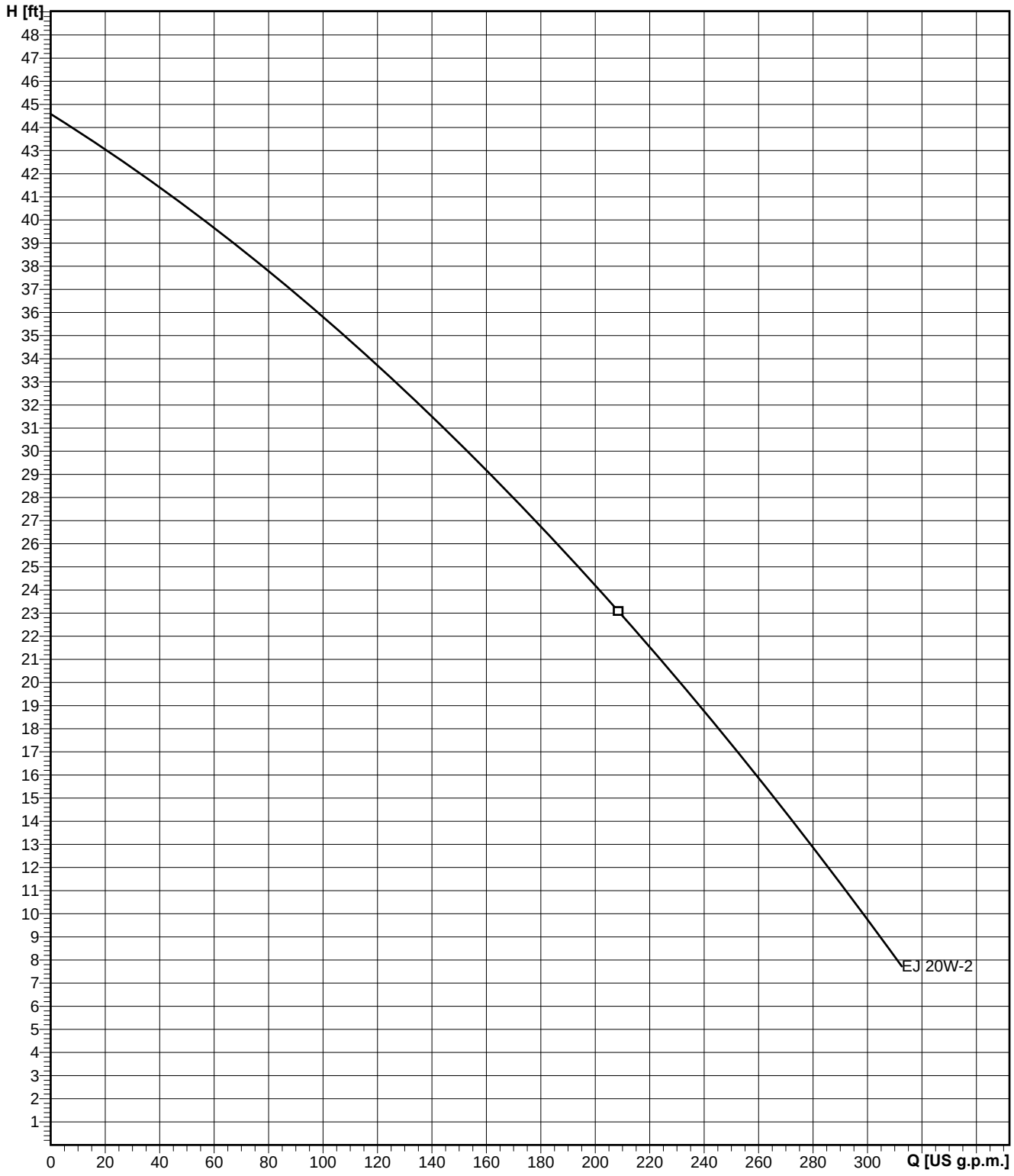
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1710..1715 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

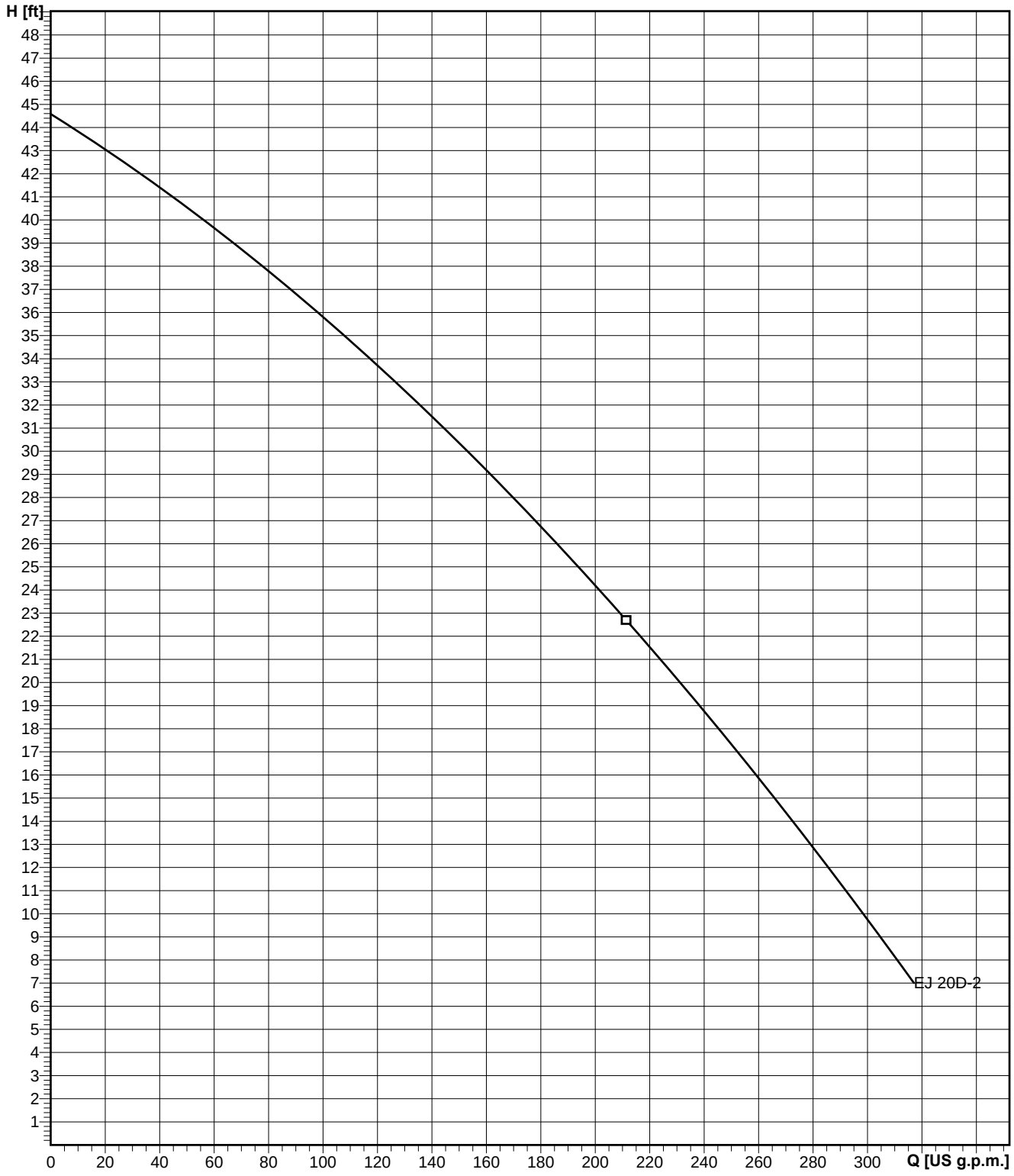
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ D-2 60HZ

				Curve number
				Reference curve EJ D-2
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1710..1715 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.22..4.72 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2"	Revision 2009-04-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 05D-2	3*	0.5	208-230	3.5-3.2	22.4-20.3	S	4/1750
	3*	0.5	460	1.6	10.1	S	4/1750
	3	0.5	575	1.3	8.1	S	4/1750

* These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	78 (35)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
16/4 SEOOW (EJ 05D-2)	208-230/460/575	0.43in (10.9mm)	20 ft (6m)	Thermoplastic elastomer

TECHNICAL DATA	SCAVENGER E SERIES	EJ 07-2

Dwg: DS-S08-070 **Rev:** C **Date:** 11/2009 **Section** Scavenger **Tab** Ejector **Page**

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 07W-2	1*	3/4	115 or 230	13.8 - 6.9	62 - 31.0	L - K	4/1750
EJ 07D-2	3**	3/4	208-230	4.2-3.8	22.4-20.3	K	4/1750
	3**	3/4	460	1.9	10.2	K	4/1750
	3	3/4	575	1.5	8.2	K	4/1750

* Start switch and capacitor integrated into top of pump.
** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	84 (38) [EJ 07W-2], 80 (36) [EJ 07D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW (EJ 07W-2)	230	0.36in (9.2mm)	20 ft (6m)	Thermoplastic elastomer
16/4 SEOOW (EJ 07D-2)	208-230/460/575	0.43in (10.9mm)		

Specifications subject to change without notice

SULZER

abs

TECHNICAL DATA	SCAVENGER E SERIES	EJ 10-2

Dwg: DS-S08-013 **Rev:** B **Date:** 11/2009 **Section** Scavenger **Tab** Ejector **Page**

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 10W-2	1*	1.0	230	10.0	38	K	4/1750
EJ 10D-2	3**	1.0	208-230	5.5-5.0	22.4-20.3	K	4/1750
	3**	1.0	460	2.5	10.1	K	4/1750
	3	1.0	575	2.0	8.1	K	4/1750

* Start switch and capacitor integrated into top of pump.
** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	84 (38) [EJ 10W-2], 80 (36) [EJ 10D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW (EJ 10W-2)	230	0.36in (9.2mm)	20 ft (6m)	Thermoplastic elastomer
16/4 SEOOW (EJ 10D-2)	208-230/460/575	0.43in (10.9mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 15W-2	1*	1.5	230	15.0	59	L	4/1750
EJ 15D-2	3**	1.5	208-230	7.7-7.0	45-40	M	4/1750
	3**	1.5	460	3.5	20	M	4/1750
	3	1.5	575	2.8	16	M	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	90 (41) [EJ 15W-2], 84 (38) [EJ 15D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW (EJ 15W-2)	230	0.36in (9.2mm)	20 ft (6m)	Thermoplastic elastomer
16/4 SEOOW (EJ 15D-2)	208-230/460/575	0.43in (10.9mm)		

TECHNICAL DATA	SCAVENGER E SERIES	EJ 20-2

Dwg: DS-S08-023 **Rev:** B **Date:** 11/2009 **Section** Scavenger **Tab** Ejector **Page**

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 20W-2	1*	2.0	230	19.0	59	G	4/1750
EJ 20D-2	3**	2.0	208-230	9.9-9	44-40	K	4/1750
	3**	2.0	460	4.5	20	K	4/1750
	3	2.0	575	3.6	16	K	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	90 (41) [EJ 20W-2], 84 (38) [EJ 20D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
12/3 SJEOOW (EJ 20W-2)	230	0.43in (10.9mm)	20 ft (6m)	Thermoplastic elastomer
14/4 SEOOW (EJ 20D-2)	208-230/460	0.57in (14.5mm)		
16/4 SEOOW (EJ 20D-2)	575	0.43in (10.9mm)		

Specifications subject to change without notice

SULZER

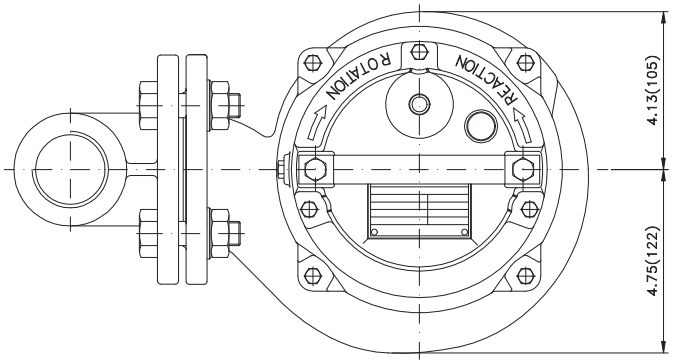
abs

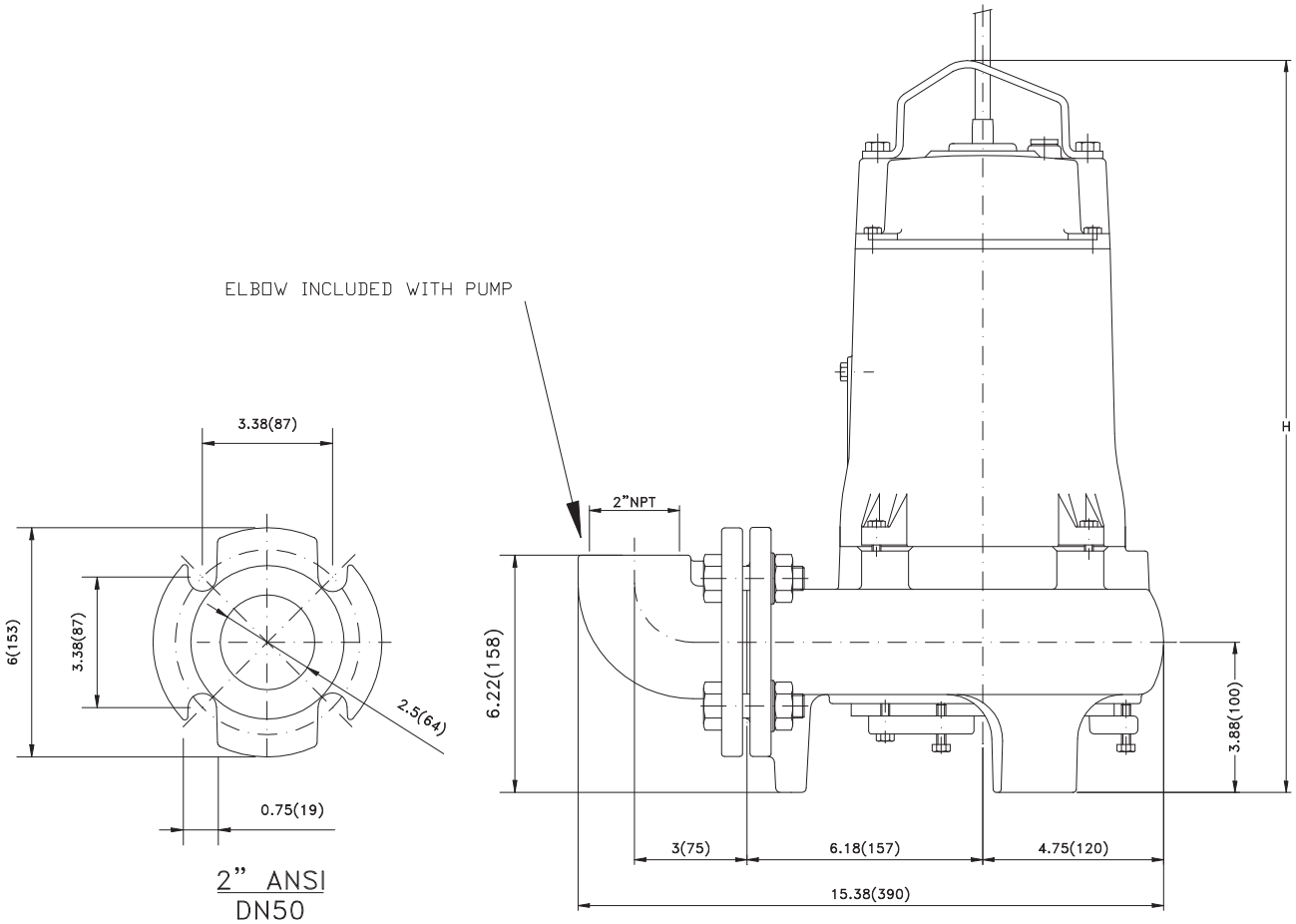
OUTLINE DIMENSIONS

SCAVENGER E SERIES EJ-05D-2 & EJ-07/10/15/20-2

Pump	*H*	*Weight*
EJ 05D-2	18.43(468)	70 lbs.
EJ 07D-2	18.43(468)	70 lbs.
EJ 10D-2	18.43(468)	70 lbs.
EJ 15D-2	20.20(513)	84 lbs.
EJ 20D-2	20.20(513)	84 lbs.

Pump	*H*	*Weight*
EJ 07W-2	19.17(487)	77 lbs.
EJ 10W-2	19.17(487)	77 lbs.
EJ 15W-2	20.94(532)	90 lbs.
EJ 20W-2	20.94(532)	90 lbs.





Note: Dimensions in inches and ( ) in millimeters.

Specifications subject to change without notice

SULZER

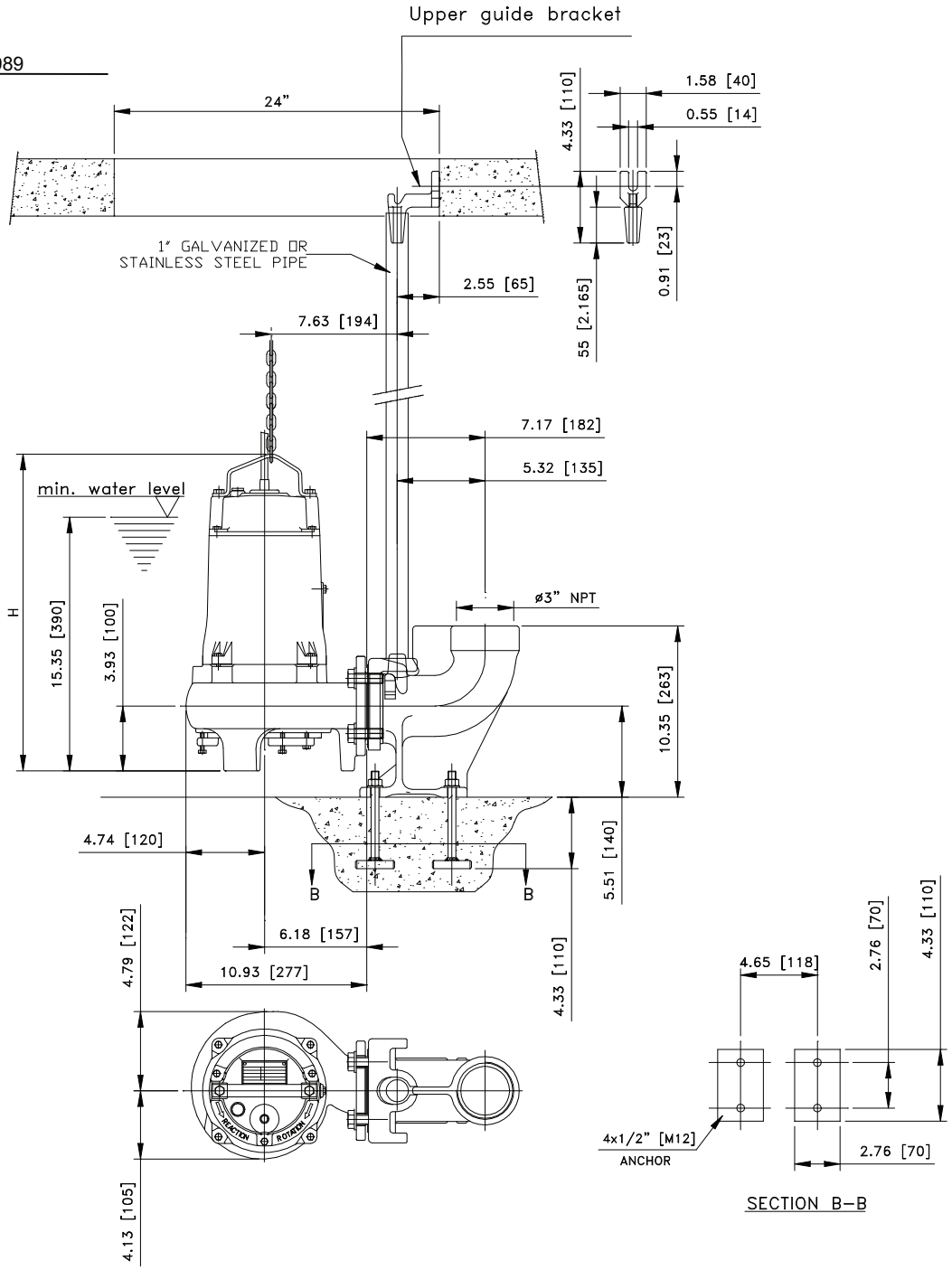
abs

Two inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EJ 10D-2	18.4 [468]	70.4 [32]
EJ 15D-2	20.2 [513]	83.6 [38]
EJ 20D-2	20.2 [513]	83.6 [38]

Pump	H in. [mm]	Weight lbs. [kg]
EJ 10W-2	19.2 [487]	77 [35]
EJ 15W-2	20.9 [532]	90.2 [41]
EJ 20W-2	20.9 [532]	90.2 [41]

Guide rail system
Part number 62327989



Note: Dimensions in millimeters and [ ] in inches.

Specifications subject to change without notice

Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 3" ANSI horizontal discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle clean or solids contaminated water, raw sewage, wastewater effluent, storm water, and other similar non corrosive, solids-laden fluids, without clogging. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well. The Guide Rail System shall be cast iron, have an integrated discharge elbow, and shall utilize a single guide rail pipe to guide the pump into place.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a 2½" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard ANSI 3" flanges.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty single row, deep grooved ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 25k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class B insulation rated for 130°C (266° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.15. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start circuit with a solid state voltage sensing start relay. The start circuit shall be integrated into the top of the motor. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

Power Cable: The power cable 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 oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 3" ANSI horizontal discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle clean or solids contaminated water, raw sewage, wastewater effluent, storm water, and other similar non corrosive, solids-laden fluids, without clogging. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well. The Guide Rail System shall be cast iron, have an integrated discharge elbow, and shall utilize a single guide rail pipe to guide the pump into place.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a 2 ½" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard ANSI 3" flanges.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty, double row, angular contact ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 30k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class F insulation rated for 155°C (311° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.10. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start, capacitor run circuit with a voltage sensing start relay. The start circuit components shall be located in the control panel. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

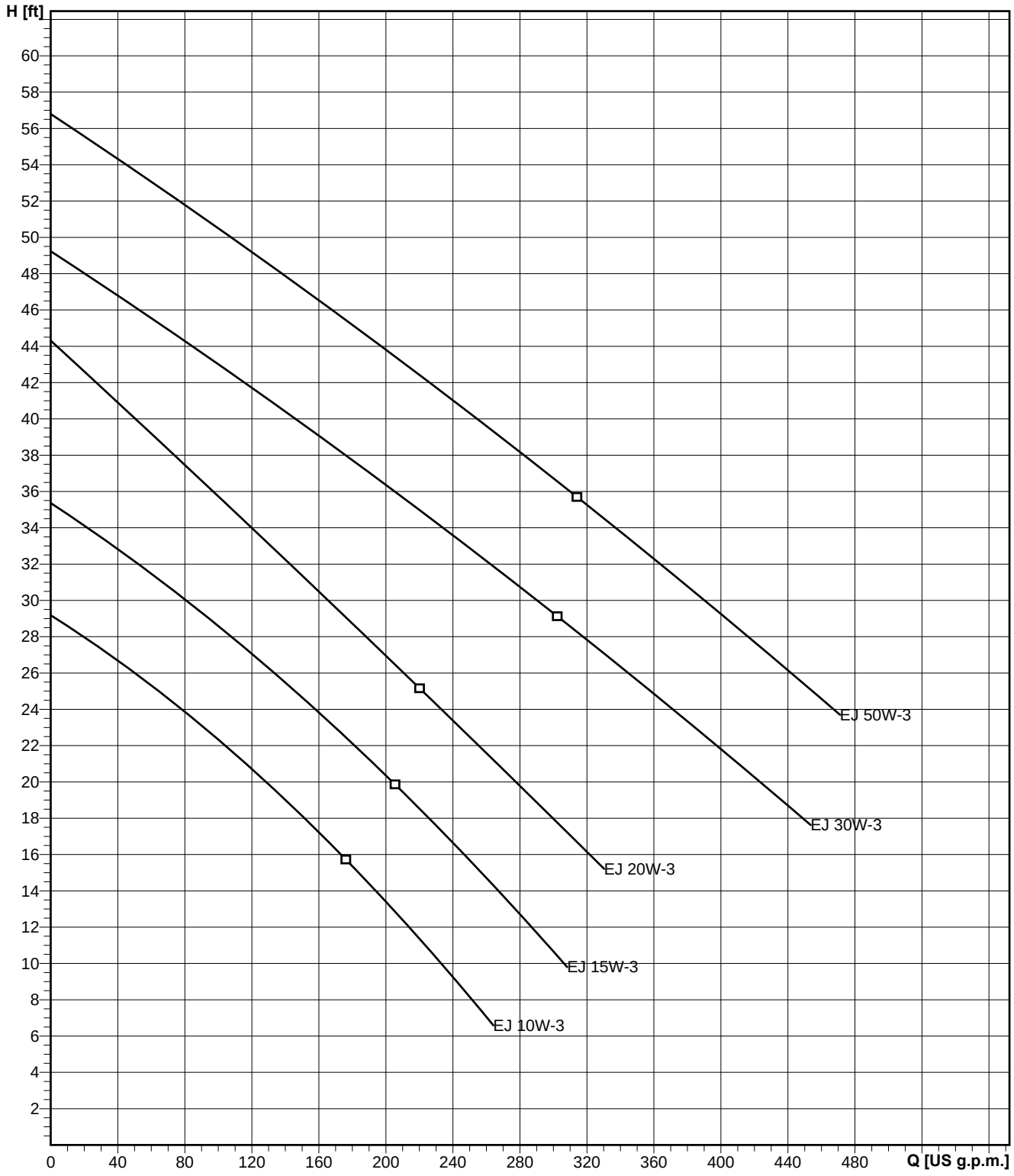
Power Cable: The power cable shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

SULZER

Pump performance curves
EJ W-3 60HZ

Curve number				
Reference curve EJ W-3				
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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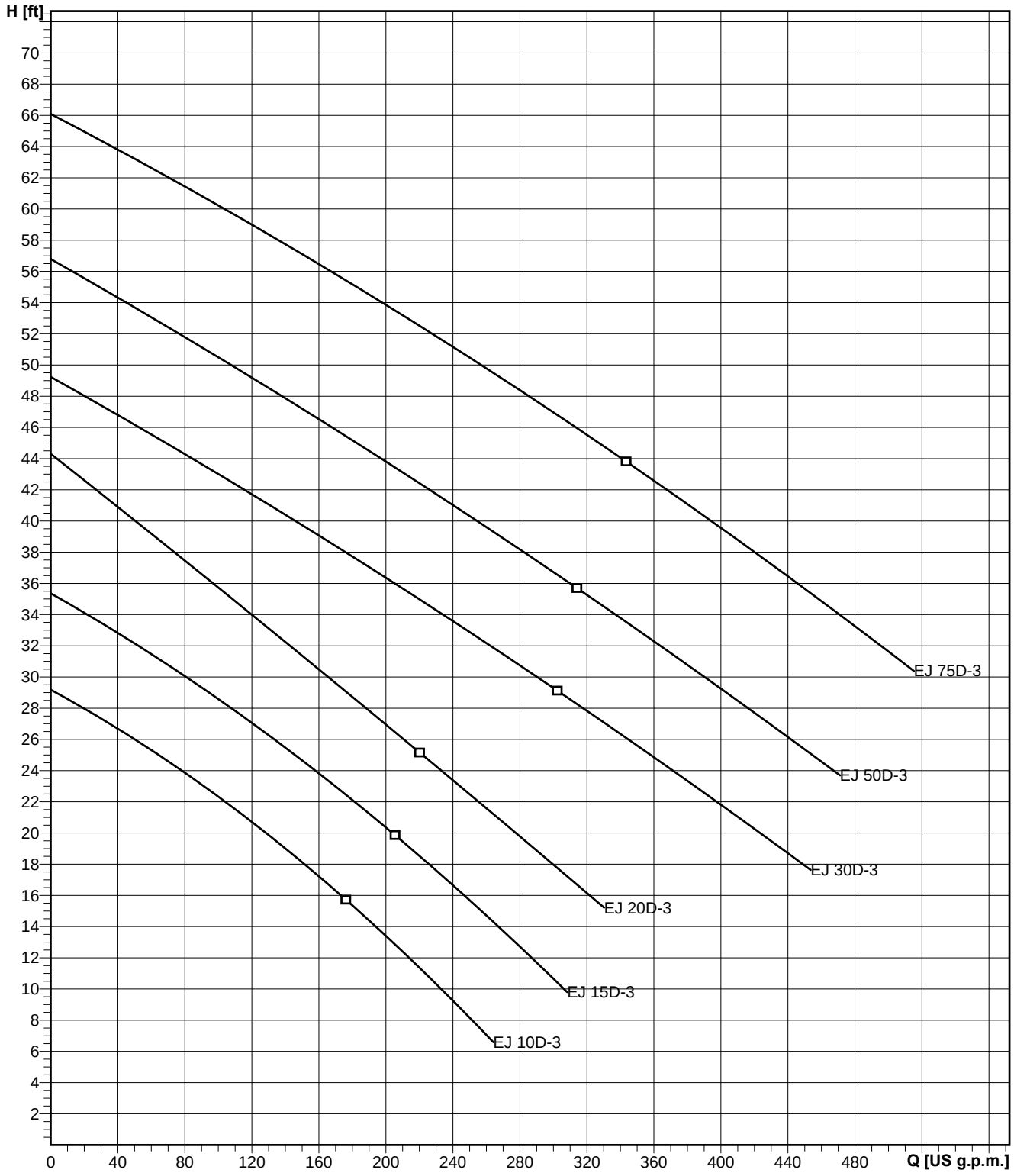
abs

SULZER

Pump performance curves
EJ D-3 60HZ

Curve number				
Reference curve EJ D-3				
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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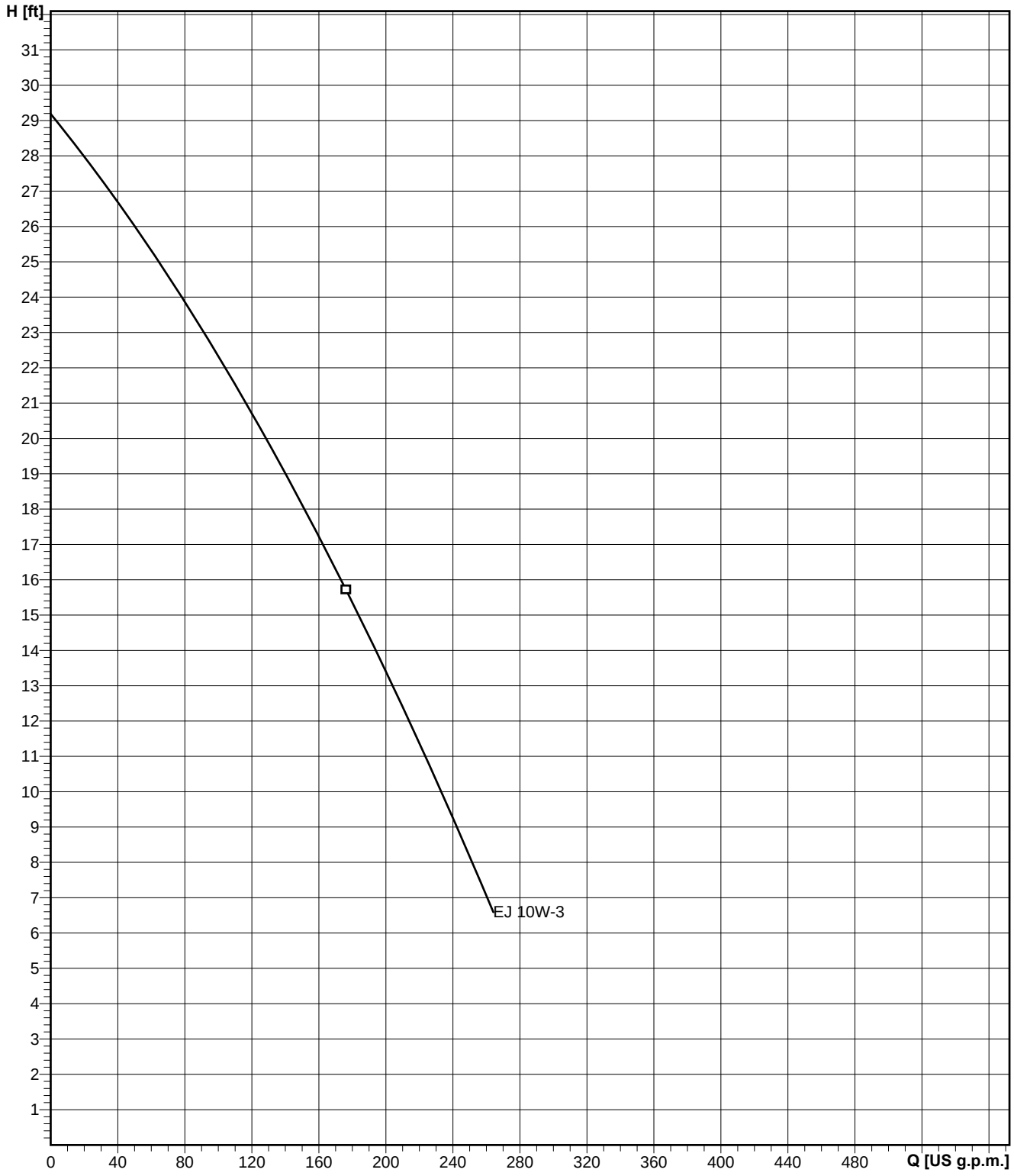
abs

SULZER

Pump performance curves
EJ W-3 60HZ

Curve number				
Reference curve EJ W-3				
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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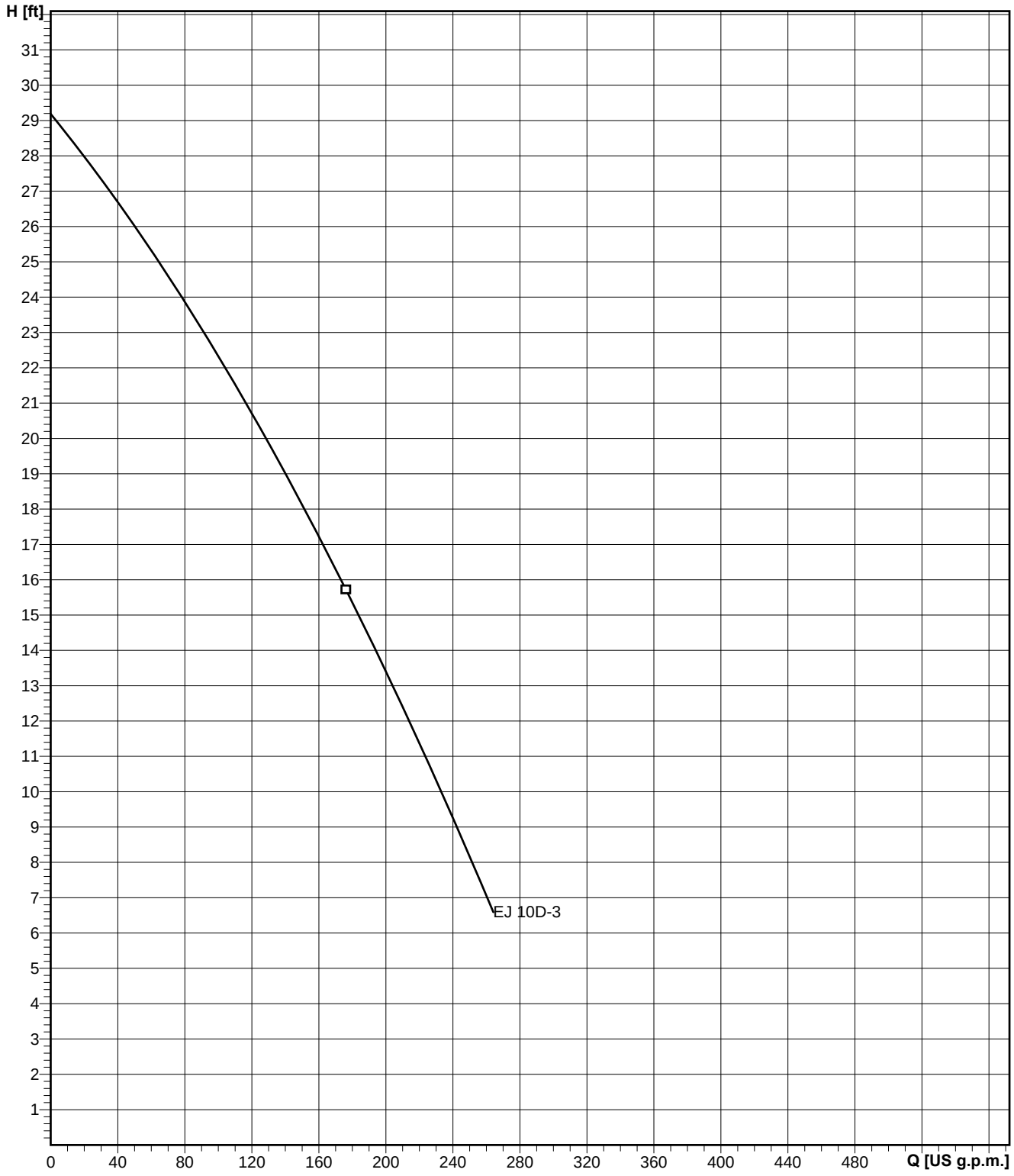
SULZER

Pump performance curves
EJ D-3 60HZ

			Curve number	
			Reference curve EJ D-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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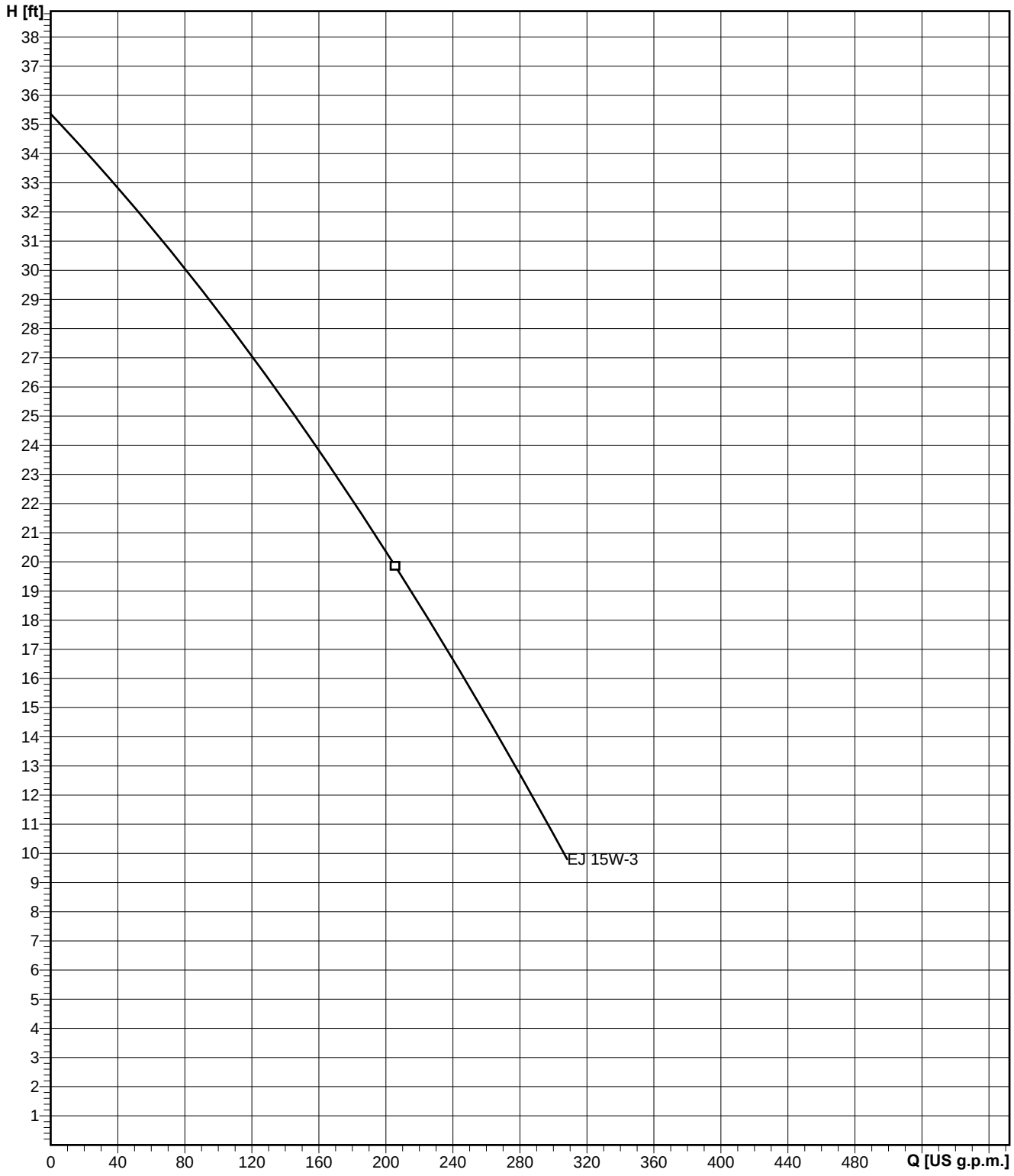
abs

SULZER

Pump performance curves
EJ W-3 60HZ

			Curve number	
			Reference curve EJ W-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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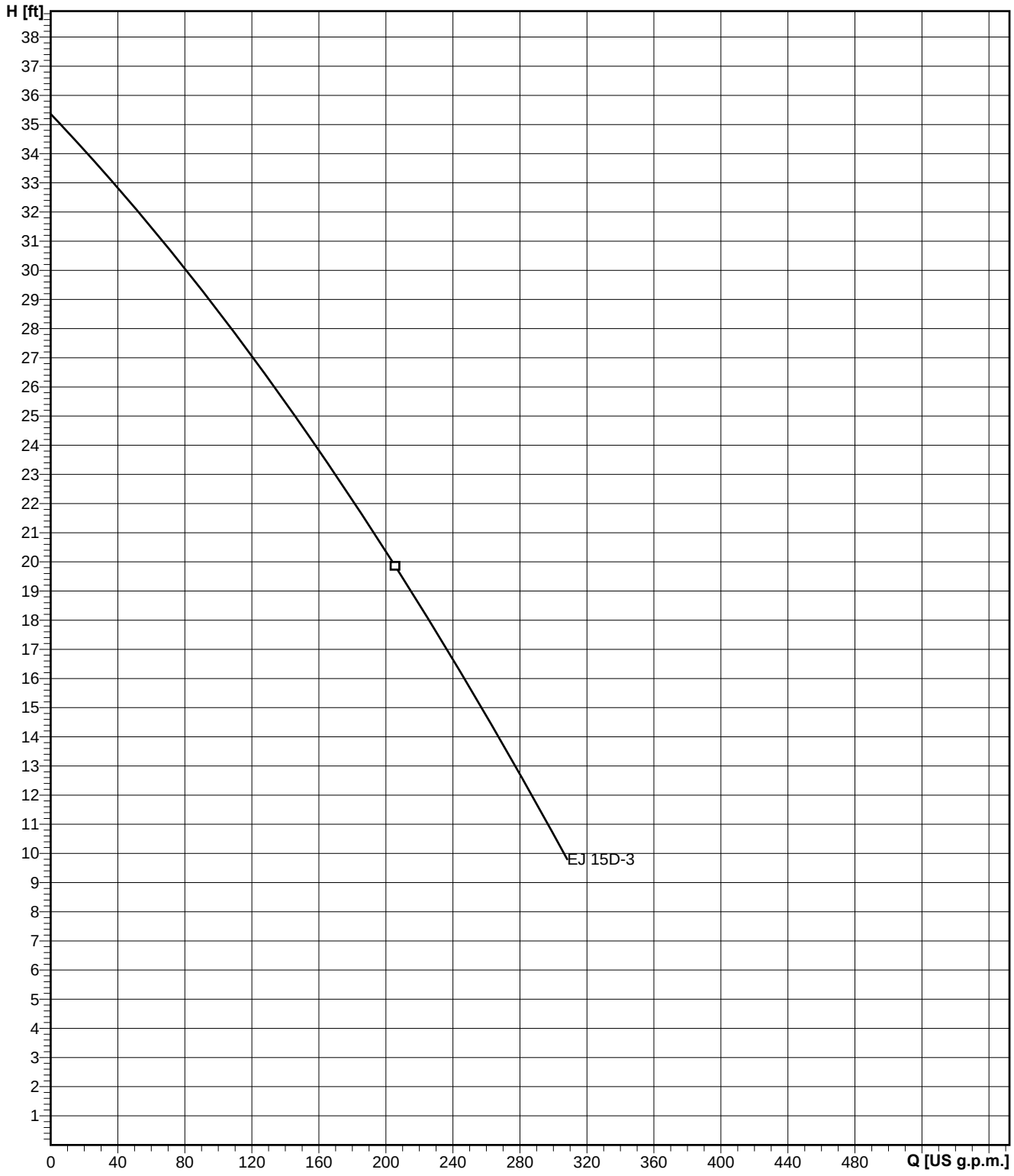
abs

SULZER

Pump performance curves
EJ D-3 60HZ

			Curve number	
			Reference curve EJ D-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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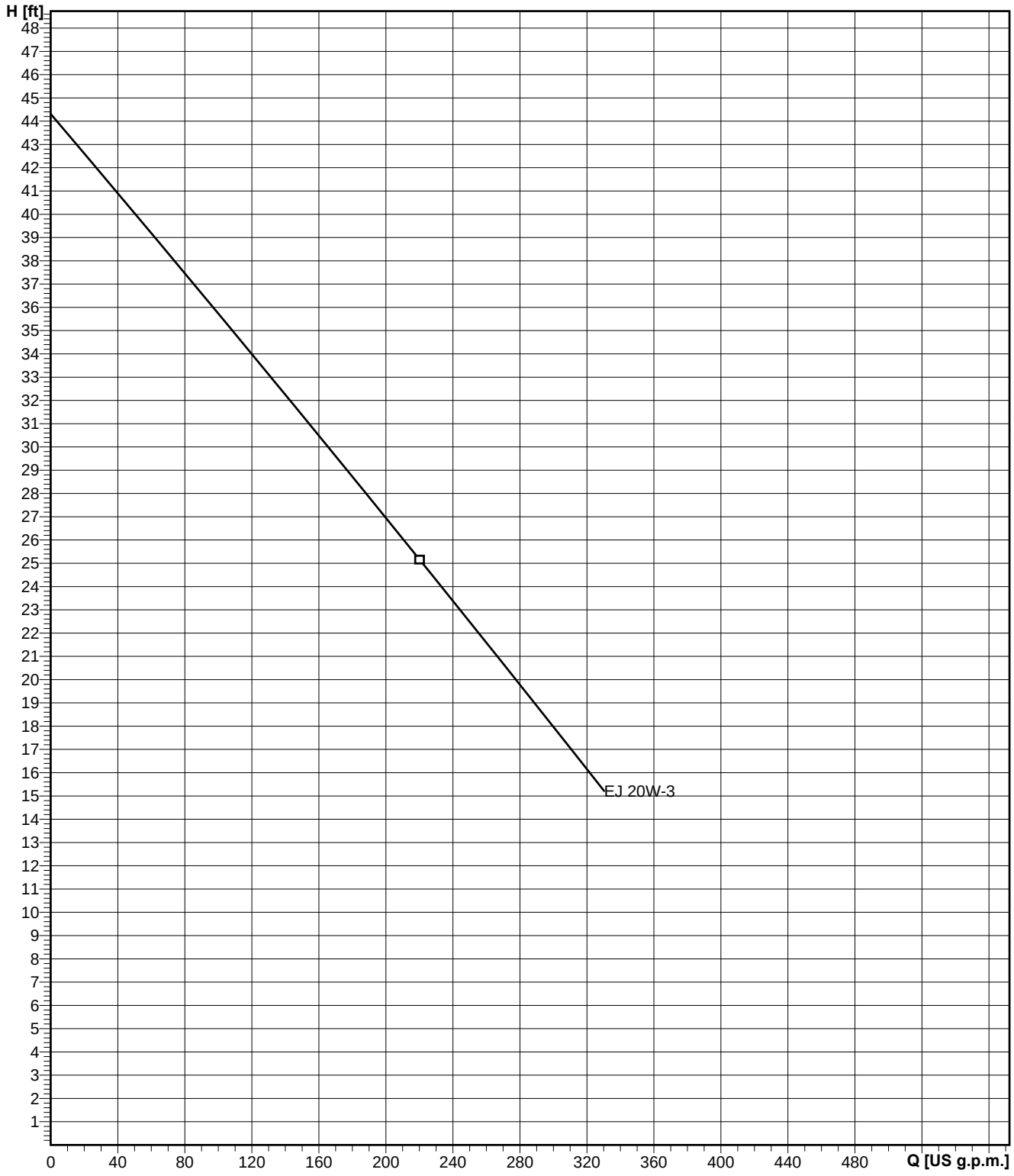
abs

SULZER

Pump performance curves
EJ W-3 60HZ

			Curve number	
			Reference curve EJ W-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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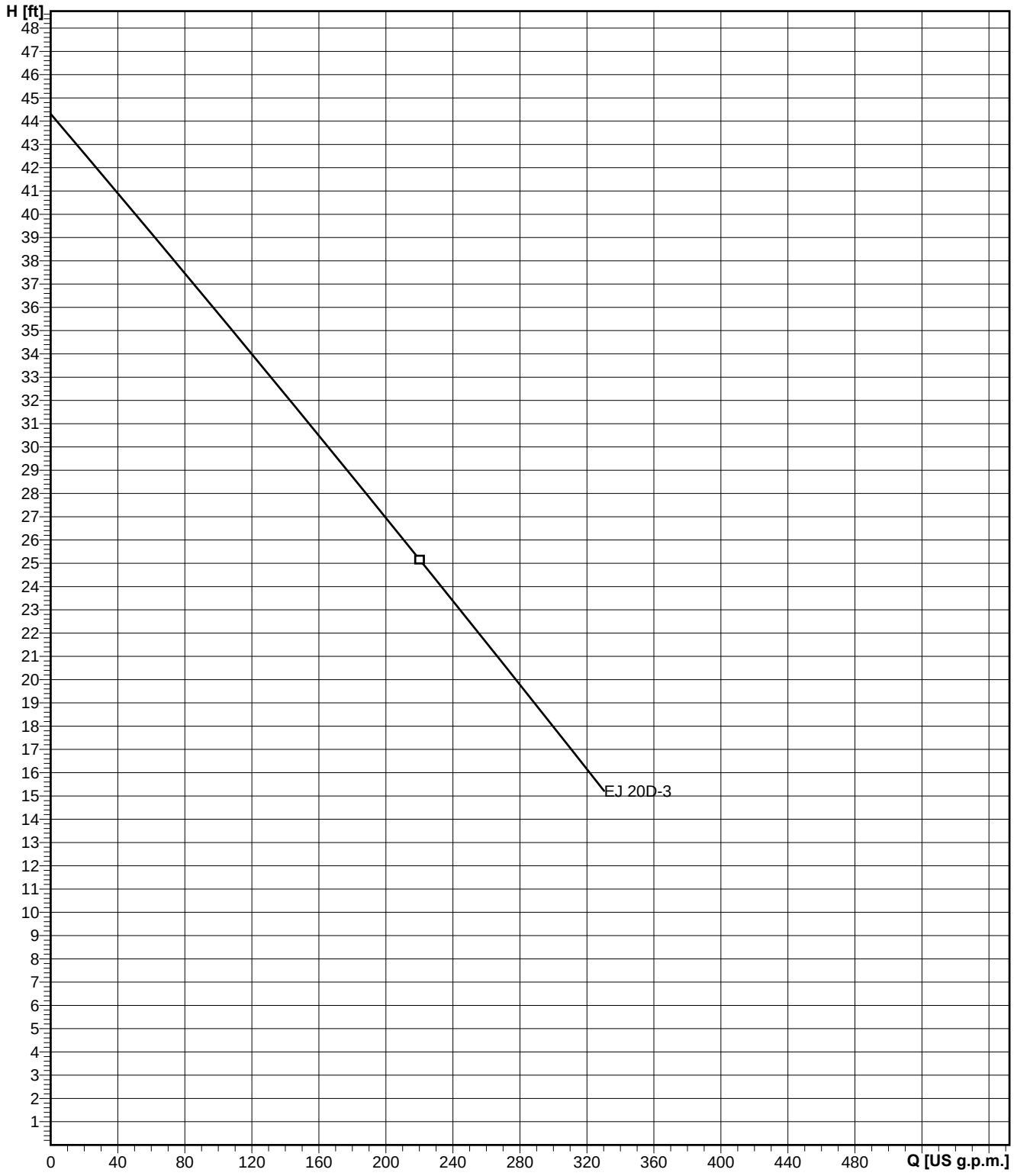
SULZER

Pump performance curves
EJ D-3 60HZ

				Curve number
				Reference curve EJ D-3
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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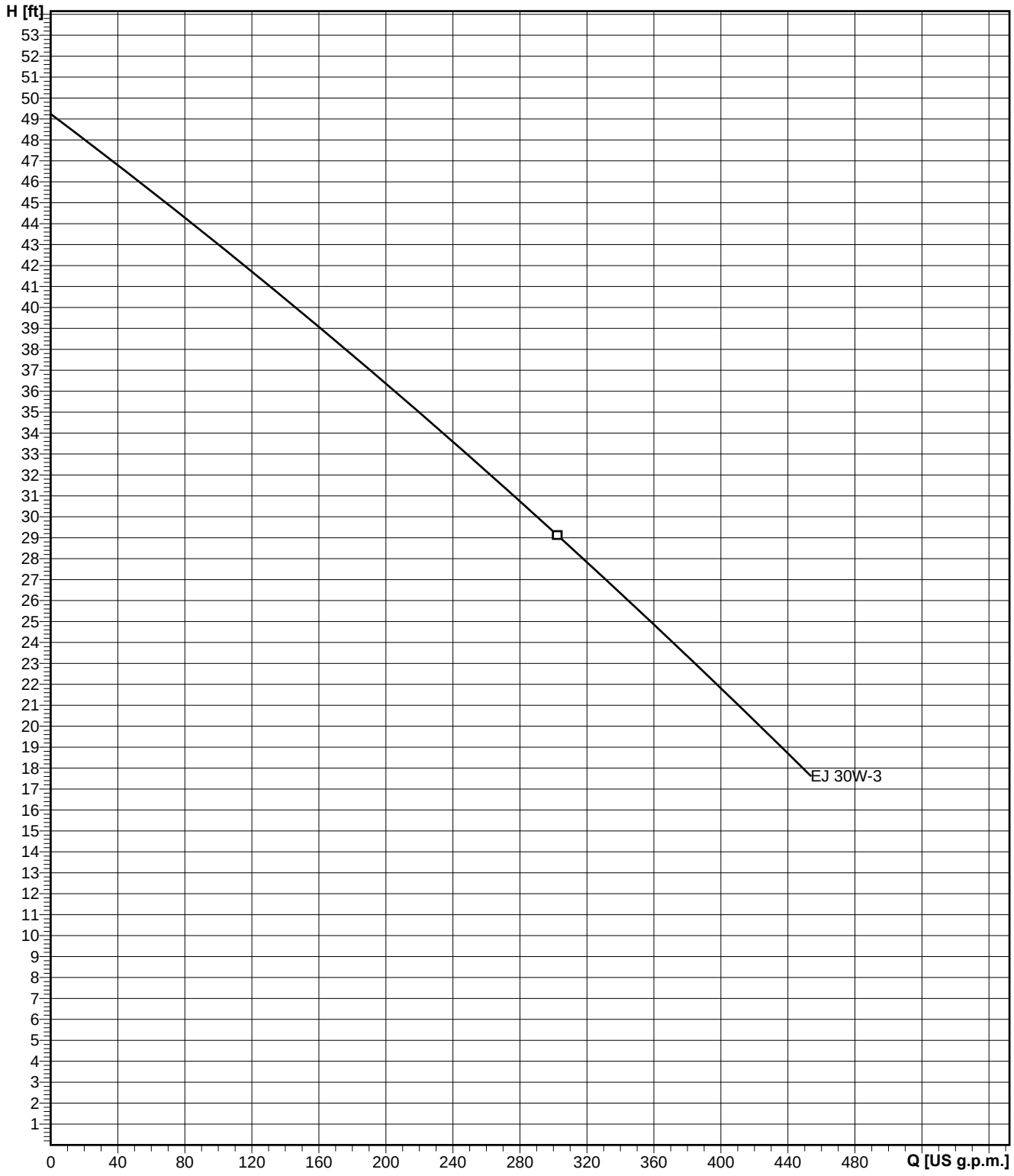
SULZER

Pump performance curves
EJ W-3 60HZ

			Curve number	
			Reference curve EJ W-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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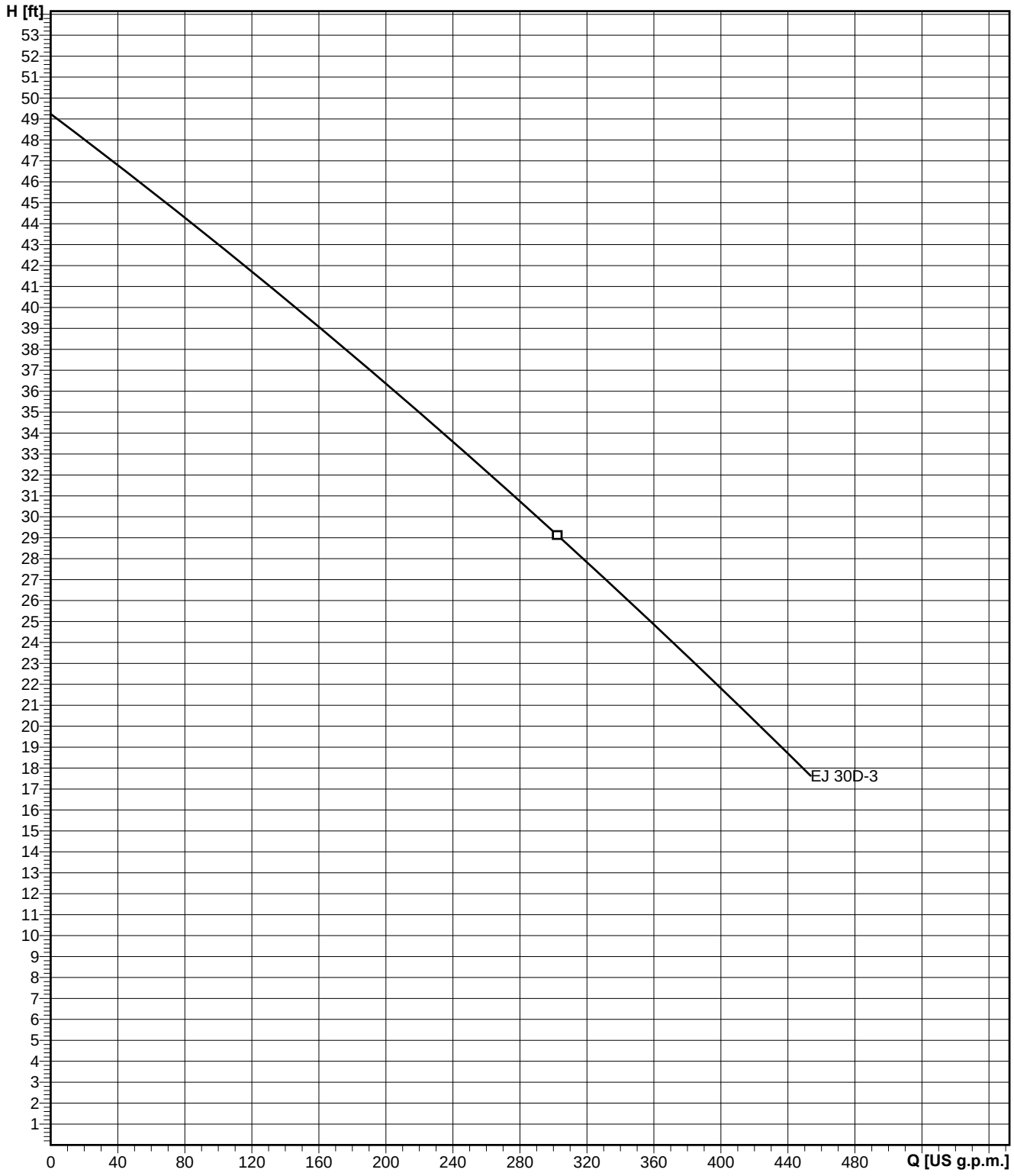
SULZER

Pump performance curves
EJ D-3 60HZ

			Curve number	
			Reference curve EJ D-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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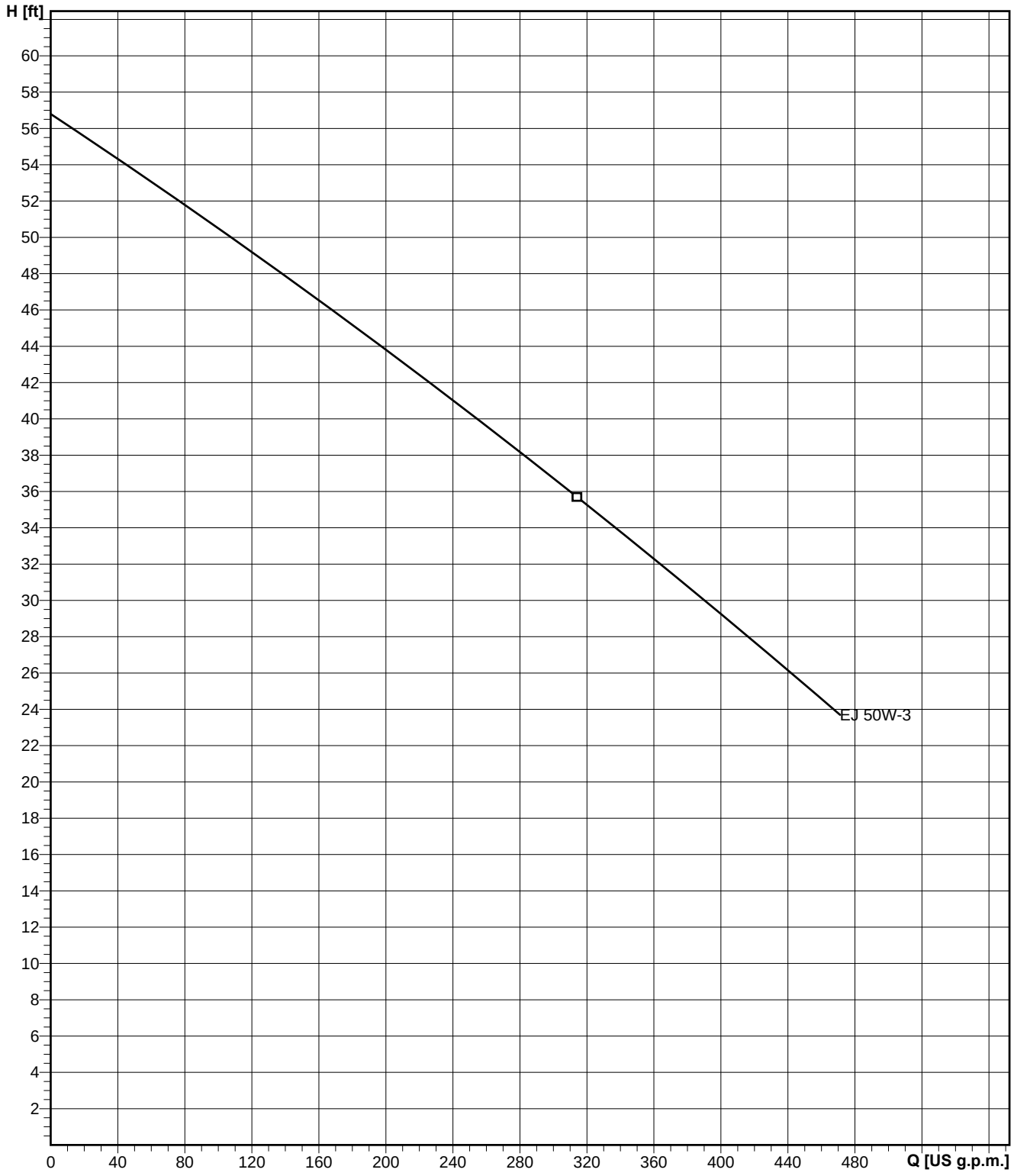
SULZER

Pump performance curves
EJ W-3 60HZ

				Curve number
				Reference curve EJ W-3
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.28..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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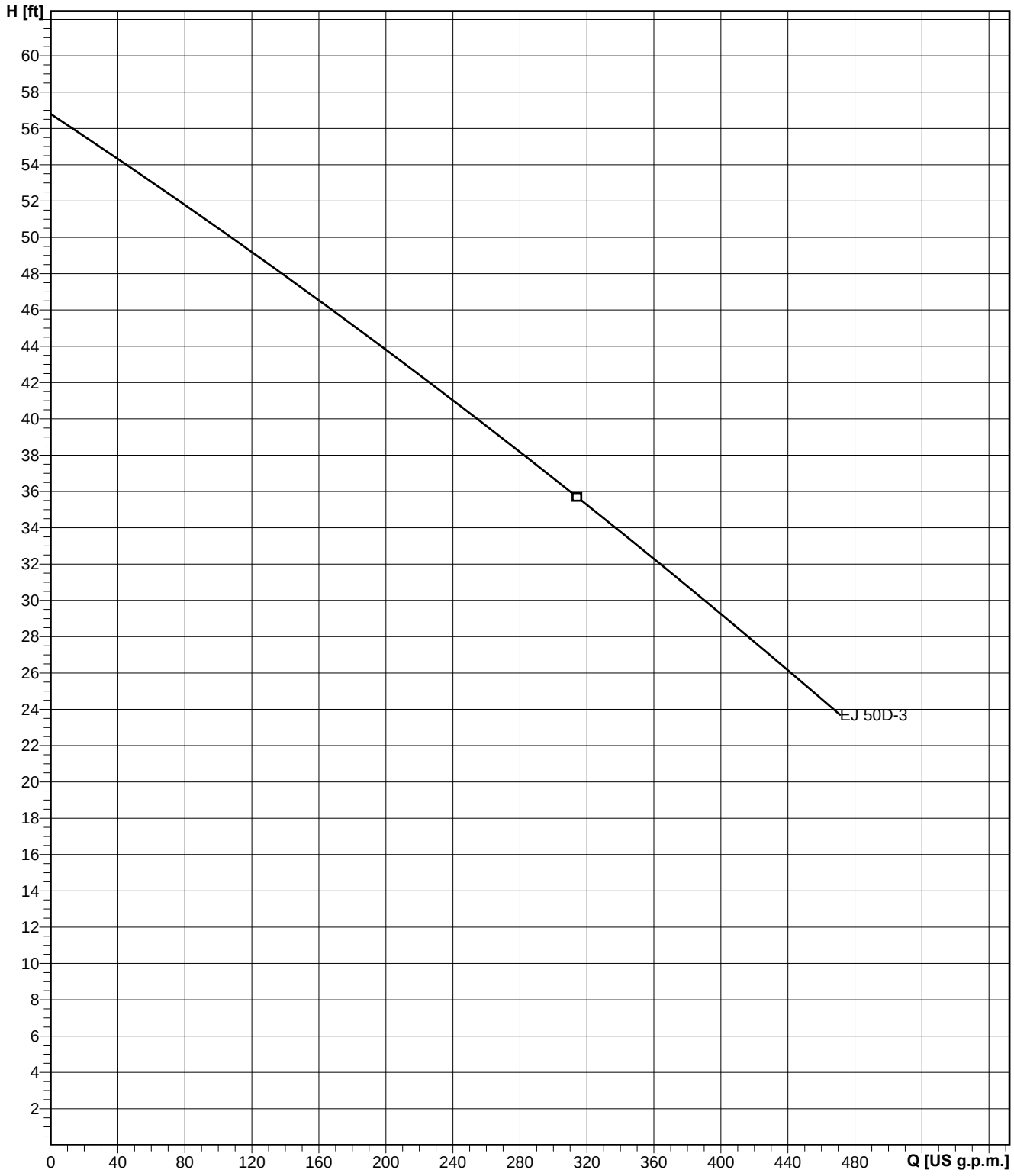
SULZER

Pump performance curves
EJ D-3 60HZ

				Curve number
				Reference curve EJ D-3
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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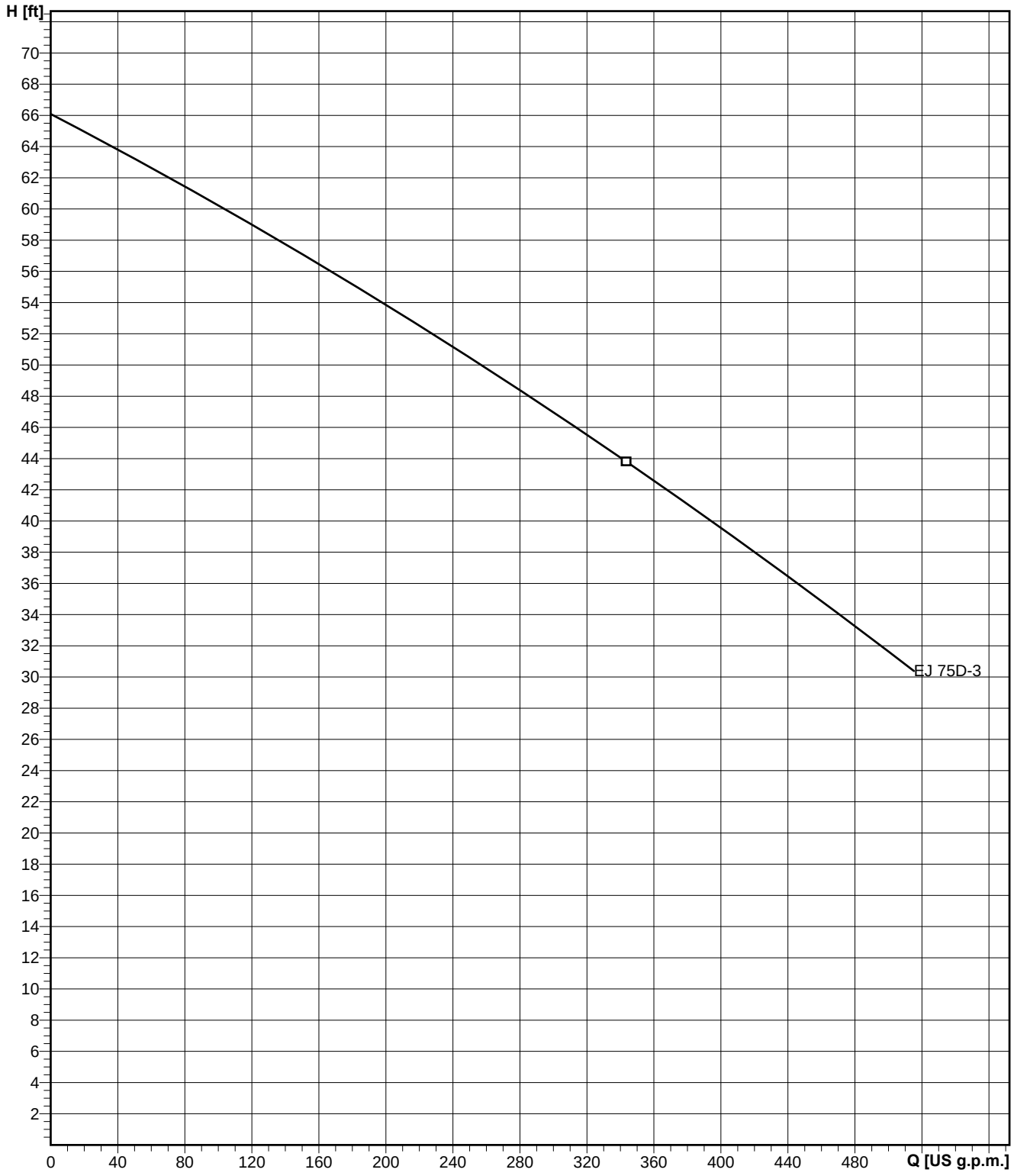
SULZER

Pump performance curves
EJ D-3 60HZ

			Curve number	
			Reference curve EJ D-3	
			Discharge 3"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1610 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..5.12 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 2 1/2"	Revision 2009-04-13

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abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 10W-3	1*	1.0	230	10.0	38	K	4/1750
EJ 10D-3	3**	1.0	208-230	5.5-5.0	22.4-20	K	4/1750
	3**	1.0	460	2.5	10	K	4/1750
	3	1.0	575	2.0	8	K	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	77 (35) [EJ 10W-3], 70 (32) [EJ 10D-3]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SEOOW (EJ 10W-3)	230	0.36in (9.14mm)	32 ft (10 m)	Thermoplastic elastomer
16/4 SEOOW (EJ 10D-2)	208-230/460/575	0.43in (10.9mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 15W-3	1*	1.5	230	15.0	59.4	L	4/1750
EJ 15D-3	3**	1.5	208-230	7.7-7.0	45-40.4	M	4/1750
	3**	1.5	460	3.5	20	M	4/1750
	3	1.5	575	2.8	16	M	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	90 (41) [EJ 15W-3], 84 (38) [EJ 15D-3]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SEOOW (EJ 15W-3)	230	0.36in (9.14mm)	32 ft (10 m)	Thermoplastic elastomer
16/4 SEOOW (EJ 15D-3)	208-230/460/575	0.43in (10.9mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120••C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide Circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a Contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 20W-3	1*	2.0	230	19.0	59	H	4/1750
EJ 20D-3	3**	2.0	208-230	9.9-9.0	45-40.4	K	4/1750
	3**	2.0	460	4.5	20	K	4/1750
	3	2.0	575	3.6	16	K	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	90 (41) [EJ 20W-3], 84 (38) [EJ 20D-3]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
12/3 SEOOW (EJ 20W-3)	230	0.43in (10.9mm)	32 ft (10 m)	Thermoplastic elastomer
14/4 SEOOW (EJ 20D-3)	208-230/460	0.57in (14.5mm)		
14/4 SEOOW (EJ 20D-3)	575	0.57in (14.5mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Single Phase: External start kit in control panel is required. Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.1 (single phase), 1.15 (three phase)
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 30W-3	1*	3.0	230	23.0	92	H	4/1750
EJ 30D-3	3**	3.0	208-230	14.4-13.0	65-59	J	4/1750
	3**	3.0	460	6.5	29.5	J	4/1750
	3	3.0	575	5.2	23.6	J	4/1750

* Requires external start kit mounted in the control panel.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	147 (67) [EJ 30W-3], 154 (70) [EJ 30D-3]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•C continuous, 50•C intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
12/4 SEOOW (EJ30W-3)	230	0.65in (16.4mm)	32 ft (10 m)	Thermoplastic elastomer
14/4 SEOOW (EJ 30D-3)	208-230/460/575	0.57in (14.5mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Single Phase: External start kit in control panel is required. Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.1 (single phase), 1.15 (three phase)
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 50W-3	1*	5.0	230	27.0	149	H	4/1750
EJ 50D-3	3**	5.0	208-230	21.0-19.0	113-102	K	4/1750
	3**	5.0	460	9.5	51	K	4/1750
	3	5.0	575	7.6	41	K	4/1750

* Requires external start kit mounted in the control panel.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	161 (73) [EJ 50W-3], 160 (73) [EJ 50D-3]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
8/4 SEOOW (EJ 50W-3)	230	0.76in (19.3mm)	32 ft (10 m)	Thermoplastic elastomer
12/4 SEOOW (EJ 50D-2)	208-230/460/575	0.57in (14.5mm)		

Specifications subject to change without notice

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 75D-3	3*	7.5	208-230	25.4-23.0	141-128	H	4/1750
	3*	7.5	460	11.5	64	H	4/1750
	3	7.5	575	9.2	51	H	4/1750

* These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	168 (76)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	3 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
10/4 SEOOW	208-230/460	0.69in (17.5mm)	32 ft (10 m)	Thermoplastic elastomer
12/4 SEOOW	575	0.65in (16.4mm)		

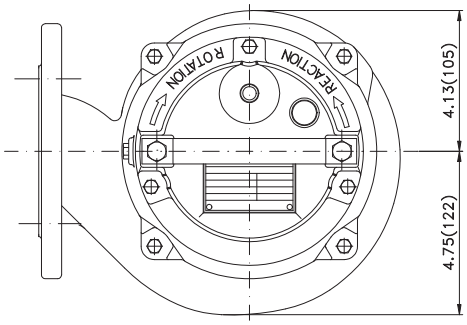
OUTLINE DIMENSIONS

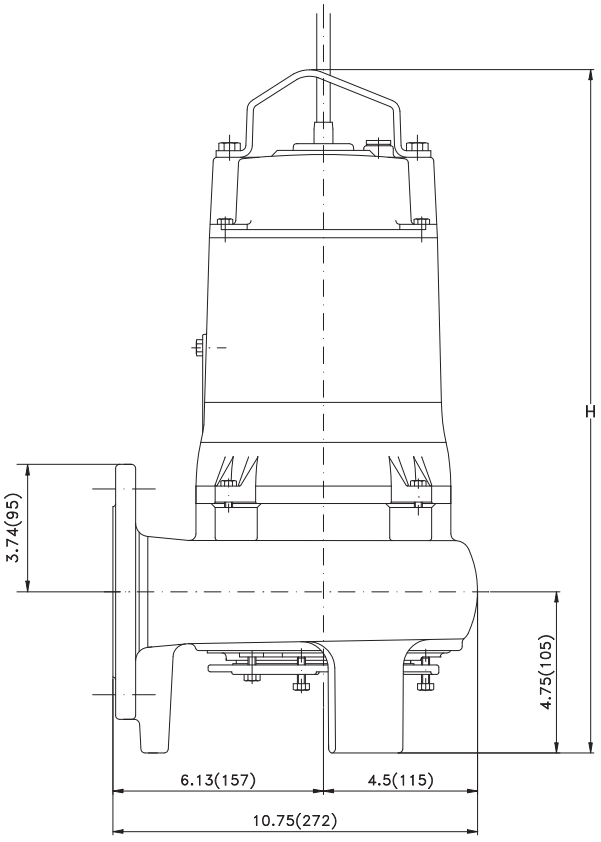
SCAVENGER E SERIES EJ-10/15/20-3

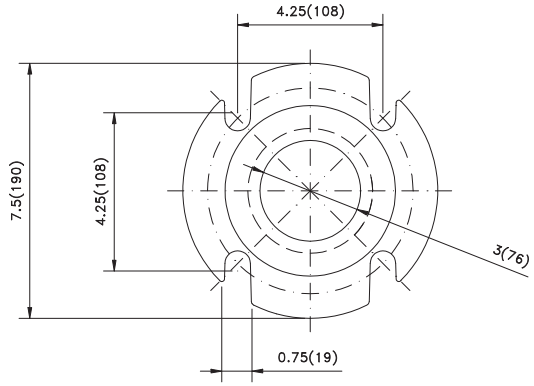
Doc No: DS-S08-015 **Rev:** **Date:** 12/17/02 **Section** Scavenger **Tab** Ejector **Page**

Pump	H	Weight
EJ 10D-3	19.09(485)	70 lbs.
EJ 15D-3	21.2(534)	84 lbs.
EJ 20D-3	21.2(534)	84 lbs.

Pump	H	Weight
EJ 10W-3	20(509)	77 lbs.
EJ 15W-3	21.77(553)	90 lbs.
EJ 20W-3	21.77(553)	90 lbs.







3" ANSI
DN80

Note: Dimensions in inches and ( ) in millimeters.

Specifications subject to change without notice

SULZER

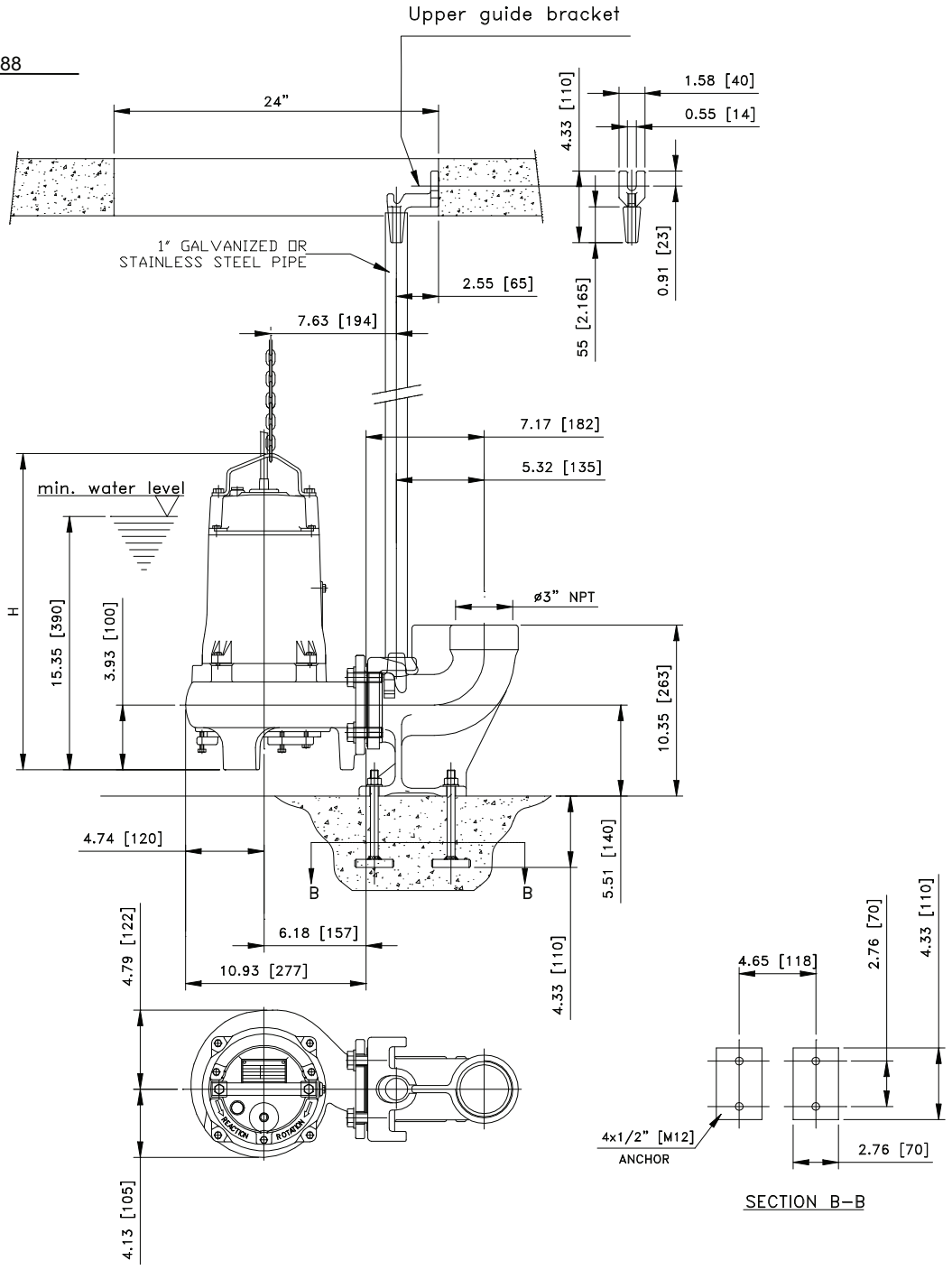
abs

Three inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EJ 10D-3	18.4 [468]	70.4 [32]
EJ 15D-3	20.2 [513]	83.6 [38]
EJ 20D-3	20.2 [513]	83.6 [38]

Pump	H in. [mm]	Weight lbs. [kg]
EJ 10W-3	19.2 [487]	77 [35]
EJ 15W-3	20.9 [532]	90.2 [41]
EJ 20W-3	20.9 [532]	90.2 [41]

Guide rail system
Part number 62327988

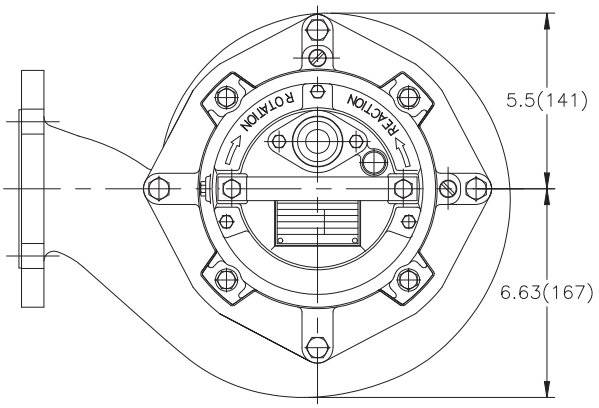


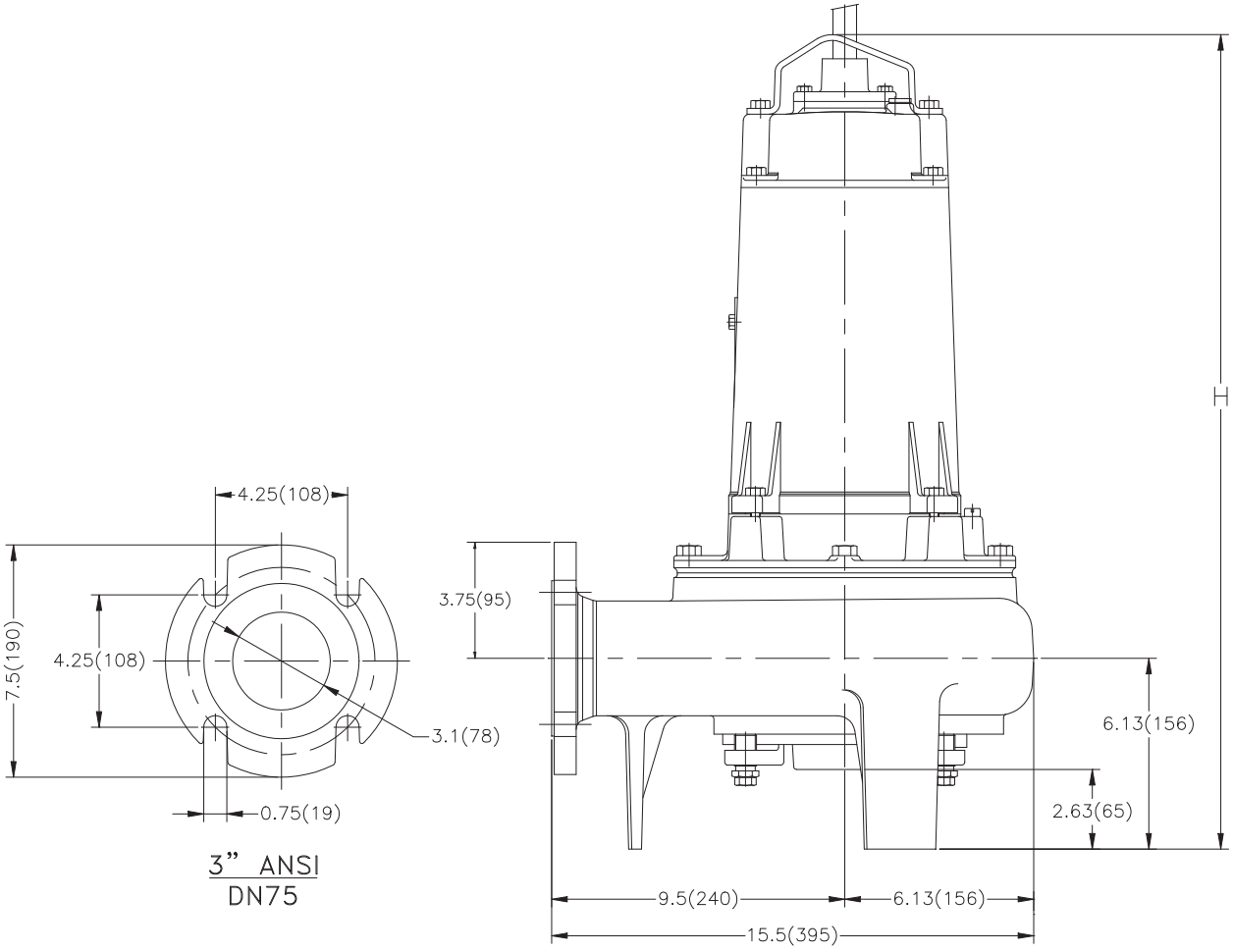
Note: Dimensions in [ ]millimeters and in inches.

Specifications subject to change without notice

Pump	*H*	*Weight*
EJ 30D-3	26.2(665)	143 lbs.
EJ 50D-3	26.2(665)	154 lbs.
EJ 75D-3	26.2(665)	161 lbs.

Pump	*H*	*Weight*
EJ 30W-3	26.2(665)	147 lbs.
EJ 50W-3	26.2(665)	161 lbs.





Note: Dimensions in inches and ( ) in millimeters.

Specifications subject to change without notice

SULZER

abs

INSTALLATION DIMENSIONS	WET PIT	SCAVENGER EJ-3

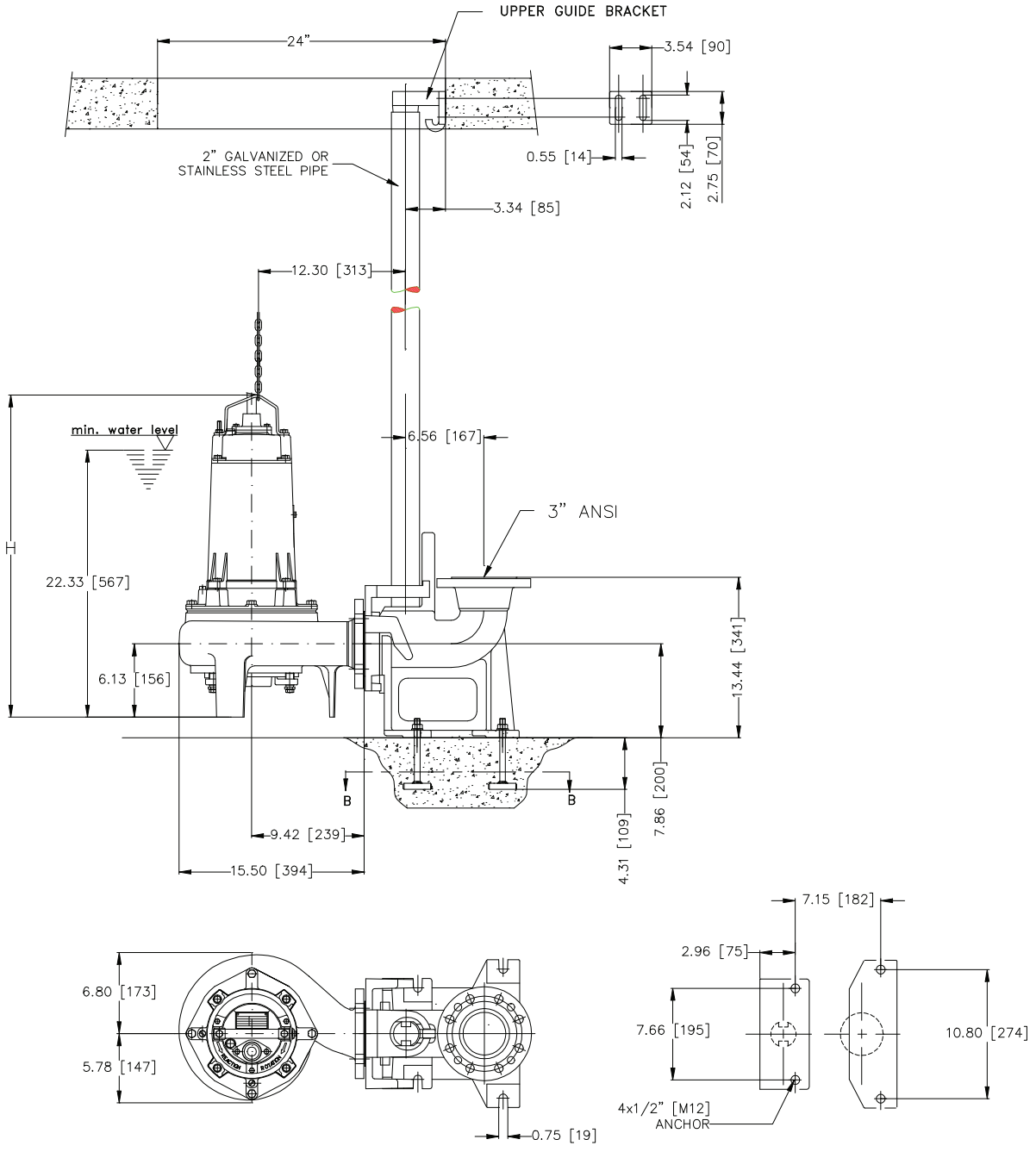
Doc No: DS-S08-042 **Rev:** **Date:** 02/07/03 **Section** Scavenger **Tab** Ejector **Page**

Three inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EJ 30D-3	26.2 [665]	143 [65]
EJ 50D-3	27 [685]	154 [70]
EJ 75D-3	27 [685]	161 [73]

Pump	H in. [mm]	Weight lbs. [kg]
EJ 30W-3	27 [685]	147 [67]
EJ 50W-3	27 [685]	161 [73]

Guide rail system
Part number 62326023



Note: Dimensions in [ ] millimeters and in inches.

Specifications subject to change without notice

SULZER

abs

Single phase and three phase versions

SCOPE

Furnish _____ ABS Scavenger Model _____ submersible non-clog wastewater pump(s) capable of delivering _____U.S. GPM at a total dynamic head of _____feet. The pump shall have a 4" ANSI horizontal discharge. The motor shall be _____HP connected for operation on a _____ volts, _____ phase, 60 hertz electrical supply service. Each pump unit shall have _____feet of _____lifting _____ sized properly for the weight of the pump, and _____ feet of power cable. The pump assembly shall be approved by CSA to UL 778 and CSA C22.2-108 standards.

PUMP DESIGN

The pump(s) shall be designed to handle clean or solids contaminated water, raw sewage, wastewater effluent, storm water, and other similar non corrosive, solids-laden fluids, without clogging. The pump shall have integrated feet allowing it to stand on a hard bottom wet well. The pump shall also be capable of mounting on a Guide Rail System allowing the pump to be removed from the wet well without disturbing the discharge piping or requiring personnel to enter the wet well. The Guide Rail System shall be cast iron, have an integrated discharge elbow, and shall utilize a single guide rail pipe to guide the pump into place.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumped media shall be protected by a factory applied spray coating of modified alkyd and phenol resin primer and top coat, with a total paint thickness of 3.5-4.5mils.

Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N o-rings. Sealing will be the result of controlled compression of rubber o-rings without requiring a specific torque on fasteners to accomplish sealing. Rectangular cross sectioned gaskets requiring specific fastener torque to achieve compression shall not be considered adequate or equal. No secondary sealing compounds shall be used or required.

Impeller: The impeller shall be a semi-open, non-clogging, dynamically balanced, double vane, ABS ContraBlock™ design, capable of passing a 3" diameter spherical solid. The impeller shall have a precision machined slip fit onto the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt and machined impeller washer. The back side of the impeller shall be fit closely against the lower portion of the motor and shall incorporate an active chopping system to prevent stringy solids from entering the area behind the impeller and interfering with the shaft.

Self Cleaning Wear Plate: The pump shall be equipped with an ABS ContraBlock™ self cleaning wear plate. The wear plate shall be capable of adjustment for maximum pump efficiency without disassembling the pump. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The use of non-adjustable wear rings or adjustment systems which require removal and shimming of the impeller shall not be considered equal.

Pump Volute: The pump volute shall be a single piece design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge flange design shall permit attachment to standard ANSI 4" flanges.

Shaft & Rotating Assembly: The common motor/pump shaft shall be of 420 stainless steel material and shall have a polished finish and accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel shafts shall not be considered adequate or equal. The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

Mechanical Seals: Each pump shall be equipped with a mechanical shaft seal system consisting of two independent seal assemblies with a common spring between them. The seals shall operate in an oil filled chamber which is completely separate from the motor chamber. Oil contained in this chamber shall be non-toxic. The rotating seal faces shall be carbon, and stationary seal faces shall be aluminum oxide. As an option, seal faces of silicon carbide shall be available. Static sealing components of the mechanical seal such as boots and o-rings shall be constructed of Buna-N. Metallic components of the mechanical seal shall be constructed of 300 series stainless steel. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. As a third level of sealing, a v-ring type lip seal shall be installed on the shaft behind the impeller to prevent solids in the pumped media from interfering with the primary mechanical seal.

Bearings: The pump shaft shall rotate on ball bearings. The upper bearing shall be a single row deep grooved ball bearing The lower bearing shall be a heavy duty, double row, angular contact ball bearing. Upper and lower bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. Bearings shall be continuously lubricated by the oil contained in the pump motor housing. B-10 bearing life shall be a minimum of 30k hr at BEP. Pump designs utilizing other than ball bearings, or those requiring supplemental guide bushings for the shaft or impeller shall not be considered acceptable.

Motor: The motor shall be of the squirrel-cage induction design, with copper windings, housed in an oil filled, water tight chamber. The oil within the motor housing shall be non-toxic. The motor shall be capable of continuous submerged operation underwater to a depth of 65 feet. The stator windings and stator leads shall be insulated with moisture resistant Class F insulation rated for 155°C (311° F). The motor shall be capable of operating continuously, submerged in liquid of 40°C (104 °F) without overheating. The motor shall be capable of handling up to 10 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.10. Three phase motors shall be tri-voltage, 208-230/460. A three phase motor rated at 575 volts shall also be available. Single phase versions shall be rated 208-230 volts. Single phase versions shall utilize a capacitor start, capacitor run circuit with a voltage sensing start relay. The start circuit components shall be located in the control panel. All motors shall have a voltage tolerance of +/- 10% from nominal name plate rating.

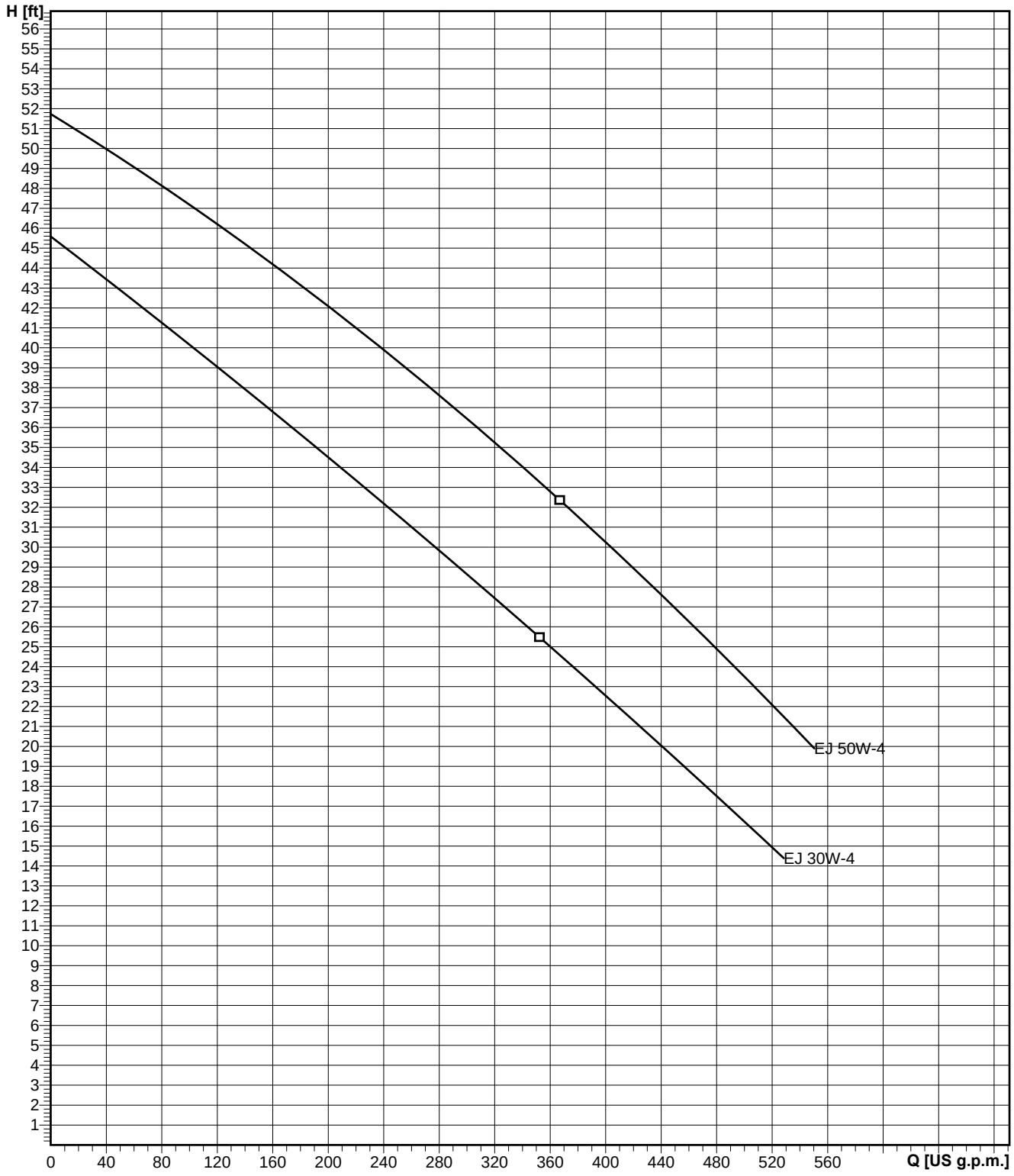
Power Cable: The power cable shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant thermoplastic elastomer. The power cable shall be fitted to the motor using an epoxy potted, water tight cable entry system, with a rubber grommet as the secondary seal and strain relief.

Lifting Bail: The pump shall be equipped with a stainless steel, open loop lifting bail to which a chain or other lifting device may be attached. The bail shall be firmly attached to the pump in a fixed, upright position, and shall be large enough to allow the pump to be hooked from the surface in an emergency. Bails which are not fixed in an upright position or those which cannot be hooked from the surface shall not be considered acceptable.

SULZER

Pump performance curves
EJ W-4 60HZ

				Curve number
				Reference curve EJ W-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.89..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

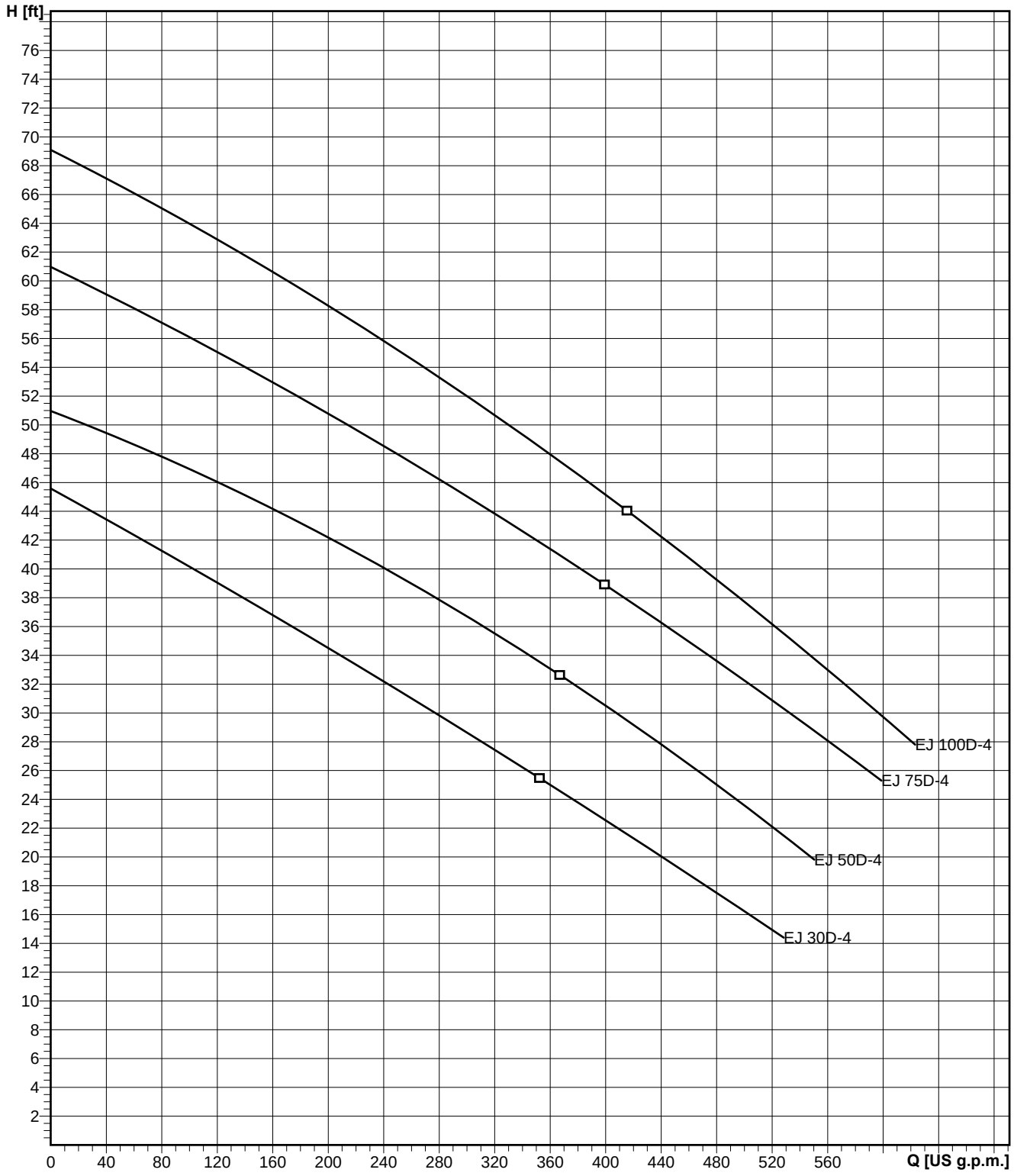
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ D-4 60HZ

				Curve number
				Reference curve EJ D-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1660..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

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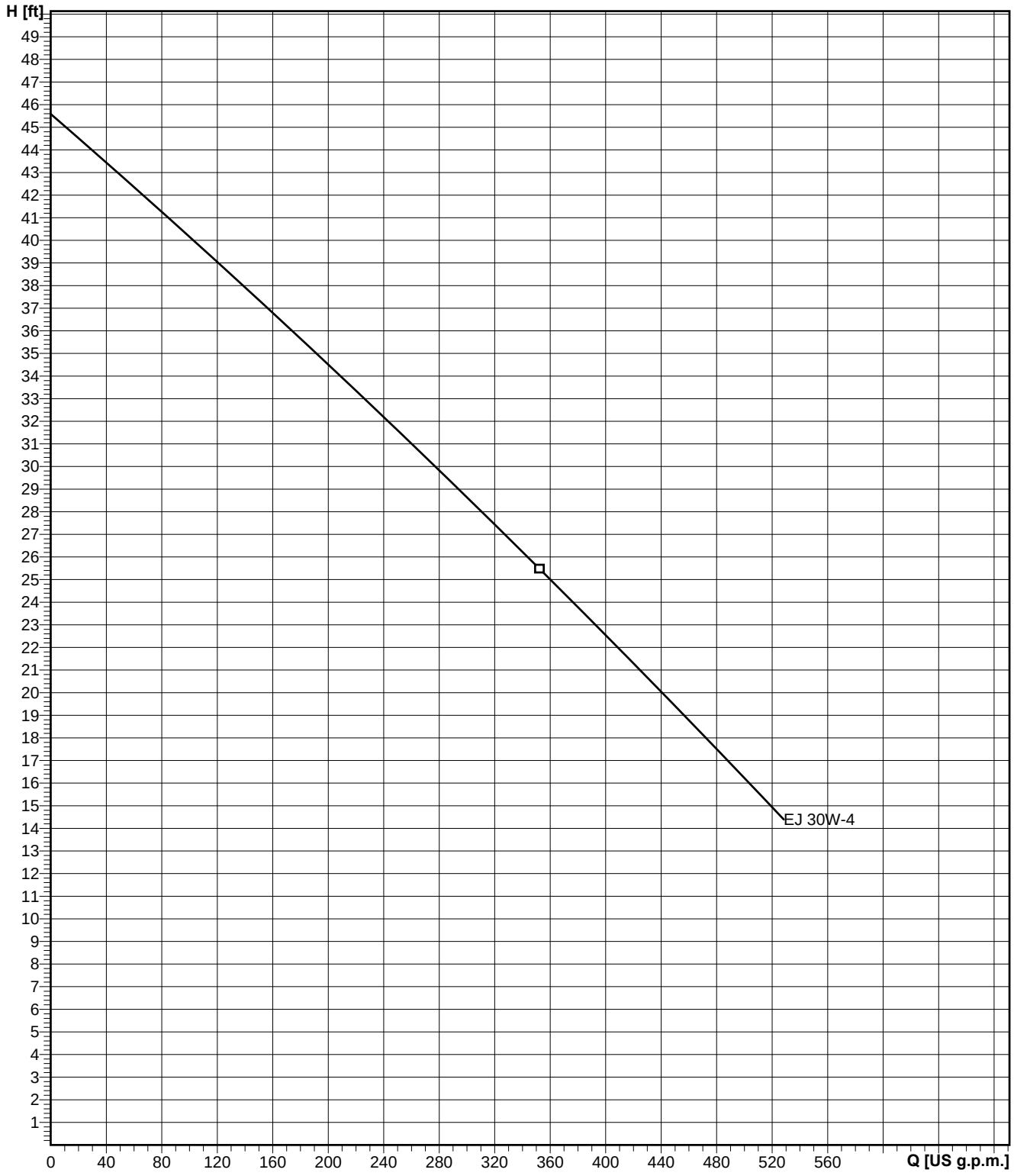
Pump performance curves
EJ W-4 60HZ

				Curve number
				Reference curve EJ W-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.89..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

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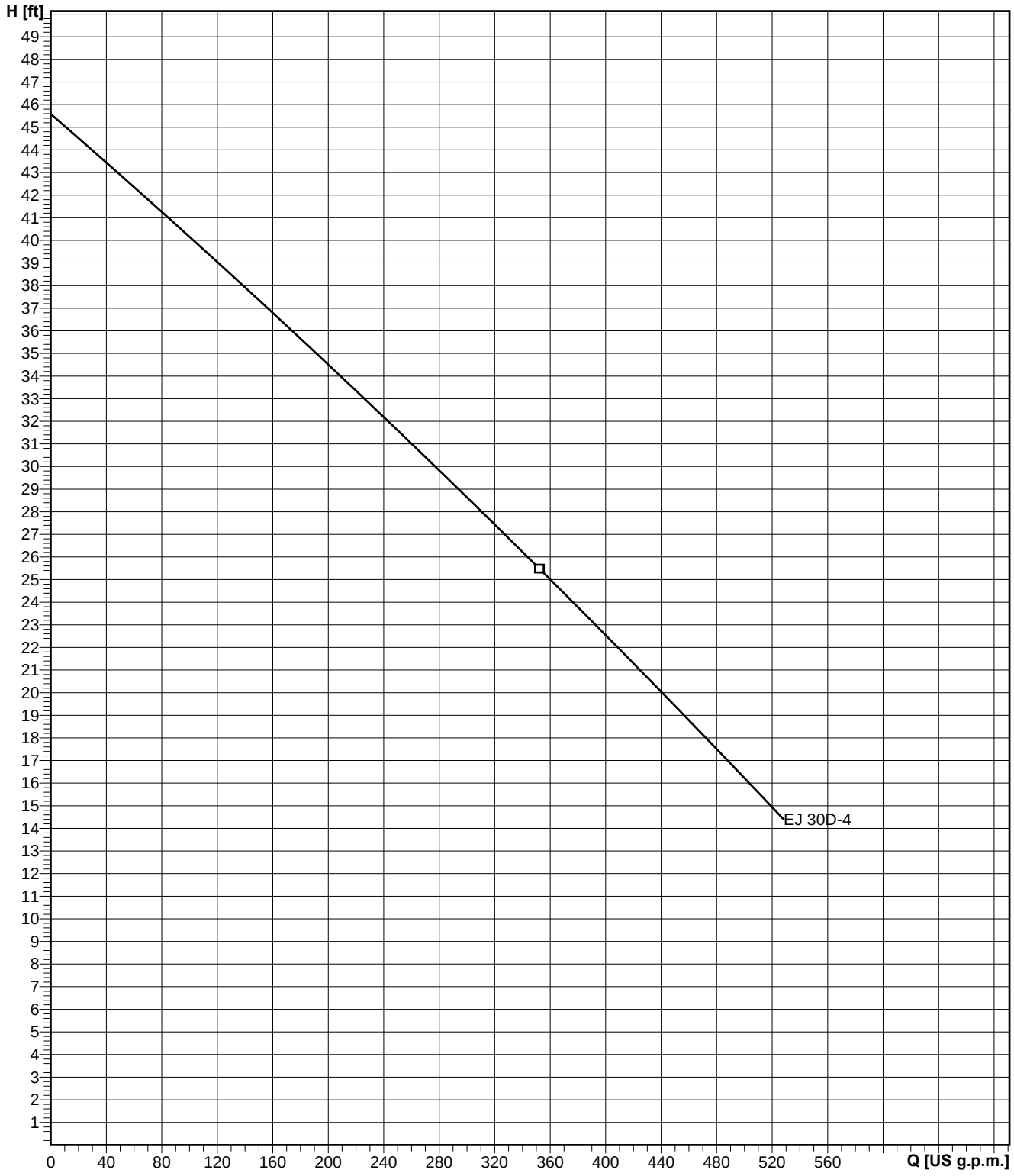
abs

SULZER

Pump performance curves
EJ D-4 60HZ

				Curve number
				Reference curve EJ D-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1660..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

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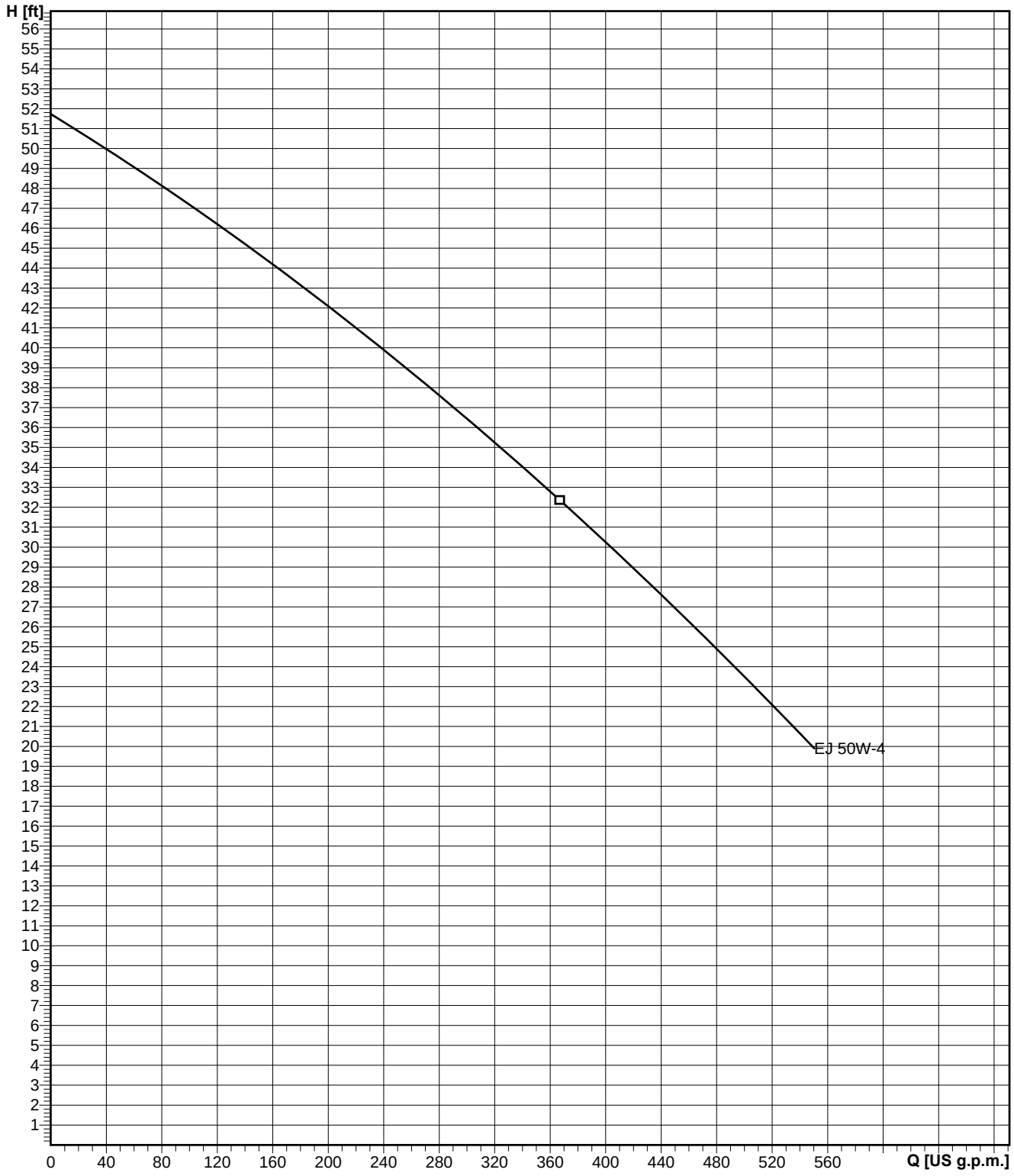
abs

SULZER

Pump performance curves
EJ W-4 60HZ

				Curve number
				Reference curve EJ W-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1690..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 6.89..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

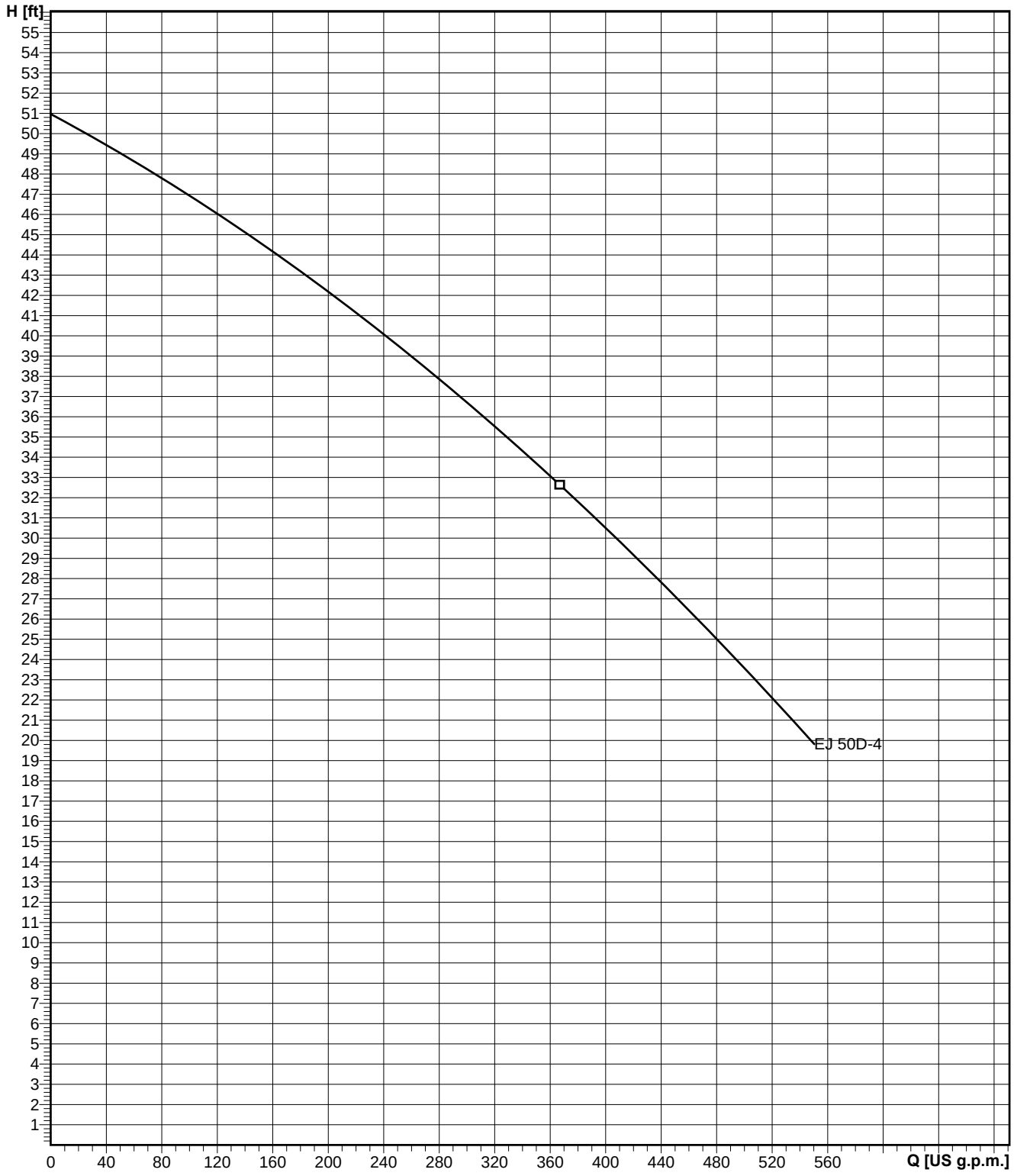
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ D-4 60HZ

				Curve number
				Reference curve EJ D-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1660..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

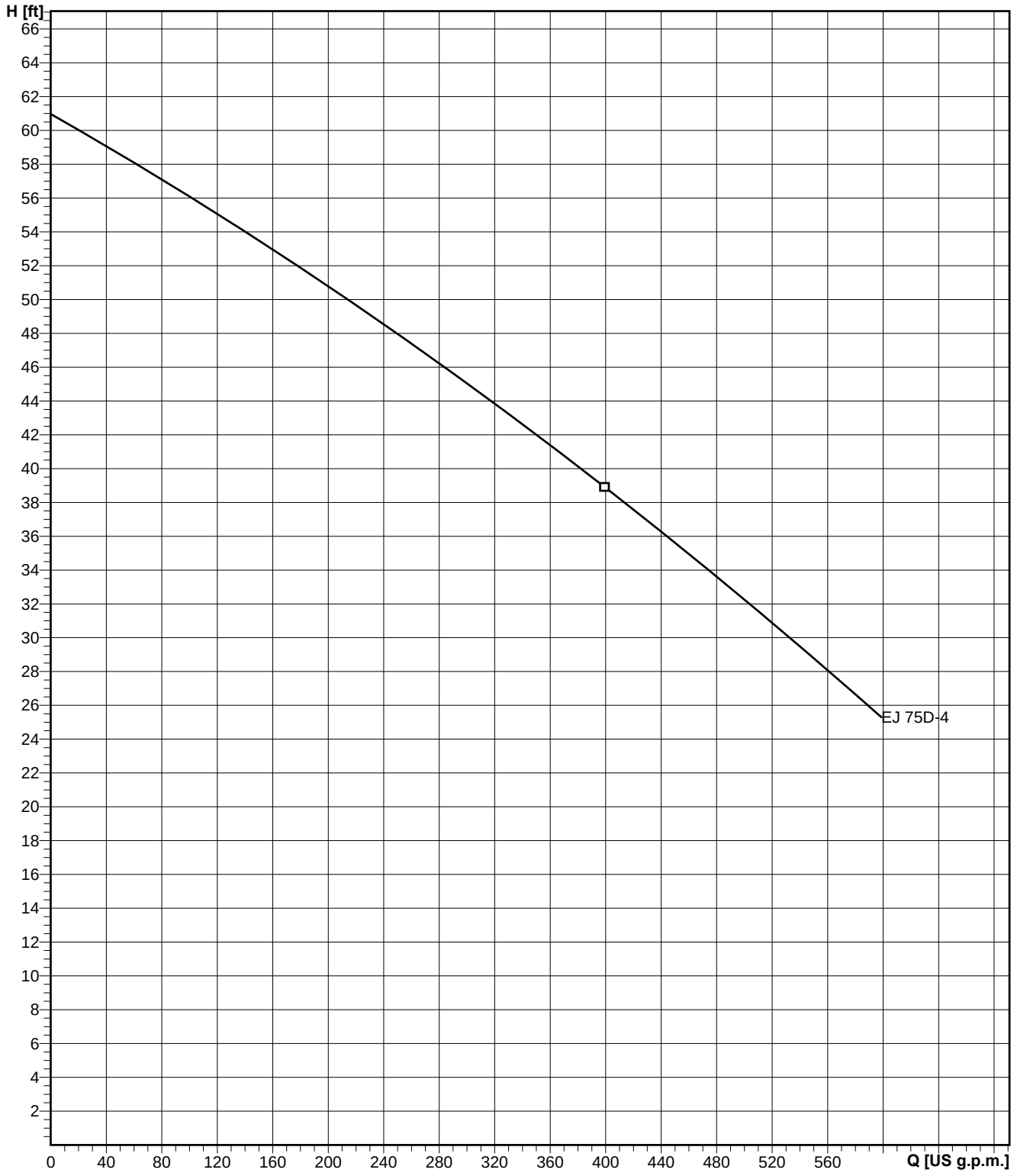
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ D-4 60HZ

				Curve number
				Reference curve EJ D-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1660..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

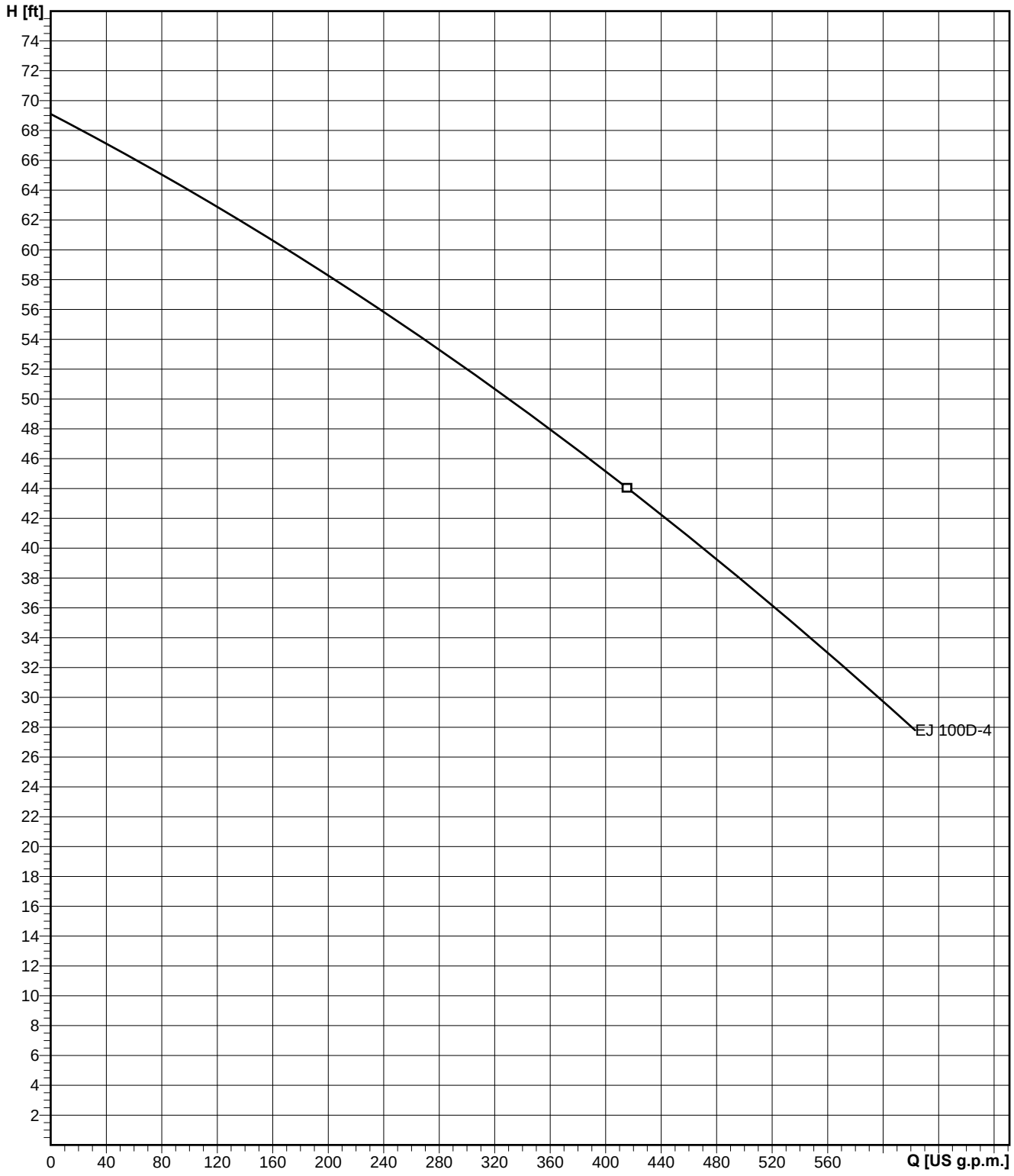
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
EJ D-4 60HZ

				Curve number
				Reference curve EJ D-4
			Discharge 4"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1660..1650 rpm	Date 2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size 7.87..6.46 inch	N° of vanes 2	Impeller Contrabloc impeller, 2 vanes	Solid size 3"	Revision 2009-04-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Single Phase: External start kit in control panel is required. Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.1 (single phase), 1.15 (three phase)
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 30W-4	1*	3.0	230	23.0	92	H	4/1750
EJ 30D-4	3**	3.0	208-230	14.4-13.0	65-59	J	4/1750
	3**	3.0	460	6.5	29	J	4/1750
	3	3.0	575	5.2	23.6	J	4/1750

* Requires external start kit mounted in the control panel.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Optional Silicon Carbide mechanical seal.

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	154 (70) [EJ 30W-4], 150 (68) [EJ 30D-4]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	4 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•C continuous, 50•C intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
8/4 SEOOW (EJ 30W-4)	230	0.76in (19.3mm)	32 ft (10m)	Thermoplastic elastomer
14/4 SEOOW (EJ 30D-4)	208-230/460/575	0.57in (14.5mm)		

Specifications subject to change without notice

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Single Phase: External start kit in control panel is required. Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay and circuit breaker for short circuit protection per N.E.C. standards. Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.1 (single phase), 1.15 (three phase)
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 50W-4	1*	5.0	230	27.0	149	H	4/1750
EJ 50D-4	3**	5.0	208-230	21.0-19.0	113-102	K	4/1750
	3**	5.0	460	9.5	51	K	4/1750
	3	5.0	575	7.6	41	K	4/1750

* Requires external start kit mounted in the control panel.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Optional: Silicon Carbide mechanical seal.

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	165 (75) [EJ 50W-4], 158 (72) [EJ 50D-4]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	4 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•€ continuous, 50•€ intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
8/4 SEOOW (EJ 50W-4)	230	0.76in (19.3mm)	32 ft (10m)	Thermoplastic elastomer
12/4 SEOOW (EJ 50D-4)	208-230/460/575	0.65in (16.4mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards. Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.15
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 75D-4	3*	7.5	208-230	25.4-23.0	141.5-128	H	4/1750
	3*	7.5	460	11.5	64	H	4/1750
	3	7.5	575	9.2	51	H	4/1750

* These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Optional: Silicon Carbide mechanical seal.

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	165 (75)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	4 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•Є continuous, 50•Є intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
10/4 SEOOW	208-230/460	0.69in (17.5mm)	32 ft (10m)	Thermoplastic elastomer
12/4 SEOOW	575	0.65in (16.4mm)		

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards. Leakage: DI Moisture Detection in Seal Sensing Chamber
Service Factor	1.1
Voltage Tolerance	••10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 100D-4	3*	10.0	208-230	31.0-28.0	141.5-128	F	4/1750
	3*	10.0	460	14.0	64	F	4/1750
	3	10.0	575	11.0	51	F	4/1750

* These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Optional: Silicon Carbide mechanical seal.

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	170 (77)
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	4 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern
Maximum temp. of pumped fluid	40•Є continuous, 50•Є intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

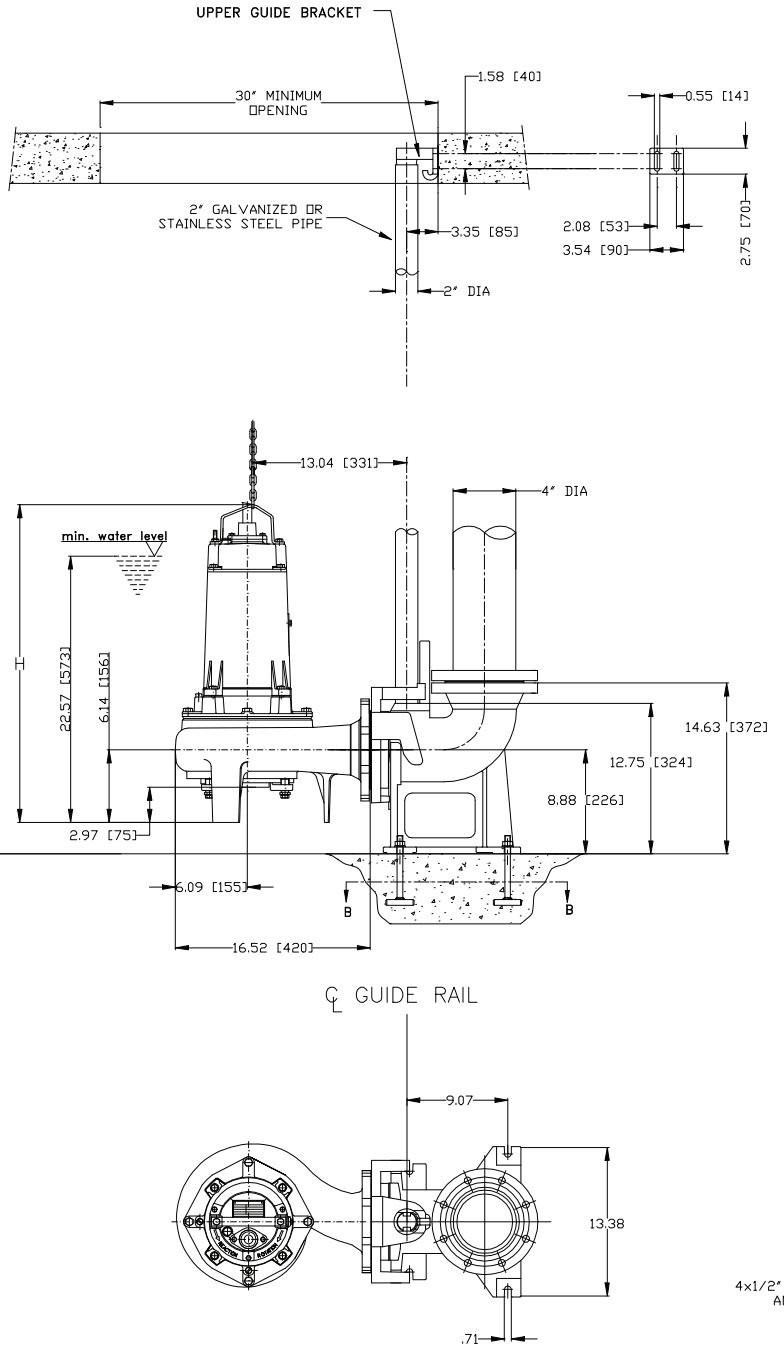
POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
8/4 SEOOW	208-230/460	0.76in (19.3mm)	32 ft (10m)	Thermoplastic elastomer
12/4 SEOOW	575	0.65in (16.4mm)		

Four inch pumps

Pump	H in. [mm]	Weight lbs. [kg]
EJ 30D-4	26.2 [665]	149.6 [68]
EJ 50D-4	27 [685]	158.4 [72]
EJ 75D-4	27 [685]	165 [75]
EJ 100D-4	27 [685]	165 [75]

Pump	H in. [mm]	Weight lbs. [kg]
EJ 30W-4	27 [685]	154 [70]
EJ 50W-4	27 [685]	165 [75]

Guide rail system
Part number 62320652

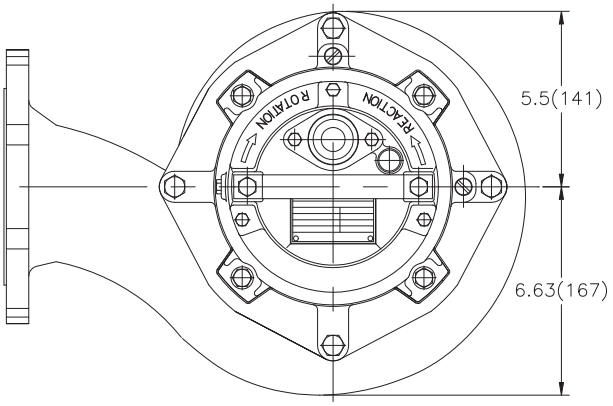


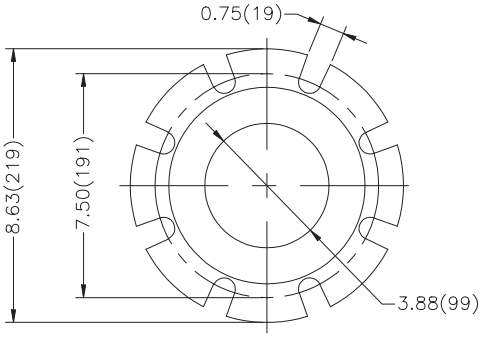
Note: Dimensions in millimeters and [ ] in inches.

Specifications subject to change without notice

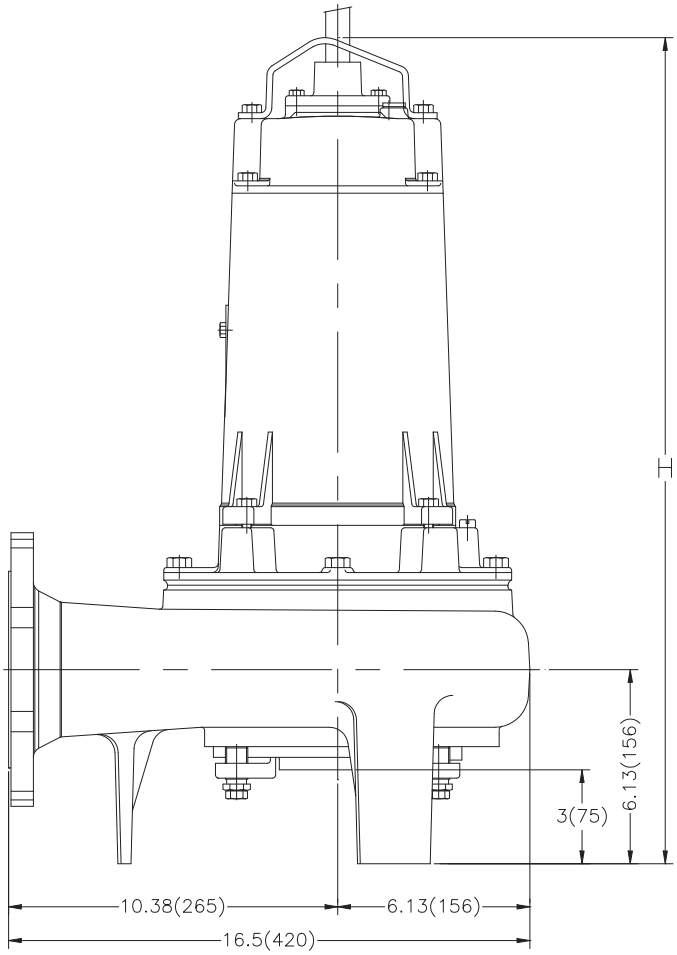
Pump	H	Weight
EJ 30D-4	26.2(665)	150 lbs.
EJ 50D-4	27.0(685)	158 lbs.
EJ 75D-4	27.0(685)	165 lbs.
EJ 100D-4	27.0(685)	170 lbs.

Pump	H	Weight
EJ 30W-4	27.0(685)	154 lbs.
EJ 50W-4	27.0(685)	165 lbs.





4" ANSI
DN100



Note: Dimensions in inches and ( ) in millimeters.

Specifications subject to change without notice

SULZER

abs

ABS Piranha submersible grinder pump 09 - 125

ABS submersible pumps for problem-free pumping of raw sewage in pipe lines from 1¼" (DN 32) and in pressure sewer systems.

Applications

Piranha submersible pumps have been designed for effective and economic dewatering using discharge lines of small diameter, in private, municipal and industrial areas.

* Sewage removal from houses in scattered settlements where the laying of a conventional sewer would be too expensive, where large ground undulations are present or where it is only possible to lay pipe lines of small diameter.
* Sewage removal from highway and motorway resting sites, community buildings and for renovation projects.
* For use in slaughter houses, food processing plants, paper factories, agriculture and similar areas.
* Piranha 09 is specially designed for private and domestic applications.
* Maximum allowable temperature of the medium is 104 °F, or short term to 140 °F (max. 5 minutes).

Construction

The water pressure-tight, encapsulated fully flood-proof motor and the pump section form a compact ,robust, unit construction.

Bearings

The stainless steel motor shaft is supported in lubricated-for-life ball bearings.

Shaft sealing

Piranha 09 - S30; between motor and hydraulic section by means of a high quality sealing unit using a silicon carbide mechanical seal. Seal at motor side is by oil-lubricated lip seal.
Piranha PE25/2C - PE125/2E: SiC-SiC double mechanical seals.
All seals are independent of direction of rotation and resistant to temperature shock.

Discharge

Piranha 09: 1¼" internal thread
Piranha S10 - PE45: DN 32 flange (1¼" threaded adaptor available as accessory).
Piranha PE80/2E - PE125/2E: DN 50 (2") with DIN-flange

Shredding system

Spiral bottom plate and stationary cutter ring combined with a shredding rotor located before the impeller, for optimum blockage-free running.

Temperature monitoring

Thermal sensors in the stator to switch off the pump in the case of overheating and switch on automatically after cooling down.

Seal monitoring

DI system consisting of a sensor in the motor and oil chambers which activates an alarm if there is leakage at the shaft seals. Not available for Piranha 09.

Features

* Unique ABS Piranha shredding system capable of shredding all materials found in sewage such as cloths and plastic bags.
* For the pumping of wastewater containing sewage, offal, organic and industrial effluent.
* Piranha 09 fitted with MF modular motor; Piranha- S with AS; Piranha-PE with XFP Premium Efficiency IE3.
* Small discharge lines from 1¼" (DN 32).
* Installations are possible where large ground undulations are present.
* Standard and Ex versions.
* Piranha 09 has a capacitor in the upper lid and does not require a control box.
* Low installation costs due to small diameter discharge pipework.

Motor

Three-phase 208, 230, 380, 460 and 600 V, or single-phase 208 and 230 V; 60 Hz; 2-pole (3400 rpm) or 4-pole (1750 rpm).
Cooled by amply dimensioned cooling areas.

Piranha 09: insulation class F, protection type IP 68, non-Ex only.
Piranha S10 - S30: insulation class F, protection type IP 68, Ex and non-Ex.
Piranha PE25/2C - PE125/2E: Premium Efficiency IE3 with NEMA Class A temperature rise, insulation class H, protection type IP 68, Ex only.

Explosive-proof versions are in accordance with FM/CSA standards.

Materials

Description	Material
Upper Lid *	Stainless steel AISI 304
Motor Housing	Cast iron ASTM A48 Class 40B
Rotor Shaft	Stainless steel AISI 420
Volute	Cast iron ASTM A48 Class 40B
Impeller	Cast iron ASTM A48 Class 40B
Fasteners	Stainless steel AISI 316

* Piranha 09

Technical Data

Piranha W = 1-phase D = 3-phase	Discharge Flange DN/ins	 Internal thread *	Motor power ** (kW) P_1	 (hp) P_2	Rated current (A) 230 V	 208 V	 460 V	 600 V	Speed (rpm)	Cable type *** 230 V	 208 V	460 V 600 V	Weight **** (lbs)
09/2W	-	1¼"	2.83	3.02	13.5	n.a.	n.a.	n.a.	3400	(a)	n.a.	n.a.	51
09/2D	-	1¼"	2.54	2.68	8.0	n.a.	4.0	n.a.	3400	(b)	n.a.	(b)	51
S10/4W [1]	32/1¼"	1¼"	1.48	1.34	6.5	7.2	n.a.	n.a.	1750	(c)	(c)	n.a.	71
S10/4D	32/1¼"	1¼"	1.33	1.34	5.2	5.8	2.6	2.1	1750	(c)	(c)	(c)	71
S20/2W [1]	32/1¼"	1¼"	2.45	2.41	11.5	12.7	n.a.	n.a.	3400	(c)	(c)	n.a.	71
S20/2D	32/1¼"	1¼"	2.42	2.41	7.2	8.0	3.6	2.9	3400	(c)	(c)	(c)	71
S26/2W [1]	32/1¼"	1¼"	3.13	3.49	13.7	15.1	n.a.	n.a.	3400	(c)	(c)	n.a.	88
S30/2D	32/1¼"	1¼"	3.90	4.02	11.0	12.2	5.5	4.4	3400	(c)	(c)	(c)	117
PE25/2W-C	32/1¼"	1¼"	2.90	3.35	13.3	14.7	n.a.	n.a.	3400	(e)	(e)	n.a.	188
PE28/2D-C	32/1¼"	1¼"	3.20	3.75	9.4	10.4	4.7	3.6	3400	(d)	(d)	(d)	188
PE35/2W-C	32/1¼"	1¼"	4.00	4.69	17.8	19.1	n.a.	n.a.	3400	(f)	(f)	n.a.	188
PE35/2D-C	32/1¼"	1¼"	3.94	4.69	11.6	12.9	5.8	4.5	3400	(d)	(e)	(d)	188
PE45/2W-C	32/1¼"	1¼"	5.10	6.03	22.4	24.8	n.a.	n.a.	3400	(g)	(g)	n.a.	188
PE45/2D-C	32/1¼"	1¼"	5.10	6.03	14.8	16.4	7.4	5.7	3400	(e)	(f)	(e)	188
PE80/2D-E	50/2"	-	8.87	10.70	26.6	29.4	13.3	10.2	3400	(g)	(g)	(e)	287
PE100/2D-E	50/2"	-	10.80	13.40	34.7	38.3	17.3	13.3	3400	(g)	(g)	(f)	320
PE110/2D-E	50/2"	-	12.00	14.80	37.1	41.1	18.6	14.2	3400	(g)	(g)	(f)	320
PE125/2D-E	50/2"	-	13.70	16.80	42.6	47.1	21.3	16.3	3400	(g)	(g)	(g)	320

* Piranha S10/4-PE45/2 with threaded flange adaptor as accessory

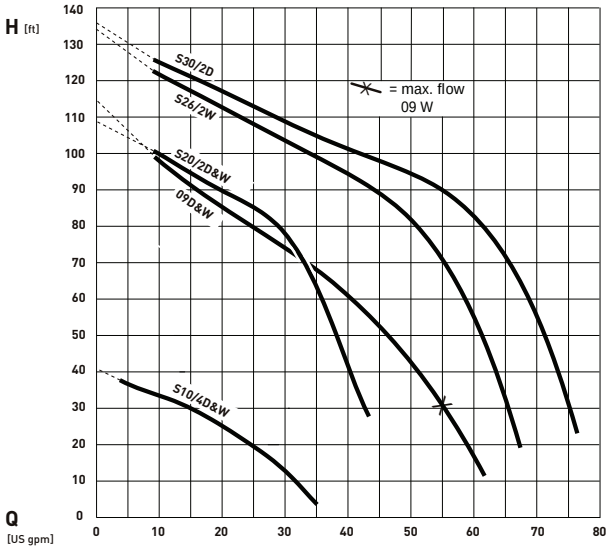
** P_1 = Power at mains; P_2 = Power at motor shaft

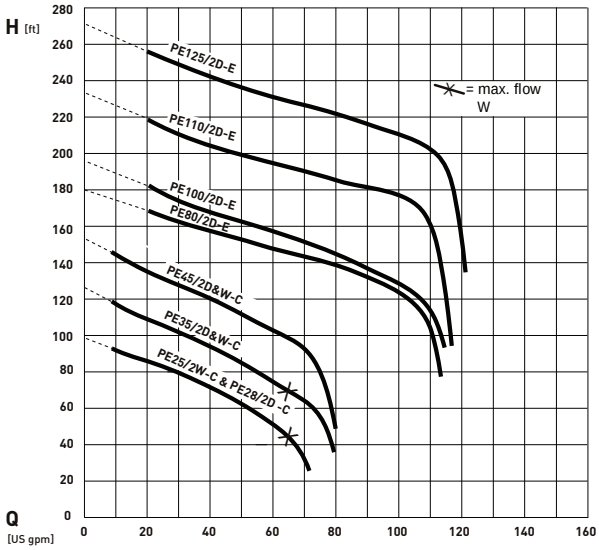
*** Neoprene cable: Std & Ex
(a) SJTOW-A 16/3
(b) STOW-A 16/4
(c) SOW-A 14/7
(d) SOOW 14/7
(e) SOOW 12/7
(f) SOOW 10/7
(g) AWM 8/4+16/3

**** Weight with 33 ft cable

[1] Start and Run capacitor to the following specification required in control panel.
Start: 161-193µF for S10/4W & S20/2W, 200µF for S26/2W
Run: 30µF for S10/4W, 20µF for S20/2W, 50µF for S26/2W
The recommended start time for the motors is two seconds.

Performance Curves

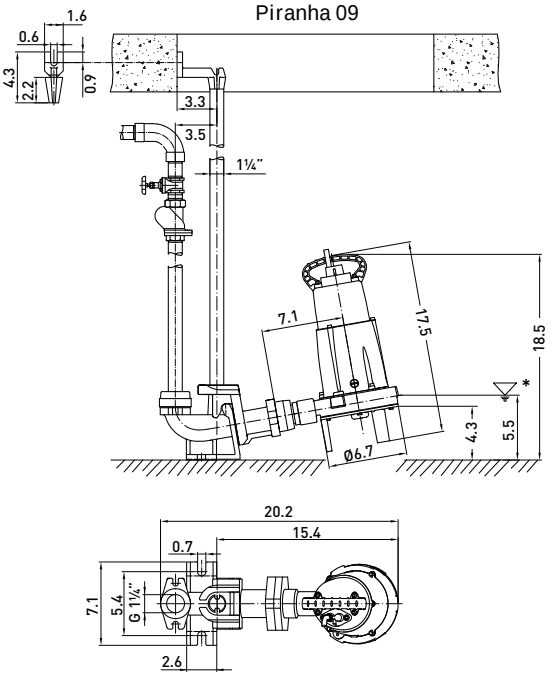




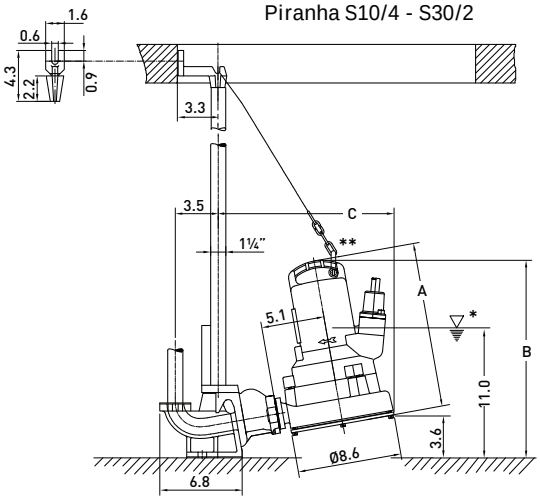
H = Total Head; Q = Discharge Volume. Curves to Hydraulic Institute N.B. please use the ABSEL program to validate pump selection.

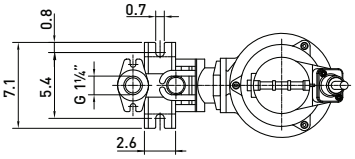
Dimensions (ins)

Piranha 09

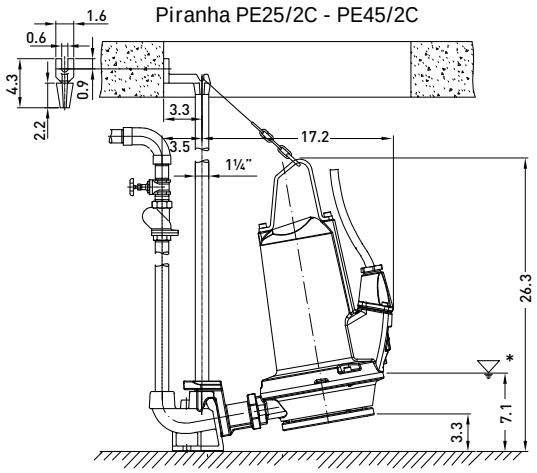


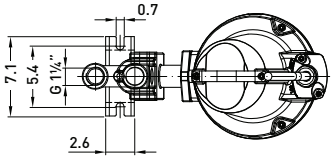
Piranha S10/4 - S30/2



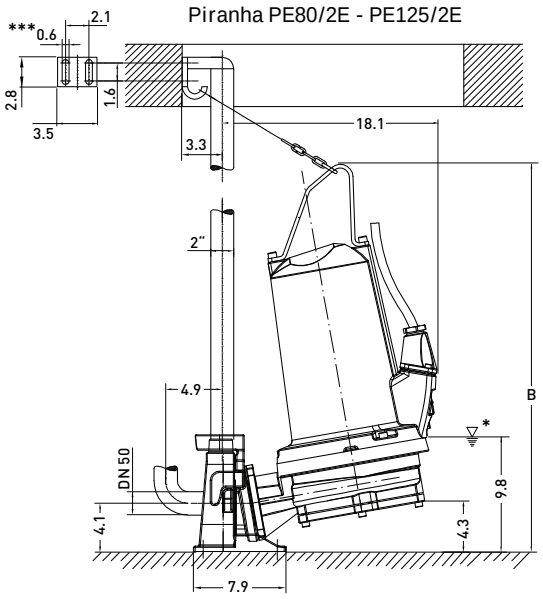


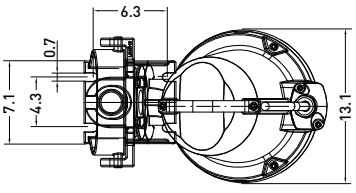
Piranha PE25/2C - PE45/2C





Piranha PE80/2E - PE125/2E





Piranha	A	B	C
S10/4 & S20/2	13.7	16.3	14.5
S26/2 & S30/2	14.2	16.8	14.7
PE80/2E	-	30.5	
PE100/2E - PE125/2E	-	33.2	

Piranha 09 - PE125/2E: Minimum sump opening Ø24.6 ins
Pedestal base secured using M10 masonry anchor bolts, drill hole size 0.6 ins
* Lowest switch-off point for automatic operation

Piranha S10/4 - S30/2: ** To allow the pump to be lowered and fixed correctly to the pedestal, the shackle must be fixed to the handle at the point furthest from the guide rail.

Piranha PE80/2E - PE125/2E: Discharge line connection with threaded flange DN 50/2" PN16
Discharge elbow supplied by customer
** Hexagon head wood screw 10 x 70 DIN 571 and dowel size 12

Accessories

	Description	Size	Part no.	Piranha
Fixed installation with pedestal	Pedestal (EN-GJL-250) 90º cast bend	G 1¼” G 1¼” G 1¼”	62325007 62320674 62320676	09 S10/4-S30/2, PE25/2C-45/2C
	90º cast bend with built-in non-return valve	G 1¼” G 1¼”	62320536 62320538	S10/4-S30/2 PE25/2C-45/2C
	without bend	DN 50/G2”	62320660	PE80/2E-125/2E
	Threaded Adaptor hexagon double nipple	G 1¼”	13770011	09
	Guide Rail (galvanized steel)	1¼” x 3.3 ft 1¼” x 6.6 ft 1¼” x 9.8 ft 1¼” x 13.1 ft 1¼” x 16.4 ft	31380007 31380008 31380009 31380010 31380011	09-PE125/2E
	Chain Kit (galvanized steel) including shackle	9.8 ft 13.1 ft 19.7 ft 22.0 ft	61265065 61265093 61265069 61265096	09-PE125/2E
	Chain Kit (stainless steel) including shackle	9.8 ft 13.1 ft 19.7 ft 22.0 ft	61265081 61265099 61265085 61265102	09-PE125/2E
Transportable applications	Threaded Flange Kit (EN-GJL-250) including discharge piece, gasket and bolts	G 1¼”	61180512	S10/4-PE45/2C
	Ground Support Stand (St. 37) with fixing bolts		61900013 61900007	S10/4-S30/2 PE25/2C_125/2E
	Fixed Coupling (brass) GEKA with external thread	G 1¼”	15020003	S10/4-PE45/2C
	Hose Coupling with nozzle, outer dia. 34 mm	G 1¼”	15020018	S10/4-PE45/2C
Horizontal (tank connection)	Pump with built-in flange on suction side	DN 150/PN 16 to DIN 2633	On request	S10/4-PE125/2E
	Head Support (EN-GJL-250) with vibration damping		62665103	S10/4-S30/2
General	Non-return Valve (EN-GJL-250) ball valve with internal thread	G1¼” G1½” G2”	61400525 61400526 61400527	09-PE125/2E
	Shut-off Valve (brass) with internal thread	G1¼” G1½” G2”	14040005 14040006 14040007	09-PE125/2E

2012-01-17 | We reserve the rights to alter specifications due to technical developments.

GENERAL

Furnish and install _____ ABS Piranha 09 submersible grinder pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 2 HP and 3450 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 1¼ inch female NPT. The pump shall be **UL** approved.

The grinder unit shall be capable of shearing and reducing to a fine slurry all material normally found in domestic sewage such as sanitary napkins, disposable diapers, cloth diapers, wash rags, etc. The slurry shall be capable of freely passing through a 1¼ inch piping system including check and gate valves.

PUMP DESIGN

The pump shall be of the centrifugal type with the rotating cutter mounted on the pump shaft directly against the impeller. The stationary cutter shall be mounted in an adjustable bottom plate. The stationary cutter shall have slots to facilitate better flow. The bottom plate shall be cast with grooves threading outward from the center opening of the plate to the outer diameter. The cutting elements and impeller shall be designed to keep the overhung load distance to a minimum.

PUMP CONSTRUCTION

Impeller: The impeller shall be cast iron semi-open multiple vane. The impeller shall be keyed to the shaft preventing any slippage of the impeller onto the shaft and shall be fastened using a stainless steel bolt.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a horizontal discharge.

Cutting Elements: The pump shall be of the centrifugal type with the rotating cutter mounted on the pump shaft directly against the impeller. The stationary cutter shall have slots to facilitate better flow. The bottom plate shall be cast with grooves threading outward from the center opening of the plate to the outer diameter. The impeller shall be a multiple vane centrifugal type. The cutting elements shall be hardened 316 stainless steel.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a silicon carbide stationary face with a spring loaded rotating silicon carbide face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The common pump and motor shaft shall be 420 stainless steel supported on the impeller end by a heavy duty single row ball bearing. The opposite end of the shaft is supported on a sealed single row ball bearing.

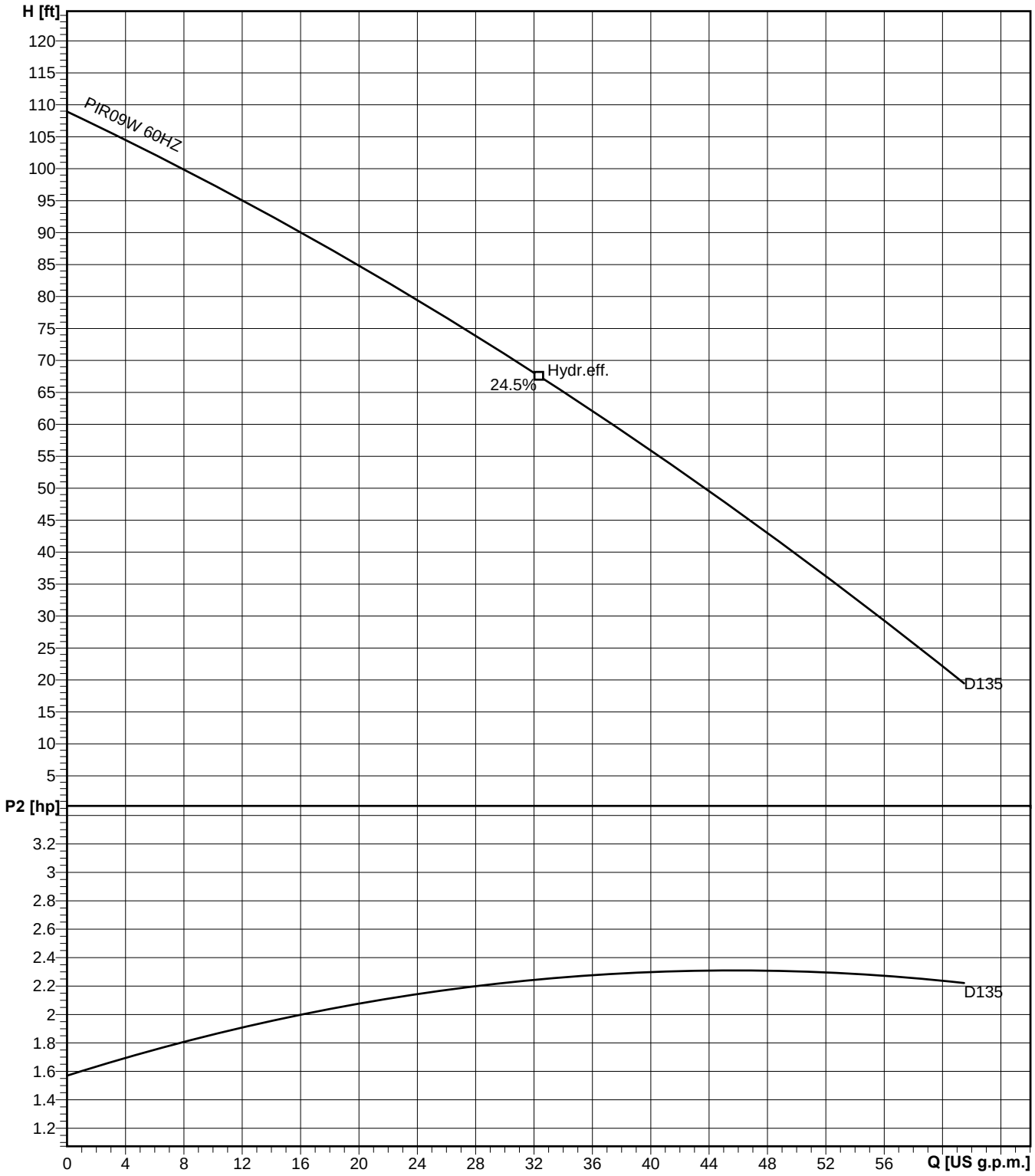
Motor and Cable: The pump motor shall be enclosed in a water tight cast iron housing with a stainless steel upper lid filled with oil. The motor shall be a NEMA design B with moisture resistant class F insulation rated for 279•F (155••C). Motors shall have an integrated thermal protection and start capacitors. Motor is designed for maximum 12 starts per hour. Power cable shall be 32 feet long with PVC insulation jacket suitable for submersible service.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be 316 stainless steel.

SULZER

Pump performance curves
PIRANHA 09 W 60 HZ

Curve number				
Reference curve PIR09W				
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395 rpm	Date 2012-03-15
Flow	Head	Rated power 2.25 hp	Hydraulic efficiency 24.6 %	NPSH



Impeller size 5.31 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-09-28

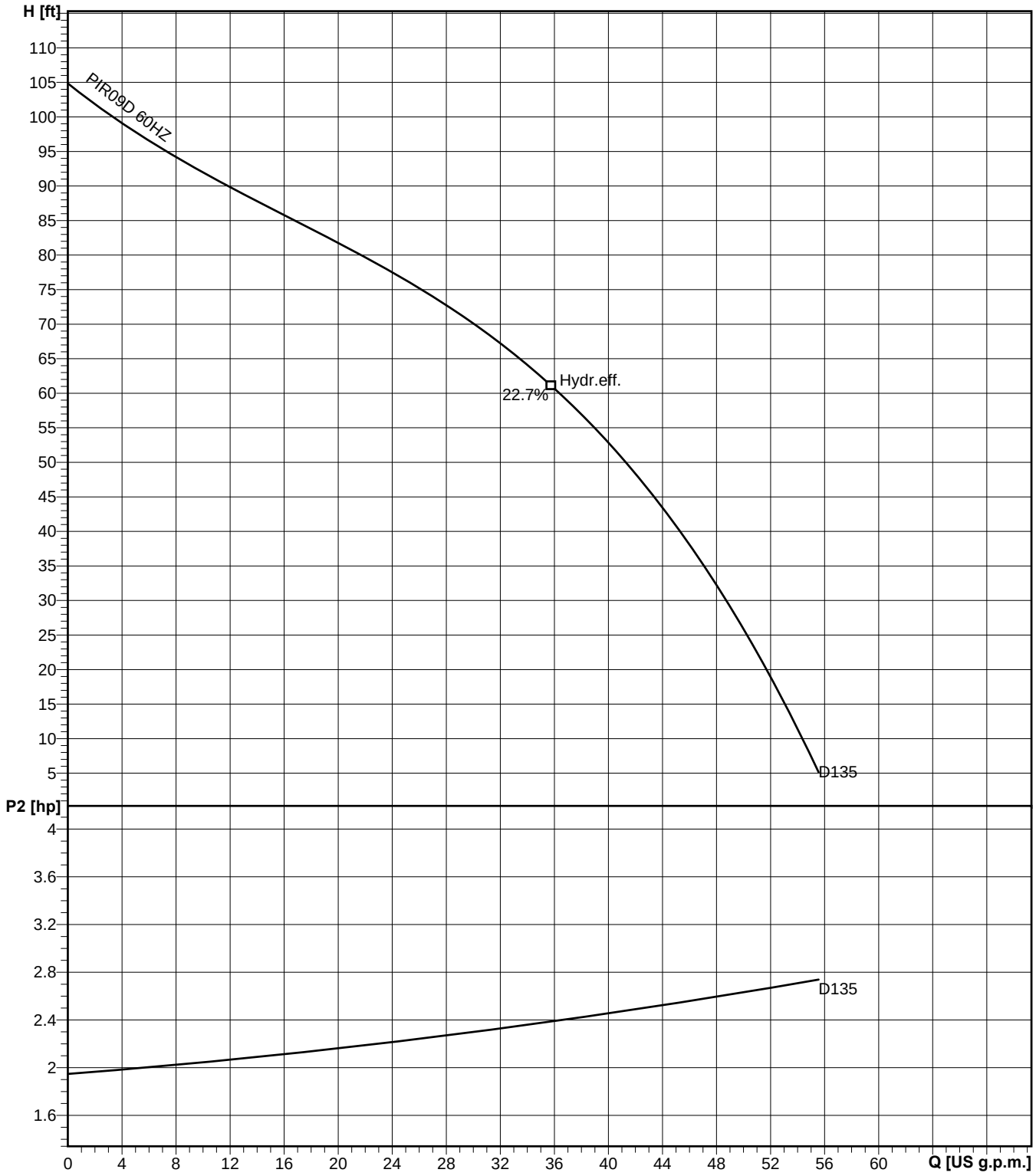
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
PIRANHA 09 D 60 HZ

Curve number				
Reference curve PIR09D				
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395 rpm	Date 2012-03-15
Flow	Head	Rated power 2.39 hp	Hydraulic efficiency 22.7 %	NPSH



Impeller size 5.31 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-09-28

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abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 279••F (155••C)
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down.
Bi-Metallic Temp Trip	234••F • ••9••(130••C • ••5••C)
Service Factor	1.0
Voltage Tolerance	• ••5% from nominal
Approvals	UL

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
09	1	3.0	208	14.94	46.3	B	0.91	79.49	2/3450
09	1	3.0	230	13.51	41.9	B	0.91	79.49	2/3450

MATERIALS of CONSTRUCTION

Motor Housing	AISI 304 Stainless Steel
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Stationary Cutter	316 SS
Rotating Cutter	316 SS
Impeller	Cast iron, semi-open multiple vane

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	42
Maximum submergence (feet)	30
Discharge size, standard	1¼ Inch, Horizontal
Discharge type	Female NPT
Maximum temp. of pumped fluid	72••F (40••C)

*Elbow adapter included with the pump

CABLE SPECIFICATIONS

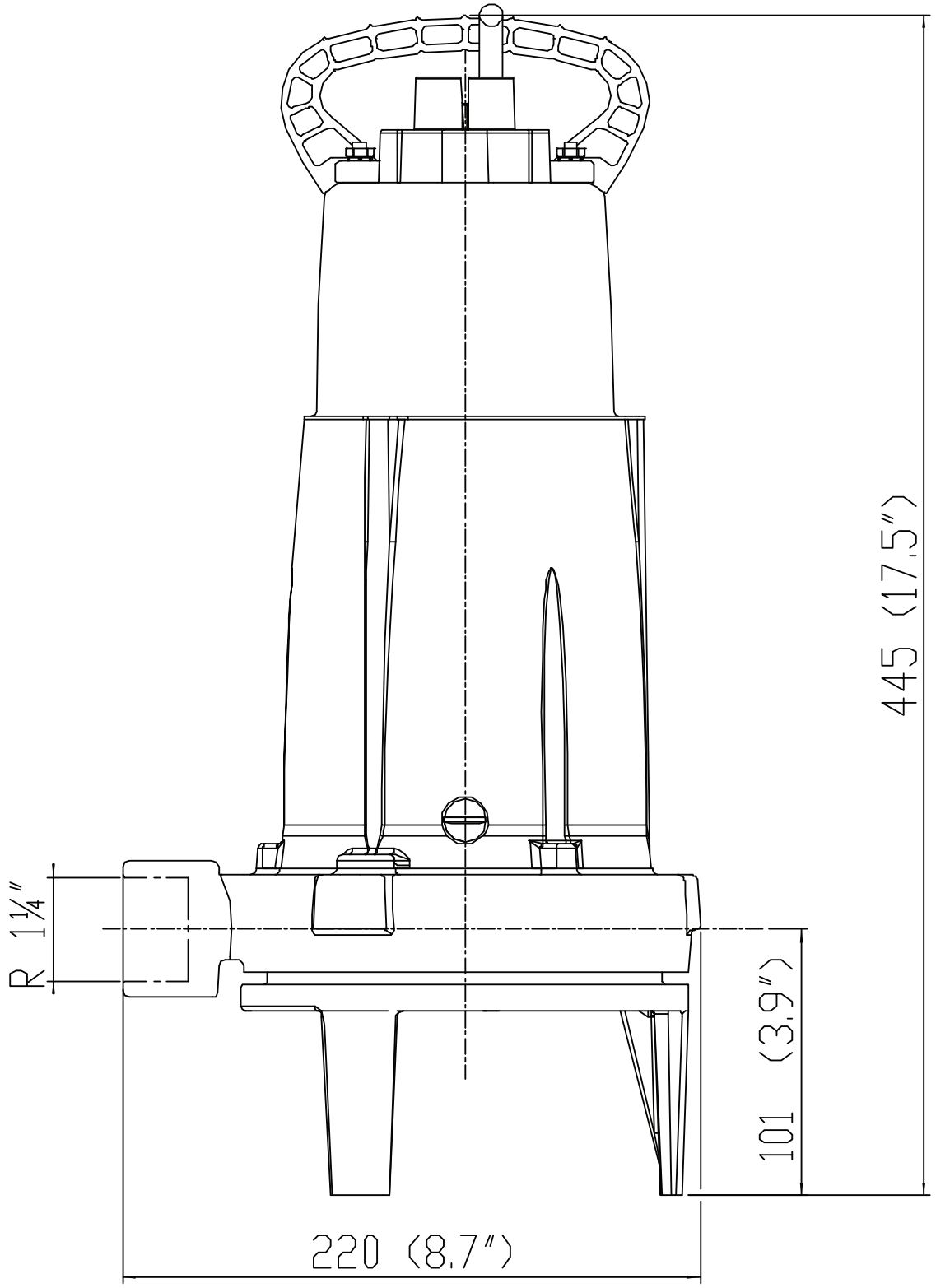
MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
09	1 - 16/3 SJTOW-A or equiv.	32	PVC or equiv. water & oil resistant.

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

SULZER

Maßblatt/Dimension sheet
Plan d'encombrement
PIRANHA 09

No: AN-M.13.191 -00
Drawn: B. Mc Donald
Issue Date: 12.11.03
Änderungen vorbehalten Technical changes reserved Con riserva di modifiche Con reserva de madificaciones Sous réserve de modification



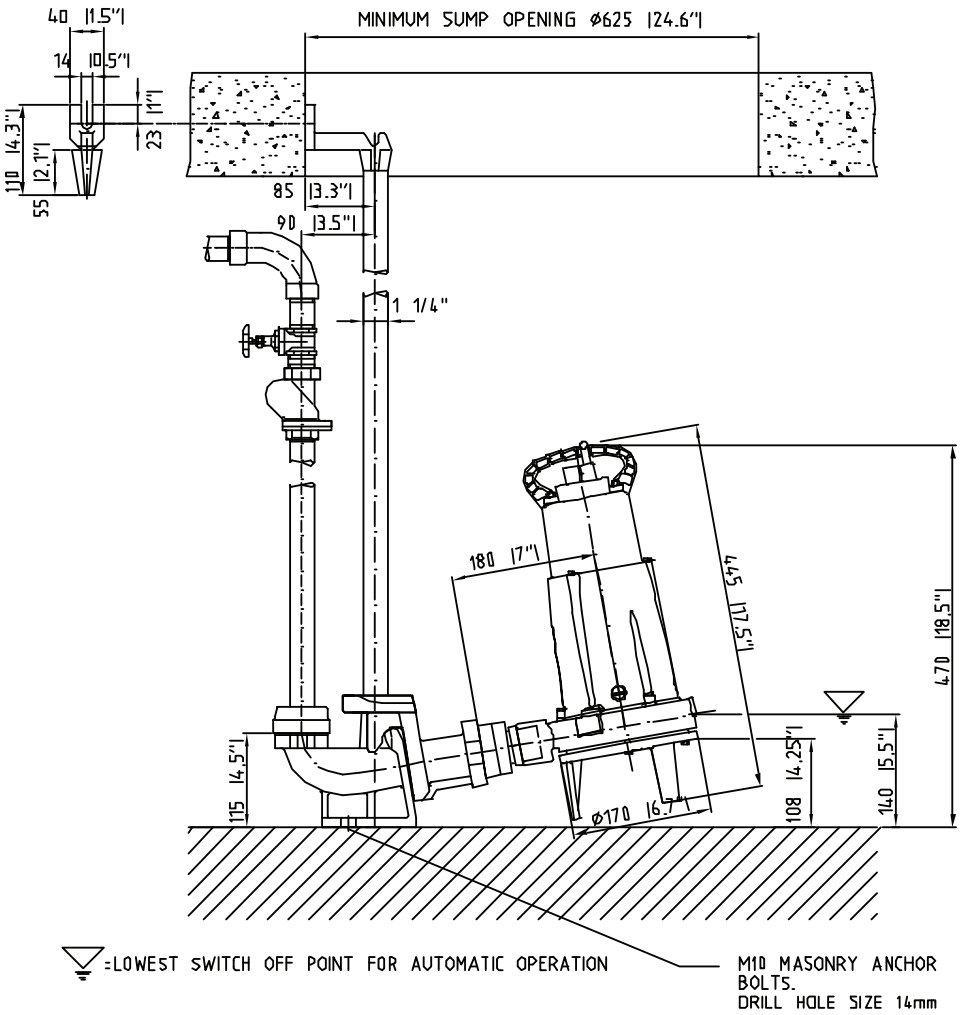
SULZER

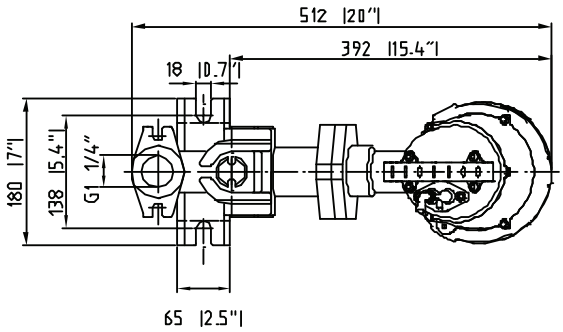
Maßblatt PIRANHA 09

Dimension sheet

Plan d'encombrement

No: AN-M.13.192-01
Date/Name:23.08.01/C.Quirke
Cad Code:G:\ANM12192
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification





EXPLOSION PROOF

GENERAL

Furnish and install _____ Model PIR S_____ **ABS Piranha** Grinder Pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be _____ HP, 3450 RPM (1750 RPM for S10/4 model), connected for operation on a _____ volt, 60 HZ, _____ phase service. The motor shall be an integral part of the pumping unit. The pump discharge shall be 1 ¼".

The grinder unit shall be capable of shearing and reducing to a fine slurry all material normally found in domestic and commercial sewage such as sanitary napkins, disposable diapers, cloth diapers, wash rags, wood, plastic, etc. The slurry shall be capable of freely passing through a 1 ¼" piping system including check and gate valves.

GRINDER PUMP CONSTRUCTION

The pump shall be of the centrifugal type with the rotating cutter mounted on the pump shaft directly against the impeller. The stationary cutter shall be mounted in an adjustable bottom plate. The stationary cutter shall have slots to facilitate better flow. The bottom plate shall be cast with grooves threading outward from the center opening of the plate to the outer diameter. The impeller shall be a multiple vane centrifugal type. The cutter material shall be similar to an ANSI 440C stainless steel with the addition of cobalt, vanadium, and molybdenum for superior abrasion resistance and a hardness of 58-62 Rockwell C.

The common pump and motor shaft shall be 420 stainless steel supported on the impeller end by a heavy duty single row ball bearing on 1.3-2.4 hp pumps, or a heavy duty double row ball bearing on 3.5-4 hp pumps. The opposite end of the shaft is supported on a sealed single row ball bearing (all models). The cutting elements and impeller shall be designed to keep the overhung load distance to a minimum. All fasteners shall be 304 stainless steel.

Shaft Seals: Each pump shall be equipped with two (2) seals. The lower seal (pump side) shall be of the mechanical type with silicon carbide faces. The upper seal shall be a lip type seal. The seals shall be separated by an oil chamber providing cooling and lubrication of the seals, and a barrier between the pumped fluid, and the dry motor chamber.

Seal Failure Warning System: An electric probe shall be provided in the oil chamber to detect the presence of water in the oil. A solid-state device mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe. If water enters the oil chamber in sufficient quantity to warrant concern, the probe shall activate a warning light in the control panel.

MOTOR CONSTRUCTION

The motor shall be of submersible type rated for _____ HP at 3450 RPM (1750 RPM for S10/4 model). The full load current shall not exceed _____ amps at _____ volts. Single phase motors shall be of the capacitor start capacitor run type for high starting and running torque.

The motor shall be air-filled and shall have Class "F" insulation. The rotor and stator shall be enclosed in a cast iron outer housing. Bi-metallic thermal switches shall be imbedded in each phase of the winding to sense high temperature. The rating of the switch shall be 130•Ċ +/- 5•Ċ. The control circuit shall be connected through the bi-metallic switches so the motor is shut down should a high temperature condition exist. The switches shall be self-resetting when the motor cools. Power cable shall be rated for explosion proof environment.

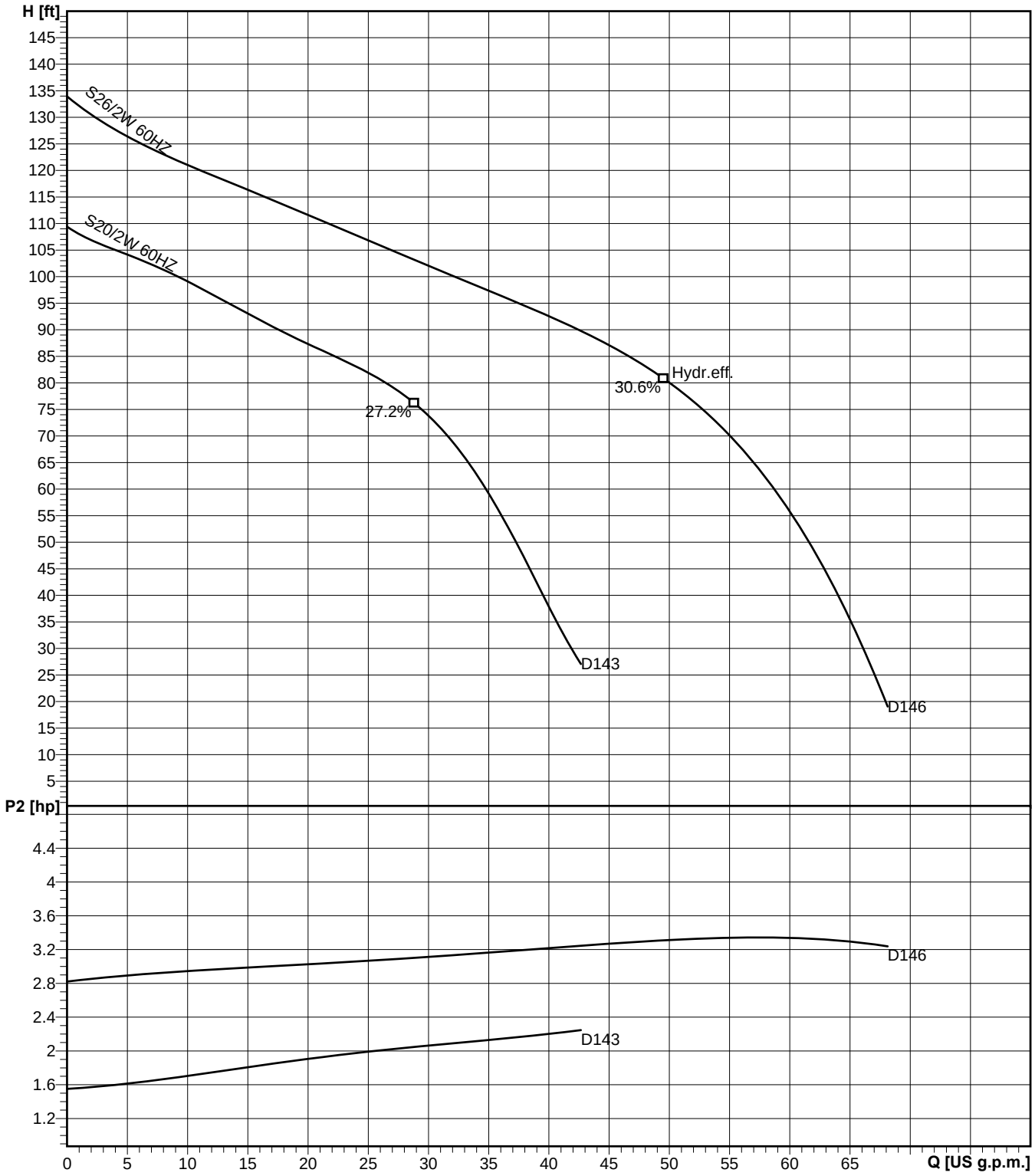
APPROVALS

All models shall be UL and CSA approved. Explosion proof models shall be FM approved for Class I Division I Group C and D.

SULZER

Pump performance curves
PIRANHA S W 60 HZ

			Curve number	
			Reference curve PIRANHA S W	
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3520..3345 rpm	Date 2012-03-15
Flow	Head	Rated power 3.31 hp	Hydraulic efficiency 30.6 %	NPSH



Impeller size 5.75..5.63 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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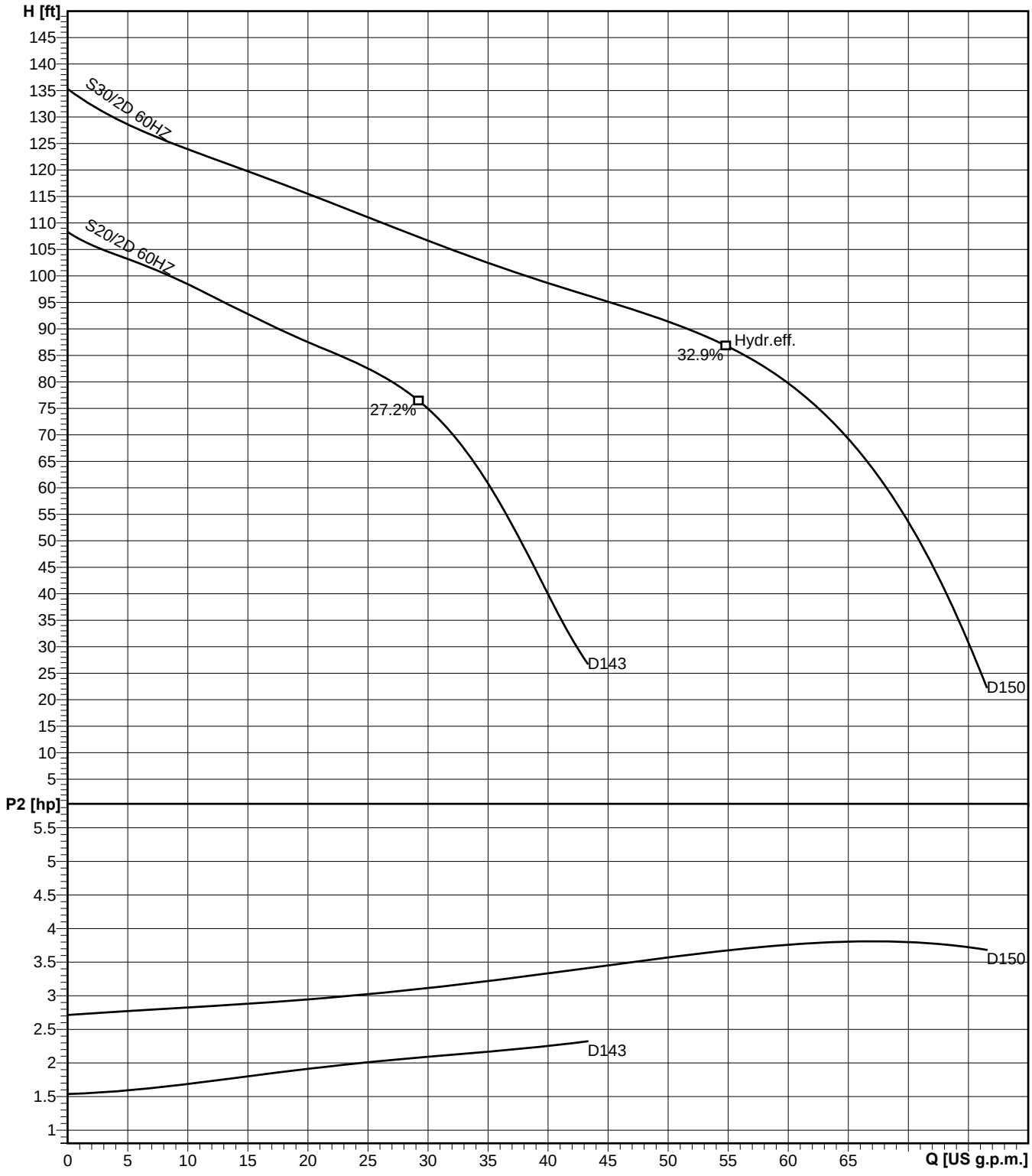
abs

SULZER

Pump performance curves
PIRANHA S D 60 HZ

			Discharge G1¼"	Curve number Reference curve PIRANHA S D
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395 rpm	Date 2012-03-15
Flow	Head	Rated power 3.68 hp	Hydraulic efficiency 32.9 %	NPSH



Impeller size 5.91..5.63 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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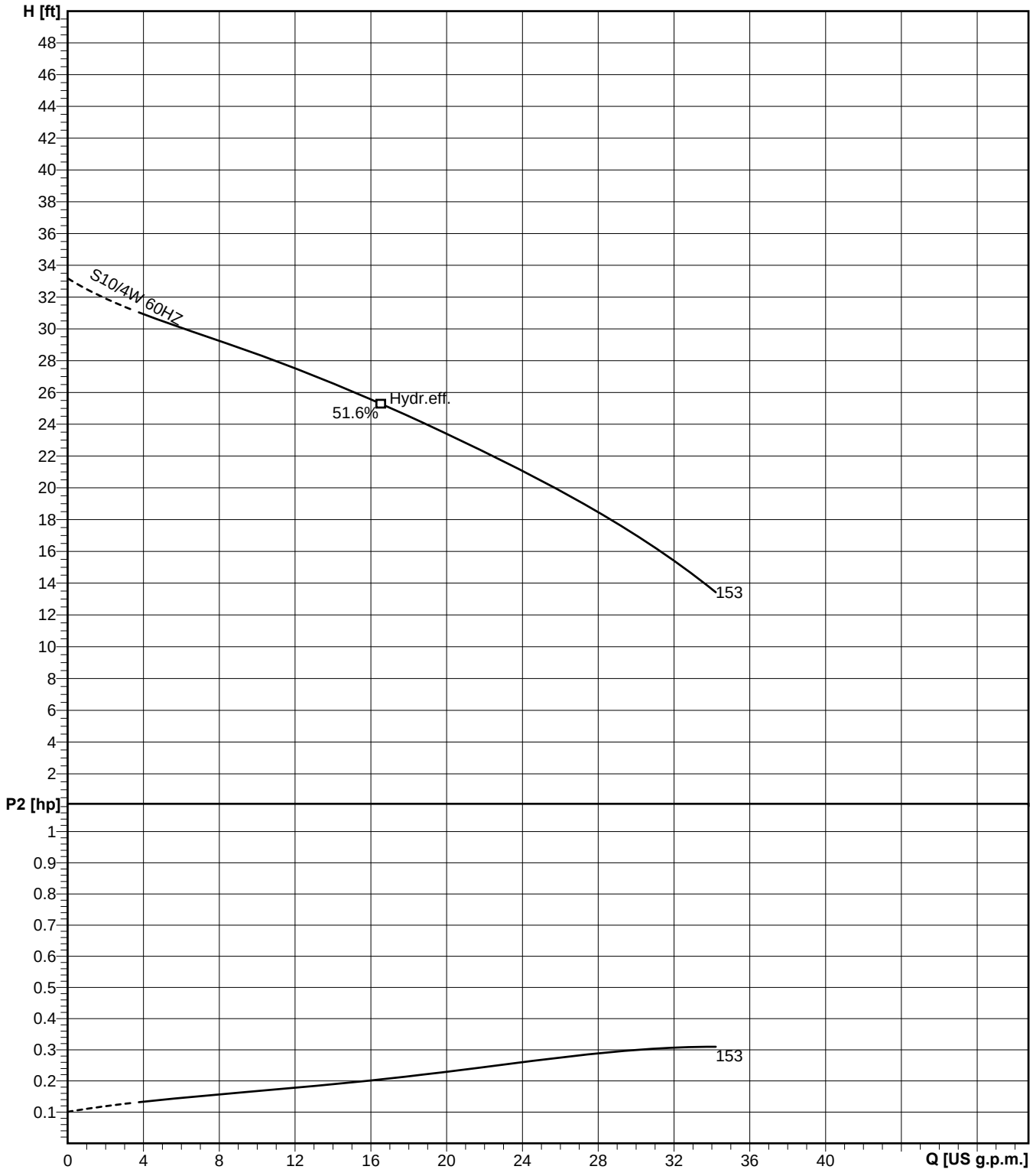
SULZER

Pump performance curves
PIRANHA S W 60 HZ

Curve number	
Reference curve	PIRANHA S W

			Discharge	Frequency
			G1¼"	60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1655 rpm	Date 2012-03-15
Flow	Head	Rated power 0.267 hp	Hydraulic efficiency 48.1 %	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision
6.02 inch	4	Macerator		2010-09-28

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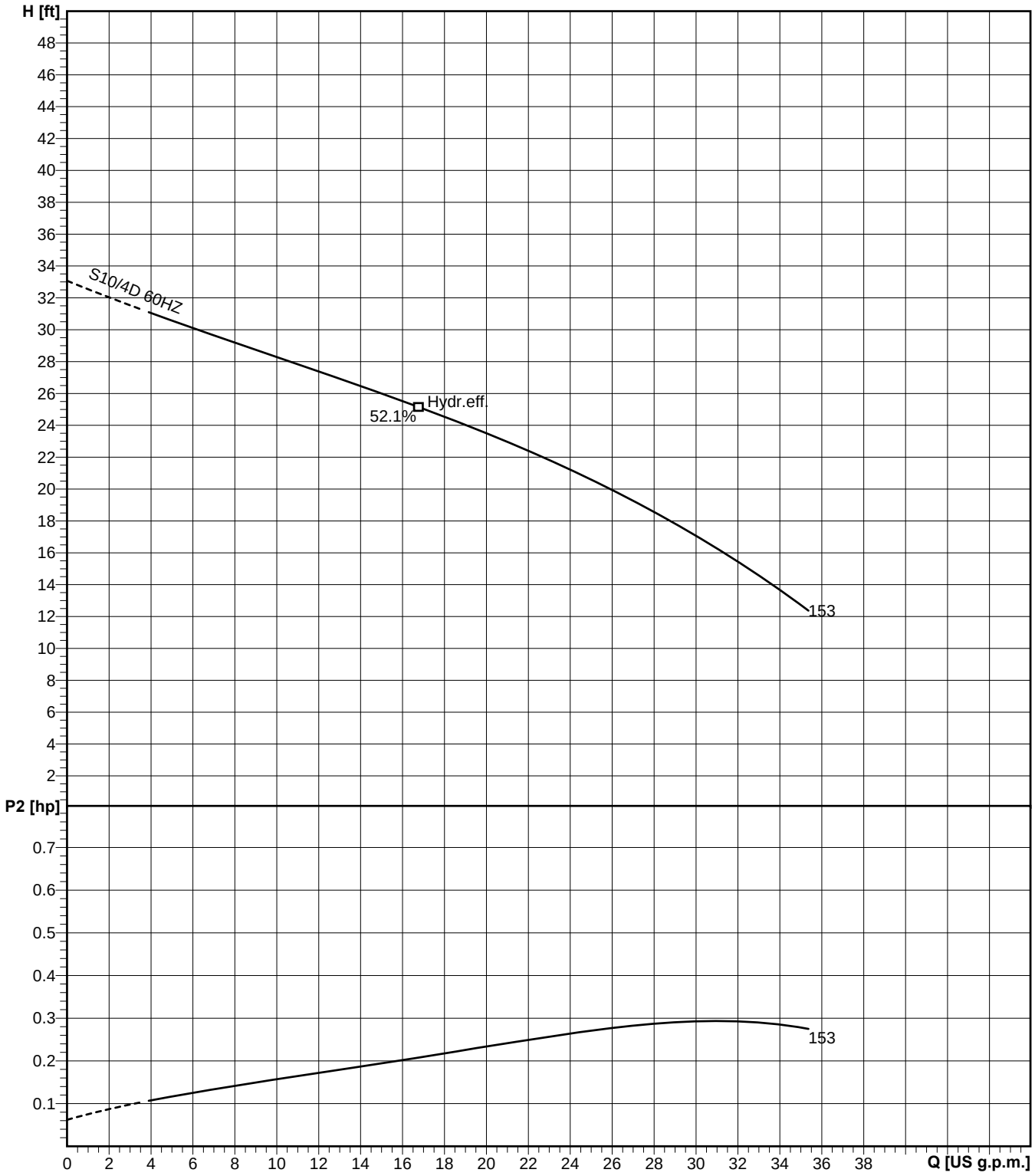
abs

SULZER

Pump performance curves
PIRANHA S D 60 HZ

			Discharge G1¼"	Curve number Reference curve PIRANHA S D
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1715 rpm	Date 2012-03-15
Flow	Head	Rated power 0.279 hp	Hydraulic efficiency 46.1 %	NPSH



Impeller size 6.02 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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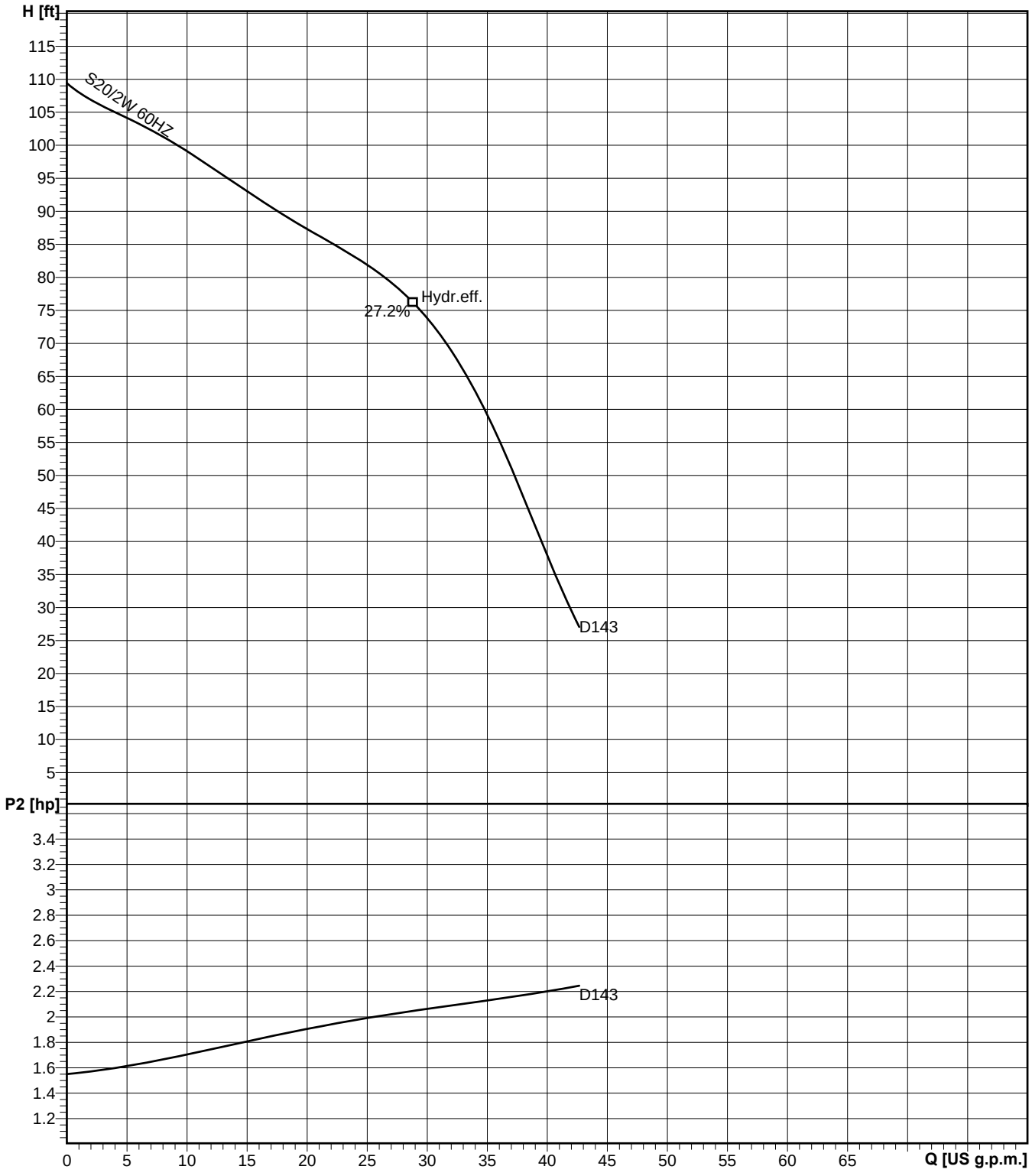
SULZER

Pump performance curves
PIRANHA S W 60 HZ

Curve number	
Reference curve	PIRANHA S W

			Discharge	Frequency
			G1¼"	60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3520..3345 rpm	Date 2012-03-15
Flow	Head	Rated power 2.17 hp	Hydraulic efficiency 20.9 %	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-09-28
5.75..5.63 inch	4	Macerator		

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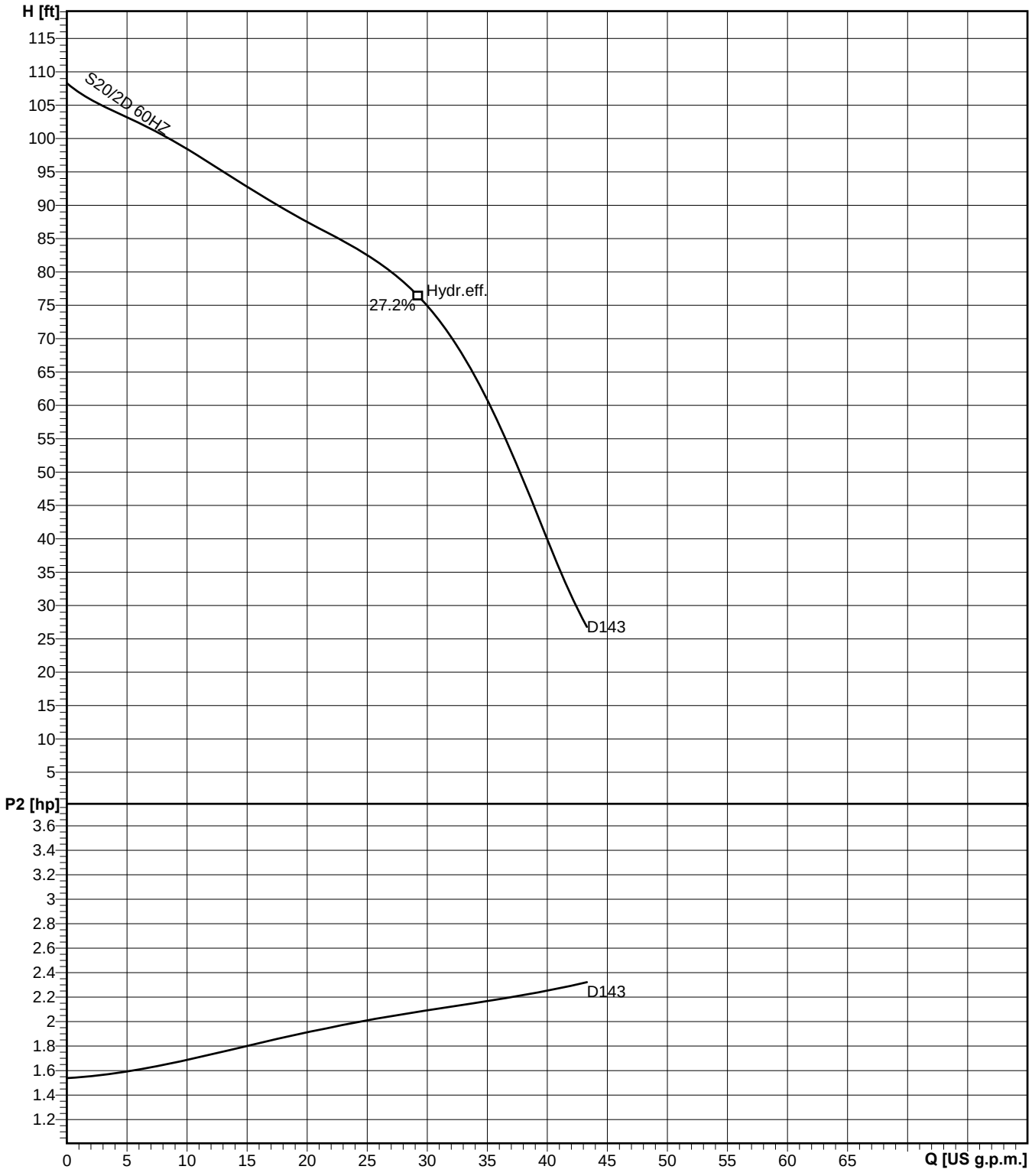
SULZER

Pump performance curves
PIRANHA S D 60 HZ

			Discharge G1¼"	Curve number Reference curve PIRANHA S D
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395 rpm	Date 2012-03-15
Flow	Head	Rated power 2.24 hp	Hydraulic efficiency 19.3 %	NPSH



Impeller size 5.91..5.63 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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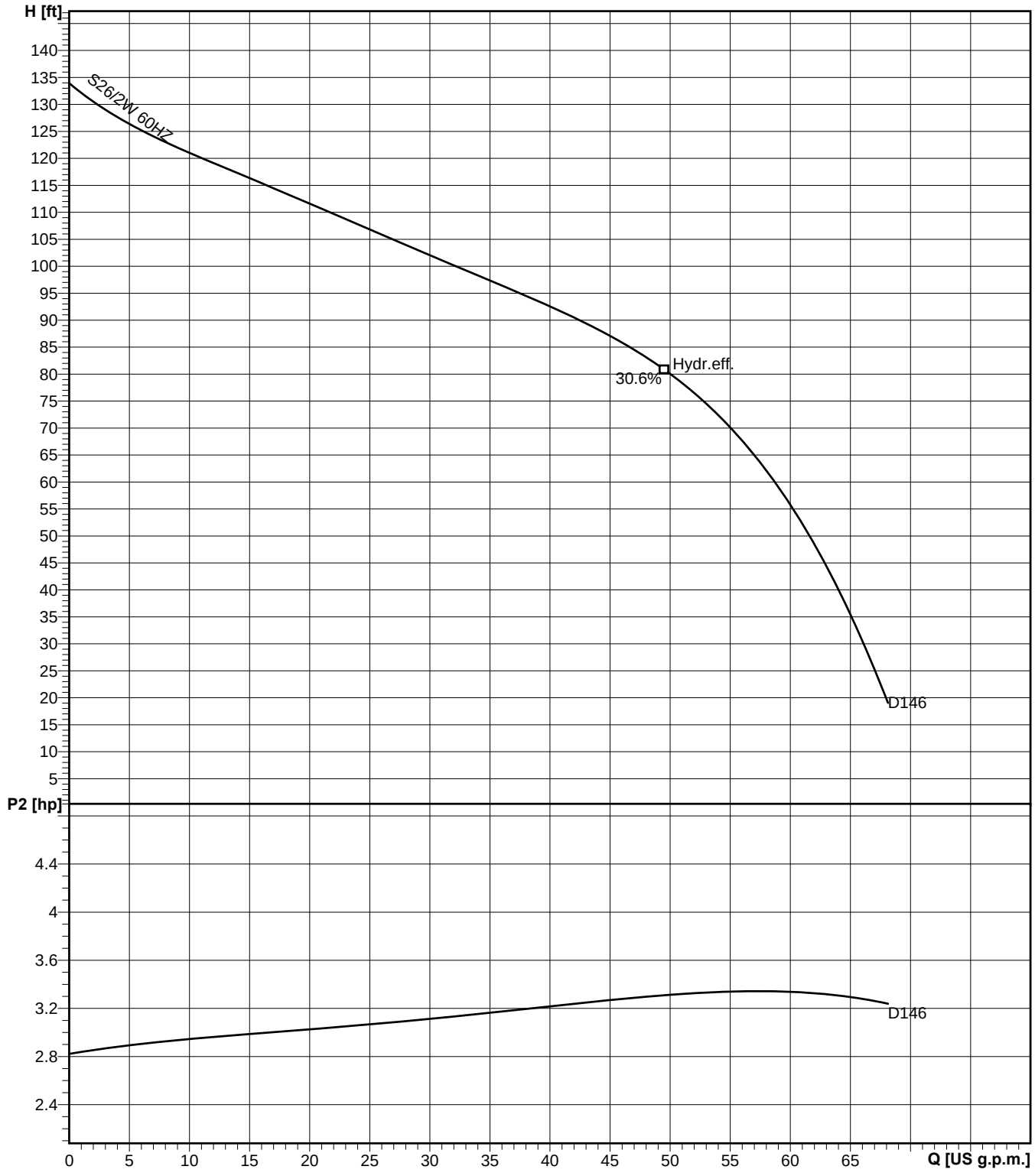
SULZER

Pump performance curves
PIRANHA S W 60 HZ

			Curve number	
			Reference curve PIRANHA S W	
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3520..3345 rpm	Date 2012-03-15
Flow	Head	Rated power 3.31 hp	Hydraulic efficiency 30.6 %	NPSH



Impeller size 5.75..5.63 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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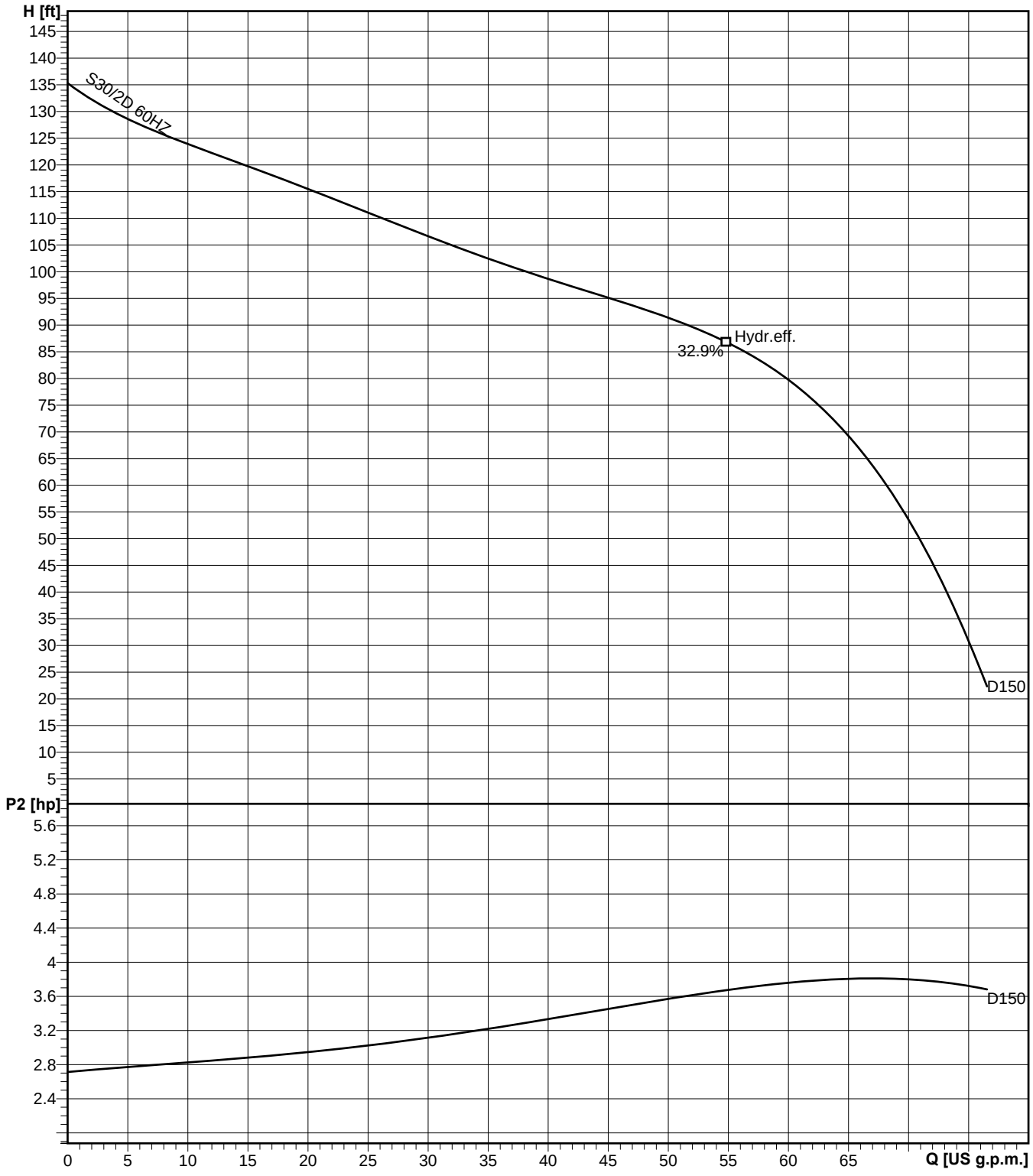
abs

SULZER

Pump performance curves
PIRANHA S D 60 HZ

				Curve number
				Reference curve PIRANHA S D
			Discharge G1¼"	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395 rpm	Date 2012-03-15
Flow	Head	Rated power 3.68 hp	Hydraulic efficiency 32.9 %	NPSH



Impeller size 5.91..5.63 inch	N° of vanes 4	Impeller Macerator	Solid size	Revision 2010-09-28

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abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 279••F (155••C)
Motor Protection	Oil Chamber Moisture Detector, bimetallic switches embedded in each phase for thermal overload protection. Installer must conform to N.E.C. standards, 1990 Ed. Art. 430.
Bimetallic Temp Trip	284••F • •9••F (140••C • •5••C)
Service Factor	1.0
Voltage Tolerance	• •10% from nominal
Approvals	UL, CSA (FM available as option)

MOTOR DATA, 60Hz

Model	Phase	Output Power Bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S10/4W*	1	1.3	208	7.2	15.8	A	0.99	67.5	4/1750
S10/4W*	1	1.3	230	6.5	14.3	A	0.99	67.5	4/1750
S10/4	3	1.3	208	5.8	25.2	H	0.64	75.3	4/1750
S10/4	3	1.3	230	5.2	22.8	H	0.64	75.3	4/1750
S10/4	3	1.3	460	2.6	11.4	H	0.64	75.3	4/1750
S10/4	3	1.3	575	2.1	9.1	H	0.64	75.3	4/1750

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Cable Cap	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Cutter Disc Assembly	Chrome Molybdenum Cobalt Tool Steel 58-62 Rockwell “C”
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing.
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Open Multi-vane

DIMENSIONS, WEIGHT, AND MISC.

Pump weight (lb.)	88
Pump weight (lb.) (explosion proof)	89
Maximum submergence (feet)	33
Discharge size, standard	1¼ Inch
Discharge thread type	Female NPT
Maximum temp. of pumped fluid	72••F (40••C)

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet
S10/4W	14/7 Type SOW-A	32
S10/4D	14/7 Type SOW-A	32

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

Specifications subject to change without notice

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 279••F (155••C)
Motor Protection	Oil Chamber Moisture Detector, bimetallic switches embedded in each phase for thermal overload protection. Installer must conform to N.E.C. standards, 1990 Ed. Art. 430.
Bimetallic Temp Trip	234••F • •9••(130••C • •5••C)
Service Factor	1.0
Voltage Tolerance	• •10% from nominal
Approvals	UL, CSA (FM available as option)

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S20/2W*	1	2.0	208	11.9	32.5	A	0.99	73.1	2/3450
S20/2W*	1	2.0	230	10.8	29.4	A	0.99	73.1	2/3450
S20/2	3	2.0	208	8.0	42.6	G	0.84	74.5	2/3450
S20/2	3	2.0	230	7.2	38.5	G	0.84	74.5	2/3450
S20/2	3	2.0	460	3.6	19.2	G	0.84	74.5	2/3450
S20/2	3	2.0	575	2.9	15.4	G	0.84	74.5	2/3450

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Cable Cap	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Cutter Disc Assembly	Chrome Molybdenum Cobalt Tool Steel 58-62 Rockwell "C"
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing.
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Open Multi-vane

DIMENSIONS, WEIGHT, AND MISC.

Pump weight (lb.)	81
Pump weight (lb.) (explosion proof)	82
Maximum submergence (feet)	33
Discharge size, standard	1¼ Inch
Discharge thread type	Female NPT
Maximum temp. of pumped fluid	72••F (40••C)

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet
S20/2W	14/7 Type SOW-A	32
S20/2D	14/7 Type SOW-A	32

Power cable suitable for all standard voltages listed in "MOTOR DATA" section.

Specifications subject to change without notice

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 155••C
Motor Protection	Oil Chamber Moisture Detector, bimetallic switches embedded in each phase for thermal overload protection. Installer must conform to N.E.C. standards, 1990 Ed. Art. 430.
Bimetallic Temp Trip	130º C ••5º C
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	UL, CSA (FM available as option)

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S26/2W*	1	3.5	208	15.14	72.4	D	0.99	83.1	2/3450
S26/2W*	1	3.5	230	13.7	65.5	D	0.99	83.4	2/3450

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Cable Cap	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Cutter Disc Assembly	Chrome Molybdenum Cobalt Tool Steel 58-62 Rockwell "C"
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Double row ball bearing.
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Open Multi-vane

DIMENSIONS, WEIGHT, AND MISC.

Pump weight (lb.)	82
Pump weight (lb.) (explosion proof)	83
Maximum submergence (feet)	33
Discharge size, standard	1¼ Inch
Discharge thread type	Female NPT
Maximum temp. of pumped fluid	40•Ɛ

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet
S26/2W	14/7 Type SOW-A	32

Power cable suitable for all standard voltages listed in "MOTOR DATA" section.

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 279••F (155••C)
Motor Protection	Oil Chamber Moisture Detector, bimetallic switches embedded in each phase for thermal overload protection. Installer must conform to N.E.C. standards, 1990 Ed. Art. 430.
Bimetallic Temp Trip	234••F • •9••(130••C • •5••C)
Service Factor	1.0
Voltage Tolerance	• •10% from nominal
Approvals	UL, CSA (FM available as option)

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S30/2	3	4.0	208	12.1	80.4	J	0.88	77.6	2/3450
S30/2	3	4.0	230	11.0	72.6	J	0.88	77.6	2/3450
S30/2	3	4.0	460	5.5	36.3	J	0.88	77.6	2/3450
S30/2	3	4.0	575	4.4	29.0	J	0.88	77.6	2/3450

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Cable Cap	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Cutter Disc Assembly	Chrome Molybdenum Cobalt Tool Steel 58-62 Rockwell “C”
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Double row ball bearing.
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Open Multi-vane

DIMENSIONS, WEIGHT, AND MISC.

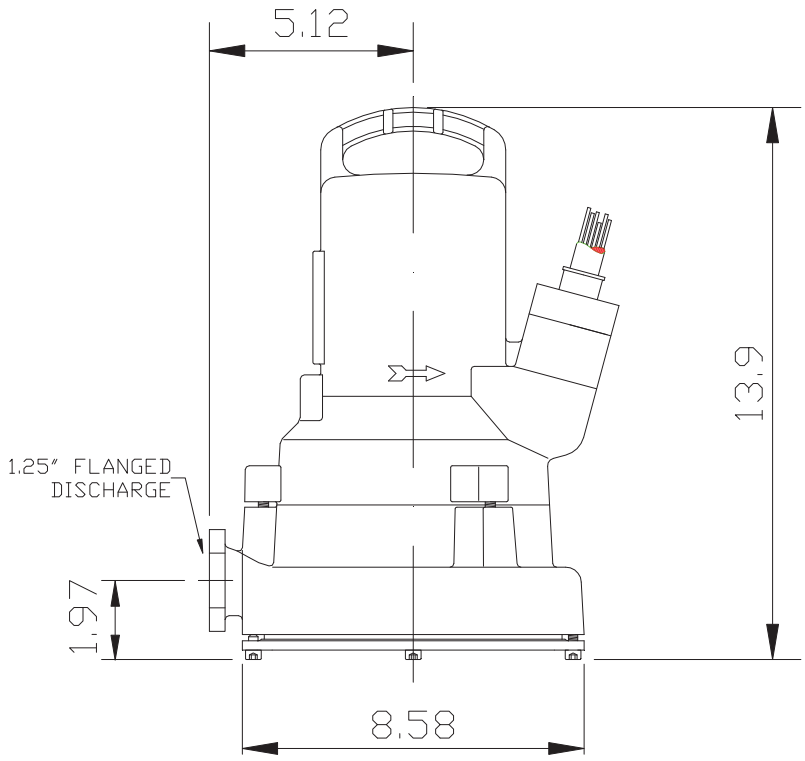
Pump weight (lb.)	88
Pump weight (lb.) (explosion proof)	89
Maximum submergence (feet)	33
Discharge size, standard	1¼ Inch
Discharge thread type	Female NPT
Maximum temp. of pumped fluid	72••F (40••C)

CABLE SPECIFICATIONS

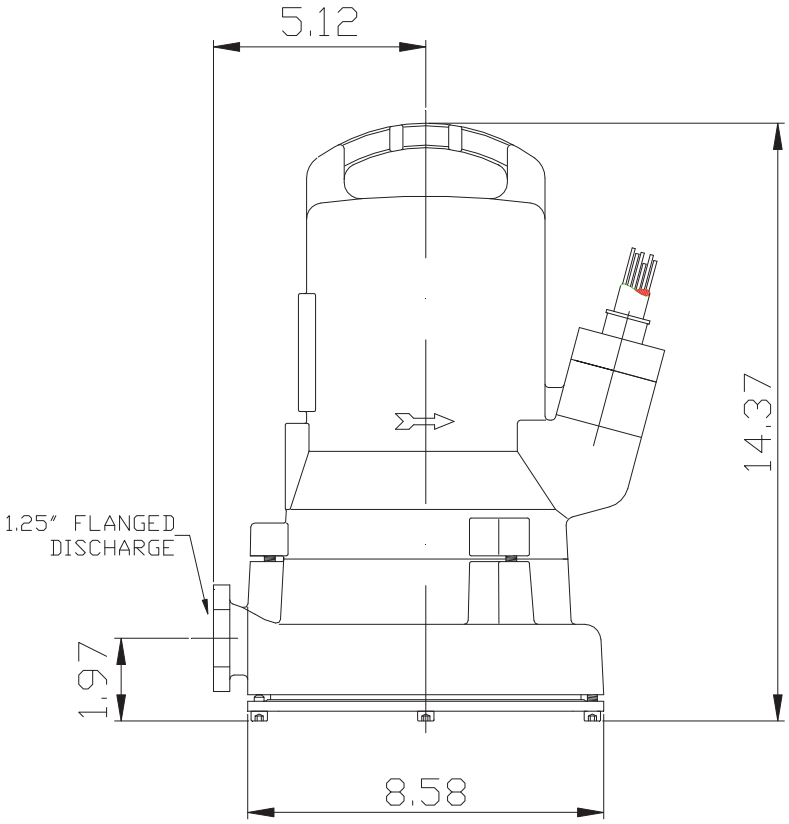
MODEL	POWER CABLE Quantity, Type	LENGTH, Feet
S30/2D	14/7 Type SOW-A	32

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

STANDARD & EXPLOSION PROOF



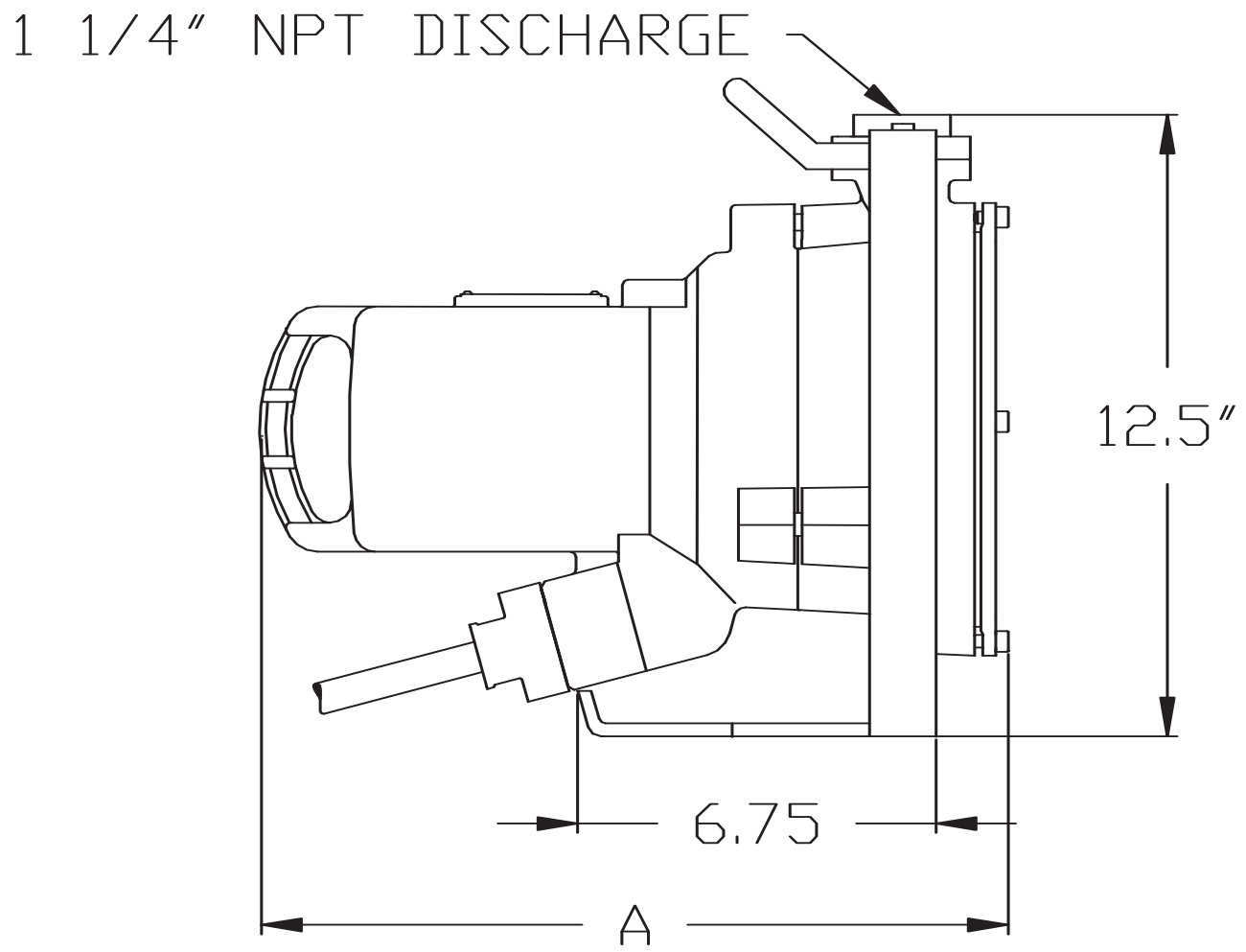
Piranha S10/4 and S20/2



Piranha S26/2W and S30/2D

STANDARD & EXPLOSION PROOF

Model	A
S10/4, S20/2	13.9"
S26/2W, S30/2D	14.37"



SULZER

Massblatt PIRANHA S 12/2 - S 20/2

Dimension sheet

Plan d'encombrement

No: AN-M.04.30-04
Drawn: 18.07.97 / C.Quirke
Issue Date: 09.11.06
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

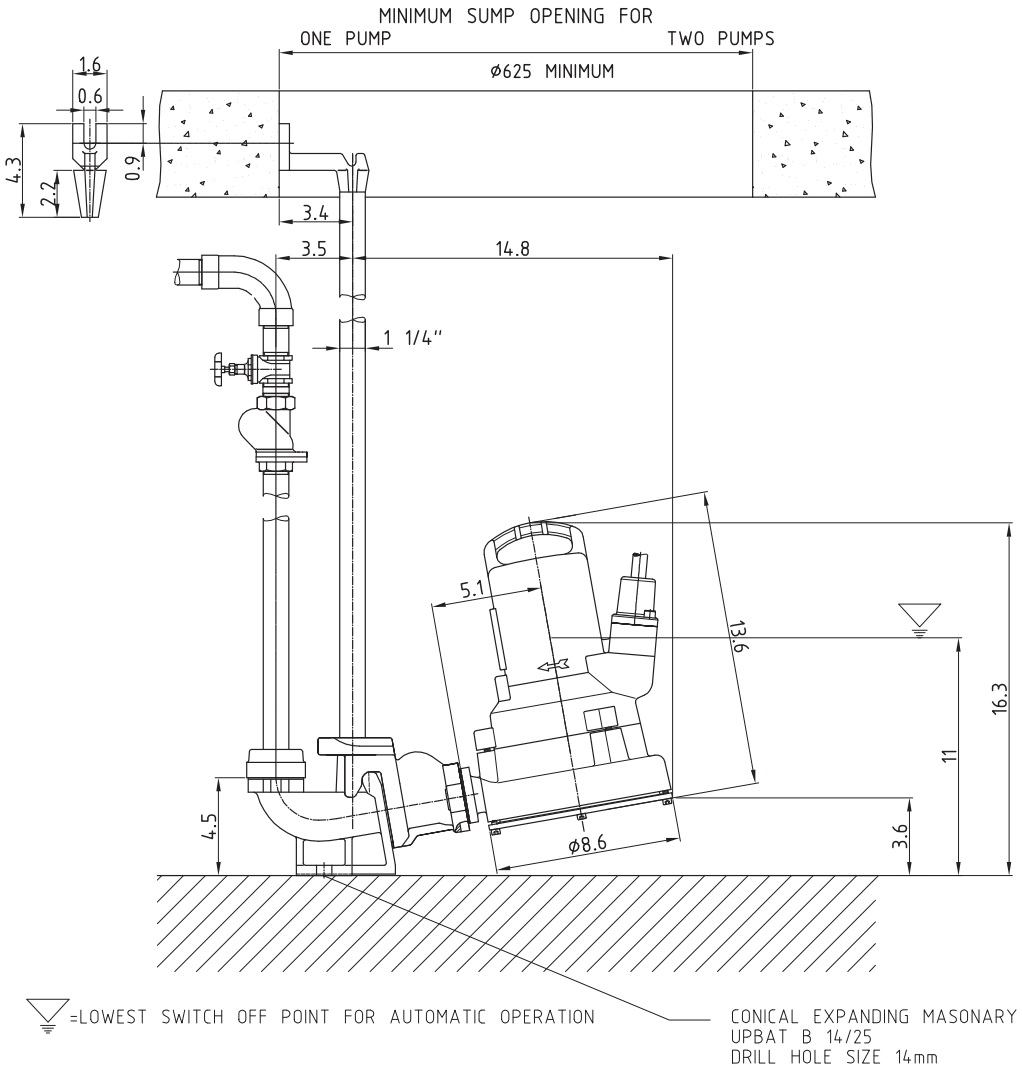
50 Hz

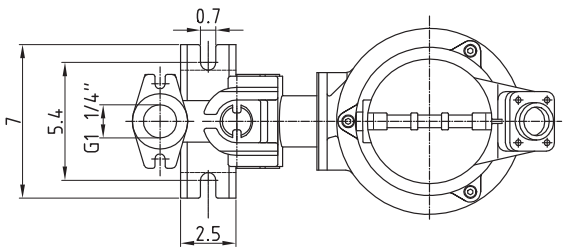
Typ Type Tipo
S 12/2
S 13/4
S 17/2

60 Hz

Typ Type Tipo
S 10/4
S 20/2

U.S.





abs

SULZER

Massblatt PIRANHA S 21/2 - S 30/2

Dimension sheet

Plan d'encombrement

No: AN-M.04.31-01
Drawn: 18.07.97 / C.Quirke
Issue Date: 16.07.01
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

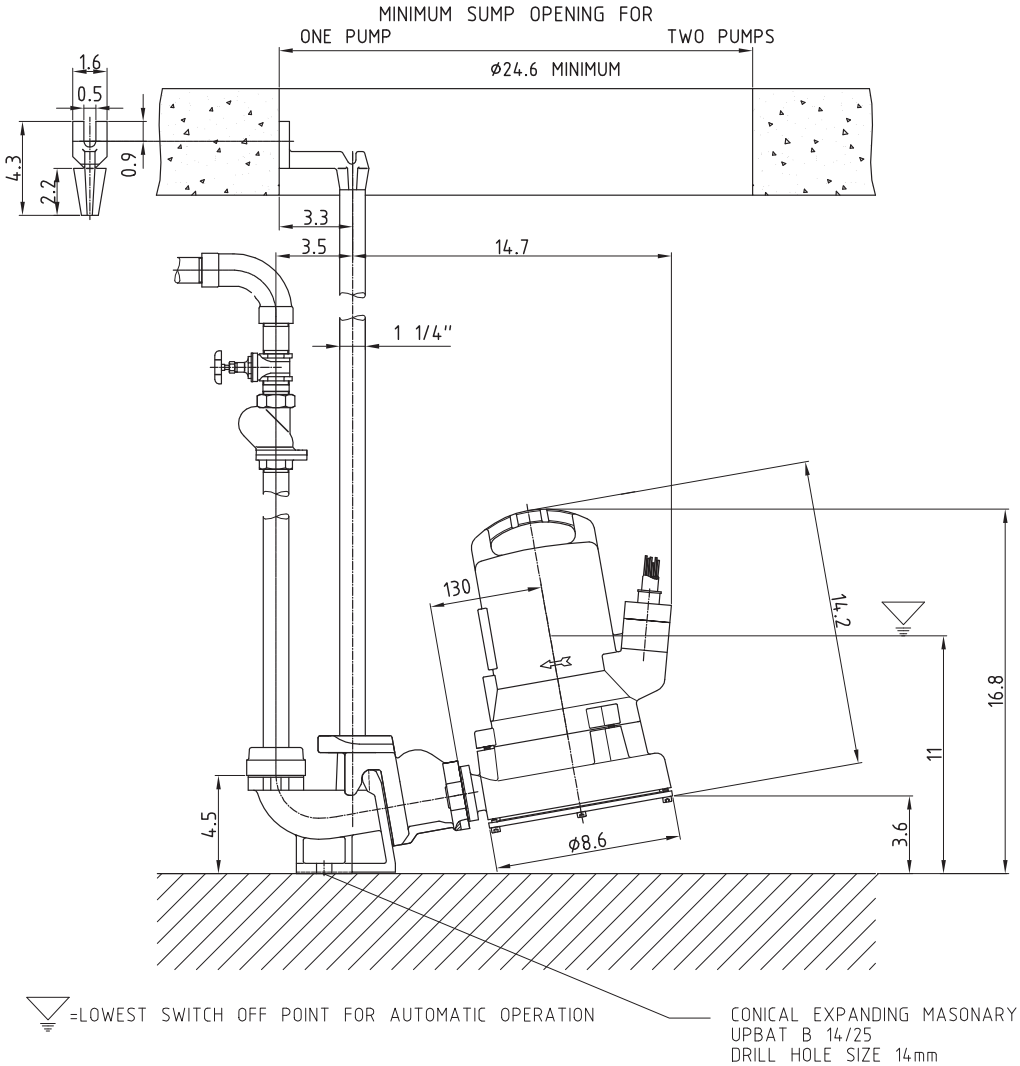
50 Hz

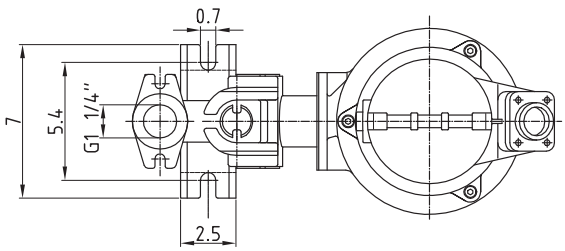
Typ Type Tipo
S 21/2
S 26/2

60 Hz

Typ Type Tipo
S 26/2
S 30/2

U.S.





abs

SPECIFICATIONS

1-1/4" PIRANHA PE GRINDER PUMP

Piranha PE1
2 Pole, 1 Phase, PE1

Date:	03/12		
Dwg:	DS-P03-009	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ Submersible Grinder type wastewater pump(s). The pump(s) shall be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps are intended for wet pit installation and shall be supplied with a _____ to support the pump. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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

GUIDE RAIL BASE ASSEMBLY (optional)

There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). In a wet pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide rail base automatically and firmly, guided by one 1 ¼ inch guide pipe extending from the base elbow to the top of the station. 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.

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.

VERTICAL PUMP STAND & HORIZONTAL CRADLE BASE (optional)

As an alternative to a Guide Rail System, the pumps shall be a supported by either a vertical pump stand or horizontal cradle base. The stand or base is bolted to the pump and provides a means to stand the pump on the wet well floor in either a vertical or horizontal position.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Grinder Mechanism:

The grinder mechanism shall consist of two circular, hardened cutter elements, one rotating and one stationary. The cutter material shall be similar to an AISI 440C stainless steel with the addition of cobalt, vanadium, and molybdenum for superior abrasion resistance and a hardness of Rockwell C 58-62. The rotating element shall be secured to the end of the pump shaft directly below the impeller by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. It shall be keyed to the impeller so that it rotates with the motor. The head of the securing bolt shall be effectively recessed within the cutter element bore to prevent disruption of the flow stream and catching of solid material in the wastewater.

The stationary element shall be secured to the Self Cleaning Wear Plate and positioned so that it is concentric to and aligned with the rotating element. Both elements shall incorporate a sinusoidal wave pattern at the grinding interface to create a shearing and cutting action between the elements as the rotating cutter spins. The rotating cutter shall incorporate an integrated solids deflector to prevent items such as plastic bags from covering the grinder assembly and starving the pump. All wastewater being pumped by the impeller shall be drawn through the grinder mechanism by the natural suction of the pump impeller and reduced to a particle size approximately 1/8 inch. The grinder mechanism shall not require routine adjustments throughout the life of the grinder assembly.

Impeller: The impeller shall be a semi open multi vane design with a solids passage size sufficient to prevent clogging on the wastewater material that has passed through the integrated grinder assembly. The impeller material shall be gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which also holds the rotating cutter element. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth vibration free operation.

Self Cleaning Wear Plate: The ABS ContraBlock style wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed to hold and secure the stationary cutter firmly in place, concentric to the rotating cutter. The impeller side of the wear plate shall incorporate an outwardly spiraling V-shaped groove to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three 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 to restore peak pumping performance shall be easily accomplished in the field utilizing 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 1 ¼ inch. The discharge flange design shall permit attachment to the ABS guide rail system, and shall also accept a 1 1/4"' NPT male fitting when the pump is supplied with an available NPT adapter kit. 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be a minimum of 1.2. The motor shall have a voltage tolerance of +/- 10% from nominal and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating completely submerged, at full rated power continuously without the need for de-rating or reduced duty cycle. It shall be self cooling via the process fluid surrounding the motor. The motor shall have a NEMA Class A temperature rise

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the "back EMF" developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run Capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, including fibrous materials, by an active Seal Protection System integrated into the impeller and volute, and by the grinder mechanism ahead of the impeller. The back side of the impeller shall be equipped with pump out vanes to eject any fibrous material that attempts to lodge behind the impeller. The volute housing adjacent to the back side pumping vanes of the impeller shall incorporate an outward spiraling groove as described in the "Self Cleaning Wear Plate" section above, to eject solid materials from the mechanical seal area. Fibrous material which attempts to lodge behind the impeller, or wrap around the mechanical seal shall be effectively ejected by the system preventing 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. Grinder pump designs which do not incorporate an active 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 hours at flows ranging from ½ of BEP flow to 1.2 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

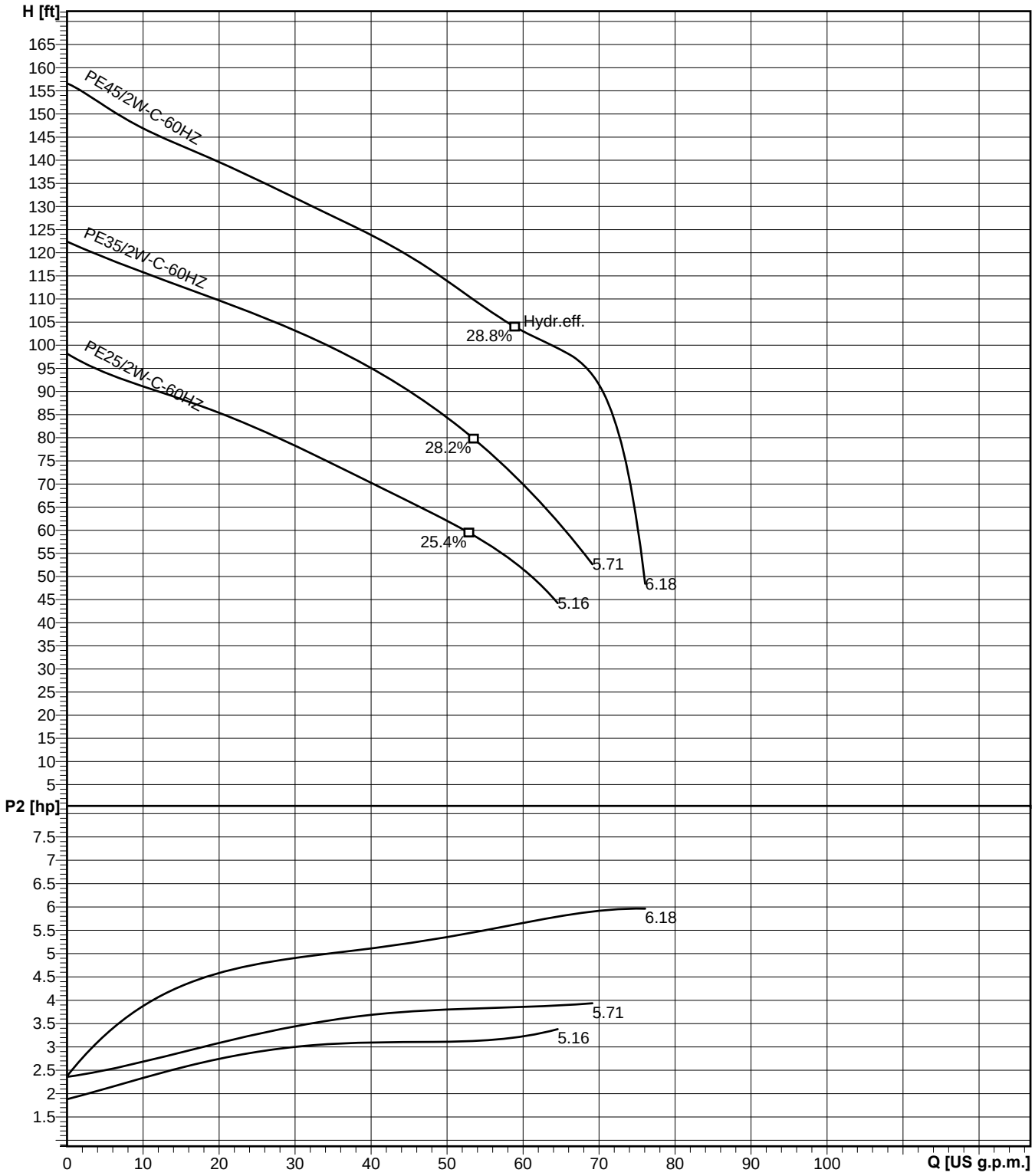
SULZER

Pump performance curves
PIR PE1 W 60HZ

			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3535..3565 rpm	Date 2012-03-21
Flow	Head	Rated power 5.63 hp	Hydraulic efficiency 28.8 %	NPSH

Curve number

Reference curve
PIR-PE-C-



Impeller size 6.18..5.16 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-16

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

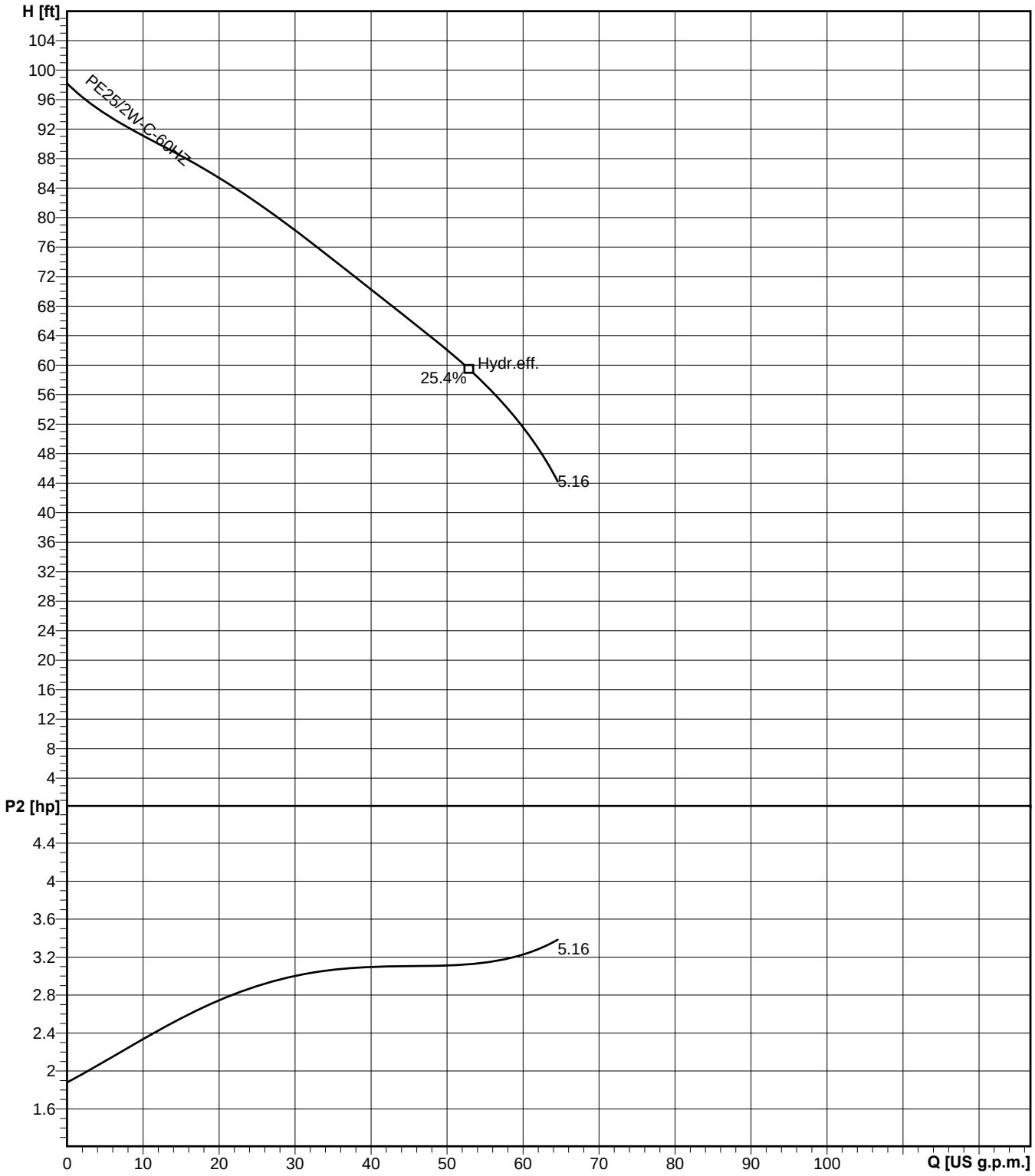
SULZER

Pump performance curves
PIR PE1 W 60HZ

			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3535..3565 rpm	Date 2012-03-21
Flow	Head	Rated power 3.11 hp	Hydraulic efficiency 24.7 %	NPSH

Curve number

Reference curve
PIR-PE-C-



Impeller size 6.18..5.16 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-16

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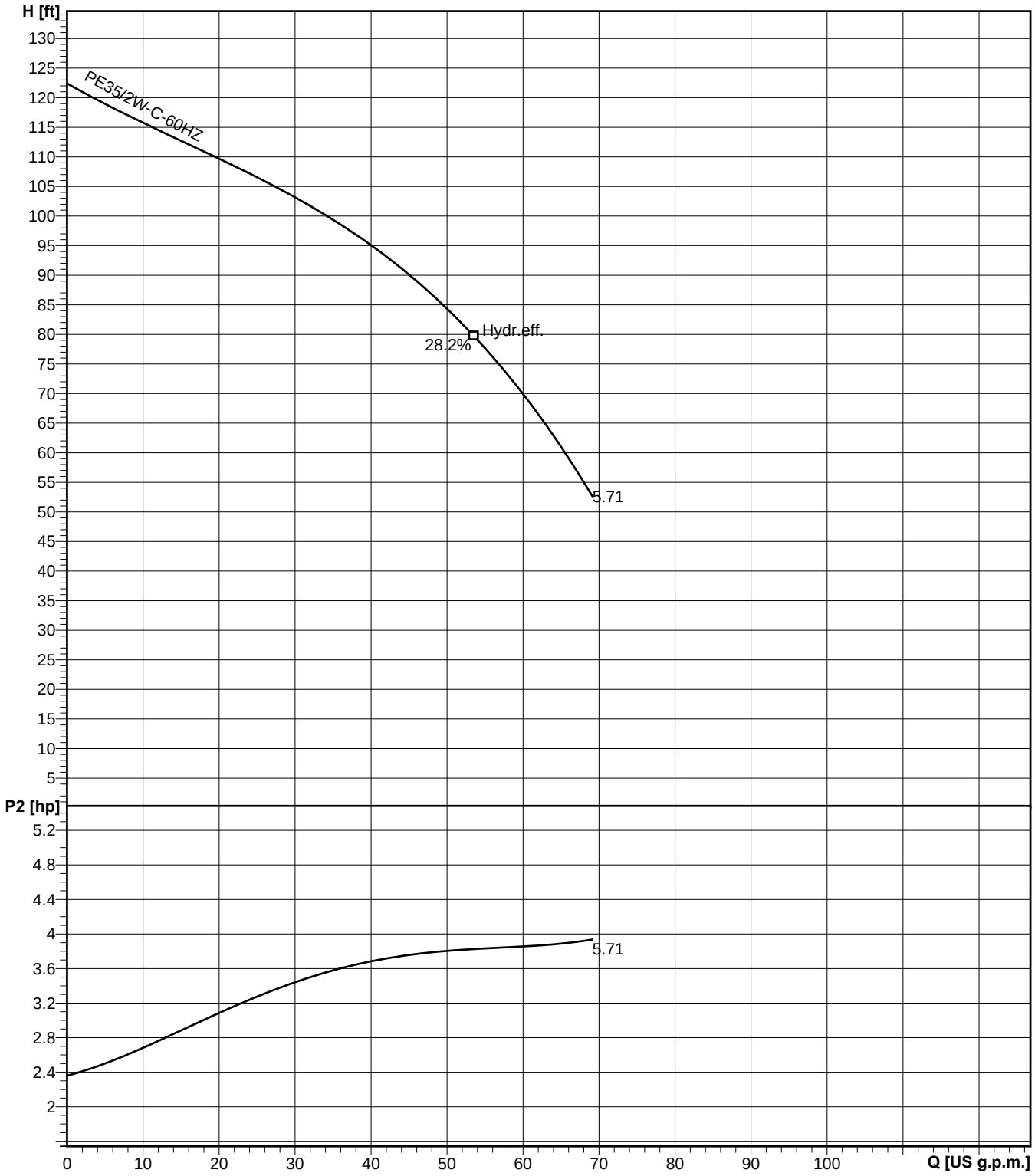
SULZER

Pump performance curves
PIR PE1 W 60HZ

Curve number	
Reference curve	PIR-PE-C-

			Discharge	Frequency
			DN32	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3535..3565 rpm	2012-03-21
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		3.82 hp	28.2 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-12-16
6.18..5.16 inch	5	Macerator		

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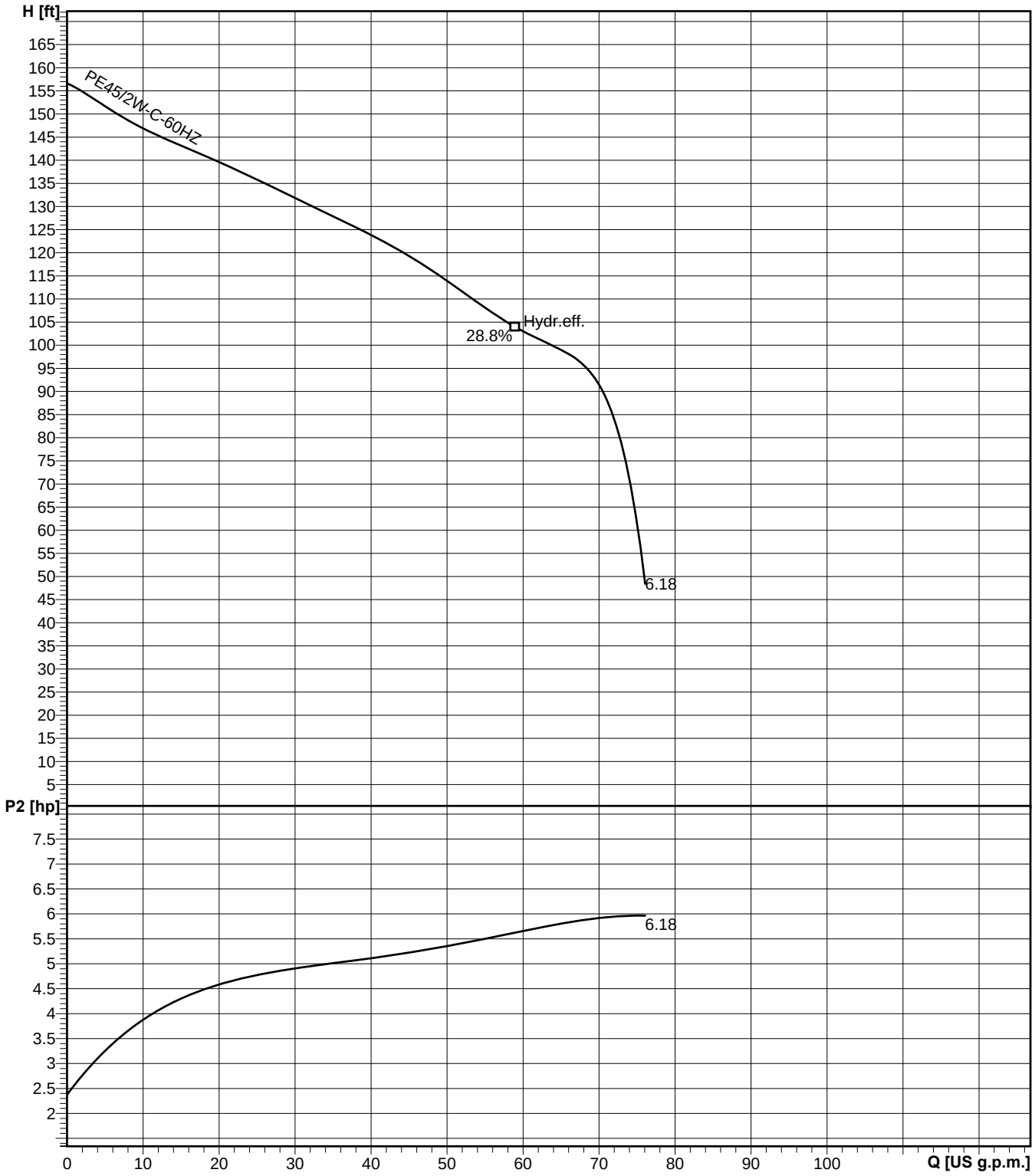
SULZER

Pump performance curves
PIR PE1 W 60HZ

			Curve number	
			Reference curve PIR-PE-C-	
			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3535..3565 rpm	Date 2012-03-21
Flow	Head	Rated power 5.63 hp	Hydraulic efficiency 28.8 %	NPSH



Impeller size 6.18..5.16 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-16

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TECHNICAL DATA

1-1/4" ABS PIRANHA PE GRINDER PUMP

Piranha PE1
2 Pole, 1 Phase, PE1

Date:	10/11	
Dwg:	DS-P01-021	Rev: 2

Submersible Motor Specifications, PE1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		12, evenly spaced
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible grinder pump
Piranha PE
Part of the ABS EffeX range

*Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 25/2W*	2.9 kW	2.5 kW 3.4 HP	3565	208 230	14.7 13.3	87.2 78.9	F	1.3	85.4	82.2	72.7	.957	.896	.818
PE 35/2W*	4.0 kW	3.5 kW 4.7 HP	3550	208 230	19.6 17.8	87.2 78.9	C	1.3	88.6	86.1	80.2	.967	.965	.920
PE 45/2W*	5.1 kW	4.5 kW 6 HP	3535	208 230	24.8 22.4	87.2 78.9	A	1.3	88.1	88.2	83.7	.992	.973	.953

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 25/2W	208 volt	SOOW 12/7	19.1mm (0.75") diameter
		230 volt	SOOW 12/7	19.1mm (0.75") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/2W	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 10/7	22.4mm (0.88") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 45/2W	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 10m (32 feet)		Optional: 20m (65 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN32, 1-1/4" Female NPT w/ use of discharge adapter kit					
Volute Pressure Rating	10 bar (145 psi)					
Impeller Type	Semi-Open, Multi-vane, w/ Cutter Assembly, Adjustable Wear Plate & Seal Protection System					
Model	PE 25/2W	PE 35/2W	PE 45/2W			
Impeller DIA	131mm (5.2")	145mm (5.7")	157mm (6.2")			
Min Recommended Flow, GPM	10	10	10			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cutter Disc Assembly		Chrome Molybdenum Cobalt Steel 58-62 Rockwell "C"	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 25/2W	PE 35/2W	PE 45/2W
Overall Height	605mm (23.8")	605mm (23.8")	605mm (23.8")
Pump Weight	85 kg (188 lb)	85 kg (188 lb)	85 kg (188 lb)

FM Approvals
Member of the FM Global Group

abs

SPECIFICATIONS

1-1/4" PIRANHA PE GRINDER PUMP

Piranha PE1
2 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-P03-010	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ Submersible Grinder type wastewater pump(s). The pump(s) shall be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps are intended for wet pit installation and shall be supplied with a _____ to support the pump. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

The heavy duty submersible grinder pump(s) shall be capable of handling raw unscreened sewage and other similar solids-laden fluids without clogging. The pump shall be driven by a Premium Efficiency three phase motor, providing the highest levels of operational reliability and energy efficiency.

GUIDE RAIL BASE ASSEMBLY (optional)

There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). In a wet pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide rail base automatically and firmly, guided by one 1 ¼ inch guide pipe extending from the base elbow to the top of the station. 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.

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.

VERTICAL PUMP STAND & HORIZONTAL CRADLE BASE (optional)

As an alternative to a Guide Rail System, the pumps shall be a supported by either a vertical pump stand or horizontal cradle base. The stand or base is bolted to the pump and provides a means to stand the pump on the wet well floor in either a vertical or horizontal position.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Grinder Mechanism:

The grinder mechanism shall consist of two circular, hardened cutter elements, one rotating and one stationary. The cutter material shall be similar to an AISI 440C stainless steel with the addition of cobalt, vanadium, and molybdenum for superior abrasion resistance and a hardness of Rockwell C 58-62. The rotating element shall be secured to the end of the pump shaft directly below the impeller by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. It shall be keyed to the impeller so that it rotates with the motor. The head of the securing bolt shall be effectively recessed within the cutter element bore to prevent disruption of the flow stream and catching of solid material in the wastewater.

The stationary element shall be secured to the Self Cleaning Wear Plate and positioned so that it is concentric to and aligned with the rotating element. Both elements shall incorporate a sinusoidal wave pattern at the grinding interface to create a shearing and cutting action between the elements as the rotating cutter spins. The rotating cutter shall incorporate an integrated solids deflector to prevent items such as plastic bags from covering the grinder assembly and starving the pump. All wastewater being pumped by the impeller shall be drawn through the grinder mechanism by the natural suction of the pump impeller and reduced to a particle size approximately 1/8 inch. The grinder mechanism shall not require routine adjustments throughout the life of the grinder assembly.

Impeller: The impeller shall be a semi open multi vane design with a solids passage size sufficient to prevent clogging on the wastewater material that has passed through the integrated grinder assembly. The impeller material shall be gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which also holds the rotating cutter element. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth vibration free operation.

Self Cleaning Wear Plate: The ABS ContraBlock style wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed to hold and secure the stationary cutter firmly in place, concentric to the rotating cutter. The impeller side of the wear plate shall incorporate an outwardly spiraling V-shaped groove to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three 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 to restore peak pumping performance shall be easily accomplished in the field utilizing 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 1 ¼ inch. The discharge flange design shall permit attachment to the ABS guide rail system, and shall also accept a 1 1/4"' NPT male fitting when the pump is supplied with an available NPT adapter kit. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be a minimum of **1.2**. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating completely submerged, at full rated power continuously without the need for de-rating or reduced duty cycle. It shall be self cooling via the process fluid surrounding the motor. The motor shall have a NEMA Class A temperature rise

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, including fibrous materials, by an active Seal Protection System integrated into the impeller and volute, and by the grinder mechanism ahead of the impeller. The back side of the impeller shall be equipped with pump out vanes to eject any fibrous material that attempts to lodge behind the impeller. The volute housing adjacent to the back side pumping vanes of the impeller shall incorporate an outward spiraling groove as described in the "Self Cleaning Wear Plate" section above, to eject solid materials from the mechanical seal area. Fibrous material which attempts to lodge behind the impeller, or wrap around the mechanical seal shall be effectively ejected by the system preventing 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. Grinder pump designs which do not incorporate an active 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 hours at flows ranging from ½ of BEP flow to 1.2 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

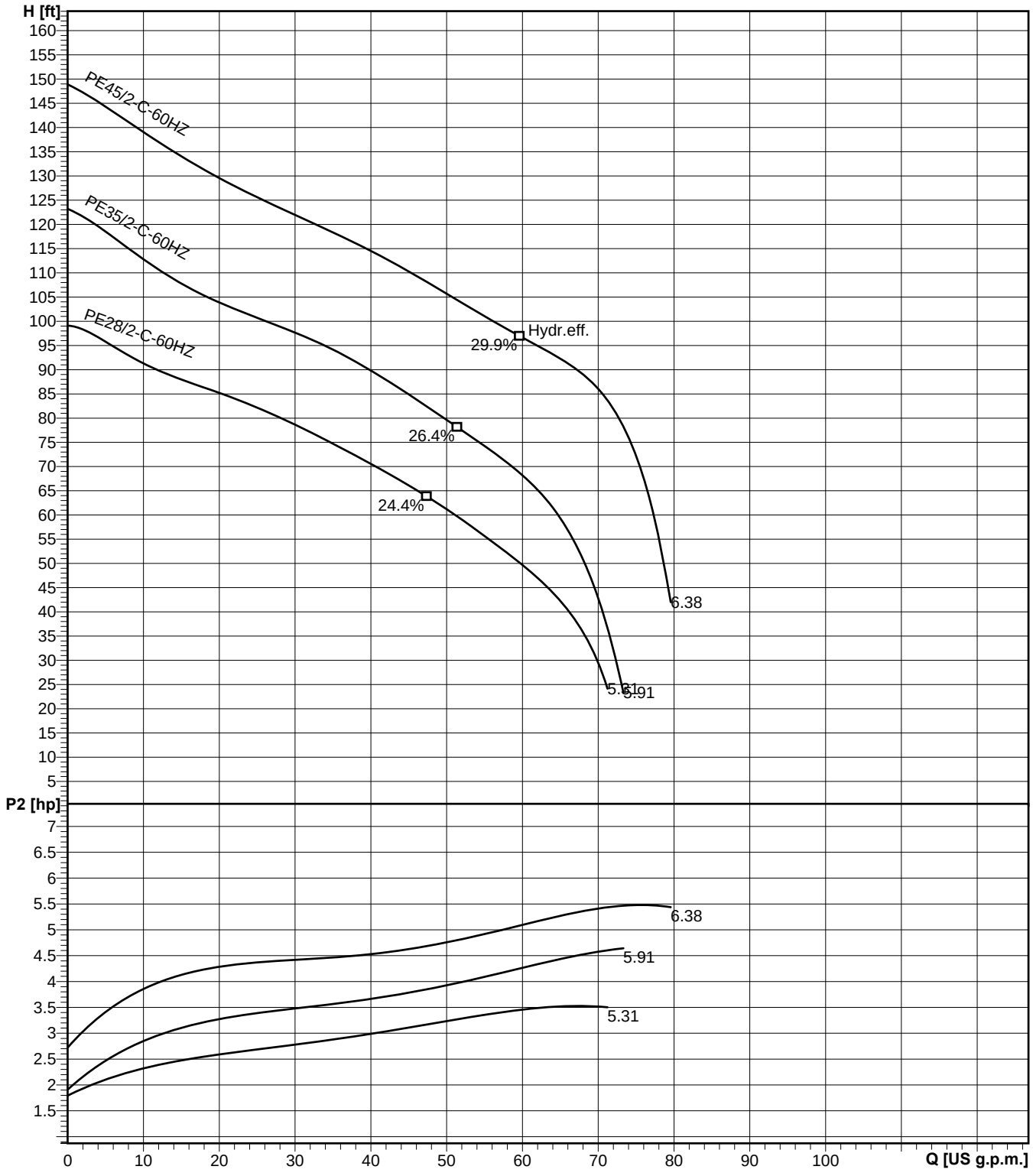
Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
PIR PE1 60HZ

Curve number				
Reference curve PIR-PE-C-				
			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3535 rpm	Date 2012-03-21
Flow	Head	Rated power 5.09 hp	Hydraulic efficiency 29.9 %	NPSH



Impeller size 6.38..5.31 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-15

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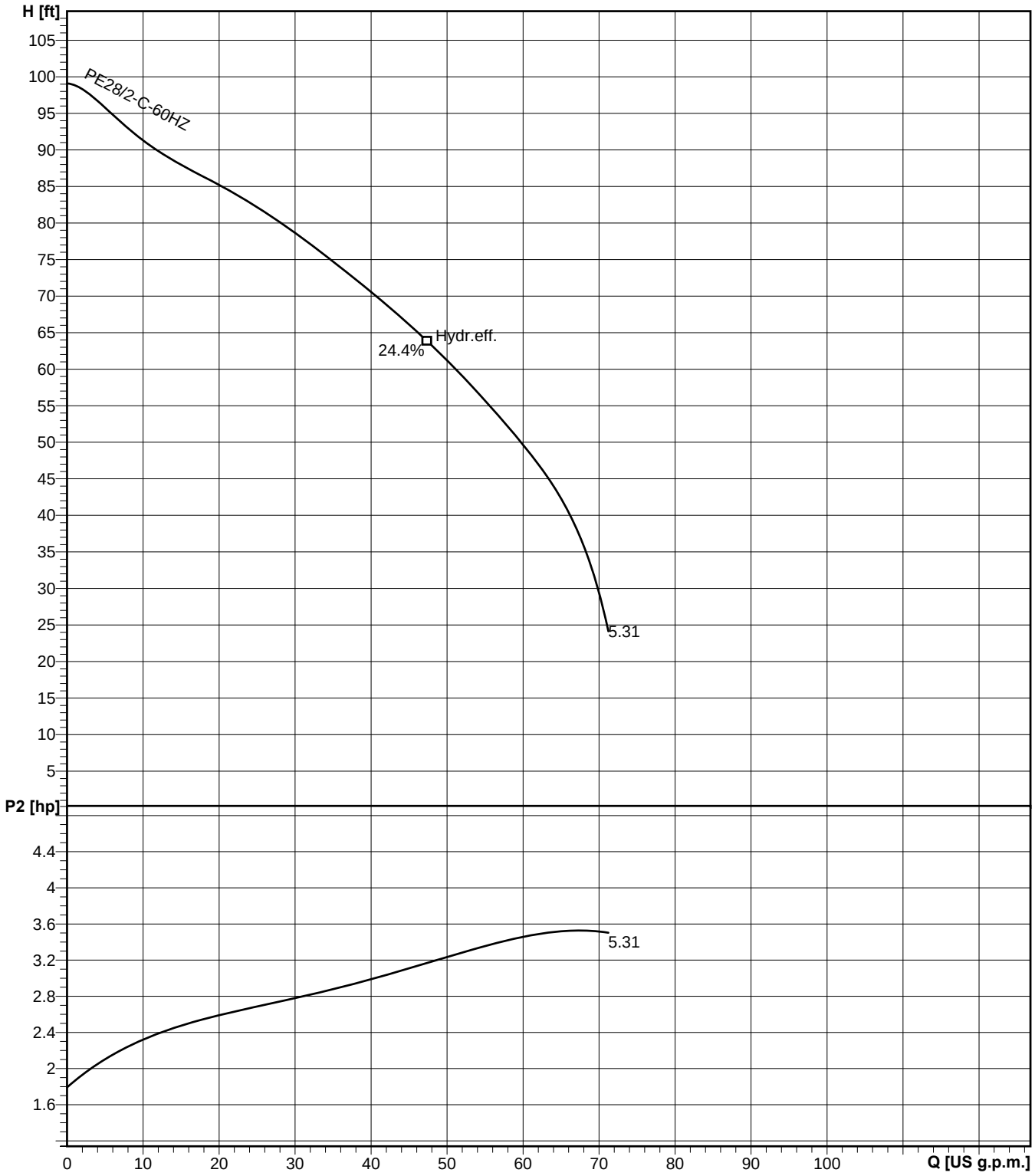
abs

SULZER

Pump performance curves
PIR PE1 60HZ

			Curve number	
			Reference curve PIR-PE-C-	
			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3535 rpm	Date 2012-03-21
Flow	Head	Rated power 3.19 hp	Hydraulic efficiency 24.4 %	NPSH



Impeller size 6.38..5.31 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

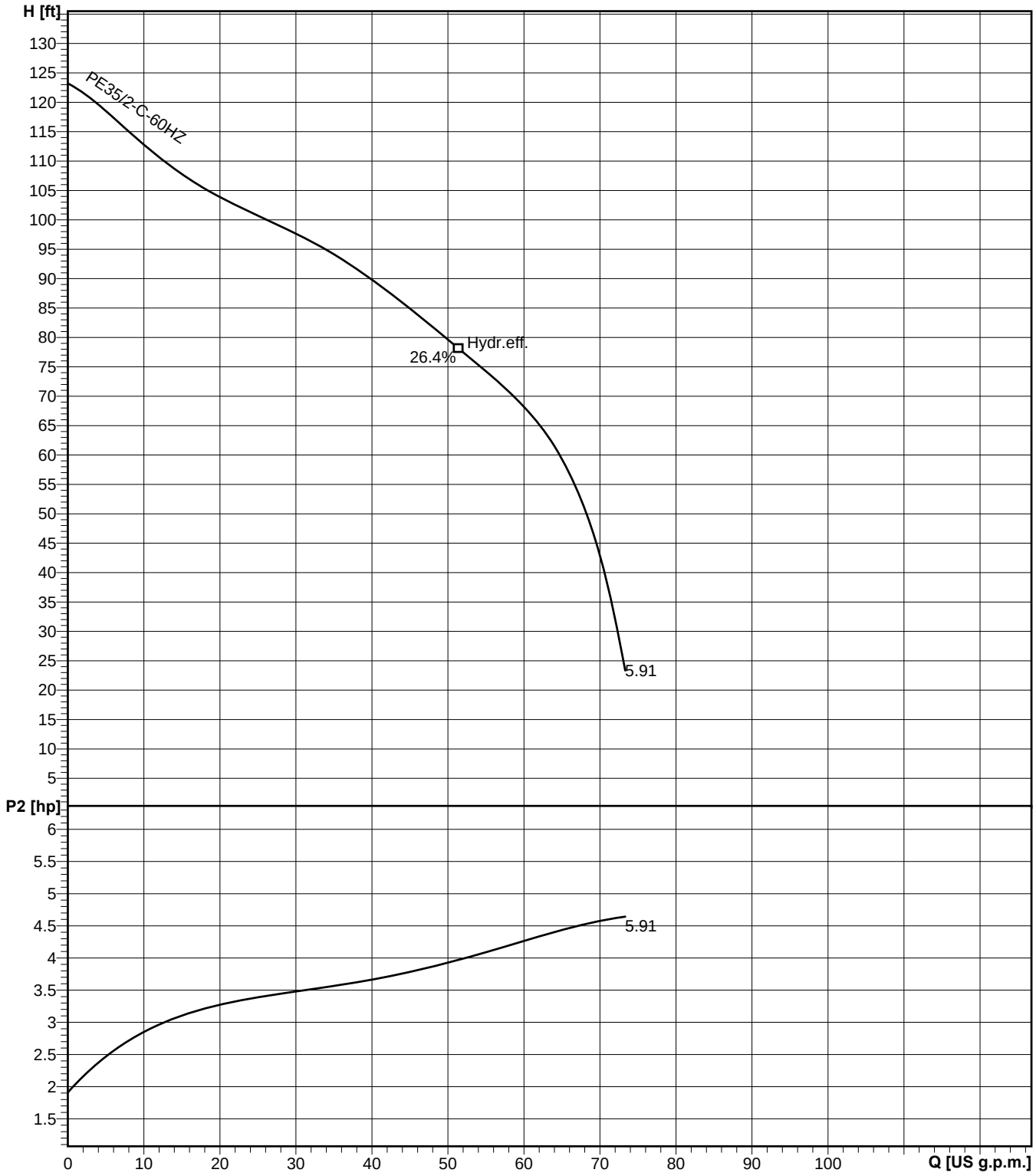
abs

SULZER

Pump performance curves
PIR PE1 60HZ

Curve number	
Reference curve	PIR-PE-C-

			Discharge	Frequency
			DN32	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3515..3535 rpm	2012-03-21
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.03 hp	26.3 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision
6.38..5.31 inch	5	Macerator		2010-12-15

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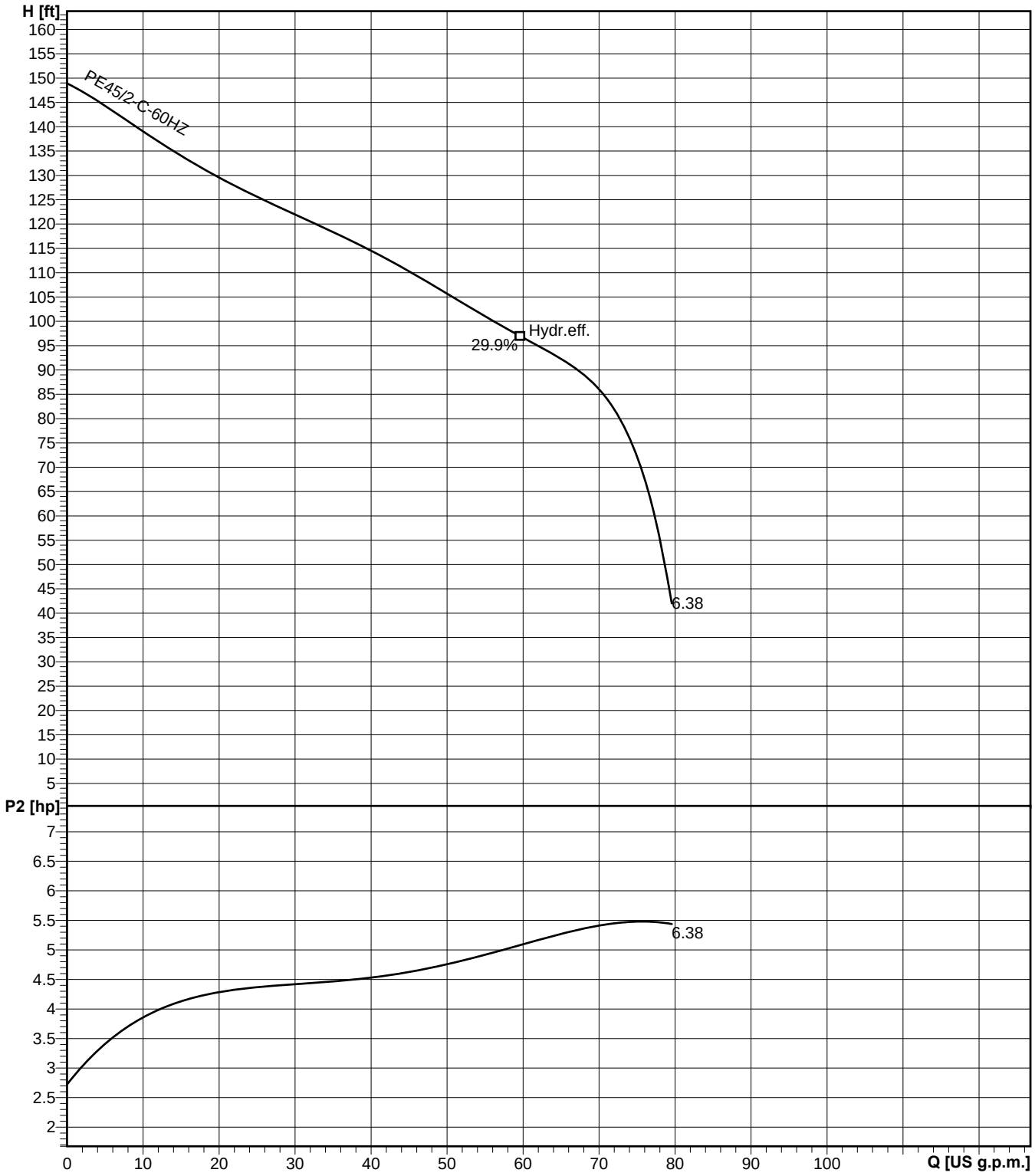
SULZER

Pump performance curves
PIR PE1 60HZ

			Discharge DN32	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3535 rpm	Date 2012-03-21
Flow	Head	Rated power 5.09 hp	Hydraulic efficiency 29.9 %	NPSH

Curve number

Reference curve
PIR-PE-C-



Impeller size 6.38..5.31 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-12-15

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TECHNICAL DATA

1-1/4" ABS PIRANHA PE GRINDER PUMP

Piranha PE1
2 Pole, 3 Phase, PE1

Date:	10/11	
Dwg:	DS-P01-022	Rev: 1

Submersible Motor Specifications, PE1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Use with across the line starting recommended
Maximum Starts per Hour		15, evenly spaced
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

ABS submersible grinder pump
Piranha PE
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 28/2	3.2 kW	2.8 kW 3.75 HP	3550	208 230 460 600	10.4 9.4 4.7 3.6	52.4 47.4 23.7 18.2	F	1.3	87.2	86.4	82.9	.854	.833	.747
PE 35/2	3.9 kW	3.5 kW 4.7 HP	3550	208 230 460 600	12.9 11.6 5.8 4.5	52.3 47.3 23.7 18.1	D	1.3	88.8	87.6	84.8	.851	.799	.706
PE 45/2	3.8 kW	4.5 kW 6 HP	3550	208 230 460 600	16.4 14.8 7.4 5.7	133 120 60 46	J	1.3	88.2	89.1	85.9	.865	.839	.775

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 28/2	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/2	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 45/2	208 volt	SOOW 10/7	20.7mm (0.82") diameter
		230 volt	SOOW 12/7	18.8mm (0.74") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 10m (32 feet)		Optional: 20m (65 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	DN32, 1-1/4" Female NPT w/ use of discharge adapter kit					
Volute Pressure Rating	10 bar (145 psi)					
Impeller Type	Semi-Open, Multi-vane, w/ Cutter Assembly, Adjustable Wear Plate & Seal Protection System					
Model	PE 28/2	PE 35/2	PE 45/2			
Impeller DIA	135mm (5.3")	150mm (5.9")	162mm (6.4")			
Min Recommended Flow, GPM	10	10	10			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cutter Disc Assembly		Chrome Molybdenum Cobalt Steel 58-62 Rockwell "C"	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 28/2	PE 35/2	PE 45/2
Overall Height	605mm (23.8")	605mm (23.8")	605mm (23.8")
Pump Weight	85 kg (188 lb)	85 kg (188 lb)	85 kg (188 lb)

SPECIFICATIONS

2" PIRANHA PE GRINDER PUMP

Piranha PE2
2 Pole, 3 Phase, PE2

Date:	03/12		
Dwg:	DS-P03-011	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ Submersible Grinder type wastewater pump(s). The pump(s) shall be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps are intended for wet pit installation and shall be supplied with a _____ to support the pump. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

The heavy duty submersible grinder pump(s) shall be capable of handling raw unscreened sewage and other similar solids-laden fluids without clogging. The pump shall be driven by a Premium Efficiency three phase motor, providing the highest levels of operational reliability and energy efficiency.

GUIDE RAIL BASE ASSEMBLY (optional)

There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). In a wet pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide rail base automatically and firmly, guided by one 2 inch guide pipe extending from the base elbow to the top of the station. 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.

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.

VERTICAL PUMP STAND (optional)

As an alternative to a Guide Rail System, the pumps shall be a supported by a vertical pump stand. The stand is bolted to the pump and provides a means to stand the pump on the wet well floor in a vertical position.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Grinder Mechanism:

The grinder mechanism shall consist of two circular, hardened cutter elements, one rotating and one stationary. The cutter material shall be similar to an AISI 440C stainless steel with the addition of cobalt, vanadium, and molybdenum for superior abrasion resistance and a hardness of Rockwell C 58-62. The rotating element shall be secured to the end of the pump shaft directly below the impeller by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. It shall be keyed to the impeller so that it rotates with the motor. The head of the securing bolt shall be effectively recessed within the cutter element bore to prevent disruption of the flow stream and catching of solid material in the wastewater.

The stationary element shall be secured to the Self Cleaning Wear Plate and positioned so that it is concentric to and aligned with the rotating element. Both elements shall incorporate a sinusoidal wave pattern at the grinding interface to create a shearing and cutting action between the elements as the rotating cutter spins. The rotating cutter shall incorporate an integrated solids deflector to prevent items such as plastic bags from covering the grinder assembly and starving the pump. All wastewater being pumped by the impeller shall be drawn through the grinder mechanism by the natural suction of the pump impeller and reduced to a particle size approximately 1/8 inch. The grinder mechanism shall not require routine adjustments throughout the life of the grinder assembly.

Impeller: The impeller shall be a semi open multi vane design with a solids passage size sufficient to prevent clogging on the wastewater material that has passed through the integrated grinder assembly. The impeller material shall be gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which also holds the rotating cutter element. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth vibration free operation.

Self Cleaning Wear Plate: The ABS ContraBlock style wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed to hold and secure the stationary cutter firmly in place, concentric to the rotating cutter. The impeller side of the wear plate shall incorporate an outwardly spiraling V-shaped groove to shred and force stringy solids 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 to restore peak pumping performance shall be easily accomplished in the field utilizing 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 2 inch. The discharge flange design shall permit attachment to the ABS guide rail system, and shall also accept 2" ANSI class 125 flanged fittings. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be a minimum of **1.2**. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating completely submerged, at full rated power continuously without the need for de-rating or reduced duty cycle. It shall be self cooling via the process fluid surrounding the motor. The motor shall have a NEMA Class A temperature rise

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, including fibrous materials, by an active Seal Protection System integrated into the impeller and volute, and by the grinder mechanism ahead of the impeller. The back side of the impeller shall be equipped with pump out vanes to eject any fibrous material that attempts to lodge behind the impeller. The volute housing adjacent to the back side pumping vanes of the impeller shall incorporate an outward spiraling groove as described in the "Self Cleaning Wear Plate" section above, to eject solid materials from the mechanical seal area. Fibrous material which attempts to lodge behind the impeller, or wrap around the mechanical seal shall be effectively ejected by the system preventing 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. Grinder pump designs which do not incorporate an active 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 hours at flows ranging from ½ of BEP flow to 1.2 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

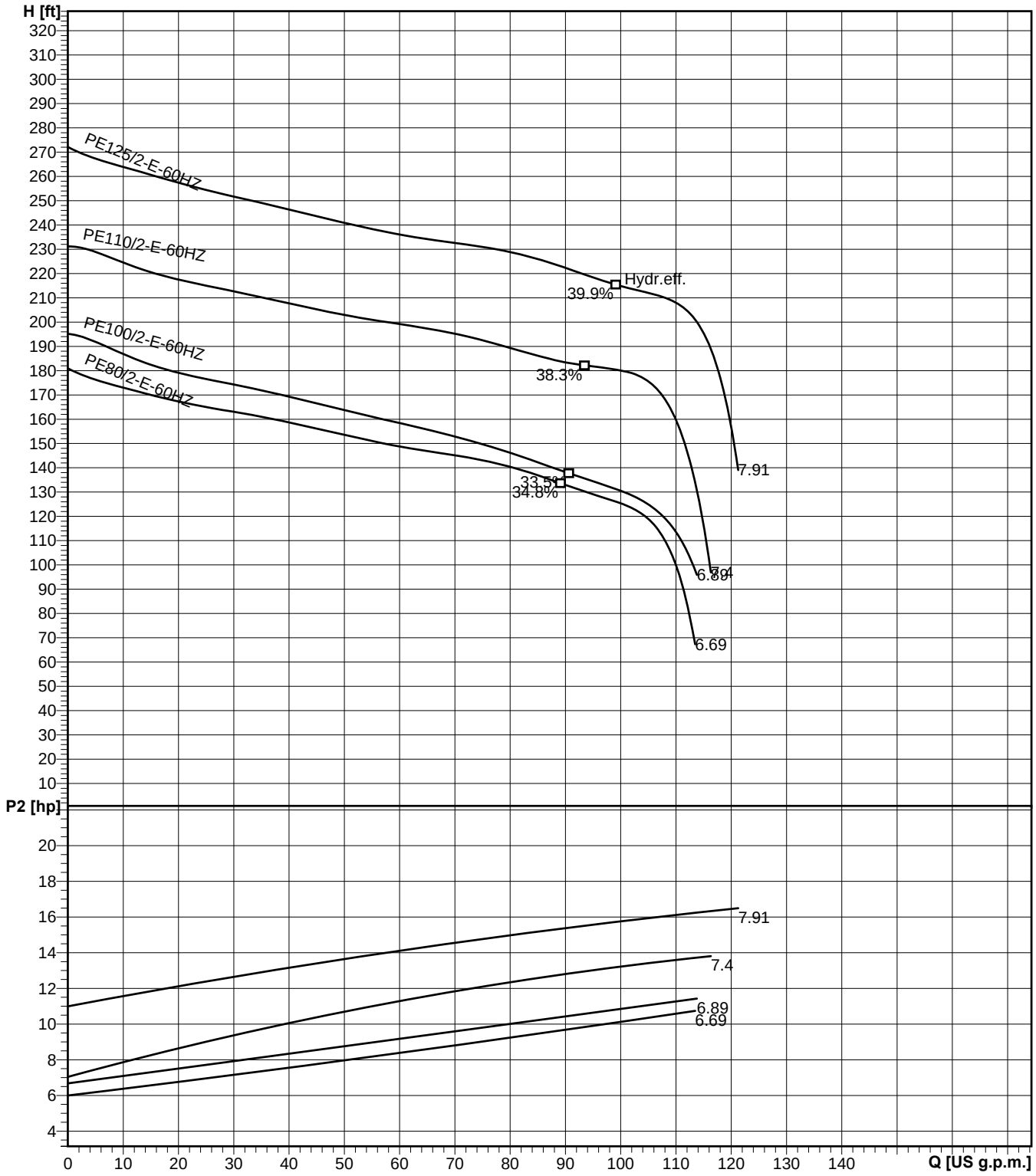
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
PIR PE2 60HZ

Curve number	
Reference curve	PIR PE2

			Discharge	Frequency
			DN50	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3515..3520 rpm	2012-03-21
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		15.7 hp	39.9 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-09-14
7.91..6.69 inch	5	Macerator		

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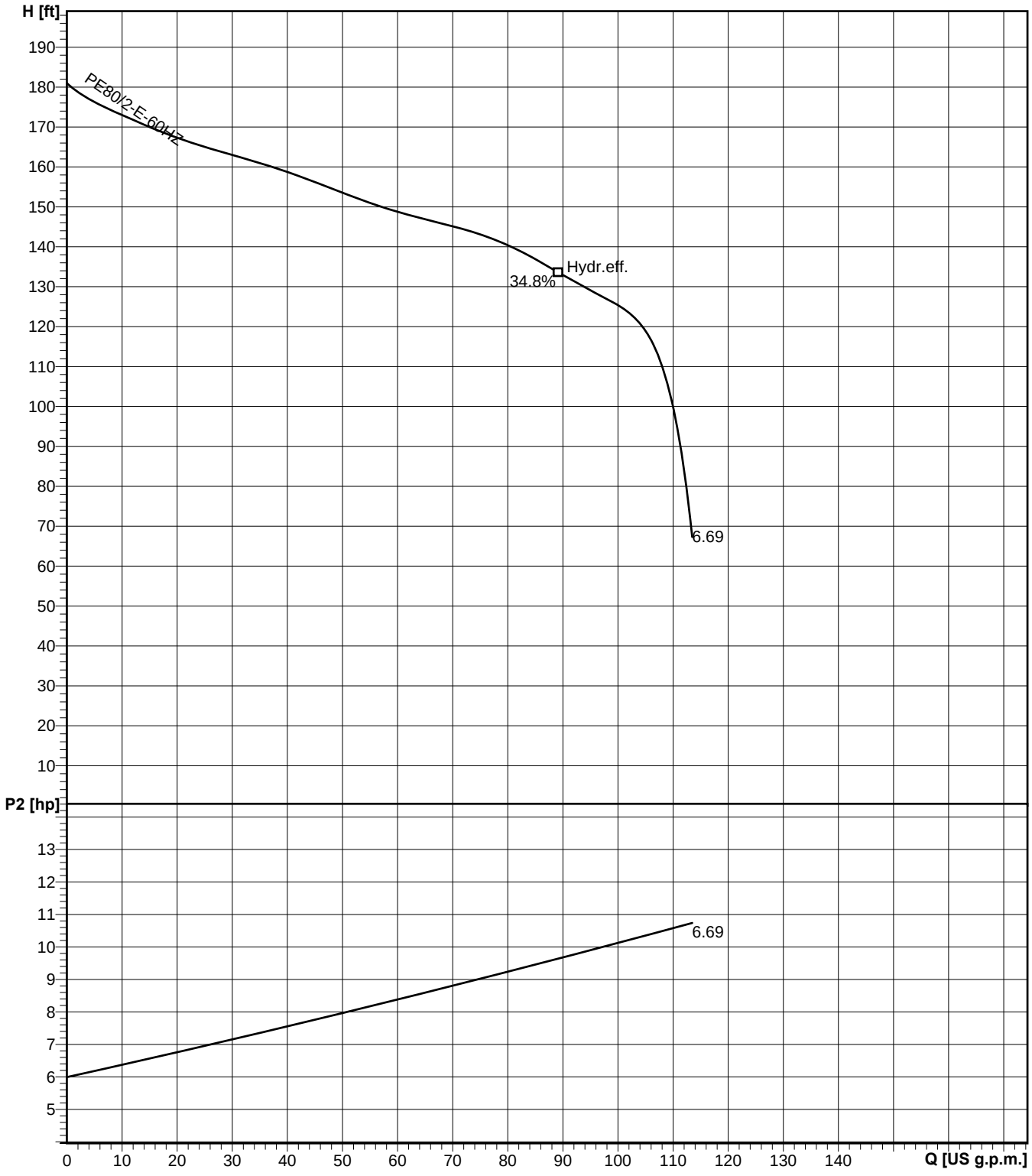
SULZER

Pump performance curves
PIR PE2 60HZ

			Curve number	
			Reference curve PIR PE2	
			Discharge DN50	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3520 rpm	Date 2012-03-21
Flow	Head	Rated power 9.26 hp	Hydraulic efficiency 33.6 %	NPSH



Impeller size 7.91..6.69 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-09-14

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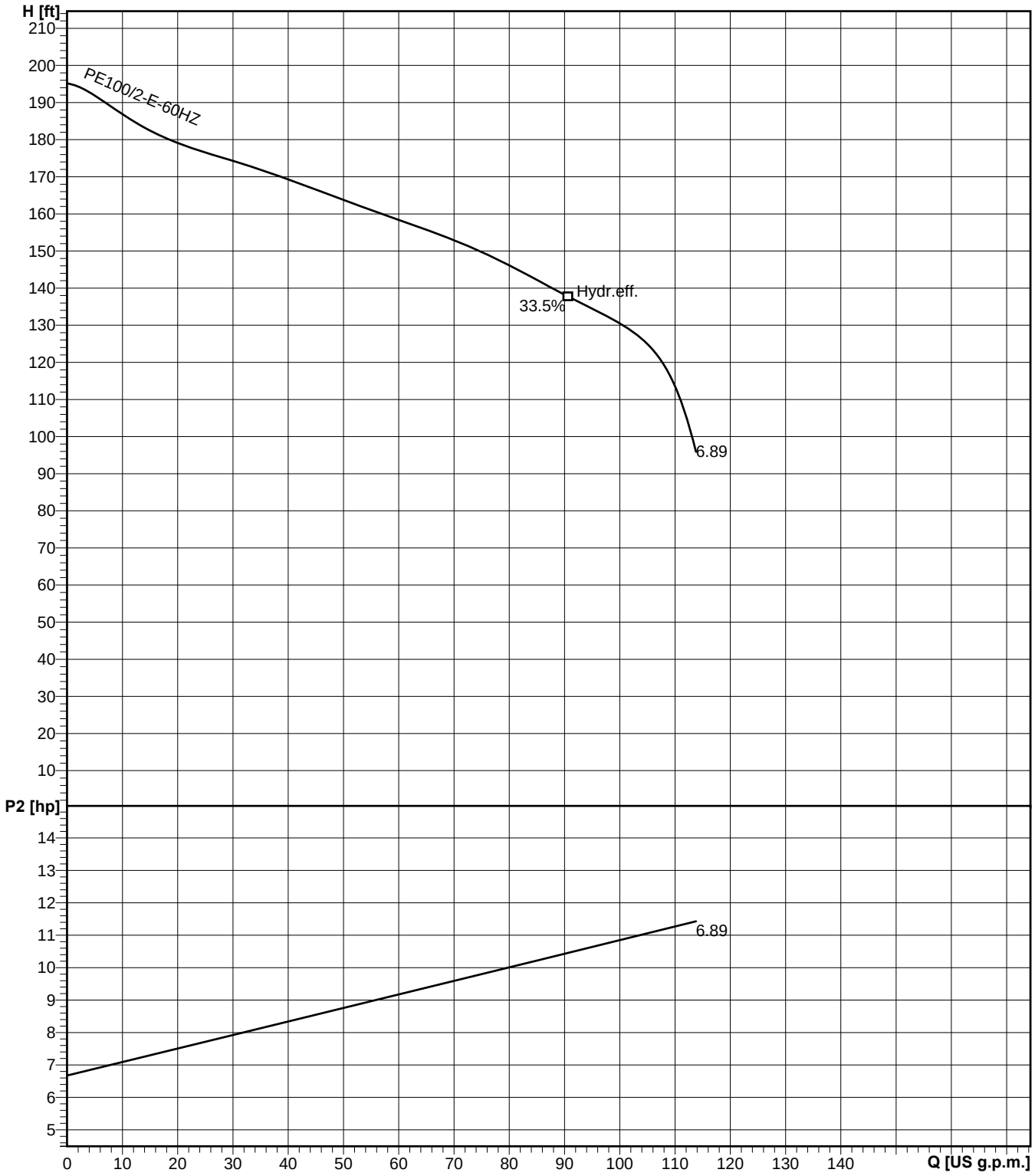
abs

SULZER

Pump performance curves
PIR PE2 60HZ

			Curve number	
			Reference curve PIR PE2	
			Discharge DN50	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3520 rpm	Date 2012-03-21
Flow	Head	Rated power 10.1 hp	Hydraulic efficiency 32.4 %	NPSH



Impeller size 7.91..6.69 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-09-14

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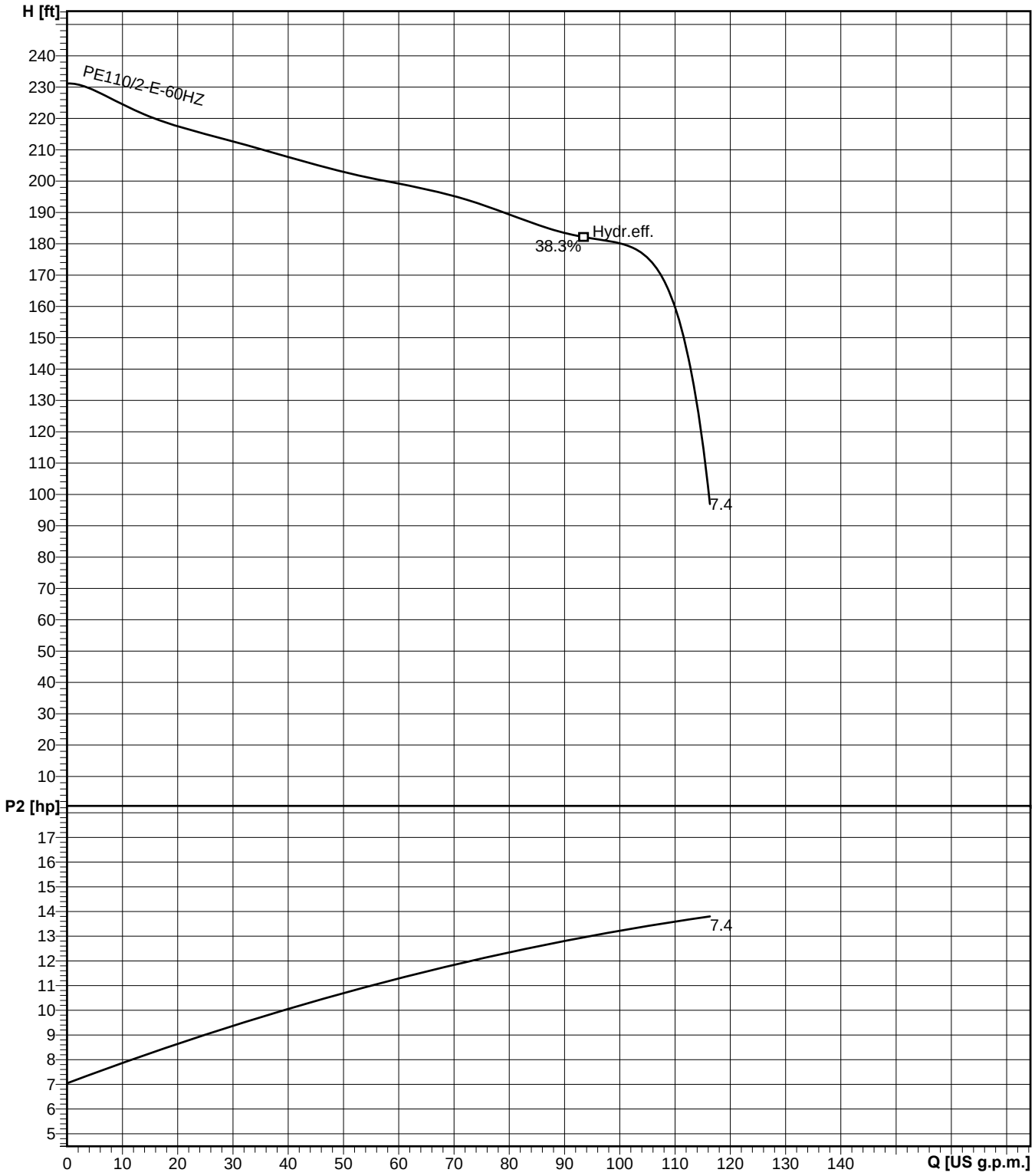
abs

SULZER

Pump performance curves
PIR PE2 60HZ

				Curve number
				Reference curve PIR PE2
			Discharge DN50	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515..3520 rpm	Date 2012-03-21
Flow	Head	Rated power 12.9 hp	Hydraulic efficiency 38.2 %	NPSH



Impeller size 7.91..6.69 inch	N° of vanes 5	Impeller Macerator	Solid size	Revision 2010-09-14

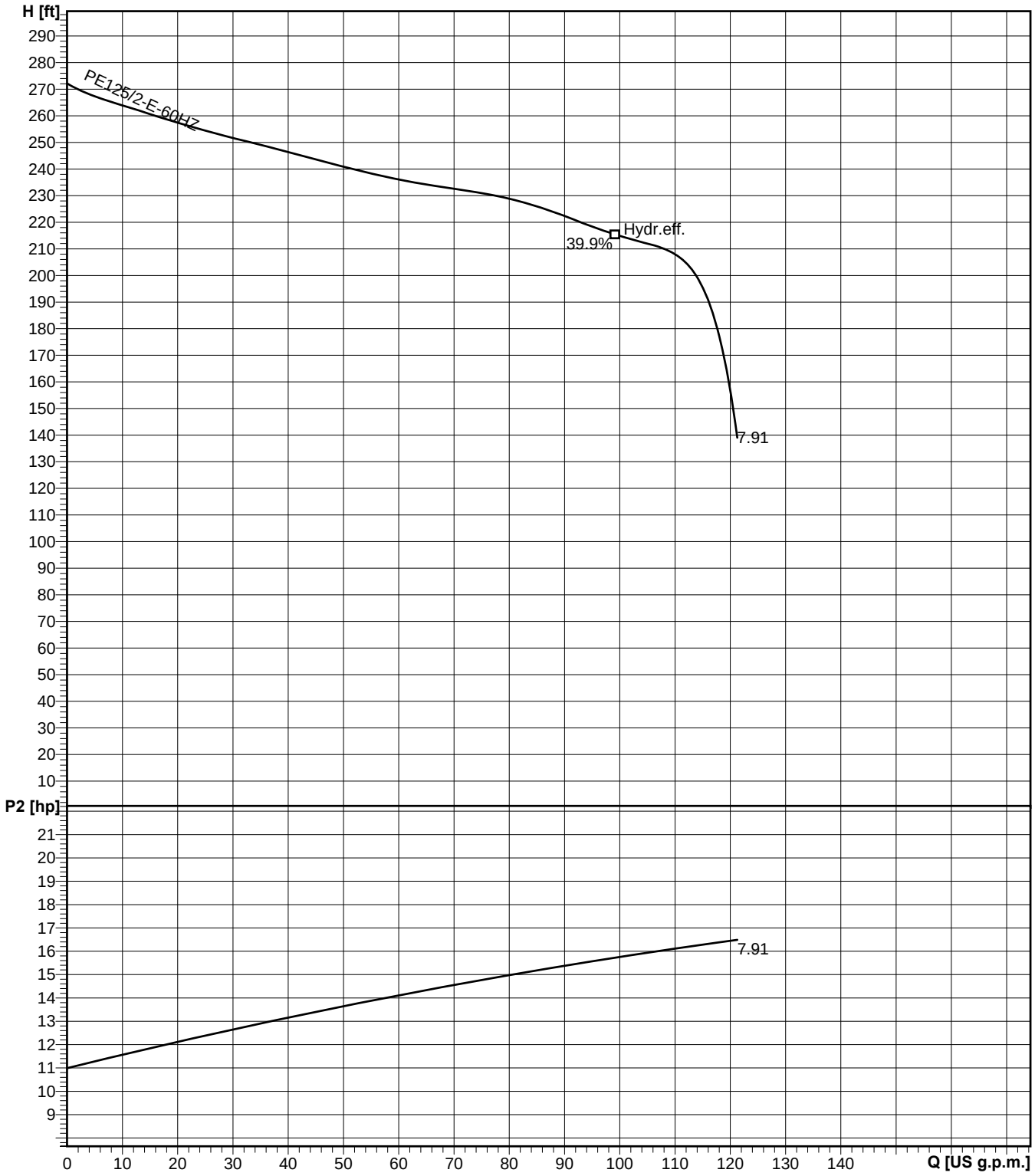
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

SULZER

Pump performance curves
PIR PE2 60HZ

Curve number	
Reference curve	PIR PE2

			Discharge	Frequency
			DN50	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3515..3520 rpm	2012-03-21
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		15.7 hp	39.9 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision
7.91..6.69 inch	5	Macerator		2010-09-14

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

TECHNICAL DATA

2” ABS PIRANHA PE GRINDER PUMP

Piranha PE2
2 Pole, 3 Phase, PE2

Date:	10/11	
Dwg:	DS-P01-023	Rev: 1

Submersible Motor Specifications, PE2 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Use with across the line starting recommended
Maximum Starts per Hour		15, evenly spaced
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

ABS submersible grinder pump
Piranha PE
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE2 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 80/2	8.9 kW	8.0 kW 10.7 HP	3550	208 230 460 600	29.4 26.6 13.3 10.2	217 196 98.1 75.2	J	1.3	90.2	89.7	87.4	.837	.801	.699
PE 100/2	10.9 kW	10.0 kW 13.4 HP	3550	208 230 460 600	38.3 34.7 17.3 13.3	325 294 147 113	K	1.3	92.3	92.4	90.6	.785	.800	.710
PE 110/2	12.0 kW	11.0 kW 14.8 HP	3550	208 230 460 600	41.1 37.1 18.6 14.2	320 290 145 111	J	1.3	91.6	92.6	91.4	.811	.746	.643
PE 125/2	13.7 kW	12.5 kW 16.8 HP	3550	208 230 460 600	47.1 42.6 21.3 16.3	321 290 145 111	H	1.3	91.0	92.6	92.8	.809	.778	.694

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 80/2	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 12/7*	18.8mm (0.74") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 100/2	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 10/7	20.7mm (0.82") diameter
		600 volt	SOOW 12/7	18.8mm (0.74") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 110/2	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 10/7	20.7mm (0.82") diameter
		600 volt	SOOW 10/7	20.7mm (0.82") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 125/2	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt	SOOW 10/7	20.7mm (0.82") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 10m (32 feet)		Optional: 20m (65 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	DN50 / 2 inch ANSI					
Volute Pressure Rating	10 bar (145 psi)					
Impeller Type	Semi-Open, Multi-vane, w/ Cutter Assembly, Adjustable Wear Plate & Seal Protection System					
Model	PE 80/2	PE 100/2	PE 110/2	PE 125/2		
Impeller DIA	170mm (6.7")	175mm (6.9")	188mm (7.4")	201mm (7.9")		
Min Recommended Flow, GPM	20	20	20	20		

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cutter Disc Assembly		Chrome Molybdenum Cobalt Steel 58-62 Rockwell "C"	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 80/2	PE 100/2	PE 110/2	PE 125/2
Overall Height	681mm (26.8")	681mm (26.8")	751mm (29.6")	751mm (29.6")
Pump Weight	130 kg (287 lb)	145 kg (320 lb)	145 kg (320 lb)	145 kg (320 lb)

SULZER

Massblatt PIRANHA PE110/2-55/2 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.04.042 -00
Drawn: 25/09/09 D.Whelan
Issue Date: 25.09.09
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

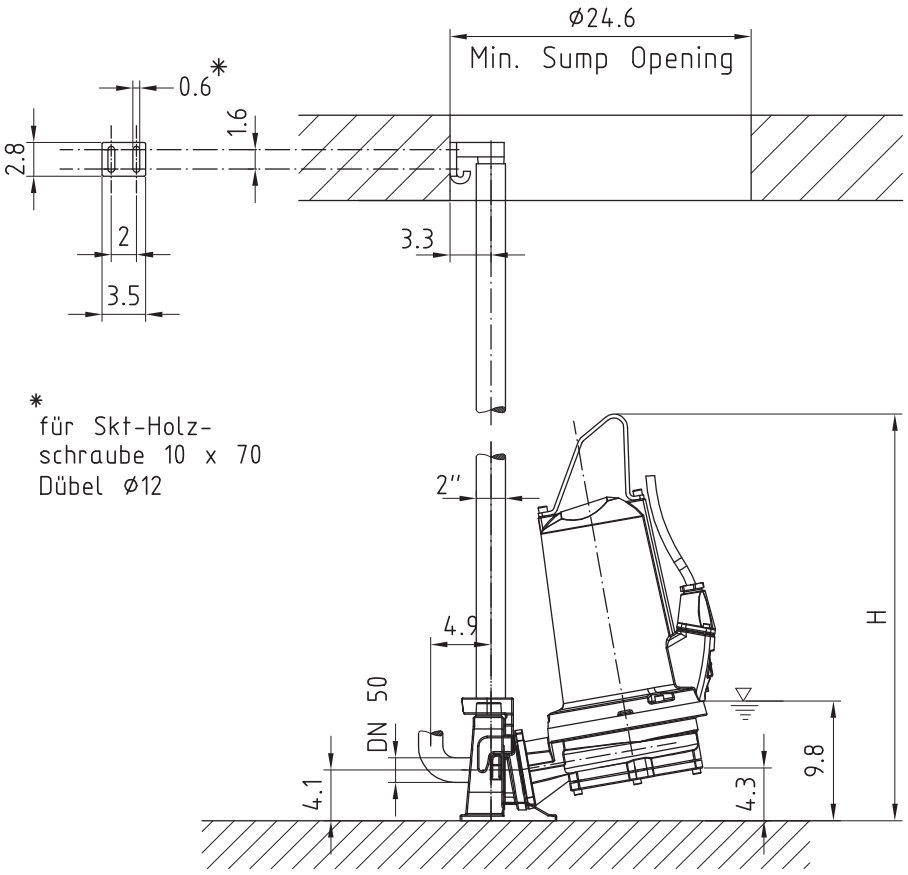
50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H
PE 55/2	287	30.5
PE 70/2	287	30.5
PE 90/2	287	30.5
PE 110/2	320	33.2

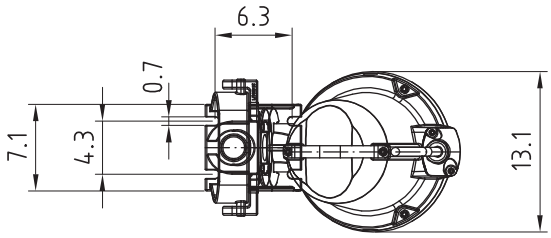
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H
PE 80/2	287	30.5
PE 100/2	320	33.2
PE 110/2	320	33.2
PE 125/2	320	33.2

U.S.



* für Skt-Holzschraube 10 x 70 Dübel ø12



Weight: Includes pump and slider bracket

abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt PIRANHA PE110/2-55/2 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.04.043 -00
Drawn: 25/09/09 D.Whelan
Issue Date: 25.09.09
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

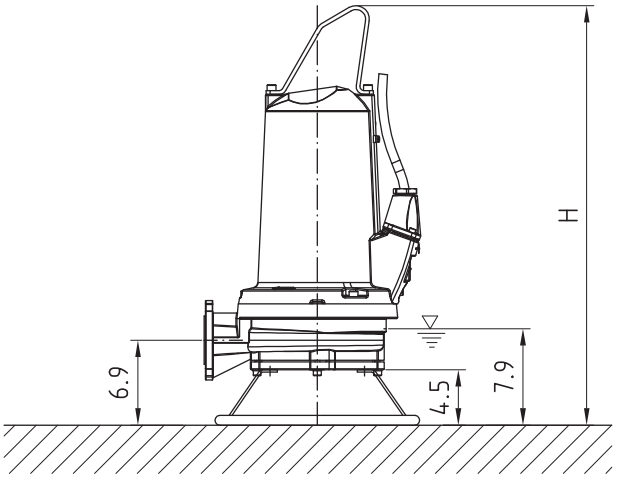
50 Hz

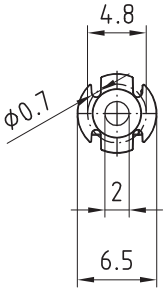
U.S.

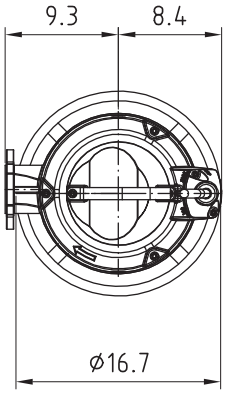
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H
PE 55/2	287	31.5
PE 70/2	287	31.5
PE 90/2	287	31.5
PE 110/2	320	34.3

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H
PE 80/2	287	31.5
PE 100/2	320	34.3
PE 110/2	320	34.3
PE 125/2	320	34.3







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt PIRANHA PE30/2 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.04.039 -00
Drawn: 25/09/09 D.Whelan
Issue Date: 25.09.09
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

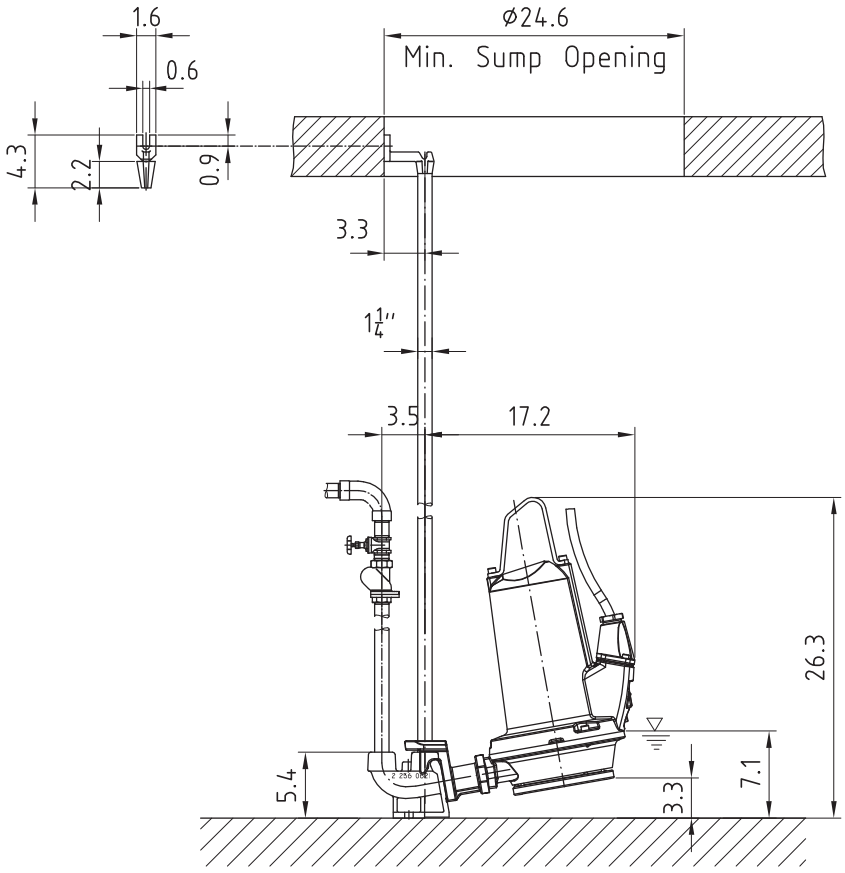
50 Hz

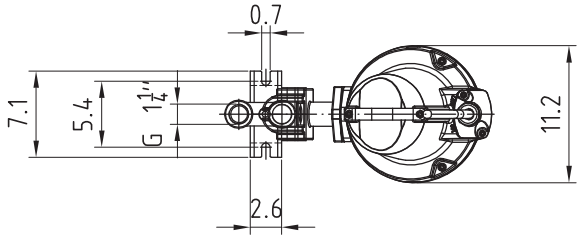
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 30/2	188

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 25/2	188
PE 28/2W	188
PE 35/2	188
PE 35/2W	188
PE 45/2	188
PE 45/2W	188

U.S.





Weight: Includes pump and slider bracket

abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

ABS Robusta light drainage pump 100, 200 and 300

Plug-in, submersible pump, for the removal of wastewater containing solids up to ½".

Application

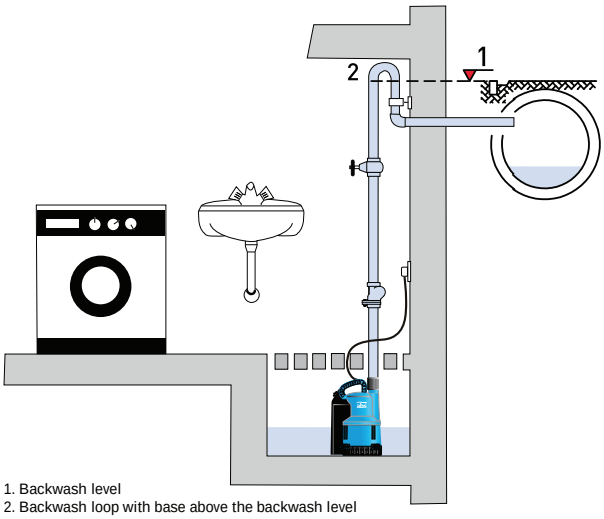
The Robusta has been designed for fixed or transportable installation, and for internal or external applications such as emptying containers and drainage pits, draining of swimming pools or flooded cellars, and removal of nuisance water from gullies or pedestrian underpasses.

Construction

* Single-phase, 60 Hz, 2-pole motor; insulation class B, protection type IP 68. Motor is dynamically balanced with stainless steel shaft. Thermal sensors in the stator switch off the pump in the case of overheating and automatically switch it back on after cooling down.
* The stainless steel rotor shaft is supported in lubricated-for-life ball bearings.
* Connection chamber with cover and watertight cable inlet and strain relief.
* Discharge outlet with internal thread, built-in checkvalve, and detachable multi-stage hose adaptor.
* Shaft sealing is by three lip seals, single at the motor side and double at the medium side, separated and lubricated by a grease chamber.
* The medium being pumped flows around the motor housing for optimum heat dissipation. The maximum allowable medium temperature is 104 °F; or up to 140 °F for intermittent usage (max 5 minutes).
* Built-in automatic level control, with easily removable float cover for cleaning purposes.
* Integrated switch for continuous operation in transportable applications.
* Bayonet clamping allows the screen to be removed by hand in the event an impeller inspection is necessary.

Installation

Attention to the backwash level is of vital importance for effective dewatering. All outflow points located below the backwash level must be protected against back flow.



1. Backwash level
2. Backwash loop with base above the backwash level

Features

* Two-position manual/automatic switch.
* Rust-proof polypropylene construction.
* Fits into 8" diameter opening.
* 1½" female discharge.
* Checkvalve included.
* Environmentally safe, air-filled, oil-free motor, with capacitor start.
* Clog-proof impeller design.
* Solids handling capacity up to ½".
* Detachable suction ring in Robusta 200 and 300 allows pumping down to ⅛" (manual mode only).
* UL and CSA listed

Materials

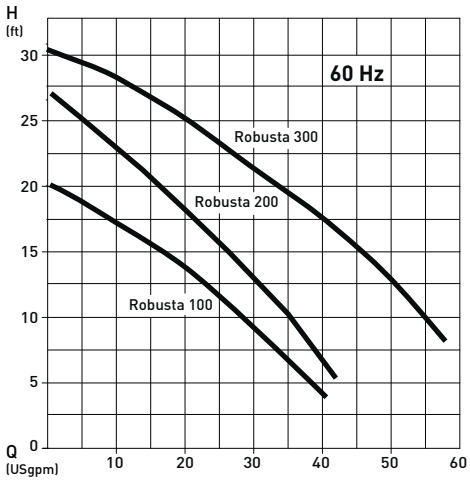
Description	Material
Pump Casing	Polypropylene
Motor Shaft	Stainless steel (AISI 420)
Impeller	Polyamide
Seals	NBR
Cable	Neoprene

Technical Data

Robusta WTS:	100	200	300
Discharge connection internal thread	1½"	1½"	1½"
Solids size	¼"	½"	½"
Nominal (hp)	¼	⅓	½
Speed (rpm)	3400	3400	3400
Rated current (A) at 115 V	4.1	5.4	5.9
Cable length (ft) with plug*	20	20	20
Weight (lbs)	7.5	8.4	9.7
Switching levels (ins) On:	6.4	5.7	6.5
Off	2.7	2.0	3.0

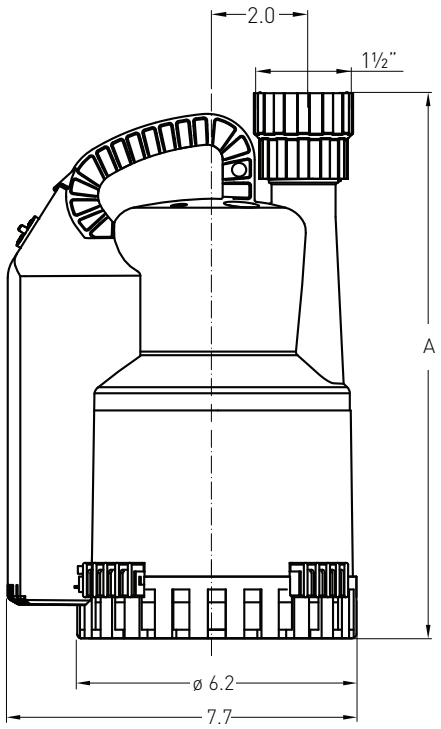
* UL listed

Performance Curves



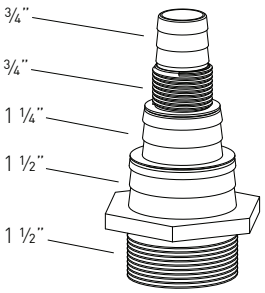
H = Total Head; Q = Discharge Volume; Curves to Hydraulic Institute

Dimensions (inches)



	A
Robusta 100	12.7
Robusta 200	12.0
Robusta 300	12.9

Hose Adaptor



2010-03-02 | We reserve the rights to alter specifications due to technical developments.

SULZER

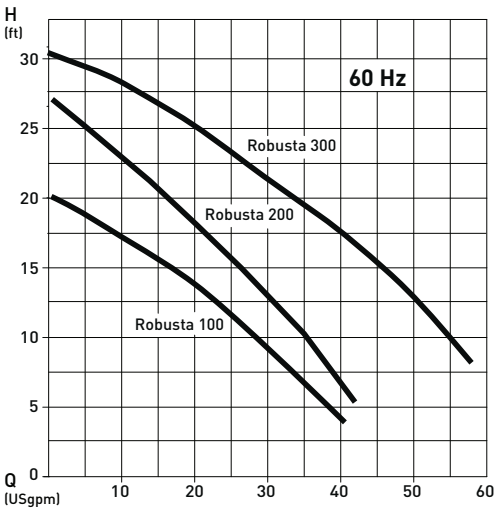
abs

ABS Sink Tray System

- Easy above floor installation, thanks to the fully assembled, lightweight, self-contained, compact design.
- Provides trouble free operation for solids up to 1/2 " in combination with internal float switch and check valve.
- Safe operation due to the fully vented basin and gas tight basin assembly.
- 5 gallon corrosion resistant polyethylene basin with 1 ½" inlet and 1 ½" reversible discharge compatible with all standard plumbing fittings.
- Quick draining action pumps 1020 gallons of water per hour at 10 feet of lift: 1920 gallons per hour at 5 feet of lift
- Rugged capacitor start, air filled motor.

Construction

- Connection chamber cover with water tight cable inlet and strain relief.
- Outer jacket and outer housing parts of corrosion resistance synthetic material
- Motor dynamically balanced with temperature monitor in the stator which switches off the pump in case of an overload.
- Stainless steel shaft
- Sealing on the motor side by special lip seals, shaft supported by lubricated-for-life maintenance-free bearings
- The medium being pumped flows around the motor housing for optimum heat dissipation.

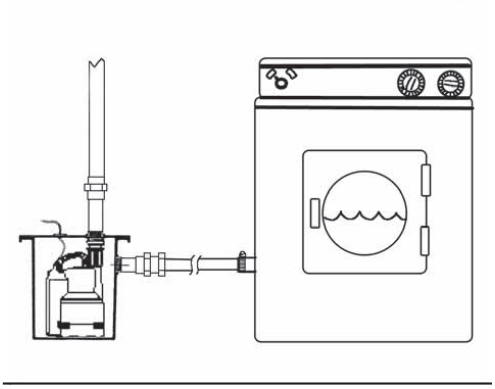


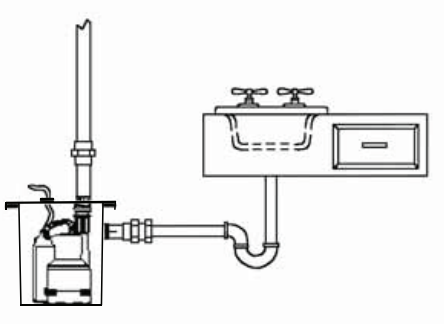
Robusta 100 Properties	
Nominal HP:	¼"*
RPM:	3450
Rated Current at 115V:	4.2A
Cable Length:	19 ft.
Dimensions	
Gallons:	5
Inlet:	1 ½"
Vent:	2"
Discharge:	1 ½"
Height:	15"
Width:	15"
Weight:	16 lbs.

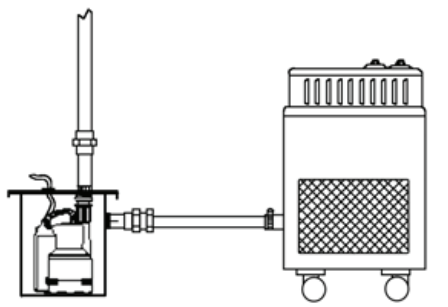
*Robusta 200 1/3 and 300 ½ Hp available

Wide Range of Applications

The sink tray system is designed to eliminate water from laundry trays, dehumidifiers, washing machines, wet bars, water softeners, etc. the system comes fully assembled and installs above the floor for easy installation.







ABS Water Removal System

Residential • Commercial • Industrial

For removal of rain, dirty or subterranean water

The ABS Water Removal System is specifically designed for indoor use, in pumping water from basements, foundations, sinks and floors. The system is fully assembled and complete with basin, pump, piping and alarm

Residential Uses:

- Waterproofing basements and foundations
- Removing dirty water from sinks, showers and washing machines
- Garage and floor dewatering

Commercial Uses:

- Foundation and floor dewatering
- Laundromat effluent removal

Industrial Uses:

- Car Washes
- Factory floor dewatering

Package Includes

- Robusta 200, 1/3 HP sump
- 18" x 24" high density polyethylene sump basin
- High density polyethylene snug fitting basin cover
- High level alarm, battery operated
- Complete hardware package
- System fully piped and ready for Installation

Tank Specifications

Gallons	14
Discharge	1 ½"
Height	24"
Width	18"
Inlets (4)	4"
Corrosion proof and acid, alkali and frost resistant	

The ABS Water Removal System is designed to handle chemical-free water. Contact the factory for any applications requiring chemical-laden water.

SULZER

abs

ABS submersible wastewater pump AS 0530-0840

Robust, reliable submersible pumps from 1 to 3.5 kW for pumping clear water, wastewater and sewage from buildings and sites in domestic and commercial areas in accordance with EN 12050-1.

Applications
AS submersible pumps have been designed for the economic and reliable pumping of wastewater and sewage, and can be used for fixed applications with ABS automatic coupling system or as portable units.
- The 2-inch version is especially suitable for pumping wastewater from underground garages.
- With vortex hydraulics the AS is particularly suitable for fluids containing fibrous or abrasive matter and for sewage.
- The Contrablock hydraulic system is suitable for larger proportions of solid or fibrous matter.
- Maximum allowable temperature of the medium for continuous operation is 40 °C, or if unit is submerged, short term to 60 °C (max. 5 minutes).

Construction
The water pressure-tight, encapsulated fully flood-proof motor and the pump section form a compact, robust, unit construction.

Motor
Single-phase 230 V and three-phase 460 V, 60 Hz, 2-pole (3400 r/min) and 4-pole (1750 r/min). Insulation class F; protection type IP 68. Ex protection to EExdIIBT4 and FM international standards. Consult ABS for Ex usage with frequency inverters.

Bearings
The stainless steel motor shaft is supported in lubricated-for-life ball bearings.

Shaft sealing
Between motor and hydraulic section by means of a high quality sealing unit using a silicon carbide mechanical seal, independent of direction of rotation and resistant to temperature shock. Seal at motor side is by oil lubricated lip seal.

Discharge
AS 0530: G 2" internal thread (DN 50)
AS 0630 to 0641: DN 65 flange
AS 0830 & 0840: DN 80 flange

Temperature monitoring
TCS (Thermo-Control-System) with thermal sensors in the stator to switch off the pump in the case of overheating and switch on automatically after cooling down (option on standard AS).

Seal monitoring
DI system consisting of a sensor in the motor and oil chambers which signals an inspection alert if there is leakage at the shaft seals (option on standard AS; not in oil chamber on Ex version).

Hydraulics
AS 0530, 0630, 0631, 0830: vortex, open, recessed four-vane impeller.
AS 0641, 0840: Contrablock, open single-vane impeller with spiral bottom plate.

Identification Code: e.g. AS 0840 S 12/2 Ex
Hydraulics:
AS ..... Product range
08 ..... Discharge outlet DN (cm)
40 ..... Hydraulic number
Motor:
S ..... Modular motor version
12 ..... Motor power P_2 kW x 10
2 ..... Number of poles
Ex ..... Explosive-proof

Features
- Hydraulic design with Contrablock system or vortex impellers.
- High reliability even under continuous operating conditions.
- For wastewater, sewage and sludge containing solid or fibrous particles.
- In standard or Ex-versions.
- Option of automatic seal and temperature monitoring. Ex version with temperature monitoring as standard.
- Available for transportable or fixed installation.

Materials

Description	Material
Motor housing	Cast iron EN-GJL-250
Rotor shaft	Stainless steel 1.4021 (AISI 420)
Volute	Cast iron EN-GJL-250
Impeller	Cast iron EN-GJL-250
Bottom plate	Cast iron EN-GJL-250
Fasteners	Stainless steel 1.4401 (AISI 316)

Technical Data

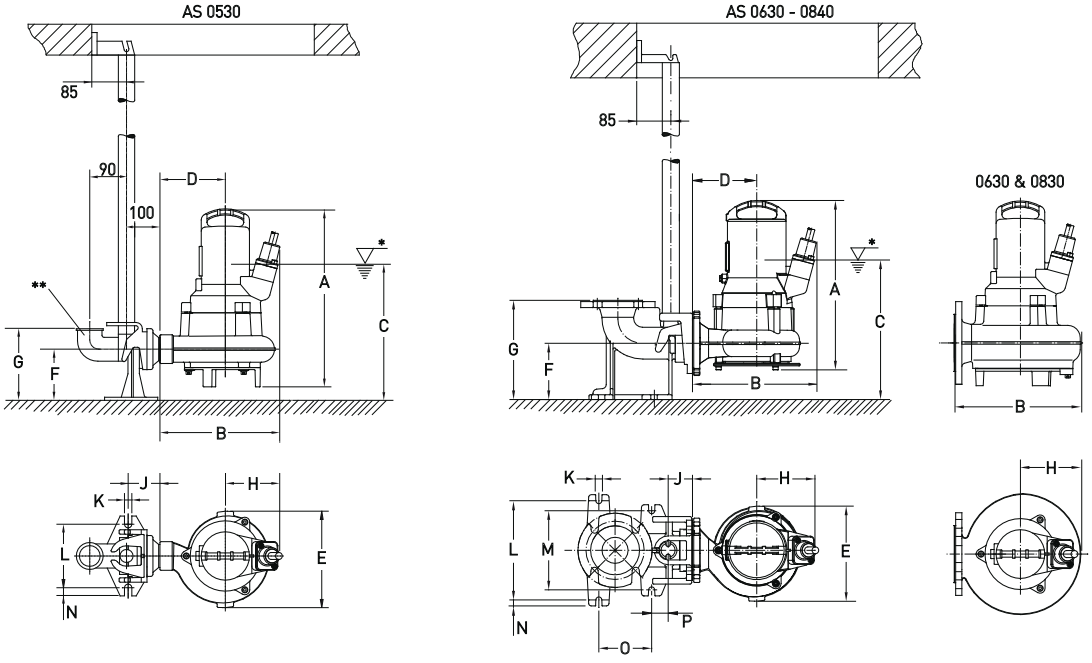
AS	Solids size (mm)	Discharge *	Rated voltage (V)	Motor power ** (kW) P_1	P_2	Rated current (A)	Speed (r/min)	Weight *** (kg)
0530 S16/2W [1]	40	G 2"	230 1~	2.09	1.60	9.15	3400	34
S16/2D	40	G 2"	460 3~	2.17	1.60	3.32	3400	34
S18/2W [1]	40	G 2"	230 1~	2.46	1.80	10.80	3400	34
S18/2D	40	G 2"	460 3~	2.42	1.80	3.61	3400	34
S30/2D	40	G 2"	460 3~	3.87	3.00	5.50	3400	40
0630 S10/4W [1]	60	DN 65	230 1~	1.48	1.00	6.50	1750	37
S10/4D	60	DN 65	460 3~	1.33	1.00	2.60	1750	37
S16/4D	60	DN 65	460 3~	2.24	1.60	3.60	1750	37
S25/4D	60	DN 65	460 3~	3.16	2.50	4.92	1750	42
0631 S16/2W [1]	40	DN 65	230 1~	2.09	1.60	9.15	3400	38
S16/2D	40	DN 65	460 3~	2.17	1.60	3.32	3400	38
S18/2W [1]	40	DN 65	230 1~	2.46	1.80	10.80	3400	38
S18/2D	40	DN 65	460 3~	2.42	1.80	3.61	3400	38
S35/2D	40	DN 65	460 3~	4.26	3.50	6.08	3400	46
0641 S35/2D	45	DN 65	460 3~	4.26	3.50	6.08	3400	42
0830 S10/4W [1]	60	DN 80	230 1~	1.48	1.00	6.50	1750	40
S10/4D	60	DN 80	460 3~	1.33	1.00	2.60	1750	40
S16/4D	60	DN 80	460 3~	2.24	1.60	3.60	1750	40
S25/4D	60	DN 80	460 3~	3.16	2.50	4.92	1750	42
0840 S16/2W [1]	30	DN 80	230 1~	2.09	1.60	9.15	3400	35
S16/2D	30	DN 80	460 3~	2.17	1.60	3.32	3400	35
S18/2W [1]	30	DN 80	230 1~	2.46	1.80	10.80	3400	35
S18/2D	30	DN 80	460 3~	2.42	1.80	3.61	3400	35
S30/2D	30	DN 80	460 3~	3.87	3.00	5.50	3400	40

* G = internal thread, DN = flange; ** P_1 = Power at mains; P_2 = Power at motor shaft; *** Weight with 10 m cable. Cable: Non-Ex = 4G1.5, Non-Ex with Di and klixon = 4G1.5+3x0.5, Ex = 7G1.5

[1] Start and Run capacitor to the following specification required for use without control panel: Start: 161-193µF (the recommended start time for the motors is two seconds) Run: 30µF for S10/4W, 20µF for S16/2W and S18/2W

Dimensions (mm)

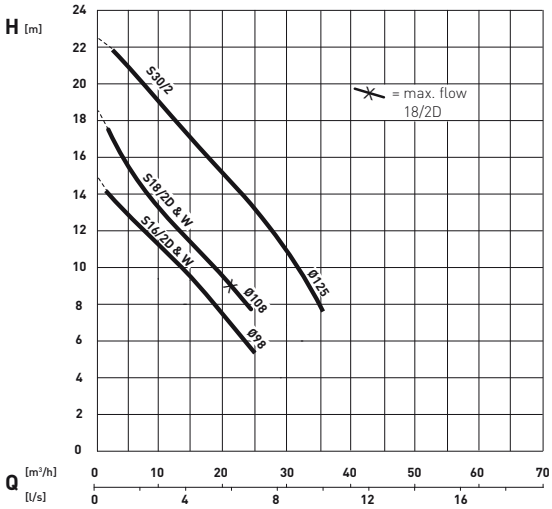
AS	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
0530 S16/2 & 18/2	432	293	331	160	236	125	175	133	100	18	155	n.a.	20	n.a.	n.a.
S30/2	444	293	331	160	236	125	175	133	100	18	155	n.a.	20	n.a.	n.a.
0630 S10/4 & 16/4	437	309	348	157	294	140	247	147	57	18	245	195	15	132	40
S25/4	450	309	348	157	294	140	247	147	57	18	245	195	15	132	40
0631 S16/2 & 18/2	409	305	346	160	237	140	247	145	54	18	245	195	15	132	40
S35/2	421	305	346	160	237	140	247	145	54	18	245	195	15	132	40
0641 S35/2	428	308	346	160	237	140	247	148	54	18	245	195	15	132	40
0830 S10/4 & 16/4	437	307	305	160	294	200	342	147	88	18	275	195	20	182	25
S25/4	450	307	305	160	294	200	342	147	88	18	275	195	20	182	25
0840 S16/2 & 18/2	418	280	305	130	210	200	342	148	88	18	275	195	20	182	25
S30/2	430	280	305	130	210	200	342	148	88	18	275	195	20	182	25



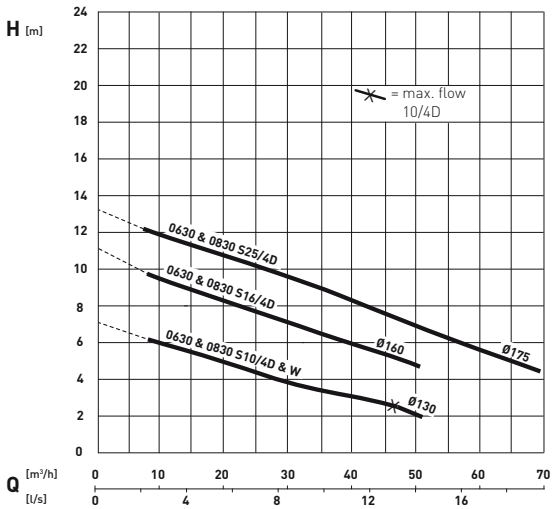
* Lowest switch-off level; minimum switch-on level must be at least 100 mm higher. AS 0830 & 0840 must be fully submerged when operating.
** Elbow not supplied.

Performance Curves

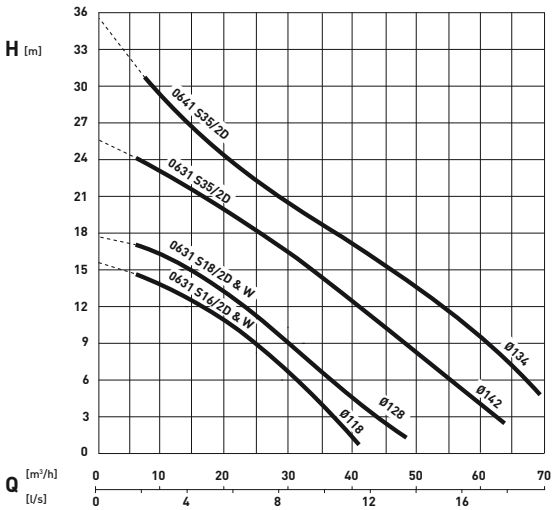
AS 0530



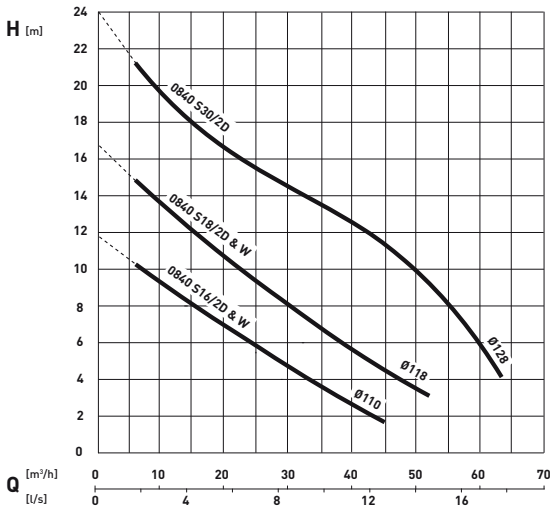
AS 0630 and 0830



AS 0631 and 0641



AS 0840



H = Total Head; Q = Discharge Volume. Curves to ISO 9906 N.B. please use the ABSEL program to validate pump selection.

Cross-section

1. Ball bearings; lubricated-for-life

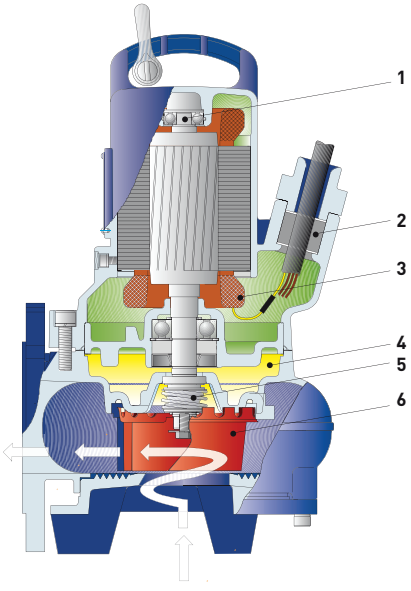
2. Watertight cable entry

3. Motor with thermal sensor in air-filled motor housing

4. Oil chamber with seal monitoring

5. Sic/Sic mechanical seal

6. Contrablock (featured) or vortex hydraulics



Accessories

	Description	Size	Part no.	AS
Fixed installation with ABS Automatic Coupling System	**Pedestal** (cast iron EN-GJL-250)			
	threaded (with fixing bolts and transition piece)	2" without bend	62320560	0530
	flange (with fixing bolts)	DN 65: 90° cast bend	62320673	0630-0641
	flange (with fixing bolts)	DN 80 without bend	62320557	0830 & 0840
	flange (fixing bolts not included)	DN 80: 90° cast bend	62320649	0830 & 0840
	flange (with plug/clamp connection and fixing bolts)	DN 80: 90° cast bend	62320650	0830 & 0840
	Fasteners (galvanized steel)			
	bolts and gasket (bracket to pump)		62610632	0830 & 0840
	anchor bolts (pedestal to base)		62610775	0830 & 0840
	Guide Rail (galvanized steel)	1¼" x 1 m	31380007	0530-0641
		1¼" x 2 m	31380008	
		1¼" x 3 m	31380009	
		1¼" x 4 m	31380010	
		1¼" x 5 m	31380011	
	Chain Kit (galvanized steel)	3 m	61265065	0530-0840
		4 m	61265093	
		6 m	61265069	
		7 m	61265096	
	Chain Kit (stainless steel)	3 m	61265081	0530-0840
		4 m	61265099	
		6 m	61265085	
		7 m	61265102	
Horizontal installation (Sanimat 1501-2502)	**Pump Support Kit** (EN-GJL-250) includes head and volute supports		62665103	0530-0840
Transportable installation	**Ground Support Stand**		42895016	0630 & 0830
			61355012	0631 & 0641
	Discharge Elbow (EN-GJL-250)			
	flange to thread	DN 80 to G 2½"	31090131	0840
	flange to STORZ coupling	DN 80 to G 2½"	62665074	
	Adaptor (galvanized steel)	DN 65 to DN 80	21405002	0630 & 0631
General	**Non-return Ball Valve** (EN-GJL-250)			
	internal thread	G 2"	61400527	0530
	internal thread with inspection hatch	G 2½"	61400543	0630-0641
	flange with inspection hatch	DN 80	61400534	0830 & 0840
	Gate Valve (brass)	G 2"	14040007	0530
	(EN-GJL-250)	DN 80	61420500	0630 & 0840

GENERAL
Furnish and install _____ **ABS Model AS** _____ **Pump(s)** with a _____ motor to deliver _____ USGPM against a total head of _____ feet. The motor shall be _____ HP, _____ RPM connected for operation on a _____ volt, 60 HZ, _____ phase service. The motor shall be an integral part of the pumping unit. The pump discharge shall be _____ horizontal. The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a semi-open vortex impeller capable of handling solids laden fluids without clogging.

PUMP CONSTRUCTION:
Impeller: The impeller shall be constructed of corrosion resistant chilled gray iron and shall be semi-open, non-clogging, dynamically balanced multi-vane design capable of passing a minimum of _____ inch spherical solids. The impeller shall have a slip fit onto a shaft and drive key and shall be fastened by a stainless steel bolt.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a horizontal discharge.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All fasteners shall be 316 stainless steel.

Shaft and Bearings: The common pump and motor shaft shall be 420 stainless steel supported on the impeller end by a heavy duty single row ball bearing on 1.3 - 2.4 hp pumps, or a heavy duty double row ball bearing on 3.4 - 4 hp pumps. The opposite end of the shaft is supported on a sealed single row ball bearing (all motors).

Shaft Seals: Each pump shall be equipped with two (2) seals. The lower seal (pump side) shall be of the mechanical type with silicon carbide faces. The upper seal shall be a lip type seal. The seals shall be separated by an oil chamber providing cooling and lubrication of the seals, and a barrier between the pumped fluid, and the dry motor chamber.

Seal Failure Warning System: A probe shall be provided in the oil chamber to detect the presence of water in the oil. A solid-state device mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe. If water enters the oil chamber in sufficient quantity to warrant concern, the probe shall activate a warning light in the control panel.

MOTOR CONSTRUCTION:
The motor shall be air-filled and shall have Class “F” insulation. The rotor and stator shall be enclosed in a cast iron outer housing. Bi-metallic thermal switches shall be imbedded in each phase of the winding to sense high temperature. The rating of the switch shall be 130•€ +/- 5•€. The control circuit shall be connected through the bi-metallic switches so the motor is shut down should a high temperature condition exist. The switches shall be self-resetting when the motor cools. Power cable shall be UL and CSA approved.

APPROVALS
All models shall be UL and CSA approved. All models shall be FM approved for Class I Division I Group C and D.

GENERAL

Furnish and install ___ **ABS Model AS** _____**Pump(s)** with a _____ motor to deliver ___ USGPM against a total head of feet. The motor shall be _____ HP, 3450 RPM connected for operation on a _____ volt, 60 HZ, _____ phase service. The motor shall be an integral part of the pumping unit. The pump discharge shall be _____ horizontal. The pump(s) shall be of the submersible type with an integral motor and pumping unit. The volute shall have an adjustable bottom plate. The bottom plate shall be cast with grooves threading outward from the center opening of the plate to the outer diameter. The pump(s) shall have a semi-open impeller capable of handling solids laden fluids without clogging. The suction inlet shall have a waveform with the leading edge of the impeller overlapping the waveform. Should a textile or plastic sheet plug the inlet, the shearing action of the leading edge of the impeller against the wave form of the inlet will cut away enough of the material to clear the inlet.

PUMP CONSTRUCTION:

Impeller: The impeller shall be constructed of corrosion resistant chilled gray iron and shall be of the semi-open, non-clogging, dynamically balanced single-vane design capable of passing a minimum of _____ inch spherical solids. The impeller shall have a slip fit onto a shaft and drive key and shall be fastened by a stainless steel bolt.

Self Cleaning Wear Plate: (CB System) The pump shall be equipped with a self cleaning wear plate constructed from gray cast iron, ASTM A-48, Class 40. The wear plate shall be mounted to the volute with three stainless steel screws to permit close tolerance fit between the wear plate and impeller for maximum pump efficiency. The wear plate shall be designed with a wave shaped inlet and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a horizontal discharge.

O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All fasteners shall be 316 stainless steel.

Shaft and Bearings: The common pump and motor shaft shall be 420 stainless steel supported on the impeller end by a heavy duty single row ball bearing on 2.1-2.4 hp pumps, or a heavy duty double row ball bearing on 4.0 – 4.7 hp pumps. The opposite end of the shaft is supported on a sealed single row ball bearing (all motors).

Shaft Seals: Each pump shall be equipped with two (2) seals. The lower seal (pump side) shall be of the mechanical type with silicon carbide faces. The upper seal shall be a lip type seal. The seals shall be separated by an oil chamber providing cooling and lubrication of the seals, and a barrier between the pumped fluid, and the dry motor chamber.

Seal Failure Warning System: A probe shall be provided in the oil chamber to detect the presence of water in the oil. A solid-state device mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe. If water enters the oil chamber in sufficient quantity to warrant concern, the probe shall activate a warning light in the control panel.

MOTOR CONSTRUCTION:

The motor shall be air-filled and shall have Class “F” insulation. The rotor and stator shall be enclosed in a cast iron outer housing. Bi-metallic thermal switches shall be imbedded in each phase of the winding to sense high temperature. The rating of the switch shall be 130•Є +/- 5•Є. The control circuit shall be connected through the bi-metallic switches so the motor is shut down should a high temperature condition exist. The switches shall be self-resetting when the motor cools. Power cable UL and CSA approved.

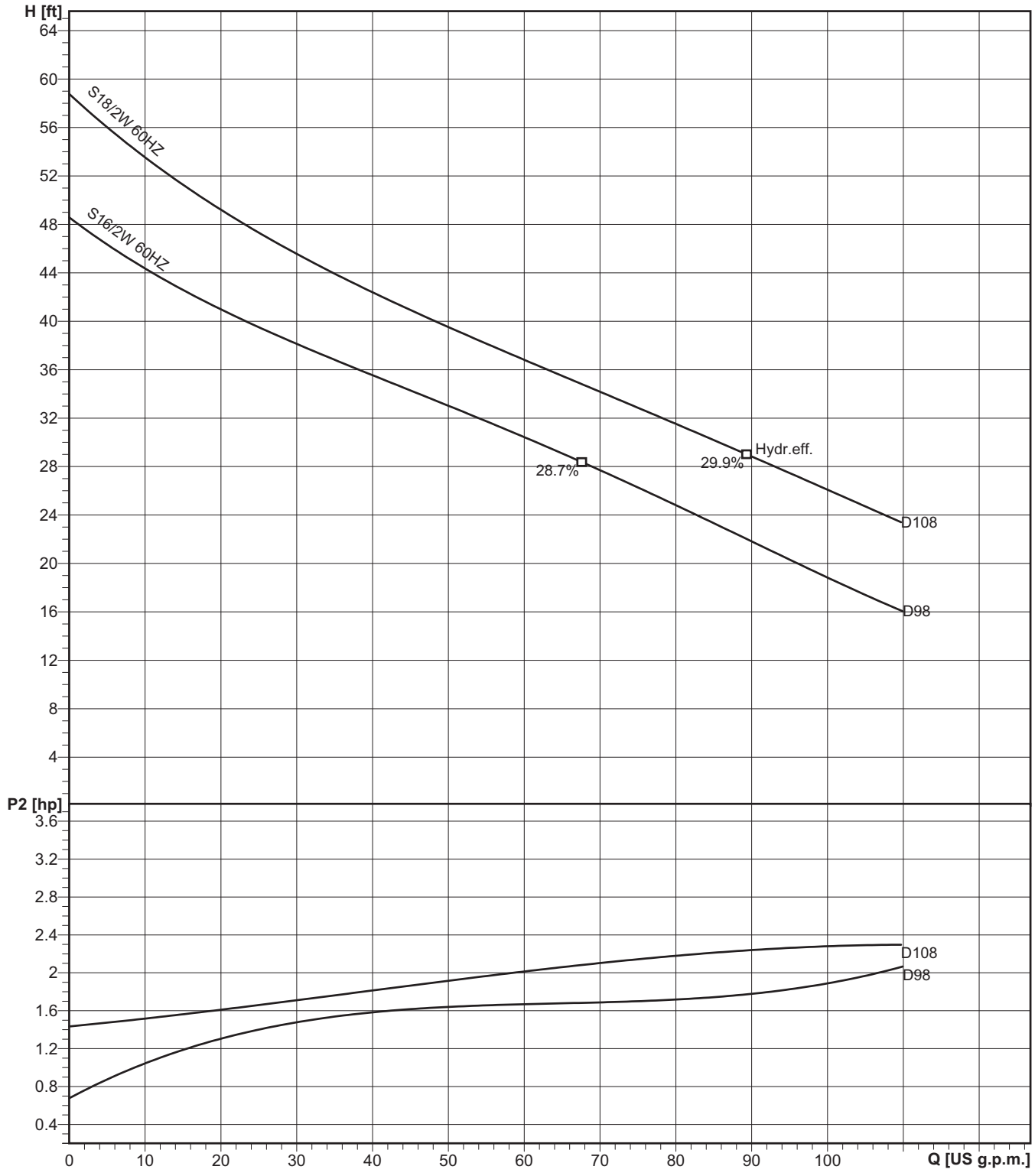
APPROVALS All models shall be UL and CSA approved. All models shall be FM approved for Class I Division I Group C and D.

SULZER

Pump performance curves
AS 0530 W 60 HZ

Curve number	
Reference curve	AS 0530W 60

			Discharge	Frequency
			DN50	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3345..3350 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.24 hp	29.9 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
108..98 mm	6	Vortex impeller	40 mm	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

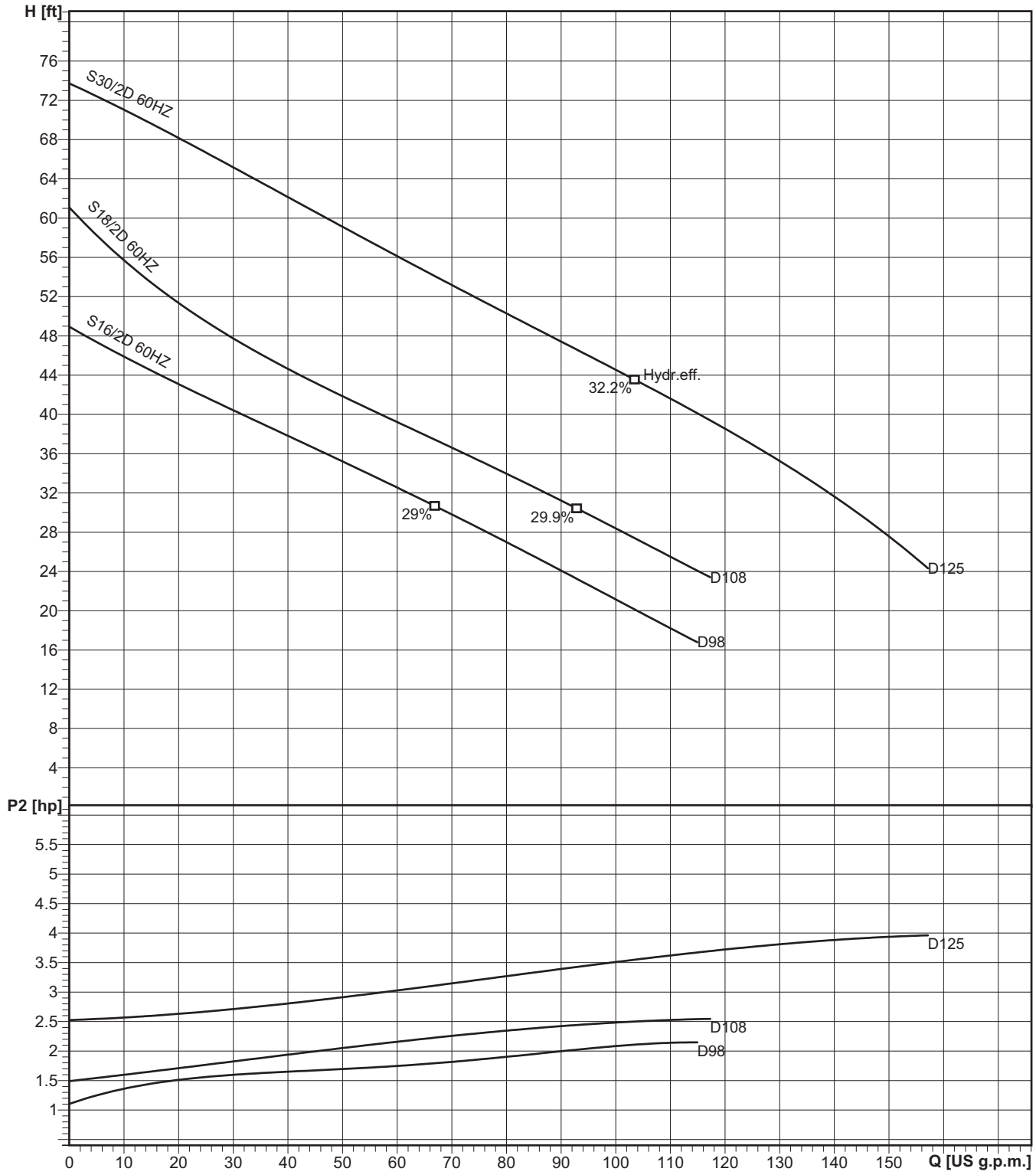
abs

SULZER

Pump performance curves
AS 0530 D 60 HZ

Curve number	
Reference curve	AS 0530D 60

			Discharge	Frequency
			DN50	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3395..3420 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		3.56 hp	32.2 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
125..98 mm	6	Vortex impeller	40 mm	

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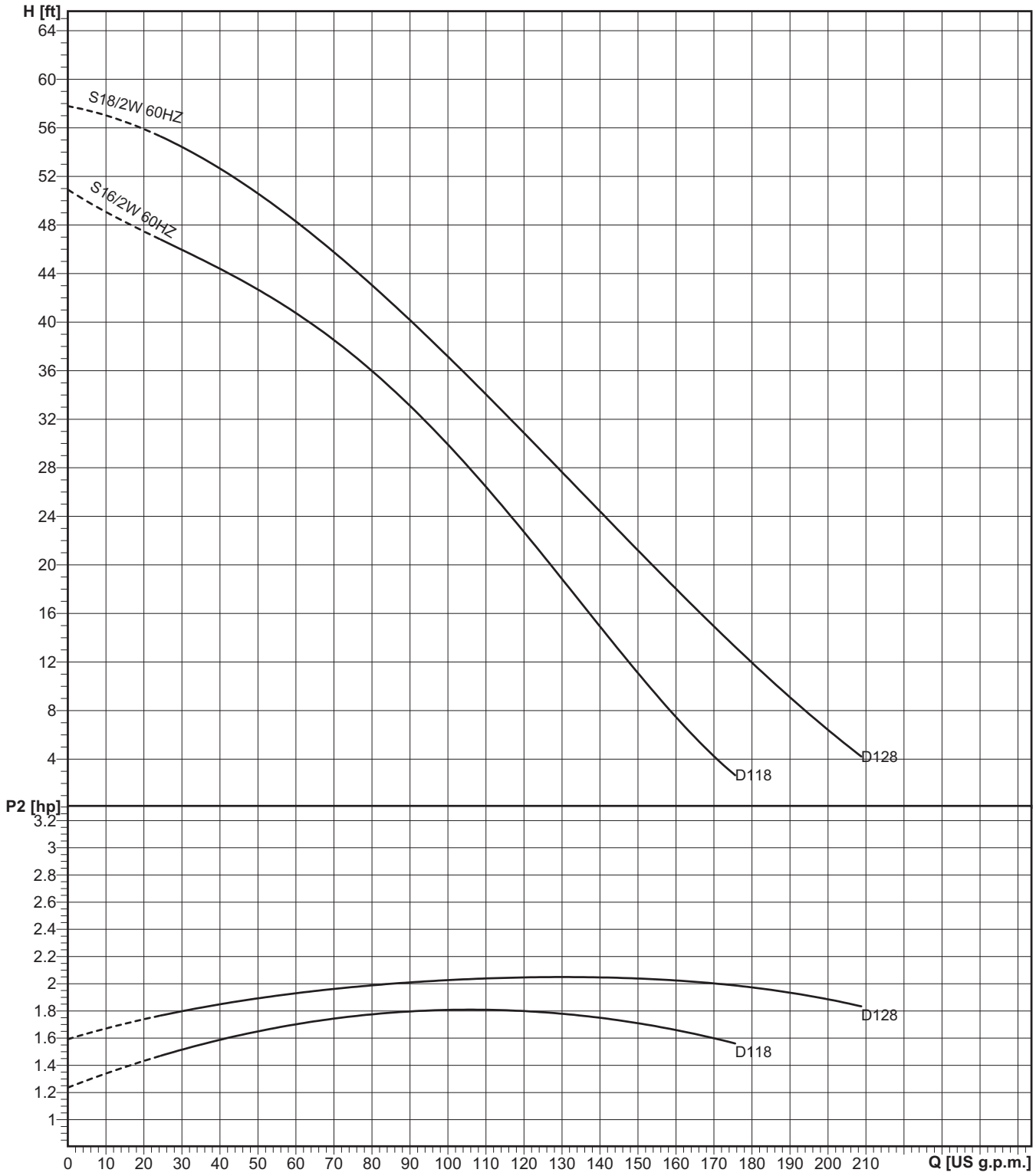
abs

SULZER

Pump performance curves
AS 0631 W 60 HZ

Curve number	
Reference curve	AS 0631 W

			Discharge	Frequency
			DN65	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3345..3350 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.03 hp	46.5 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
128..118 mm	6	Vortex impeller	40 mm	

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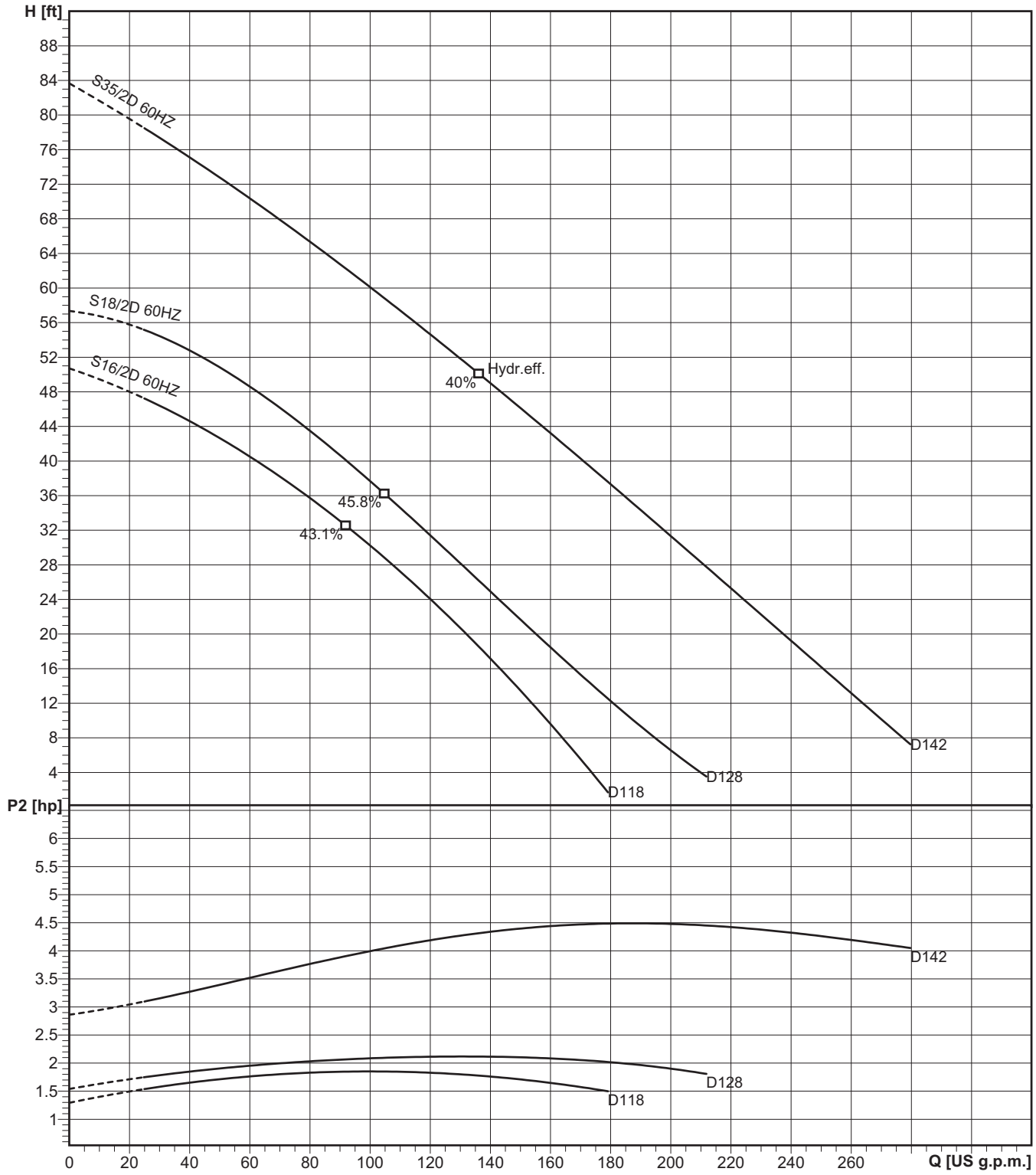
abs

SULZER

Pump performance curves
AS 0631 D 60 HZ

Curve number	
Reference curve	AS 0631 D

			Discharge	Frequency
			DN65	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3425..3420 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.32 hp	40 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
142..118 mm	6	Vortex impeller	40 mm	

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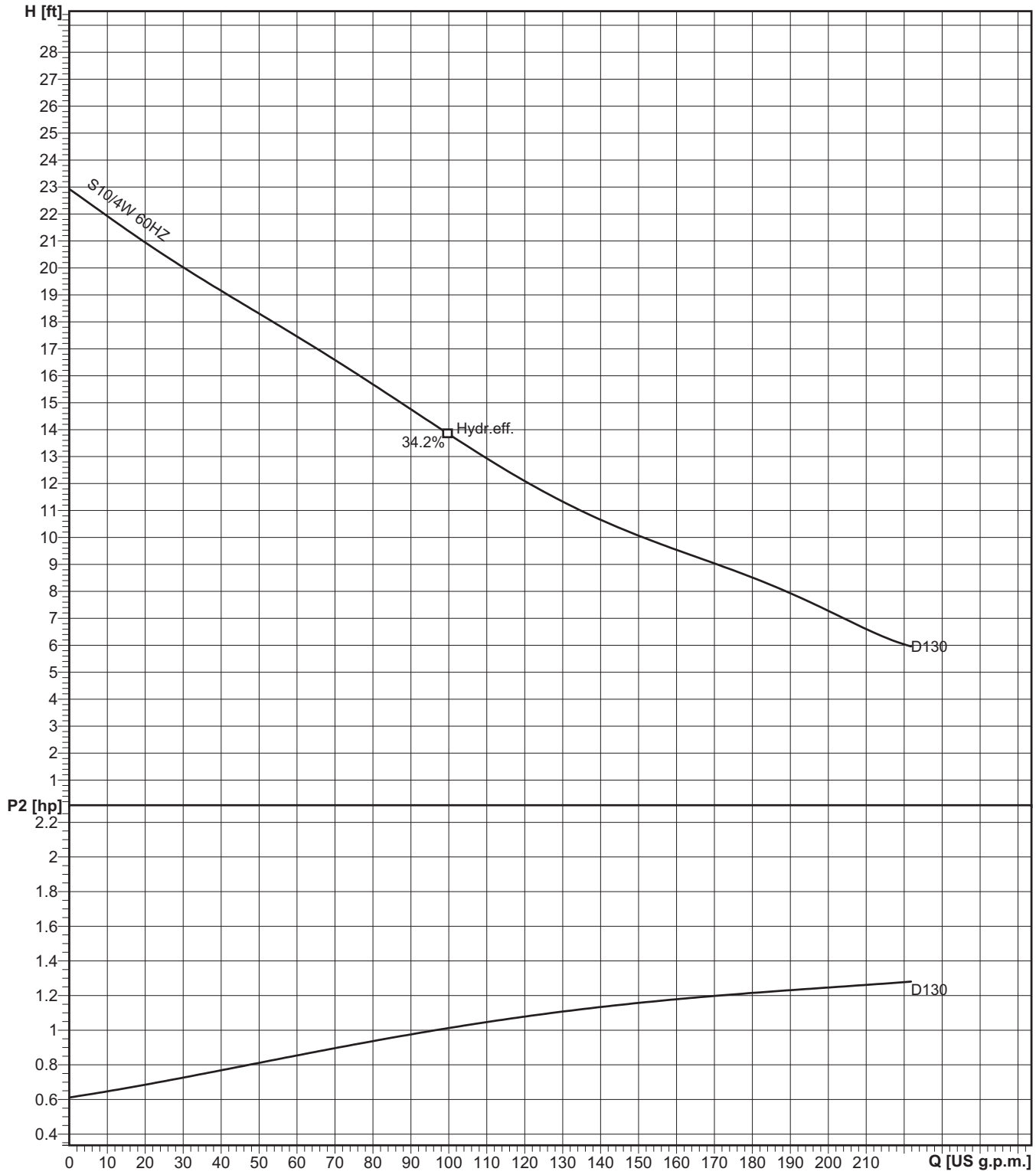
abs

SULZER

Pump performance curves
AS 0630 W 60 HZ

				Curve number
				Reference curve AS 0630 W
			Discharge DN65	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1655 rpm	Date 2010-05-10
Flow	Head	Rated power 1.02 hp	Hydraulic efficiency 34.3 %	NPSH



Impeller size 130 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 60 mm	Revision 2005-06-14

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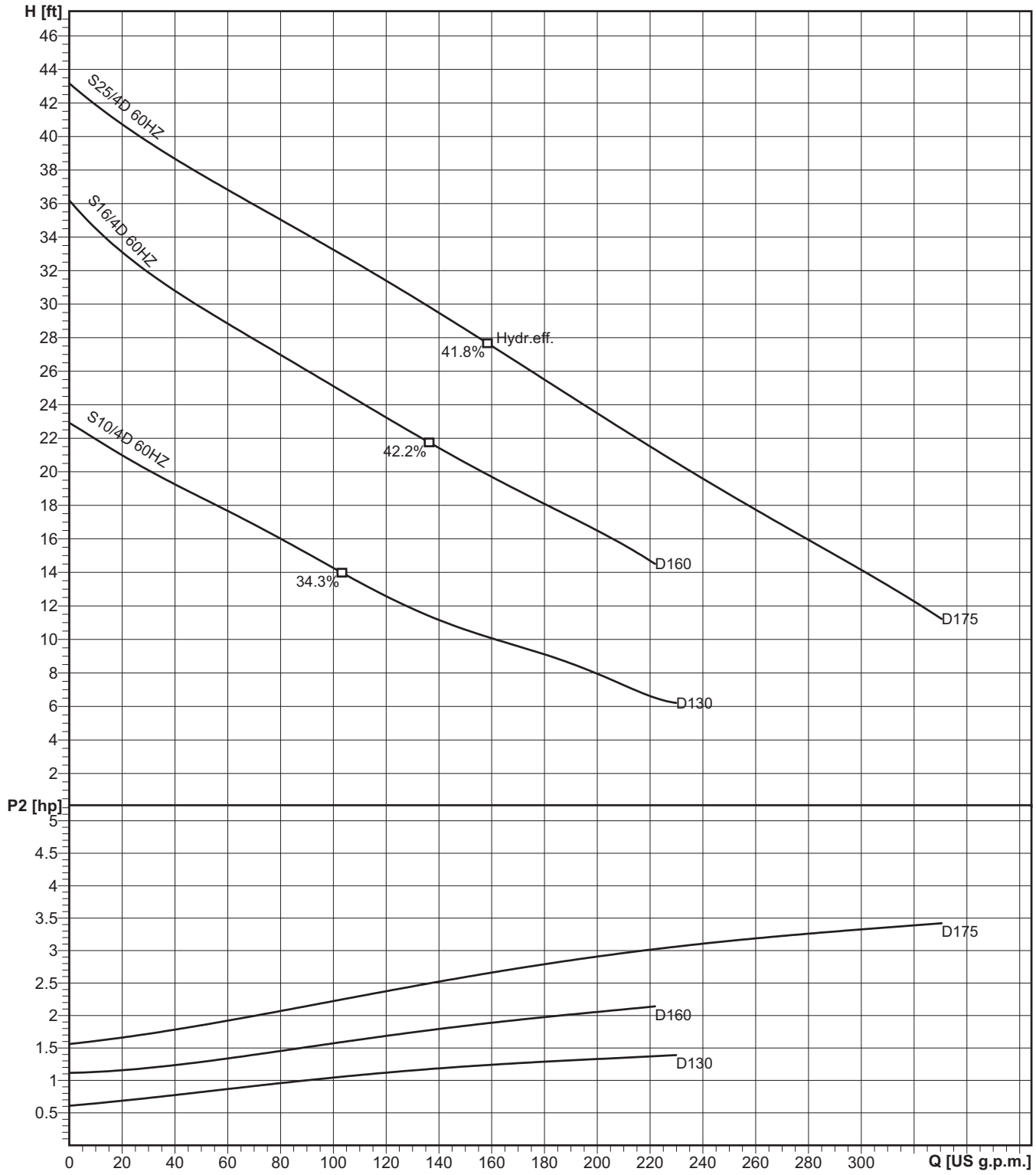
abs

SULZER

Pump performance curves
AS 0630 D 60 HZ

Curve number	
Reference curve	AS 0630 D

			Discharge	Frequency
			DN65	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1690..1715 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.67 hp	41.8 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
175..130 mm	6	Vortex impeller	60 mm	

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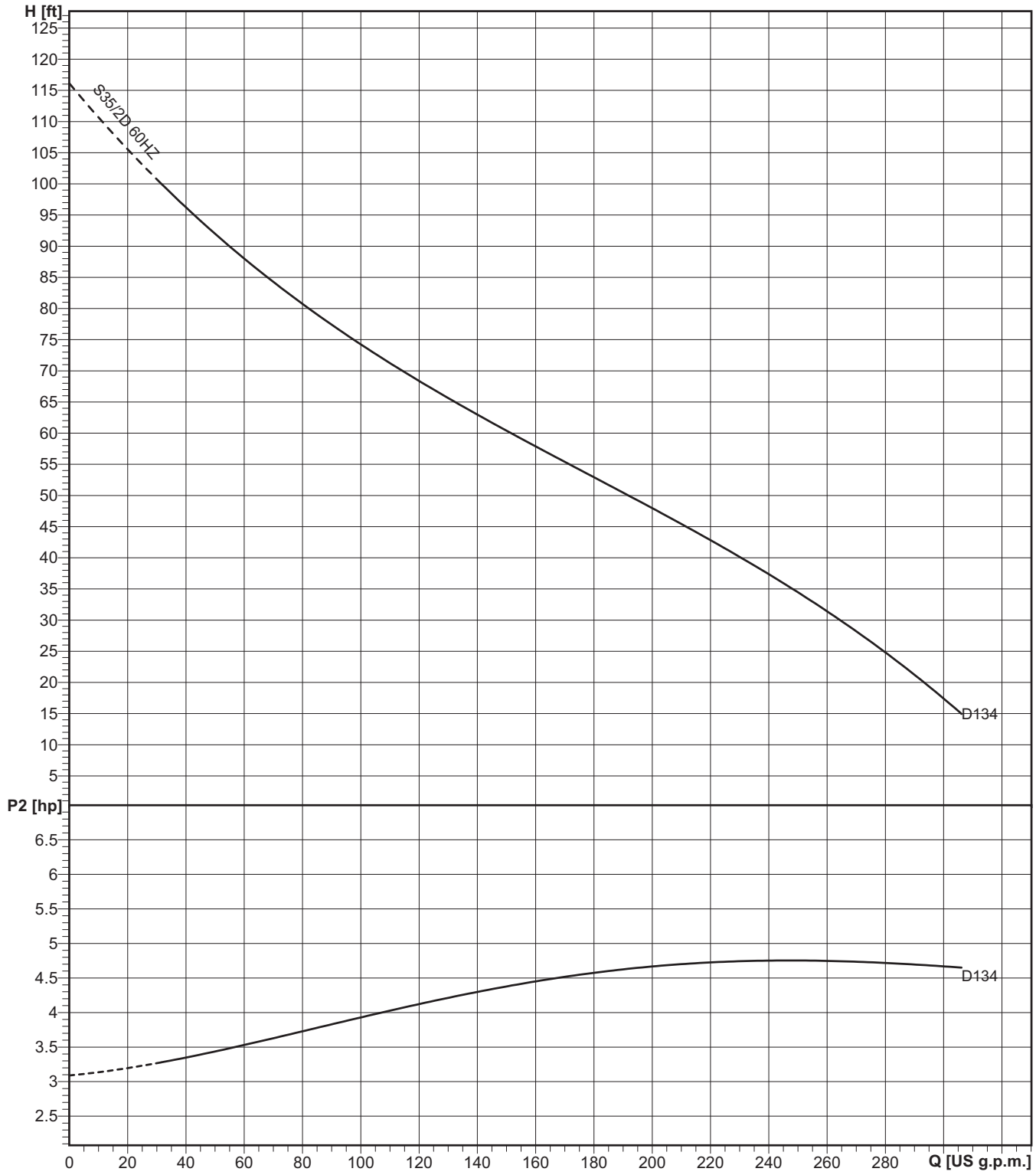
abs

SULZER

Pump performance curves
AS 0641 D 60 HZ

				Curve number
				Reference curve AS 0641 D
			Discharge DN65	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3425 rpm	Date 2010-05-10
Flow	Head	Rated power 4.52 hp	Hydraulic efficiency 52.7 %	NPSH



Impeller size 134 mm	N° of vanes 1	Impeller ContraBlock impeller, 1 vane	Solid size 45 mm	Revision 2005-06-14

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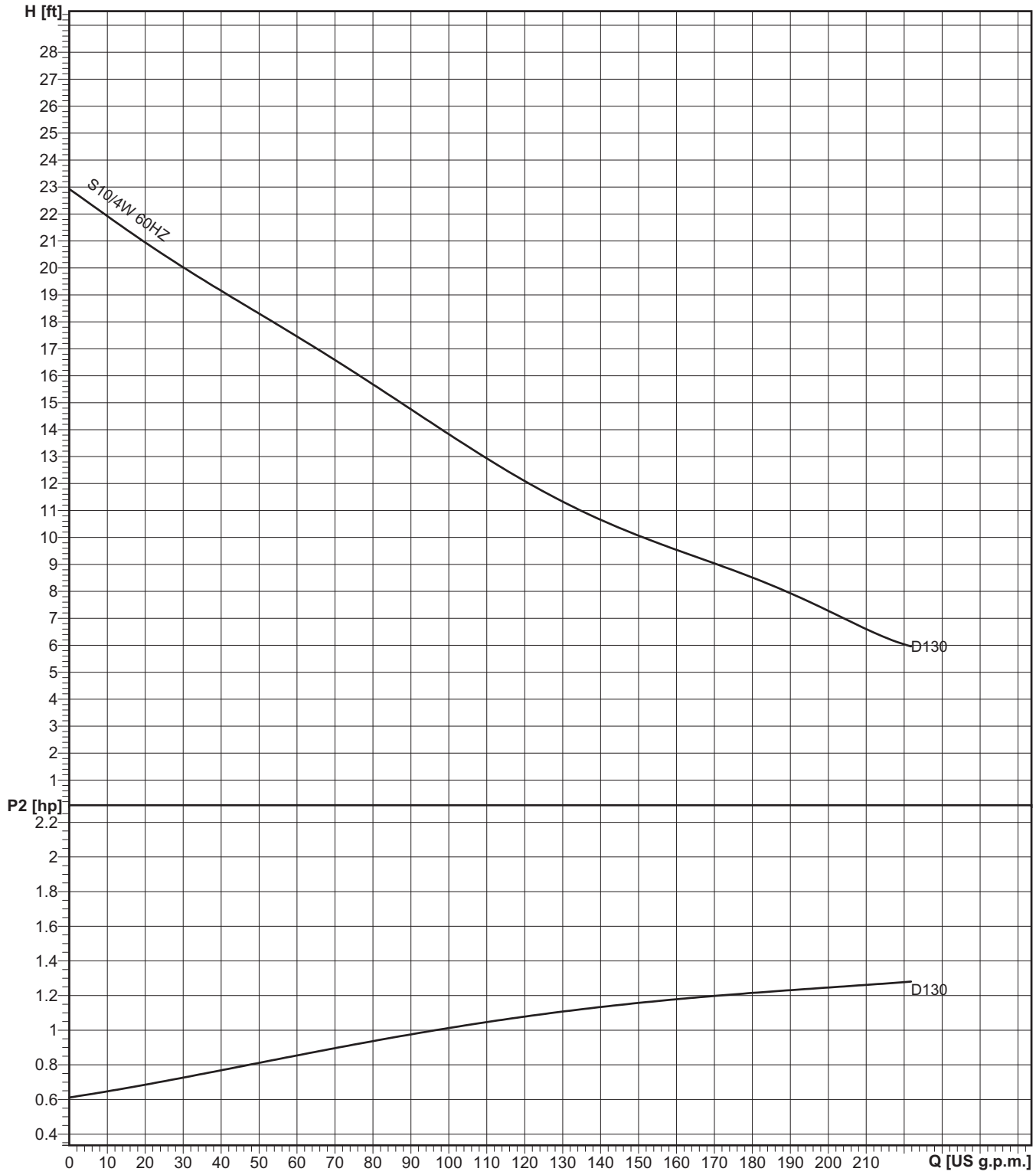
abs

SULZER

Pump performance curves
AS 0830 W 60 HZ

Curve number	
Reference curve	AS 0830 W

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1655 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		1.02 hp	34.3 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
130 mm	6	Vortex impeller	60 mm	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

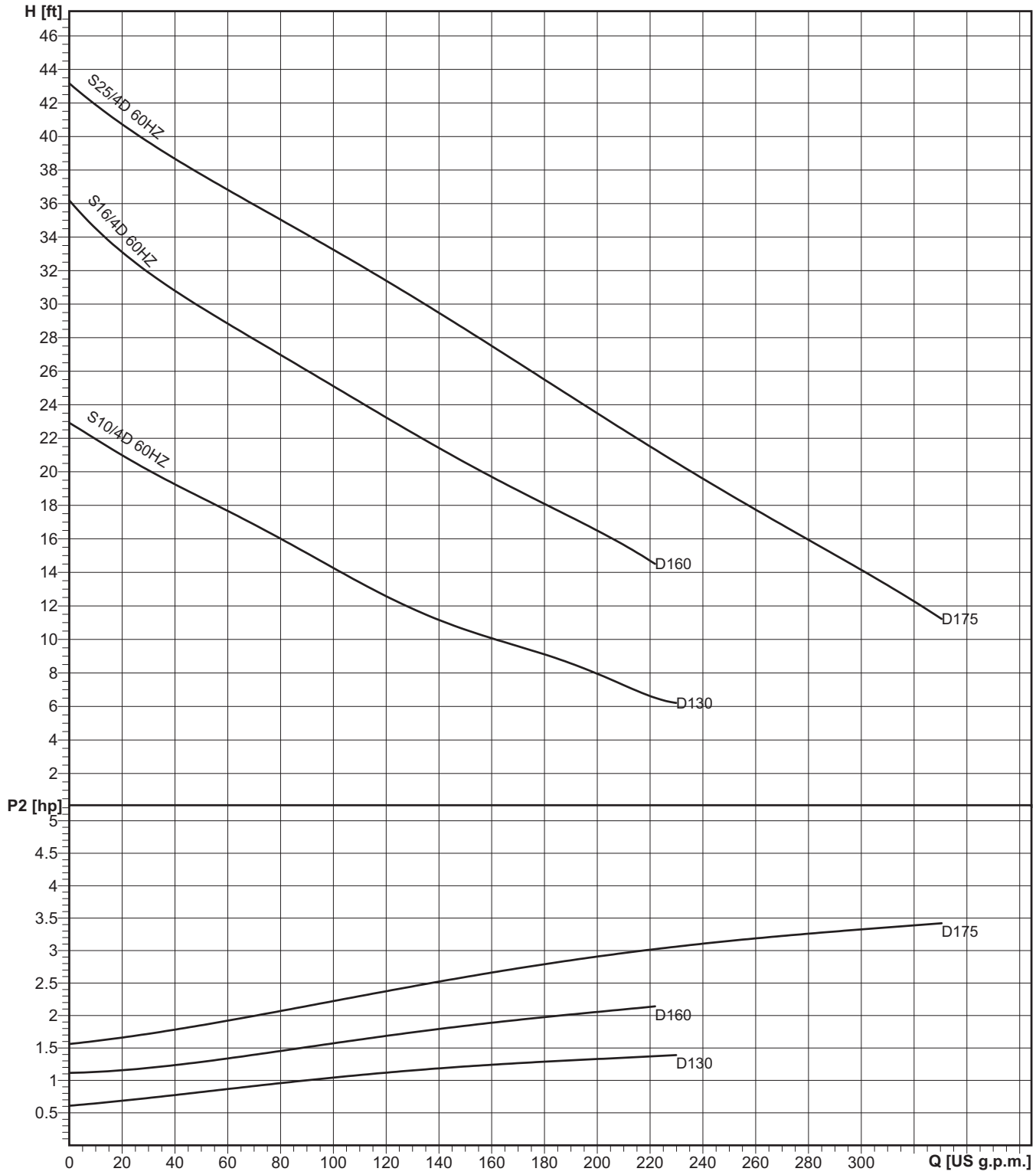
abs

SULZER

Pump performance curves
AS 0830 D 60 HZ

Curve number	
Reference curve	AS 0830 D

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1690..1715 rpm	2010-05-10
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.67 hp	41.8 %	



Impeller size	N° of vanes	Impeller	Solid size	Revision 2005-06-14
175..130 mm	6	Vortex impeller	60 mm	

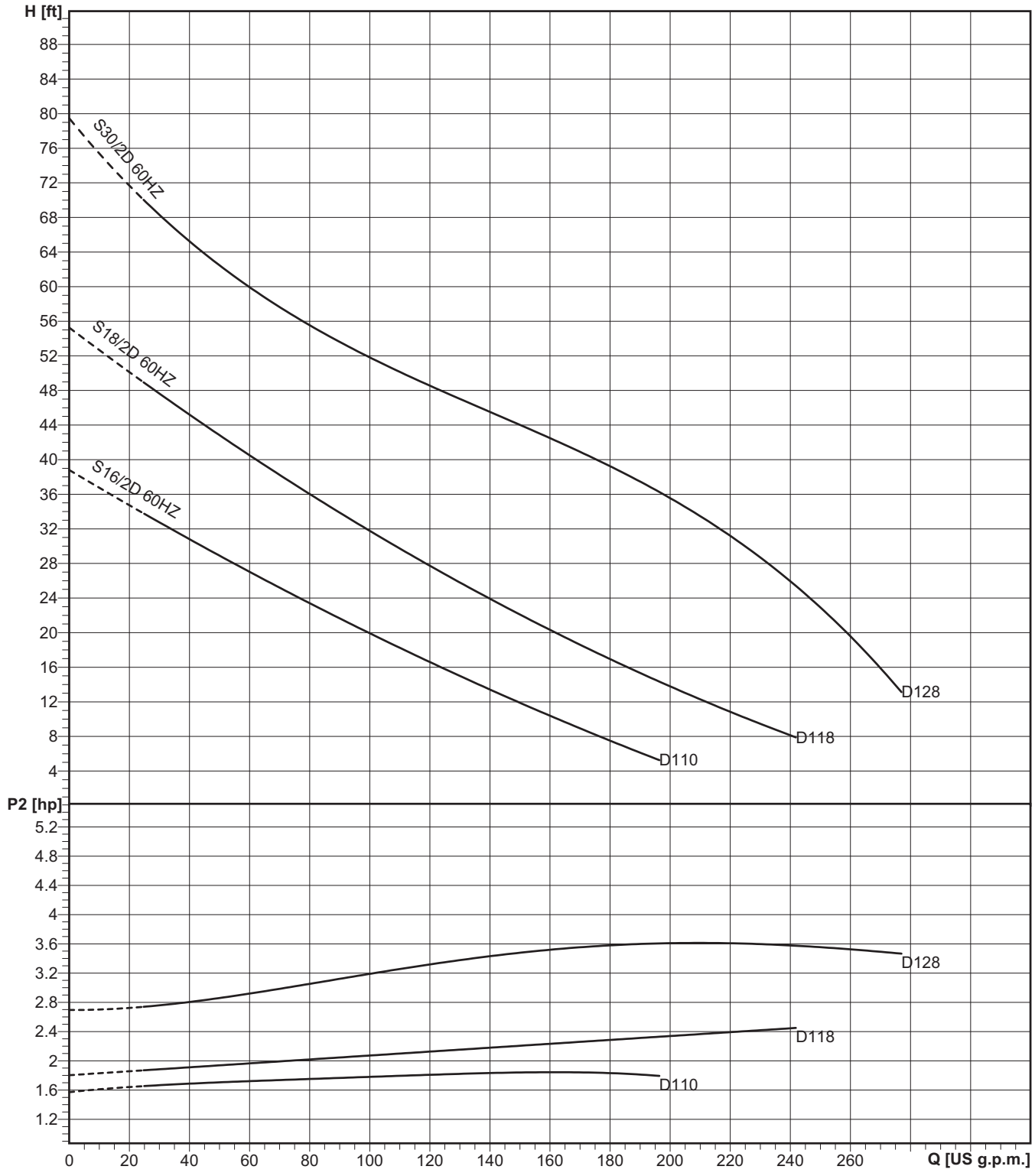
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
AS 0840 D 60 HZ

			Curve number	
			Reference curve AS 0840 D	
			Discharge DN80	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3395..3420 rpm	Date 2010-05-25
Flow	Head	Rated power 3.6 hp	Hydraulic efficiency 50.1 %	NPSH



Impeller size 128..110 mm	N° of vanes 1	Impeller ContraBlock impeller, 1 vane	Solid size 30 mm	Revision 2005-06-14

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 311•F (155•C)
Motor Protection	Bimetallic Switches in each Phase.
Leakage	DI Moisture Detection in seal sensing chamber.
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	UL, CSA, FM

AS 0530 and 0840 MOTOR DATA, 60Hz

Motor	Phase	Output Power BHP (kW)	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S16/2W*	1	2.1 (1.6)	208	10.1	32.5	B	0.99	76.7	2/3450
S16/2W*	1	2.1 (1.6)	230	9.2	29.4	B	0.99	76.7	2/3450
S16/2D	3	2.1 (1.6)	208	7.3	41.9	J	0.82	76.9	2/3450
S16/2D	3	2.1 (1.6)	230	6.6	37.9	J	0.82	73.9	2/3450
S16/2D	3	2.1 (1.6)	460	3.3	18.9	J	0.82	73.9	2/3450
S16/2D	3	2.1 (1.6)	575	2.6	15.3	J	0.82	73.9	2/3450
S18/2W*	1	2.4 (1.8)	208	11.9	32.5	A	0.99	73.1	2/3450
S18/2W*	1	2.4 (1.8)	230	10.8	29.4	A	0.99	73.1	2/3450
S18/2D	3	2.4 (1.8)	208	8.0	42.6	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	230	7.2	38.5	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	460	3.6	19.1	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	575	2.9	15.4	H	0.84	74.5	2/3450
S30/2D	3	4.0 (3.0)	208	12.2	80.4	J	0.88	77.6	2/3450
S30/2D	3	4.0 (3.0)	230	11.0	72.7	J	0.88	77.6	2/3450
S30/2D	3	4.0 (3.0)	460	5.5	36.3	J	0.88	77.6	2/3450
S30/2D	3	4.0 (3.0)	575	4.4	29.1	J	0.88	77.6	2/3450

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Pump, Motor Housing and Volute	Cast Iron ASTM A48 Class 40
External Hardware	AISI 316 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Bottom Plate	Cast Iron ASTM A48 Class 40 (0840)
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing (16/2, 18/2). Double row ball bearing (30/2)
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron,Vortex (0530), Contrabloc (0840)

DIMENSIONS, WEIGHT, AND MISC.

Pump weight	0530, 75 Lb. max, 0840, 88 Lb. Max
Maximum submergence – feet (meters)	33 (10.1)
Discharge size, standard	2 inch FNPT (0530). 3 inch flange (0840)
Maximum temp. of pumped fluid	104•C (40•C)

CABLE SPECIFICATIONS

Motor	POWER CABLE Quantity, Type	LENGTH, Feet (meters)
All Motors	14/7 Type SOW-A	32 (10)

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 311•F (155•C)
Motor Protection	Bimetallic Switches in each Phase.
Leakage	DI Moisture Detection in seal sensing chamber.
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	UL, CSA, FM

AS 0631 MOTOR DATA, 60Hz

Motor	Phase	Output Power BHP (kW)	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S16/2W*	1	2.1 (1.6)	208	10.1	32.5	B	0.99	76.7	2/3450
S16/2W*	1	2.1 (1.6)	230	9.2	29.4	B	0.99	76.7	2/3450
S16/2D	3	2.1 (1.6)	208	7.3	41.9	J	0.82	76.9	2/3450
S16/2D	3	2.1 (1.6)	230	6.6	37.9	J	0.82	73.9	2/3450
S16/2D	3	2.1 (1.6)	460	3.3	18.9	J	0.82	73.9	2/3450
S16/2D	3	2.1 (1.6)	575	2.6	15.3	J	0.82	73.9	2/3450
S18/2W*	1	2.4 (1.8)	208	11.9	32.5	A	0.99	73.1	2/3450
S18/2W*	1	2.4 (1.8)	230	10.8	29.4	A	0.99	73.1	2/3450
S18/2D	3	2.4 (1.8)	208	8.0	42.6	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	230	7.2	38.5	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	460	3.6	19.1	H	0.84	74.5	2/3450
S18/2D	3	2.4 (1.8)	575	2.9	15.4	H	0.84	74.5	2/3450
S35/2D	3	4.7 (3.5)	208	13.5	78.9	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	230	12.2	71.4	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	460	6.1	35.7	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	575	4.8	28.6	G	0.88	82.1	2/3450

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Pump, Motor Housing and Volute	Cast Iron ASTM A48 Class 40
External Hardware	AISI 316 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Bottom Plate	Cast Iron ASTM A48 Class 40 (0840)
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing (16/2, 18/2). Double row ball bearing (35/2)
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight	101 Lb.
Maximum submergence – feet (meters)	33 (10.1)
Discharge size, standard	2.5 inch flange
Maximum temp. of pumped fluid	104•C (40•C)

CABLE SPECIFICATIONS

Motor	POWER CABLE Quantity, Type	LENGTH, Feet (meters)
M35/2	7 X 1.5mm H07RN, or Type SOW	32 (10)

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

Specifications subject to change without notice

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 311•F (155•C)
Motor Protection	Bimetallic Switches in each Phase.
Leakage	DI Moisture Detection in seal sensing chamber.
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	UL, CSA, FM

AS 0641 MOTOR DATA, 60Hz

Motor	Phase	Output Power BHP (kW)	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S35/2D	3	4.7 (3.5)	208	13.5	78.9	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	230	12.2	71.4	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	460	6.1	35.7	G	0.88	82.1	2/3450
S35/2D	3	4.7 (3.5)	575	4.8	28.6	G	0.88	82.1	2/3450

MATERIALS of CONSTRUCTION

Pump, Motor Housing, Volute	Cast Iron ASTM A48 Class 40
External Hardware	AISI 316 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Bottom Plate	Cast Iron ASTM A48 Class 40 (0840)
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Double row ball bearing
Upper Shaft Seal	Buna-N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, 1-vane Contra-Block

DIMENSIONS, WEIGHT, AND MISC.

Pump weight	99 Lb.
Maximum submergence – feet (meters)	33 (10.1)
Discharge size, standard	2.5 inch flange
Maximum temp. of pumped fluid	104•C (40•C)

CABLE SPECIFICATIONS

Motor	POWER CABLE Quantity, Type	LENGTH, Feet (meters)
M35/2	7 X 1.5mm H07RN, or Type SOW	32 (10)

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 311•F (155•C)
Motor Protection	Bimetallic Switches in each Phase.
Leakage	DI Moisture Detection in seal sensing chamber.
Service Factor	1.0
Voltage Tolerance	••10% from nominal
Approvals	UL, CSA, FM

AS 0630 and 0830 MOTOR DATA, 60Hz

Motor	Phase	Output Power BHP (kW)	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
S10/4W*	1	1.3 (1.0)	230	6.5	14.3	A	0.99	67.5	4/1750
S10/4D	3	1.3 (1.0)	230	5.2	22.8	H	0.64	75.3	4/1750
S10/4D	3	1.3 (1.0)	460	2.6	11.4	H	0.64	75.3	4/1750
S10/4D	3	1.3 (1.0)	575	2.1	9.1	H	0.64	75.3	4/1750
S16/4D	3	2.1 (1.6)	230	7.2	22.8	D	0.78	71.5	4/1750
S16/4D	3	2.1 (1.6)	460	3.6	11.4	D	0.78	71.5	4/1750
S16/4D	3	2.1 (1.6)	575	2.9	9.1	D	0.78	71.5	4/1750
S25/4D	3	3.4 (2.5)	230	9.8	44.0	F	0.81	79.1	4/1750
S25/4D	3	3.4 (2.5)	460	4.9	22.0	F	0.81	79.1	4/1750
S25/4D	3	3.4 (2.5)	575	3.9	17.6	F	0.81	79.1	4/1750

***Requires external start kit mounted in the control panel**

MATERIALS of CONSTRUCTION

Pump, Motor Housing, Volute	Cast Iron ASTM A48 Class 40
External Hardware	AISI 316 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing (10/4, 16/4). Double row ball bearing (25/4)
Upper Shaft Seal	Buna-N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight	88 Lb. max
Maximum submergence – feet (meters)	33 (10.1)
Discharge size, standard	2.5 inch flange (0630). 3 inch flange (0830)
Maximum temp. of pumped fluid	104•C (40•C)

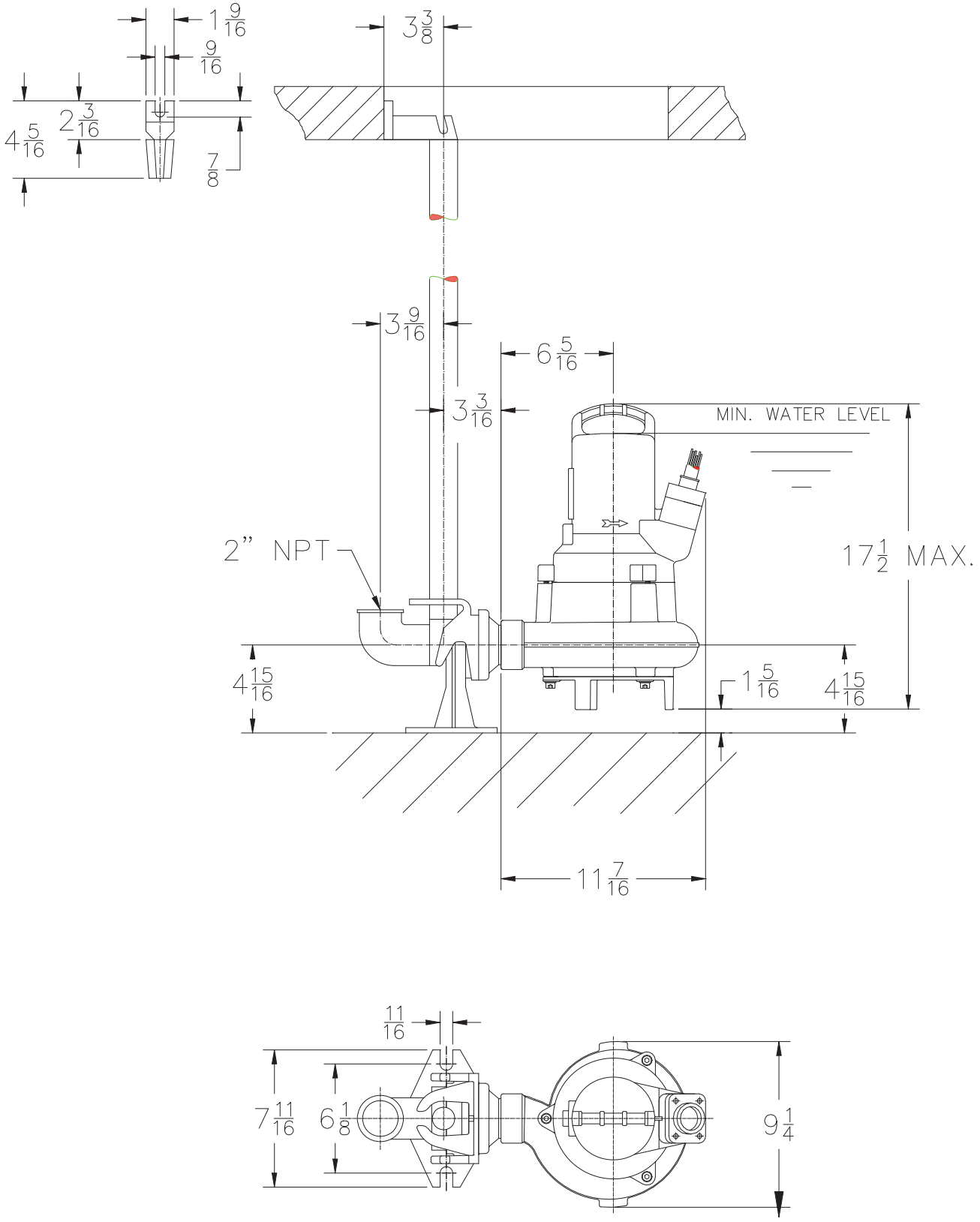
CABLE SPECIFICATIONS

Motor	POWER CABLE Quantity, Type	LENGTH, Feet (meters)
All Motors	14/7 Type SOW-A	32 (10)

Power cable suitable for all standard voltages listed in “MOTOR DATA” section.

INSTALLATION DIMENSIONS	Wet Pit	AS 0530
Dwg. DS-Q99-001 Rev: Date: 01/00	Section AS	Tab AS

62320560 Guide Rail Assembly



TYPICAL DRAWING ONLY, NOT FOR CONSTRUCTION PURPOSES. CONTACT FACTORY FOR CERTIFIED DRAWINGS.

Specifications subject to change without notice

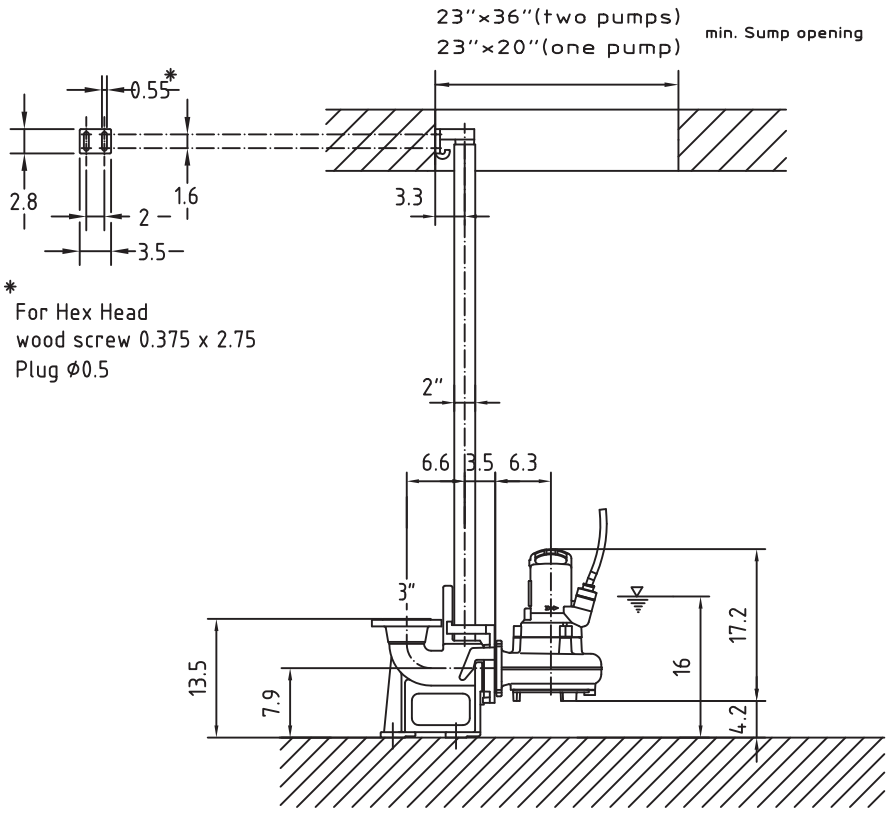
SULZER

abs

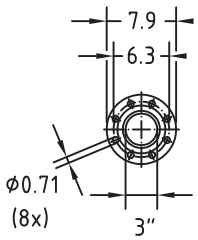
SULZER	AS 0630 Dimension Sheet WET-WELL Installation	No: DS-Q99-014 Drawn: 03.23.2012 / C.Olofsson Issue Date: 03.23.2012 Technical changes reserved

60 Hz **U.S.**

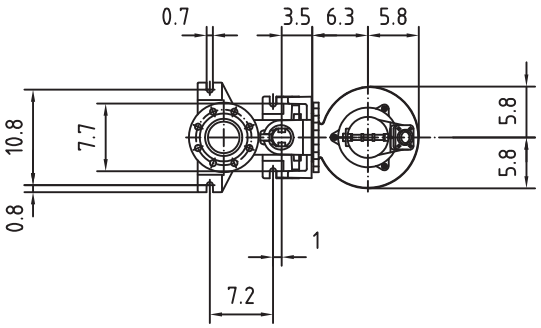
Type	Weight (lbs)
S10/4W	92
S10/4	92
S16/4	92
S25/4	98



* For Hex Head
wood screw 0.375 x 2.75
Plug ⌀0.5



Class 125
ANSI



Weight: Includes pump and slider bracket
Pump shown with 62326015 guide rail assembly

General tolerances for castings in acc. to DIN1680-GTB16

	Massblatt AS 0631 Nassinstallation	No: AN-M.12.062-01x
	Dimension sheet WET-WELL Installation	Drawn: 05.16.12/C.Olofsson
	Dimensioni Installazione sommersa	Issue Date: 05.16.12
	Hoja de dimensiones instalacion sumérgida	Änderungen vorbehalten Technical changes reserved Con riserva di modifiche Con reserva de modificaciones Sous reserve de modification
	Plan d'encombrement Installation noyee	

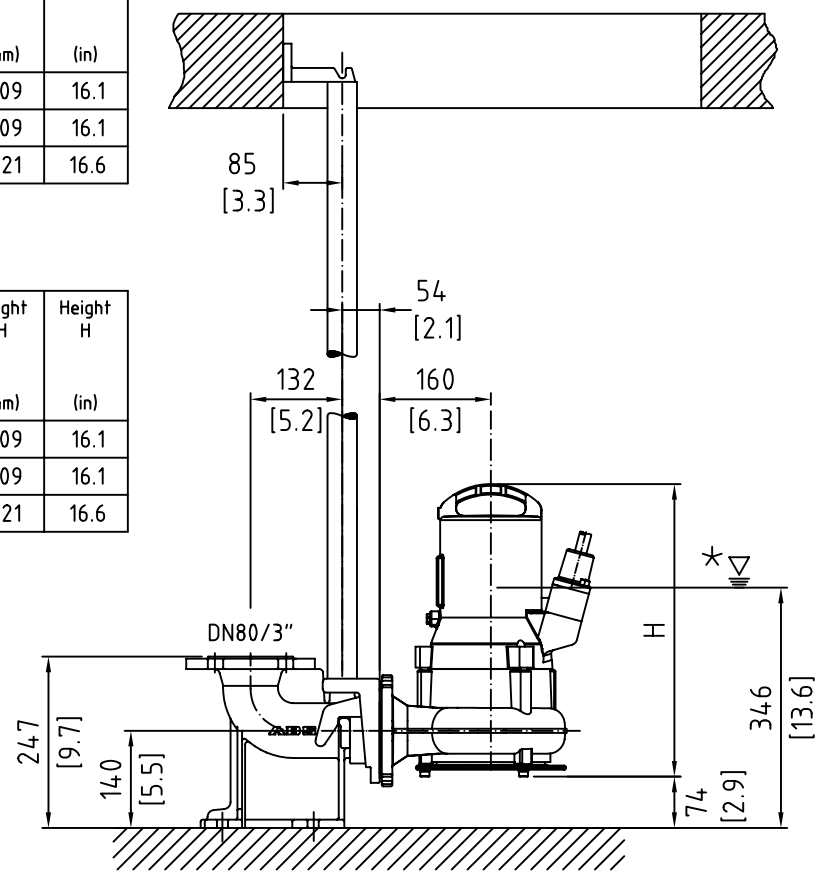
50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (kg)	Gewicht Weight Poids Peso (lbs)	Height H (mm)	Height H (in)
S 12/2	38	84	409	16.1
S 17/2	38	84	409	16.1
S 30/2	45	100	421	16.6

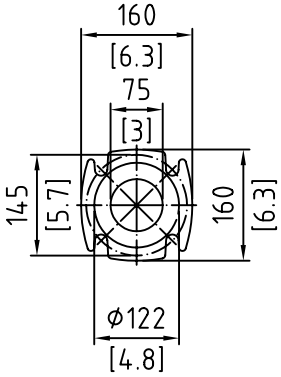
60 Hz

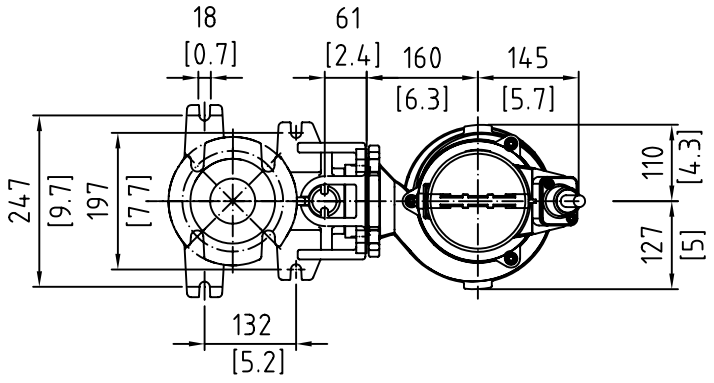
Typ Type Tipo	Gewicht Weight Poids Peso (kg)	Gewicht Weight Poids Peso (lbs)	Height H (mm)	Height H (in)
S 16/2	38	84	409	16.1
S 18/2	38	84	409	16.1
S 35/2	45	100	421	16.6

Gewicht: Beinhaltet Pumpe und Halterung
Weight: Includes pump and slider bracket
Il peso include il pezzo intermedio
Peso: Incluye bomba y una
Poids: Pompe et coulisseau



✶ LOWEST SWITCH OFF POINT FOR AUTOMATIC OPERATION



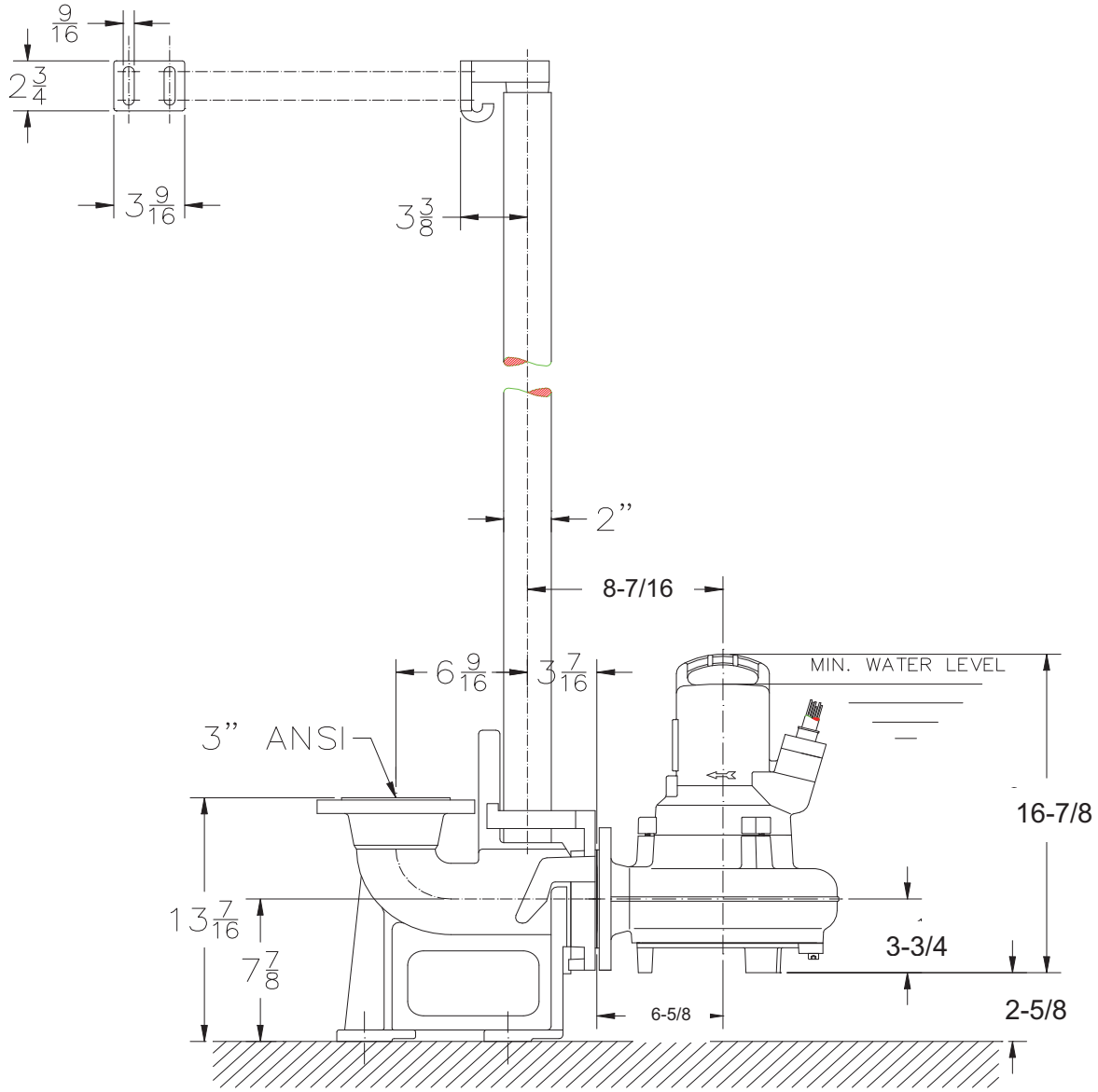


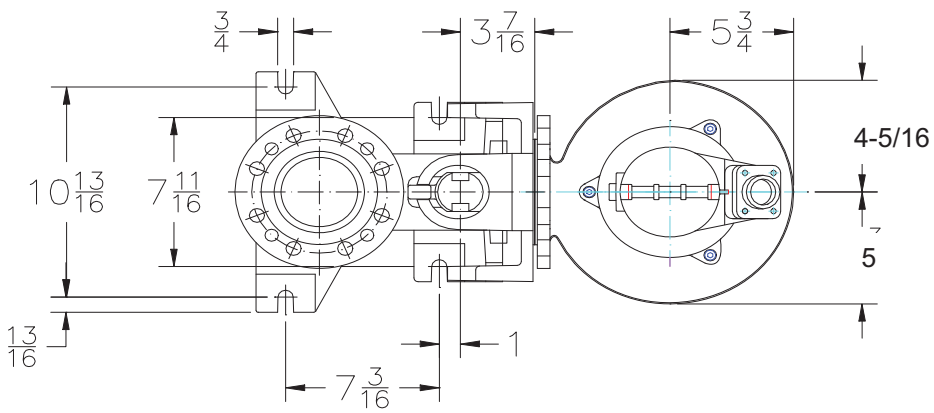
mm
[in]

SULZER

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundicion seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

62326015 Guide Rail Assembly

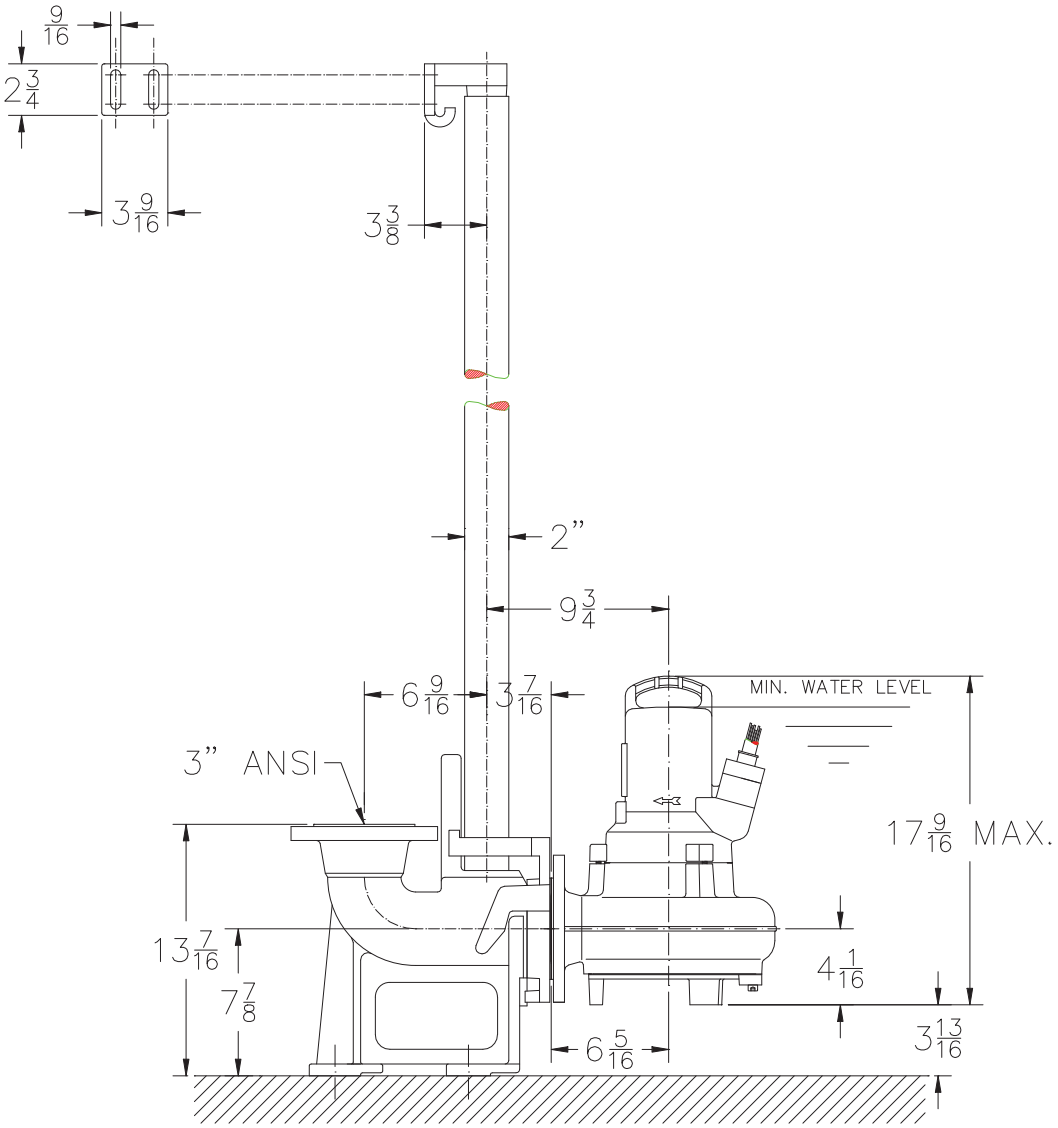


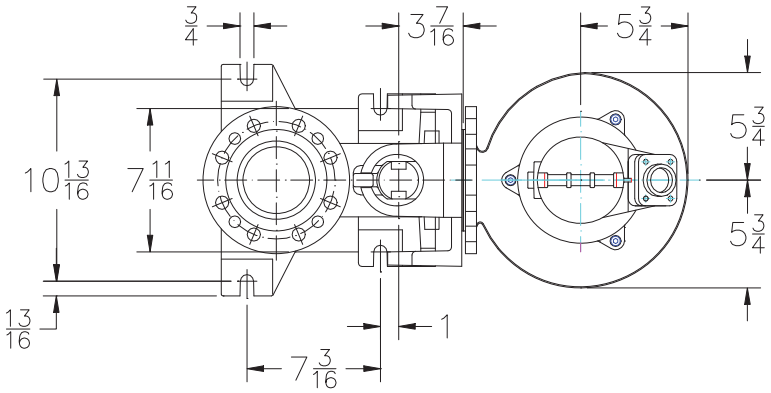


INSTALLATION DIMENSIONS	Wet Pit	AS 0830

Dwg.	DS-Q99-003	Rev:	Date:	01/00	Section	AS	Tab	AS

62320649 Guide Rail Assembly





TYPICAL DRAWING ONLY, NOT FOR CONSTRUCTION PURPOSES. CONTACT FACTORY FOR CERTIFIED DRAWINGS.

Specifications subject to change without notice

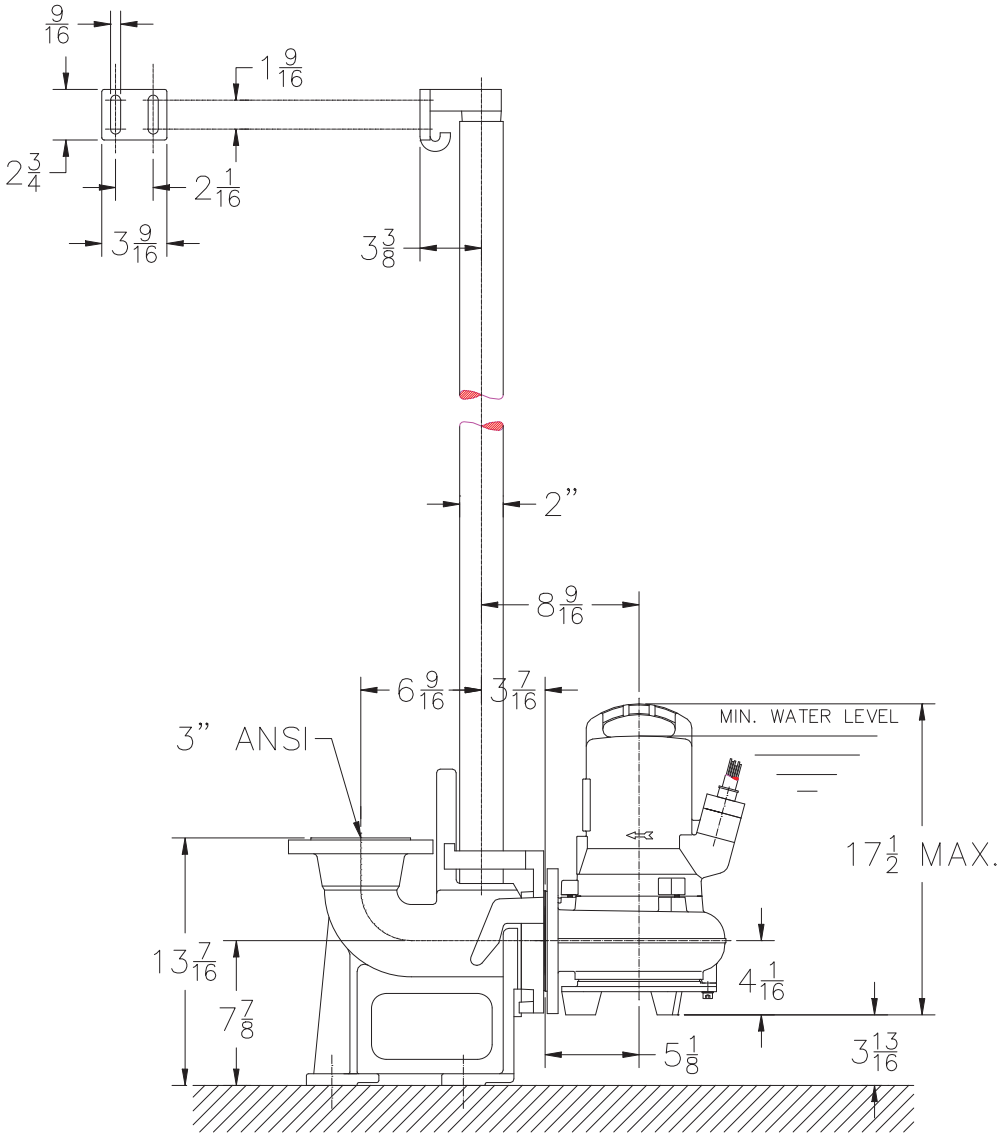
SULZER

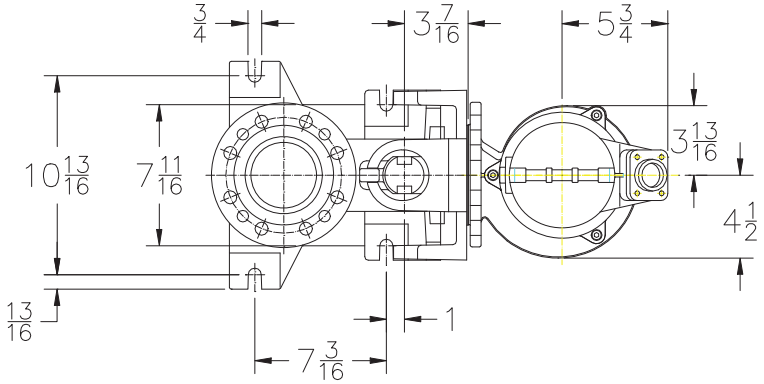
abs

INSTALLATION DIMENSIONS	Wet Pit	AS 0840

Dwg. DS-Q99-004 **Rev:** **Date:** 01/00 **Section** AS **Tab** AS

62320649 Guide Rail Assembly





TYPICAL DRAWING ONLY, NOT FOR CONSTRUCTION PURPOSES. CONTACT FACTORY FOR CERTIFIED DRAWINGS.

Specifications subject to change without notice

ABS submersible sewage pump XFP 80C - 201G

Tough, reliable, submersible pumps, with Premium Efficiency motors from 2.4 to 40.2 hp. For the pumping of wastewater and sewage from buildings and sites in private, commercial, industrial and municipal areas.

Features

- The water-pressure-tight, encapsulated, flood-proof motor and the pump section form a compact, robust, modular construction.
- NEMA Class A temperature rise.
- Premium Efficiency Motors in accordance with IEC 60034-30 level IE3* with testing in accordance with IEC60034-2-1.
- Continuously rated motor in submerged and non-submerged applications.
- Double SiC-SiC mechanical seals. All seals are independent of rotation direction and resistant to temperature shock.
- Anti-wicking cable plug solution (80C - 150E), or water-pressure-sealed connection chamber (100G - 201G).
- Hydraulic options of Contrablock and Contrablock Plus impellers for high efficiency, or vortex impellers for maximum solids handling.
- Lubricated-for-life bearings with a calculated life time of minimum 50,000 hrs. (80C - 150E), and 1000,000 hrs. (100G - 201G).
- Stainless steel shaft. Designed with high safety factor to prevent fatigue fracture.
- Temperature monitoring using bi-metallic thermal sensors in the stator windings that open at 140 °C (284 °F).
- Seal monitoring by a moisture probe (DI) in the seal chamber (80C - 150E), or dry chamber (100G - 201G), which signals an inspection alert if there is leakage at the shaft seals.
- Smooth outer design to reduce rag build-up.
- Stainless steel lifting hoop.
- 3", 4", 6" and 8" radial slot ANSI flange discharge.
- Maximum allowable temperature of the medium for continuous operation is 104 °F.
- Maximum submergence depth of 65 ft.
- Available in explosion-proof version in accordance with international standards FM / CSA.

* See Technical Data table

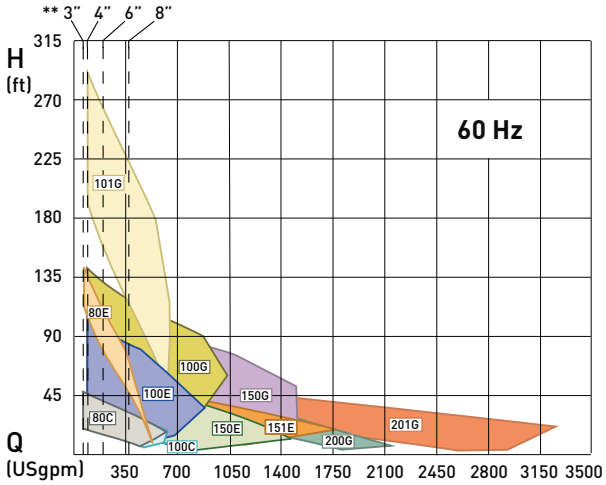
Motor

Premium Efficiency IE3* motor.
60 Hz single-phase 230 V through 3.8 hp, and three-phase 460 V through 40.2 hp.
Squirrel-cage motor as 2-pole (3400 rpm), 4-pole (1750), 6-pole (1180) and 8-pole (870).
Protection type IP 68, with stator insulation Class H.
Starting: DOL (direct on line).
Service factor: 1.3
Motors with other operating voltages and frequencies are also available (DOL and YΔ).

Identification Code: e.g. XFP 80C CB1.3 PE22/4-C-60

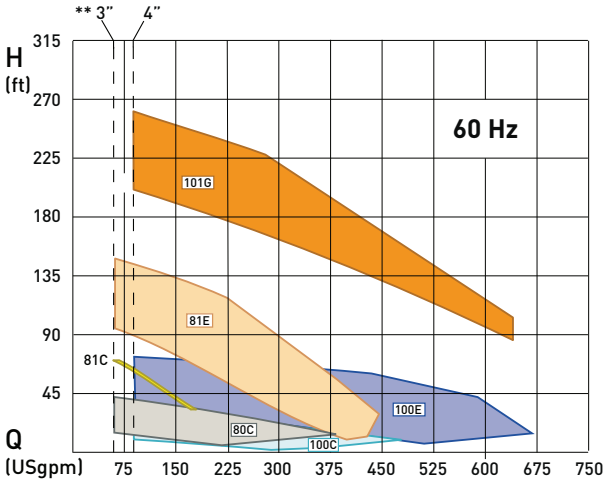
Hydraulics:
XFP ..... Product range
8 ..... Discharge outlet DN (cm)
0 . .....Hydraulic type
C ..... Volute opening (dia. ins)
CB..... Impeller type: CB = Contrablock, VX = vortex
1 ..... Number of impeller vanes
3 ..... Impeller size
Motor:
PE ..... Premium Efficiency
22 ..... Motor power P_2 x 10 hp
4 ..... Number of poles
C ..... Volute opening (dia. ins)
60 ..... Frequency

Performance fields with Contrablock impeller



** Minimum flow rate Q

Performance fields with vortex impeller



Please use the ABSEL program as the only valid selection tool.

Technical Data

XFP	Motor	IEC rating	Impeller size	Rated voltage (V)	Motor power* (kW) P_1	Motor power* (hp) P_2	Rated current (A)	Speed (rpm)	Cable size	Weight** (lbs)
80C-CB1	PE 28/4	IE3	5	460 3~	3.1	3.8	5.2	1750	SOOW 14/7	215 / n.a.
	PE 35/4	IE3	4	460 3~	3.9	4.7	6.2	1750	SOOW 14/7	221 / n.a.
	PE 20/6	IE1	1, 2, 4	460 3~	2.4	2.7	4.2	1180	SOOW 14/7	221 / n.a.
	PE 28/4W	IE3	5	230 1~	3.6	3.8	16.9	1750	SOOW 10/7	215 / n.a.
	PE 20/6W	IE1	1, 2, 4	230 1~	2.6	2.7	12.0	1180	SOOW 12/7	221 / n.a.
80C-VX	PE 22/4	IE3	2, 3, 4	460 3~	2.5	3.0	4.6	1750	SOOW 14/7	215 / n.a.
	PE 35/4	IE3	1	460 3~	3.9	4.7	6.2	1750	SOOW 14/7	220 / n.a.
	PE 18/4W	IE3	3, 4	230 1~	2.3	2.4	10.5	1750	SOOW 12/7	211 / n.a.
	PE 28/4W	IE3	2	230 1~	3.6	3.8	16.9	1750	SOOW 10/7	215 / n.a.
80E-CB1	PE125/2	IE3	4, 5	460 3~	13.7	16.8	21.3	3400	AWM 8/4+16/3	381 / n.a.
81C-VX	PE 45/2	IE3	1	460 3~	5.1	6.0	7.4	3400	SOOW 14/7	275 / n.a.
81E-VX	PE 80/2	IE3	4	460 3~	8.9	10.7	13.3	3400	SOOW 12/7	300 / n.a.
	PE 125/2	IE3	1, 2, 3	460 3~	13.7	16.8	21.3	3400	AWM 8/4+16/3	336 / n.a.
100C-CB1	PE 28/4	IE3	5	460 3~	3.1	3.8	5.2	1750	SOOW 14/7	235 / n.a.
	PE 35/4	IE3	4	460 3~	3.9	4.7	6.2	1750	SOOW 14/7	240 / n.a.
	PE 20/6	IE1	1, 2, 4	460 3~	2.4	2.7	4.2	1180	SOOW 14/7	240 / n.a.
	PE 28/4W	IE3	5	230 1~	3.6	3.8	16.9	1750	SOOW 10/7	235 / n.a.
	PE 20/6W	IE1	1, 2, 4	230 1~	2.6	2.7	12.0	1180	SOOW 12/7	240 / n.a.
100C-VX	PE 22/4	IE3	3, 4, 5	460 3~	2.5	3.0	4.6	1750	SOOW 14/7	208 / n.a.
	PE 28/4	IE3	2	460 3~	3.1	3.8	5.2	1750	SOOW 14/7	259 / n.a.
	PE 35/4	IE3	1	460 3~	3.9	4.7	6.2	1750	SOOW 14/7	259 / n.a.
	PE 18/4W	IE3	4	230 1~	2.3	2.4	10.5	1750	SOOW 10/7	203 / n.a.
	PE 28/4W	IE3	2, 3	230 1~	3.6	3.8	16.9	1750	SOOW 10/7	259 / n.a.
100E-CB1	PE 45/4	IE3	6	460 3~	5.0	6.0	8.2	1750	SOOW 14/7	357 / n.a.
	PE 56/4	IE3	5	460 3~	6.1	7.5	9.9	1750	SOOW 14/7	390 / n.a.
	PE 75/4	IE3	4, 4A, 5	460 3~	8.2	10.1	13.8	1750	SOOW 12/7	390 / n.a.
	PE 90/4	IE3	2, 3, 4	460 3~	9.8	12.1	15.8	1750	SOOW 12/7	416 / n.a.
	PE 105/4	IE3	1, 2, 3	460 3~	11.4	14.1	17.7	1750	SOOW 10/7	416 / n.a.
	PE 35/6	IE2	2, 3, 4, 5	460 3~	4.0	4.7	6.3	1180	SOOW 14/7	349 / n.a.
100E-VX	PE 45/4	IE3	5	460 3~	5.0	6.0	8.2	1750	SOOW 14/7	357 / n.a.
	PE 56/4	IE3	4	460 3~	6.1	7.5	9.9	1750	SOOW 14/7	390 / n.a.
	PE 75/4	IE3	4	460 3~	8.2	10.1	13.8	1750	SOOW 12/7	364 / n.a.
	PE 90/4	IE3	3	460 3~	9.8	12.1	15.8	1750	SOOW 12/7	364 / n.a.
	PE 105/4	IE3	1, 2	460 3~	11.4	14.1	17.7	1750	SOOW 10/7	390 / n.a.
100G-CB1	PE 130/4	IE3	8, 9	460 3~	14.0	17.4	23.2	1750	AWM 8/4+16/3	708 / 858
	PE 150/4	IE3	7	460 3~	16.1	20.1	25.5	1750	AWM 8/4+16/3	710 / 855
	PE 185/4	IE3	6	460 3~	19.8	24.8	32.3	1750	AWM 8/4+16/3	763 / 885
	PE 210/4	IE3	4, 5	460 3~	22.4	28.2	35.4	1750	AWM 8/4+16/3	763 / 885
	PE 250/4	IE3	4	460 3~	26.7	33.5	40.8	1750	AWM 4/4+16/3	792 / 1015
	PE 90/6	IE3	4, 5	460 3~	10.0	12.1	18.8	1180	SOOW 10/7	721 / 865
101G-CB1	PE 185/2	IE3	4	460 3~	20.0	24.8	28.4	3400	AWM 8/4+16/3	629 / 796
	PE 200/2	IE3	3	460 3~	21.8	26.8	30.5	3400	AWM 8/4+16/3	629 / 796
	PE 300/2	IE3	2, 1	460 3~	32.5	40.2	45.8	3400	AWM 4/4+16/3	651 / 821
101G-VX	PE 300/2	IE3	3, 4, 5, 6	460 3~	32.5	40.2	45.8	3400	AWM 4/4+16/3	651 / 821
150E-CB1	PE 45/4	IE3	7	460 3~	5.0	6.0	8.2	1750	SOOW 14/7	369 / n.a.
	PE 56/4	IE3	6	460 3~	6.1	7.5	9.9	1750	SOOW 14/7	390 / n.a.
	PE 75/4	IE3	5, 6	460 3~	8.2	10.1	13.8	1750	SOOW 12/7	410 / n.a.
	PE 90/4	IE3	4, 5	460 3~	9.8	12.1	15.8	1750	SOOW 12/7	410 / n.a.
	PE 105/4	IE3	4	460 3~	11.4	14.1	17.7	1750	SOOW 10/7	435 / n.a.
	PE 35/6	IE2	4, 5, 6	460 3~	4.0	4.7	6.3	1180	SOOW 14/7	369 / n.a.
150G-CB1	PE 130/4	IE3	8	460 3~	14.0	17.4	23.2	1750	AWM 8/4+16/3	735 / 925
	PE 150/4	IE3	7	460 3~	16.1	20.1	25.5	1750	AWM 8/4+16/3	755 / 900
	PE 185/4	IE3	6, 7	460 3~	19.8	24.8	32.3	1750	AWM 8/4+16/3	765 / 981
	PE 210/4	IE3	4, 5	460 3~	22.4	28.2	35.4	1750	AWM 8/4+16/3	765 / 981
	PE 110/6	IE3	2,3, 4	460 3~	12.0	14.8	21.1	1180	AWM 8/4+16/3	735 / 964
151E-CB2	PE 75/4	IE3	4	460 3~	8.2	10.1	13.8	1750	SOOW 12/7	415 / n.a.
	PE 90/4	IE3	2, 3	460 3~	9.8	12.1	15.8	1750	SOOW 12/7	415 / n.a.
	PE 105/4	IE3	1	460 3~	11.4	14.1	17.7	1750	SOOW 10/7	440 / n.a.
	PE 35/6	IE2	1, 2, 3, 4	460 3~	4.0	4.7	6.3	1750	SOOW 14/7	375 / n.a.
200G-CB1	PE 90/6	IE3	3, 4	460 3~	10.0	12.1	18.8	1180	SOOW 10/7	805 / 1018
	PE 110/6	IE3	1, 2	460 3~	12.0	14.8	21.1	1180	AWM 8/4+16/3	805 / 1018
	PE 130/6	IE3	1	460 3~	14.2	17.4	23.7	1180	AWM 8/4+16/3	805 / 1018
201G-CB2	PE 130/6	IE3	6	460 3~	14.2	17.4	23.7	1180	AWM 8/4+16/3	845 / 982
	PE 160/6	IE3	4	460 3~	17.5	21.5	28.4	1180	AWM 8/4+16/3	865 / 1004
	PE 200/6	IE3	2	460 3~	21.5	26.8	32.7	1180	AWM 8/4+16/3	907 / 1047
	PE 120/8	IE3	1, 2	460 3~	13.5	16.1	23.7	870	AWM 8/4+16/3	851 / 993

* P_1 = power at mains. P_2 = power at motor shaft. **Without / with cooling jacket; includes 33 ft of cable.

Data for alternative voltages available on request.

Standard and Options

Description	Standard	Option
Mains voltage	230 V 1~, 460 V 3~	208 V 1~, 208, 220, 380, 600, 220/380, 380/660 V 3~
Voltage tolerance	± 10%	-
Motor efficiency	Premium Eff. IE3*	-
Insulation class	H	-
Start-up	Direct on line	Star delta
Approvals	FM / CSA	-
Mechanical seal (at medium side)	SiC-SiC	-
Mechanical seal (at motor side)	SiC-SiC	-
O-rings	NBR	-
Cables	CSA	EMC
Cable length (ft)	49	33, 66, 99, 131, 164
Protective coating	2k Epoxy 120 µm	2k Epoxy 400 µm
Provision for lifting hoist	Lifting hoop	
Cooling	Self-cooling (80C - 150E); by the medium (100G - 201G)	Closed cooling (100G - 201G)
Installation	Wet well	Dry well** or transportable

* See Technical Data table ** Except XFP 80E and 81E

Monitoring

Description		Standard	Option
Motor	Bi-metallic switch in windings	X	-
(temperature)	PTC thermistor in windings	-	X
Seals	Moisture sensor (DI) in oil chamber (80C - 150E)	X	-
(leakage)	Moisture sensor (DI) in dry chamber (100G - 201G)	X	-
	Moisture sensor (DI) in connection chamber (100G - 201G)	-	X

Materials

Motor	Material	Option
Motor housing	Cast iron EN-GJL-250	-
Motor shaft	Stainless steel 1.4021	-
Fasteners	Stainless steel 1.4401	-
Lifting hoop	Stainless steel 1.4401	-
Hydraulics	**Material**	**Option**
Volute	Cast iron EN-GJL-250	-
Impeller	Cast iron EN-GJL-250	Stainless steel 1.4470 *
Bottom plate	Cast iron EN-GJL-250	Stainless steel 1.4470 *

* Selected models only. Contact ABS for details.

Material comparison

Europe	USA
EN-GJL-250	ASTM A48; Class 35B
1.4021	ASTM / AISI 420
1.4401	ASTM / AISI 316
1.4470	ASTM / AISI 329

Accessories

	Description	Size	XFP	Part no.
Fixed installation - wet well with ABS Automatic Coupling System	**Pedestal*** (cast iron ASTM A48; Class 40B) 90° cast bend (single guide rail) - DIN flange connection	3" 4" 4" (high-head) 6" 8"	80C - 81E 100C - 100G 101G 150E - 150G 201G	62320649 62320652 62325019 62320655 62320658
	90° cast bend (single guide rail) - plug/clamp connection	3" (pipe Ø3½") 4" (pipe Ø4¼") 4" high head (pipe Ø4¼") 4" (pipe Ø4½") 6" (pipe Ø6¼")	80C - 81E 100C - 100G 101G 100C - 100G 150E - 150G	62320650 62320653 62325020 62320654 62320656
	90° cast bend (twin guide rail) - DIN flange connection	3" 4" 6" 8"	80C - 81E 100C - 101G 150E - 150G 201G	62325029 62325030 62325031 62325032
	Pedestal bracket fasteners single guide rail version (galvanised steel)		80C - 81E 100C - 101G 150E - 150G 201G	62610632 62610633 62610635 62610883
	single guide rail version (stainless steel)		80C - 81E 100C - 101G 150E - 150G 201G	62610899 62610637 62610639 62610862
	twin guide rail version (galvanised steel)		80C - 81E 100C - 101G 150E - 150G 201G	62615053 62615054 62615055 62615056
	Pedestal base anchor bolts single and twin guide rail (galvanised steel)		80C - 101G 150E - 150G 201G	62610775 62610784 62610785
Fixed installation - dry well, (horizontal)	**Pump Support Kit** (ASTM A48; Class 40B) head and volute supports with fixing bolts and vibration damper		80C 80C**, 81C, 100C 81E*** 100E 150E, 151E 101G 100G, 101G** 150G, 201G	61825032 61825033 61825038 61825030 61825031 61825036 61825037
(vertical)	**Ground Support Stand**		80C, 81C 81E*** 100C 100E 150E, 151E 101G 100G, 101G** 150G, 201G	61355014 61355020 61355015 61355021 61355022 61355024 61355023
Transportable	**Ground Support Stand**		80C, 81C, 100C 80E & 81E 100E 150E, 151E 101G 100G, 101G** 150G, 201G	61355016 61355017 61355018 61355019 61355026 61355025
General	**Cathodic Protection** (Zinc anodes)		80C - 201G	13905000

*Guide rail not included **Vortex version of pumps (VX) *** Only with PE 80/2 motor

2012-02-28 | We reserve the rights to alter specifications due to technical developments.

NAMING CONVENTION

XFP NOTATION

Date: 11/2010
Dwg: DS-E00-003 Rev: 3

The XFP Product line's naming convention is described below in two sections, Hydraulics and Motor. To illustrate the naming convention, the model **XFP 100C-CB1-4 PE 35/4–C–60FM** will be used as an example.

Hydraulic Portion

XFP 100 C – CB1- 4

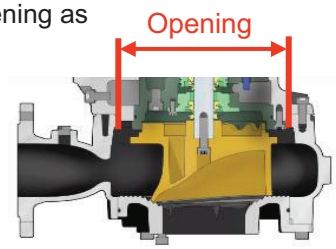
XFP 100 C – CB1- 4 — **XFP** is the product range of ABS premium efficiency submersible pump.

XFP 10 0 C – CB1- 4 — The **first two characters** are used to describe the pump's discharge size using the following table:

Two Digits	Discharge Size		Two Digits	Discharge Size
08	3”		35	14”
10	4”		40	16”
15	6”		50	20”
20	8”		60	24”
25	10”		80	32”
30	12”			

XFP 100 C – CB1- 4 — The **third character** is the hydraulic version of the model.

XFP 100 C – CB1- 4 — The **fourth character** is the volute opening as see in the figure to the right.



XFP 100 C – CB1- 4 — The **fifth and sixth character** is the impeller type and is described by the table right.

Character	Impeller Type
CH	Closed
CB	Contra Block
CP	Chopper
VX	Vortex
SK	Skew
MX	Mixed
AF	Axial Flow

XFP 100 C – CB1- 4 — The **seventh character** is the number of impeller vanes.

XFP 100 C – CB1- 4 — The **eighth character** is the impeller trim. For IEM impeller an impeller number will be displayed. For DEM Impellers, the machined diameter (in millimeters) trim is displayed.

Motor Portion

PE 35/4 – C – 60 FM

PE 35/4 – C – 60 FM — The **PE** is the designation for the Premium Efficiency Motor series.

PE 35/4 – C – 60 FM — The **Motor Rated Output Power** is shown using the kW Rating multiplied by 10, similar to the AFP motors.

PE 35/4 – C – 60 FM — The **motor speed** is indicated by the number of poles.

PE 35/4 – C – 60 FM — The **letter** in the motor designation indicate the volute opening size and corresponds to the letter in the hydraulic designation.

PE 35/4 – C – 60 FM — The **last characters** designate the motor frequency and special ratings.

Quick Reference

IEM	XFP	10	0	C	-CB	1	-4		PE	35	/4	-C	60	FM
DEM	XFP	20	0	M	-CH	2	-450		PE	860	/6	-M	60	FM
	Product Line	Discharge Size	Hydraulic Version	Interface Size	Impeller Type	Number of vanes	Impeller Size		Motor Range	Motor Rated Output Power (10x) kW	Motor Speed (Poles)	Interface Size	Frequency (Hz)	Special Ratings

SULZER

abs

The ABS Contrablock Plus

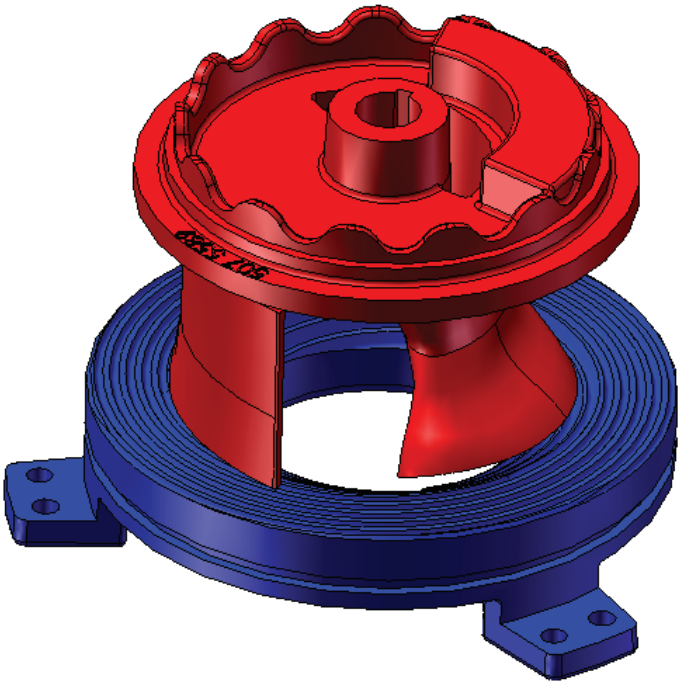
Our ABS EffeX range makes use of a completely new impeller concept called ContraBlock Plus. This solution takes the best of the tried and tested designs and adds new functionality to enhance the levels of clog resistance above that of any other supplier in the market. In addition, the free solids passage is never reduced below 3" (75 mm) to give a further level of protection against clogging.

Mechanical Design

The ABS ContraBlock Plus is not dependent on speed or clearance to maintain rag handling. The ABS ContraBlock Plus system consists of a bottom plate which has a serrated entrance and an outwardly spiraling groove on the face and an impeller designed with a sloping edge and a large overlapping single blade.

The ABS ContraBlock Plus prevents materials from roping and clogging the impeller eye by shredding the material as it is pulled into and spun against the serrated edges of the bottom plate entrance. The sloping leading edge of the impeller pulls the shredded material up onto the impeller blade so that it does not become bound between the bottom of the impeller and bottom plate. Should material be caught between the impeller and bottom plate, the outward spiraling groove on the face of the bottom plate will track the material outward and into the volute to be safely pumped through the pump discharge.

The binding forces of textiles, plastics and other stringy matter are quickly reduced by the ABS ContraBlock Plus where the power reserves of the motor are always adequate to clear the pump of material as it is bent, broken or torn between the shearing edges of the bottom plate and impeller.



SULZER

abs

Clear Opening and Spacing Data Formulas.

Pipe Dia.-Discharge size plus two sizes bigger.

Min. Clear Opening (simplex)- From the dimensions on absel for wet pit installation drawings.
Z1= distance from edge to centerline of the pipe + centerline of the pipe to centerline of volute/motor+ centerline of volute/motor to edge of the volute + 4 inches.
Z2= diameter of the volute + 8 (4 on both sides).

Min. Clear Opening (Duplex and Triplex)- From the dimensions on absel for wet pit installation drawings.
Z1= same as simplex EXCEPT on 8" models and up 2 more inches was added for addition clearance.

Z3 and Z4- Diameter of the volute+ min. manifold distance/separation distance+ 8 or 12 inches. 8" pumps and up we added 12.

Min. Hydraulic Distance: Width of the volute + discharge size

Min. Manifold Distance: The "A" dimension from the short radius 90 degree bend section of "Flanged fittings: AWWA C110, ANSI A21.10." This dimension multiplied by 4.

Min Separation Distance: Same as Manifold distance.

Spacer length: 2 * the A dimension from above.

TECHNICAL DATA — XFP CLEAR OPENING AND SPACING

XFP 3" PUMPS

Date: 06/11

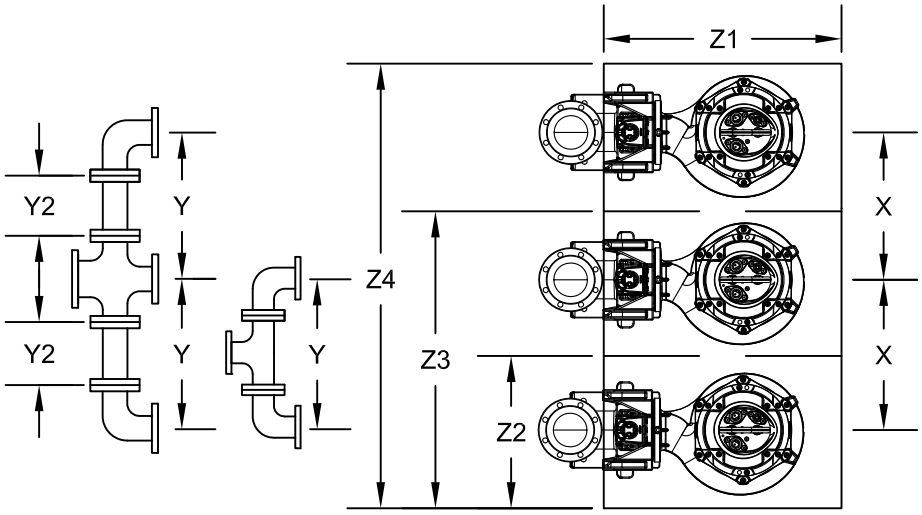
Dwg: DS-E03-001 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 80C-CB1	3	27x21	15	22	27x43	22	27x65	11
	4	27x21	15	26	27x47	26	27x73	13
	6	27x21	15	32	27x53	32	27x85	16
XFP 80C-VX	3	27x21	16	22	27x43	22	27x65	11
	4	27x21	16	26	27x47	26	27x73	13
	6	27x21	16	32	27x53	32	27x85	16
XFP 81C-VX	3	27x20	15	22	27x42	22	27x64	11
	4	27x20	15	26	27x46	26	27x68	13
	6	27x20	15	32	27x52	32	27x74	16
XFP80E-CB1	3	27x22	16	22	27x43	22	27x65	11
	4	27x22	16	26	27x47	26	27x73	13
	6	27x22	16	32	27x53	32	27x85	16
XFP 81E-VX	3	28x21	16	22	28x43	22	28x65	11
	4	28x21	16	26	28x47	26	28x73	13
	6	28x21	16	32	28x53	32	28x85	16

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

TECHNICAL DATA

XFP CLEAR OPENING AND SPACING

XFP 4" PUMPS

Date: 06/11

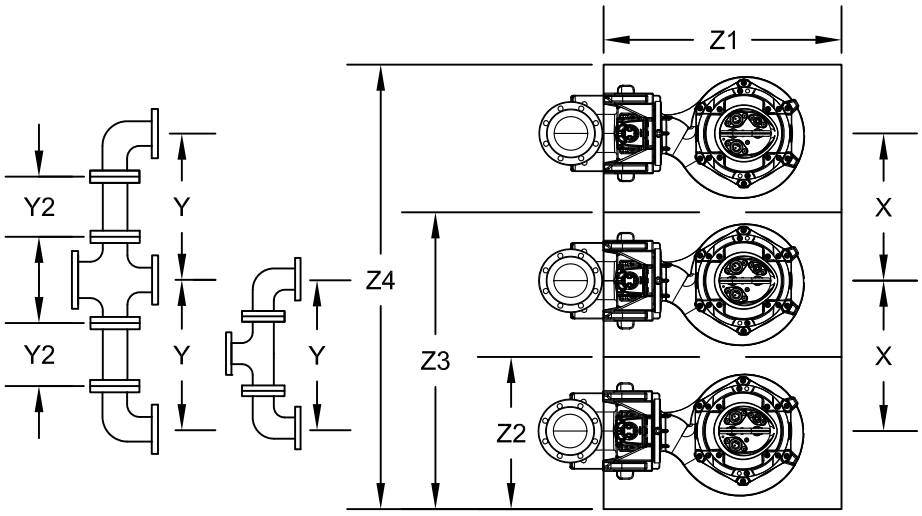
Dwg: DS-E03-002 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 100C-CB1	4	29x21	16	26	29x46	26	29x72	13
	6	29x21	16	32	29x52	32	29x84	16
	8	29x21	16	36	29x56	36	29x92	18
XFP 100C-VX	4	28x21	17	26	28x47	26	28x73	13
	6	28x21	17	32	28x53	32	28x85	16
	8	28x21	17	36	28x57	36	28x93	18
XFP 100E-CB1	4	30x23	20	26	30x49	26	30x75	13
	6	30x23	20	32	30x55	32	30x82	16
	8	30x23	20	36	30x59	36	30x96	18
XFP 100E-CP	4	30x24	19	26	30x49	26	30x75	13
	6	30x24	19	32	30x55	32	30x87	16
	8	30x24	19	36	30x59	36	30x95	18
XFP 100E-VX	4	28x22	18	26	28x48	26	28x74	13
	6	28x22	18	32	28x54	32	28x81	16
	8	28x22	18	36	28x58	36	28x95	18

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

TECHNICAL DATA — XFP CLEAR OPENING AND SPACING

XFP 4" PUMPS

Date: 06/11

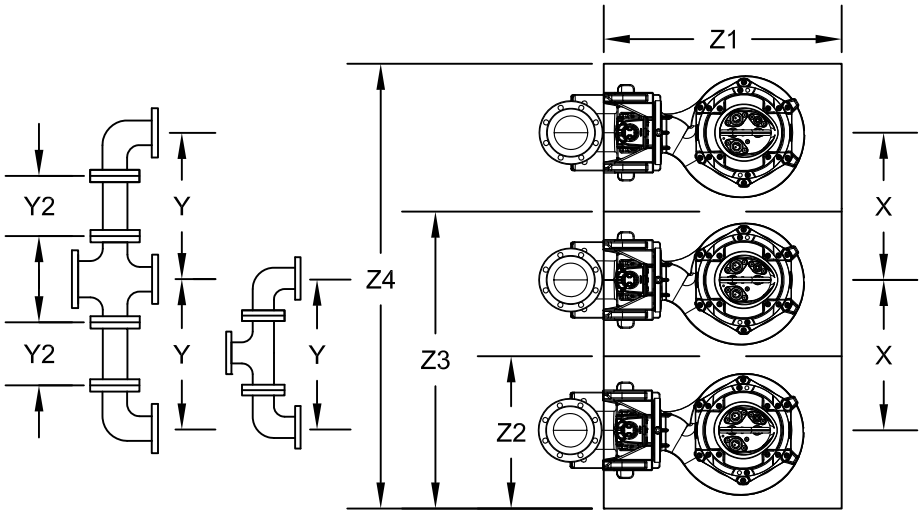
Dwg: DS-E03-011 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 100G-CB1	4	33x26	22	26	33x52	26	33x78	13
	6	33x26	22	32	33x58	32	33x90	16
	8	33x26	22	36	33x62	36	33x98	18
XFP 101G-CB1	4	34x24	20	26	34x50	26	34x76	13
	6	34x24	20	32	34x56	32	34x88	16
	8	34x24	20	36	34x60	36	34x96	18
XFP 101G-VX	4	35x25	21	26	35x51	26	35x77	13
	6	35x25	21	32	35x57	32	35x89	16
	8	35x25	21	36	35x61	36	35x97	18
XFP 100J-CB2	4	41x32	28	26	41x58	26	41x84	13
	6	41x32	28	32	41x64	32	41x96	16
	8	41x32	28	36	41x68	36	41x104	18
XFP 100J-CH1	4	41x32	28	26	41x58	26	41x84	13
	6	41x32	28	32	41x64	32	41x96	16
	8	41x32	28	36	41x68	36	41x104	18

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

TECHNICAL DATA

XFP CLEAR OPENING AND SPACING

XFP 4" PUMPS

Date: 06/11

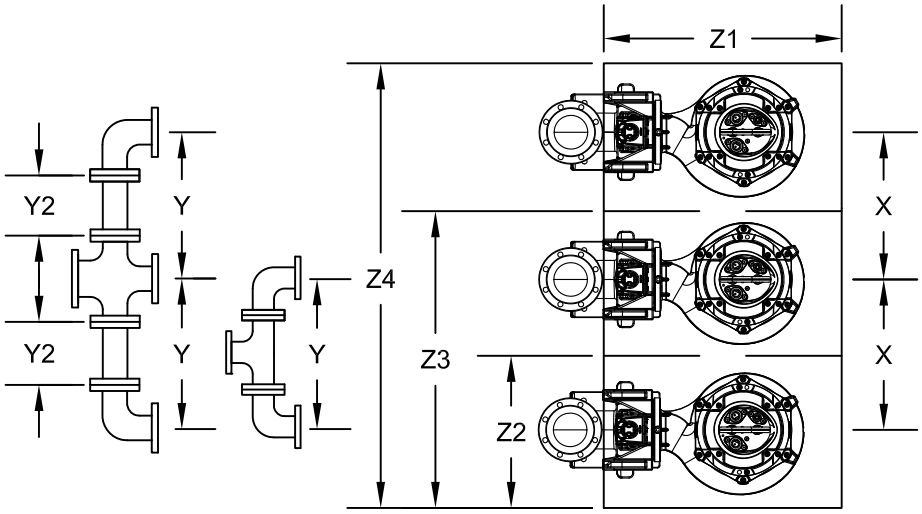
Dwg: DS-E03-018 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 100J-CH2	4	41x32	28	26	41x58	26	41x84	13
	6	41x32	28	32	41x64	32	41x96	16
	8	41x32	28	36	41x68	36	41x104	18

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

TECHNICAL DATA — XFP CLEAR OPENING AND SPACING

XFP 6" PUMPS

Date: 06/10

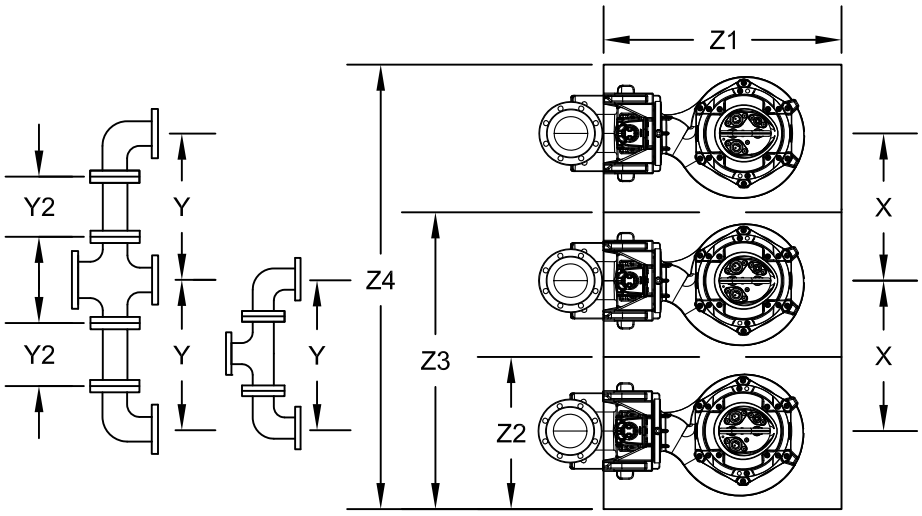
Dwg: DS-E03-003 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 150E-CB1	6	32x24	22	32	32x56	32	32x88	16
	8	32x24	22	36	32x62	36	32x98	18
	10	32x24	22	44	32x66	44	32x110	22
XFP151E-CB2	6	42x32	30	32	42x64	32	42x96	16
	8	42x32	30	34	42x68	36	42x104	18
	10	42x32	30	44	42x76	44	42x120	22
XFP 150G-CB1	6	34x28	26	32	34x60	32	34x92	16
	8	34x28	26	36	34x64	36	34x96	18
	10	34x28	26	44	34x72	44	34x104	22
XFP 150G-CP	6	34x28	26	32	34x60	32	34x92	16
	8	34x28	26	36	34x64	36	34x96	18
	10	34x28	26	44	34x72	44	34x104	22
XFP 150J-CH2	6	41x32	30	32	41x64	32	41x96	16
	8	41x32	30	36	41x68	36	41x104	18
	10	41x32	30	44	41x76	44	41x120	22

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

TECHNICAL DATA — XFP CLEAR OPENING AND SPACING

XFP 6" PUMPS

Date: 06/10

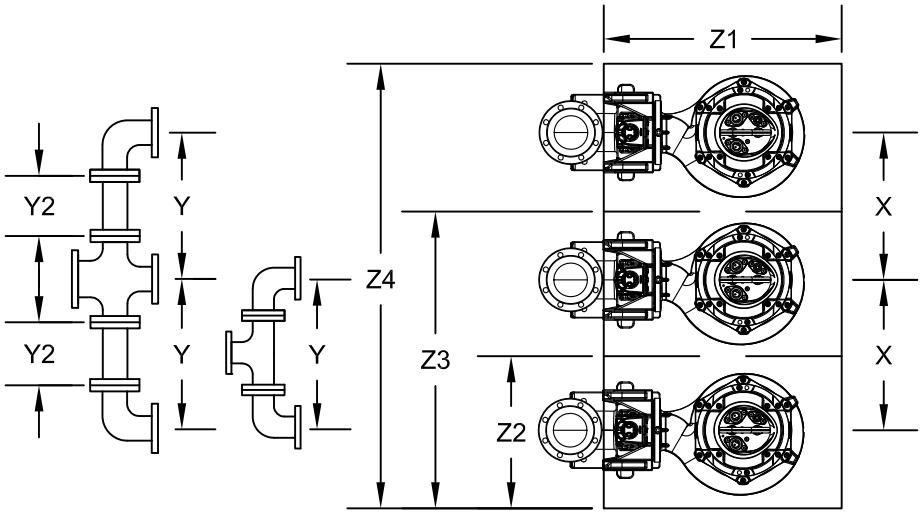
Dwg: DS-E03-012 | Rev. 0

		SIMPLEX	DUPLEX			TRIPLEX***		
Pump Model	Pipe Dia.	Min. Clear Opening (Z1 X Z2)	Min. Hydraulic Dist.* (X)	Min. Manifold Dist.** (Y)	Min. Clear Opening (Z1 X Z3)	Min. Separation Dist.** (Y)	Min. Clear Opening (Z1 X Z4)	Spacer length (Y2)
XFP 151J-CB2	6	42x32	30	32	42x64	32	42x96	16
	8	42x32	30	36	42x68	36	42x104	18
	10	42x32	30	44	42x76	44	42x120	22
XFP 150M-CB2	6	49x36	34	32	49x68	32	49x100	16
	8	49x36	34	36	49x72	36	49x108	18
	10	49x36	34	44	49x78	44	49x123	22

*Minimum distance required for proper hydraulic performance. Consult factory for special circumstances.

**Spacer and elbow dimensions are based on AWWA C110, ANSI A21.10 standards. Configurations shown are for illustration purposes only. Other minimums can be achieved with different fittings.

***Minimum separation distances accommodate typical hatch beam supports. However, actual requirements should be verified with hatch manufacturer and adjusted if necessary.



All units are in inches unless otherwise specified

Specifications subject to change without notice.

SULZER

abs

SPECIFICATIONS

3" ABS XFP PUMP

XFP 80C-CB1
4 Pole, 1 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-003	Rev: 1

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

3" ABS XFP PUMP

XFP 080C-CB1
4 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-E01-001	Rev:	4

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup.

Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

3" ABS XFP PUMP

XFP 080C-CB1
6 Pole, 1 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-064	Rev: 0

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

3" ABS XFP PUMP

XFP 080C-CB1
6 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-E01-002	Rev:	3

SCOPE

Furnish , ____ ABS Model _____ Submersible Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **High Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined

surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard 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 High Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE1. 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.

The High Efficiency 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 High Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service.. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

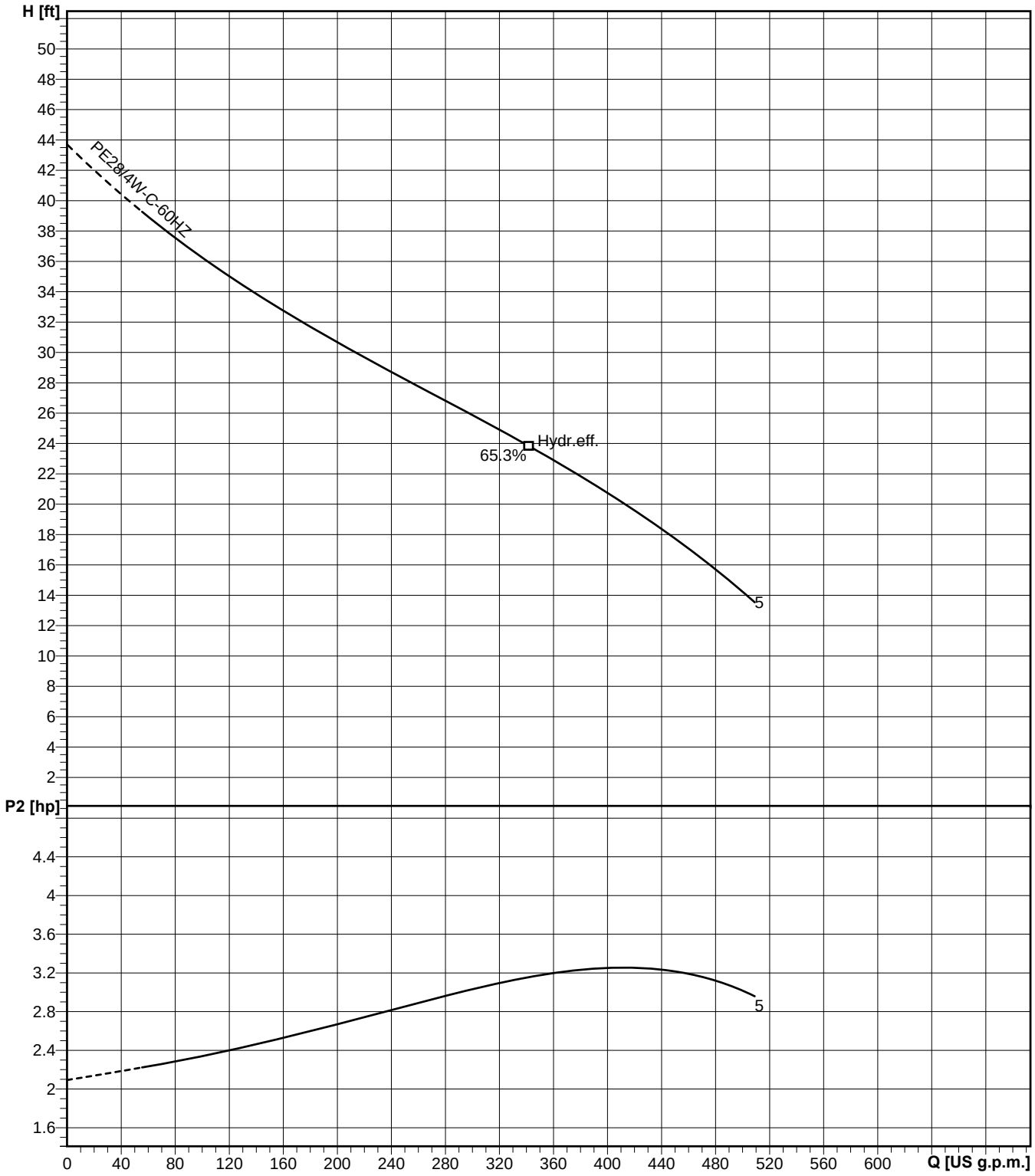
Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP 80C CB1 1~ 60HZ

			Curve number	
			Reference curve	XFP80C-CB SINGLE PHAS
			Discharge DN80	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1735 rpm	Date 2012-03-02
Flow	Head	Rated power 3.16 hp	Hydraulic efficiency 65.3 %	NPSH 8.4 ft



Impeller size 6.69 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3"	Revision 2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

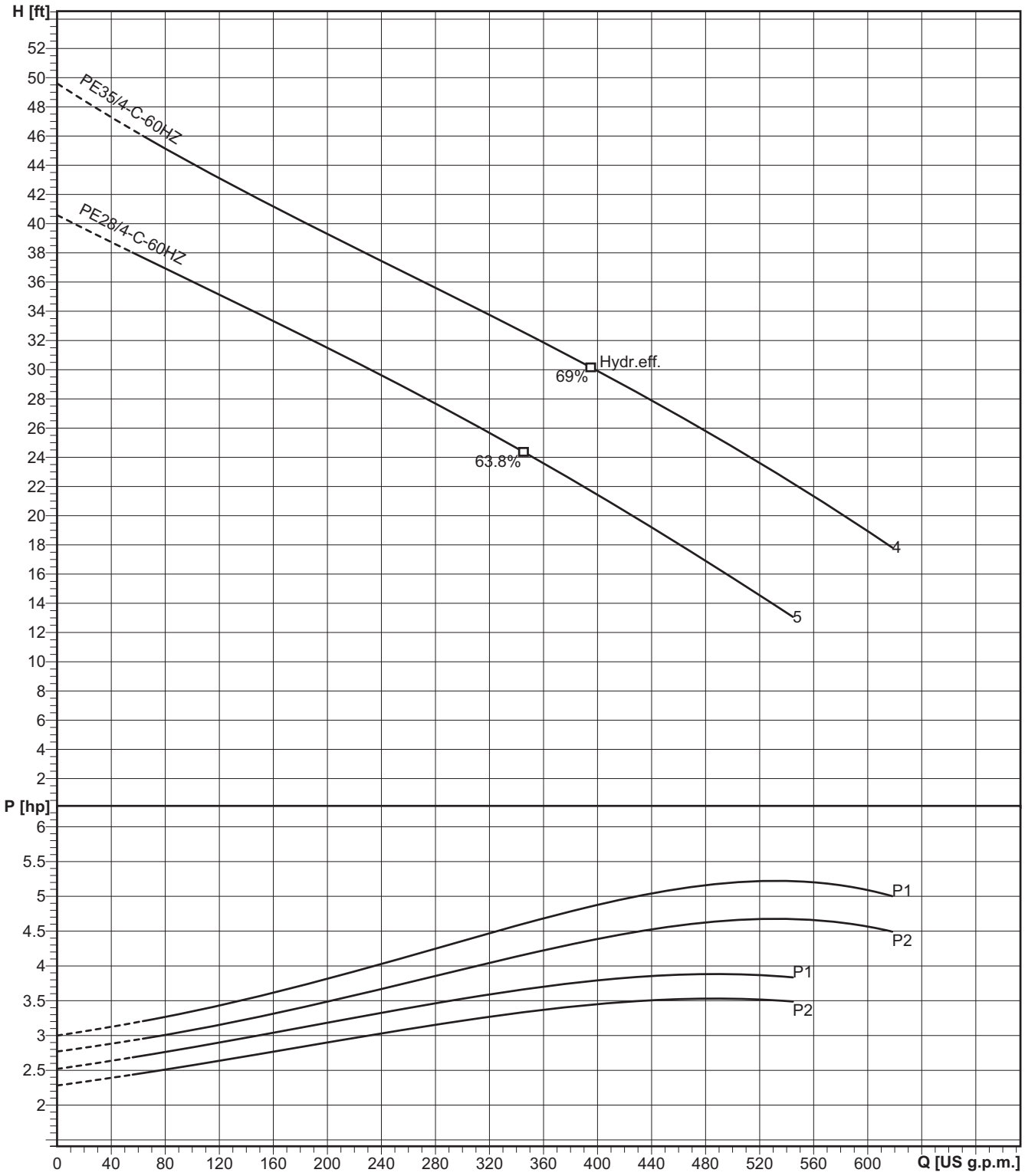
abs

SULZER

Pump performance curves
XFP 80C CB1 60HZ

Curve number	
Reference curve	XFP80C-CB

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1730..1750 rpm	2012-02-28
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.37 hp	69 %	11.3 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-12-15
6.89..6.69 inch	1	Contrabloc Plus impeller, 1 vane	3"	

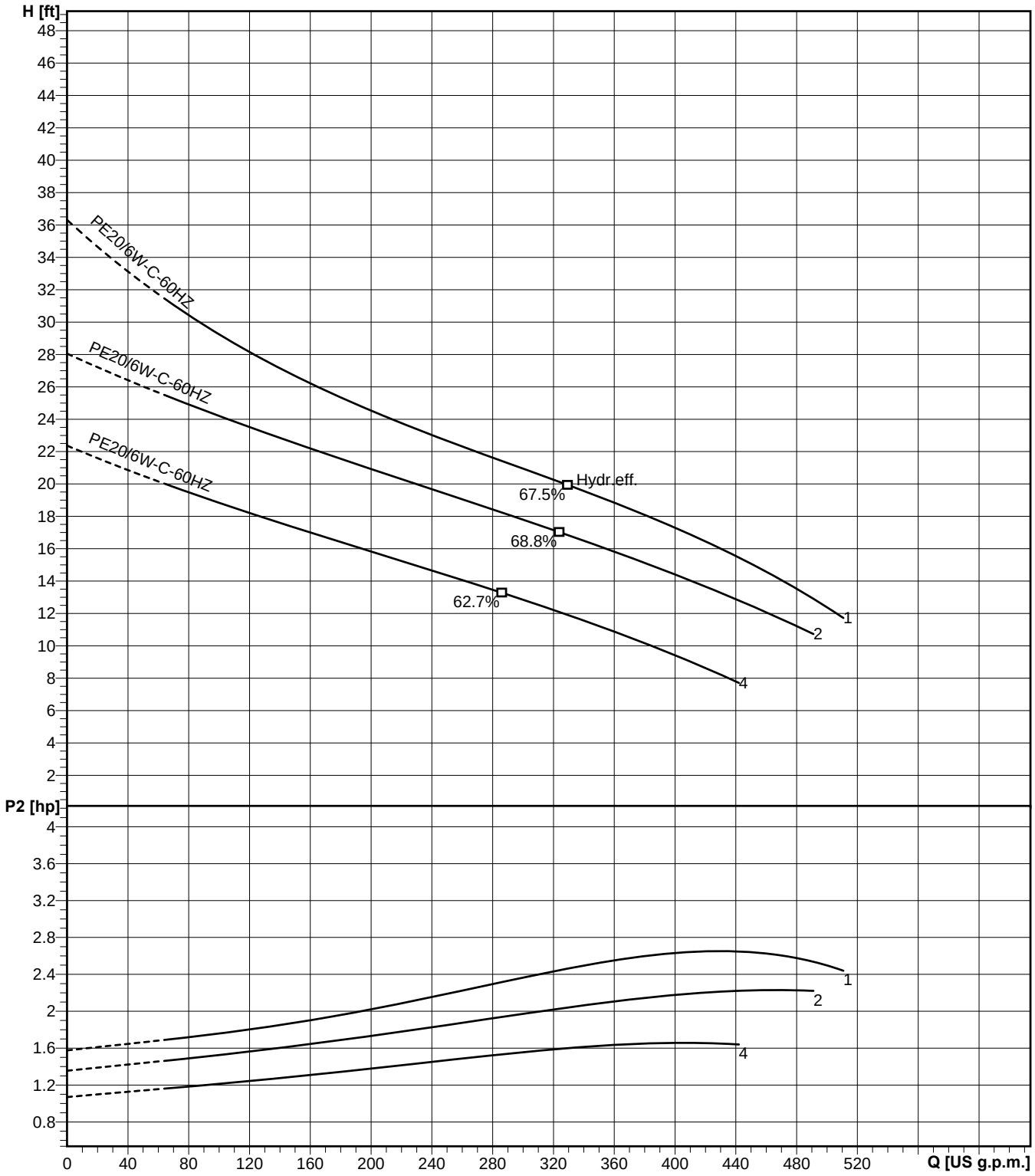
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
XFP 80C CB1 1~ 60HZ

			Curve number	
			Reference curve	XFP80C-CB SINGLE PHAS
			Discharge DN80	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1145 rpm	Date 2012-03-15
Flow	Head	Rated power 2.43 hp	Hydraulic efficiency 67.5 %	NPSH 4.8 ft



Impeller size 8.35..6.89 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3"	Revision 2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

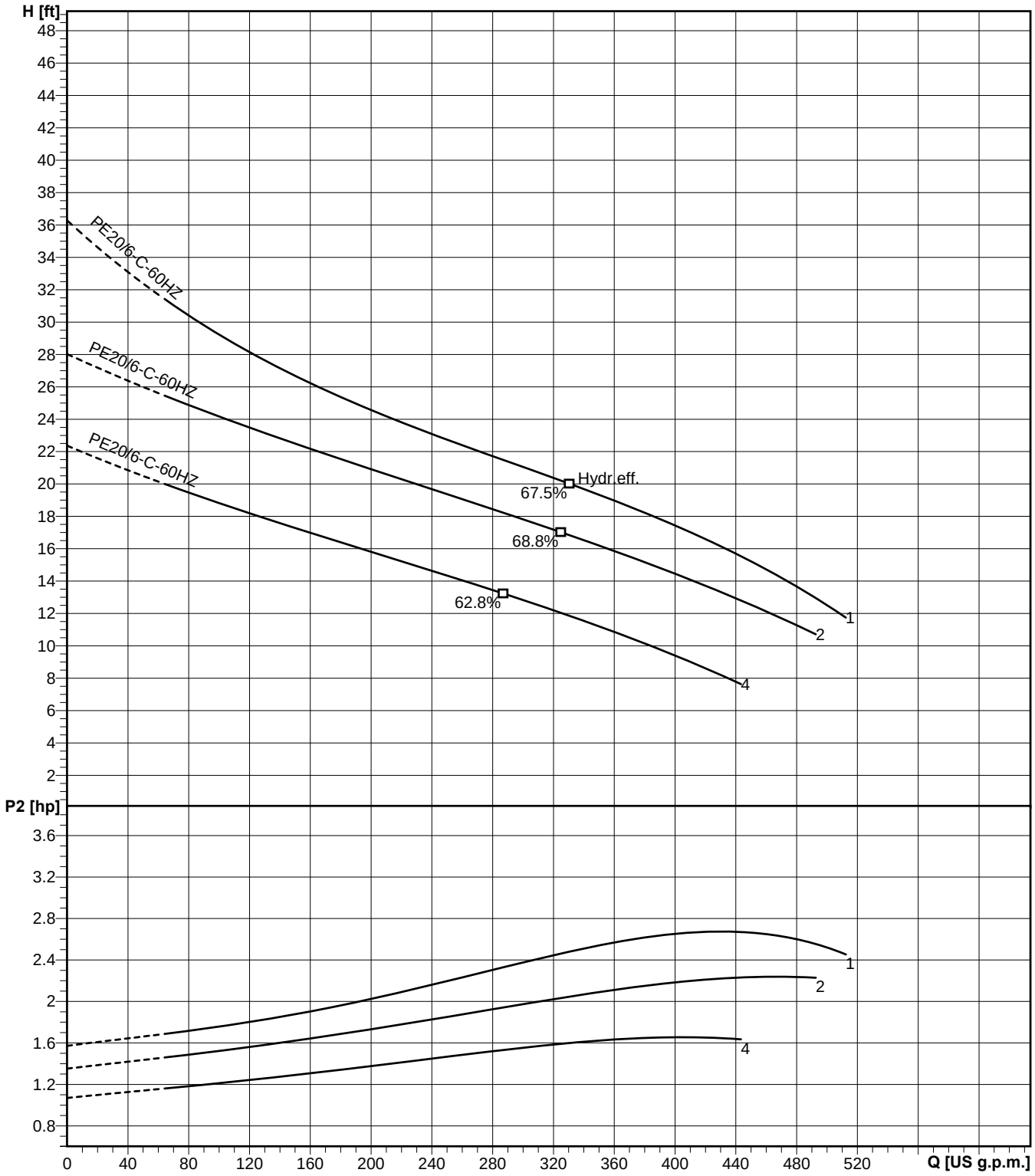
abs

SULZER

Pump performance curves
XFP 80C CB1 60HZ

Curve number	
Reference curve	XFP80C-CB

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1150 rpm	2012-03-09
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.46 hp	67.5 %	5.0 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-12-15
8.35..6.89 inch	1	Contrabloc Plus impeller, 1 vane	3"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

3” ABS XFP PUMP

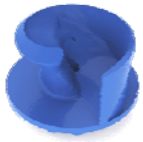
XFP 080C-CB1
4 Pole, 1 Phase, PE1

Date:	4/11	
Dwg:	DS-E01-019	Rev: 0

Submersible Motor Specifications, PE 1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		10, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range



* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 28/4W*	3.6 kW	2.8 kW 3.7 HP	1735	208 230	18.7 16.9	75.9 68.7	D	1.3***	78.5	80.0	77.8	0.920	0.849	0.721

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals

Specifications subject to change without notice

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02”)
Power Cable	PE 28/4W	208 volt	SOOW 10/7	22.4mm (0.88”) diameter
		230 volt	SOOW 10/7	22.4mm (0.88”) diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3” class 125 ANSI flanges (fitting flange must be rotated 22.5 degrees for compatibility)					
Suction Size	4” flanged, compatible with 4” class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1”) deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.5					
Solids Passage Size	75mm (3”)					
Impeller DIA	170mm (6.69”)					
Impeller Weight						
Min Recommended Flow, GPM	80					

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 28/4W			
Overall Height	700mm (27.6”)			
Pump Weight	100 kg (220 lb)			

TECHNICAL DATA

3” ABS XFP PUMP

XFP 080C-CB1
4 Pole, 3 Phase, PE1

Date:	09/10	
Dwg:	DS-E01-017	Rev: 3

Submersible Motor Specifications, PE 1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 28/4	3.09 kW	2.8 kW 3.75 HP	1750	208 230 460 600	11.5 10.4 5.2 4	92.2 83.4 41.7 31.9	K	1.3**	90.7	91.1	89.6	.742	.65	.51
PE 35/4	3.9 kW	3.5 kW 4.7 HP	1750	208 230 460 600	13.7 12.4 6.2 4.8	92 83.2 41.6 31.9	H	1.3**	89.5	91.3	92.5	.79	.72	.58

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 28/4	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/4	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5				
Solids Passage Size	75mm (3")	75mm (3")				
Impeller DIA	175mm (6.8")	170mm (6.69")				
Impeller Weight	5.6 Kg (12.3 lb)	5.5 kg (12.1 lb)				
Min Recommended Flow, GPM	80	80				

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 28/4	PE 35/4		
Overall Height	700mm (27.6")	700mm (27.6")		
Pump Weight	97.5 kg (215 lb)	100 kg (221 lb)		

TECHNICAL DATA

3” ABS XFP PUMP

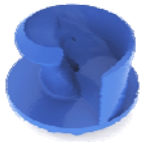
XFP 080C-CB1
6 Pole, 1 Phase, PE1

Date:	12/11		
Dwg:	DS-E01-063	Rev:	0

Submersible Motor Specifications, PE 1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		10, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range



* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 20/6W*	2.6 kW	2.0 kW 2.7 HP	1145	208 230	13.2 12	25.9 23.4	A	1.3***	77.8	71.8	61.6	0.935	0.886	0.784

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals

abs

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 20/6W	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (fitting flange must be rotated 22.5 degrees for compatibility)					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.1	.2	.4			
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")			
Impeller DIA	212mm (8.35")	195mm (7.68")	175mm (6.89")			
Impeller Weight						
Min Recommended Flow, GPM	80	80	80			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 20/6W			
Overall Height	700mm (27.6")			
Pump Weight	100 kg (220 lb)			

TECHNICAL DATA

3” ABS XFP PUMP

XFP 080C-CB1
6 Pole, 3 Phase, PE1

Date:	06/10		
Dwg:	DS-E01-018	Rev:	3

Submersible Motor Specifications, PE 1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30, IE1 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Motor Ratings, PE1 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 20/6	3.4 kW	2 kW 2.7 HP	1150	208 230 460 600	9.3 8.4 4.2 3.5	49.0 44.4 22.2 17.0	H	1.3**	83.5	82.1	78.9	.715	.639	.511

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals · CSA · IE3 · NEMA Premium · abs

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- 5mm (.02")
Power Cable	PE 20/6	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.1	.2	.4			
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")			
Impeller DIA	212mm (8.70")	195mm (7.68")	175mm (6.89")			
Impeller Weight	6.3 Kg (13.9 lb)	6.1 Kg (13.4 lb)	5.6 Kg (12.3 lb)			
Min Recommended Flow, GPM	80	80	80			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 20/6			
Overall Height	700mm (27.6")			
Pump Weight	100 kg (220 lb)			

SULZER

Massblatt XFP 80C-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalaćion sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.554 -01
Drawn: 11.05.09 / D.Whelan
Issue Date: 29/03/2011
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

50 Hz

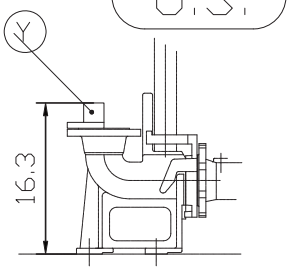
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	211
PE 22/4	215
PE 29/4	221

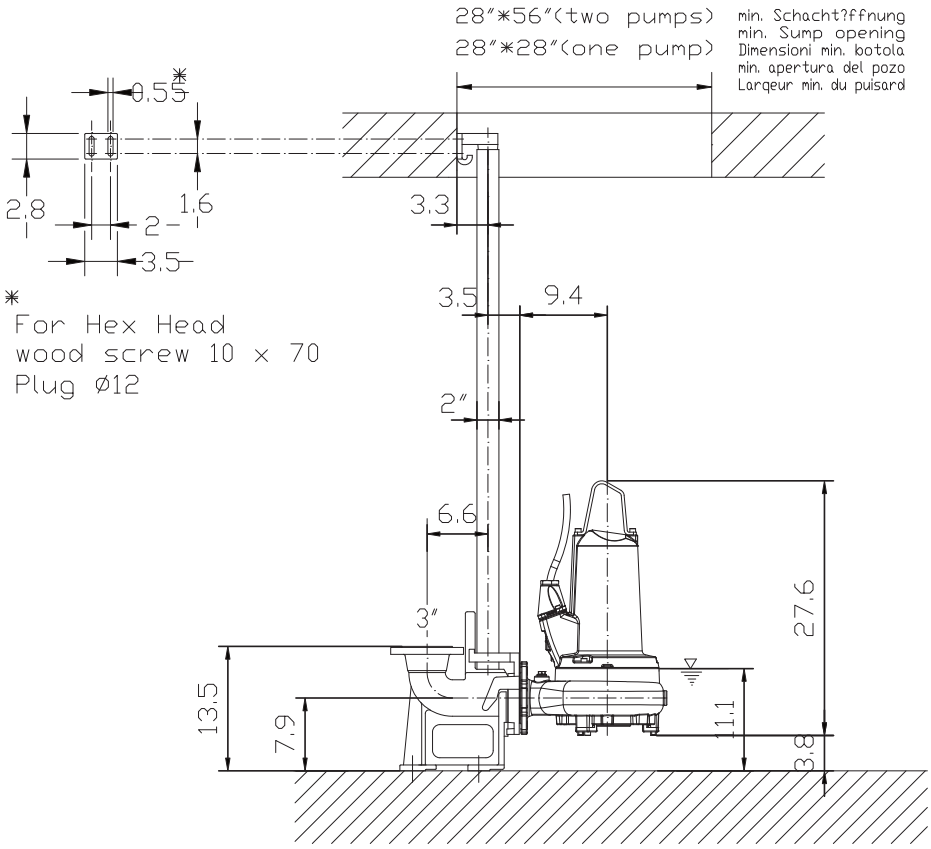
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 18/4	211
PE 28/4	215
PE 28/4W	215
PE 20/6	221
PE 20/6W	221
PE 35/4	221

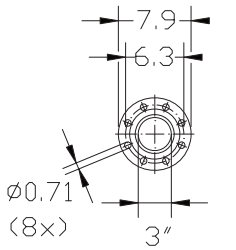
U.S.

Part No.	Y(mm)
DN 80	
6 232 0649	
6 232 0650	ø 90

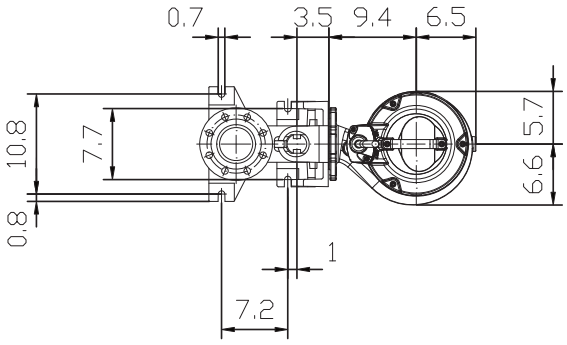




* For Hex Head wood screw 10 x 70 Plug ø12



Class 125 ANSI



Weight: Includes pump and slider bracket

abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80C-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalaćion sumergida
lan d'encombrement Installation noyee

No: AN-M.22.555 -01
Drawn: 11.05.09 / D.Whelan
Issue Date: 29/03/2011
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

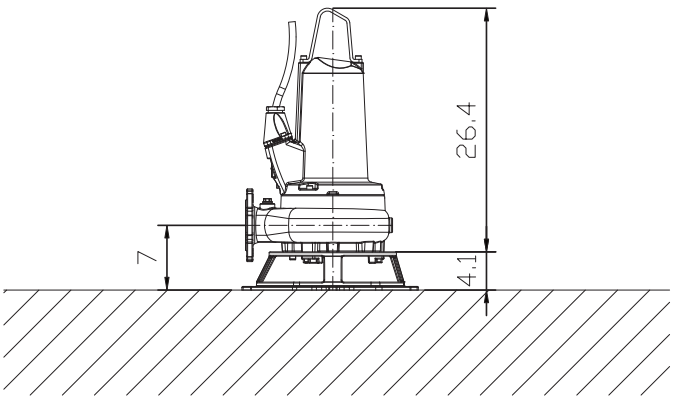
50 Hz

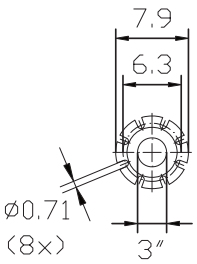
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	196
PE 22/4	201
PE 29/4	206

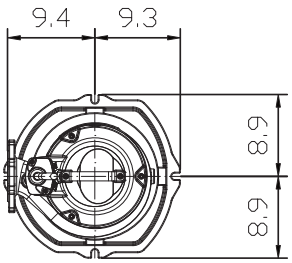
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	196
PE 28/4	201
PE 28/4W	201
PE 20/6	206
PE 20/6W	206
PE 35/4	206





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80C-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalacion en seco
Plan d'encombrement Installation a sec

No: AN-M.22.556 - 01
Drawn: 11.05.09 / D.Whelan
Issue Date: 29/03/2011
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

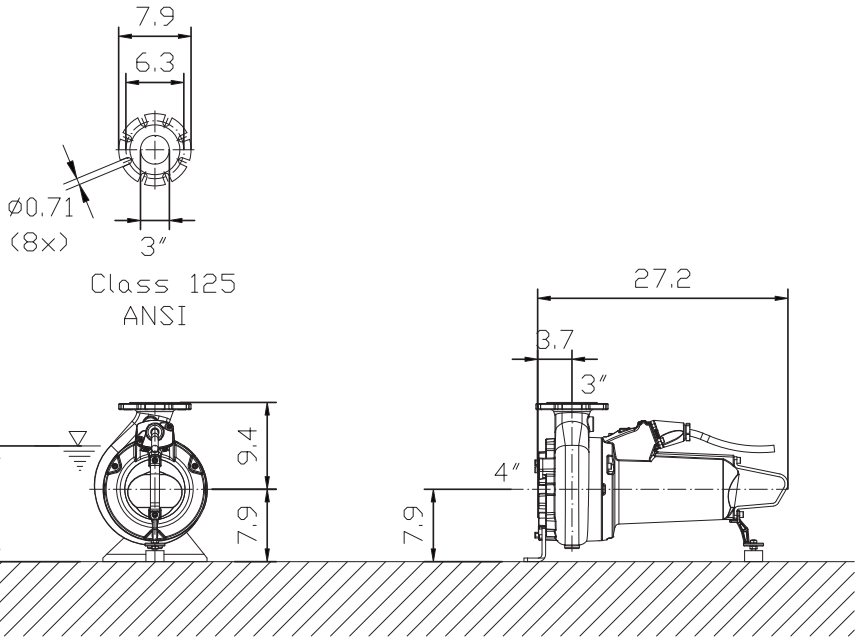
50 Hz

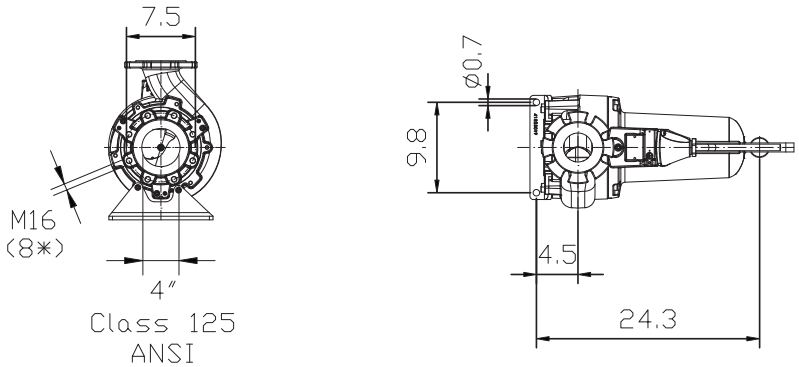
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	196
PE 22/4	201
PE 29/4	206

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	196
PE 28/4	201
PE 28/4W	201
PE 20/6	206
PE 20/6W	206
PE 35/4	206

U.S.





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80C-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation à sec

No: AN-M.22.557 - 01
Drawn: 11.05.09 / D.Whelan
Issue Date: 29/03/2011
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

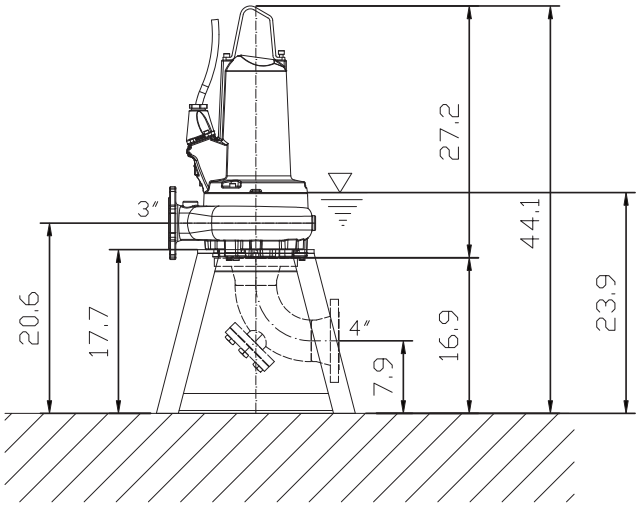
50 Hz

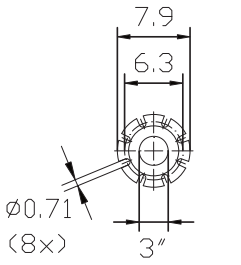
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	196
PE 22/4	201
PE 29/4	206

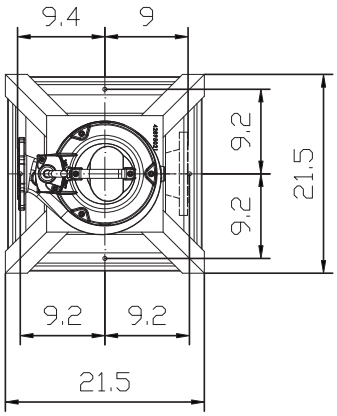
60 Hz

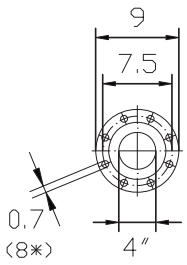
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	196
PE 28/4	201
PE 28/4W	201
PE 20/6	206
PE 20/6W	206
PE 35/4	206





Class 125
ANSI





Class 125
ANSI

abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. The pumps are intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single vane design, capable of passing a minimum of 1.8 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125

(rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged or partially submerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. The motor shall have a NEMA Class A temperature rise for submerged service providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

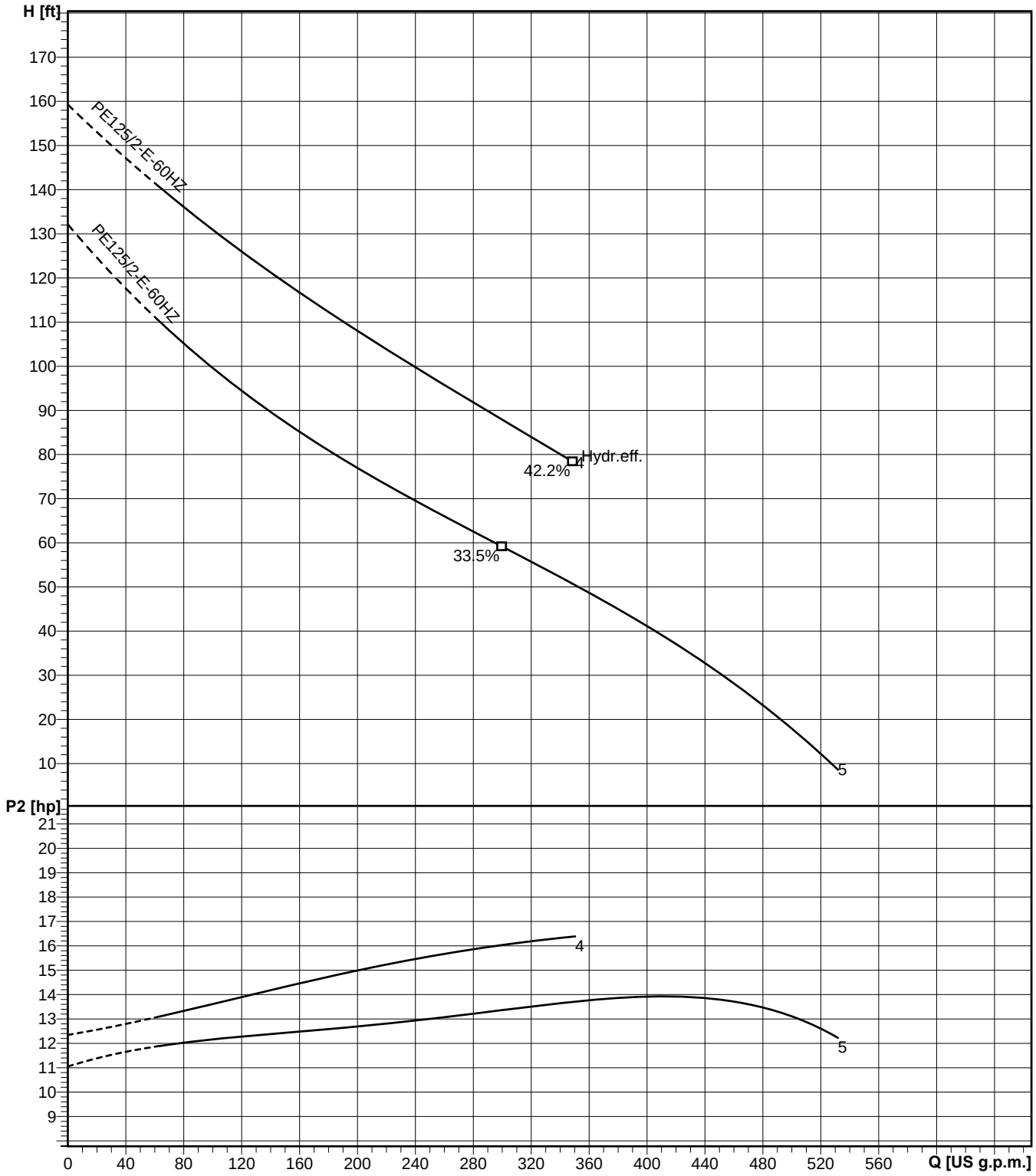
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP 80E CB1 60HZ

Curve number	
Reference curve	XFP80E CB1

			Discharge	Frequency
			DN80	60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515 rpm	Date 2012-03-15
Flow	Head	Rated power 16.4 hp	Hydraulic efficiency 42.2 %	NPSH 21.8 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
6.3..5.91 inch	1	Contrabloc impeller, 1 vane	1 3/4"	2010-09-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

3” ABS XFP PUMP

XFP 80E-CB1
2 Pole, 3 Phase, PE2

Date:	10/10	
Dwg:	DS-E01-020	Rev: 3

Submersible Motor Specifications, PE2 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE2 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 125/2	13.7 kW	12.5 kW 16.8 HP	3515	208 230 460 600	47.1 42.6 21.3 16.3	321 290 145 111	H	1.3	91	92.6	92.8	.81	.78	.69

SULZER

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 125/2	208 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		460 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		600 volt	SOOW 10/7	20.7mm (0.82") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	3" (this model is designed for wet pit installation only so suction flange bolt holes are not drilled)					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	ContraBlock impeller, 1 vane w/ Seal Protection System					
Impeller Size	.4	.5				
Solids Passage Size	45mm (1.8")	45mm (1.8")				
Impeller DIA	160mm (6.3")	150mm (5.9")				
Impeller Weight	4.2 Kg (9.3 lb)	4.1 Kg (9 lb)				
Min Recommended Flow, GPM	80	80				

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 125/2			
Overall Height	793mm (31.2")			
Pump Weight	173 kg (381.4 lb)			

SULZER

Massblatt XFP 80E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.562 -00
Drawn: 11.05.09 / D.Whelan
Issue Date: 11.05.09
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rêserve de modification

50 Hz

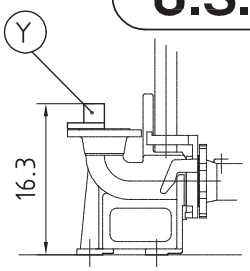
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 70/2	352	28.5
PE 110/2	381	31.2

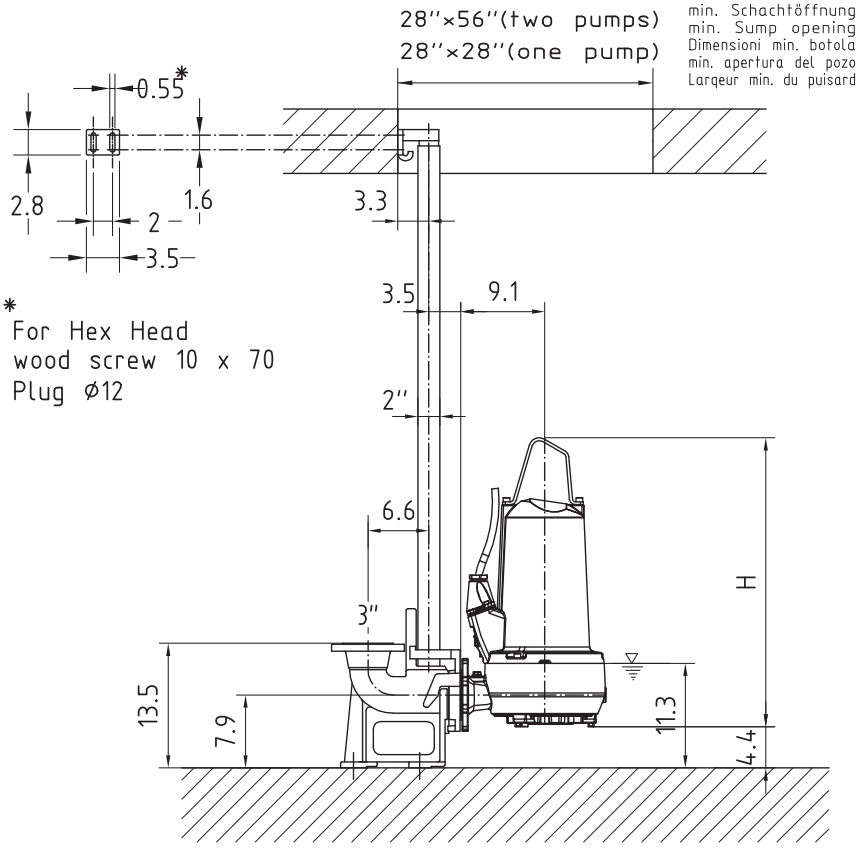
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 125/2	381	31.2

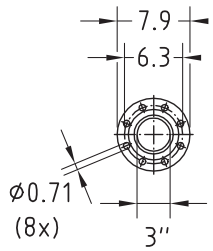
U.S.

Part No.	Y(mm)
DN 80	
6 232 0649	
6 232 0650	ø 90

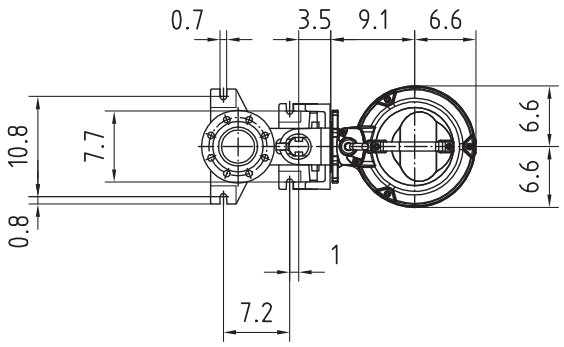




* For Hex Head wood screw 10 x 70 Plug ø12



Class 125 ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.563 -00
Drawn: 11.05.09 / D.Whelan
Issue Date: 11.05.09
Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

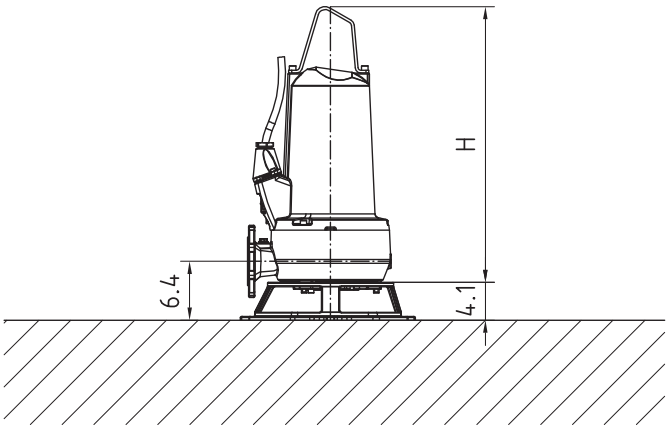
50 Hz

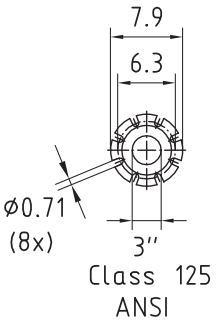
U.S.

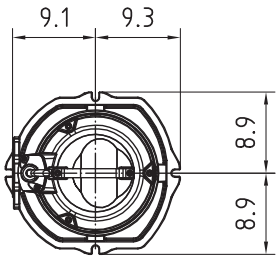
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 70/2	336	27.3
PE 110/2	366	30.1

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 125/2	366	30.1







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
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Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

3" ABS XFP PUMP

XFP 80C-VX
4 Pole, 1 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-053	Rev: 0

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open six 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. The suction flange shall be integrated into the volute and its bolt holes shall be drilled and threaded to accept 3 inch ANSI class 125 fittings (rotated 22.5 degrees). Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

3" ABS XFP PUMP

XFP 080C-VX
4 Pole, 3 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-054	Rev: 1

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open six 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. The suction flange shall be integrated into the volute and its bolt holes shall be drilled and threaded to accept 3 inch ANSI class 125 fittings (rotated 22.5 degrees). Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber

shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

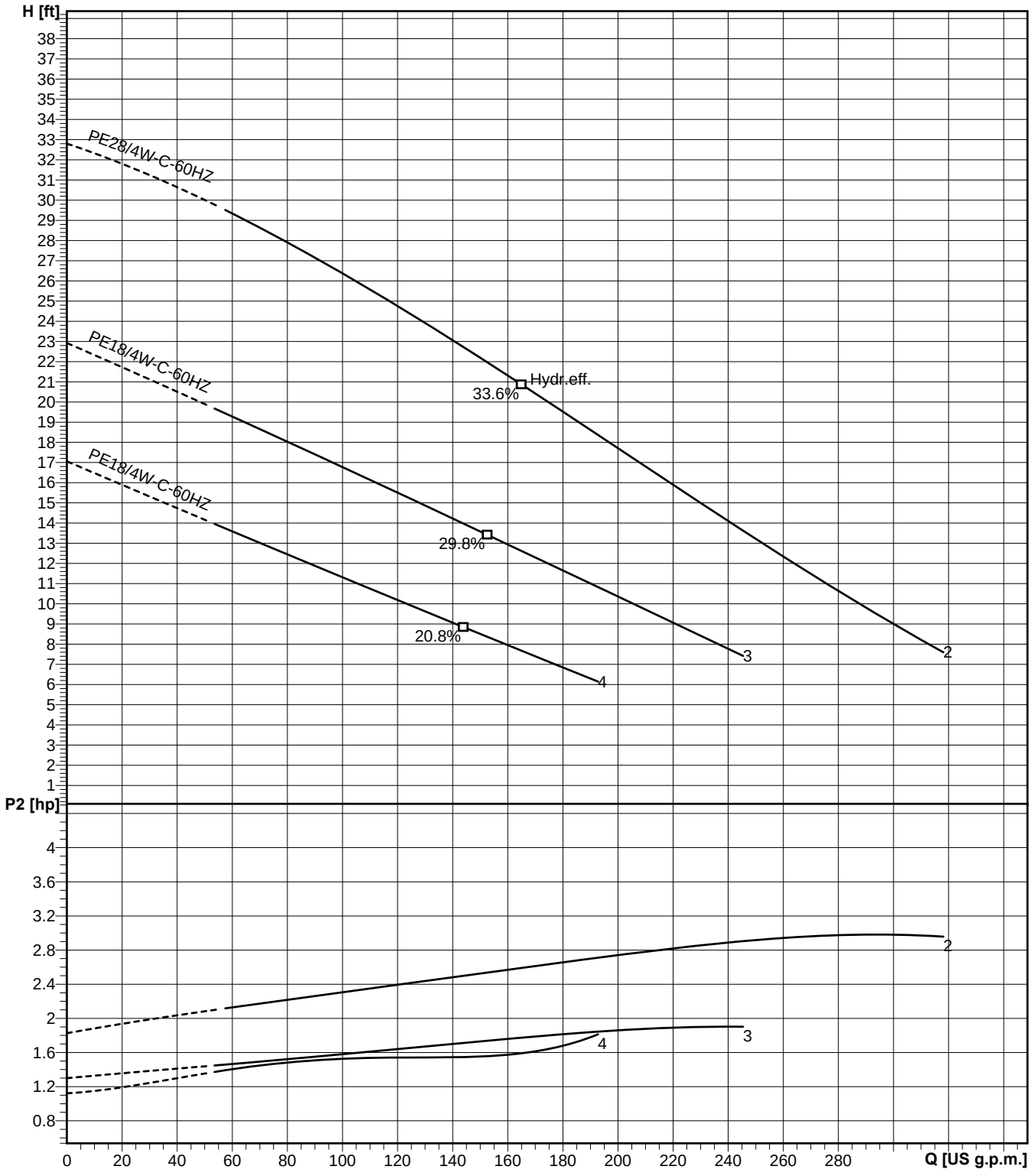
Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP 80C VX 1~ 60HZ

			Curve number	
			Reference curve	XFP80C-VX SINGLE PHAS
			Discharge DN80	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1735..1755 rpm	Date 2012-03-15
Flow	Head	Rated power 2.6 hp	Hydraulic efficiency 33.6 %	NPSH 7.8 ft



Impeller size 6.34..4.92 inch	N° of vanes 6	Impeller Vortex impeller	Solid size 3"	Revision 2011-10-11

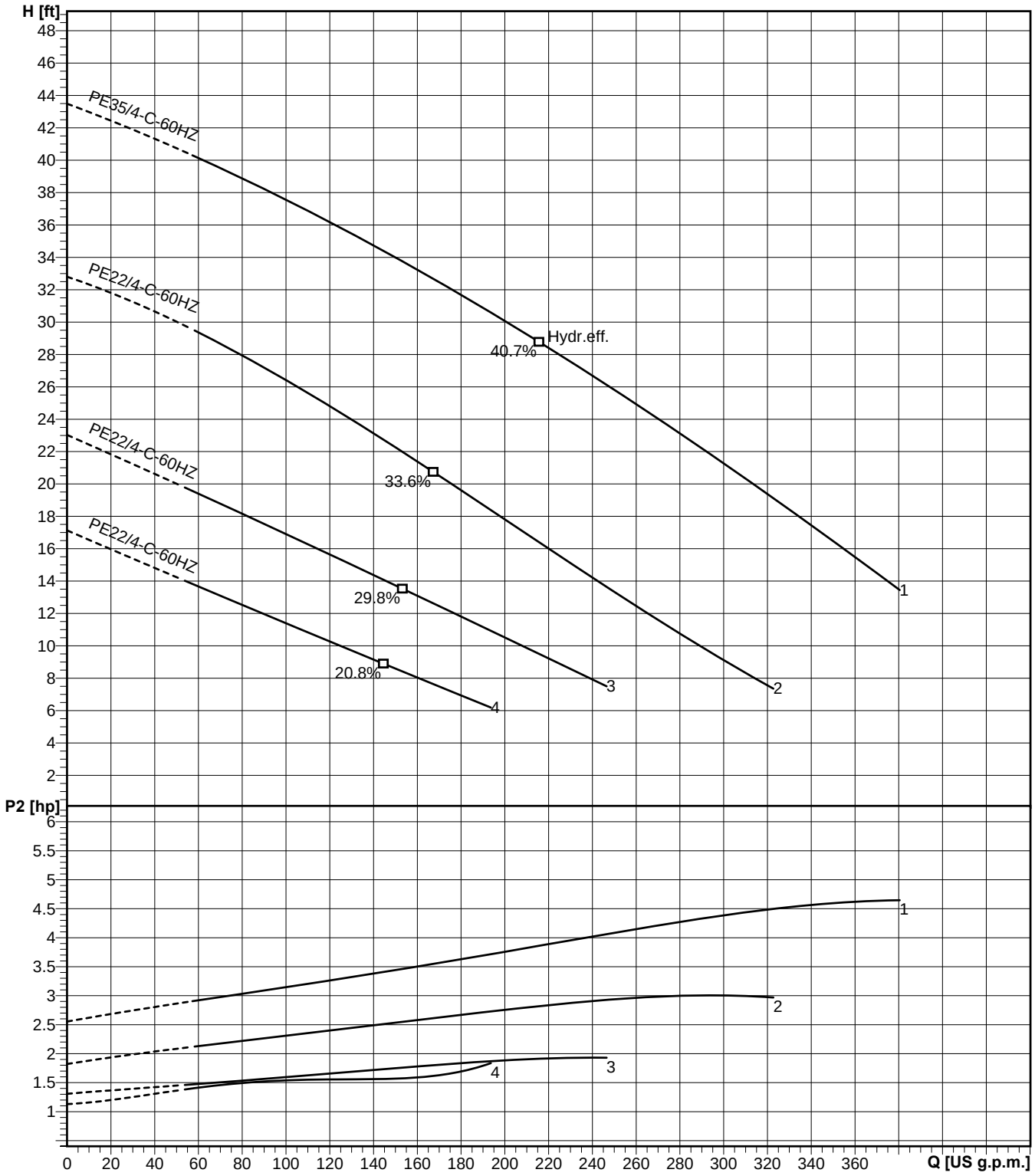
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

SULZER

Pump performance curves
XFP 80C VX 60HZ

Curve number	
Reference curve	XFP80C-VX

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1730..1760 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		3.87 hp	40.7 %	14.8 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
7.36..4.92 inch	6	Vortex impeller	3"	2011-10-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

TECHNICAL DATA

3” ABS XFP PUMP

XFP 080C-VX
4 Pole, 1 Phase, PE1

Date:	3/12	
Dwg:	DS-E01-047	Rev: 0

Submersible Motor Specifications, PE1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		12, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range

* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 18/4W*	2.3 kW	1.8 kW 2.4 HP	1755	208 230	11.6 10.5	24.3 22	A	1.3***	79.5	79.9	74.5	.935	.886	.784
PE 28/4W*	3.6 kW	2.8 kW 3.8 HP	1735	208 230	18.7 16.9	75.9 68.7	D	1.3***	78.5	80.0	77.8	.920	.849	.721

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 18/4W	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 12/7	19.1mm (0.75") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 28/4W	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 10/7	22.4mm (0.88") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	3" flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility), threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.2	.3	.4			
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")			
Impeller DIA	161mm (6.34")	140mm (5.51")	125mm (4.92")			
Impeller Weight						
Min Recommended Flow, GPM	50	50	50			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 18/4W	PE 28/4W
Overall Height	696mm (27.4")	696mm (27.4")
Pump Weight	95.5 kg (210 lb)	97.5 kg (215 lb)

FM Approvals
Member of the FM Global Group

abs

TECHNICAL DATA

3” ABS XFP PUMP

XFP 080C-VX
4 Pole, 3 Phase, PE1

Date:	2/11		
Dwg:	DS-E01-048	Rev:	0

Submersible Motor Specifications, PE1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 22/4	2.45 kW	2.2 kW 3 HP	1760	208 230 460 600	10.1 9.1 4.6 3.5	48.6 43.9 22 16.8	G	1.3**	89.7	88.4	84.6	.677	.579	.449
PE 35/4	3.9 kW	3.5 kW 4.7 HP	1730	208 230 460 600	13.7 12.4 6.2 4.8	91.9 83.1 41.6 31.9	H	1.3**	89.5	91.3	92.5	.790	.721	.582

** For wet pit installation. Service factor is 1.15 for dry pit installation.

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 22/4	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/4	208 volt	SOOW 12/7	19.1mm (0.75") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	3" flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility), threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.1	.2	.3	.4		
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")	75mm (3")		
Impeller DIA	185mm (7.28")	161mm (6.34")	140mm (5.51")	125mm (4.92")		
Impeller Weight						
Min Recommended Flow, GPM	50	50	50	50		

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 22/4	PE 35/4		
Overall Height	696mm (27.4")	696mm (27.4")		
Pump Weight	97.5 kg (215 lb)	100 kg (220 lb)		

SULZER

Massblatt XFP 80C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalaćion sumergida
lan d'encombrement Installation noyee

No: AN-M.22.609 - 01
Drawn: 11.08.10 / D.Whelan
Issue Date: 29/03/2011
Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

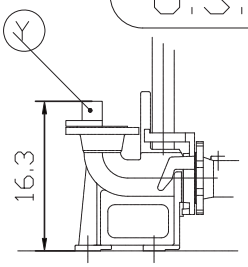
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	211.0
PE 22/4	215.0
PE 29/4	220.0

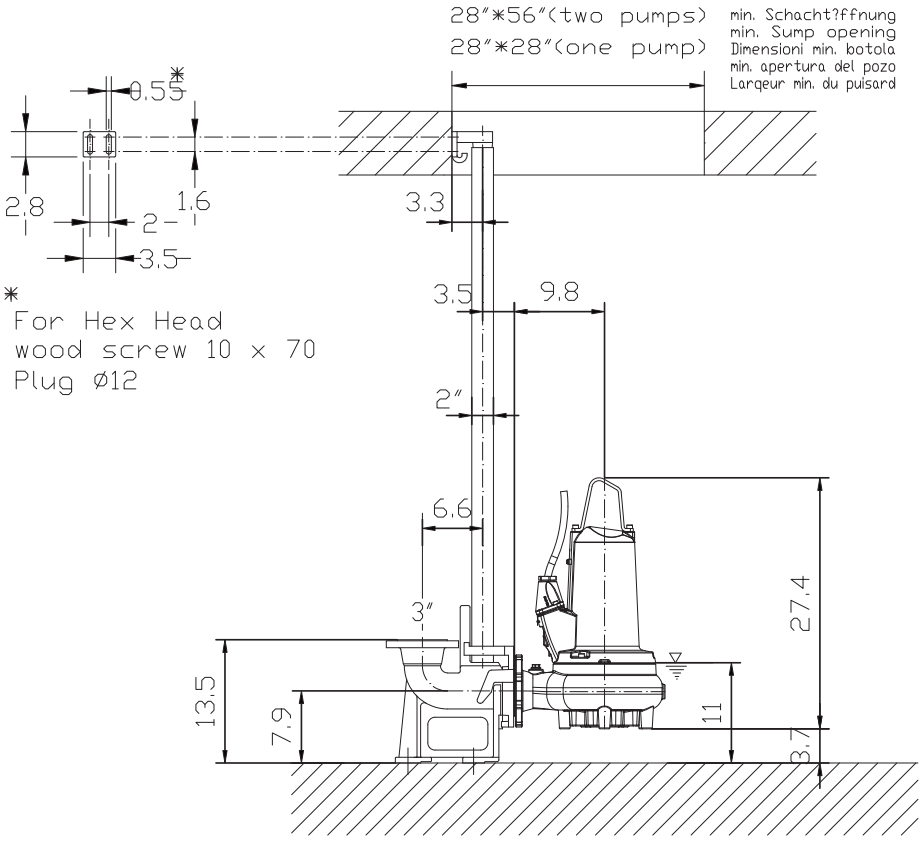
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	211.0
PE 18/4W	211.0
PE 22/4	215.0
PE 28/4	215.0
PE 28/4W	215.0
PE 35/4	220.0

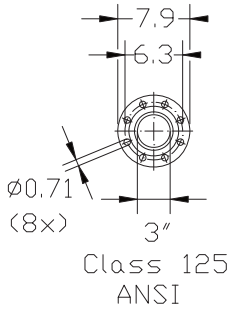
U.S.

Part No.	Y(mm)
DN 80	
6 232 0649	
6 232 0650	ø 90

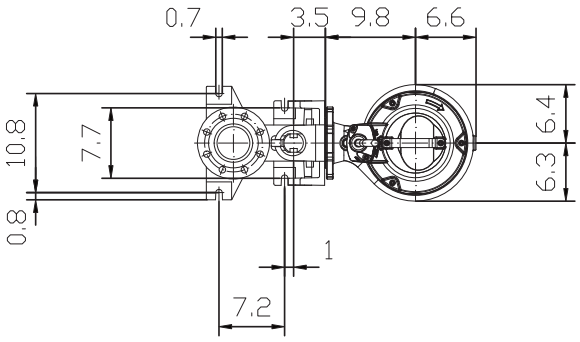




* For Hex Head wood screw 10 x 70 Plug ø12



Class 125 ANSI



Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

abs

SULZER

Massblatt XFP 80C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.611 - 01
Drawn: 11.08.10 / D.Whelan
Issue Date: 30/03/2011
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

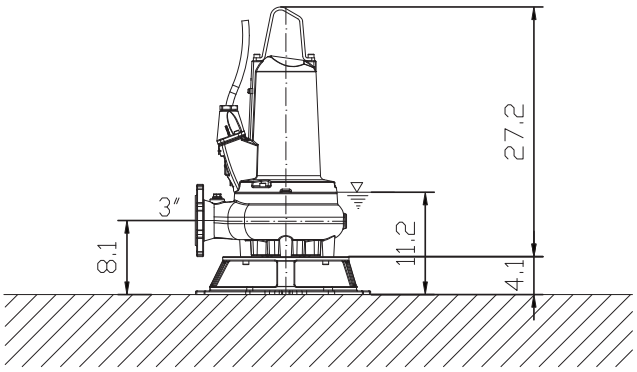
50 Hz

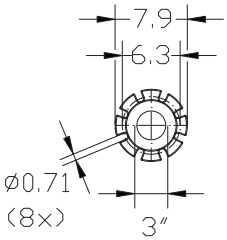
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	189.0
PE 22/4	193.0
PE 29/4	198.0

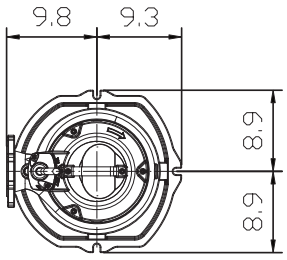
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	189.0
PE 18/4W	189.0
PE 22/4	193.0
PE 28/4	193.0
PE 28/4W	193.0
PE 35/4	198.0





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalacion en seco
Plan d'encombrement Installation a sec

No: AN-M.22.612 - 01
Drawn: 11.08.10 / D.Whelan
Issue Date: 30/03/2011
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

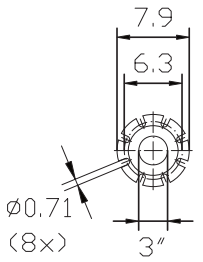
50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	189.0
PE 22/4	193.0
PE 29/4	198.0

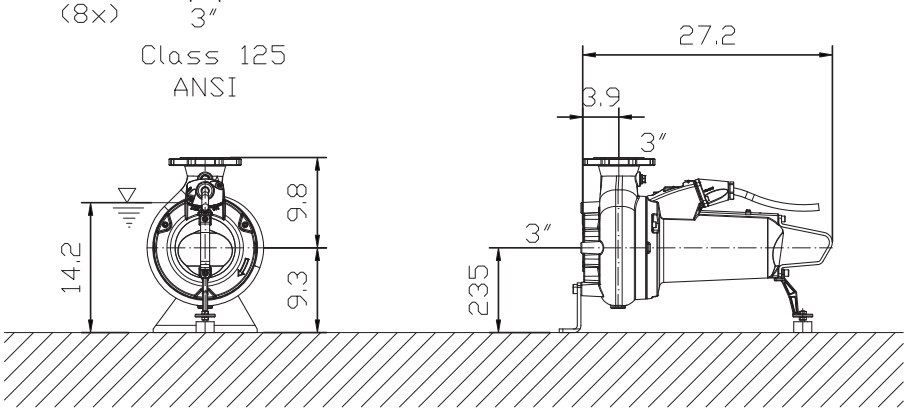
60 Hz

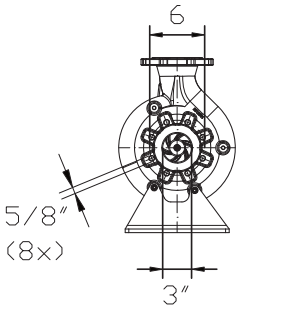
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	189.0
PE 18/4W	189.0
PE 28/4	193.0
PE 20/6	193.0
PE 20/6W	193.0
PE 35/4	198.0

U.S.

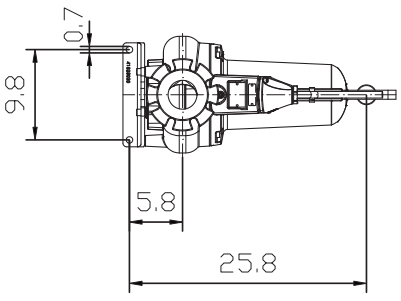


Class 125
ANSI





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 80C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalacion en seco
Plan d'encombrement Installation a sec

No: AN-M.22.613 - 01
Drawn: 11.08.10 / D.Whelan
Issue Date: 30/03/2011
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rëserve de modification

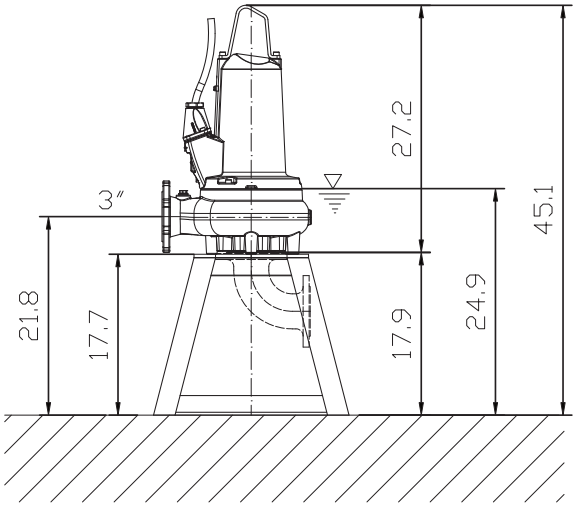
50 Hz

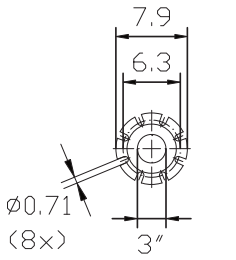
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	189.0
PE 22/4	193.0
PE 29/4	198.0

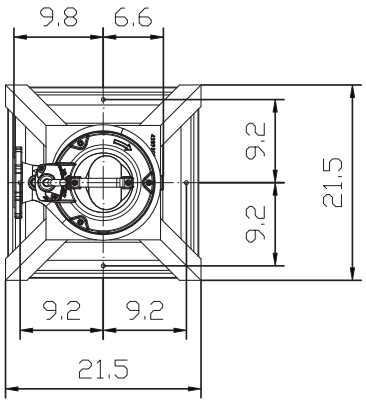
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	189.0
PE 18/4W	189.0
PE 28/4	193.0
PE 20/6	193.0
PE 20/6W	193.0
PE 35/4	198.0





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

3" ABS XFP PUMP

XFP 081C-VX
2 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-E01-065	Rev:	1

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open six vane design, capable of passing a minimum of 2 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 3 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

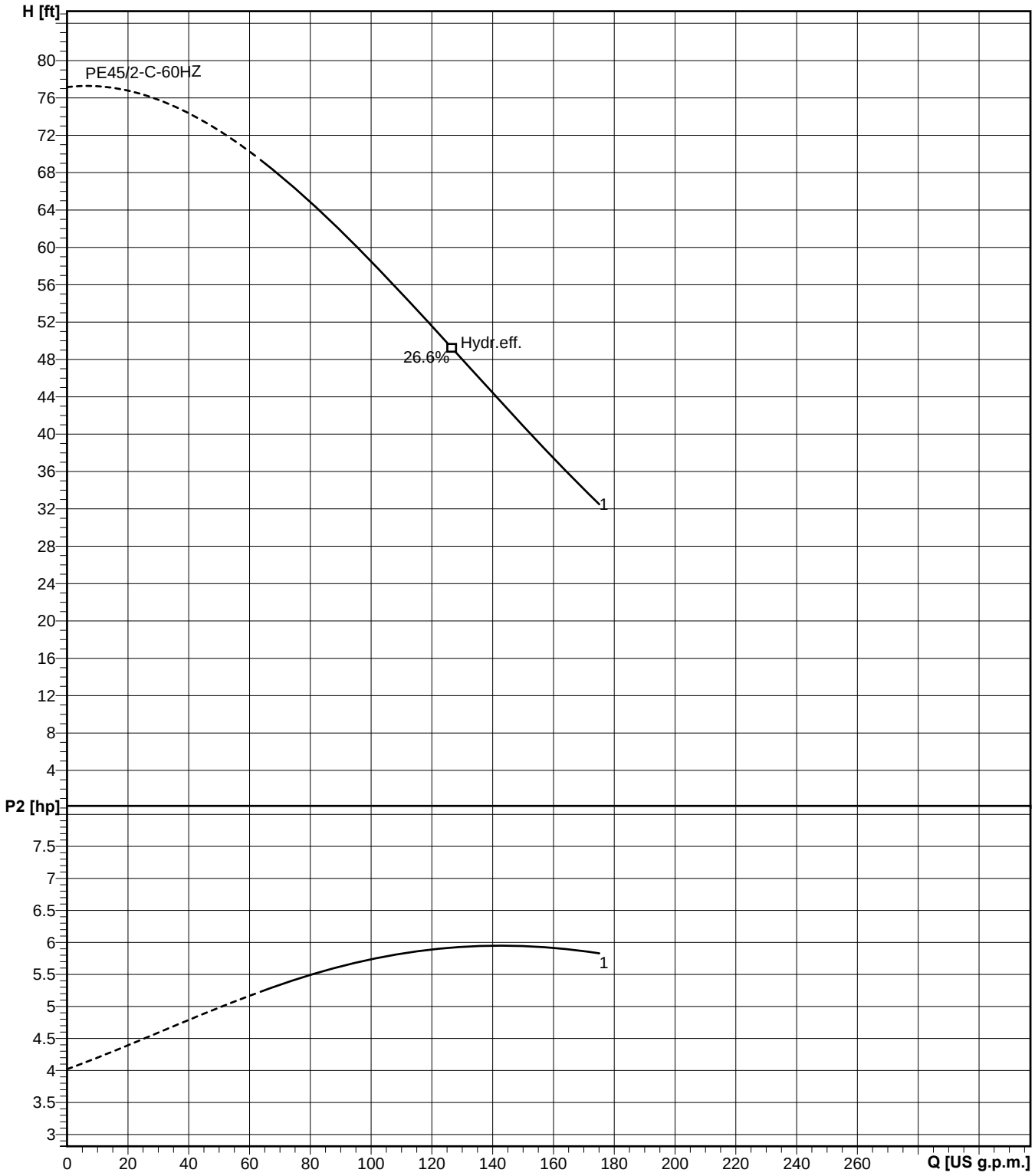
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP 81C VX 60HZ

Curve number	
Reference curve	XFP81C VX

			Discharge	Frequency
			DN80	60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3515 rpm	Date 2012-03-15
Flow .	Head	Rated power 5.92 hp	Hydraulic efficiency 26.6 %	NPSH 22.6 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
5.31 inch	6	Vortex impeller	2"	2011-10-11

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

3” ABS XFP PUMP

XFP 081C-VX
2 Pole, 3 Phase, PE1

Date:	7/11	
Dwg:	DS-E01-069	Rev: 0

Submersible Motor Specifications, PE1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 45/2	5.1 kW	4.5 kW 6.0 HP	3515	208 230 460 600	16.4 14.8 7.4 5.7	133 120 60 46	J	1.3**	88.2	89.1	85.9	.865	.839	.775

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals · CSA · IE3 · NEMA Premium · abs

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 45/2	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 12/7	19.1mm (0.75") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	3" flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility), threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.1					
Solids Passage Size	80mm (3.15")					
Impeller DIA	135mm (5.31")					
Impeller Weight						
Min Recommended Flow, GPM	50					

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 45/2			
Overall Height	692mm (27.3")			
Pump Weight	100 kg (220 lb)			

SULZER

Massblatt XFP 81C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.614 -00
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Issue Date: 11.08.2010
Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

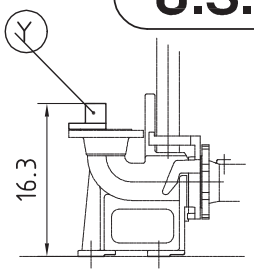
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 30/2	220
PE 40/2	231

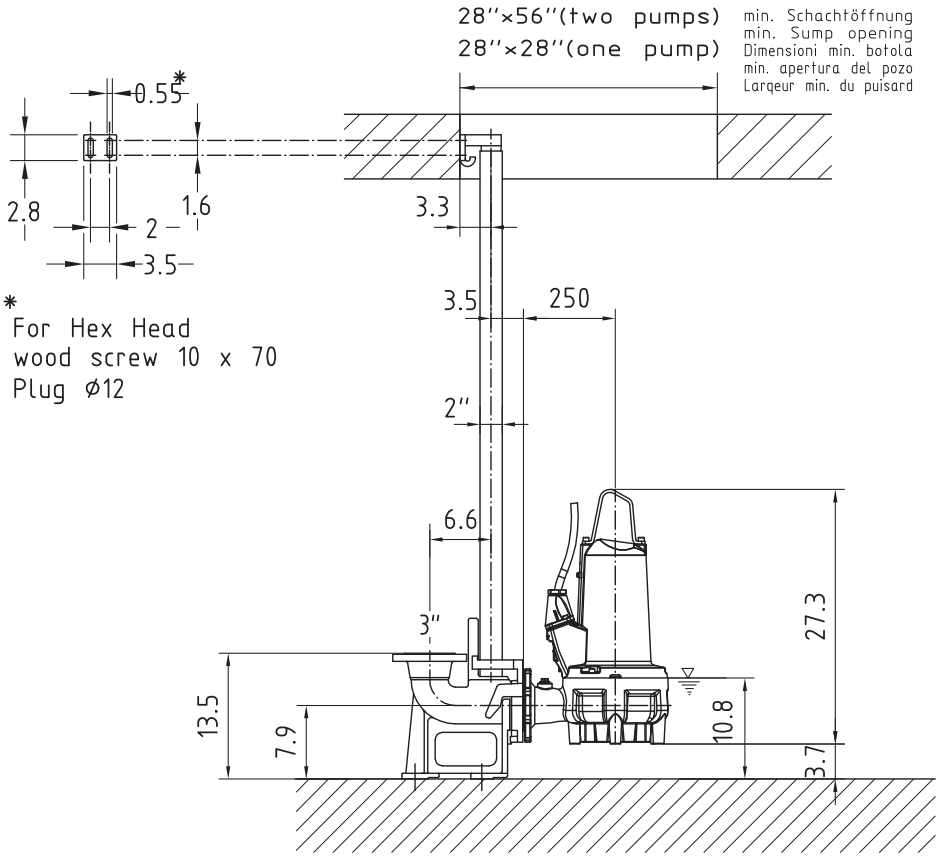
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 45/2	231

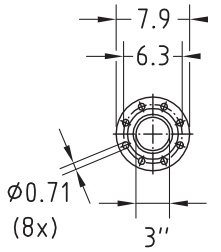
U.S.

Part No.	Y(mm)
DN 80	
6 232 0649	
6 232 0650	ø 90

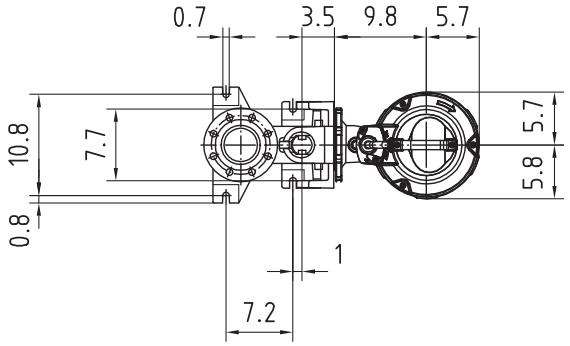




* For Hex Head wood screw 10 x 70 Plug ø12



Class 125 ANSI



Weight: Includes pump and slider bracket

abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 81C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

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Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

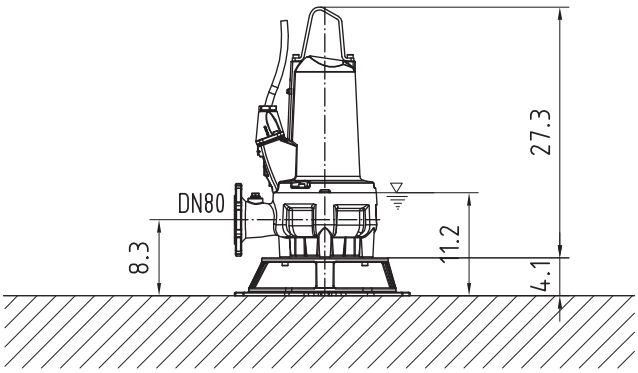
50 Hz

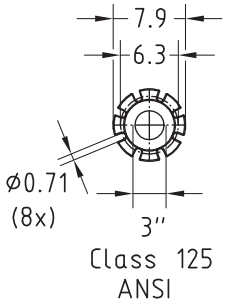
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 30/2	
PE 40/2	

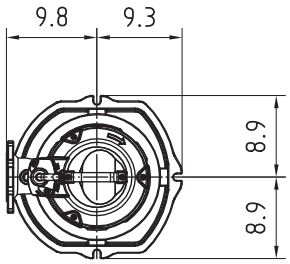
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 35/2	
PE 45/2	





Class 125
ANSI



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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 81C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalacion en seco
Plan d'encombrement Installation a sec

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Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

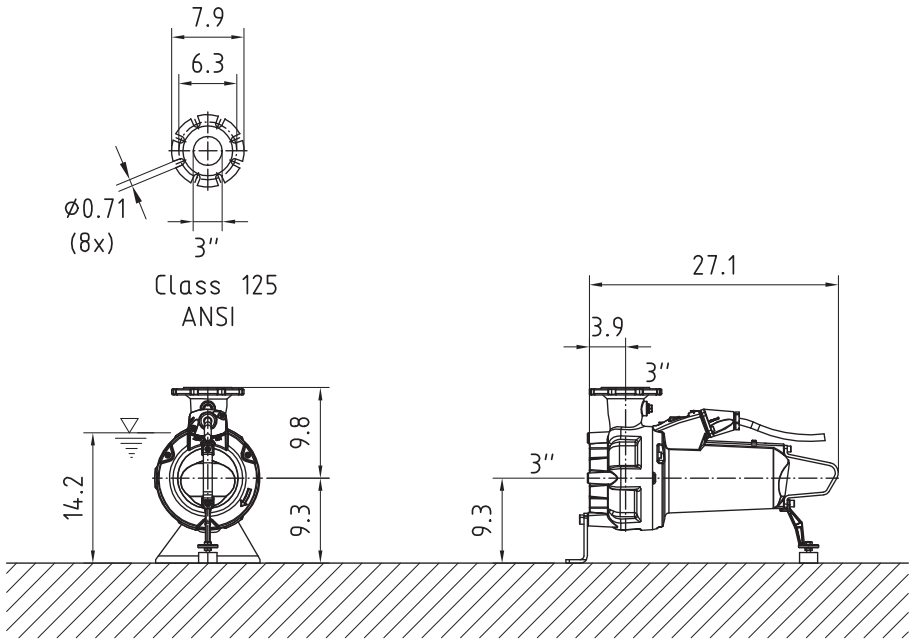
50 Hz

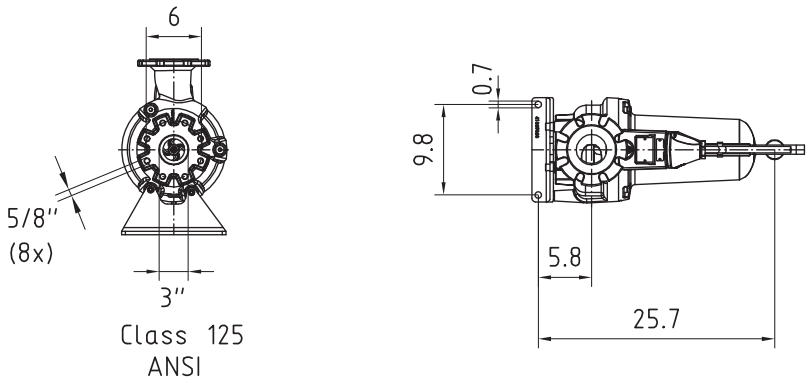
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 30/2	
PE 40/2	

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 35/2	
PE 45/2	





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 81C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalacion en seco
Plan d'encombrement Installation a sec

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Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

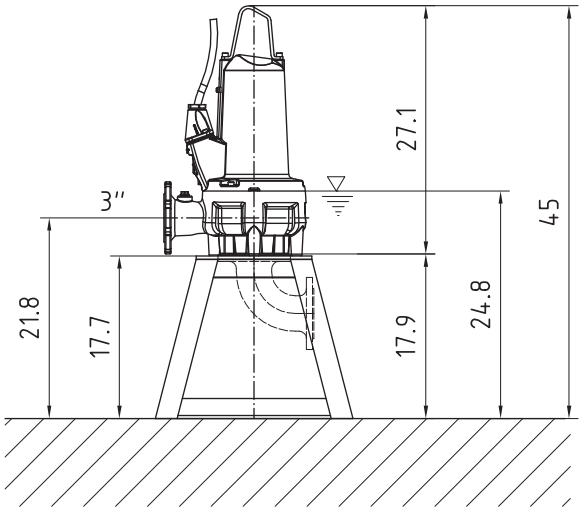
50 Hz

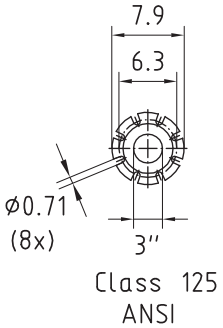
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 30/2	
PE 40/2	

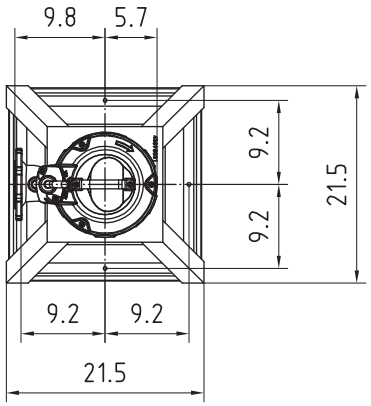
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 35/2	
PE 45/2	





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

3" ABS XFP PUMP

XFP 081E-VX
2 Pole, 3 Phase, PE2

Date:	02/11		
Dwg:	DS-E01-055	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron three inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated three 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 3 inch ANSI class 125 or metric DN80 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open, six vane design, and shall be capable of passing a minimum of 2.6 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125 (rotated 22.5 degrees) and metric DN80 (PN 10) flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating completely or partially submerged and shall be self cooling via the process fluid surrounding the motor. The motor shall have a NEMA Class A temperature rise for submerged service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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

between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

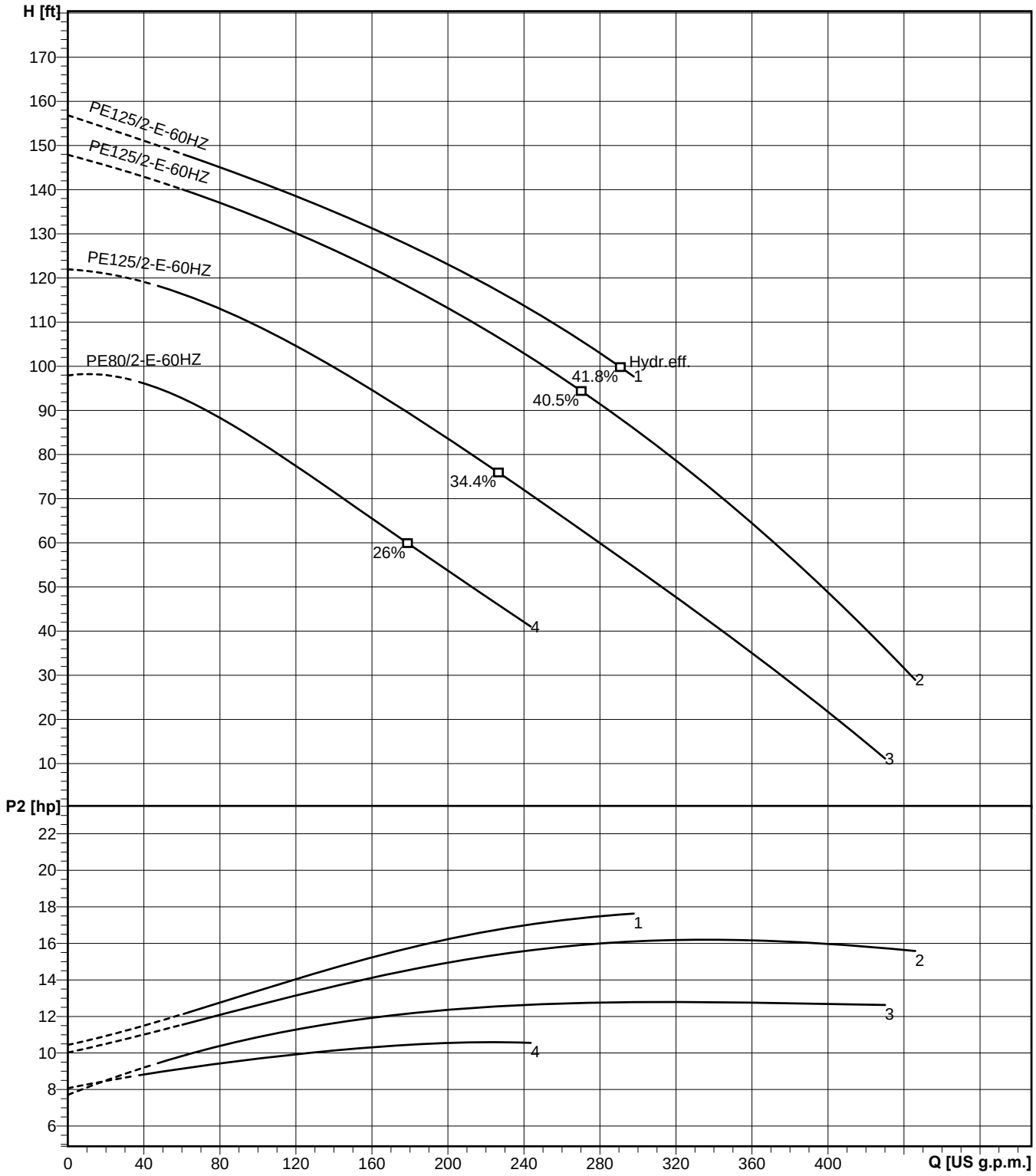
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP 81E VX 60HZ

Curve number	
Reference curve	XFP81E VX

			Discharge	Frequency
			DN80	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3515..3520 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		17.6 hp	41.8 %	26.0 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
7.09..5.43 inch	6	Vortex impeller	2 1/2"	2011-04-19

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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TECHNICAL DATA

3” ABS XFP PUMP

XFP 81E-VX
2 Pole, 3 Phase, PE2

Date:	1/11		
Dwg:	DS-E01-049	Rev:	0

Submersible Motor Specifications, PE2 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line and electronic soft starters, and PWM type VFDs*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE2 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 80/2	8.9 kW	8.0 kW 10.7 HP	3520	208 230 460 600	29.4 26.6 13.3 10.2	217 196 98.1 75.2	J	1.3	90.2	89.7	87.4	.84	.80	.70
PE 125/2	13.7 kW	12.5 kW 16.8 HP	3515	208 230 460 600	47.1 42.6 21.3 16.3	321 290 145 111	H	1.3	91.0	92.6	92.8	.81	.78	.69

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Outside Diameter
Power Cable	PE 80/2	208 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		460 volt	SOOW 12/7	18.8mm (0.74") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 125/2	208 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		460 volt	SOOW 8/4 +16/3	25.4mm (1.0") diameter
		600 volt	SOOW 10/7	20.7mm (0.82") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	DN80 flanged, compatible with 3" class 125 ANSI flanges (ANSI flanged fittings must be rotated 22.5 degrees for compatibility)					
Suction Size	3" (this model is designed for wet pit installation only so suction flange bolt holes are not drilled)					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.1	.2	.3	.4		
Solids Passage Size	65mm (2.56")	65mm (2.56")	65mm (2.56")	65mm (2.56")		
Impeller DIA	180mm (7.09")	175mm (6.89")	155mm (6.10")	138mm (5.43")		
Impeller Weight						
Min Recommended Flow, GPM	60	60	60	60		

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 80/2	PE 125/2
Overall Height	709mm (27.9")	779mm (30.7")
Pump Weight	136 kg (300 lb)	152 kg (336 lb)

SULZER

FM Approvals Member of the FM Global Group

CSA

IE3

NEMA Premium

abs

SULZER

Massblatt XFP 81E-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.619 -00
Drawn: 11.08.10 / D.Whelan
Issue Date: 11.08.10
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

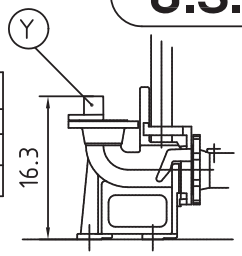
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 55/2	300.0	27.9
PE 70/2	306.0	27.9
PE 110/2	336.0	30.7

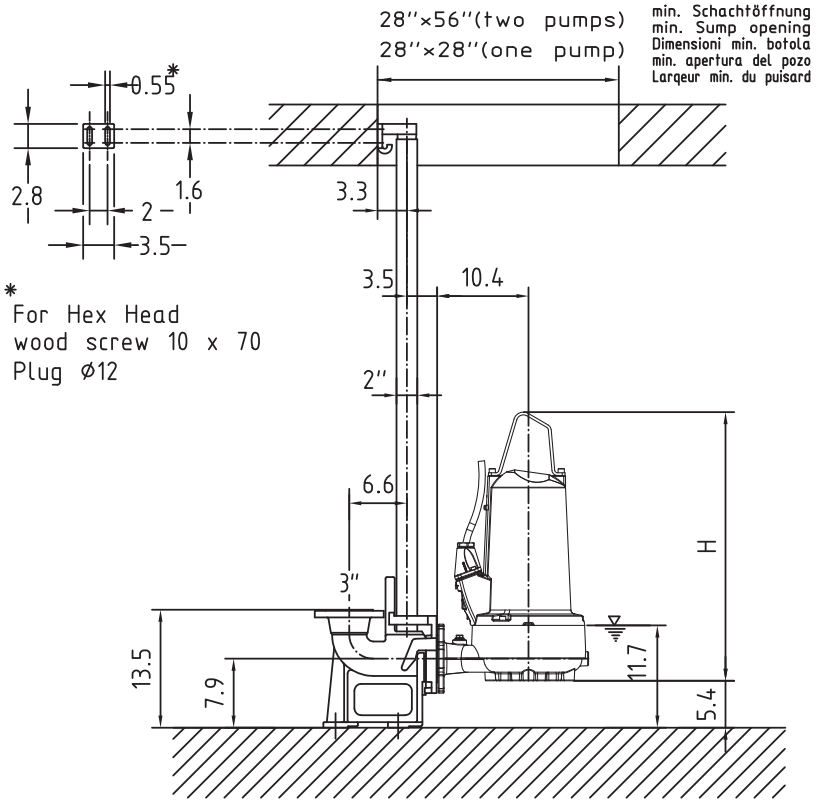
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 80/2	300.0	27.9
PE 125/2	336.0	30.7

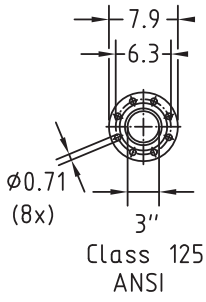
U.S.

Part No.	Y(mm)
DN 80	
6 232 0649	
6 232 0650	ø 90

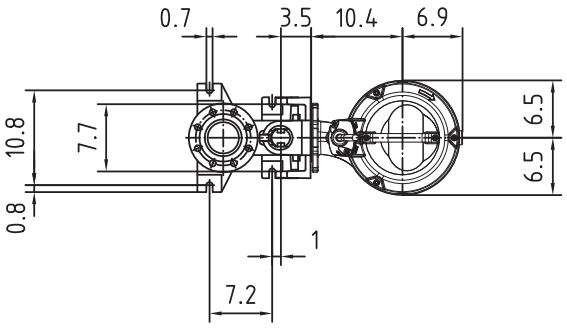




* For Hex Head wood screw 10 x 70 Plug ø12



Class 125 ANSI



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SULZER

Massblatt XFP 81E-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.621 -00
Drawn: 11.08.10 / D.Whelan
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Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

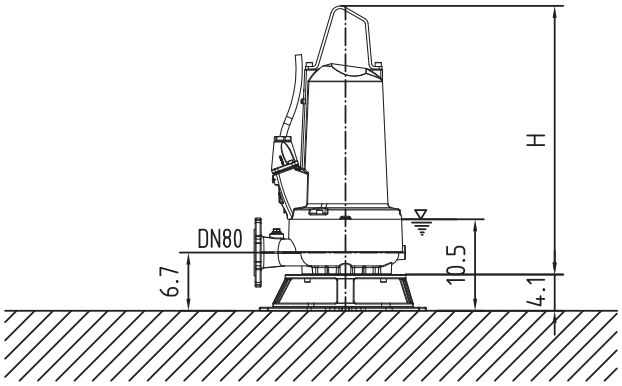
50 Hz

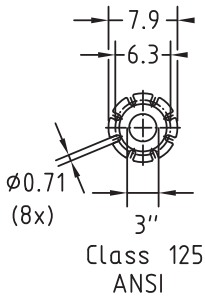
U.S.

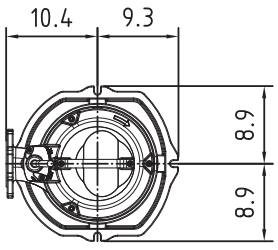
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 55/2	278.0	27.9
PE 70/2	284.0	27.9
PE 110/2	336.0	30.7

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 80/2	278.0	27.9
PE 125/2	314.0	30.7







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SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4inch ANSI class 125 and metric DN100 (PN 10) flanged fittings. Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

4" ABS XFP PUMP

XFP 100C-CB1
4 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-E01-005	Rev:	3

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined

surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

4" ABS XFP PUMP

XFP 100C-CB1
6 Pole, 1 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-062	Rev: 1

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4inch ANSI class 125 and metric DN100 (PN 10) flanged fittings. Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

4" ABS XFP PUMP

XFP 100C-CB1
6 Pole, 3 Phase, PE1

Date:	03/12		
Dwg:	DS-E01-006	Rev:	3

SCOPE

Furnish , ____ ABS Model _____ Submersible Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **High Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup.

Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard 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 High Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE1. 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.

The High Efficiency 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 High Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

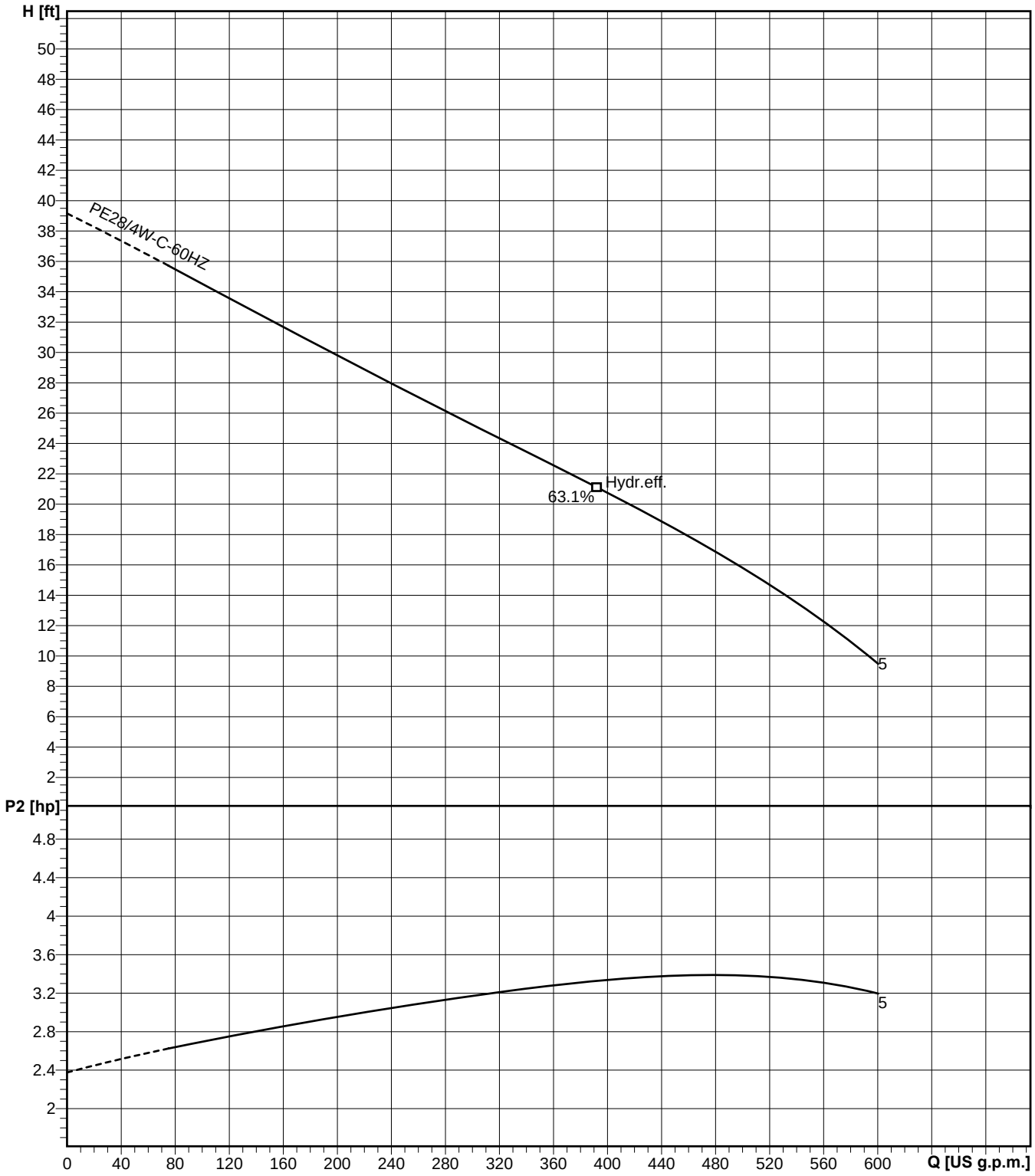
Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP100C CB1 1~ 60HZ

Curve number				
Reference curve XFP100C-CB SINGLE PHA				
			Discharge DN100	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1735 rpm	Date 2012-03-15
Flow	Head	Rated power 3.33 hp	Hydraulic efficiency 63.1 %	NPSH 10.4 ft



Impeller size 6.69 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3"	Revision 2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

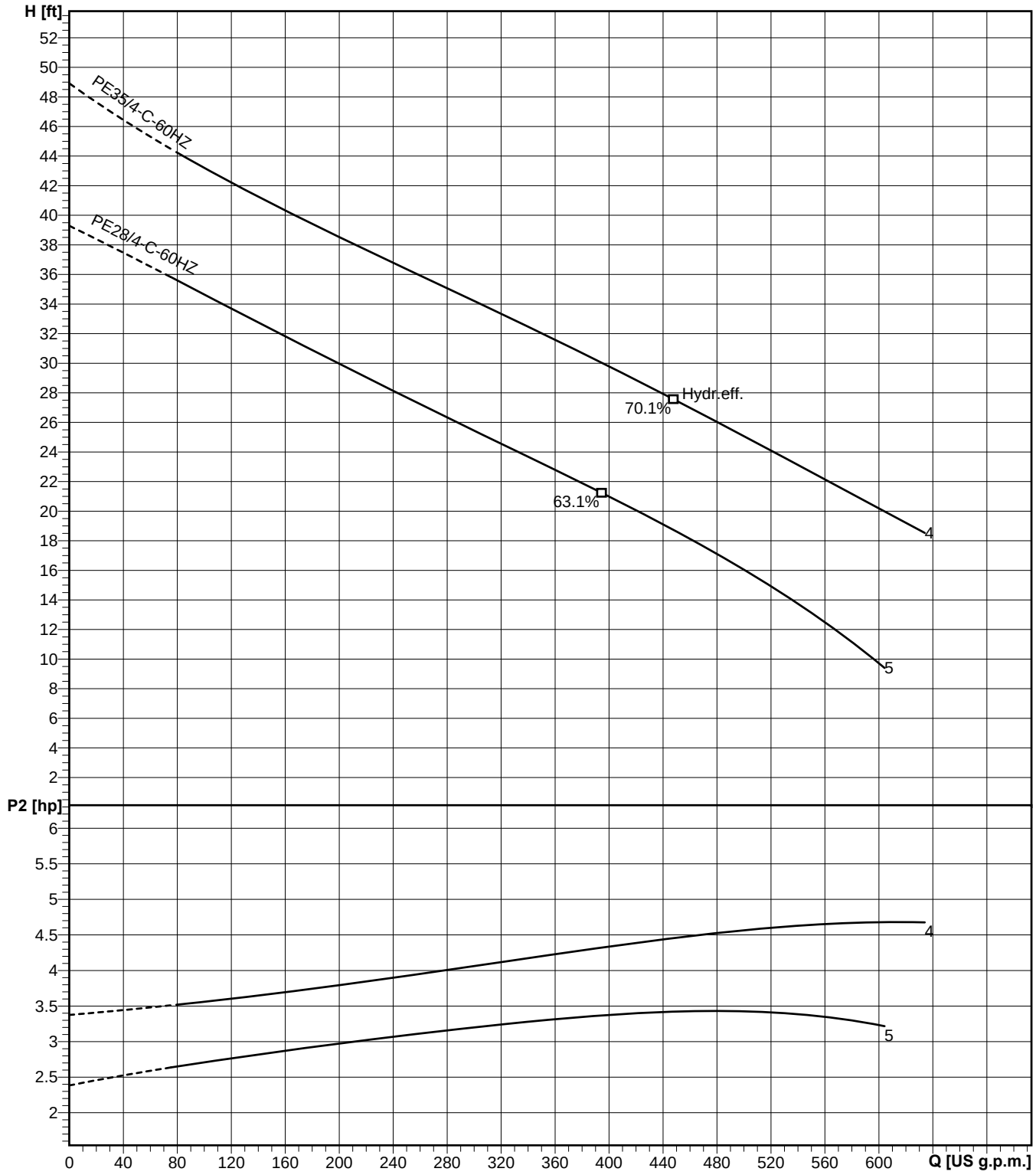
abs

SULZER

Pump performance curves
XFP100C CB1 60HZ

Curve number	
Reference curve	XFP100C-CB

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1730..1750 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.46 hp	70.1 %	13.3 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2011-10-11
7.01..6.69 inch	1	Contrabloc Plus impeller, 1 vane	3"	

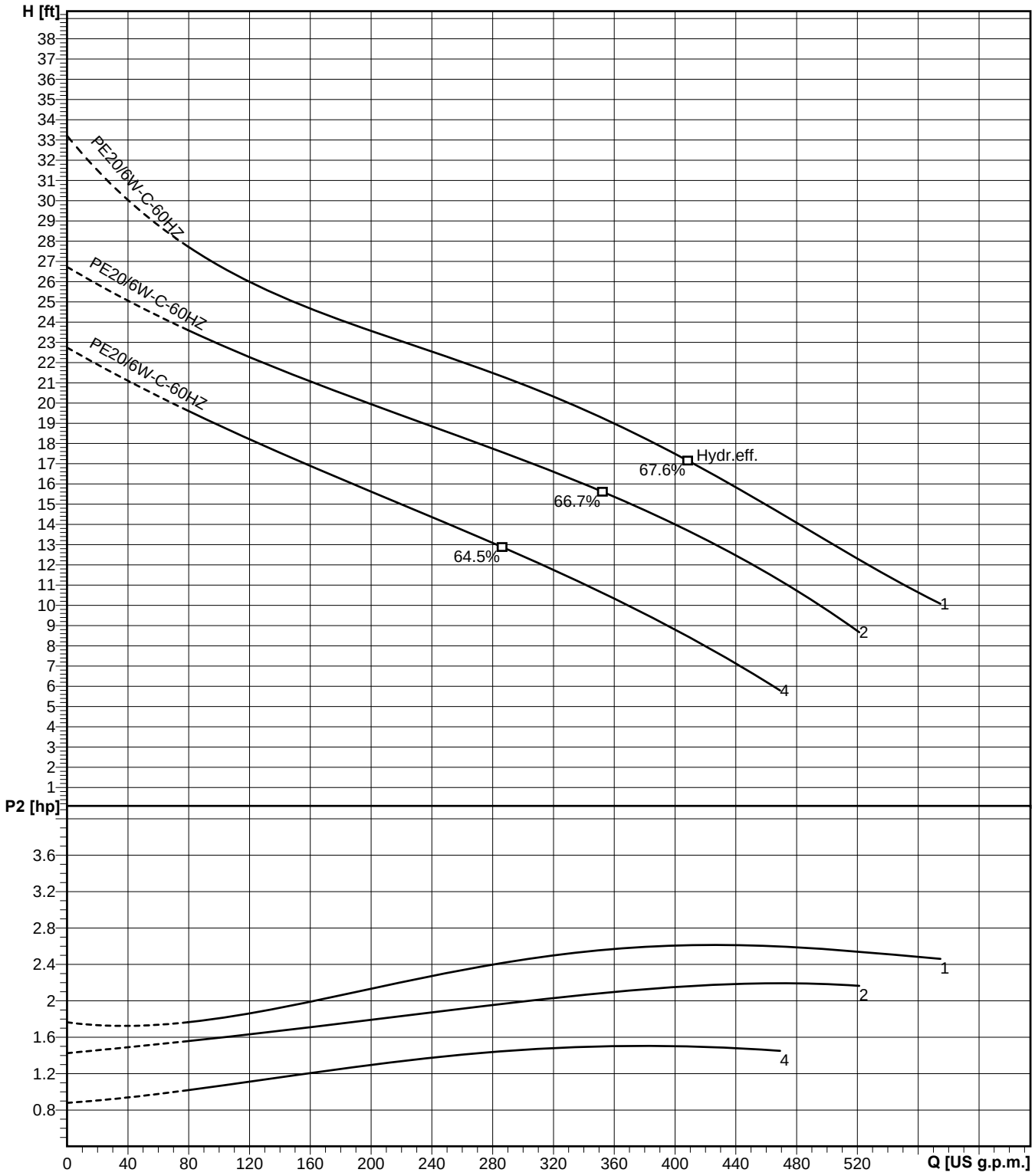
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
XFP100C CB1 1~ 60HZ

Curve number				
Reference curve XFP100C-CB SINGLE PHA				
			Discharge DN100	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1145 rpm	Date 2012-03-15
Flow	Head	Rated power 2.58 hp	Hydraulic efficiency 67.3 %	NPSH 5.9 ft



Impeller size 8.35..6.89 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3"	Revision 2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

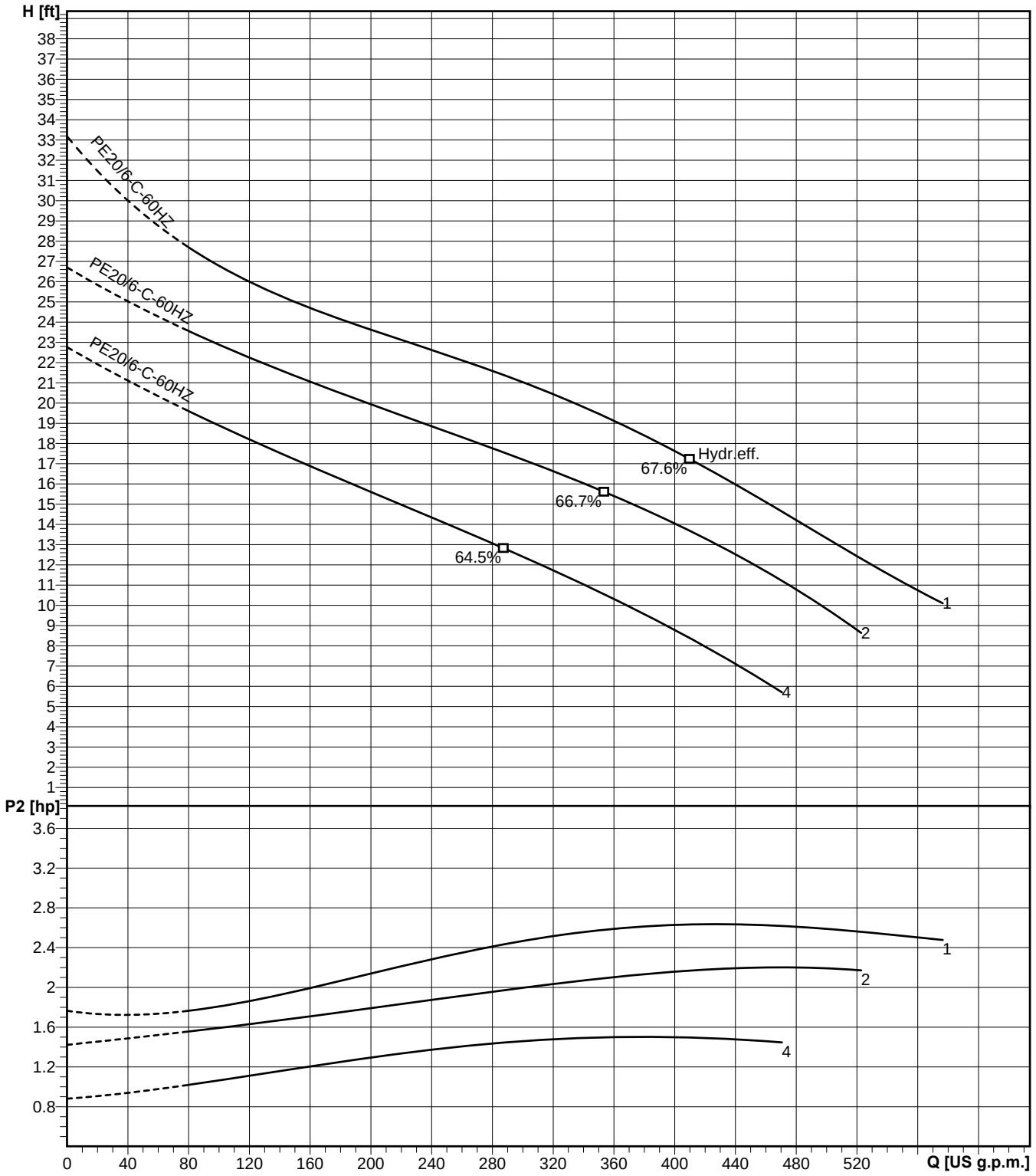
abs

SULZER

Pump performance curves
XFP100C CB1 60HZ

Curve number	
Reference curve	XFP100C-CB

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1150 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		2.6 hp	67.2 %	5.9 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
8.35..6.89 inch	1	Contrabloc Plus impeller, 1 vane	3"	2011-10-11

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

4" ABS XFP PUMP

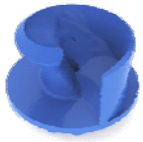
XFP 100C-CB1
4 Pole, 1 Phase, PE1

Date:	2/11	
Dwg:	DS-E01-023	Rev: 0

Submersible Motor Specifications, PE 1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		12, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range



* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 28/4W	3.6 kW	2.8 kW 3.7 HP	1735	230	16.9	68.7	D	1.3***	78.5	80.0	77.8	0.920	0.849	0.721

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals

Specifications subject to change without notice

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 28/4W			
		230 volt	SOOW 10/7	22.4mm (0.88") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.5					
Solids Passage Size	75mm (3")					
Impeller DIA	170mm (6.69")					
Impeller Weight						
Min Recommended Flow, GPM	100					

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 28/4W			
Overall Height	716mm (28.2")			
Pump Weight	109 kg (240 lb)			

TECHNICAL DATA

4” ABS XFP PUMP

XFP 100C-CB1
4 Pole, 3 Phase, PE1

Date:	09/10	
Dwg:	DS-E01-021	Rev: 3

Submersible Motor Specifications, PE 1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 28/4	3.09 kW	2.8 kW 3.75 HP	1750	208 230 460 600	11.5 10.4 5.2 4	92.2 83.4 41.7 31.9	K	1.3**	90.7	91.1	89.6	.742	.65	.51
PE 35/4	3.9 kW	3.5 kW 4.7 HP	1750	208 230 460 600	13.7 12.4 6.2 4.8	92 83.2 41.6 31.9	H	1.3**	89.5	91.3	92.5	.79	.72	.58

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

Specifications subject to change without notice

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 28/4	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/4	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5				
Solids Passage Size	75mm (3")	75mm (3")				
Impeller DIA	175mm (6.89")	170mm (6.69")				
Impeller Weight	5.6 Kg (12.3 lb)	5.5 Kg (12.1 lb)				
Min Recommended Flow, GPM	100	100				

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 28/4	PE 35/4		
Overall Height	716mm (28.2")	716mm (28.2")		
Pump Weight	109 kg (240 lb)	109 kg (240 lb)		

TECHNICAL DATA

4" ABS XFP PUMP

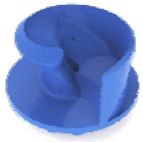
XFP 100C-CB1
6 Pole, 1 Phase, PE1

Date:	4/11	
Dwg:	DS-E01-061	Rev: 0

Submersible Motor Specifications, PE1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range



* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 20/6W*	2.6 kW	2.0 kW 2.7 HP	1145	208 230	13.2 12	25.9 23.4	A	1.3***	77.8	71.8	61.6	0.935	0.886	0.784

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals

Member of the FM Global Group

abs

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 20/6W	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 12/7	18.8mm (0.74") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.1	.2	.4			
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")			
Impeller DIA	212mm (8.35")	195mm (7.68")	175mm (6.89")			
Impeller Weight						
Min Recommended Flow, GPM	100	100	100			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 20/6W			
Overall Height	716mm (28.2")			
Pump Weight	109 kg (240 lb)			

TECHNICAL DATA

4” ABS XFP PUMP

XFP 100C-CB1
6 Pole, 3 Phase, PE1

Date:	06/10	
Dwg:	DS-E01-022	Rev: 3

Submersible Motor Specifications, PE 1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30, IE1 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Material		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Motor Ratings, PE1 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 20/6	3.4 kW	2 kW 2.7 HP	1150	208 230 460 600	9.3 8.4 4.2 3.5	49.0 44.4 22.2 17.0	H	1.3**	83.5	82.1	78.9	.715	.639	.511

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals

IE3

abs

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- 5mm (.02")
Power Cable	PE 20/6	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.1	.2	.4			
Solids Passage Size	75mm (3")	75mm (3")	75mm (3")			
Impeller DIA	212mm (8.35")	195mm (7.68")	175mm (6.89")			
Impeller Weight	6.2 Kg (13.6 lb)	6.1 Kg (13.4 lb)	5.6 Kg (12.3 lb)			
Min Recommended Flow, GPM	80	80	80			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 20/6			
Overall Height	716mm (28.2")			
Pump Weight	109 kg (240 lb)			

SULZER

Massblatt XFP 100C-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.558 - 01
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Issue Date: 29/03/2011
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

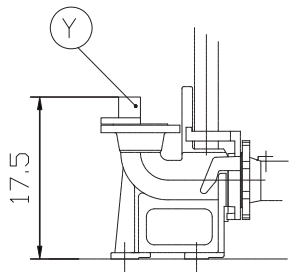
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	230
PE 22/4	235
PE 29/4	240

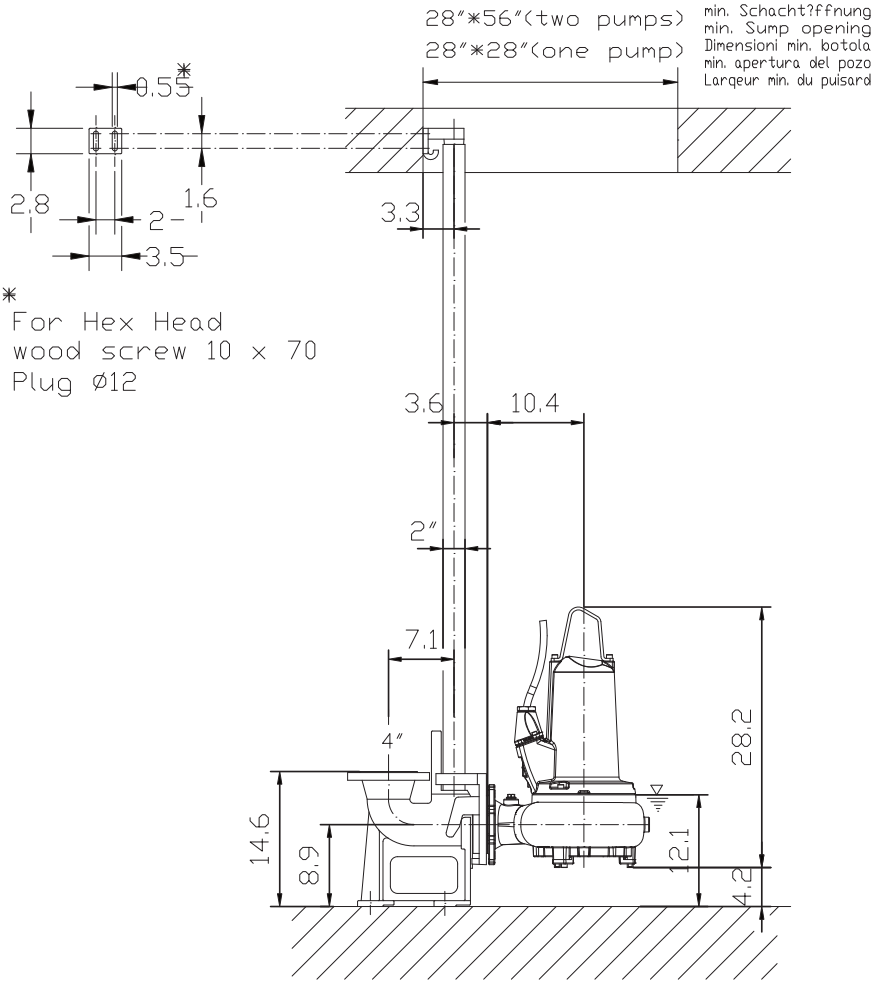
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	230
PE 28/4	235
PE 28/4W	235
PE 20/6	240
PE 20/6W	240
PE 35/4	240

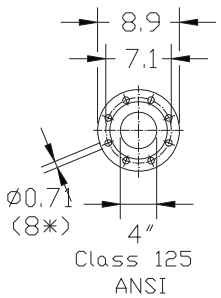
	Part No.	Y(mm)
	DN 100	
	6 232 0652	
	6 232 0653	ø 110
	6 232 0654	ø 115
ASA	6 232 0664	
	6 232 0665	ø 115

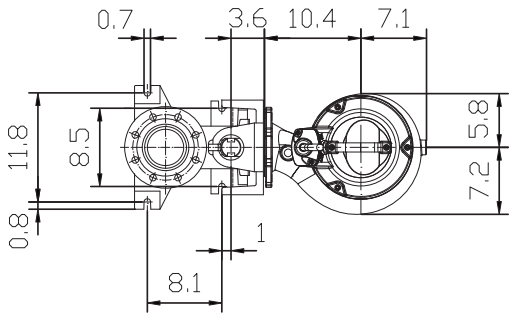
U.S.





* For Hex Head wood screw 10 x 70 Plug ø12





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100C-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
lan d'encombrement Installation noyee

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Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

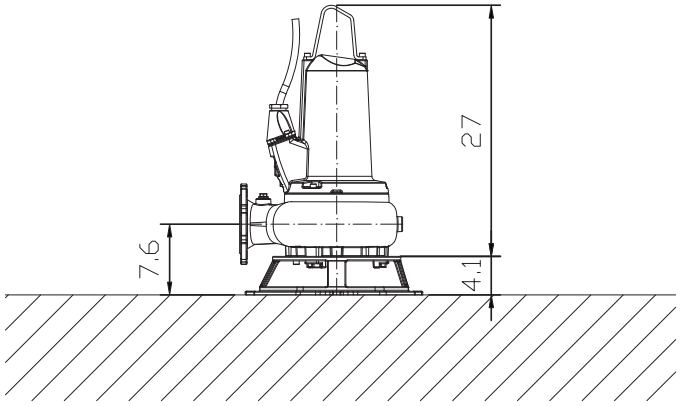
50 Hz

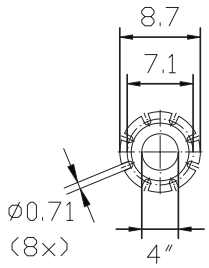
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	206
PE 22/4	211
PE 29/4	216

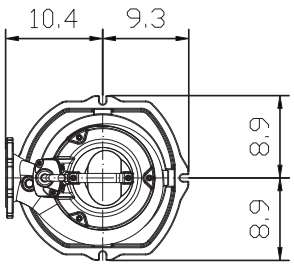
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	206
PE 28/4	211
PE 28/4W	211
PE 20/6	216
PE 20/6W	216
PE 35/4	216





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
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SULZER

Massblatt XFP 100C-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation a sec

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?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

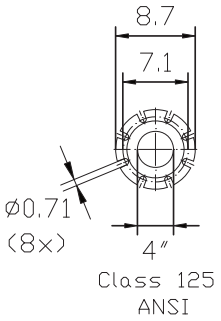
50 Hz

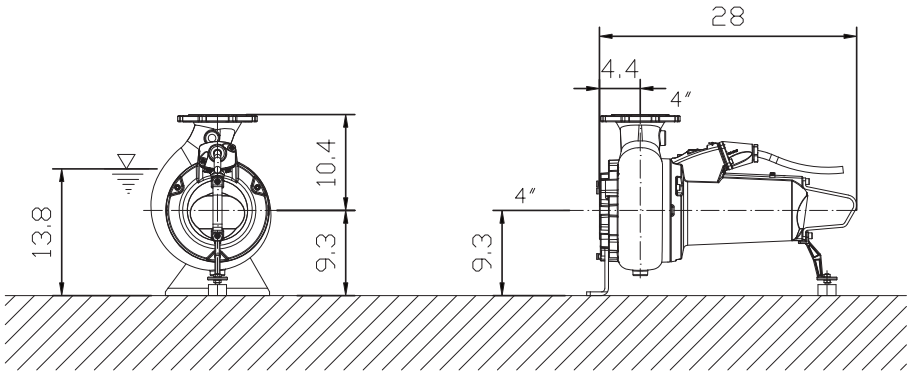
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	206
PE 22/4	211
PE 29/4	216

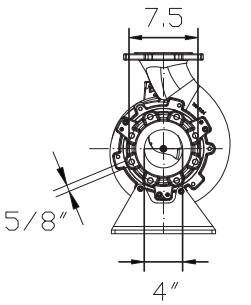
60 Hz

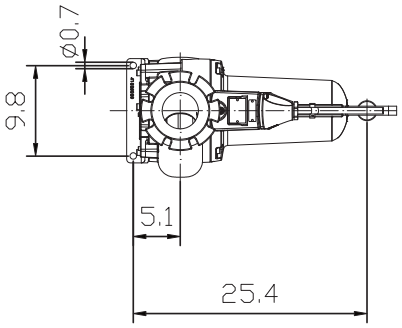
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	206
PE 28/4	211
PE 28/4W	211
PE 20/6	216
PE 20/6W	216
PE 35/4	216

U.S.









abs

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SULZER

Massblatt XFP 100C-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation a sec

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Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

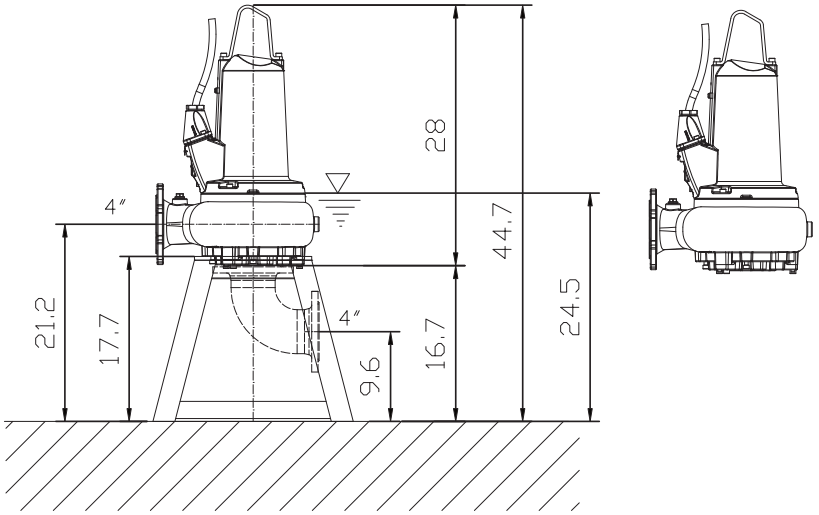
50 Hz

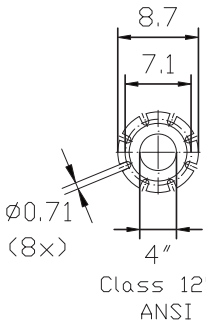
U.S.

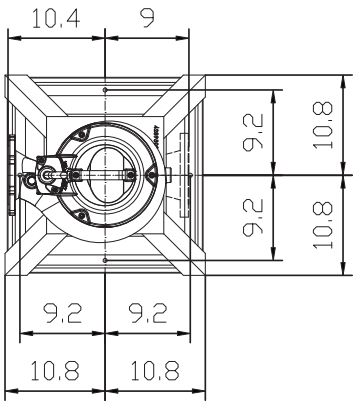
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 13/6	206
PE 22/4	211
PE 29/4	216

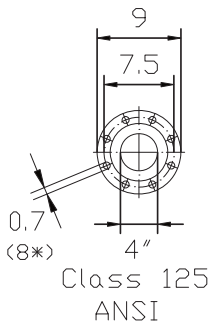
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	206
PE 28/4	211
PE 28/4W	211
PE 20/6	216
PE 20/6W	216
PE 35/4	216









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Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

4" ABS XFP PUMP

XFP 100C-VX
4 Pole, 1 Phase, PE1

Date:	03/12	
Dwg:	DS-E01-056	Rev: 0

SCOPE

Furnish , ____ ABS Model _____ Submersible Premium Efficiency Non-Clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **1 phase**, **60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a High Efficiency single phase, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel, 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel, 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open six 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) flanged fittings. The suction flange shall be integrated into the volute and its bolt holes shall be drilled and threaded to accept 4 inch ANSI class 125 fittings. Proprietary or non standard 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, 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 single phase motors, only three phase motors. The PE motors are designed to meet expected IE3 efficiency levels for single phase motors in future revisions of the IEC 60034-30 standard.

The High Efficiency 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 materials, 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 12 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

Motor Starting System: The single phase motor shall be started by a high torque "capacitor start-capacitor run" type starting circuit housed in the pump control panel. The start circuit shall work in conjunction with the motor and control system to provide high starting and running torque capability of the motor, as well as consistent and predictable direction of rotation. The factory supplied start kit shall consist of a start relay, start capacitor(s) run capacitor(s) and a dropping resistor, as well as the required mounting brackets for the components.

The start relay shall be the voltage sensing type, capable of sensing the back EMF developed by the start winding during motor starting. The relay shall respond to the applicable level of back EMF by switching the capacitor system from start mode to run mode during the start sequence; removing the start capacitor(s) from the circuit, and leaving the run capacitor(s) connected. In the event exceptional torque is required during motor operation the relay shall be capable of bringing the start capacitor portion of the circuit back on line to provide a short torque boost for the motor.

Start and Run capacitors shall be sized with a microfarad value suitable for the particular characteristics of the high efficiency PE Series motor. The selected values shall provide the ideal balance between motor torque and inrush current. Capacitors shall be premium grade devices, with a voltage rating of 330 volt minimum.

A dropping resistor shall be connected across the terminals of the start capacitor system to bleed down residual voltage in the capacitor(s) between motor starts.

Start circuits using simple capacitor start, permanent split capacitor, or shaded pole technology in lieu of capacitor start-capacitor run technology shall not be considered equal due to their inherent characteristic of lower motor torque capability than the capacitor start-capacitor run system.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be an open six 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be 4 inch. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) flanged fittings. The suction flange shall be integrated into the volute and its bolt holes shall be drilled and threaded to accept 4 inch ANSI class 125 fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

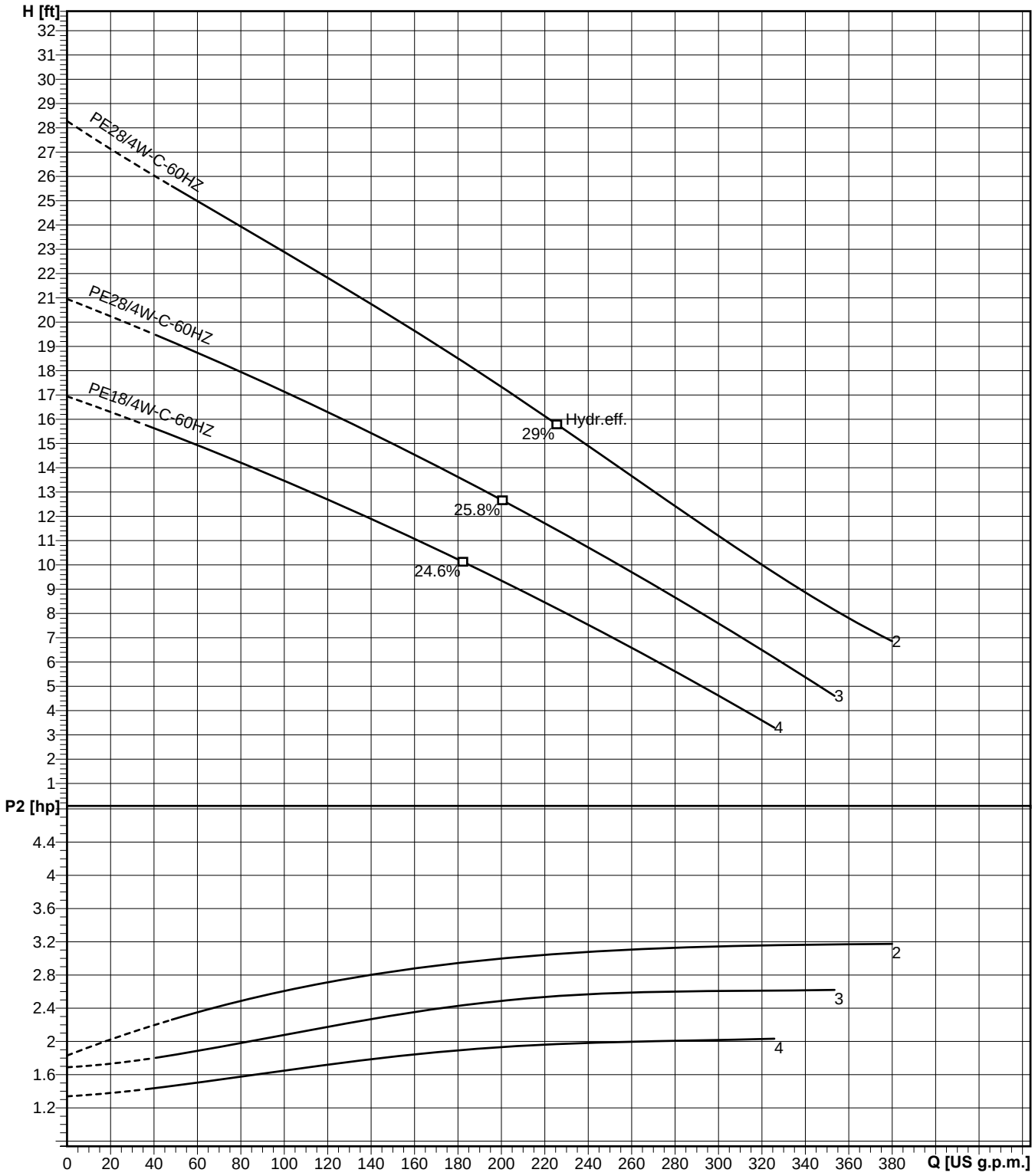
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP100C VX 1~ 60HZ

Curve number	
Reference curve	XFP100C-VX SINGLE PHA

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1735..1755 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		3.06 hp	29.1 %	8.9 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2010-12-15
6.69..5.91 inch	6	Vortex impeller	3 7/8"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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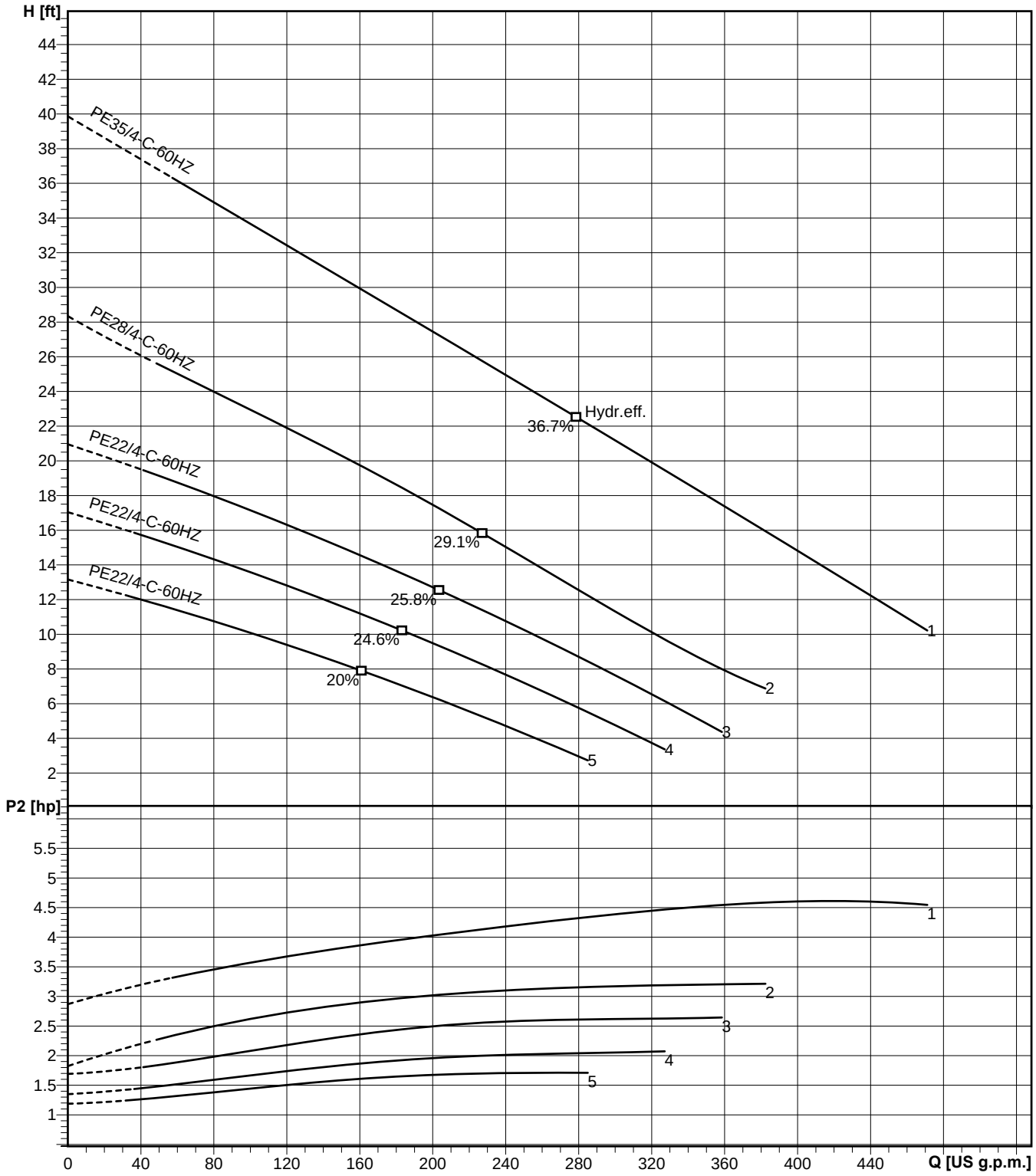
SULZER

Pump performance curves
XFP100C VX 60HZ

Curve number	
Reference curve	XFP100C-VX

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1730..1760 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.32 hp	36.7 %	13.5 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
7.32..5.51 inch	6	Vortex impeller	3 7/8"	2010-12-15

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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TECHNICAL DATA

4" ABS XFP PUMP

XFP 100C-VX
4 Pole, 1 Phase, PE1

Date:	3/12		
Dwg:	DS-E01-050	Rev:	0

Submersible Motor Specifications, PE1 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30**
Motor Efficiency Test Protocol		IEC 60034-2-1**
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Across the line, capacitor start–capacitor run*
Maximum Starts per Hour		12, evenly spaced
Inverter Duty Rating		Not applicable to single phase motors
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230
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

ABS submersible sewage pump XFP
Part of the ABS EffeX range

* Requires external start kit mounted in the control panel. See document DS-Z01-009 for ABS single phase start kits.
** Single phase 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, PE1 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 18/4W*	2.3 kW	1.8 kW 2.4 HP	1755	208 230	11.6 10.5	24.3 22	A	1.3***	79.5	79.9	74.5	.935	.886	.784
PE 28/4W*	3.6 kW	2.8 KW 3.8 HP	1735	208 230	18.7 16.9	75.9 68.7	D	1.3***	78.5	80.0	77.8	.920	.849	.721

*** For wet pit installation. Service factor is 1.15 for dry pit installation.

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Outside Diameter
Power Cable	PE 18/4W	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 12/7	19.1mm (0.75") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 28/4W	208 volt	SOOW 10/7	22.4mm (0.88") diameter
		230 volt	SOOW 10/7	22.4mm (0.88") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 26mm (1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.2	.3	.4			
Solids Passage Size	100mm (3.94")	100mm (3.94")	100mm (3.94")			
Impeller DIA	170mm (6.91")	160mm (6.30")	150mm (5.91")			
Impeller Weight						
Min Recommended Flow, GPM	80	80	80			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 18/4W	PE 28/4W		
Overall Height	716mm (28.2")	716mm (28.2")		
Pump Weight	96.5 kg (259 lb)	96.5 kg (259 lb)		

TECHNICAL DATA

4" ABS XFP PUMP

XFP 100C-VX
4 Pole, 3 Phase, PE1

Date:	2/11	
Dwg:	DS-E01-051	Rev: 0

Submersible Motor Specifications, PE1 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE1 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 22/4	2.45 kW	2.2 kW 3 HP	1760	208 230 460 600	10.1 9.1 4.6 3.5	48.6 43.9 22 16.8	G	1.3**	89.7	88.4	84.6	.677	.579	.449
PE 28/4	3.1 kW	2.8 kW 3.8 HP	1750	208 230 460 600	11.5 10.4 5.2 4.0	92.2 83.3 41.7 31.9	K	1.3**	90.7	91.1	89.6	.742	.650	.511
PE 35/4	3.9 kW	3.5 kW 4.7 HP	1730	208 230 460 600	13.7 12.4 6.2 4.8	92.0 83.1 41.6 31.9	H	1.3**	89.5	91.3	92.5	.790	.721	.582

** For wet pit installation. Service factor is 1.15 for dry pit installation.

Cable Data, PE1 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 22/4	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 28/4	208 volt	SOOW 14/7	18.3mm (0.72") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 35/4	208 volt	SOOW 12/7	19.1mm (0.75") diameter
		230 volt	SOOW 14/7	18.3mm (0.72") diameter
		460 volt	SOOW 14/7	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8x5/8-11 UNC bolts, 26mm (1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.1	.2	.3	.4	.5	
Solids Passage Size	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	
Impeller DIA	186mm (7.32")	170mm (6.69")	160mm (6.30")	150mm (5.91")	140mm (5.51")	
Impeller Weight						
Min Recommended Flow, GPM	80	80	80	80	80	

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 22/4	PE 28/4	PE 35/4	
Overall Height	716mm (28.2")	716mm (28.2")	716mm (28.2")	
Pump Weight	94 kg (208 lb)	96.5 kg (259 lb)	96.5 kg (259 lb)	

SULZER

Massblatt XFP 100C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.624 - 01
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?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

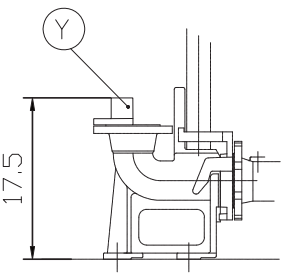
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	203.0
PE 22/4	208.0
PE 29/4	259.0

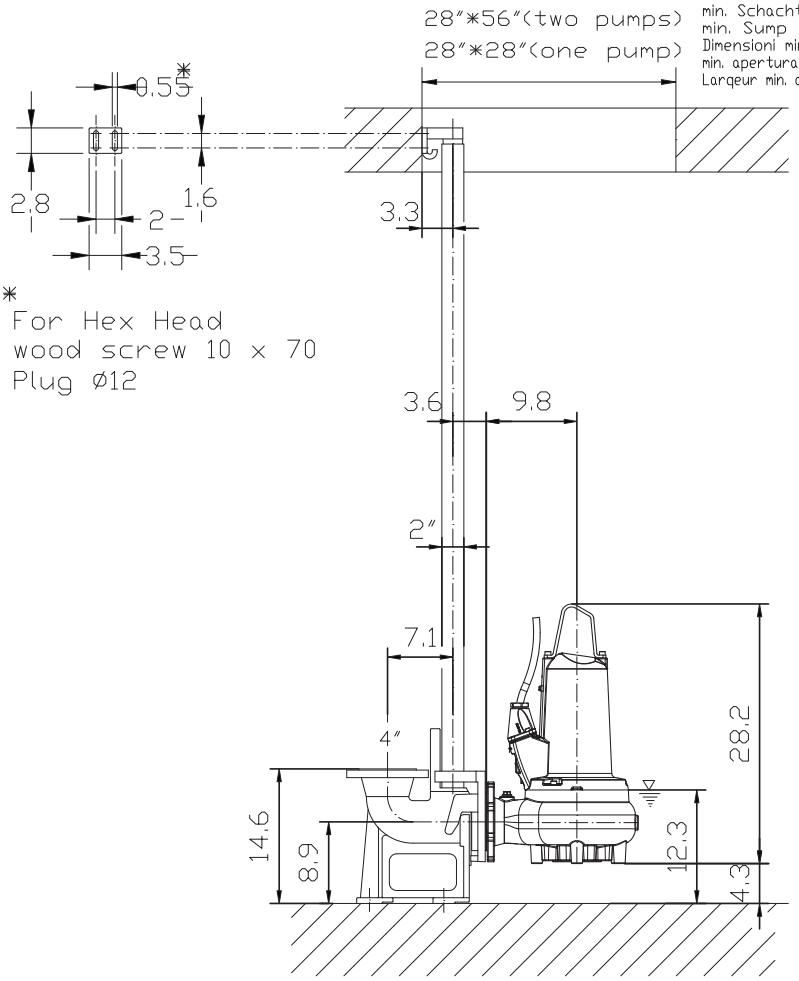
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	203.0
PE 18/4W	203.0
PE 22/4	208.0
PE 28/4	259.0
PE 28/4W	259.0
PE 35/4	259.0

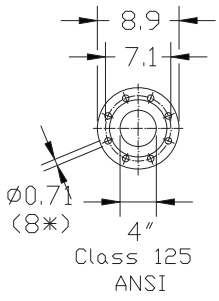
	Part No.	Y(mm)
	DN 100	
	6 232 0652	
	6 232 0653	ø 110
	6 232 0654	ø 115
ASA	6 232 0664	
ASA	6 232 0665	ø 115

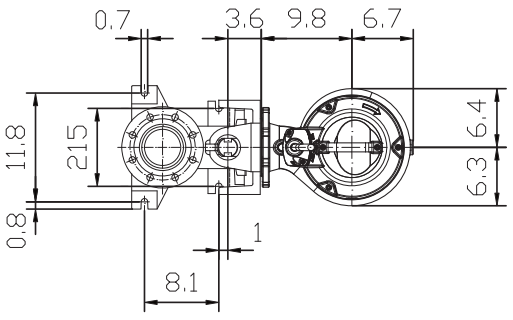
U.S.





* For Hex Head wood screw 10 x 70 Plug Ø12





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100C-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

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?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

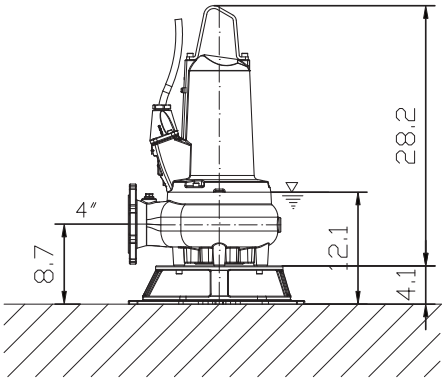
50 Hz

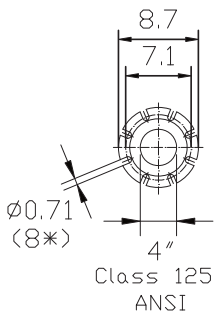
U.S.

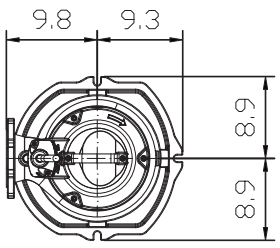
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	181.0
PE 22/4	186.0
PE 29/4	191.0

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	181.0
PE 18/4W	181.0
PE 22/4	186.0
PE 28/4	191.0
PE 28/4W	191.0
PE 35/4	191.0







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
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SULZER

Massblatt XFP 100C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation a sec

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?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

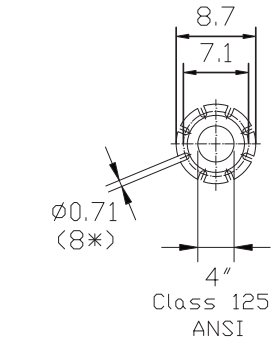
U.S.

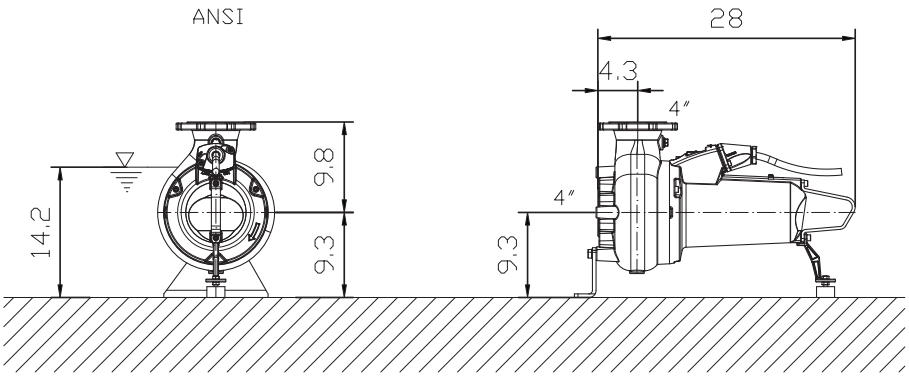
50 Hz

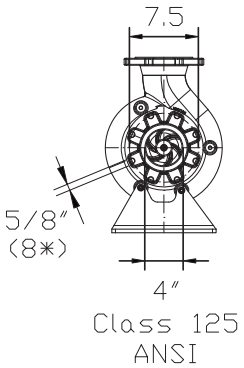
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	181.0
PE 22/4	186.0
PE 29/4	191.0

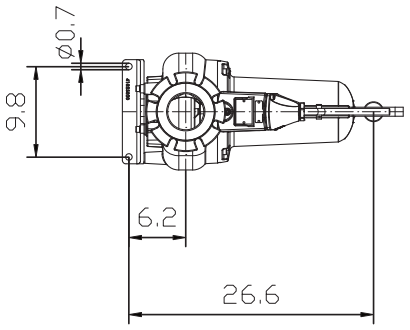
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	181.0
PE 18/4W	181.0
PE 22/4	186.0
PE 28/4	191.0
PE 28/4W	191.0
PE 35/4	191.0









abs

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Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100C-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalaćion en seco
Plan d'encombrement Installatioń a sec

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Con reserva de modificaciones
Sous rèserve de modification

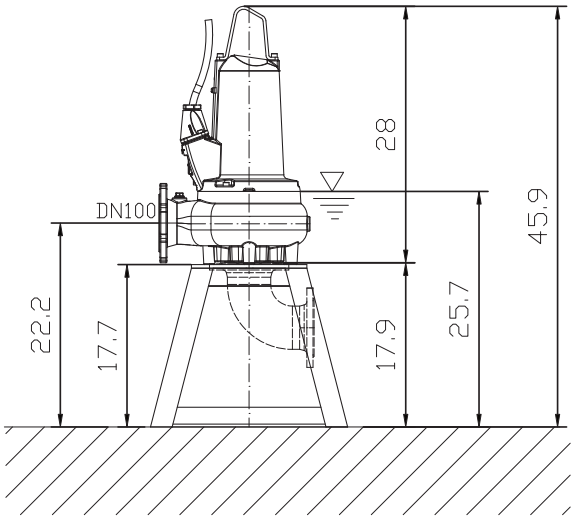
50 Hz

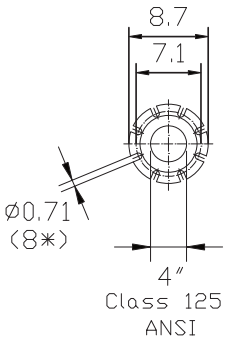
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 15/4	181.0
PE 22/4	186.0
PE 29/4	191.0

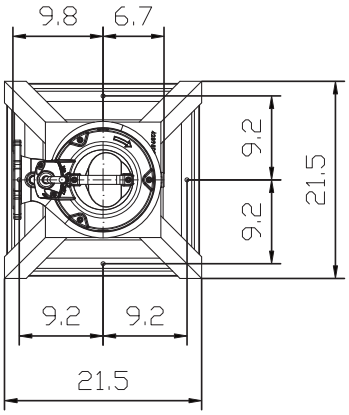
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)
PE 18/4	181.0
PE 18/4W	181.0
PE 22/4	186.0
PE 28/4	191.0
PE 28/4W	191.0
PE 35/4	191.0

U.S.







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Tolérance générale de la fonderie selon DIN1680-GTB16

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.1 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup.

Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **High Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.1 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup.

Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard 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 High Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE2. 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.

The High Efficiency 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, High Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

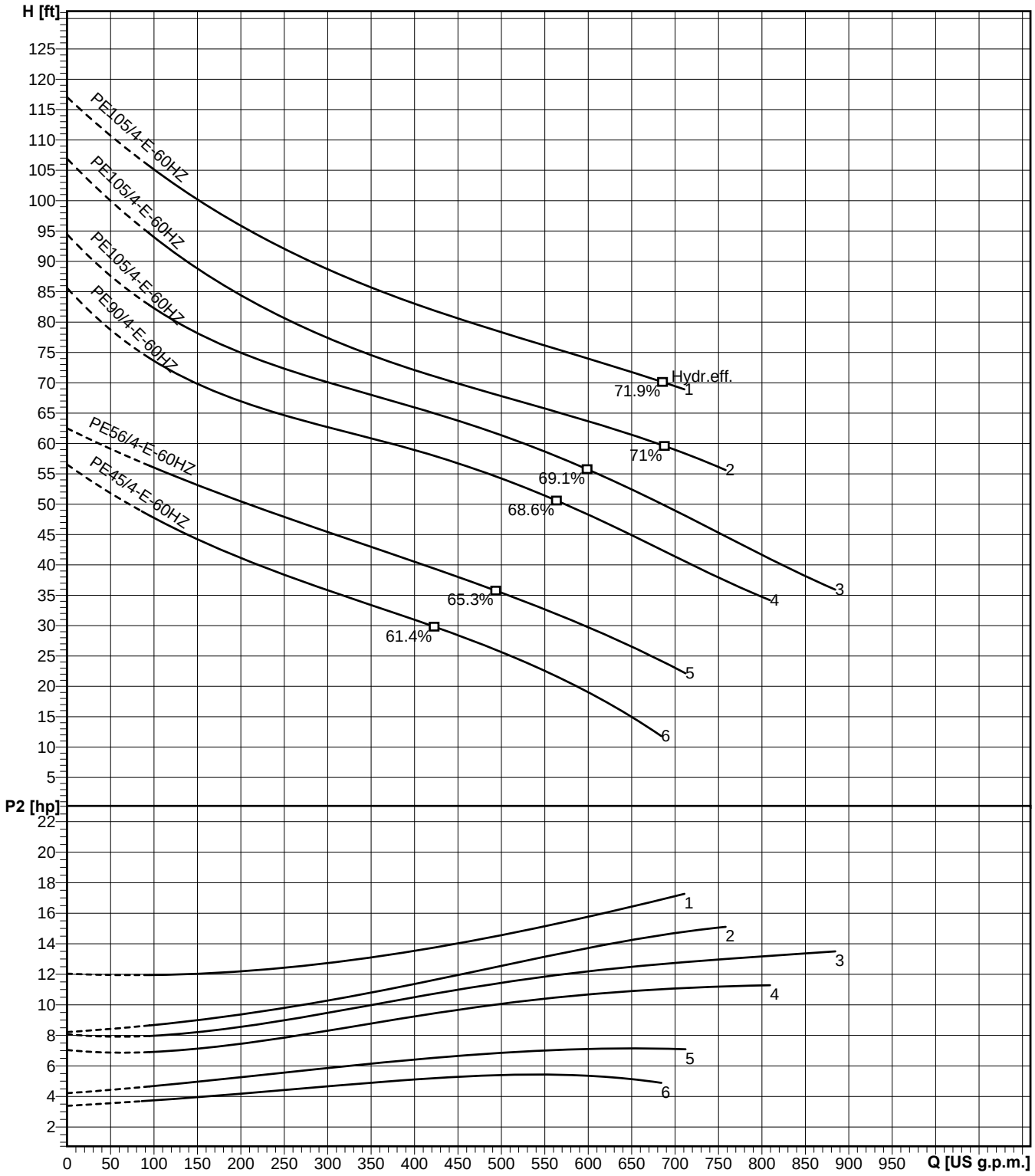
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP100E CB1 60HZ

Curve number	
Reference curve	XFP100E CB1

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1755..1765 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		16.9 hp	71.9 %	13.2 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
9.84..7.28 inch	1	Contrabloc Plus impeller, 1 vane	3 1/8"	2012-01-23

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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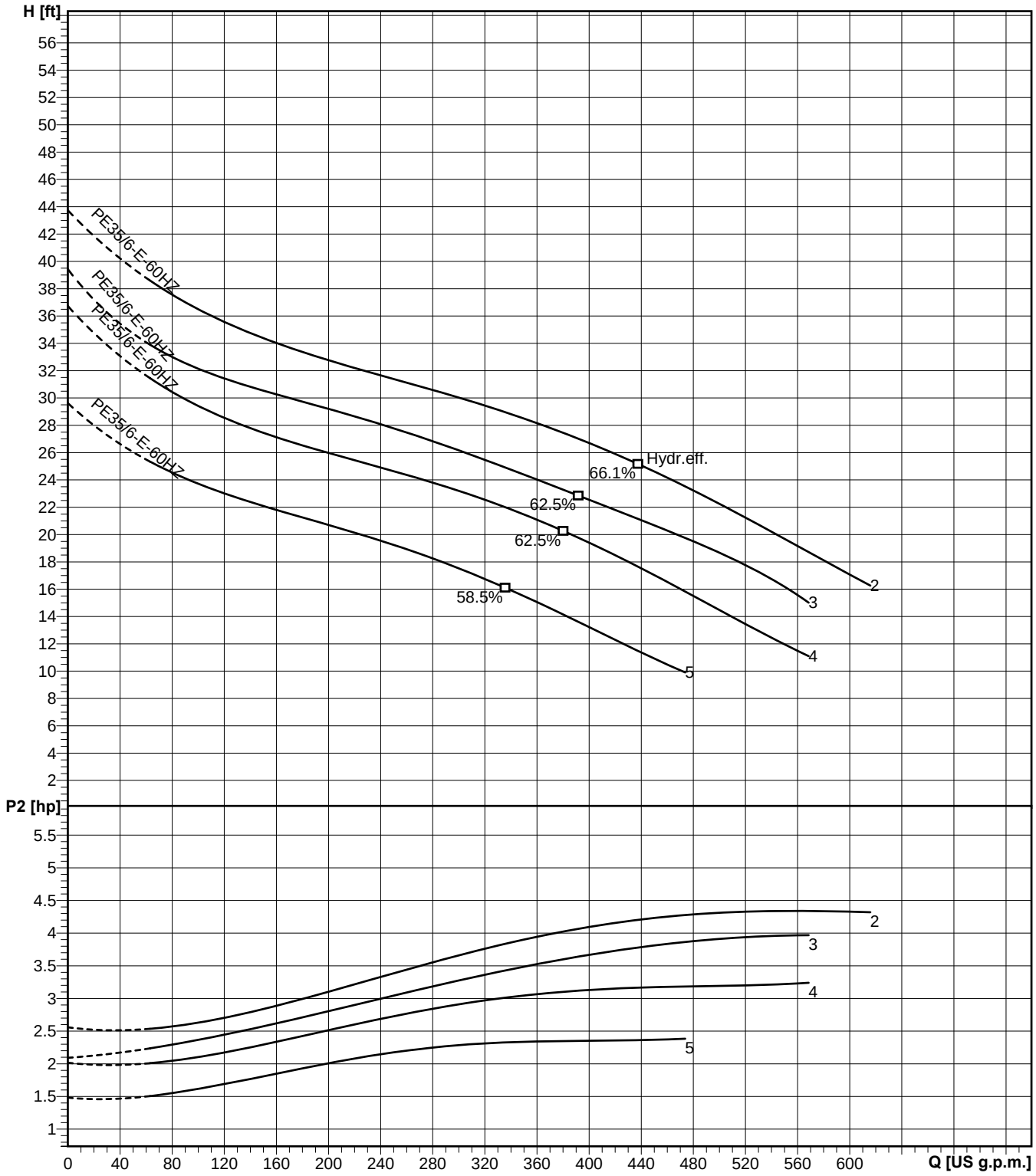
SULZER

Pump performance curves
XFP100E CB1 60HZ

Curve number	
Reference curve	XFP100E CB1

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1170 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		4.14 hp	66 %	5.7 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2012-01-23
9.45..7.68 inch	1	Contrabloc Plus impeller, 1 vane	3 1/8"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

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TECHNICAL DATA

4" ABS XFP PUMP

XFP 100E-CB1
4 Pole, 3 Phase, PE2

Date:	09/11		
Dwg:	DS-E01-024	Rev:	7

Submersible Motor Specifications, PE2 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE2 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 45/4	5.0 kW	4.5 kW 6 HP	1755	208 230 460 600	18.1 16.4 8.2 6.3	111 101 50.3 38.6	H	1.3**	90.6	92.5	90.0	.761	.676	.555
PE 56/4	6.1 kW	5.6 kW 7.5 HP	1755	208 230 460 600	21.8 19.7 9.9 7.6	134 121.2 60.6 46.5	H	1.3**	91.7	91.1	88.3	.778	.716	.596
PE 75/4	8.2 kW	7.5 kW 10.1 HP	1765	208 230 460 600	30.6 27.7 13.8 10.6	178 161 80.4 61.6	H	1.3**	91.7	91.9	91.6	.742	.654	.534
PE 90/4	9.8 kW	9.0 kW 12.1 HP	1760	208 230 460 600	34.9 31.5 15.8 12.1	233 211 106 80.9	H	1.3**	91.8	91.5	88.8	.781	.707	.581
PE 105/4	11.4 kW	10.5 kW 14.1 HP	1755	208 230 460 600	39.1 35.4 17.7 13.6	234 212 106 81.2	G	1.3**	92.4	92.6	90.9	.806	.754	.632

** For wet pit installation. Service factor is 1.15 for dry pit installation.

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FM Approvals · CSA · IE3 · NEMA Premium · abs

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 45/4	208 & 230 volt	SOOW 10/7	22.4mm (0.88") diameter
		460 volt	SOOW 14/7*	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
	PE 56/4	208 & 230 volt	SOOW 10/7	22.4mm (0.88") diameter
		460 volt	SOOW 14/7*	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
	PE 75/4	208 & 230 volt	SOOW 8/4+16/3	20.8mm (0.82") diameter
		460 volt	SOOW 12/7*	19.1mm (0.75") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
	PE 90/4	208 & 230 volt	SOOW 8/4+16/3	20.8mm (0.82") diameter
		460 volt	SOOW 12/7*	19.1mm (0.75") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
	PE 105/4	208 & 230 volt	SOOW 8/4+16/3	20.8mm (0.82") diameter
		460 volt	SOOW 10/7*	22.4mm (0.88") diameter
		600 volt	SOOW 12/7	19.1mm (0.75") diameter
Control Cable	All		Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.1	.2	.3	.4	.5	.6
Solids Passage Size	80mm (3.14")	80mm (3.14")	80mm (3.14")	80mm (3.14")	80mm (3.14")	80mm (3.14")
Impeller DIA	250mm (9.84")	240mm (9.4")	225mm (8.6")	215mm (8.5")	195mm (7.7")	185mm (7.3")
Min Recommended Flow, GPM	160	160	160	130	130	130

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	Duplex Stainless Steel 1.4470 (ASTM A890, CD3MN Grade 4A)
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 45/4	PE 56/4	PE 75/4	PE 90/4	PE 105/4
Overall Height	762mm (30")	762mm (30")	762mm (30")	832mm (32.8")	832mm (32.8")
Pump Weight	168 kg (370 lb)	169 kg (372 lb)	177 kg (390 lb)	188 kg (416 lb)	188 kg (416 lb)

SULZER

FM Approvals Member of the FM Global Group

IE3

NEMA Premium

abs

TECHNICAL DATA

4” ABS XFP PUMP

XFP 100E-CB1
6 Pole, 3 Phase, PE2

Date:	10/10	
Dwg:	DS-E01-025	Rev: 4

Submersible Motor Specifications, PE2 Frame

Motor Design		NEMA design B, squirrel cage induction
Motor Type		Fully enclosed High Efficiency submersible, IP68 protection rating
Motor Efficiency Standard and Rating		IEC 60034-30, IE2 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Motor Ratings, PE2 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 35/6	4 kW	3.5 kW 4.7 HP	1170	208 230 460 600	13.9 12.6 6.3 4.8	75.2 68 34 26.1	G	1.3**	88	88.1	85.5	.789	.739	.628

** For wet pit installation. Service factor is 1.15 for dry pit installation.

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 35/6	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 12/7	18.8mm (0.74") diameter
		460 volt	SOOW 14/7*	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 28mm (1.1") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.2	.3	.4	.5		
Solids Passage Size	80mm (3.14")	80mm (3.14")	80mm (3.14")	80mm (3.14")		
Impeller DIA	240mm (9.4")	225mm (8.6")	215mm (8.5")	195mm (7.7")		
Impeller Weight	8.8 Kg (19.4lb)	8.4 Kg (18.5lb)	6.6 Kg (14.5 lb)	6.3 Kg (13.9 lb)		
Min Recommended Flow, GPM	100	100	100	100		

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 35/6			
Overall Height	762mm (30")			
Pump Weight	177 kg (390 lb)			

SULZER

Massblatt XFP 100E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.566 - 05
Drawn: 12/05/09 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

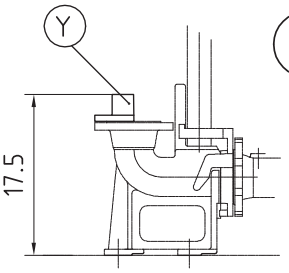
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 40/4	349	30
PE 60/4	390	30
PE 90/4	416	32.8

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 35/6	349	30
PE 45/4	370	30
PE 56/4	372	30
PE 75/4	390	30
PE 90/4	416	32.8
PE 105/4	416	32.8

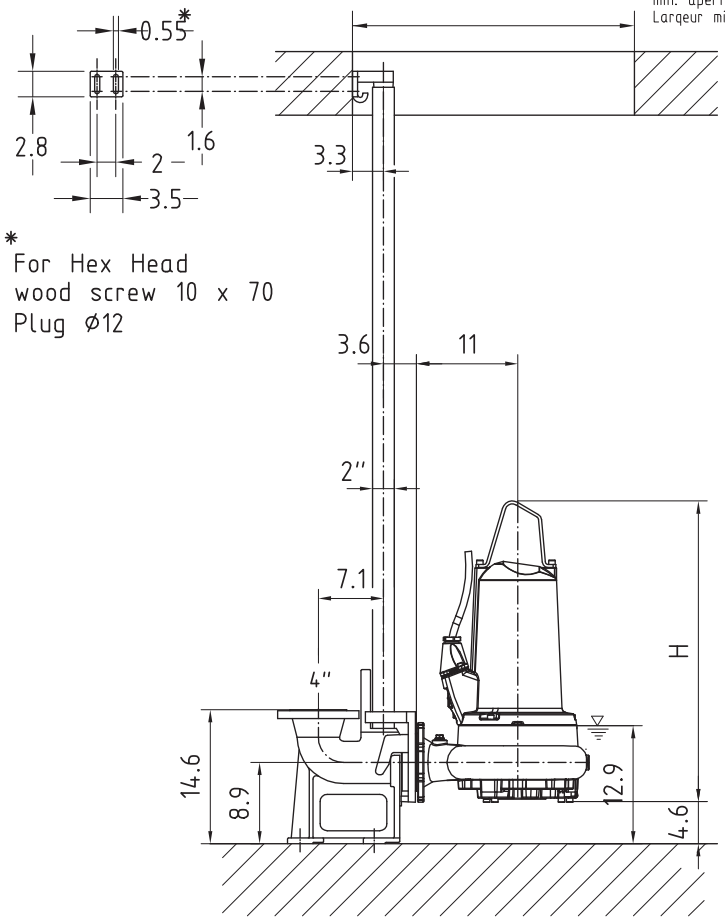
	Part No.	Y(mm)
	DN 100	
	6 232 0652	
	6 232 0653	ø 110
	6 232 0654	ø 115
ASA	6 232 0664	
	6 232 0665	ø 115

U.S.

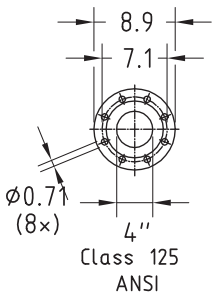


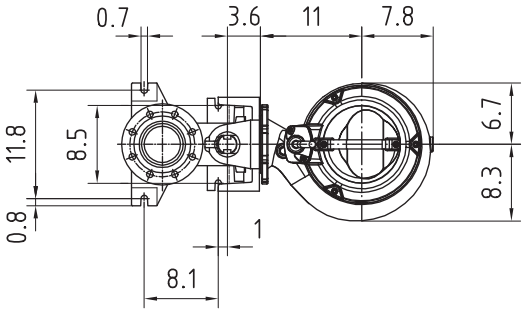
42"×60"(two pumps)
31"×42"(one pump)

min. Schachtöffnung
min. Sump opening
Dimensioni min. botola
min. apertura del pozo
Largeur min. du puisard



* For Hex Head wood screw 10 x 70 Plug ø12





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.567 -04
Drawn: 11.05.09 / D.Whelan
Issue Date: 18/07/11
Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

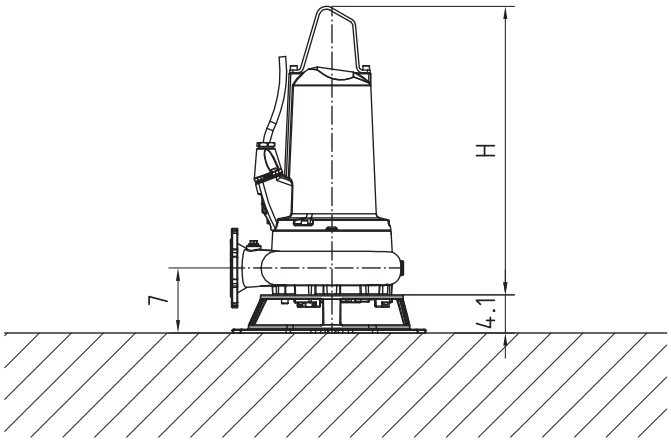
50 Hz

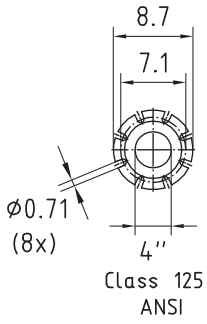
U.S.

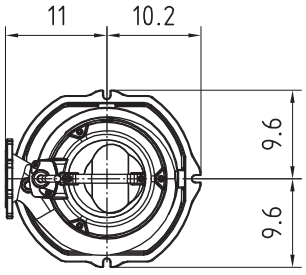
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 40/4	326	28.7
PE 60/4	367	28.7
PE 90/4	392	31.4

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 35/6	326	28.7
PE 45/4	345	28.7
PE 56/4	347	28.7
PE 75/4	367	28.7
PE 90/4	392	31.4
PE 105/4	392	31.4







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100E-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.568-04
Drawn: 11.05.09 / D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

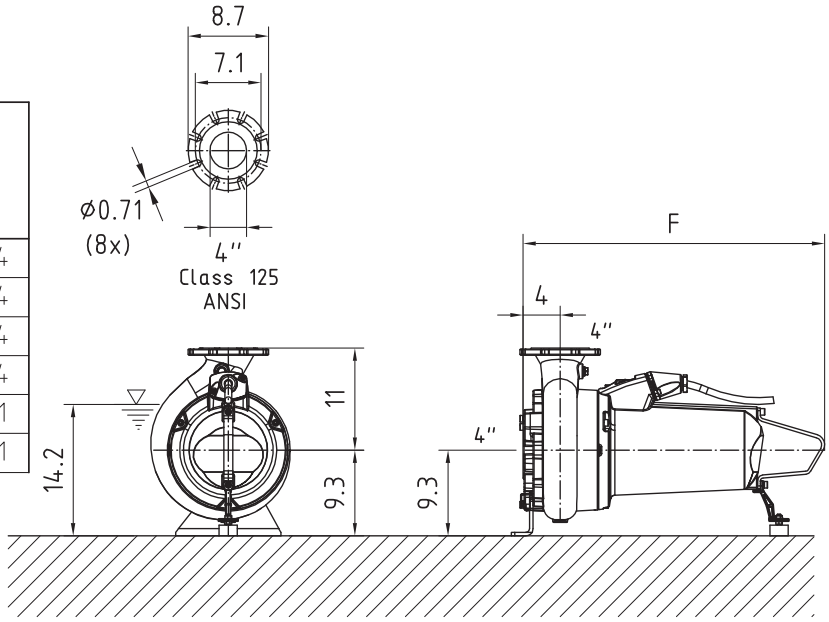
50 Hz

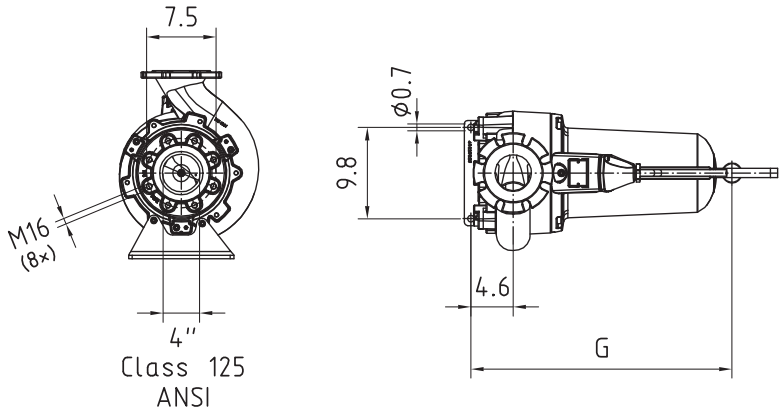
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 40/4	326	29.5	25.4
PE 60/4	367	29.5	25.4
PE 90/4	392	32.3	28.1

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 35/6	326	29.5	25.4
PE 46/4	345	29.5	25.4
PE 56/4	347	29.5	25.4
PE 75/4	367	29.5	25.4
PE 90/4	392	32.3	28.1
PE 105/4	392	32.3	28.1





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100E-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.569-04
Drawn: 11.05.09 / D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous rèserve de modification

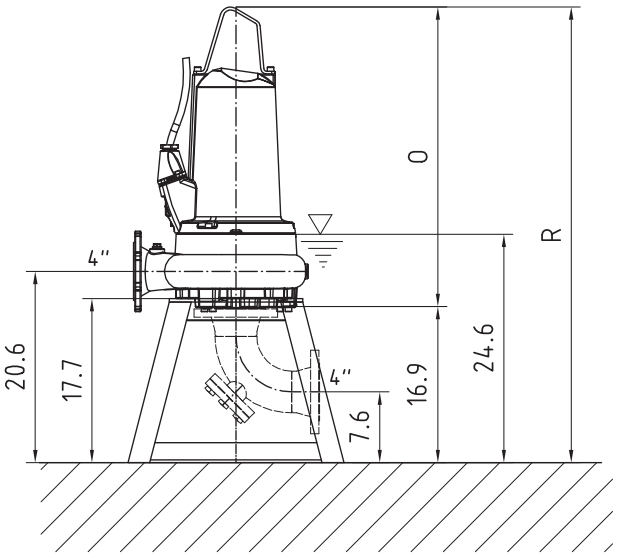
50 Hz

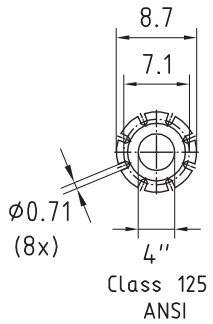
U.S.

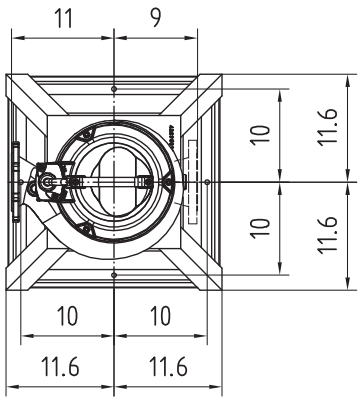
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 40/4	326	29.5	46.4
PE 60/4	367	29.5	46.4
PE 90/4	392	32.3	49.1

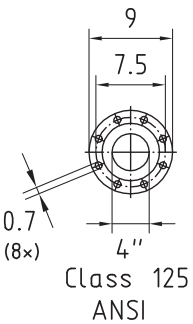
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 35/6	326	29.5	46.4
PE 45/4	345	29.5	46.4
PE 56/4	347	29.5	46.4
PE 75/4	367	29.5	46.4
PE 90/4	392	32.3	49.1
PE 105/4	392	32.3	49.1









abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

4" ABS XFP PUMP

XFP 100G-CB1
4 Pole, 3 Phase, PE3

Date:	01/11		
Dwg:	DS-E01-040	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids 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 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

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.

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids 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 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

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.

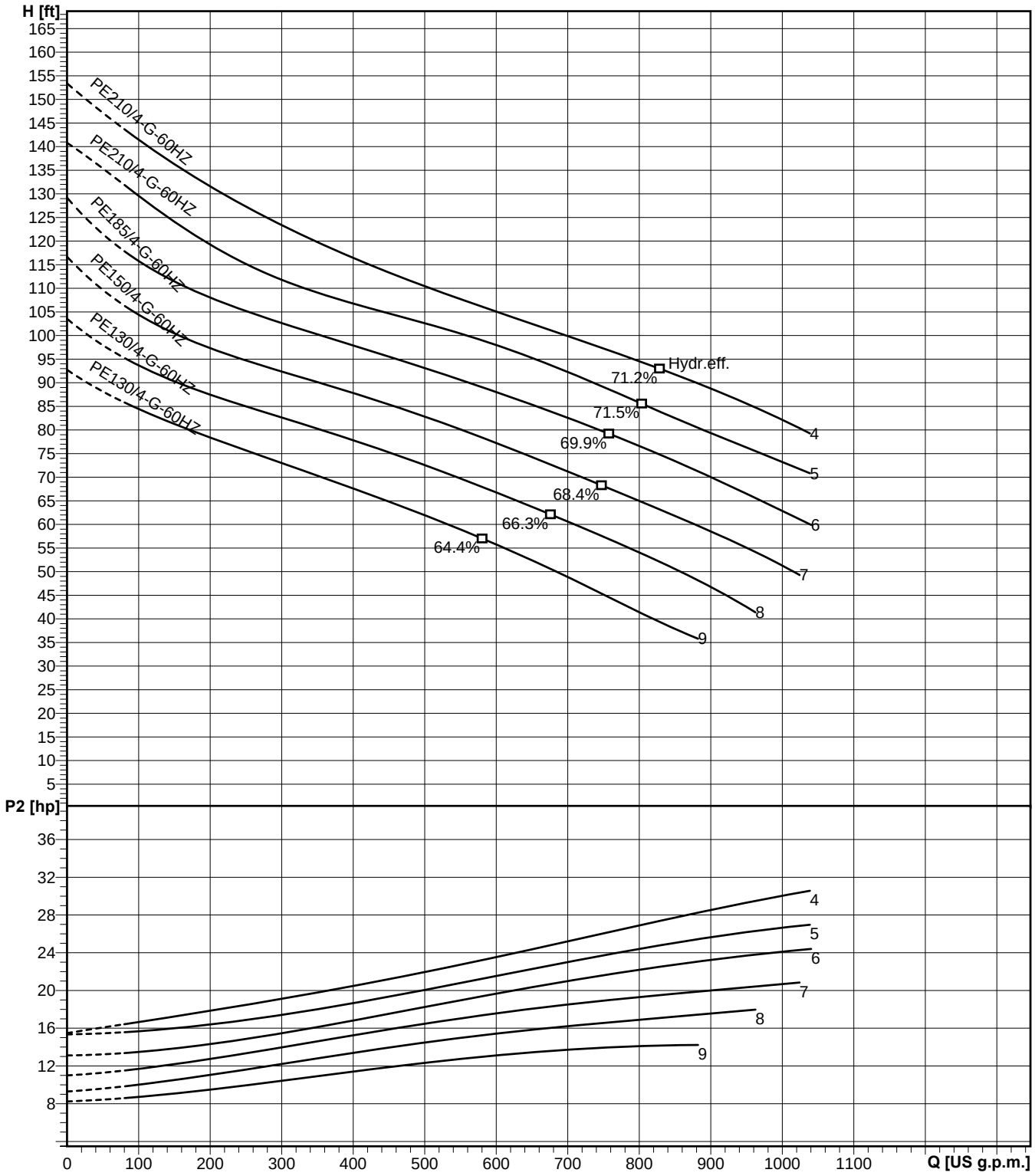
SULZER

Pump performance curves
XFP100G CB1 60HZ

			Discharge DN100	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1775..1780 rpm	Date 2012-03-15
Flow	Head	Rated power 27.4 hp	Hydraulic efficiency 71.2 %	NPSH 13.1 ft

Curve number

Reference curve
XFP100G CB1



Impeller size 11..9.06 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3 7/8"	Revision 2011-10-11

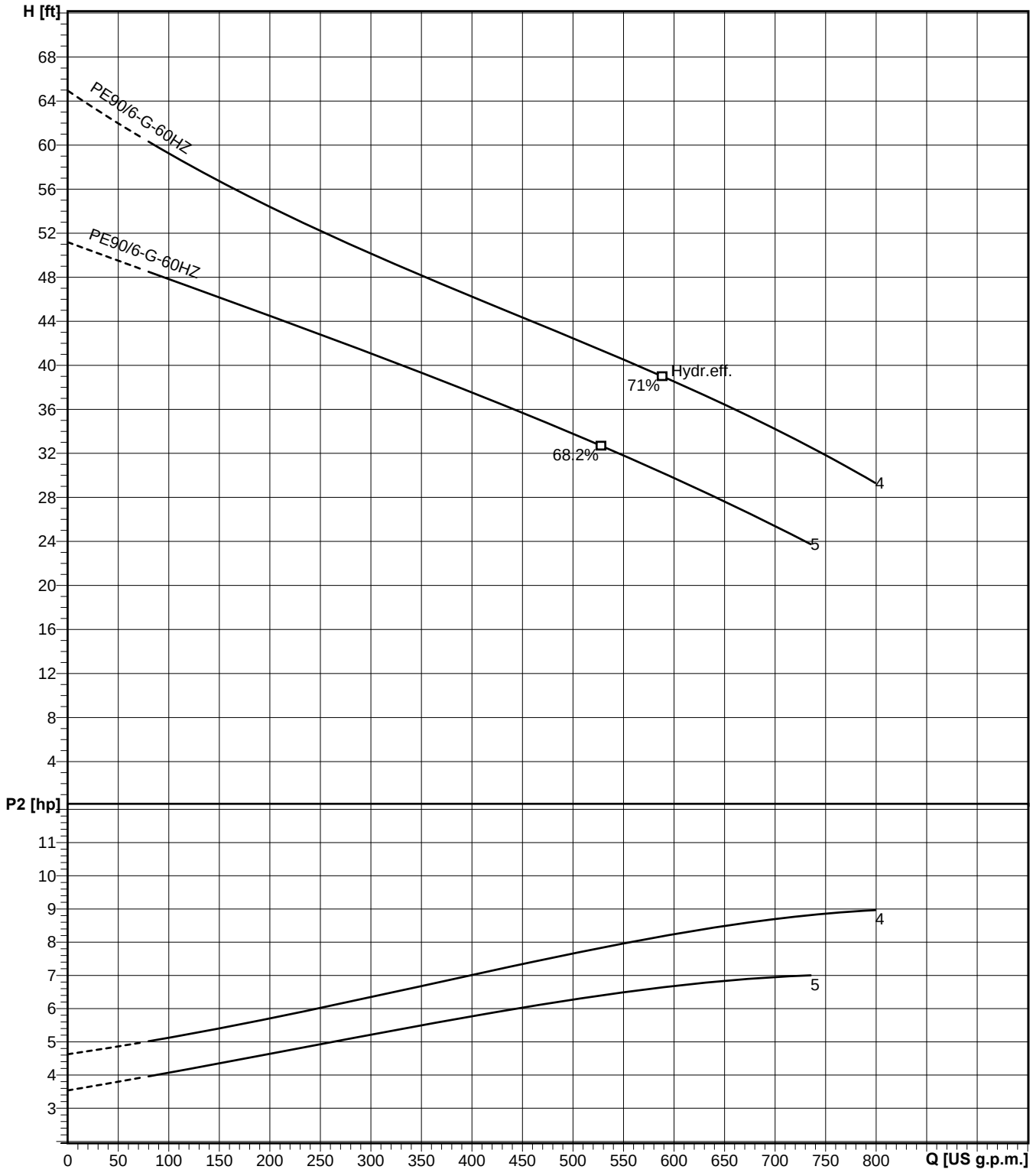
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

SULZER

Pump performance curves
XFP100G CB1 60HZ

Curve number	
Reference curve	XFP100G CB1

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1185 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		7.95 hp	70.8 %	4.5 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
11..10.2 inch	1	Contrabloc Plus impeller, 1 vane	3 7/8"	2011-10-11

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

4" ABS XFP PUMP

XFP 100G-CB1
4 Pole, 3 Phase, PE3

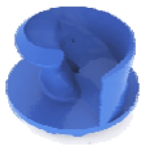
Date:	3/12	
Dwg:	DS-E01-033	Rev: 3

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range



Premium Efficiency
without Compromise

Motor Ratings, PE3 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 130/4	14 kW	13 kW 17.4 HP	1780	208 230 460 600	51.3 46.4 23.2 17.8	595 538 269 206	N	1.3	93.1	91.6	85.8	.757	.672	.552
PE 150/4	16.2 kW	15 kW 20.1 HP	1775	208 230 460 600	56.4 51 25.5 19.6	598 541 271 207	M	1.3	92.9	92.7	88.4	.794	.715	.592
PE 185/4	19.8 kW	18.5 kW 24.8 HP	1775	208 230 460 600	71.4 64.6 32.3 24.7	685 620 310 238	L	1.3	93.7	92.4	88.5	.768	.691	.566
PE 210/4	22.5 kW	21 kW 28.1 HP	1775	208 230 460 600	78.2 70.7 35.3 27.1	686 620 310 238	K	1.3	93.6	93.0	90.0	.797	.728	.605
PE 250/4	26.7 kW	25 kW 33.5 HP	1775	208 230 460 600	90.3 81.7 40.8 31.3	696 630 315 241	J	1.3	93.6	93.5	92.8	.821	.762	.631

SULZER

Specifications subject to change without notice

Cable Data, PE3 Frame

	Motor	Motor Voltage		Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 130/4	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 10/7	22.4mm (0.88") diameter
	PE 150/4	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 10/7	22.4mm (0.88") diameter
	PE 185/4	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
	PE 210/4	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
	PE 250/4	208 volt		1	G-GC 2-3	34.1mm (1.34") diameter
		230 volt		1	G-GC 4-3	30.2mm (1.19") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
Control Cable	All	Std**	208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			460 or 600 volt	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)			Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "208 or 230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 30mm (1.18") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5	.6	.7	.8	.9
Solids Passage Size	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")
Impeller DIA	280mm (11.0")	270mm (10.6")	260mm (10.2")	250mm (9.84")	240mm (9.45")	230mm (9.1")
Min Recommended Flow, GPM	225	225	200	200	200	175

Materials of Construction

		Standard	Optional
Motor and Intermediate Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	**Lower**	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
	Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal		Nitrile (Buna-N) covered steel	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 130/4	PE 150/4	PE 185/4	PE 210/4	PE 250/4
Overall Height	1282mm (50.5")	1282mm (50.5")	1282mm (50.5")	1282mm (50.5")	1322mm (52")
Pump Weight	321 kg (708 lb)	321 kg (708 lb)	336 kg (763 lb)	336 kg (763 lb)	359 kg (792 lb)

TECHNICAL DATA

4” ABS XFP PUMP

XFP 100G-CB1
6 Pole, 3 Phase, PE3

Date:	3/11	
Dwg:	DS-E01-034	Rev: 1

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE3 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 90/6	9.9 kW	9 kW 12.1 HP	1185	208 230 460 600	41.6 37.6 18.8 14.4	367 332 166 127	M	1.3	91.0	89.2	85.1	.660	.571	.448

SULZER

FM Approvals · CSA · IE3 · NEMA Premium · abs

Cable Data, PE3 Frame

	Motor	Motor Voltage		Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 90/6	208 or 230 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt		1	SOOW 10/7	22.4mm (0.88") diameter
		600 volt		1	SOOW 12/7	19.1mm (0.75") diameter
Control Cable	All	Std**	All	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)			Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "208 or 230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 30mm (1.18") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5				
Solids Passage Size	100mm (3.94")	100mm (3.94")				
Impeller DIA	280mm (11.0")	260mm (10.2")				
Min Recommended Flow, GPM	140	140				

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Steel 1.0036 (ASTM A-570, Grade D)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem Mechanical Seal Lower	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Tandem Mechanical Seal Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 90/6
Overall Height	1282mm (50.5")
Pump Weight	327 kg (721 lb)

SULZER

Massblatt XFP 100G-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalacioń sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.589 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/01/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

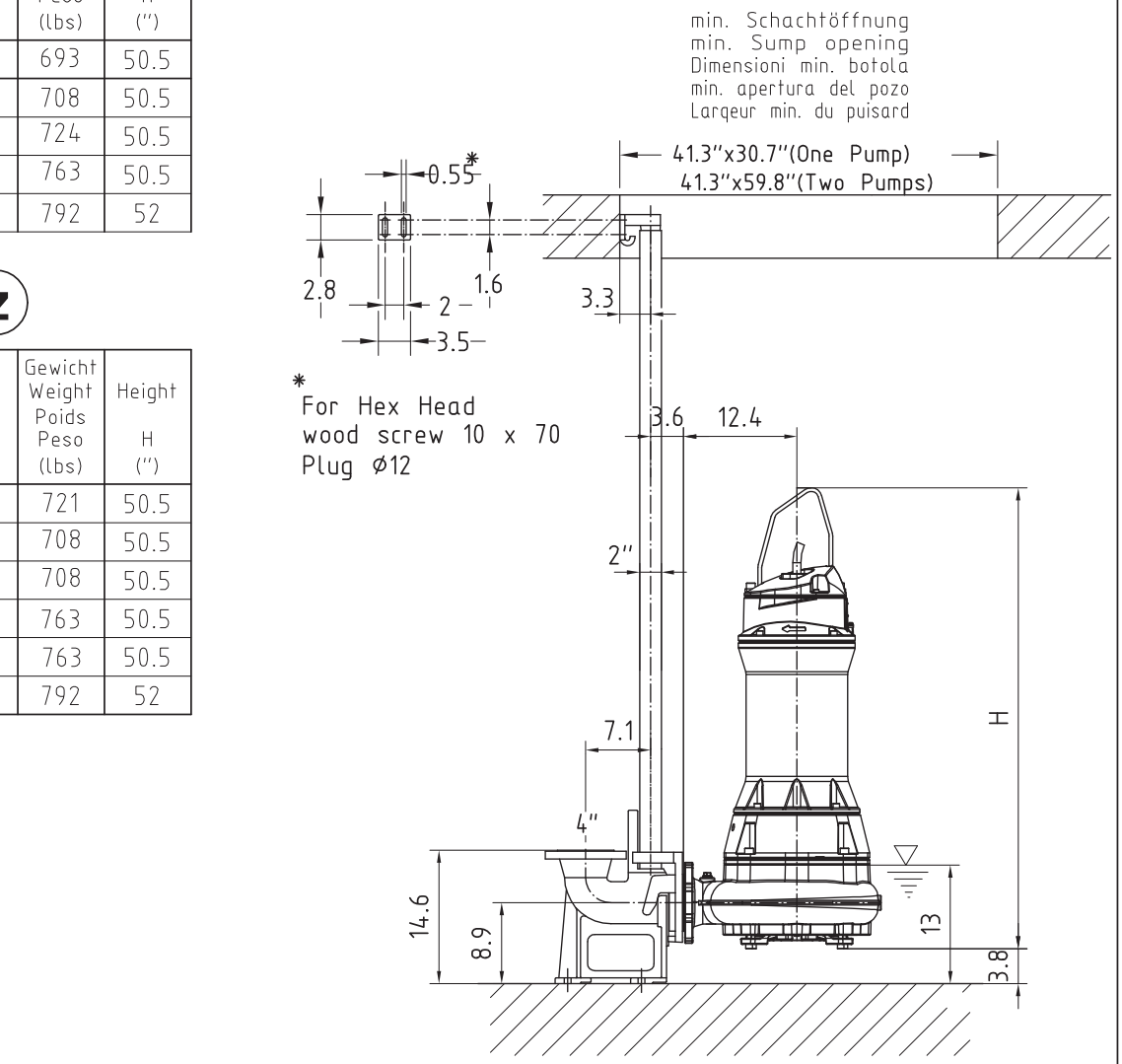
50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/4	693	50.5
PE 140/4	708	50.5
PE 160/4	724	50.5
PE 185/4	763	50.5
PE 220/4	792	52

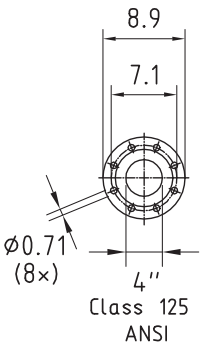
60 Hz

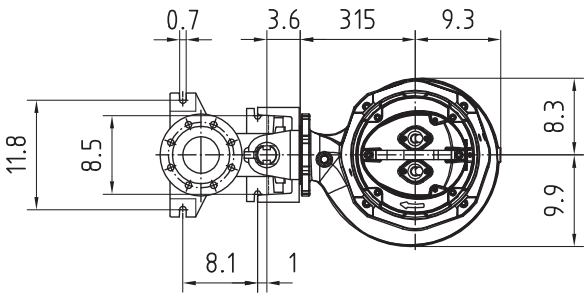
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 90/6	721	50.5
PE 130/4	708	50.5
PE 150/4	708	50.5
PE 185/4	763	50.5
PE 210/4	763	50.5
PE 250/4	792	52

U.S.



* For Hex Head wood screw 10 x 70 Plug ø12





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundicion´seg. de DIN1680-GTB16
Tolérance geñerale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100G-CB1 Nassinstallation
Dimension sheet Wet Well Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.591 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

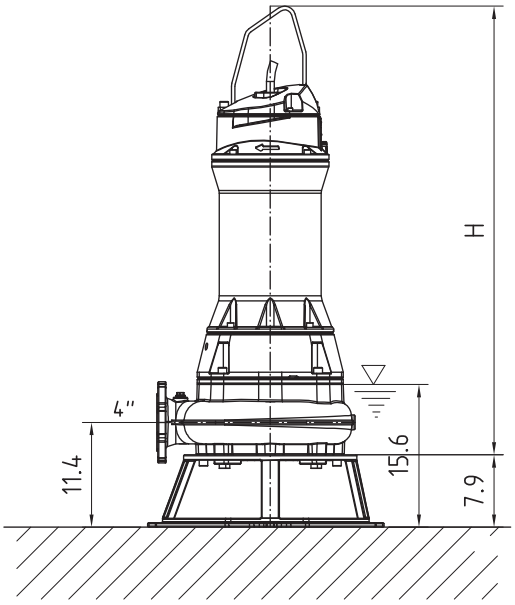
U.S.

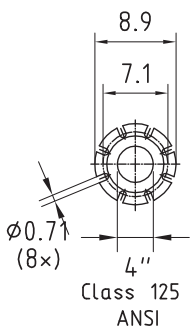
50 Hz

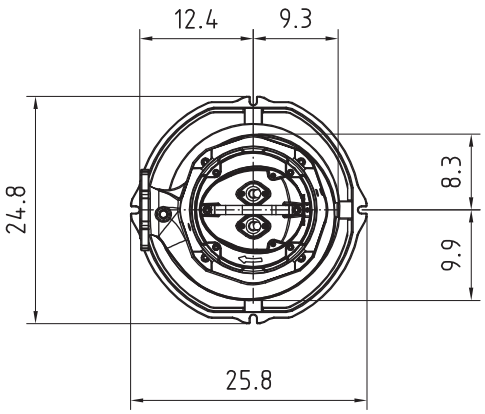
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/4	752	49
PE 140/4	768	49
PE 160/4	783	49
PE 185/4	801	49
PE 220/4	869	50.6

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 90/6	782	49
PE 130/4	768	49
PE 150/4	768	49
PE 185/4	801	49
PE 210/4	801	49
PE 250/4	869	50.6







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100G-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.592 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

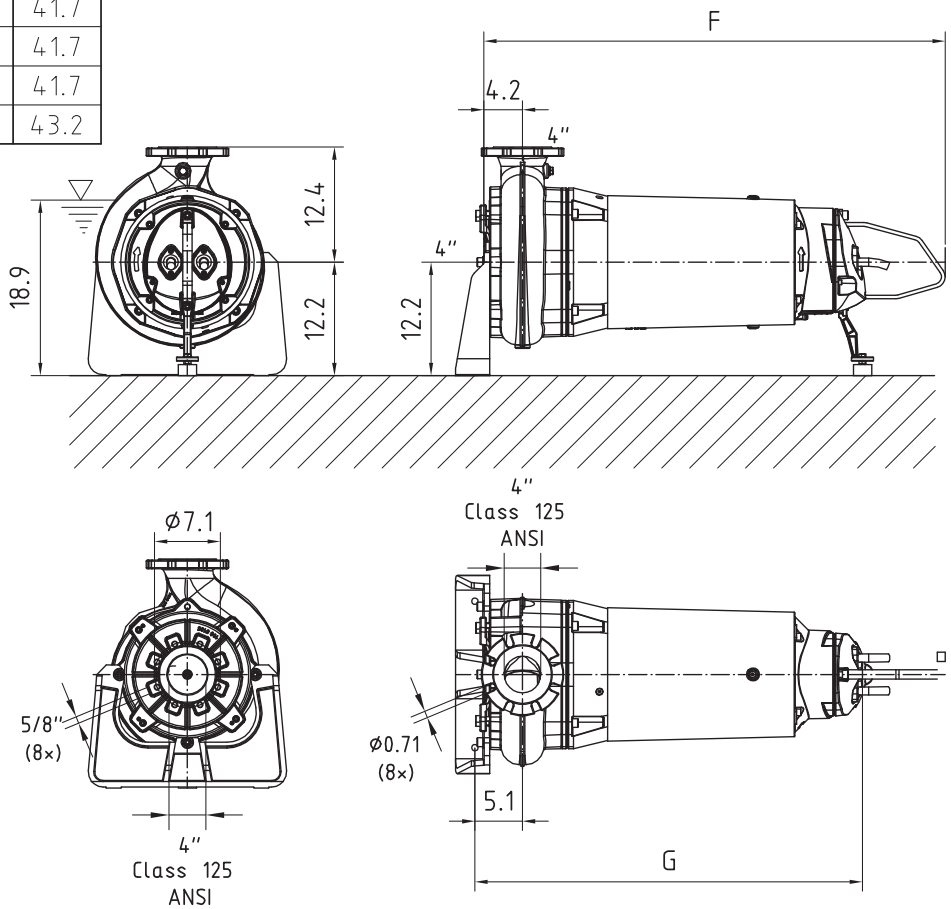
50 Hz

U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 110/4	836	49.6	41.7
PE 140/4	854	49.6	41.7
PE 160/4	869	49.6	41.7
PE 185/4	885	49.6	41.7
PE 220/4	960	51.2	43.2

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 90/6	865	49.6	41.7
PE 130/4	858	49.6	41.7
PE 150/4	858	49.6	41.7
PE 185/4	885	49.6	41.7
PE 210/4	885	49.6	41.7
PE 250/4	960	51.2	43.2



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 100G-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.593 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

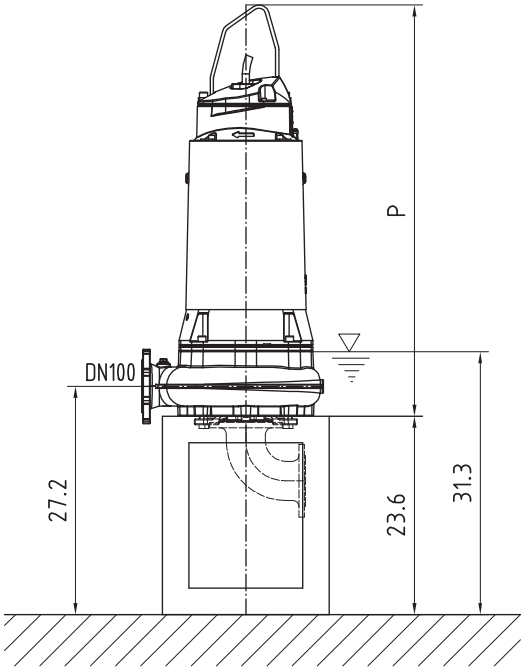
50 Hz

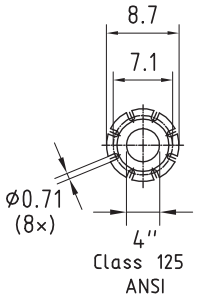
U.S.

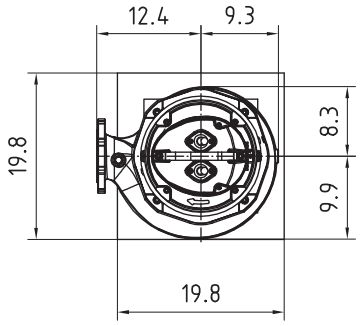
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 110/4	836	49
PE 140/4	854	49
PE 160/4	869	49
PE 185/4	885	49
PE 220/4	1015	50.6

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 90/6	865	49
PE 130/4	858	49
PE 150/4	858	49
PE 185/4	885	49
PE 210/4	885	49
PE 250/4	1015	50.6







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

4" ABS XFP PUMP

XFP 101G-CB1
2 Pole, 3 Phase, PE3

Date:	01/11		
Dwg:	DS-E01-042	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single vane design, and shall be capable of passing a minimum of 2 inch diameter spherical solids as are commonly found in waste water. The impeller shall be highly clog resistant by virtue of its single vane semi open design and the features of the ABS ContraBlock System. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids 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 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 threaded to accept standard 4 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and

lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

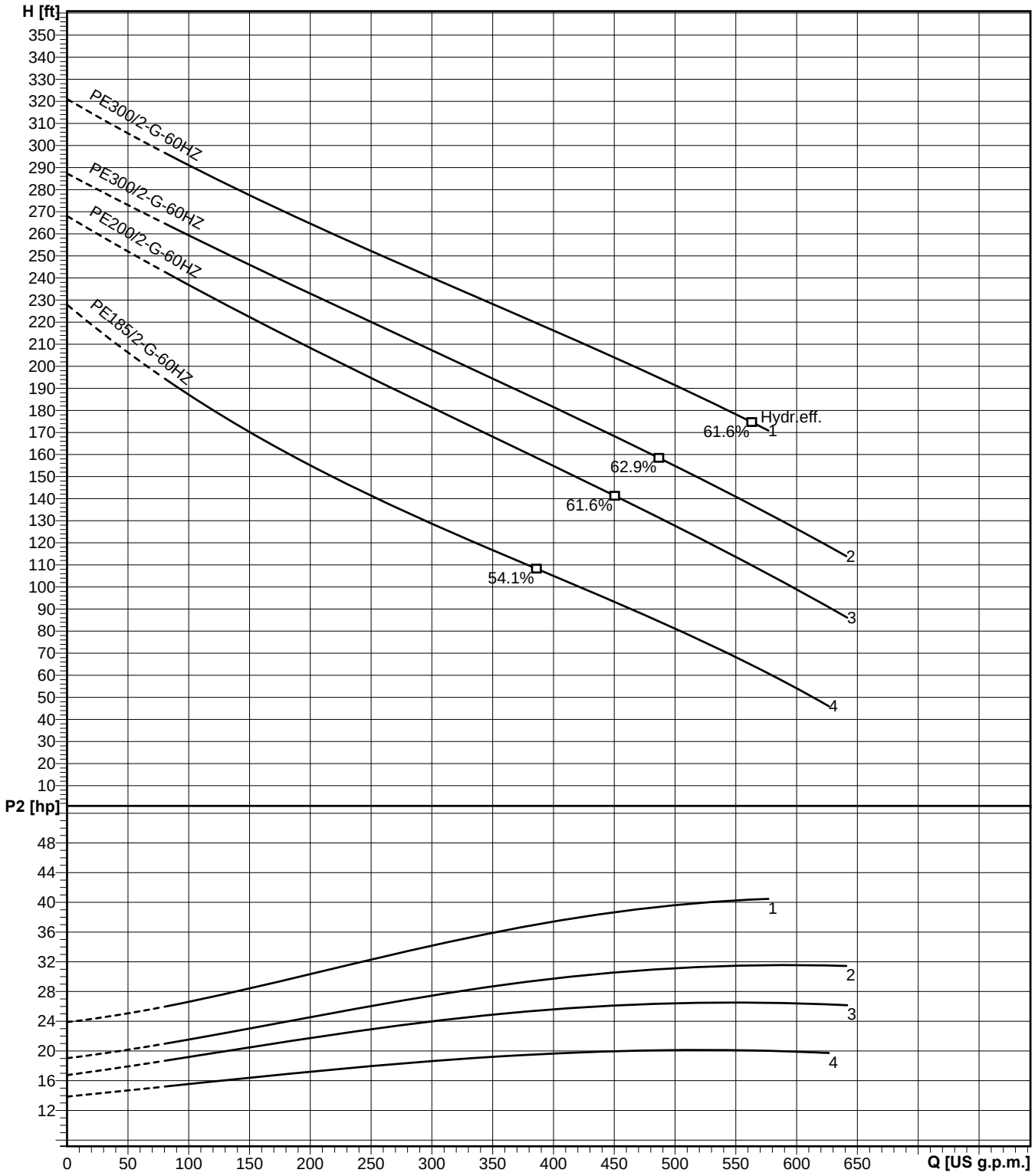
The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

SULZER

Pump performance curves
XFP101G CB1 60HZ

Curve number	
Reference curve	XFP101G CB1

			Discharge	Frequency
			DN100	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	3540..3545 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		40.4 hp	61.6 %	30.8 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
8.46..7.28 inch	1	Contrabloc impeller, 1 vane	2"	2012-02-13

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

4" ABS XFP PUMP

XFP 101G-CB1
2 Pole, 3 Phase, PE3

Date:	3/11	
Dwg:	DS-E01-035	Rev: 1

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE3 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 185/2	20.2 kW	18.5 kW 24.8 HP	3545	208 230 460 600	62.7 56.7 28.3 21.7	625 565 283 217	L	1.3	91.7	91.4	87.7	.893	.852	.766
PE 200/2	21.8 kW	20 kW 26.8 HP	3540	208 230 460 600	67.4 61 30.5 23.4	625 565 283 217	K	1.3	91.7	91.8	88.7	.898	.864	.784
PE 300/2	32.5 kW	30 kW 40.2 HP	3540	208 230 460 600	101 91.6 45.8 35.1	822 743 372 285	J	1.3	92.4	92.6	88.0	.890	.865	.805

Cable Data, PE3 Frame

	Motor	Motor Voltage		Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 185/2	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
	PE 200/2	208 volt		1	G-GC 4-3	30.2mm (1.19") diameter
		230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
	PE 300/2	208 or 230 volt		1	G-GC 2-3	34.1mm (1.34") diameter
		460 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
Control Cable	All	Std**	208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			460 volt G-GC	1	SOOW 16/4	10.7mm (0.42") diameter
			460 or 600 volt SOOW	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)			Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 37mm (1.46") deep [including raised flange face]					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock w/ Seal Protection System					
Impeller Size	.1	.2	.3	.4		
Solids Passage Size	50mm (2")	50mm (2")	50mm (2")	50mm (2")		
Impeller DIA	215mm (8.5")	205mm (8.1")	197mm (7.8")	185mm (7.3")		
Min Recommended Flow, GPM	140	130	120	110		

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Steel 1.0036 (ASTM A-570, Grade D)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem Mechanical Seal Lower	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Tandem Mechanical Seal Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 185/2	PE 200/2	PE 300/2
Overall Height	1212mm (47.7")	1212mm (47.7")	1212mm (47.7")
Pump Weight	285 kg (629 lb)	285 kg (629 lb)	295 kg (651 lb)

SULZER

Massblatt XFP 101G-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.584 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 03/02/2012
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 150/2	629	47.7
PE 185/2	629	47.7
PE 250/2	651	47.7

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 185/2	629	47.7
PE 200/2	629	47.7
PE 300/2	651	47.7

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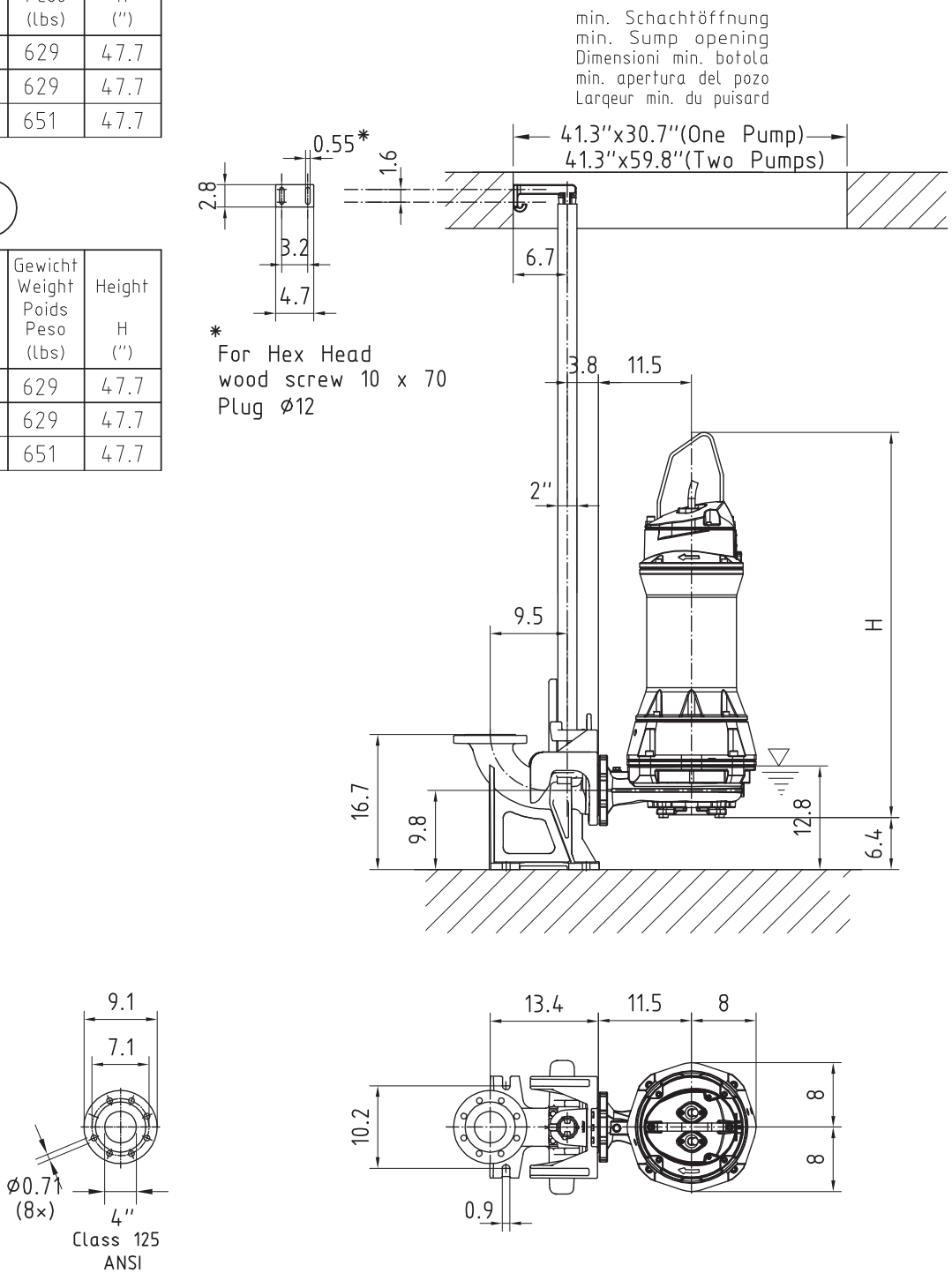

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundicion´seg. de DIN1680-GTB16
Tolérance geñerale de la fonderie selon DIN1680-GTB16

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SULZER	Massblatt XFP 101G-CB1 Nassinstallation Dimension sheet WET-WELL Installation Dimensioni Installazione sommersa Hoja de dimensiones instalación sumergida Plan d'encombrement Installation noyee	No: AN-M.22.586 - 00 Drawn: 05/08/10 D.Whelan Issue Date: 05/08/10 Änderungen vorbehalten Technical changes reserved Con riserva di modifiche Con reserva de modificaciones Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 150/2	629	46.5
PE 185/2	629	46.5
PE 250/2	650	46.5

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 185/2	629	46.5
PE 200/2	629	46.5
PE 300/2	650	46.5

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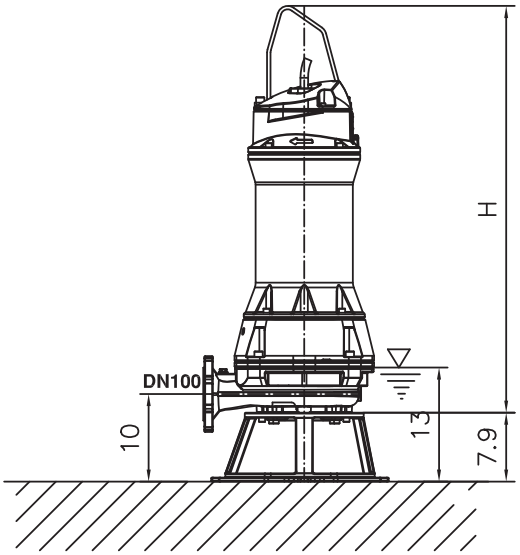

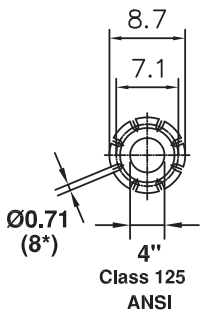

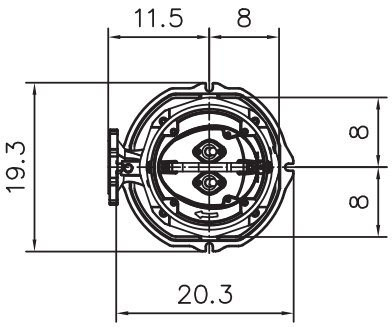

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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolerance generale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation a sec

No: AN-M.22.587 - 00
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Issue Date: 05/08/10
?nderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

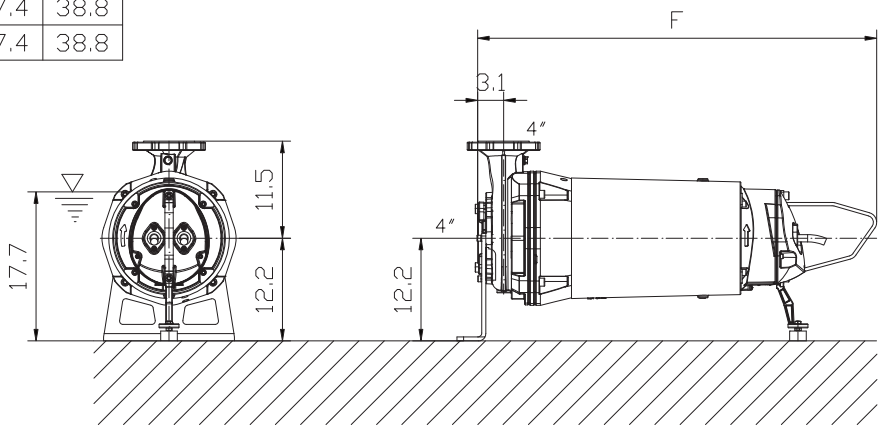
50 Hz

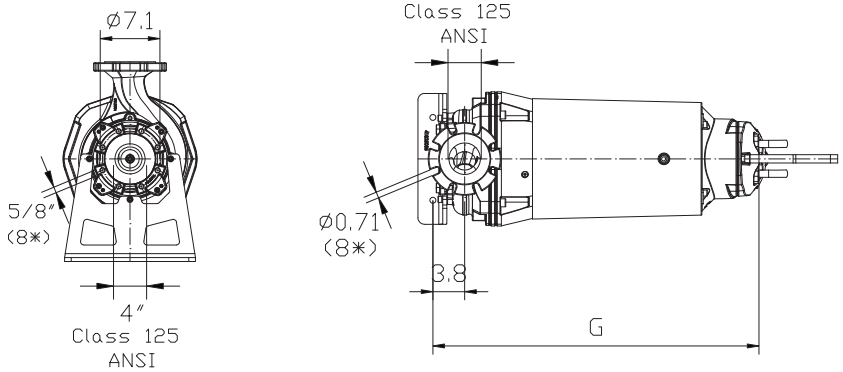
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (″)	G (″)
PE 150/2	735	47.4	38.8
PE 185/2	735	47.4	38.8
PE 250/2	759	1205	984

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (″)	G (″)
PE 185/2	735	47.4	38.8
PE 200/2	735	47.4	38.8
PE 300/2	759	47.4	38.8





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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation a sec

No: AN-M.22.588 - 00
Drawn: 05/08/10 D.Whelan
Issue Date: 05/08/10
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 150/2	796	46.5
PE 185/2	796	46.5
PE 250/2	821	46.5

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 185/2	796	46.5
PE 200/2	796	46.5
PE 300/2	821	46.5

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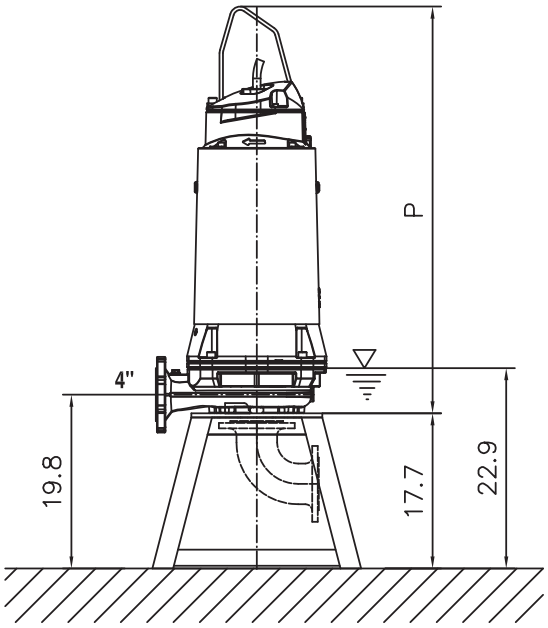

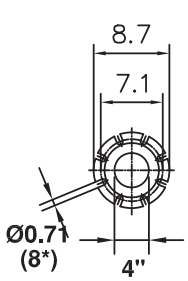

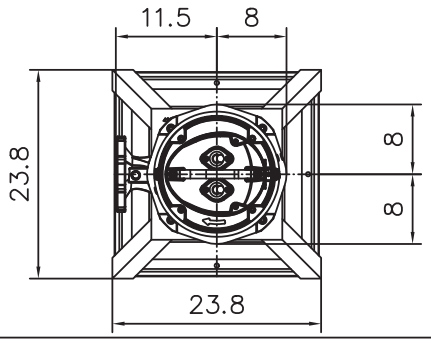

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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolerance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

4" ABS XFP PUMP

XFP 101G-VX1
2 Pole, 3 Phase, PE3

Date:	10/11		
Dwg:	DS-E01-066	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron four inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated four inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be open, semi-recessed, multi vane design, The impeller shall be capable of passing a minimum of 2.75 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 4 inch ANSI class 125 and metric DN100 (PN 10) flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 70,000 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

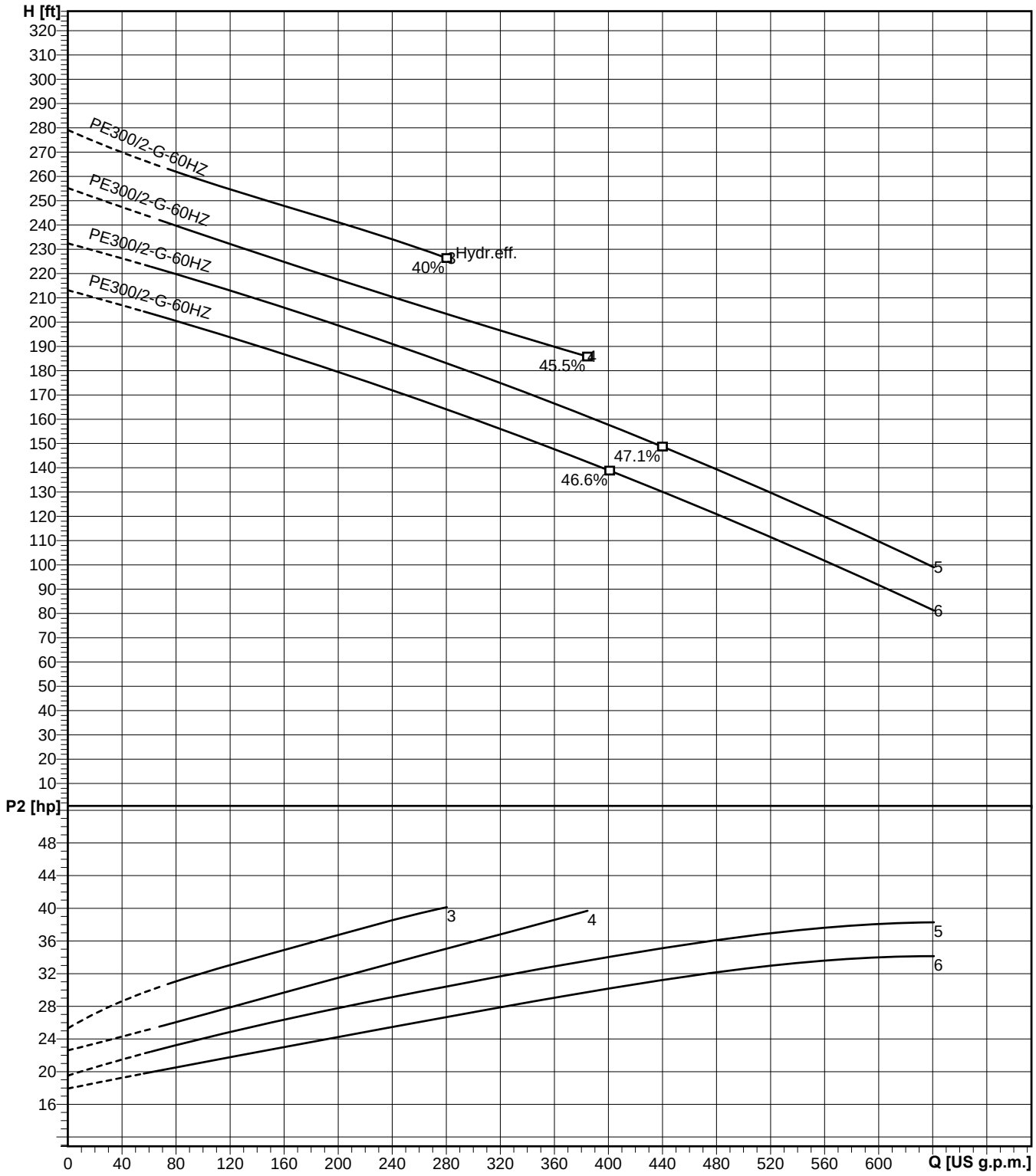
The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

SULZER

Pump performance curves
XFP101G VX 60HZ

Curve number	
Reference curve	XFP101G VX

			Discharge DN100	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3540 rpm	Date 2012-03-15
Flow	Head	Rated power 40.1 hp	Hydraulic efficiency 40 %	NPSH 26.6 ft



Impeller size 9.25..8.07 inch	N° of vanes 6	Impeller Vortex impeller	Solid size 2 1/2"	Revision 2011-10-11

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

TECHNICAL DATA

4" ABS XFP PUMP

XFP 101G-VX
2 Pole, 3 Phase, PE3

Date:	10/11	
Dwg:	DS-E01-070	Rev: 0

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 600034-2-1
Insulation Class		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line and electronic soft starters, and PWM type VFDs*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE2 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 300/2	32.5 kW	30 kW 40.2 HP	3540	208 230 460 600	101 91.6 45.8 35.1	822 743 372 285	J	1.3	92.4	92.6	88.0	.890	.865	.805

SULZER

FM Approvals

IE3

NEMA Premium

abs

Cable Data, PE2 Frame

	Motor	Motor Voltage		Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 300/2	208 volt		1	G-GC 2-3	34.1mm (1.34") diameter
		230 volt		1	G-GC 2-3	34.1mm (1.34") diameter
		460 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		600 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
Control Cable		Std**	208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			460 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			600 volt	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)			Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	4" flanged, compatible with 4" class 125 ANSI flanges					
Suction Size	4" flanged, compatible with 4" class 125 ANSI flanges, threaded for 8 x 5/8-11 UNC bolts, 26mm (1.02") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Vortex, 6-vane, w/ Seal Protection System					
Impeller Size	.3	.4	.5	.6		
Solids Passage Size	70mm (2.75")	70mm (2.75")	70mm (2.75")	70mm (2.75")		
Impeller DIA	235mm (9.25")	225mm (8.86")	215mm (8.46")	205mm (8.07")		
Impeller Weight						
Min Recommended Flow, GPM	100	100	100	100		

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Steel 1.0036 (ASTM A-570, Grade D)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem Mechanical Seal Lower	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Tandem Mechanical Seal Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 300/2			
Overall Height	1232mm (48.5")			
Pump Weight	295 kg (651 lb)			

SULZER

Massblatt XFP 101G-VX Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.643 - 03
Drawn: 23/11/10 D.Whelan
Issue Date: 03/02/2012
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

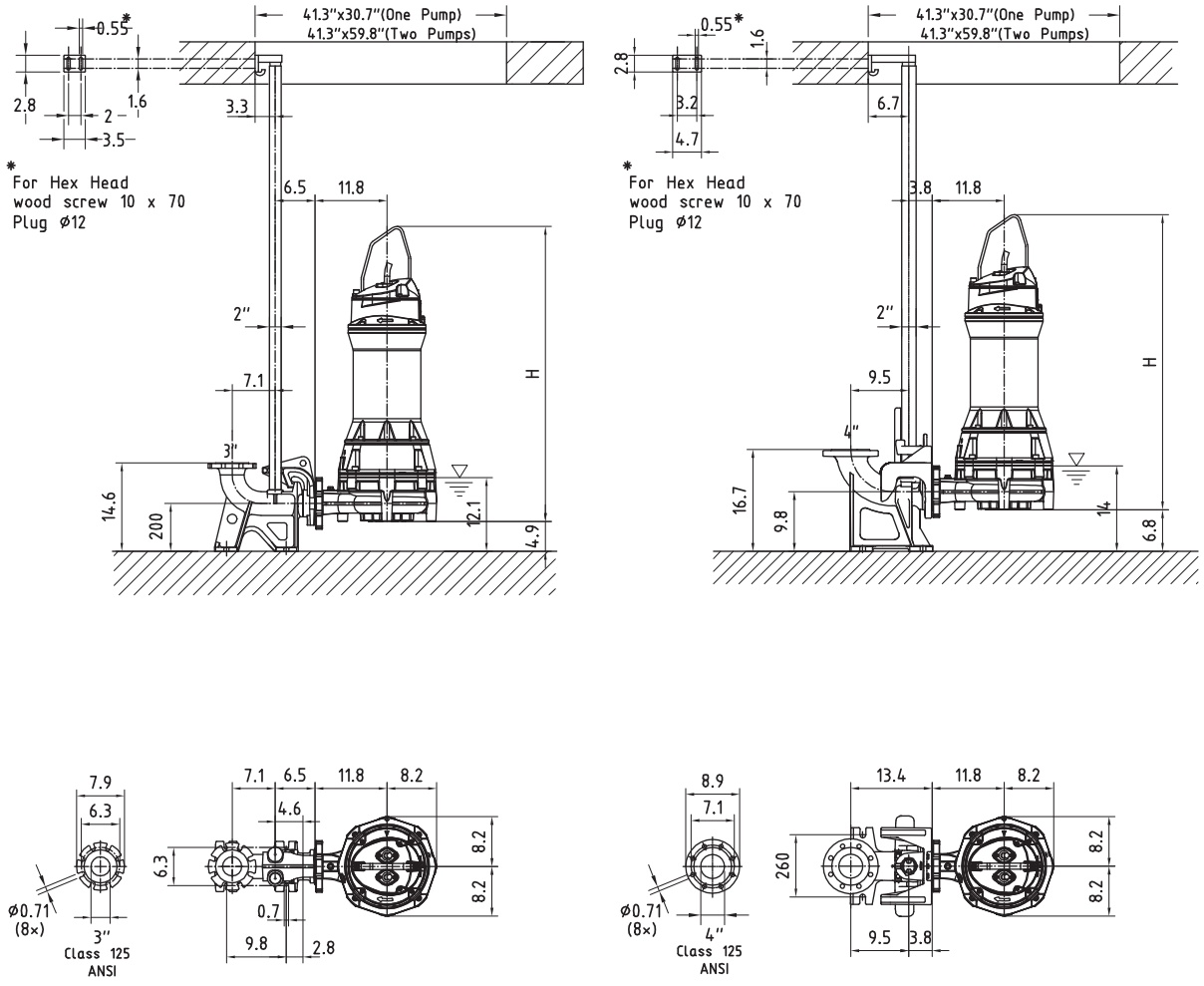
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 150/2	705	48.5
PE 185/2	716	48.5
PE 250/2	727	48.5

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 300/2	727	48.5

U.S.

min. Schachtöffnung
min. Sump opening
Dimensioni min. botola
min. apertura del pozo
Largeur min. du puisard



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-VX Nassinstallation
Dimension sheet Wet Well Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalacíon sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.645 - 00
Drawn: 23/11/10 D.Whelan
Issue Date: 20/12/2010
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

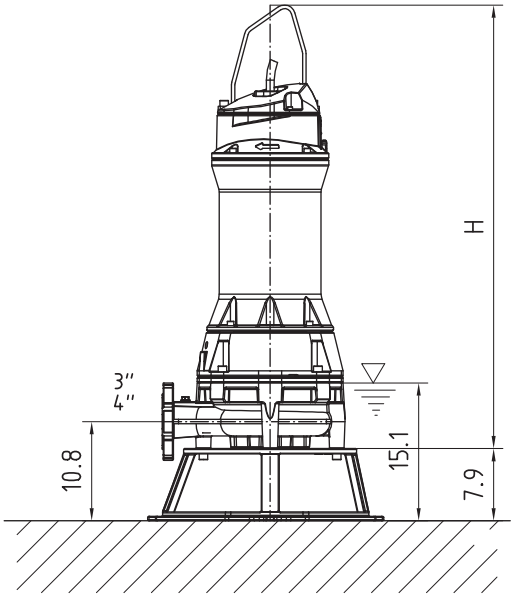
U.S.

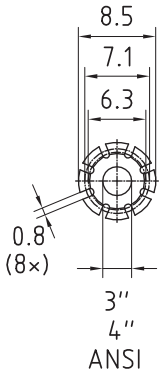
50 Hz

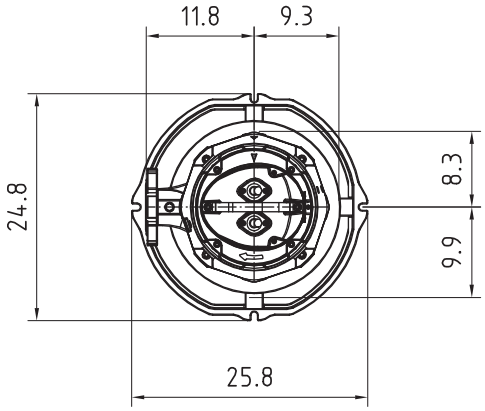
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 150/2		48.5
PE 185/2		48.5
PE 250/2		48.5

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 185/2		48.5
PE 200/2		48.5
PE 300/2		48.5







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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-VX Nassinstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.646 - 00
Drawn: 23/11/10 D.Whelan
Issue Date: 20/12/2010
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

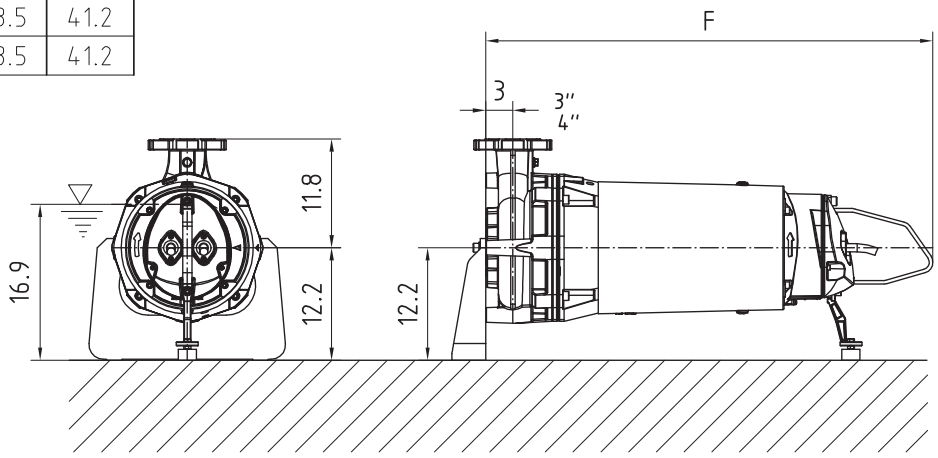
50 Hz

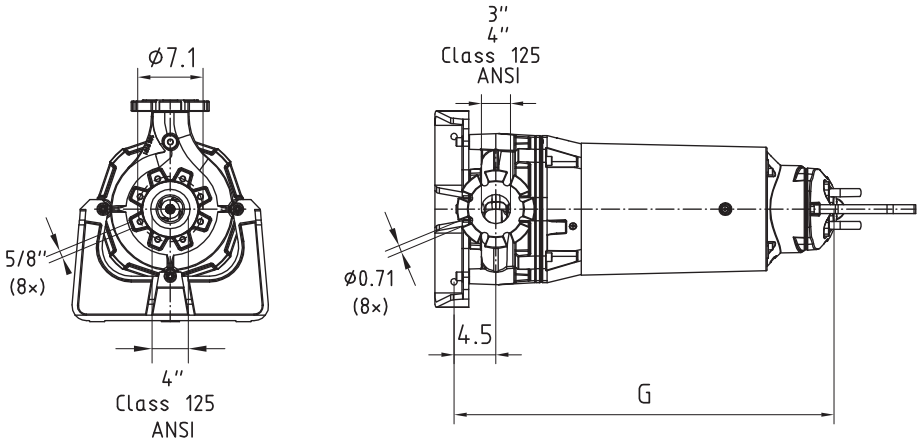
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 150/2		48.5	41.2
PE 185/2		48.5	41.2
PE 250/2		48.5	41.2

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 185/2		48.5	41.2
PE 200/2		48.5	41.2
PE 300/2		48.5	41.2





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Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 101G-VX Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.647 - 00
Drawn: 23/11/10 D.Whelan
Issue Date: 20/12/2010
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

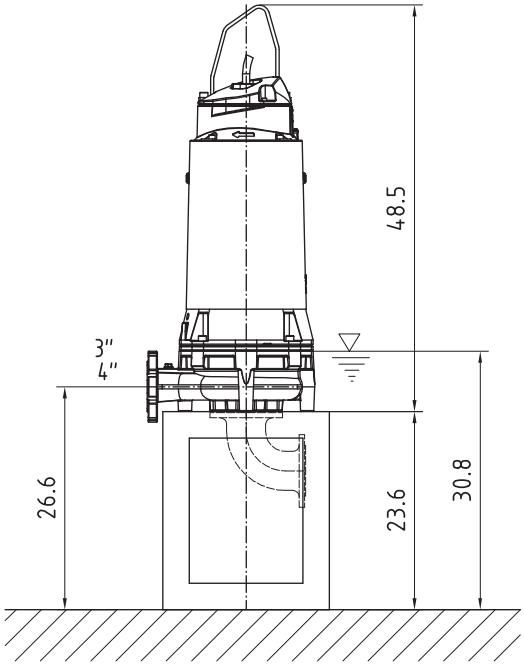
50 Hz

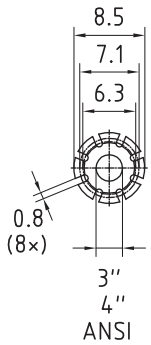
U.S.

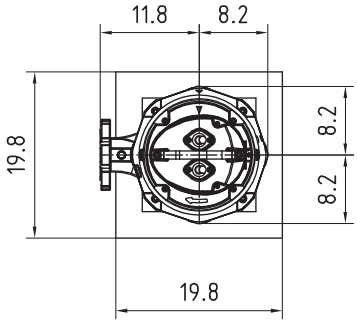
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 150/2		1282
PE 185/2		1282
PE 250/2		1282

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	P (")
PE 185/2		48.5
PE 200/2		48.5
PE 300/2		48.5







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron six inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated six inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing

three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 6 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 6 inch ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SPECIFICATIONS

6" ABS XFP PUMP

XFP 150E-CB1
6 Pole, 3 Phase, PE2

Date:	07/10		
Dwg:	DS-E01-012	Rev:	2

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron six inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated six inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **High Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. The wear plate shall be factory mounted to the volute in a fixed position with metal to metal contact on machined

surfaces to insure optimal clearance and efficiency at startup. Future adjustments shall be easily accomplished by removing three securing screws and rotating the plate 45 degrees to the adjustment position. Adjustment to allow for wear and restore peak pumping performance shall then be 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 threaded to accept standard 6 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 6 inch ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE2. 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.

The High Efficiency 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, High Efficiency. 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 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be **1.3** in wet pit service and 1.15 in dry pit service. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, and class B rise for dry pit service, providing cool operation under all operating conditions.

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, and used in conjunction with, and supplemental to, external motor overload protection.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 between the primary and secondary mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be filled with environmentally safe non toxic oil. 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 through the primary mechanical seal, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 50,000 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 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 oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry System: The cable entry system shall consist of submersible plug assembly which allows the cable be easily disconnected from the pump for service or replacement. Cable sealing shall be accomplished by a Nitrile compression grommet with both cylindrical and conical sealing surfaces, flanked by a stainless steel washer and an integrated strain relief. A brass (C3604) compression nut shall be threaded into to the cast iron EN-GJL-250 (ASTM A-48, Class 35B) cable plug housing, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry housing. Cable conductors shall be terminated in copper pin connectors which are separated and retained by a circular pin retainer fabricated from high dielectric strength Polyamid (30% GF). Each pin shall pass through its own hole in the pin retainer, maintaining perfect alignment with the mating pins in the motor body. The corresponding motor body pin assembly shall be manufactured from high dielectric strength Polyamid (30% GF), with copper connector pins. The pin assembly shall be sealed with an o-ring to prevent water entry into the motor, and retained in the motor housing bore via a retaining ring. Attachment of the plug assembly to the motor shall engage the corresponding copper pins, creating a complete circuit between the motor and cable. The plug assembly shall be fastened with stainless steel fasteners, and shall be sealed by an o-ring.

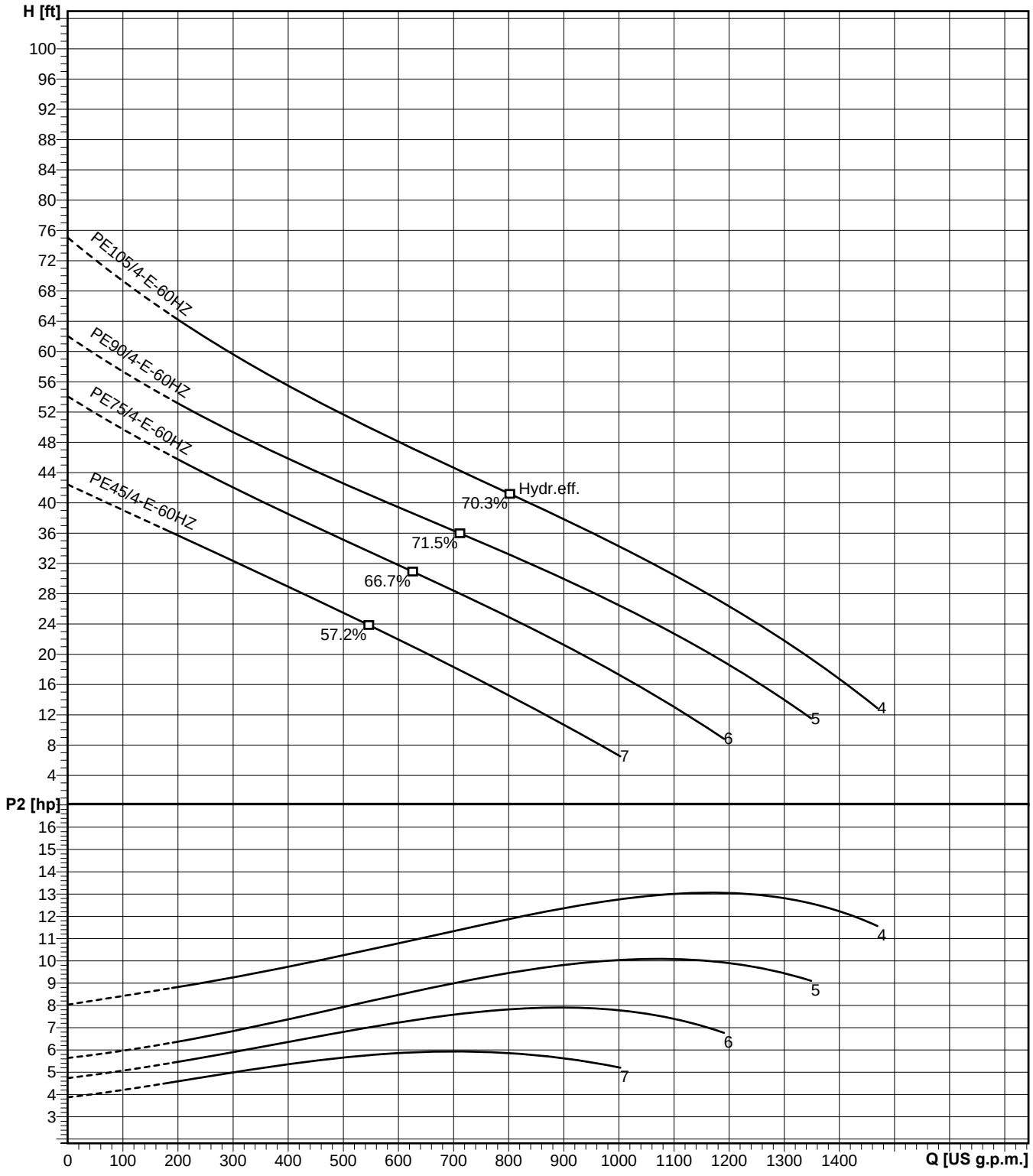
The cable plug and sealed entry system as part of the motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The system shall be anti wicking by design, and shall prevent any water that enters the cable through damage to the jacket from entering the motor. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

SULZER

Pump performance curves
XFP150E CB1 60HZ

Curve number	
Reference curve	XFP150E CB1

			Discharge	Frequency
			DN150	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1755..1765 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		11.9 hp	70.3 %	13.5 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
8.46..7.13 inch	1	Contrabloc Plus impeller, 1 vane	3 7/8"	2011-10-11

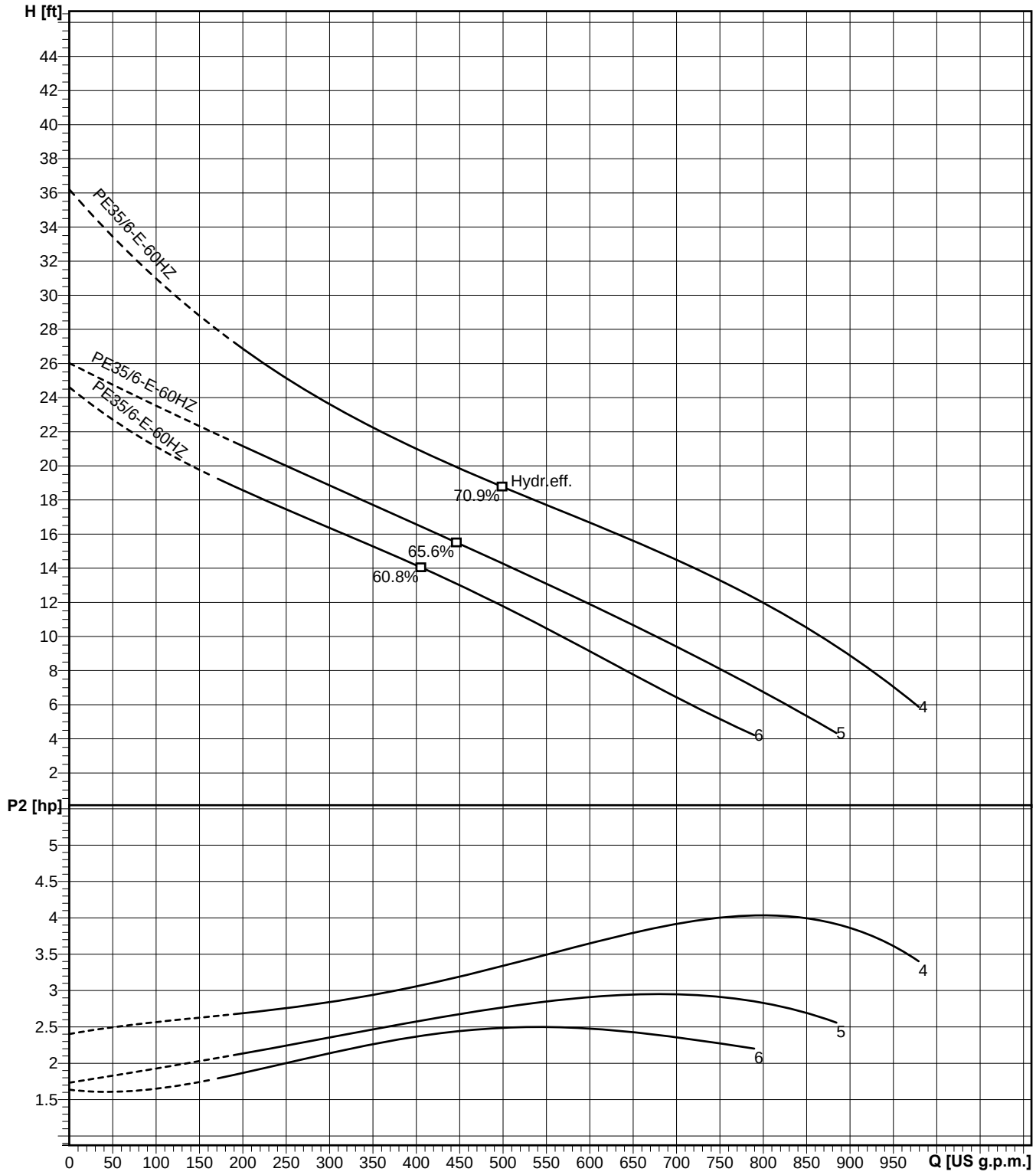
ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

SULZER

Pump performance curves
XFP150E CB1 60HZ

				Curve number
				Reference curve XFP150E CB1
			Discharge DN150	Frequency 60 Hz
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 1170 rpm	Date 2012-03-15
Flow	Head	Rated power 3.44 hp	Hydraulic efficiency 70.8 %	NPSH 6.4 ft



Impeller size 8.46..7.48 inch	N° of vanes 1	Impeller Contrabloc Plus impeller, 1 vane	Solid size 3 7/8"	Revision 2011-10-11

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

6” ABS XFP PUMP

XFP 150E-CB1
4 Pole, 3 Phase, PE2

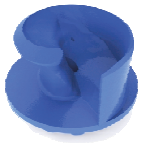
Date:	11/10	
Dwg:	DS-E01-027	Rev: 4

Submersible Motor Specifications, PE2 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range



Premium Efficiency
without Compromise

Motor Ratings, PE2 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 45/4	5 kW	4.5 kW 6 HP	1770	208 230 460 600	18.1 16.4 8.2 6.3	111 101 50.3 38.6	H	1.3**	90.6	92.5	90	.761	.676	.555
PE 75/4	8.2 kW	7.5 kW 10 HP	1760	208 230 460 600	30.6 27.7 13.8 10.6	177.8 160.8 80.4 61.6	H	1.3**	91.7	91.9	91.6	.742	.654	.534
PE 90/4	9.8kW	9 kW 12 HP	1760	208 230 460 600	34.9 31.5 15.8 12.1	232 210 105 80.5	H	1.3**	91.7	91.5	88.8	.78	.70	.56
PE 105/4	11.4 kW	10.5 kW 14.1 HP	1755	208 230 460 600	39.1 35.4 17.7 13.6	232 210 105 80.5	G	1.3**	92.4	92.6	90.9	.806	.754	.632

** For wet pit installation. Service factor is 1.15 for dry pit installation.

SULZER

FM Approvals · CSA · IE3 · NEMA Premium · abs

Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 45/4	208 volt	SOOW 10/7	20.7mm (0.82") diameter
		230 volt	SOOW 10/7	20.7mm (0.82") diameter
		460 volt	SOOW 14/7*	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 75/4, PE 90/4	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 12/7*	18.8mm (0.74") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Power Cable	PE 105/4	208 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		230 volt	SOOW 8/4+16/3	25.4mm (1.0") diameter
		460 volt	SOOW 10/7*	20.7mm (0.82") diameter
		600 volt	SOOW 12/7	18.8mm (0.74") diameter
Control Cable			Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	6" flanged, compatible with 6" class 125 ANSI flanges					
Suction Size	6" flanged, compatible with 6" class 125 ANSI flanges, threaded for 8 x ¾-10 UNC bolts, 35mm (1.37") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5	.6	.7		
Solids Passage Size	100mm (3.9")	100mm (3.9")	100mm (3.9")	100mm (3.9")		
Impeller DIA	215mm (8.5")	200mm (7.9")	190mm (7.5")	181mm (7.1")		
Impeller Weight	9.2 Kg (20.2 lb)	7.8 Kg (17.2lb)	6.6 Kg (14.5 lb)	5.5 Kg (12.1 lb)		
Min Recommended Flow, GPM	180	150	150	150		

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 45/4	PE 75/4	PE 90/4	PE 105/4
Overall Height	783mm (30.8")	783mm (30.8")	783mm (30.8")	853mm (33.5")
Pump Weight	167.5 kg (369 lb)	167.5 kg (369 lb)	167.5 kg (369 lb)	197.5 kg (435 lb)

TECHNICAL DATA

6” ABS XFP PUMP

XFP 150E-CB1
6 Pole, 3 Phase, PE2

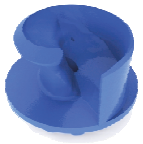
Date:	11/10		
Dwg:	DS-E01-028	Rev:	4

Submersible Motor Specifications, PE2 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, IE2 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Material		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air for wet pit installation, environmentally safe, non-toxic oil for dry pit installation, no cooling jacket required
Temperature Rise		Class A for wet pit installation, Class B for dry pit installation
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Environmentally safe, non-toxic oil
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range



Premium Efficiency
without Compromise

Motor Ratings, PE2 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 35/6	4 kW	3.5 kW 4.7 HP	1170	208 230 460 600	13.9 12.6 6.3 4.8	75.2 68 34 26.1	G	1.3**	88	88.1	85.5	.789	.739	.628

** For wet pit installation. Service factor is 1.15 for dry pit installation.

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FM Approvals

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Cable Data, PE2 Frame

	Motor	Motor Voltage	Cable Type	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 35/6	208 volt	SOOW 12/7	18.8mm (0.74") diameter
		230 volt	SOOW 12/7	18.8mm (0.74") diameter
		460 volt	SOOW 14/7*	18.3mm (0.72") diameter
		600 volt	SOOW 14/7	18.3mm (0.72") diameter
Control Cable		All	Included in Power Cable	
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths	

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "230 volt" section of the table

Pump Data

Discharge Size	6" flanged, compatible with 6" class 125 ANSI flanges					
Suction Size	6" flanged, compatible with 6" class 125 ANSI flanges, threaded for 8 x ¾-10 UNC bolts, 35mm (1.37") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5	.6			
Solids Passage Size	100mm (3.9")	100mm (3.9")	100mm (3.9")			
Impeller DIA	215mm (8.5")	200mm (7.9")	190mm (7.5")			
Impeller Weight	9.2 Kg (20.2 lb)	7.8 Kg (17.2lb)	6.6 Kg (14.5lb)			
Min Recommended Flow, GPM	180	150	150			

Materials of Construction

		Standard	Optional
Motor Housing		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Oil Chamber		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting		Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft		Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware		Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop		Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings		Nitrile (Buna-N)	
Cable Glands		Nitrile (Buna-N)	
Tandem Mechanical Seal	Lower	Silicon Carbide on Silicon Carbide	
	Upper	Silicon Carbide on Silicon Carbide	
Coating		Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 35/6			
Overall Height	783 mm (30.8")			
Pump Weight	167.5 kg (396.3 lb)			

SULZER

Massblatt XFP 150E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.570 -03
Drawn: 14.07.09/D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

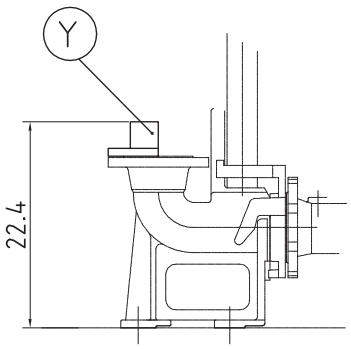
50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 40/4	369	30.8
PE 30/6	369	30.8
PE 60/4	410	30.8
PE 90/4	435	33.6

60Hz

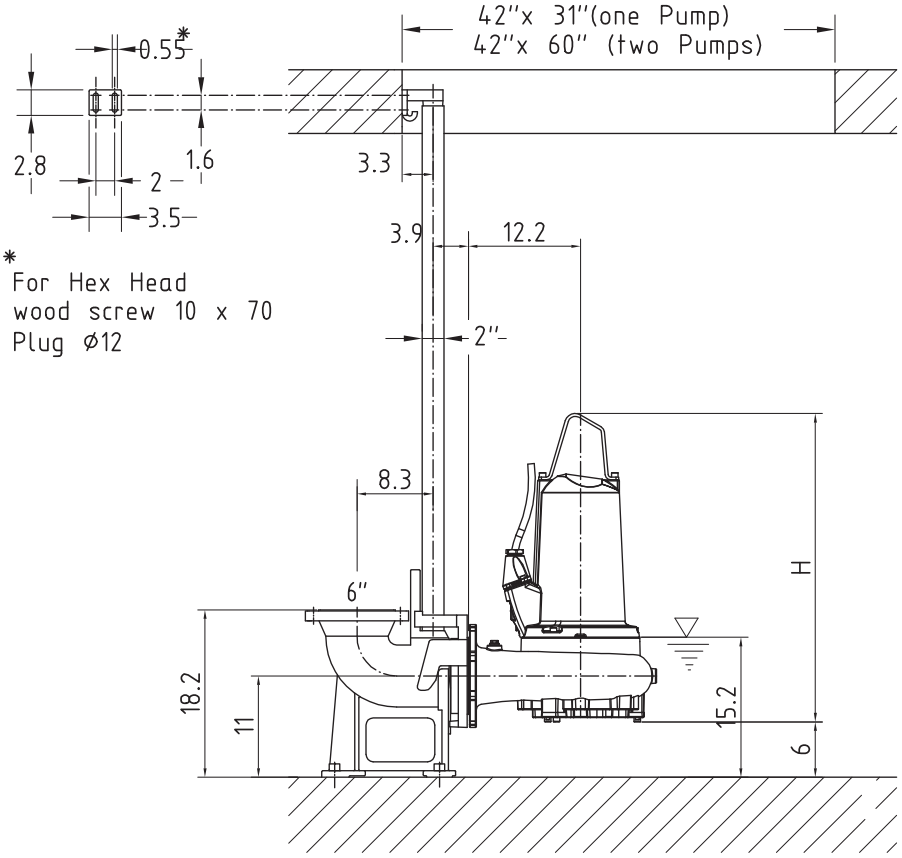
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 35/6	369	30.8
PE 45/4	369	30.8
PE 56/4	371	30.8
PE 75/4	410	30.8
PE 90/4	410	30.8
PE 105/4	435	33.6

Part No.	Y(mm)
DN150	
6 232 0655	
6 232 0656	ø 160
6 232 0657	ø 169

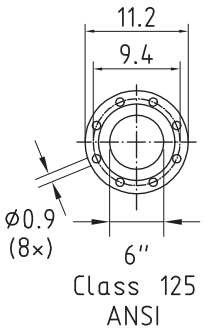


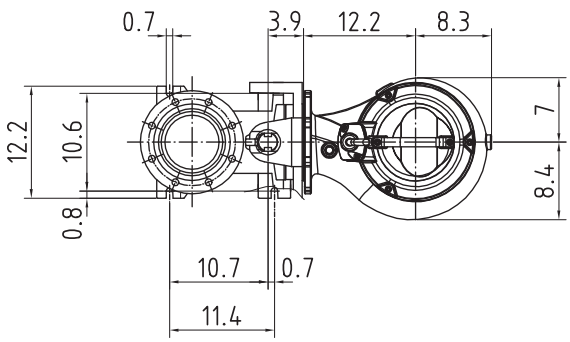
U.S.

min. Schachtöffnung
min. Sump opening
Dimensioni min. botola
min. apertura del pozo
Largeur min. du puisard



* For Hex Head wood screw 10 x 70 Plug ø12





abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 150E-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.571 -03
Drawn: 23.09.09/D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

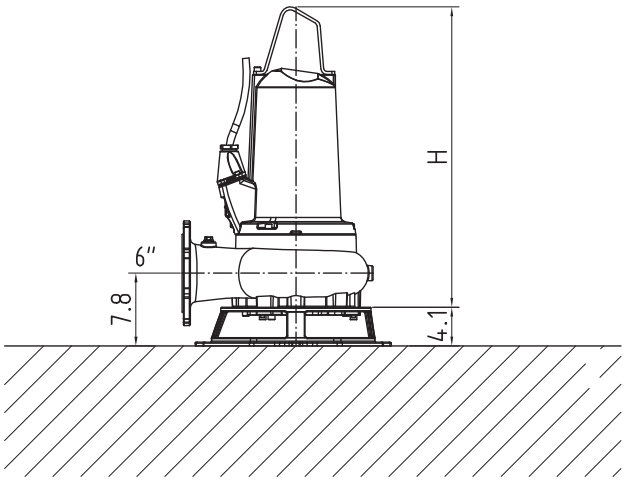
50Hz

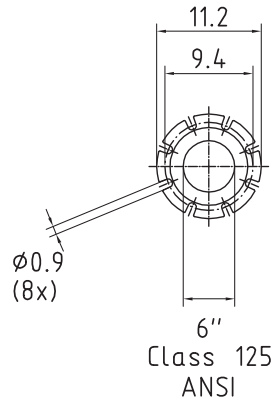
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 40/4	336	29.5
PE 30/6	336	29.5
PE 60/4	377	29.5
PE 90/4	402	32.2

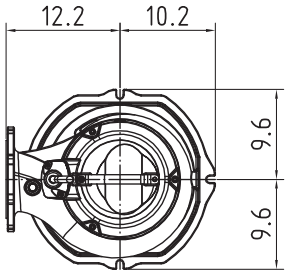
60Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	H (")
PE 35/6	336	29.5
PE 45/4	336	29.5
PE 56/4	338	29.5
PE 75/4	377	29.5
PE 90/4	377	29.5
PE 105/4	402	32.2

U.S.







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

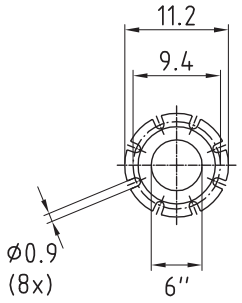
Massblatt XFP 150E-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.572 -03
Drawn: 23.09.09/D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

U.S.

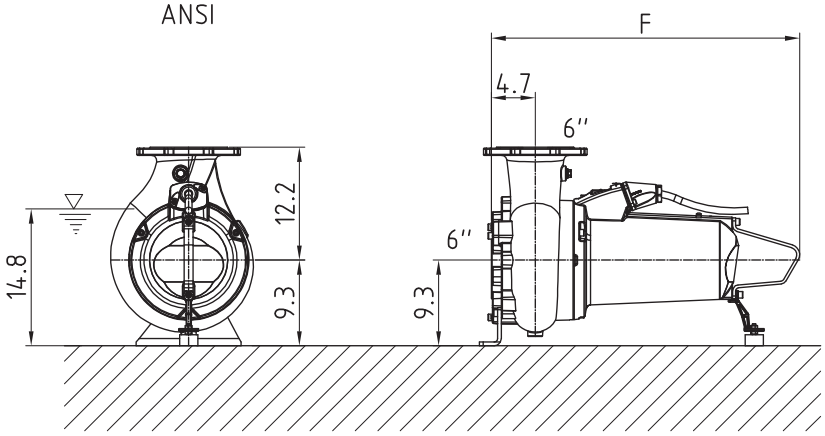
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 40/4	336	30.4	26.2
PE 30/6	336	30.4	26.2
PE 60/4	377	30.4	26.2
PE 90/4	402	33.1	29

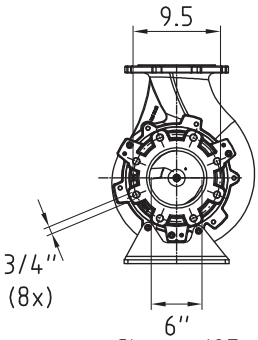


Class 125
ANSI

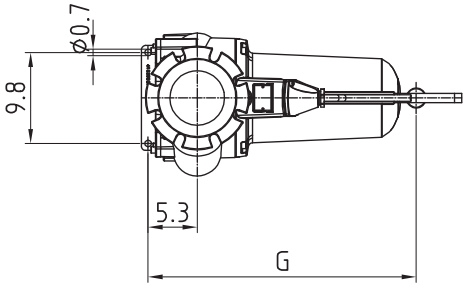
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 35/6	336	30.4	26.2
PE 45/4	336	30.4	26.2
PE 56/4	338	30.4	26.2
PE 75/4	377	30.4	26.2
PE 90/4	377	30.4	26.2
PE 105/4	402	33.1	29





Class 125
ANSI



abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 150E-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.573 -04
Drawn: 24.09.2009/D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

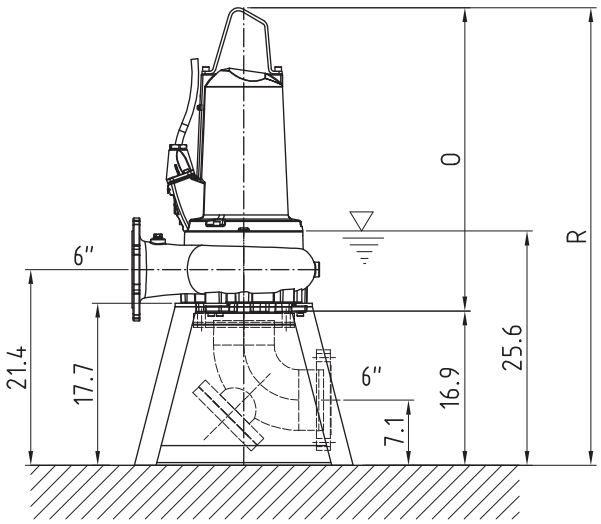
50 Hz

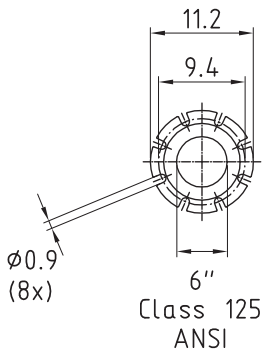
U.S.

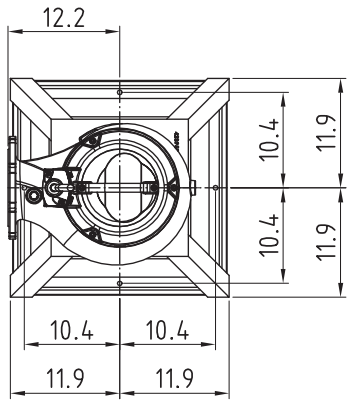
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 40/4	336	30.4	47.2
PE 30/6	336	30.4	47.2
PE 60/4	377	30.4	47.2
PE 90/4	402	33.1	50

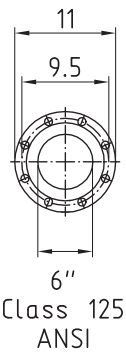
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 35/6	336	30.4	47.2
PE 45/4	336	30.4	47.2
PE 56/4	338	30.4	47.2
PE 75/4	377	30.4	47.2
PE 90/4	377	30.4	47.2
PE 105/4	402	33.1	50









abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SPECIFICATIONS

6" ABS XFP PUMP

XFP 150G-CB1
4 Pole, 3 Phase, PE3

Date:	01/11		
Dwg:	DS-E01-043	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron six inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated six inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three 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 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 threaded to accept standard 6 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 6 inch ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

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.

SPECIFICATIONS

6" ABS XFP PUMP

XFP 150G-CB1
6 Pole, 3 Phase, PE3

Date:	02/11		
Dwg:	DS-E01-044	Rev:	0

SCOPE

Furnish , ____ ABS Model _____ submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron six inch discharge connection and be capable of delivering _____ U.S. GPM at a total dynamic head of _____ feet. An additional point on the same curve shall be _____ U.S. GPM at a total dynamic head of _____ feet. Shut off head shall be _____ feet (minimum). The motor shall be an integral part of the pump unit. The motor shall be _____ HP connected for operation on a _____ volt, **3 phase, 60 hertz** electrical supply service. Pumps intended for wet pit installation shall be supplied with a _____ cast iron guide rail system with an integrated six inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. 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. Each pump motor shall be equipped with _____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

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 shall be driven by a **Premium Efficiency motor**, providing the highest levels of operational reliability and energy efficiency.

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 pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide 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. 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 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

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.

In a dry pit installation, the pump shall be secured to a steel support stand 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.

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 stainless steel 1.4401 (AISI type 316) construction. 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, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), 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. 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.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single 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 3.9 inch diameter spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt 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.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids 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 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 threaded to accept standard 6 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 6 inch ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 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 levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency 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, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, 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 15 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 be FM and CSA 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.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry pit) applications, an optional integrated glycol based cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a 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 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, an RTD (PT100) type temperature measuring device shall be available for the motor winding to provide actual temperature measurement of the winding. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. 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 and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary 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 **silicon-carbide** seal ring and one rotating industrial duty **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 motor housing, shall contain one stationary industrial duty **silicon-carbide** seal ring, and one rotating one rotating industrial duty **silicon-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. 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 non toxic material.

The following seal types shall not be considered equal: 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 acting between the upper and lower seal faces, 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 waste water, 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 the 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 air 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 through the mechanical seal system, 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 pump, 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 between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, an additional moisture sensing probe in the electrical connection chamber shall be available. This optional probe shall send a separate signal to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the connection chamber.

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 stainless steel 1.4021 (AISI 420) material, 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 deep grooved ball bearing and the lower bearings shall be a heavy duty double row angular contact ball bearing. 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 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 oil and water resistant, and shall be 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. Cable entry designs which utilize potting compounds to provide a water tight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal.

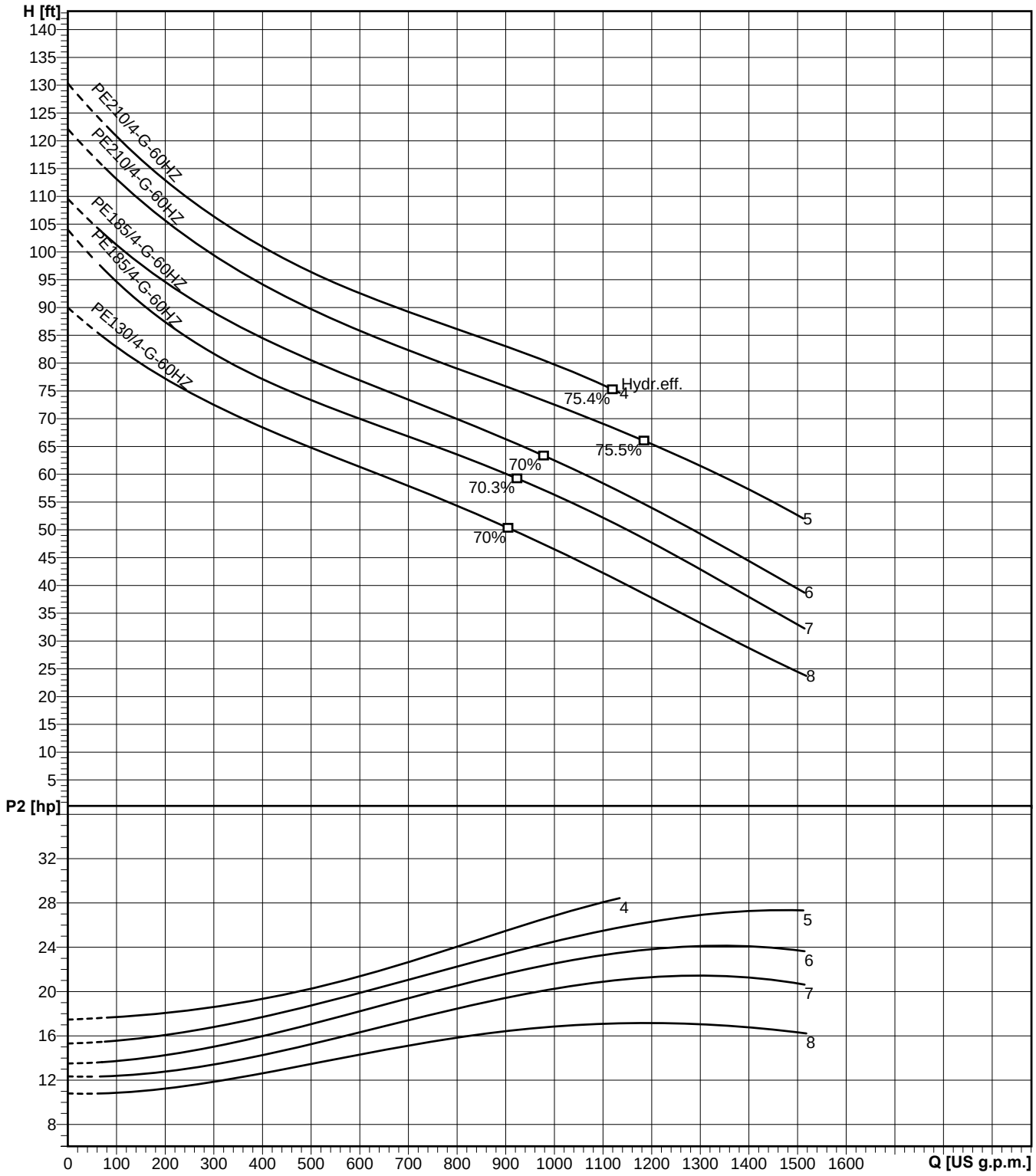
The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

SULZER

Pump performance curves
XFP150G CB1 60HZ

Curve number	
Reference curve	XFP150G CB1

			Discharge	Frequency
			DN150	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1775..1780 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		28.3 hp	75.4 %	16.1 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2011-10-11
10.4..9.06 inch	1	Contrabloc Plus impeller, 1 vane	3 7/8"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

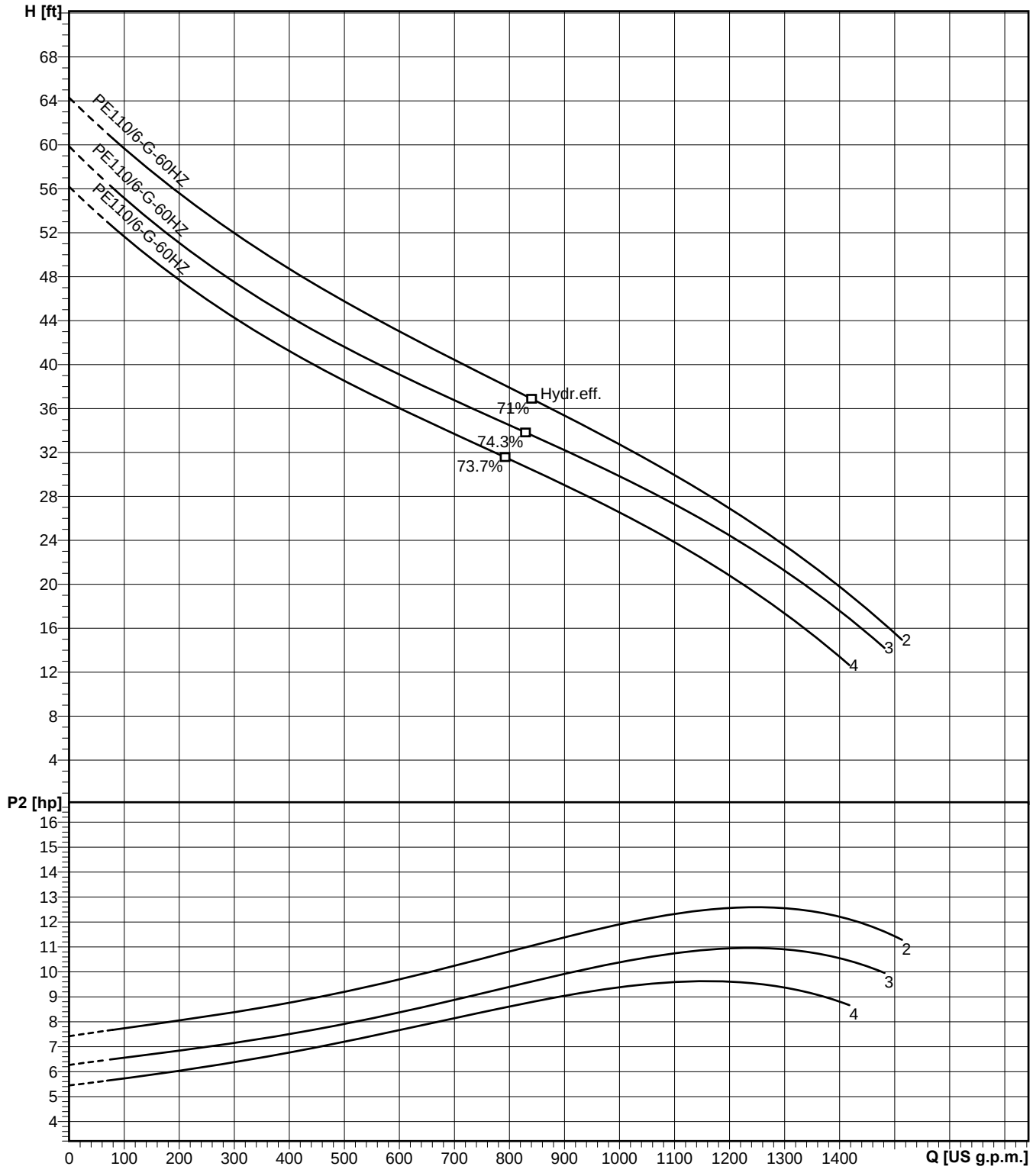
abs

SULZER

Pump performance curves
XFP150G CB1 60HZ

Curve number	
Reference curve	XFP150G CB1

			Discharge	Frequency
			DN150	60 Hz
Density	Viscosity	Testnorm	Rated speed	Date
62.428 lb/ft³	0.000016813 ft²/s	Hydraulic Institute	1180 rpm	2012-03-15
Flow	Head	Rated power	Hydraulic efficiency	NPSH
		10.8 hp	70.9 %	3.6 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision 2011-10-11
11.2..10.4 inch	1	Contrabloc Plus impeller, 1 vane	3 7/8"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

TECHNICAL DATA

6” ABS XFP PUMP

XFP 150G-CB1
4 Pole, 3 Phase, PE3

Date:	1/12	
Dwg:	DS-E01-036	Rev: 2

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE3 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 130/4	14 kW	13 kW 17.4 HP	1780	208 230 460 600	51.3 46.4 23.2 17.8	595 538 269 206	N	1.3	93.1	91.6	85.8	.757	.672	.552
PE 150/4	16.2 kW	15 kW 20.1 HP	1775	208 230 460 600	56.4 51 25.5 19.6	598 541 271 207	M	1.3	92.9	92.7	88.4	.794	.715	.592
PE 185/4	19.8 kW	18.5 kW 24.8 HP	1775	208 230 460 600	71.4 64.6 32.3 24.7	685 620 310 238	L	1.3	93.7	92.4	88.5	.768	.691	.566
PE 210/4	22.5 kW	21 kW 28.2 HP	1775	208 230 460 600	78.2 70.7 35.3 27.1	686 620 310 238	K	1.3	93.6	93.0	90.0	.797	.728	.605

SULZER

Specifications subject to change without notice

Cable Data, PE3 Frame

	Motor	Motor Voltage	Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 130/4	208 or 230 volt	1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt	1	SOOW 10/7	22.4mm (0.88") diameter
	PE 150/4	208 or 230 volt	1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt	1	SOOW 10/7	22.4mm (0.88") diameter
	PE 185/4	208 or 230 volt	1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
	PE 210/4	208 or 230 volt	1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt	1	SOOW 8/4+16/3	25.4mm (1.0") diameter
Control Cable	All	Std** 208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
		460 or 600 volt	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)		Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "208 or 230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	6" flanged, compatible with 6" class 125 ANSI flanges					
Suction Size	6" flanged, compatible with 6" class 125 ANSI flanges, threaded for 8 x 3/4-10 UNC bolts, 33mm (1.3") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.4	.5	.6	.7	.8	
Solids Passage Size	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	100mm (3.94")	
Impeller DIA	265mm (10.4")	258mm (10.2")	250mm (9.8")	240mm (9.45")	230mm (9.1")	
Min Recommended Flow, GPM	250	250	250	250	250	

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem Mechanical Seal Lower	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Tandem Mechanical Seal Upper	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 130/4	PE 150/4	PE 185/4	PE 210/4
Overall Height	1297mm (51.1")	1297mm (51.1")	1297mm (51.1")	1297mm (51.1")
Pump Weight	333 kg (735 lb)	333 kg (735 lb)	347 kg (765 lb)	347 kg (765 lb)

TECHNICAL DATA

6” ABS XFP PUMP

XFP 150G-CB1
6 Pole, 3 Phase, PE3

Date:	3/11	
Dwg:	DS-E01-037	Rev: 1

Submersible Motor Specifications, PE3 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, IE3 rating
Motor Efficiency Test Protocol		IEC 60034-2-1
Insulation Materials		Class H, 180ºC (356ºF), copper windings
Motor Filling Medium		Air
Temperature Rise		Class A
Maximum Fluid Temperature		40ºC (104ºF) continuous, 50ºC (122ºF) intermittent
Optional Cooling System		Closed-loop, non-toxic glycol/water mixture (⅓ / ⅔)
Motor Protection	**Thermal**	Normally closed bimetallic switch in each phase, connected in series, 140ºC (284ºF), +/- 5 ºC opening temperature
	Leakage	ABS Sealminder moisture detection probe in seal sensing chamber
Sensing Chamber Filling Medium		Air
Bearing Type	**Upper**	Single row ball permanently lubricated
	Lower	Double row angular contact permanently lubricated
Motor Starter Types		Suitable for use with across the line, electronic soft starters, and PWM type Variable Frequency Drives*
Maximum Starts per Hour		15, evenly spaced
Inverter Duty Rating		Motors meet NEMA MG1, part 31 requirements
Maximum Submergence		20 meters (65 feet)
Available Voltages		208, 230, 460, 600
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

*Output filters may be required on VFDs. See document **DS-E00-001** for details.

ABS submersible sewage pump XFP
Part of the ABS EffeX range

Premium Efficiency
without Compromise

Motor Ratings, PE3 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 110/6	12 kW	11 kW 14.8 HP	1180	208 230 460 600	46.6 42.2 21.1 16.2	367 332 166 127	K	1.3	91.7	90.6	87.5	.714	.634	.506

Cable Data, PE3 Frame

	Motor	Motor Voltage		Cable Qty	Cable Type*	Cable Nominal Dia. +/- .5mm (.02")
Power Cable	PE 110/6	208 or 230 volt		1	G-GC 6-3	26.6mm (1.05") diameter
		460 volt		1	SOOW 8/4+16/3	25.4mm (1.0") diameter
		600 volt		1	SOOW 12/7	19.1mm (0.75") diameter
Control Cable	All	Std**	208 or 230 volt	1	SOOW 16/4	10.7mm (0.42") diameter
			460 or 600 volt	Included in Power Cable		
Cable Length	Standard: 15m (49 feet)			Optional: 20m (65 feet), 30m (98 feet) - Consult Factory for Longer Lengths		

* Special versions ordered with cable suitable for both 230 volt and 460 volt operation will be equipped with the cable type and diameter shown in the "208 or 230 volt" section of the table
** See motor protection on page 1.

Pump Data

Discharge Size	6" flanged, compatible with 6" class 125 ANSI flanges					
Suction Size	6" flanged, compatible with 6" class 125 ANSI flanges, threaded for 8 x 3/4-10 UNC bolts, 33mm (1.3") deep					
Volute pressure rating	10 bar (145 psi)					
Impeller Type	Semi-open, 1-vane, ContraBlock Plus w/ Seal Protection System					
Impeller Size	.2	.3	.4			
Solids Passage Size	100mm (3.94")	100mm (3.94")	100mm (3.94")			
Impeller DIA	285mm (11.2")	275mm (10.8")	265mm (10.4")			
Min Recommended Flow, GPM	200	200	200			

Materials of Construction

	Standard	Optional
Motor and Intermediate Housing	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Optional Cooling Jacket	Steel 1.0036 (ASTM A-570, Grade D)	
Seal Plate	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Impeller	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Volute	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Bottom Plate CB	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Cable Entry Casting	Cast Iron EN-GJL-250 (ASTM A-48, Class 35B)	
Pump and Motor Shaft	Stainless Steel 1.4021 (AISI 420 SS)	
External Hardware	Stainless Steel 1.4401 (AISI 316 SS)	
Lifting Hoop	Stainless Steel 1.4401 (AISI 316 SS)	
O-Rings and Cable Glands	Nitrile (Buna-N)	
Tandem Mechanical Seal **Lower**	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Tandem Mechanical Seal **Upper**	Silicon Carbide / Silicon Carbide, Nitrile, 316 SS	
Lower Bearing Lip Seal	Nitrile (Buna-N) covered steel	
Coating	Two part epoxy, black, 120µm (4.7 mil) DFT	Two part epoxy, black, 400µm (15.7 mil) DFT

General Data

	PE 110/6
Overall Height	1297mm (51.1")
Pump Weight	333 kg (735 lb)

SULZER

Massblatt XFP 150G-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.594 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/4	735	51.1
PE 140/4	735	51.1
PE 160/4	765	51.1
PE 185/4	765	51.1
PE 220/4	815	52.6

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/6	735	51.1
PE 130/4	735	51.1
PE 150/4	735	51.1
PE 185/4	765	51.1
PE 210/4	765	51.1

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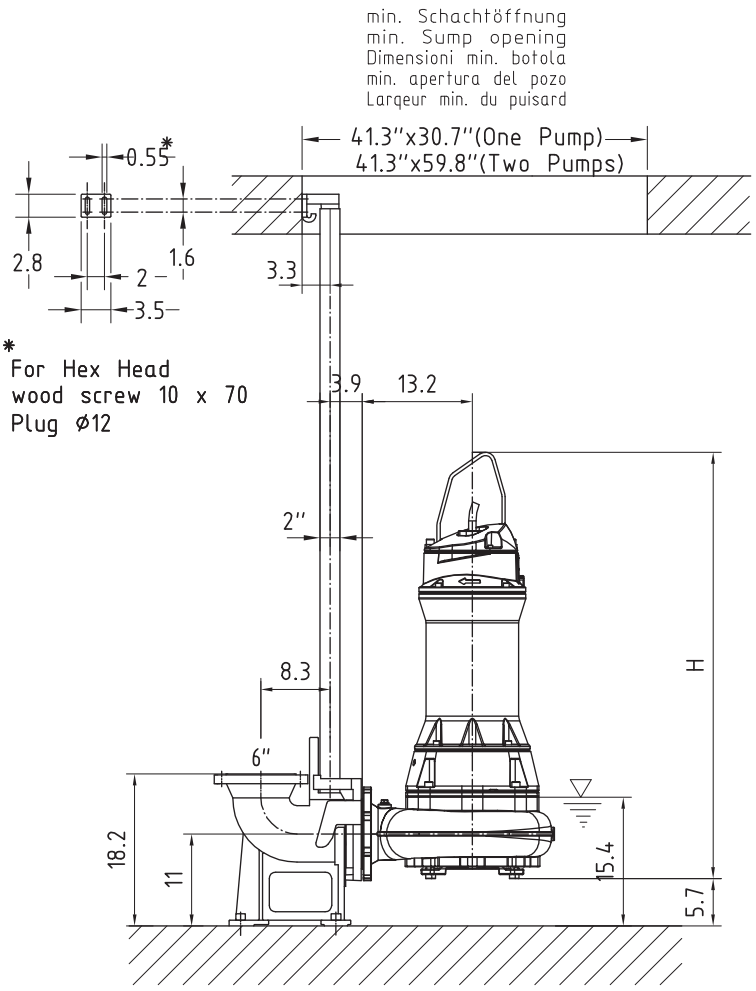
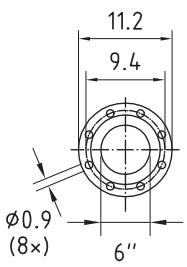
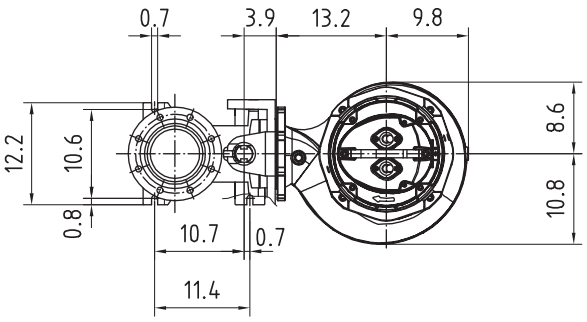






abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 150G-CB1 Nassinstallation
Dimension sheet WET-WELL Installation
Dimensioni Installazione sommersa
Hoja de dimensiones instalación sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.596 - 01
Drawn: 05/08/10 D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

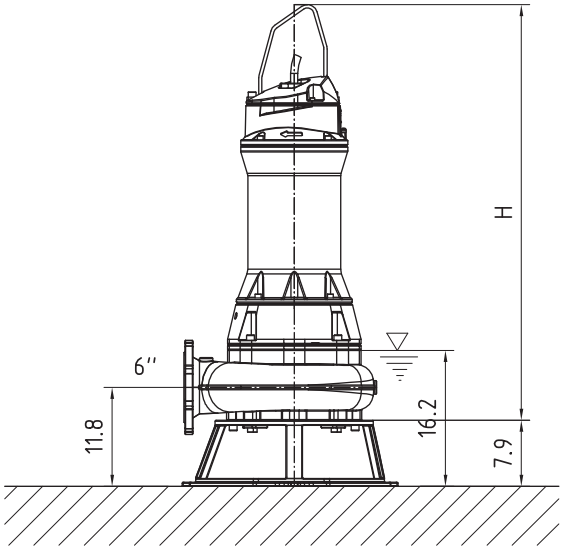
U.S.

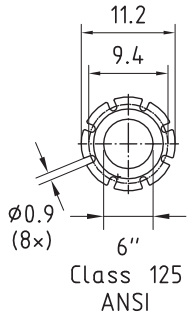
50 Hz

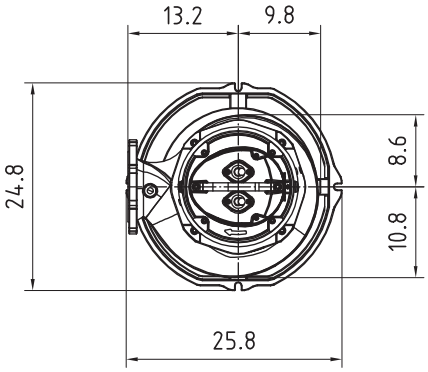
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/4	780	49.6
PE 140/4	780	49.6
PE 160/4	814	49.6
PE 185/4	814	49.6
PE 220/4	945	51.2

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	Height H (")
PE 110/6	796	49.6
PE 130/4	780	49.6
PE 150/4	780	49.6
PE 185/4	814	49.6
PE 210/4	814	49.6







abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER	Massblatt XFP 150G-CB1 Trockeninstallation Dimension sheet DRY-WELL Installation Dimensioni Installazione a secco Hoja de dimensiones instalación en seco Plan d'encombrement Installation á sec	No: AN-M.22.597 - 01 Drawn: 05/08/10 D.Whelan Issue Date: 18/07/11 Änderungen vorbehalten Technical changes reserved Con riserva di modifiche Con reserva de modificaciones Sous réserve de modification

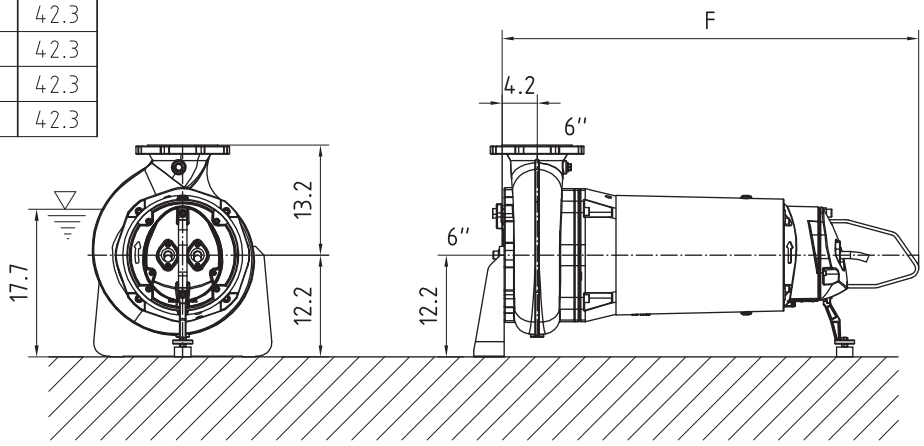
50 Hz

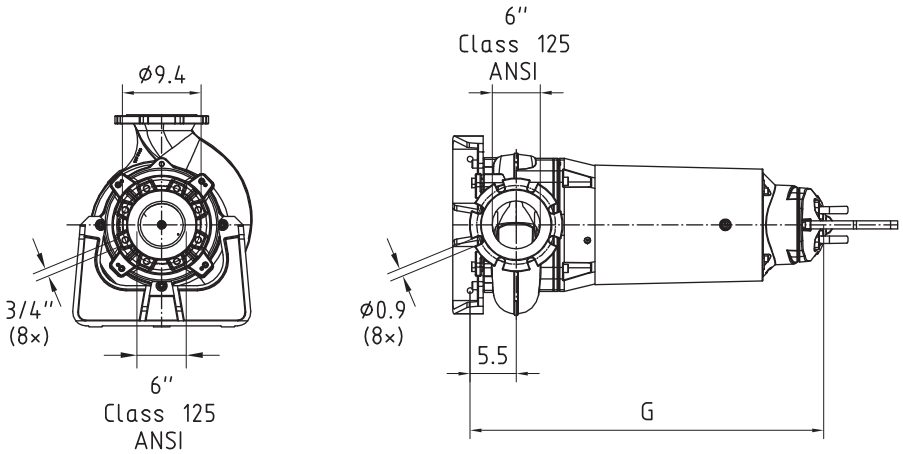
U.S.

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 110/4	860	49.9	42.3
PE 140/4	860	49.9	42.3
PE 160/4	915	49.9	42.3
PE 185/4	915	49.9	42.3
PE 220/4	966	51.5	43.9

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	F (")	G (")
PE 110/6	898	49.9	42.3
PE 130/4	860	49.9	42.3
PE 150/4	860	49.9	42.3
PE 185/4	915	49.9	42.3
PE 210/4	915	49.9	42.3





abs	Guss-Allgemeintoleranzen nach DIN1680 - GTB16 General tolerances for castings in acc. to DIN1680-GTB16 Tolleranze generali delle fusioni secondo DIN1680-GTB16 Tolerancias generales para la fundición seg. de DIN1680-GTB16 Tolérance générale de la fonderie selon DIN1680-GTB16

SULZER

Massblatt XFP 150E-CB1 Trockeninstallation
Dimension sheet DRY-WELL Installation
Dimensioni Installazione a secco
Hoja de dimensiones instalación en seco
Plan d'encombrement Installation á sec

No: AN-M.22.573 -04
Drawn: 24.09.2009/D.Whelan
Issue Date: 18/07/11
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

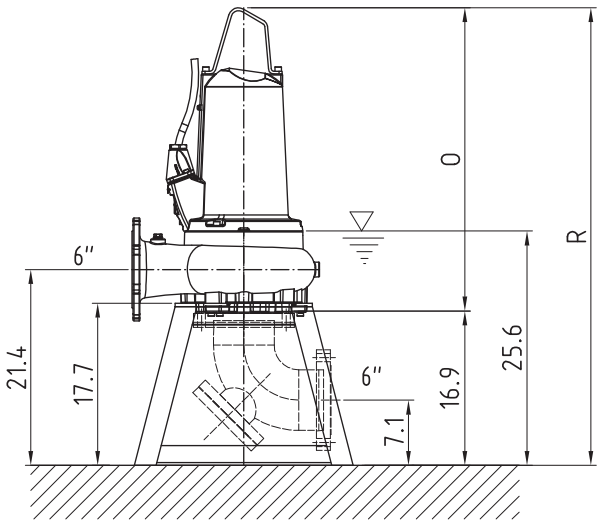
50 Hz

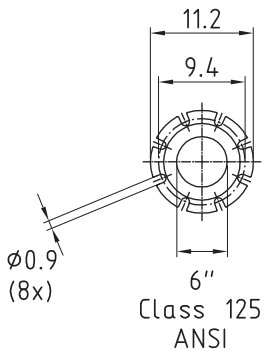
U.S.

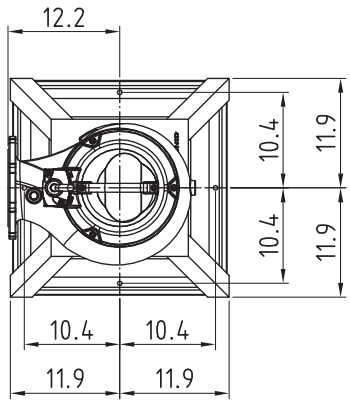
Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 40/4	336	30.4	47.2
PE 30/6	336	30.4	47.2
PE 60/4	377	30.4	47.2
PE 90/4	402	33.1	50

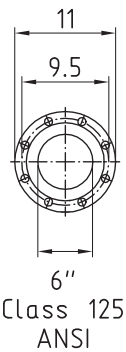
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (lbs)	O (")	R (")
PE 35/6	336	30.4	47.2
PE 45/4	336	30.4	47.2
PE 56/4	338	30.4	47.2
PE 75/4	377	30.4	47.2
PE 90/4	377	30.4	47.2
PE 105/4	402	33.1	50









abs

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

ABS submersible mixer RW 200 and 280

Compact submersible mixer for flushing and cleaning of pump sumps, plus a wide range of applications in sewage treatment plants and industrial mixing applications.

60 Hz

Applications
The compact ABS submersible mixers of the RW 200 and 280 series have been designed for a wide range of applications. As well as for the prevention of deposits and floating crusts in pump sumps, the units are also ideal for a variety of mixing and stirring applications in sewage treatment plants and in industrial areas. Depending on the intensity of mixing required, and the flow formation needed, one or more mixers may be installed. RW 200 and 280 series is suitable for the cleaning of sumps up to 16-ft diameter or 260-ft square.
The optimum flow direction for a particular application can be achieved quite simply by adjusting the mixer position horizontally or vertically (± 30°) on the mounting bracket.
Horizontal adjustment is not possible in a guide rail installation; in a hanging installation, swivelling in the horizontal plane is facilitated by the conical threaded pipe connection.
The coupling bracket, adjusting plate, and 33 ft cable with free cable ends are supplied as standard.

For optimum selection in general mixing applications the following information is required:
- application
- tank/sump dimensions
- medium to be mixed
- viscosity and specific weight of medium
- temperature, dry matter content et

Construction

Motor
The water pressure-tight encapsulated modular motor with cast iron housing, oil chamber, propeller, and bracket, form a compact, robust, unit construction.
Single-and-three-phase; 4-pole; 1750 minimum rpm; insulation class F; protection class IP 68.

Bearings and Seals
Rotor shaft supported in lubricated-for-life ball bearings, having 100,000 B_{10} life.
Tandem shaft sealing with lip seal and silicon carbide mechanical seal as standard; option of Viton double mechanical seal.

Solids Deflection Ring
The patented solids deflection ring protects the mechanical seal from damage by ingress of solid or fibrous matter.

Propeller
Blockage-free, 2 blade propeller is manufactured in cast iron.

TCS (Thermo-Control-System)
Thermal sensors in the stator give a warning and switch off the unit if excessive temperatures are reached in the motor.

Features
- Easy installation
- Small space requirements
- Adjustable bracket allows direction to be altered
- Guide rail mounting option
- Cast iron housing
- Wear-resisting propeller
- High power reserves
- Patented solids deflection ring
- Modular motor
- Available as standard or explosion-proof

Materials

Cast Iron	
Motor Housing	ASTM A48 Class 40B
Oil Chamber	ASTM A48 Class 40B
Propeller	ASTM A48 Class 40B
Stainless Steel	
Motor Shaft	AISI 420 or 316 (1.4021 or 1.4401)
Fasteners	AISI 316 (1.4401)

Identification code: RW 20 2 2 13/4 Ex

Hydraulics:
RW ..... Mixer series
20 ..... Propeller diameter (cm) nominal
2 ..... Propeller type
2 ..... Hydraulic no.
Motor:
13 ..... Motor power P_2 (hp) x 10
4 ..... Motor polarity
Ex ..... Motor version (EX only on request)

Accessories

Description	**Part no.**
Mounting Brackets:	
wall or floor	62995000
wall (extended)	62990006
pipe G 1½"	62990007
guide rail 2.4" x 2.4" open	61265048
guide rail 2.4" x 2.4" closed	61265049
guide rail 2.0" x 2.0" open	61265050
guide rail 2.0" x 2.0" closed	61265051

Technical Data

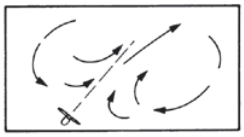
RW	2022	2022	2821
Motor	S16/4	S18/4	S28/4
Propeller: diameter (ins) angle	8	8	9.8
Speed (rpm)	1750	1750	1750
Motor power * (hp)	P_2 = 2.1	P_2 = 2.4	P_2 = 3.8
Rated voltage (V)	Three phase 208; 230; 380; 460; 575	Single phase 115 (not FM) 208; 230	Three phase 208; 230; 380; 460; 575
Rated current (A) 230 V 460 V 575 V	7.2 3.6 2.9	12.1 - -	10.9 5.5 4.4
Cable type (TL90 07RN-F)	4G1.5 + 3x0.5	4G1.5 + 3x0.5	4G1.5 + 3x0.5
Cable length (ft)	33; 66; 98; 131; 164	33; 66; 98; 131; 164	33; 66; 98; 131; 164
Weight (lbs)	57	70	70

* P2 = power at motor shaft

Maximum Keep-tank Sizes

RW 200: Ø 11 ft
RW 280: Ø 16 ft

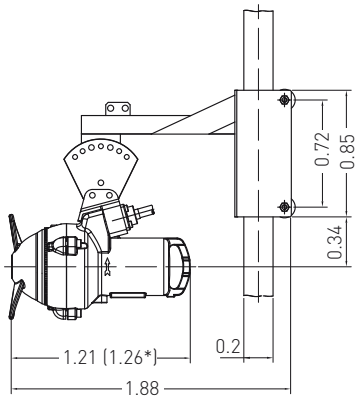
RW 200: 10 x 16 ft
RW 280: 13 x 20 ft



Dimensions (ft)

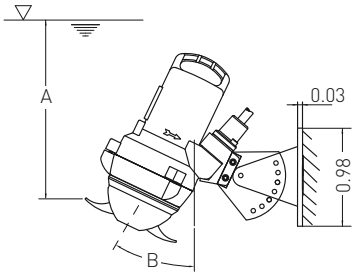
Guide Rail

for easy installation and removal



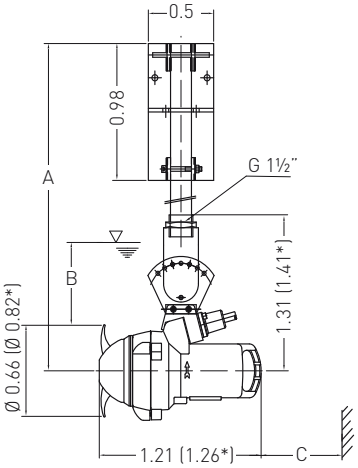
* RW 2821

Wall Mounted



A = min. 1.64 ft; **B** = max. 30°

Hanging Installation



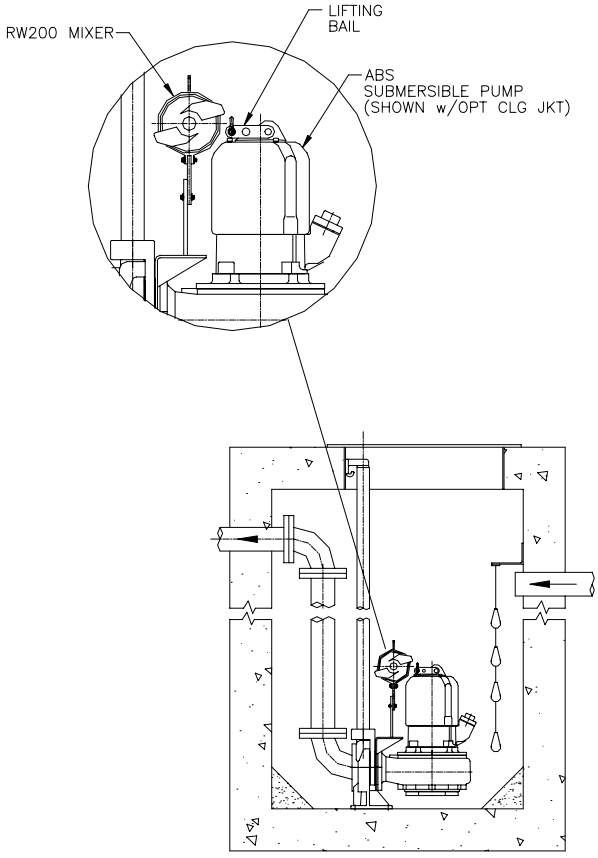
A = max. 6.56 ft; **B** = min. 1.31 ft;
C = min. 1.48 ft

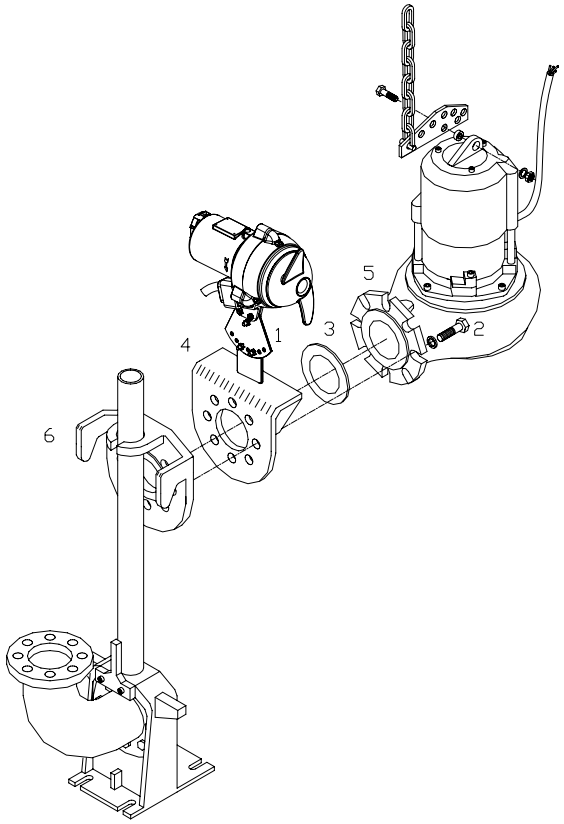
* RW 2821

ABS Submersible Mixer RW 200 & 280 US 2009-08-10 | We reserve the rights to alter specifications due to technical developments.

SUBMERSIBLE PUMP INSTALLATION

The stainless steel mixer adapter bracket (Item 4) attaches the RW200 mixer to the pump between the pump discharge flange (Item 5) and pump guide bracket (Item 6). An adjustable lifting bail balances weight distribution when the pump/mixer assembly is raised and lowered on the guide rail.



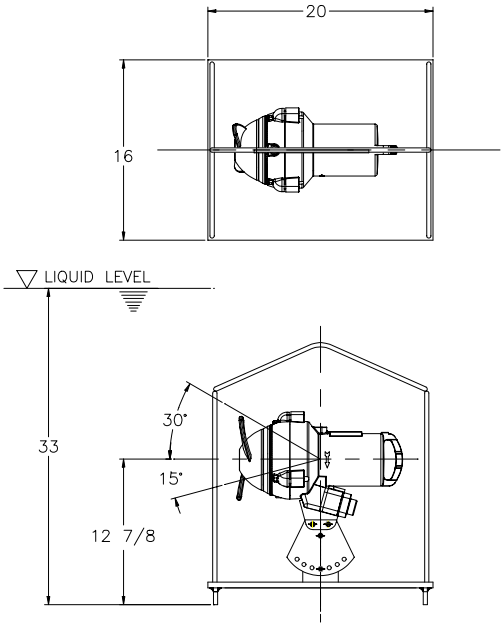


ITEM #	DESCRIPTION
1	RW 200 MIXER BRACKET
2	HEX HEAD BOLT & WASHER
3	FLAT RUBBER GASKET
4	MIXER ADAPTER BRACKET
5	PUMP DISCHARGE FLANGE
6	GUIDE BRACKET w/PROFILE GSKT

NOTE: Consult ABS for pump sizes and specific models available for RW200 guide rail mounting.

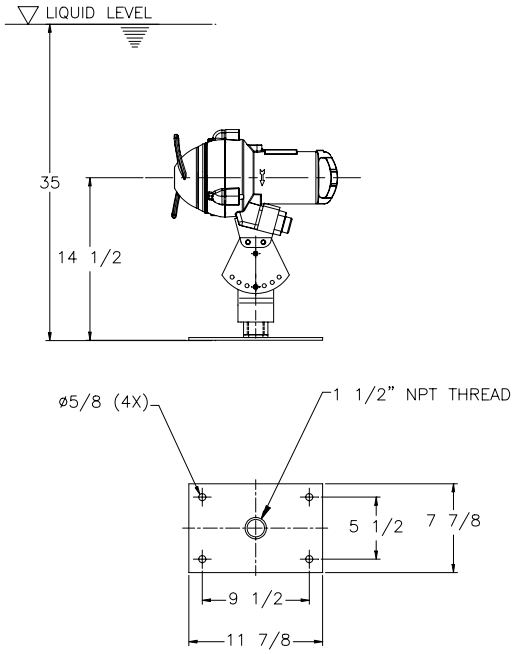
PORTABLE CAGE

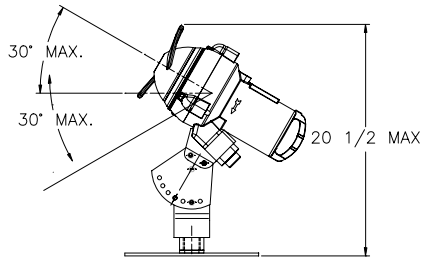
304 Stainless Steel
Weight of Cage only: 43 lbs.



FLOOR MOUNTED BRACKET

304 Stainless Steel
NOTE: Anchor Bolts by others





	MOTOR SIZE		
MODEL	**S16/4**	**S18/4**	**S28/4**
WT (LBS)*	**100**	**113**	**113**

* Weight includes mixer and portable cage

	MOTOR SIZE		
MODEL	**S16/4**	**S18/4**	**S28/4**
WT (LBS)**	**72**	**85**	**85**

** Weight includes mixer and floor-mounted bracket

Information Sheet

Dwg: DS-P99-032 Rev: A Date: 7/2010

Piranha Basin Assemblies- Add a Pump

Basin Diameter		Basin Depth	Type	Basin Capacity/Gallons
24	x	36	Simplex	71
24	x	48	Simplex	94
24	x	60	Simplex	118
24	x	72	Simplex	141
24	x	84	Simplex	165
24	x	96	Simplex	188
30	x	60	Simplex	184
30	x	72	Simplex	220
30	x	84	Simplex	257
30	x	96	Simplex	294
36	x	60	Duplex	264
36	x	72	Duplex	317
36	x	84	Duplex	370
36	x	96	Duplex	423
36	x	108	Duplex	476
36	x	120	Duplex	529
36	x	132	Duplex	582
36	x	144	Duplex	635
36	x	156	Duplex	688
36	x	168	Duplex	740
48	x	60	Duplex	470
48	x	72	Duplex	564
48	x	84	Duplex	658
48	x	96	Duplex	752
48	x	108	Duplex	846
48	x	120	Duplex	940
48	x	132	Duplex	1,034
48	x	144	Duplex	1,128
48	x	156	Duplex	1,222
48	x	168	Duplex	1,316

Basin Package Includes:

Basin with Anit-Float
Cover, Fiberglass, w/Mushroom Vent, 2" Galv
Piping, 1-1/4", Galv or PVC 80
Guide Rail Assy or Pedestal
(If GRA, guide rails longer than 96" must be galv or ss)
Valves, Gate & Swing Check, Bronze
J-Box, NEMA 4X
Float Bracket, Aluminum
Hub, Side Discharge, 1-1/4" Cast Iron
Hub, Conduit, 1-1/4" or 1-1/2" Cast Iron
Hub, Inlet, Cast Iron or Flex
Lift Chain, Galv

Notes:

1. Select basin assembly from table, then refer to appropriate price pages to add pump(s), control, and pilot floats as required.
2. Basins may be used with Piranha 09, S16/2 thru S30/2, and M25/2 thru M50/2.
3. See info sheet DS-B00-002 to specify basin size, pipe material, guide or pedestal assembly, inlet hub size & material, & discharge hub depth.
4. All packages fully assembled, except for inlet hub, which is shipped loose.
5. Inlet hub sizes available: Cast Iron 2" - 8". Flex 2" - 6". C/F for larger inlet sizes.
6. C/F for custom assemblies and sizes/options not shown.
7. Basin diameters & depths are given in inches.
8. Basin capacities are total fill, not useable waste storage capacity.

SULZER

abs

Information Sheet	Piranha Basin Assemblies - Standard Indoor
Dwg: DS-P99-033 Rev: A Date 7/2010	

PART NO.	MODEL	HP	VOLT	PHASE	SYSTEM TYPE	NOTES	WGT. (lbs)
08716700	Piranha S20/2W	2	230	1	Simplex	chain hung, 30" x 36"	210
08716701	Piranha S20/2W	2	230	1	Duplex	chain hung, 36" x 48"	400
08716702	Piranha S20/2	2	230	3	Simplex	chain hung, 30" x 36"	210
08716703	Piranha S20/2	2	230	3	Duplex	chain hung, 36" x 48"	400
08716704	Piranha S20/2	2	460	3	Simplex	chain hung, 30" x 36"	210
08716705	Piranha S20/2	2	460	3	Duplex	chain hung, 36" x 48"	400
08716706	Piranha S20/2	2	575	3	Simplex	chain hung, 30" x 36"	210
08716707	Piranha S20/2	2	575	3	Duplex	chain hung, 36" x 48"	400
Special Size Residential Package							
08716724	Piranha S20/2W	2	230	1	Simplex	chain hung, 24" x 48"	200

Notes:

All packages are fully assembled.

Please consult factory for custom packages.

Basin Package Includes:

- Grinder pump(s).
- Nema 4X Fiberglass Control Panel *.
- Pilot Floats (3 for simplex or 4 for duplex).
- Steel Basin Cover w/ 2" Vent Flange& Access Plate.
- Float Inspection Plate.
- Fiberglass Basin .
- 1 1/4" Galvanized Piping.
- 1 1/4" Bronze Swing Check Valve(s).
- 1 1/4" NPT Discharge Hub on Cover.
- Lifting eyes.
- Chain(s).
- 4" Cast Iron Inlet (Installed 8" from top of basin).

****Control Panel Includes:***

- Nema 4X fiberglass enclosure.
- Circuit breaker w/ short circuit protection, per pump.
- Contactor and overload relay, per pump (overload relay provides class 10 trip).
- Start & run capacitors, start relay, per pump.
- Hand, Off, Auto selector switch, per pump.
- Green pump run light, per pump.
- Red seal fail light, per pump.
- Elevation bracket.
- Motor thermal wired into control logic to shut off pump upon an over temp. Pump will restart after thermal cools.
- High water alarm beacon, top mounted on panel.
- High water alarm buzzer, 95dB @ 2ft, bottom mounted.
- Alarm Off-Auto selector switch.
- Terminal blocks for power, pump, and float switch connections.

COMPETITVE RESIDENTIAL GRINDER PACKAGED SYSTEMS

PART NO.	INDOOR MODEL	HP	VOLT	PHASE	SYSTEM TYPE	NOTES	WGT. (lbs)
08716790	Piranha 09 Indoor Package	2	230	1	Simplex	30" x 36"	170
08716791	Piranha 09 Indoor Package	2	230	1	Simplex	24" x 48"	170

Basin Package Includes:

Piranha 09 Grinder Pump
Piggyback Float
NEMA 4X Tank Alarm
Steel Basin Cover with 2" Vent Flange and 1 1/4" NPT Discharge Flange
Fiberglass Basin
1 1/4" Galvanized Piping
4" Cast Iron Inlet (Installed 8" From Top)

Notes:

Top Discharge.
All packages are fully assembled.

PART NO.	OUTDOOR MODEL	HP	VOLT	PHASE	SYSTEM TYPE	NOTES	WGT. (lbs)
08716792	Piranha 09 Outdoor Package	2	230	1	Simplex	24" x 48"	180

Basin Package Includes Same As Indoor Except:

Side Discharge (Customer must inform ABS of discharge depth required).
JB Plugger Junction Box (Floats are Field Installed)
1 1/4" Bronze Swing Check Valve
1 1/4" Galvanized Union
1 1/4" Galvanized Piping
Cover, blank, steel
Inlet Hub Shipped Loose for Field Installation.

Information Sheet	Scavenger Basin Assemblies - No Anti Float
Dwg: DS-S99-045 Rev: A Date: 7/2010	

Fiberglass Scavenger Basin Assemblies

BASIN SIZE	TYPE	Anti-Float	Basin Capacity/Gallons*
24x48	Simplex	No	94
30x36	Simplex	No	110
30x48	Simplex	No	147
30x60	Simplex	No	184
36x36	Duplex	No	159
36x48	Duplex	No	212
36x60	Duplex	No	264
48x48	Duplex	Yes	376
48x60	Duplex	Yes	470

Ordering Instructions: Select basin assembly from table above, then refer to appropriate price pages to add pump(s), control with pilot floats, or piggy-back float(s). Basins with 1-1/4" piping (Scavenger EF series) have galvanized piping; basins with 2" piping (Scavenger EJ 2" series) and 3" piping (Scavenger EJ 3" series) have PVC 80 piping. Discharge piping terminates 6" above pump access cover with NPT male pipe end. Pumps are free standing on basin floor with lift chain attached to lifting eye on underside of pump access plate. All packages are shipped ready for installation (gate valve is shipped loose for intallation exterior to basin). Please consult factory for custom packages and options not shown here.

Above Basin Package Includes:

Fiberglass Basin .
Piping (size & material per note above).
Steel Basin Cover w/ 2" Vent Flange & Pump Access Plate(s).
Galvanized Lifting Eyes on Pump Access Plate(s).
Float Inspection Plate w/ Float Pole for assemblies ordered w/ Pilot Floats.
4" Cast Iron Inlet (Installed 8" from top of basin).
Union(s).
Bronze Gate Valve(s).
Bronze Swing Check Valve(s).
Galvinzed Lift Chain(s).

Above assemblies do not include pump, control, or floats; see relevant price page for adders.

*Basin capacities are total fill, not waste storage capacity.

SULZER

abs

Information Sheet — Scavenger Basin Assemblies with Anti Float

Dwg: DS-S99-046 Rev: A Date: 7/2010

NOTE: Select basin assembly from table below, then refer to appropriate price pages to add pump(s), control, and pilot floats. Basins with 1-1/4" piping (Scavenger EF series) have galvanized piping; basins with 2" piping (Scavenger EJ 2" series) and 3" piping (Scavenger EJ 3" series) have PVC 80 piping. Please consult factory for custom packages and options not shown here. All systems require customer to specify discharge location; please see info sheet DS-B00-002. Consult factory for sizes & types not listed.

BASIN SIZE	TYPE	Base*	Basin Capacity/Gallons**
24x48	Simplex	Floor	94
24x60	Simplex	Floor	118
24x72	Simplex	Floor	141
24x84	Simplex	Floor	165
30x48	Simplex	Floor	147
30x60	Simplex	Floor	184
30x72	Simplex	Floor	220
30x84	Simplex	Floor	257
36x60	Duplex	Floor	264
36x72	Duplex	Floor	317
36x84	Duplex	Floor	370
36x96	Duplex	Floor	423
48x60	Duplex	Floor	470
48x72	Duplex	Floor	564
48x84	Duplex	Floor	658
48x96	Duplex	Floor	752
48x108	Duplex	Floor	846
24x60	Simplex	GRA	118
24x72	Simplex	GRA	141
24x84	Simplex	GRA	165
30x60	Simplex	GRA	184
30x72	Simplex	GRA	220
30x84	Simplex	GRA	257
36x60	Duplex	GRA	264
36x72	Duplex	GRA	317
36x84	Duplex	GRA	370
36x96	Duplex	GRA	423
48x60	Duplex	GRA	470
48x72	Duplex	GRA	564
48x84	Duplex	GRA	658
48x96	Duplex	GRA	752
48x108	Duplex	GRA	846

Basin Package Includes:

Fiberglass Basin w/ Anti-Float Plate .
Piping (size & material per note above).
Blank Steel Cover w/ 2" Vent Flange
NEMA 4X Junction Box & Aluminum Float Bracket
Nylon Conduit Hub (1-1/4" for sim; 1-1/2" for dup).
4" Cast Iron Inlet (Shipped Loose).
Union(s).
Bronze Gate Valve(s) w/ Alum Ext Handle(s) as req'd.
Bronze Swing Check Valve(s).
Galvinzed Lift Chain(s).
Discharge Hub (Nylon for 1-1/4" & 2"; SS for 3").
Guide Rail Assembly(s) for GRA systems (Systems w/1-1/4" Piping have ABS Ball Check GRA).
Galvanized Guide Rail(s) for GRA systems.

(Assemblies do not include pump, control, or floats; see relevant price page for adders)

*Base: Floor means pump on integral support feet. GRA means standard guide rail assembly for pump selected (excluding EF-2" series; consult factory for EF-2" pumps on GRA). Guide rail(s) are galvanized.

**Basin capacities are total fill, not waste storage capacity.

SULZER abs

Pumps Water and Contains Oil or Hydrocarbons in a Sump Pit or Tank

OIL ALERT ™ - Elevator Sump Water Removal

The Oil Alert ™ - Water Discharge/Oil Containment system is used in elevator sump pits to remove water while retaining oil and other hydrocarbons. The Oil Alert is a UL listed system.

Control Panel

Remote Alarm

Preset Level Sensor

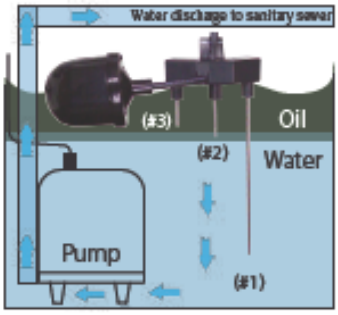
Key Features

- ONE SENSOR
  One preset level sensor for easy installation.
- OPERATES WITH ALL PUMPS APPROVED FOR SUMP PITS
  The Oil Alert is not limited to and does not force you to use one brand of pump.
- REMOTE ALARM
  A remote alarm is included with the Oil Alert
- MULTIPLE INDICATOR LIGHTS
  Power On, Pump Run, High Water and High Oil Indicator.
- ASME A17.1 COMPLIANT
- WORKS WITH AUTO DIALERS OR BAS (Building Automation Systems)

OPERATION OF DISCHARGE

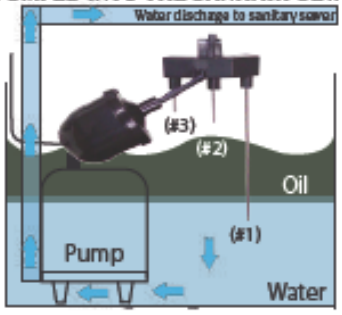
Water and oil fill the elevator sump pit. As the sump is filling, the oil will float on top of the water. This layer of oil will not be pumped from the tank. The water underneath the oil will be pumped out through the discharge pipe to the sewer or other proper disposal area.

#1. WATER RISES & PUMP TURNS ON.
When the water reaches probe (#2) the system will turn on and pump the water out of the sump.



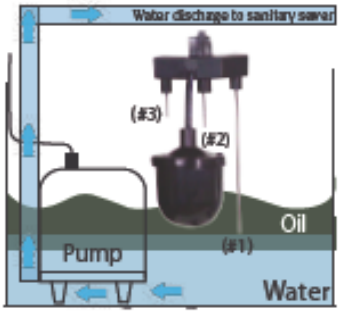
Elevator Sump

#2. WATER IS REMOVED/OIL CONTAINED
As the water is being pumped from the sump pit, the oil will remain floating on top of the water. THE OIL WILL NOT BE PUMPED INTO THE SANITARY SEWER.



Elevator Sump

#3. PUMP TURNS OFF.
When the water is pumped below probe (#1) the pump will turn off.



Elevator Sump

PRESET LEVEL SENSOR AND CONTROL PANEL OPERATION

When water touches probes (#1) and (#2) the pump will turn on.

If the pump can not keep up, loses power or fails the water will reach probe (#3). The "HIgh Water" light will illuminate on the control panel and the remote alarm will activate.

If the water continues to rise the float switch will activate. If the float switch is activated and probe (#3) is touching water the "High Water" alarm will remain on. If OIL is touching probe (#3) and the float switch is activated, the "High Oil" light will illuminate and the remote alarm will activate.

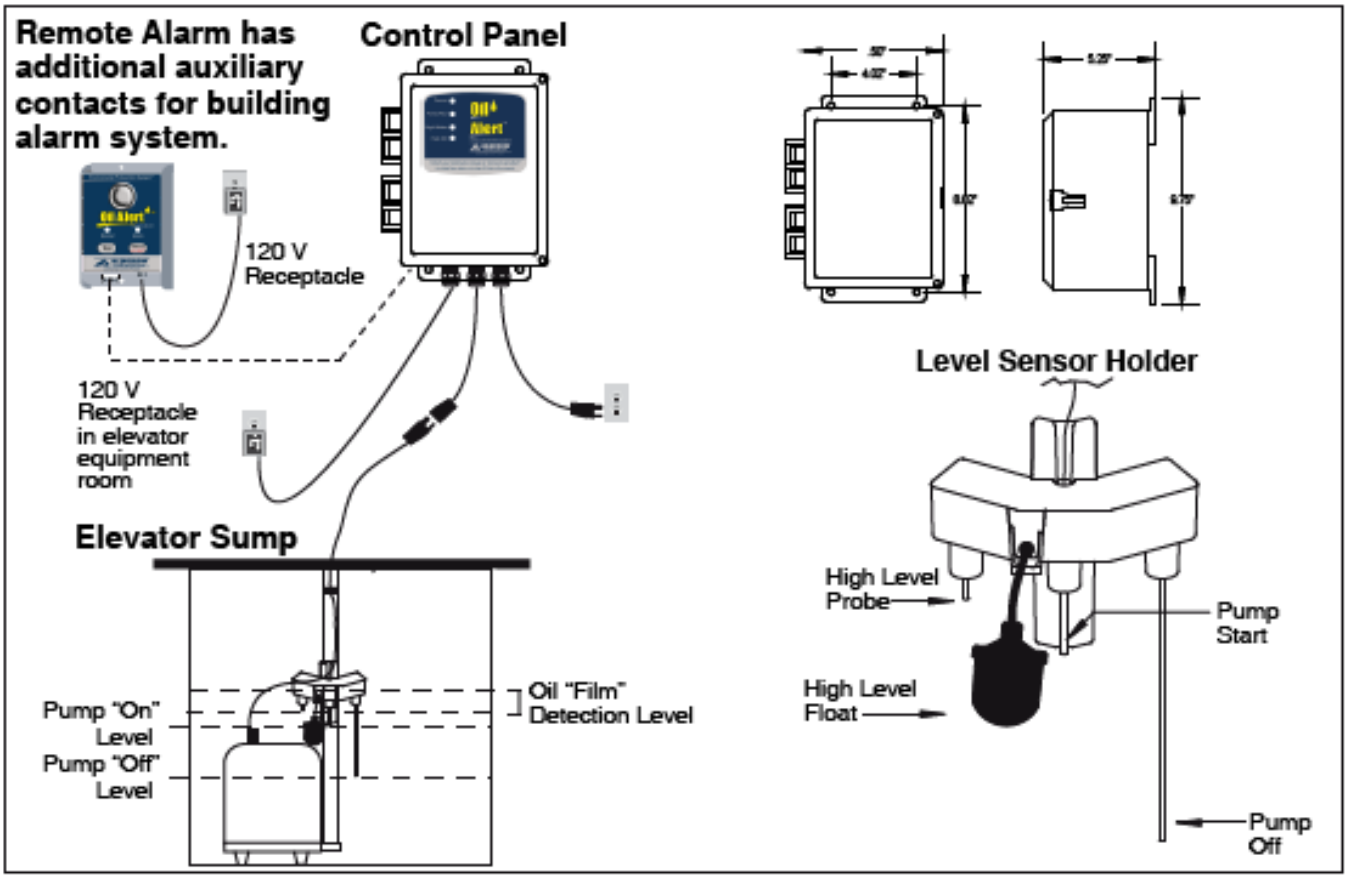
SULZER

abs

OIL ALERT™ - Control/Alarm System

Description of Operation

On liquid rise, level reaches pump "start" probe to start the pump. Pump will remain on until level is below "off" probe. The "off" probe senses air or oil and turns the pump off so the oil layer will not be pumped out of the tank. If the level reaches alarm probe and mechanical float, the system will differentiate between water and oil and activate the remote alarm.



Specifications

Sensor

- **Housing:** ABS
- **Probe:** Stainless Steel
- **Float:** PVC

Control Panel

- **Enclosure:** Type 1
- **Power Cord:** 6' SJT, 120 VAC
- **Receptacle:** 6" SJT, 120VAC, 15 Amp

Alarm Panel

- **Enclosure:** Type 1
- **Power Cord:** Plug In Transformer, 120 VAC
- **Backup Power:** 9 VDC Battery Backup
- **LED Alarm Indicators**
- **Audible Alarm:** 103 db buzzer, auto test/reset

SULZER

abs

GENERAL
Furnish and install _____ ABS Model EF 05W Scavenger submersible pump(s) to deliver _____ USGPM against a total head of _____ feet. The motor shall be 0.5 HP and 3450 RPM connected for operation on a _____ volt 60 Hz single phase service. The pump discharge shall be 2 inch female NPT.

PUMP DESIGN
The pump(s) shall be of the submersible type with an integral motor and pumping unit. The pump(s) shall have a recessed vortex impeller capable of handling solids laden fluids without clogging. The pump shall have an integrated, open loop handle suitable for lifting the pump by hand, and for attaching a chain shackle. The pump assembly shall be approved by CSA to UL778 and CSA22.2-108 standards.

PUMP CONSTRUCTION
Impeller: The impeller shall be PTB Vortex impeller capable of passing ¾ inch spherical solids.

Pump Volute: The pump volute shall be constructed of gray cast iron with smooth internal surfaces free of rough spots or flashing. The volute shall have a vertical discharge.

Mechanical Seal: Each pump shall be equipped with a lower mechanical seal having a ceramic stationary face with a spring loaded rotating carbon face with BUNA-N elastomers and stainless steel metal parts.

Shaft and Bearings: The pump shaft shall be AISI 420 stainless steel supported by two heavy duty single row ball bearings.

Motor and Cable: The pump motor shall be enclosed in a water tight housing of gray cast iron and filled with non toxic di-electric oil. The motor shall be a NEMA design B with moisture resistant class B insulation rated for 120° C. The motor upper lid shall be constructed of gray cast iron and house the start capacitor and stator connections. Power cable shall be 15 feet long with PVC or thermoplastic elastomer insulated jacket suitable for submersible service. Pump cable shall be terminated with a molded three prong plug.

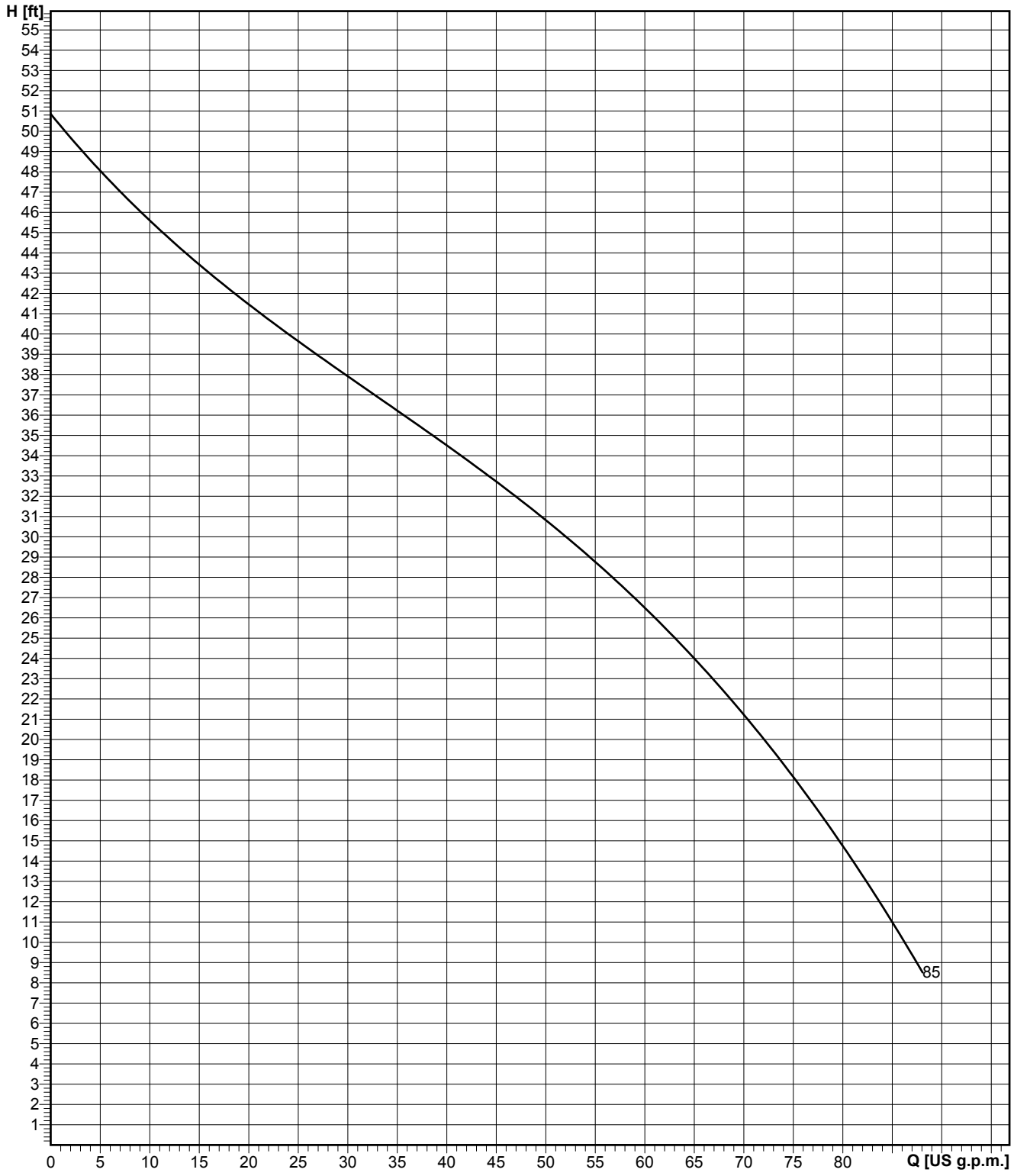
O-Rings and Fasteners: All mating surfaces of the pump and motor shall be machined and fitted with BUNA-N O-Rings where water sealing is required. Sealing shall be accomplished by the proper fitting of the parts not by compression or special torque requirements. All external screws and fasteners shall be AISI stainless steel.

Integrated Float Clamp: Pump shall be equipped with an integrated clamping mechanism to secure a piggyback float switch to the pump housing. Clamp mechanism shall allow easy adjustment of the float switch tether length so that the pump down level can be adjusted. The clamp shall not damage the float cable when tightened securely.

SULZER

Pump performance curves
EF 05W-2 60HZ

			Curve number	
			Reference curve EF 05W-2	
			Discharge 2"	Frequency
Density 62.428 lb/ft³	Viscosity 0.000016813 ft²/s	Testnorm Hydraulic Institute	Rated speed 3480 rpm	Date 2010-05-26
Flow	Head	Rated power	Hydraulic efficiency	NPSH



Impeller size	N° of vanes	Impeller	Solid size	Revision 2009-04-13
85 mm	6	Vortex impeller	2"	

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

abs

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120° C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	± 10% from nominal
Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 05W	1	0.5 Hp	115	13.2	58.5	P	0.85	50	2/3450
	1	0.5 Hp	208/230*	7.3/6.6	38.9/35.2	S	0.85	50	2/3450

*** 230 volt motor can be operated on 208 volts without modification.**

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	36
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40°C continuous, 50°C intermittent

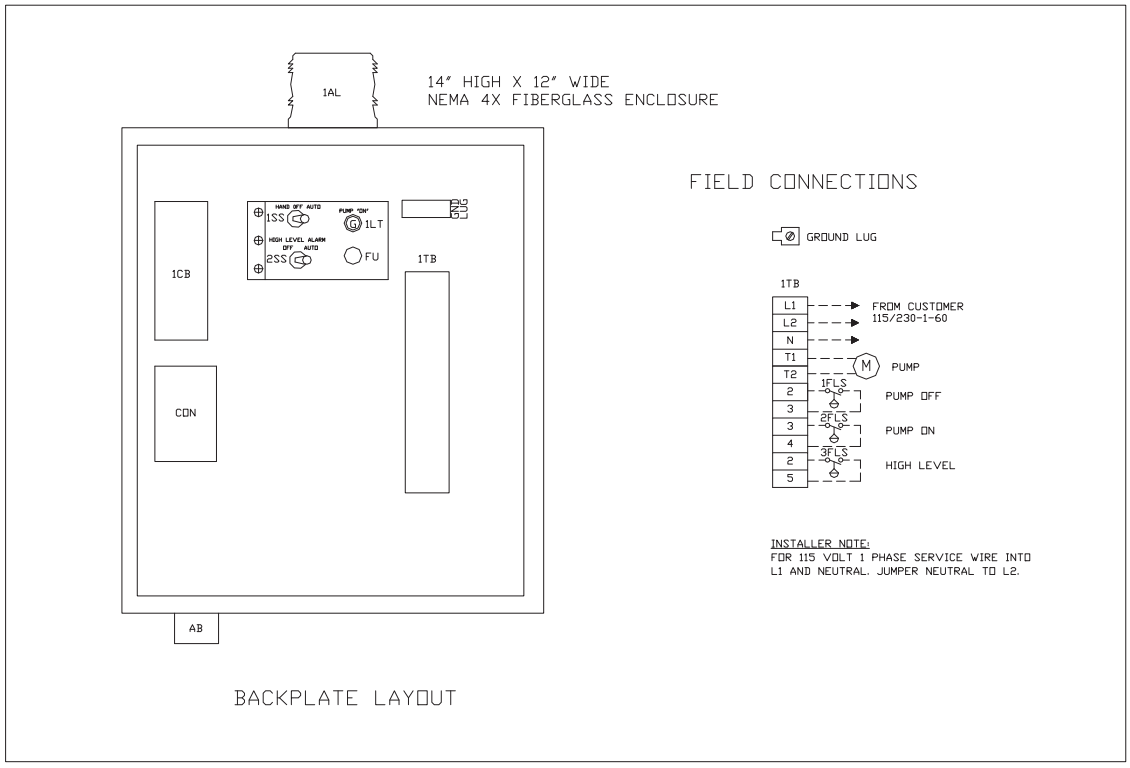
CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 05W	115 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug 208/230 volt - 16/3 SJEOOW or equiv. w/3 prong plug	20	Thermoplastic elastomer

The standard simplex control panel offered as part of the residential Scavenger package includes the following:

- The enclosure is NEMA 4X fiberglass.
- Thermal magnetic circuit breaker for each pump.
- IEC rated contactor, rated for 17 amps @ 230/115 volts, for each pump.
- Integral bi-metallic current sensing switch (wired internal to motor) to automatically shutdown pump upon an overtemp condition.
- An electric alternator alternates the pumps upon successive cycles. (Duplex only).
- Thermal magnetic circuit breaker for protection of 120VAC control circuit.
- Backplate mounted aluminum elevation bracket for lights and switches.
- Hand-off-auto selector switch.
- Green pump on indicator light.
- High level alarm off-auto selector switch.
- Flashing high level alarm beacon.
- High level alarm buzzer, rated for 95dB @ 2 feet, bottom mounted.
- Terminals are provided for connecting the float switches and motor leads into the control panel.

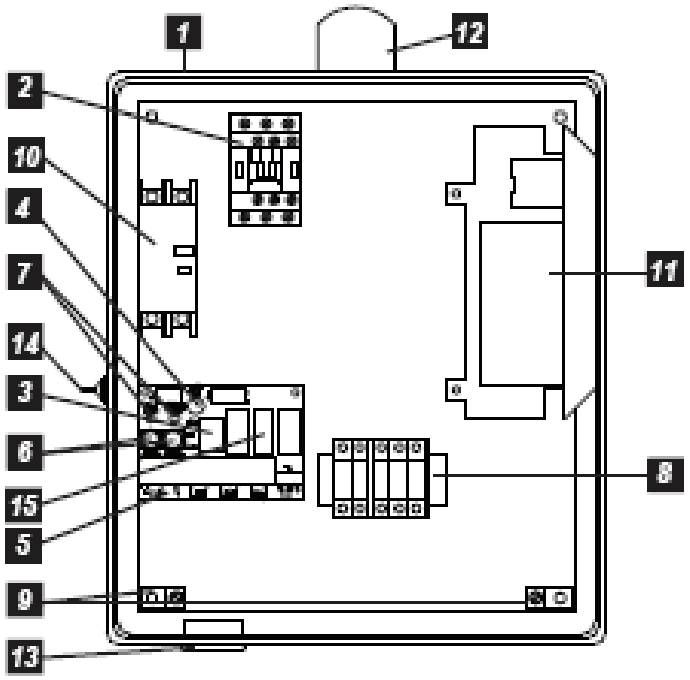
Typical Panel Layout



The standard simplex control panel offered as part of the residential 2HP/230 volt 1 phase or 3 phase grinder package includes the following:

1. Nema 4X fiberglass enclosure
2. IEC rated motor contactor
3. HOA Switch
4. Green Pump Run & Red Seal alarm indication lights
5. Float Switch terminal Block
6. Alarm and control fuses
7. Alarm and control power indicators
8. Pump input power and Pump connection terminal block
9. Ground lugs
10. Circuit breaker with short circuit protection.
11. Start & run capacitors, start relay
12. High water alarm beacon, top mounted on panel
13. Highwater alarm buzzer, 85 db @ 2 ft., bottom mounted
14. Exterior Alarm test/normal/silence switch
15. Horn silence Relay

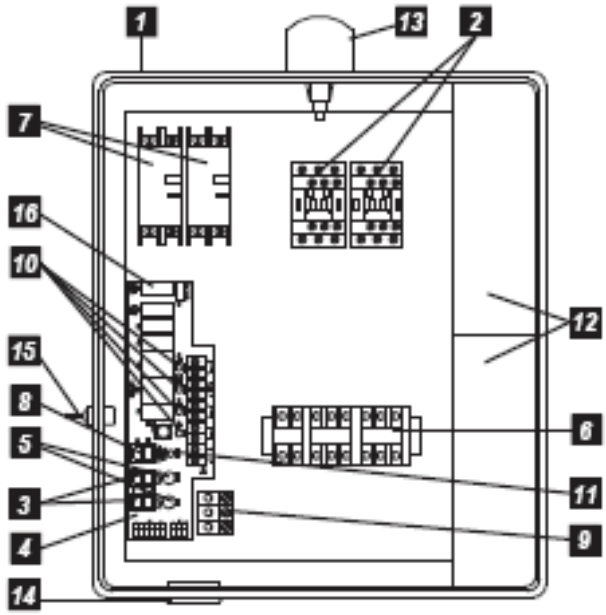
Typical Panel layout



The standard duplex control panel offered as part of the residential 2HP/230 volt 1 phase or 3 phase grinder package includes the following:

1. Nema 4X fiberglass enclosure
2. IEC rated motor contactor
3. HOA Switch per pump
4. Alternating Circuit board provides pump control and alternation
5. Green Pump Run & Red Seal alarm indication lights
6. Pump input power and Pump connection terminal block
7. Circuit breaker with short circuit protection.
8. Control ON/Off Switch
9. Ground lugs
10. Float Status indicator lights
11. Control and alarm power indicator light
12. Start & run capacitors, start relay
13. High water alarm beacon, top mounted on panel
14. Highwater alarm buzzer, 85 db @ 2 ft., bottom mounted
15. Exterior Alarm test/normal/silence switch
16. Horn silence Relay

Typical Panel layout



CONTROLS

A. GENERAL:

1. The pump manufacturer shall supply a simplex control panel for each station. IT shall be designed to operate the pump as specified herein. The control panel shall be housed in a NEMA type 4X, non-metallic, weatherproof enclosures. All hinges, latches, and external hardware shall be stainless steel. A padlockable hasp shall be provided. Mounting feet shall be an integral part of the enclosure design. A steel backplate and aluminium inner deadfront door assembly shall be provided. The control panel shall be UL 508A listed as a complete assembly. The control system shall be designed, assembled and tested at the pump manufacturer's facility, by the pump manufacturer. Documentation on the warranty for the control system shall be provided by the pump manufacturer, factory direct, not the local representative or distributor. Standard catalog literature is not accepted. Literature must include specifics relating to the project and the individual equipment supplied. The pump manufacturer must have an electrical engineering department representative witness test the control system at the pump manufacturer's facility.

2. Level control shall be provided by float type level switches. Installation of the level control system shall be such that levels can be field adjusted without the need for special tools or equipment. In Class I Division I locations, intrinsically safe barrier relays shall be utilized to reduce the amount of voltage being applied to the float switches.

3. The control panel shall include, but not be limited to, the following: individual pump circuit breaker/disconnect, magnetic contactors, thermal overload relays, single-phase start/run capacitors and start relays, solid state electronic alternating relay, hand-off-auto selector switches, pump running lights and pump seal alarm lights. A control circuit transformer shall be included for providing 120 volt power within the control panel where required. Primary and secondary fusing shall be included. Terminals shall be provided for connection of pumps, control and alarm wiring.

4. A high water alarm system shall be provided. The alarm shall be both audio and visual. A top of panel mounted red lexan alarm beacon shall be provided. Beacon will flash until level recedes below the high level alarm float switch. An alarm buzzer shall be provided for audible annunciation. An external silence pushbutton shall be provided to silence the buzzer and acknowledge alarm condition.

5. Operation shall be as follows:

Level 1 : Pump off
Level 2 : Pump on
Level 3 : High level alarm

On a rising level the first float switch shall be activated, then the second float switch shall start the pump. The pump shall run until the level drops below the first float switch. If the third float switch is reached the high level alarm shall be activated.

6. Pump Alarm Conditions

Upon a pump seal alarm a door mounted red pilot light shall illuminate, indicating that the pump will need to be serviced.

Upon a pump overload or overtemp the pump will be shut off and will restart after the overload relay is reset. Thermal switches in the motor shall automatically reset.

B. EQUIPMENT

1. Enclosure shall be of NEMA type 4X design. Enclosure shall be manufactured from polyester or compression moulded fibreglass. All hardware shall be 300 series stainless steel. Backpanel shall be steel. Inner deadfront door shall be aluminium.

2. Circuit breakers for 240 volt systems shall provide 10,000 amps interrupting capacity at 240 volts. They shall have integral trip indication. Circuit breakers for 480 volt systems shall provide 18,000 amps interrupting capacity at 480 volts. Circuit breakers shall be operable without opening the inner deadfront door.

3. Magnetic contactors provided shall be horsepower rated. Definite purpose contactors shall not be permitted. Overload relays shall be ambient compensated.

4. Start/Run capacitors and start relays required for single-phase motors shall be by the pump manufacturer. No approved equals.

5. Control relays shall be of the plug-in design. Contacts shall be rated for 10 amps at 120 volts.

6. Selector switches, pilot lights and pushbuttons shall be compact, oiltight and watertight models. Pilot lights shall be direct voltage models with LED lamps for extended life.

7. Seal detection relays shall be of a solid state design with a low voltage output. Relays shall be by the pump manufacturer or approved equal.

8. Alarm beacon shall be a red moulded lexan type. Bulb shall be easily replaced from within the enclosure. Beacon shall be a minimum 25 watt model.

9. Alarm buzzer shall be a weatherproof model designed to deliver 95dB at 10 feet.

10. Form C dry contacts shall be provided for remote monitoring of the high level alarm.

11. Terminal block shall be 600 volt rated. Power terminal will be sized to accept up to a number 8 gauge wire. Control terminals will be sized to accept up to 10 gauge wire.

12. A ground lug shall be provided for each pump. Lug shall accept up to a number 4 gauge wire.

SPEC.STD SIM.DOC

BASIC QCII SIMPLEX SPECIFICATIONS

CONTROLS
A. GENERAL:

1. The pump manufacturer shall supply a simplex control panel for each station. IT shall be designed to operate the pump as specified herein. The control panel shall be housed in a NEMA type 4X, non-metallic, weatherproof enclosures. All hinges, latches, and external hardware shall be stainless steel. A padlockable hasp shall be provided. Mounting feet shall be an integral part of the enclosure design. A steel backplate and aluminium inner deadfront door assembly shall be provided. The control panel shall be UL 508A listed as a complete assembly. The control system shall be designed, assembled and tested at the pump manufacturer's facility, by the pump manufacturer. Documentation on the warranty for the control system shall be provided by the pump manufacturer, factory direct, not the local representative or distributor. Standard catalog literature is not accepted. Literature must include specifics relating to the project and the individual equipment supplied. The pump manufacturer must have an electrical engineering department representative witness test the control system at the pump manufacturer's facility.

2. Level control shall be provided by float type level switches. Installation of the level control system shall be such that levels can be field adjusted without the need for special tools or equipment. In Class I Division I locations, intrinsically safe barrier relays shall be utilized to reduce the amount of voltage being applied to the float switches.

3. The control panel shall include, but not be limited to, the following: individual pump circuit breaker/disconnect, magnetic contactors, thermal overload relays, single-phase start/run capacitors and start relays, solid state electronic alternating relay, hand-off-auto selector switches, pump running lights and pump seal alarm lights. A control circuit transformer shall be included for providing 120 volt power within the control panel where required. Primary and secondary fusing shall be included. Terminals shall be provided for connection of pumps, control and alarm wiring.

4. A high water alarm system shall be provided. The alarm shall be both audio and visual. A top of panel mounted red lexan alarm beacon shall be provided. Beacon will flash until level recedes below the high level alarm float switch. An alarm buzzer shall be provided for audible annunciation. An external silence pushbutton shall be provided to silence the buzzer and acknowledge alarm condition.

5. Operation shall be as follows:

Level 1 : Pump off
Level 2 : Pump on
Level 3 : High level alarm

On a rising level the first float switch shall be activated, then the second float switch shall start the pump. The pump shall run until the level drops below the first float switch. If the third float switch is reached the high level alarm shall be activated.

6. Pump Alarm Conditions

Upon a pump seal alarm a door mounted red pilot light shall illuminate, indicating that the pump will need to be serviced.

Upon a pump overload or overtemp the pump will be shut off and will restart after the overload relay is reset. Thermal switches in the motor shall automatically reset.

B. EQUIPMENT

1. Enclosure shall be of NEMA type 4X design. Enclosure shall be manufactured from polyester or compression moulded fibreglass. All hardware shall be 300 series stainless steel. Backpanel shall be steel. Inner deadfront door shall be aluminium.

2. Circuit breakers for 240 volt systems shall provide 10,000 amps interrupting capacity at 240 volts. They shall have integral trip indication. Circuit breakers for 480 volt systems shall provide 18,000 amps interrupting capacity at 480 volts. Circuit breakers shall be operable without opening the inner deadfront door.

3. Magnetic contactors provided shall be horsepower rated. Definite purpose contactors shall not be permitted. Overload relays shall be ambient compensated.

4. Start/Run capacitors and start relays required for single-phase motors shall be by the pump manufacturer. No approved equals.

5. Control relays shall be of the plug-in design. Contacts shall be rated for 10 amps at 120 volts.

6. Selector switches, pilot lights and pushbuttons shall be compact, oiltight and watertight models. Pilot lights shall be direct voltage models with LED lamps for extended life.

7. Seal detection relays shall be of a solid state design with a low voltage output. Relays shall be by the pump manufacturer or approved equal.

8. Alarm beacon shall be a red moulded lexan type. Bulb shall be easily replaced from within the enclosure. Beacon shall be a minimum 25 watt model.

9. Alarm buzzer shall be a weatherproof model designed to deliver 95dB at 10 feet.

10. Form C dry contacts shall be provided for remote monitoring of the high level alarm.

11. Terminal block shall be 600 volt rated. Power terminal will be sized to accept up to a number 8 gauge wire. Control terminals will be sized to accept up to 10 gauge wire.

12. A ground lug shall be provided for each pump. Lug shall accept up to a number 4 gauge wire.

BASIC QCII DUPLEX SPECIFICATIONS

CONTROLS
A. GENERAL:

1. The pump manufacturer shall supply a duplex control panel for each station. IT shall be designed to operate two pumps as specified herein. The control panel shall be housed in a NEMA type 4X, non-metallic, weatherproof enclosures. All hinges, latches, and external hardware shall be stainless steel. A padlockable hasp shall be provided. Mounting feet shall be an integral part of the enclosure design. A steel backplate and aluminium inner deadfront door assembly shall be provided. The control panel shall be UL 508A listed as a complete assembly. The control system shall be designed, assembled and tested at the pump manufacturer's facility, by the pump manufacturer. Documentation on the warranty for the control system shall be provided by the pump manufacturer, factory direct, not the local representative or distributor. Standard catalog literature is not accepted. Literature must include specifics relating to the project and the individual equipment supplied. The pump manufacturer must have an electrical engineering department representative witness test the control system at the pump manufacturer's facility.

2. Level control shall be provided by float type level switches. Installation of the level control system shall be such that levels can be field adjusted without the need for special tools or equipment. In Class I Division I locations, intrinsically safe barrier relays shall be utilized to reduce the amount of voltage being applied to the float switches.

3. The control panel shall include, but not be limited to, the following: individual pump circuit breaker/disconnect, magnetic contactors, thermal overload relays, single-phase start/run capacitors and start relays, solid state electronic alternating relay, hand-off-auto selector switches, pump running lights and pump seal alarm lights. A control circuit transformer shall be included for providing 120 volt power within the control panel where required. Primary and secondary fusing shall be included. Terminals shall be provided for connection of pumps, control and alarm wiring.

4. A high water alarm system shall be provided. The alarm shall be both audio and visual. A top of panel mounted red lexan alarm beacon shall be provided. Beacon will flash until level recedes below the high level alarm float switch. An alarm buzzer shall be provided for audible annunciation. An external silence pushbutton shall be provided to silence the buzzer and acknowledge alarm condition.

5. Operation shall be as follows:

Level 1 : Pumps off
Level 2 : Lead pump on
Level 3 : Lag pump on
Level 4 : High level alarm

On a rising level the first float switch shall be activated, then the second float switch shall start the lead pump. The pump shall run until the level drops below the first float switch. The pumps off float shall alternate the pumps upon successive cycles. If the third level is reached both pumps shall run simultaneously until the level drops below the first float switch. If the fourth level is reached the high level alarm shall be activated.

6. Pump Alarm Conditions

Upon a pump seal alarm a door mounted red pilot light shall illuminate, indicating that the pump will need to be serviced.
Upon a pump overload or overtemp the pump will be shut off and will restart after the overload relay is reset. Thermal switches in the motor shall automatically reset.

B. EQUIPMENT

1. Enclosure shall be of NEMA type 4X design. Enclosure shall be manufactured from polyester or compression moulded fibreglass. All hardware shall be 300 series stainless steel. Backpanel shall be steel. Inner deadfront door shall be aluminium.

2. Circuit breakers for 240 volt systems shall provide 10,000 amps interrupting capacity at 240 volts. They shall have integral trip indication. Circuit breakers for 480 volt systems shall provide 18,000 amps interrupting capacity at 480 volts. Circuit breakers shall be operable without opening the inner deadfront door.

3. Magnetic contactors provided shall be horsepower rated. Definite purpose contactors shall not be permitted. Overload relays shall be ambient compensated.

4. Start/Run capacitors and start relays required for single-phase motors shall be by the pump manufacturer. No approved equals.

5. Alternating relays shall be provided with a selector switch for choosing the Lead-Lag sequence. Switch shall select between automatic alternation, pump 1 leads or pump 2 leads. Contacts shall be rated for 10 amps at 120 volts.

6. Control relays shall be of the plug-in design. Contacts shall be rated for 10 amps at 120 volts.

7. Selector switches, pilot lights and pushbuttons shall be compact, oiltight and watertight models. Pilot lights shall be direct voltage models with LED lamps for extended life.

8. Seal detection relays shall be of a solid state design with a low voltage output. Relays shall be by the pump manufacturer or approved equal.

9. Alarm beacon shall be a red moulded lexan type. Bulb shall be easily replaced from within the enclosure. Beacon shall be a minimum 25 watt model.

10. Alarm buzzer shall be a weatherproof model designed to deliver 95dB at 10 feet.

11. Form C dry contacts shall be provided for remote monitoring of the high level alarm.

12. Terminal block shall be 600 volt rated. Power terminal will be sized to accept up to a number 8 gauge wire. Control terminals will be sized to accept up to 10 gauge wire.

13. A ground lug shall be provided for each pump. Lug shall accept up to a number 4 gauge wire.

SPEC.STD DUP.DOC

The QCII line of control panels are offered as a standard control for typical simplex or duplex pump applications. The control panels include the following:

Features and Option Packages:

Basic QC II series single phase panels include:

1. NEMA 4X fiberglass enclosure with stainless steel lockable latches.
2. Control components mounted on aluminum back plate, lights and switches mounted on inner swing out dead front door.
3. Circuit breaker for each pump.
4. IEC rated contactor with adjustable trip overload for each pump.
5. Complete start circuit including capacitors start relay, and dropping resistor for each pump (single phase controls only).
6. Control transformer to supply 120 volt control power within the panel (3 phase 3 wire controls only).
7. Class CC fuse protection for the primary side of the control power transformer (3 phase 3 wire controls only).
8. Fuse protection for control circuit.
9. Hand-Off-Auto switch for each pump.
10. Green LED cluster pump ON indicator light for each pump.
11. ABS Sealminder sensing relays.
12. Red LED cluster seal failure warning light for each pump.
13. Alternating relay for Duplex controls.
14. Flashing red high level alarm beacon.
15. Simplex controls operate with 3 float switches (not included), off, on, and high level alarm.
16. Duplex controls operate with 4 float switches (not included), off, lead pump on, lag pump on, and high level alarm.
17. Terminals for all field connections.
18. Alt mode switch.
19. High level alarm dry contacts.
20. High level alarm buzzer.
21. UL 508 listing.

QCII Plus series includes features of **QCII basic panel plus:**

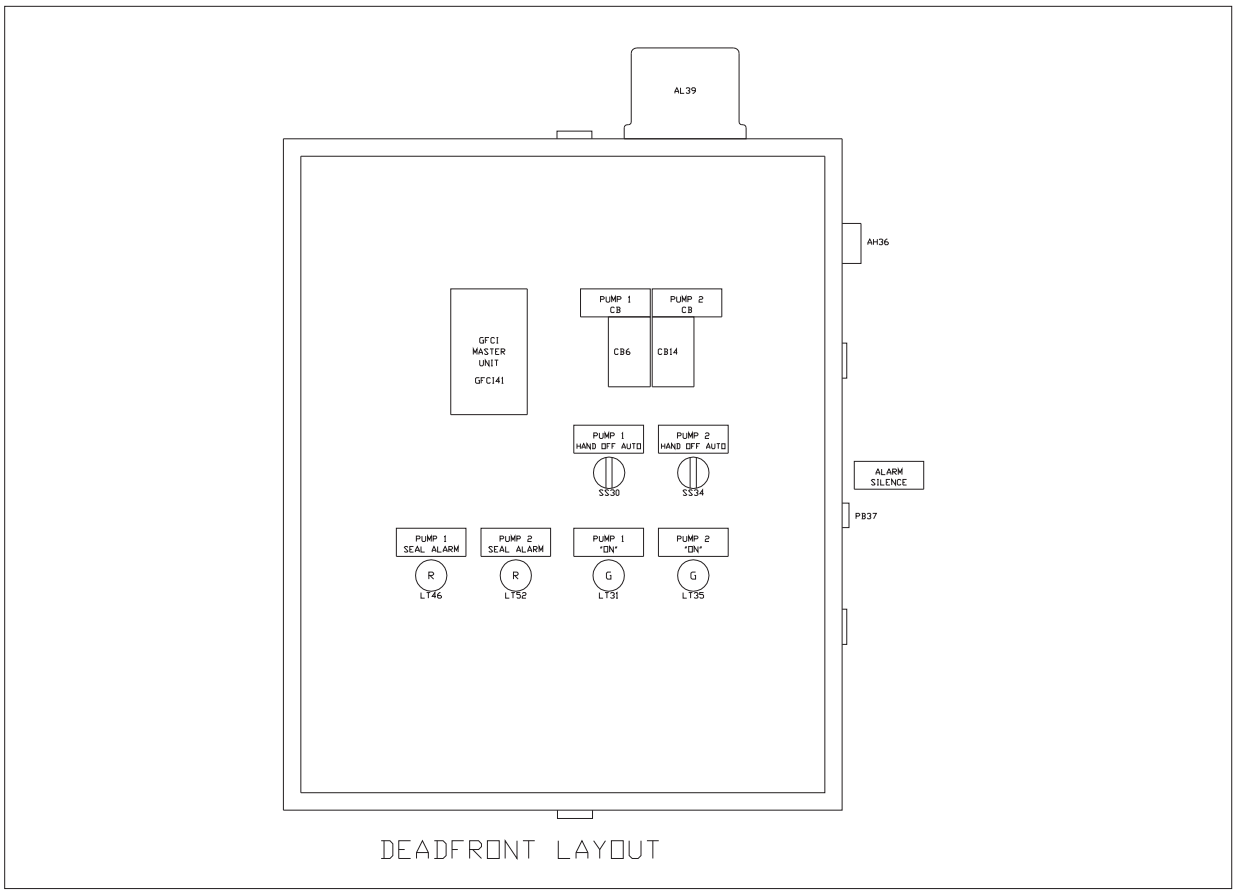
1. Digital elapsed time indicator for each pump (option 09).
2. GFCI receptacle (option 55 for 4 wire systems or option 57 for 3 wire systems).
3. Lightning arrestor (option 52,53)
4. Power monitor (option 50,51)
5. Test push button (option 37)
6. Lag pump delay (option 58)
7. Larger NEMA 4X fiberglass enclosure when required.

QCII Advanced Series includes features of **QCII Plus panel plus:**

1. Larger NEMA 4X fiberglass enclosure when required.
2. PC242 controller
3. Control power circuit breaker (option 63).
4. Control power on indication (option 04).
5. 100 watt heater (option 43)

Specifications subject to change without notice

Typical Duplex 230 volt 1 phase inner door layout



The QCII line of control panels can be modified with the addition of one or more standard options. If an option or specific project requirement is not listed below contact engineering.

OPTION NUMBER	DESCRIPTION

01 PUSH TO TEST PUMP ON INDICATION

Standard pump on indicating light(s) are replaced with press to test indicating lights. Press to test indicating lights illuminate when pressed unless control power is off or the bulb is bad. Lights are green in color and illuminate when pump is running.

02 PUMP OFF INDICATION

An amber colored light for each pump indicates when the pump is off. Light(s) are only illuminated when pump(s) are off.

03 PUSH TO TEST PUMP OFF INDICATION

This option is the same as option two except that indicating lights are press to test.

04 CONTROL POWER ON INDICATION

A White colored light illuminates when the control power is on.

05 FLOAT SWITCH INDICATION

Amber lights (3 for simplex, 4 for duplex) are provided to indicate when each float switch is raised.

06 PUSH TO TEST FLOAT SWITCH INDICATION

This option is the same as option five except that indicating lights are press to test.

07 5 FLOAT SWITCH STATUS INDICATION

Five amber lights are provided to indicate when each float switch is raised. For use with duplex panel.

08 PUSH TO TEST 5 FLOAT INDICATION

This option is the same as option seven except that indicating lights are press to test.

09 ELAPSED TIME METER

One non-resetable elapsed time meter per pump is provided. Elapsed time meter(s) are six digit displays and indicate to the nearest tenth of an hour.

10 PUMP FAILURE INDICATION

One red indicating light per pump indicates when pump fails to turn on. Indication may be caused by a motor overload or motor overtemp. For specific indication of faults order indications as outlined below (options 12, 14).

11 PUSH TO TEST PUMP FAIL INDICATION

This option is the same as option ten except that indicating lights are press to test.

12 HIGH TEMPERATURE INDICATION

One red indicating light per pump indicates when pump motor thermal protector opens due to motor overheating.

13 PUSH TO TEST HIGH TEMPERATURE INDICATION

This option is the same as option twelve except that indicating lights are press to test.

14 OVERLOAD FAILURE INDICATION

One red indicating light per pump indicates when pump motor overload (in control panel) opened due to motor overloading.

15 PUSH TO TEST OVERLOAD INDICATION

This option is the same as option twelve except that indicating lights are press to test.

16 PUSH TO TEST SEAL ALARM INDICATION

Standard seal failure indicating light(s) are replaced with press to test indicating lights. Press to test indicating lights illuminate when pressed unless control power is off or the bulb is bad. Lights are red in color and illuminate when pump seal failure occurs.

17 CYCLE COUNTER

One non-resettle cycle counter per pump is provided. Cycle counter(s) are six digit displays and indicate to the nearest cycle.

18 OVERLOAD RESET PUSHBUTTON

One through the inner door overload reset pushbutton per pump is provided. Pushbutton allows the operator to reset the overload relay without opening the inner deadfront door.

19 HIGH LEVEL ALARM INDICATION

A red indicating light is provided to indicate a high level alarm. This option should be ordered when a common alarm beacon is necessary to signal a variety of alarms.

20 SEAL FAILURE DRY CONTACTS

One set of unpowered "form c" contacts is provided for each pump to signal a pump seal failure. These contacts are wired to field terminals for connection by customer.

21 CONTROL POWER ON DRY CONTACTS

One set of unpowered "form c" contacts is provided to signal that control power is turned on. These contacts are wired to field terminals for connection by customer.

23 LOW LEVEL DRY CONTACTS

One set of unpowered "form c" contacts is provided to signal that liquid level dropped below the low level float switch (not pumps off float switch). These contacts are wired to field terminals for connection by customer.

24 PUMP FAILURE DRY CONTACTS

One set of unpowered "form c" contacts is provided for each pump to signal a pump failure. These contacts are wired to field terminals for connection by customer.

25 COMMON ALARM DRY CONTACTS

One set of unpowered "form c" contacts is provided to indicate cumulative status of options 20 thru 24. Note this option is applicable only when more than one option is ordered from options 20 thru 24. Separate contacts are still provided for options 20 thru 24. These contacts are wired to field terminals for connection by customer. This does not include options 20 thru 24.

26 COMMON ALARM WIRED BEACON

This option will cause alarm circuit to annunciate when options 20 thru 24 detect a fault. Note that with loss of control power the beacon cannot function unless battery backup option (#38) is ordered. This does not include options 20 thru 24.

30 SEAL FAILURE LOCKOUT

This option will stop each pump independently upon seal failure. The pump(s) will not be able to restart until the reset pushbutton for seal failure has been depressed.

31 LOW LEVEL LOCKOUT

This option will stop all pumps upon a redundant low level alarm. The pump(s) will not be able to restart until a reset timer has timed out. A red indicating light will indicate a low level alarm. The alarm beacon will also be wired to signal a low level alarm.

32 PUMP FAIL LOCKOUT WITH INDICATION AND CONTACTS

This option will stop each pump independently upon pump failure due to a motor overtemp or motor overload. The pump(s) will not be able to restart until the reset pushbutton for pump failure has been depressed. A red indicating light and form c contacts are also included for each pump. The alarm beacon will also be wired to the pump failure logic.

33 MOTOR OVERTEMP LOCKOUT WITH INDICATION AND CONTACTS

This option will stop each pump independently upon motor overtemp failure. The pump(s) will not be able to restart until the reset pushbutton for motor overtemp failure has been depressed. A red indicating light and form c contacts are also included for each pump. The alarm beacon will also be wired to the motor overtemp failure logic.

37 ALARM TEST PUSHBUTTON

An alarm test pushbutton is provided to test the alarm circuit when no alarm condition is present.

38 ALARM BATTERY AND CHARGER

A 12 volt dc battery and battery charger are provided so that the alarm circuit may annunciate upon a power outage. The standard beacon will be replaced with a 12 volt dc beacon and if an alarm horn is ordered it will also be 12 volt dc.

43 24 HOUR VARIABLE TIMER

24 hour variable timer is provided for pump(s) operation. timer is equipped with 96 fixed trippers for minimal timing increments. 90 hours of battery backup is standard.

45 24 VOLT FLOAT CONTROL

The float switch status will be monitored with 24 volts ac. This option monitors 3 floats for simplex operation and 4 floats for duplex operation.

46 24 VOLT 5 FLOAT CONTROL

The float switch status will be monitored with 24 volts ac. This option monitors 5 floats for duplex operation.

47 FLOAT TEST PUSHBUTTONS

A pushbutton is provided to simulate operation of each float switch by the operator. This option simulates 3 floats for simplex operation and 4 floats for duplex operation. It is suggested that float status indication option (#5) be ordered with this option.

48 5 FLOAT TEST PUSHBUTTONS

A pushbutton is provided to simulate operation of each float switch by the operator. This option simulates 5 floats for duplex operation. It is suggested that float status indication option (#5) be ordered with this option.

49 INTRINSICALLY SAFE FLOAT

Intrinsically safe float control voltages and currents are provided for 3, 4, or 5 floats for simplex or duplex operation.

50 230V 3 PHASE POWER MONITOR

An adjustable power monitor relay prevents the pumps from running when there is a phase loss, reversal, or a voltage problem.

51 460V 3 PHASE POWER MONITOR

An adjustable power monitor relay prevents the pumps from running when there is a phase loss, reversal, or a voltage problem.

52 1 PHASE LIGHTNING ARRESTOR

A lightning arrestor intended to provide protection against lightning for single phase controls.

53 3 PHASE LIGHTNING ARRESTOR

A lightning arrestor intended to provide protection against lightning for three phase controls.

54 100 WATT HEATER W/TEMPERATURE SWITCH

One 100 watt heater with integral temperature switch, fuse, and fuseblock.

55 15 AMP GFCI RECEPTACLE (1 PHASE & 4 WIRE 3 PHASE SYSTEMS ONLY)

One duplex ground fault protected receptacle protected for 15 amps. Only for 208 volt three phase systems with neutral, 230 volt three phase systems with neutral wire, or 230 volt single phase

56 15 AMP GFCI RECEPTACLE (W/2kVA XFMR)

One duplex ground fault protected receptacle protected for 15 amps. Includes transformer; for systems than cannot directly provide 120 volts.

57 15 AMP GFCI RECEPTACLE (W/2 AMP FUSE)

One duplex ground fault protected receptacle protected for 2 amps. Includes transformer; for systems than cannot directly provide 120 volts.

58 TIME DELAY STARTING LAG

Provides adjustable time delay module for starting lag pump. Lag pump will not start simultaneously with the lead pump upon a power outage and subsequent recovery.

60 MOTOR INSULATION MONITOR

Monitors insulation of motor. Will not allow motor to start when insulation of motor degrades.

61 FAILURE AUTO TRANSFER

Automatically transfers control from one pump to another upon a lead pump failure, regardless of which pump is the lead pump.

63 CONTROL POWER BREAKER

Replaces standard control fuse with circuit breaker mounted on deadfront door.

64 MAIN CIRCUIT BREAKER

Main circuit breaker provides complete branch circuit short circuit protection required by National Electric Code. Provides minimum of 14,000 amps interrupting capacity @ 480 volts and 18,000 amps interrupting capacity @ 240 volts. Actual current rating of breaker based upon motor loads. Note for pricing above 20 hp @ 480 volts or 10 hp @ 230 volts consult factory.

65 LOCKABLE MAIN BREAKER

Same as option 64 and also includes a lockable operating handle on deadfront door.

66 20" NEMA 4X STAINLESS STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X stainless steel enclosure. Swingout deadfront is included. Enclosure dimensions are 20" high x 20" wide x 8" deep.

67 30" NEMA 4X FIBERGLASS

Replaces standard NEMA 4X fiberglass enclosure with larger NEMA 4X fiberglass enclosure. Swingout deadfront is included. Enclosure dimensions are 30" high x 24" wide x 10" deep.

68 30" NEMA 4X STAINLESS STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X stainless steel enclosure. Swingout deadfront is included. Enclosure dimensions are 30" high x 24" wide x 10" deep.

69 30" NEMA 3R PAINTED STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 3R steel enclosure. Swingout deadfront is included. Enclosure dimensions are 30" high x 24" wide x 12" deep.

70 30” NEMA 4 PAINTED STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4 steel enclosure. Swingout deadfront is included. Enclosure dimensions are 30” high x 24” wide x 12” deep.

71 36” NEMA 4X STAINLESS STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X stainless steel enclosure. Swingout deadfront is included. Enclosure dimensions are 36” high x 30” wide x 12” deep.

72 40” NEMA 4X FIBERGLASS

Replaces standard NEMA 4X fiberglass enclosure with larger NEMA 4X fiberglass enclosure. Swingout deadfront is included. Enclosure dimensions are 40” high x 30” wide x 12” deep.

73 36” NEMA 4 PAINTED STEEL

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4 steel enclosure. Swingout deadfront is included. Enclosure dimensions are 36” high x 30” wide x 12” deep.

74 24" NEMA 4X FIBERGLASS

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X fiberglass enclosure. Swingout deadfront is included. Enclosure dimensions are 24" high x 24" wide x 10" deep.

75 **48" NEMA 4X FIBERGLASS**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X fiberglass enclosure. Swingout deadfront is included. Enclosure dimensions are 48" high x 36" wide x 12" deep.

76 **24” NEMA 4X STAINLESS STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X stainless steel enclosure. Swingout deadfront is included. Enclosure dimensions are 24” high x 24” wide x 12” deep.

77 **48” NEMA 4X STAINLESS STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X stainless steel enclosure. Swingout deadfront is included. Enclosure dimensions are 48” high x 36” wide x 12” deep.

78 **48” NEMA 4 PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with larger NEMA 4 steel enclosure. Swingout deadfront is included. Enclosure dimensions are 48” high x 36” wide x 12” deep.

79 **30” NEMA 3R PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 3R steel enclosure. Swingout deadfront is included. Enclosure dimensions are 30” high x 24” wide x 12” deep.

80 **36" NEMA 3R PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 3R steel enclosure. Swingout deadfront is included. Enclosure dimensions are 36" high x 30" wide x 12" deep.

81 **42" NEMA 3R PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 4X fiberglass enclosure. Swingout deadfront is included. Enclosure dimensions are 42" high x 36" wide x 12" deep.

82 **24” NEMA 12 PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 12 steel enclosure. Lights and switches are mounted on the outer door. Enclosure dimensions are 24” high x 24” wide x 8” deep.

83 **30” NEMA 12 PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 12 steel enclosure. Lights and switches are mounted on the outer door. Enclosure dimensions are 30” high x 24” wide x 8” deep.

84 **36” NEMA 12 PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with larger NEMA 12 steel enclosure. Lights and switches are mounted on the outer door. Enclosure dimensions are 36” high x 30” wide x 8” deep.

85 **48” NEMA 12 PAINTED STEEL**

Replaces standard NEMA 4X fiberglass enclosure with NEMA 12 steel enclosure. Lights and switches are mounted on the outer door. Enclosure dimensions are 48” high x 36” wide x 8” deep.

86 **BEACON, ALARM, REMOTE MOUNTED**

Replaces standard control panel mounted alarm beacon with a beacon suitable for remote mounting. Beacon is weather proof and suitable for use in hazardous locations. Unit has a red glass globe with protector, 100-watt bulb, and right angle mounting bracket. Terminals are supplied in the control for connection of the alarm beacon.

87 BEACON, ALARM, STROBE TYPE

Replaces standard control panel mounted alarm beacon with an electronic strobe type beacon. Unit is weather proof and has a flash rate of 60-70 fpm at approximately 100,000 candle power.

88 CHECK VALVE LIMIT SWITCH ALARM

One red indicating light per limit switch indicates when limit switch fails to open after the pump has started.

89 DIM GLOW ALARM LIGHT

The alarm beacon will glow during normal operation. In an alarm condition, the beacon will flash brightly.

90 HORN, ALARM, REMOTE MOUNTED

A horn is provided for audible annunciation of a high level alarm. Alarm horn may be mounted ina remote location from the control panel. A silence pushbutton mounted in a NEMA 4 enclosure is provided to acknowledge alarm and silence horn. Contacts are provided in the control for the remote beacon and push button.

91 LAG PUMP RUNNING ALARM

The alarm beacon will flash if the water level rises to the Lag pump ON level.

92 LOCKABLE PUMP CIRCUIT BREAKERS

Pump circuit breaker(s) include operating handle(s) capable of being padlocked in the off position.

93 MAIN POWER DISCONNECT SWITCH, LOCKABLE

Disconnect switch is provided to disconnect power to the control panel. Disconnect includes operating handle capable of being padlocked in the off position.

94 CUSTOM CONTROL PANEL O&M MANUAL

O&M manual includes description of operations, electrical schematics and layout drawings, bill of materials and component specification sheets.

95 POWER FAILURE DRY CONTACTS

One set of unpowered "form c" contacts is provided to signal power failure alarm condition. These contacts are wired to field terminals for connection by customer.

96 PUMP RUNNING DRY CONTACTS

One set, per pump of unpowered "form c" contacts is provided to signal that the pump is running. These contacts are wired to field terminals for connection by customer.

97 PUMP RUNNING DRY CONTACTS, LAG PUMP ONLY

One set of unpowered "form c" contacts is provided to signal that the lag pump is running. These contacts are wired to field terminals for connection by customer.

98 **CYCLE COUNTER, LAG PUMP ON**

One non-resettle cycle counter per pump is provided for the lag pump. Cycle counter(s) are six digit displays and indicate to the nearest cycle.

.

99 **ELAPSED TIME METER, LAG PUMP ON**

One non-resetable elapsed time meter for the lag pump is provided. Elapsed time meter(s) are six digit displays and indicate to the nearest tenth of an hour.

100 **30 WATT HEATER, SEMICONDUCTOR TYPE**

One 30 watt heater with temperature switch, fuse, and fuseblock.

101 **50 WATT HEATER, SEMICONDUCTOR TYPE**

One 30 watt heater with temperature switch, fuse, and fuseblock.

102 **PUSH TO TEST HIGH LEVEL INDICATION**

This option is the same as option nineteen except that indicating light is press to test.

103 **INDICATING RELAYS, 1-5 PANEL OPTIONS**

Control relays include indication LEDs that will light up when the relay coil is energized.

104 **INDICATING RELAYS, 6 OR MORE PANEL OPTIONS**

Control relays include indication LEDs that will light up when the relay coil is energized.

105 **LOW LEVEL ALARM INDICATION**

A red indicating light is provided to indicate a low level alarm.

106 **PUSH TO TEST LOW LEVEL ALARM INDICATION**

This option is the same as option 106 except that indicating light is press to test.

107 **MILLTRONICS HYDRORANGER ULTRASONIC LEVEL CONTROL SYSTEM**

An ultrasonic level monitor is provided for level control. The probe is equipped with a 2" NPT thread for ease of mounting. It will measure the level in the wetwell via an ultrasonic signal, eliminating the need for floats.

108 **NEMA RATED MOTOR STARTER, SIZE 1**

Motor control is provided by NEMA rated full voltage non-reversing motor starter(s). Overload relay is ambient compensated.

109 **NEMA RATED MOTOR STARTER, SIZE 2**

Motor control is provided by NEMA rated full voltage non-reversing motor starter(s). Overload relay is ambient compensated.

110 **NEMA RATED MOTOR STARTER, SIZE 3**

Motor control is provided by NEMA rated full voltage non-reversing motor starter(s). Overload relay is ambient compensated.

111 **30 AMP RECEPTACLE WITH MANUAL TRANSFER SWITCH**

A main and emergency disconnect switch are provided. A pistol type operating handle is provided for transferring from main power supply to emergency power supply.

112 **60 AMP RECEPTACLE WITH MANUAL TRANSFER SWITCH**

A main and emergency disconnect switch are provided. A pistol type operating handle is provided for transferring from main power supply to emergency power supply.

113 **100 AMP RECEPTACLE WITH MANUAL TRANSFER SWITCH**

A main and emergency disconnect switch are provided. A pistol type operating handle is provided for transferring from main power supply to emergency power supply.

114 **200 AMP RECEPTACLE WITH MANUAL TRANSFER SWITCH**

A main and emergency disconnect switch are provided. A pistol type operating handle is provided for transferring from main power supply to emergency power supply.

115 **CONTROL CIRCUIT SURGE ARRESTOR (UL1449)**

A UL1449 surge suppressor is provided in the control panel. Unit has 480 volts max clamping voltage with 50,000 amps per phase max surge current. Unit also provides EMI/RFI noise filtering.

116 **TELEPHONE DIALER PHONE LINE SURGE ARRESTOR**

A surge arrestor intended to provide protection against power surge for the telephone line going to the telephone dialer.

117 **TELEPHONE DIALER, 4 CHANNEL, ECONOMY**

An automatic telephone dialer is provided in the control panel. Dialer monitors up to 4 channels. An hour keypad is provided for local programming. Unit dials up to 4 numbers. Unit can be called for status monitoring. Dialer will be a Sensaphone model 400.

118 **TELEPHONE DIALER, 4 CHANNEL**

An automatic telephone dialer is provided in the control panel. Dialer monitors up to 4 channels. An hour keypad is provided for local programming. Unit dials up to 8 numbers, each up to 16 digits. Unit can be called for status monitoring. 6 hour battery backup is included. Integral surge protection is provided. Dialer will be a RACO CB-4.

119 **TELEPHONE DIALER, 8 CHANNEL**

An automatic telephone dialer is provided in the control panel. Dialer monitors up to 8 channels. Dialer will be a Sensaphone model 800.

128 **PC242 WITH HSC2, 39 FOOT CABLE**

Aqualevel PC242 control is provided for level control and monitoring of the pumps. The controller features:
Graphic interface, Level status, alarm status, current monitoring, height of water (animated) high level float visual monitor, pump run visual monitor, inward flow, low level float sensor, overflow sensor, Separate start stop levels with delays to avoid water hammer, Alternation of pumps.

129 **PC242 WITH HSC2, 82 FOOT CABLE**

Same as option 128, but with 82 feet of cable

130 **PC242 WITH HSR**

Same as option 128 but with the HSR hydrostatic transducer.

131 **PC242 WITH HSC2, 39 FOOT CABLE & INTRINSICALLY SAFE ISOLATOR**

Same as option 128, but also includes an intrinsically safe isolation barrier.

132 **PC242 WITH HSC2, 82 FOOT CABLE & INTRINSICALLY SAFE ISOLATOR**

Same as option 131, but with 82 feet of cable.

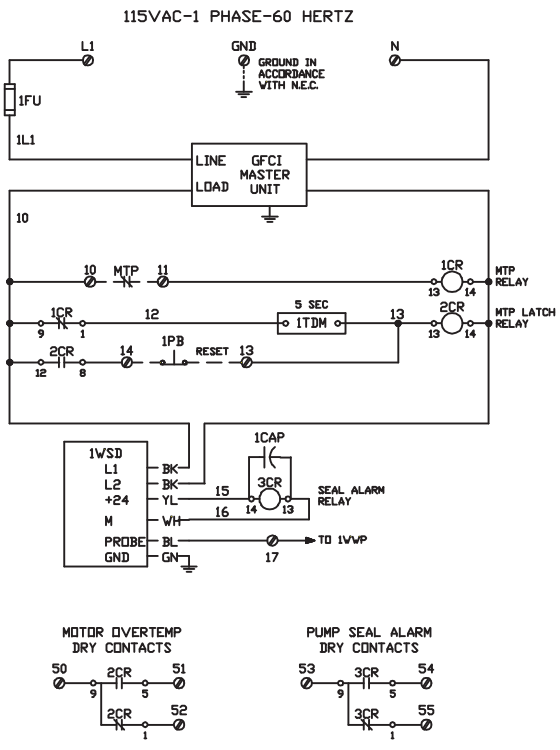
The standard series of chassis mounted monitoring panels, offered for use with M1, M2, M3, M3Y and M4 series motors that are NOT supplied with an ABS control panel, includes the following:

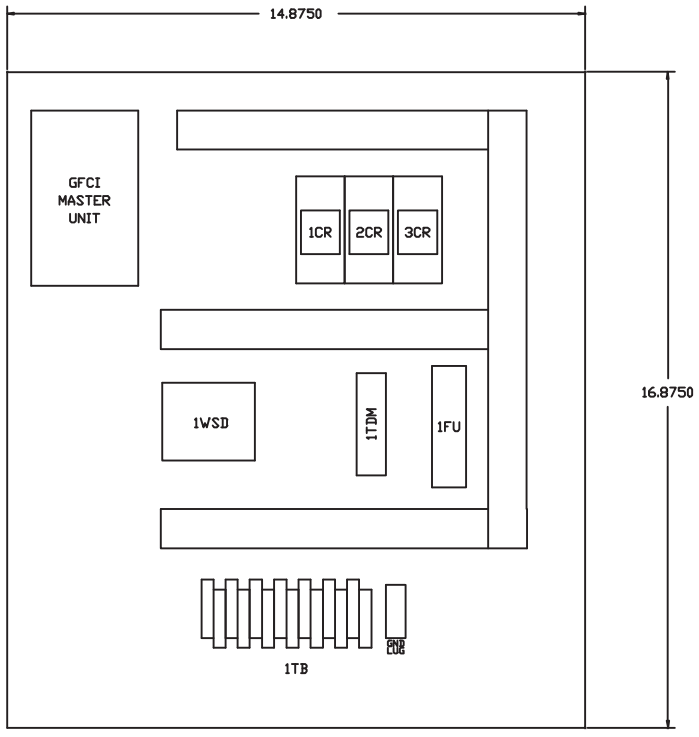
- Chassis mounted aluminum backplate (16.875” high X 14.875” wide).
- UL 508 listed industrial control panel.
- UL midget type fuse provided for main short circuit protection.
- ABS solid state sealminder water sensing relay for monitoring seal leakage in the oil chamber.
- Klixon (internal motor thermal protection) wired to automatically shutdown pump upon an overtemp condition. Klixons provided for monitoring the stator windings.
- A motor overtemp lockout circuit is provided. Upon an overtemp the circuit will latch in until manually reset. A reset pushbutton is provided for remote mounting.
- Control relays provided have contacts rated for 10 amps @ 120 volts.
- A set of “form C” dry contacts, wired to terminals, are provided for remote indication for each of the following alarm conditions:

  Seal alarm
  Motor overtemp

- 600 volt rated terminals for field wiring of panel.

Typical schematic & backplate layout





BACKPLATE LAYOUT

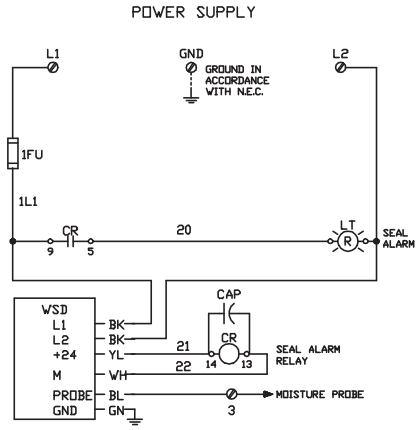
The standard series of local sealminder panels are offered as optional to mounting the sealminder relay and associated circuitry remote from the motor. Panels are offered for use with M1, M2, M3, M3Y and M4 series motors that are NOT supplied with an ABS control panel, and includes the following:

- NEMA 4X fiberglass enclosure with aluminum backplate. Components mounted to enclosure outer door.
- Optional power supplies available (115VAC, 208/230VAC, 460VAC and 575VAC).
- UL class CC type fuse provided for main short circuit protection.
- ABS solid state sealminder water sensing relays for monitoring seal leakage in the oil chamber.
- Red seal alarm indicator light mounted on enclosure outer door.
- Control relays provided have contacts rated for 10 amps @ 120 volts.
- A set of “form C” dry contacts, wired to terminals, are provided for remote indication for each of the following alarm conditions:

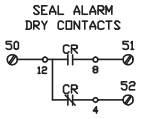
  Seal alarm

- 600 volt rated terminals for field wiring of panel.

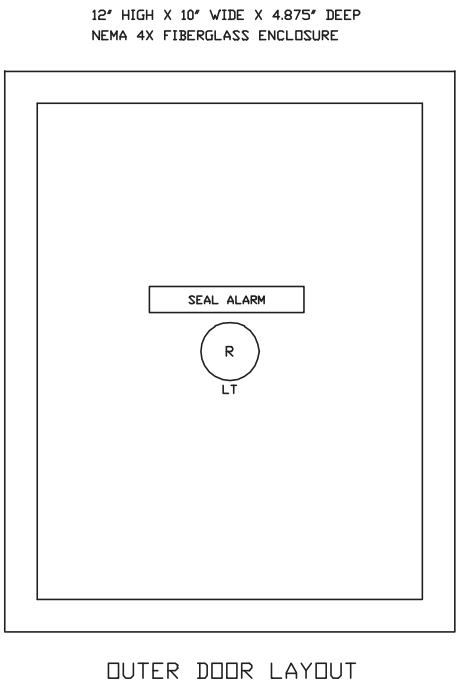
Typical schematic & outer door layout



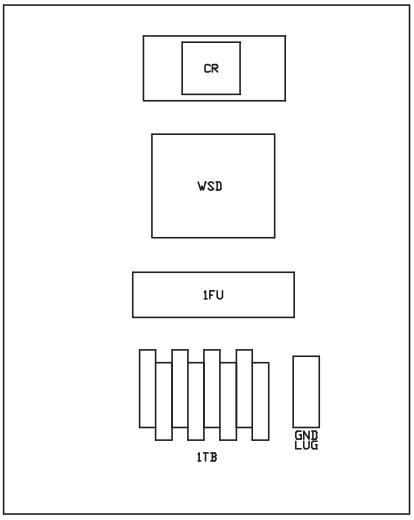
SEALMINDER LOCAL CONTROL	
END ITEM #	POWER SUPPLY
V45-00089-A	115 VOLTS
V45-00089-B	208/230 VOLTS
V45-00089-C	460 VOLTS
V45-00089-D	575 VOLTS



INSTALLER NOTE:
NORMALLY OPEN CONTACT CAN BE WIRED TO A SEPARATE SEAL ALARM PILOT LIGHT.
NORMALLY CLOSED CONTACT CAN BE WIRED INTO MOTOR STARTING CIRCUIT, TO SHUTDOWN MOTOR UPON A SEAL ALARM.



OUTER DOOR LAYOUT



BACKPLATE LAYOUT

OPERATION

The ABS Sealminder system is a solid state device that provides a warning signal when the oil in the individual chamber (oil, motor, connection) reaches a certain level of contamination by water. The contamination level is determined by measuring the resistivity of the oil bath. The resistivity is measured from a probe (di-electrode), installed to extend into the oil, to ground or the motor case. The probe is connected to a lead which runs back through the motor cables and is connected to the #3 sensing lead from the Sealminder relay. The relay will "trip" at a resistance of 90K to 100K ohms or lower, activating a 24 volt DC output on the M (white) lead of the relay. This output can be used to activate a 24 volt DC pilot light or a 24 volt DC auxiliary relay, which in turn can provide multiple output signals. The auxiliary relay is shown below.

MOUNTING

The ABS Sealminder relay can be mounted in any position by means of the mounting lugs on either side. Approximate dimensions are shown below.

ELECTRICAL CONNECTIONS

The ABS Sealminder relay comes in 115 volt, 208/230 volt, 460 volt, or 575 volt models. The relay is CSA approved. A ground fault master unit is required for UL approval. The power (input) leads are the two black leads and are labeled on the package as to the correct line voltage, i.e. labeled as 460V at point where leads enter relay. The output lead (24 volt DC) is white and labeled (M). This should be connected to the line side of a pilot light or the (-) side of a 24 volt DC relay. The common lead is yellow and is labeled (+). The ground lead is green. The probe or sensing input lead is blue and is labeled as (3). This lead should be connected to the probe lead (#3) of the motor cable.

NOTE: The input power leads DO NOT require a transformer connection, using power from any two leads.

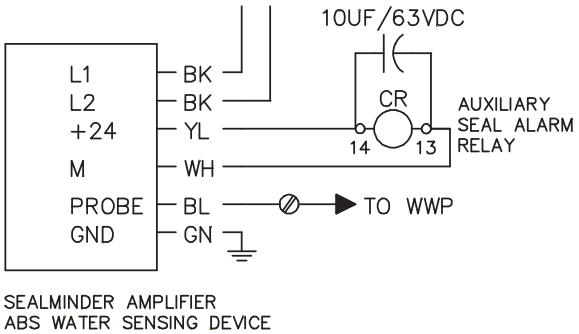
VOLTAGE	PART NUMBER
115V	61240170
208/230V	61240171
460V	61240172
575V	61240173

NOTE:

When coupling the output to a relay, use an IDEC DC relay, part number RH2B-U-DC24V, base part number SH2B-05 or equivalent.

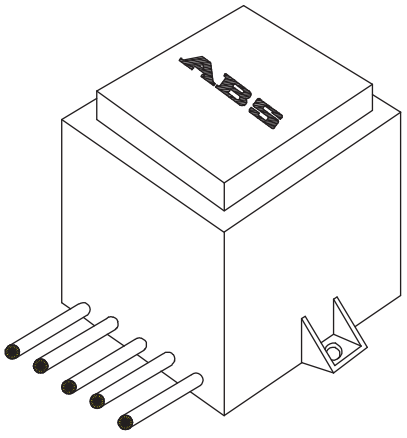
SPECIFICATIONS

Signal strength: 24 volt DC, 5VA
Temperature range: -20° to +60° C



SEALMINDER AMPLIFIER
ABS WATER SENSING DEVICE

Capicitor supplied by others.



UNIT MEASURES 2.00" WIDE X 2.00" DEEP X 1.88" HIGH

ABS DUPLEX PUMP CONTROLLER PC 242

The PC 242 is a duplex pump controller designed mainly to be used in municipal wastewater pumping stations of either gravity or pressurized systems. It is has many advanced features to minimize the costs in the pumping station throughout the whole life-cycle.

The controller includes a graphical display with full user interface.

The level sensing in the pit may be done using either float switches or 4-20 mA sensor.

Viewing of alarms, manual control of pumps and changing of settings etc. can be made locally via the graphical user interface. It can also be done via the configuration software AquaProg at a PC, connected directly to the local service port or remotely via e.g.
modem.

Settings are password protected in two levels to avoid unauthorized or accidental changes.

AquaProg software can be used for backing up the controllers settings on the hard disc, download alarms, events and historical data.

Features:

- **Advanced control of 2 pumps**
- **Communication via GPRS, GSM, tele modem or cable**
- **Logging of analog signals, digital signals and alarms**
- **Level sensing by 4-20 mA sensor or float switches**
- **Mixer/flush valve control**
- **Pump capacity calculation and alarm**
- **Overflow measurement**
- **DIN-rail mounted**

Following values are accumulated and

- Pump start count
- Pump run time
- Overflow count
- Overflow time
- Overflow volume
- Pumped volume
- Energy/rain

Functions:

- Pump run confirmation via motor current orcontactor feedback
- Pump stop after max runtime setting
- Cyclic pump motion timer
- Emergency pump run timer on high float.
- Overflow calculation and monitoring
- Pulse frequency to analog, value conversion(energy/rain inputs)
- Alarm dial-up
- GSM/SMS alarms
- GPRS modem support
- Modbus & Comli communication protocol
- Data logger 8 analog channels 1-60 minute/sample: Level, motor current P1/P2, inflow/outflow, pressure, motor temperature (Pt 100) P1/P2,calculated energy/rain
- Data logger digital: Pump 1/2 on/off, alarmson/off/acknowledged
- SW clock for time and date. Must be set after each power up
- Inflow calculation
- Outflow calculation

Analog inputs:

- 2-wire level sensor 4-20 mA
- Current transformer P1 4-20 mA
- Current transormer P2 4-20 mA
- Pressure sensor for conditional pump blockingin pressurized systems (4-20 mA)

Digital outputs (potential free contacts):

- Pump control P1
- Pump control P2
- Common alarm output
- Mixer control/cleaning control/drain pump control
- Motor protector reset/pump fail P1
- Motor protector reset/pump fail P2

Technical specifications:

Ambient oper. temp:	-20 to +70 °C (-4 to +158 °F)
Ambient storage temp:	-30 to +80 °C (-22 to +176 °F)
Degree of protection:	IP 20
Housing material:	PPO and PC
Mounting:	DIN-rail 35 mm
Humidity:	0-95% RH non condensing
Dimensions (H x W x D):	86 x 160 x 60 mm 3.39 x 6.30 x 2.36 inch
Power supply:	9-34 VDC
Power consumption:	< 150 mA average at 24 VDC
Max load DO relays:	250 VAC 4 A max 100 VA resistive load
Digital input voltage:	5-34 VDC
Digital input resistance:	10 k ohm
Analogue inputs:	0/4-20 mA
Analogue input resolution:	Leval sensor 16 bits Other AI 10 bits
Telemetry interface:	RS 232
PCx component sharing interface:	CAN bus
Data memory (logger):	
Analogue signals:	15 days at 8 channels, 1 min interval
Digital signals and alarms:	4096 events

CE

PC 241/ PC 242 fulfill following council directives and generic standards:
89/336/EEC relating to electromagnetic compability (EMC).
EN 50 081-1:1992 Emission
EN 50 082-2:1995 Immunity
72/23/EEC relating to safety requirements (LVD) EN 61 010-1:1993

CSAU - approval pending

Analog inputs:

- 2-wire level sensor 4-20 mA
- Current transformer P1 4-20 mA
- Current transormer P2 4-20 mA
- Pressure sensor for conditional pump blocking in pressurized systems (4-20 mA)

Digital outputs (potential free contacts):

- Pump control P1
- Pump control P2
- Common alarm output
- Mixer control/cleaning control/drain pump control
- Motor protector reset/pump fail P1
- Motor protector reset/pump fail P2

Telemetry interface:

- 1 RS 232 port connects to modem, radio or other serial communication carrier.
- 1 RS 232 service port

BUS interface:

- CAN bus for future external graphical operator panel and other possible future modules.

Digital inputs:

- High level float
- Overflow sensor
- Start float/run confirmation P1
- Start float/run confirmation P2
- Stop float (common)/ low level float (blocks pumping)
- Motor protector P1
- Motor protector P2
- Manual start of pump 1
- Manual start of pump 2
- P1 not in auto/pump fail
- P2 not in auto/pump fail
- Energy or rain meter 1
- Energy or rain meter 2
- Alarm reset

Integrated amplifiers:

- Leakage monitor (integrated DI amplifier with differential inputs) P1
- Leakage monitor (integrated DI amplifier with differential inputs) P2
- Temperature monitor. Integrated amplifier for PTC orPt100 sensor (Klixon) P1
- Temperature monitor. Integrated amplifier for PTC orPt100 sensor (Klixon) P2

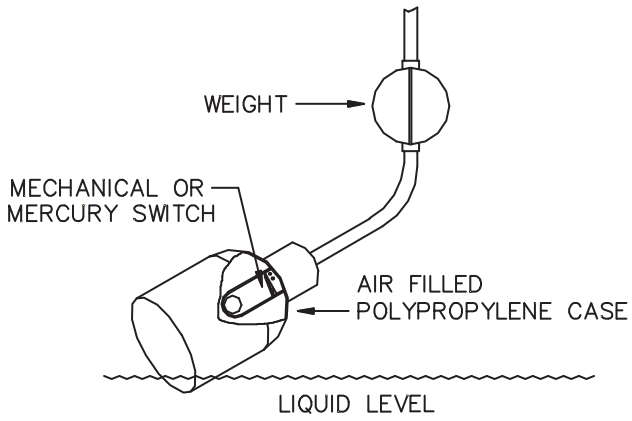
SULZER

abs

PC 242 US 2007-04-19 | We reserve the rights to alter specifications due to technical developments.

The ABS mercury or mechanical float switch is a direct acting float switch. The float is a chemical resistant polypropylene air filled casing with a single pole mechanical (or mercury) switch and electrical cable permanently encapsulated in the float to form a completely water tight and impact resistant unit. The switch actuates when the longitudinal axis of the float is horizontal and deactivates when the float falls 1 inch below the actuation level. Switch rating 13A @ 120V, 6.5A @ 230V. UL CSA approved.

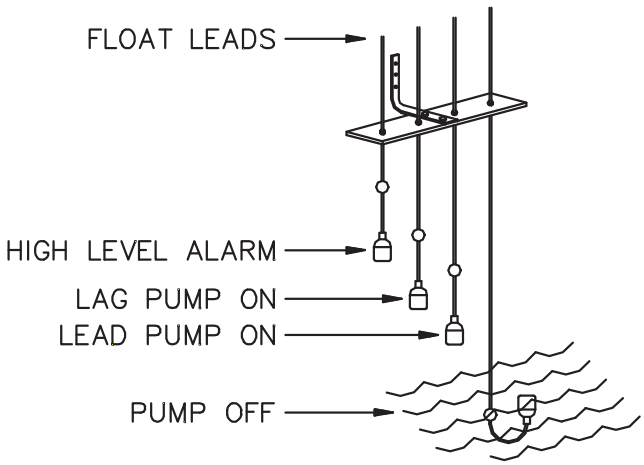
Cable Length	**Mercury**	**N.O.**	**N.C.**
15 ft	12806801	12806001	12806005
30 ft	12806802	12806002	12806006
60 ft	12806803	12806003	12806007
90 ft	12806804	12806004	12806008
120 ft	12806805	12806009	12806010



NOTE: ABS floats are pilot duty devices. They cannot be used to directly power motors. Do not use
floats in gasoline or other combustibles.

FLOAT BRACKET

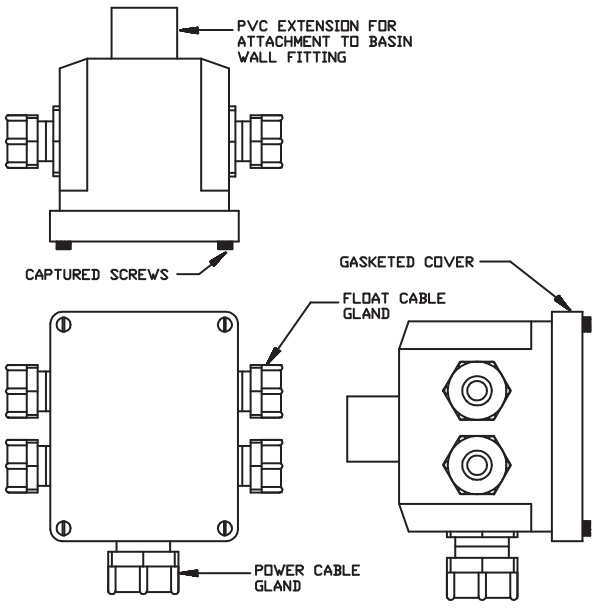
A float mounting bracket is available for attachment to the access cover or to the wet well wall. The ABS float bracket is constructed of 1 ½" x ¼" thick aluminum flat bar and incorporates a PVC cable gland for securing each float without damaging the cable. This also permits simple float length adjustment with the use of standard tools. The bracket is available in either 3, 4, or 5 float support combination. Either version is capable of being mounted with a 3 1/4" reach or a 6" reach from the mounting surface by simple disassembly and reversal of the float support mounting bracket.



Number of Floats	Part Number
3	4142525Y
4	4142526Y
5	4142536Y

JUNCTION BOX

An ABS junction box is constructed of Noryl and is available in either a simplex model or a duplex model. The junction boxes are NEMA 4X. The junction box comes complete with power cable gland, float cable glands, gasketed cover, and captured stainless steel screws. The simplex junction box has a hinged cover and a 1¼ inch socket pipe fitting for connection to the basin wall. The duplex junction box has a removable cover and a 1½ inch fitting. (Duplex shown)



	Part Number
Simplex	6002002-1
Duplex	6002002-2

ABS submersible pressure sensor HSC2

Description
HSC2 is a microprocessor based 2-wire loop powered submersible hydrostatic level sensor used for level measuring in fluids. The HSC2 gives a 4-20 mA signal, which is proportional to the level of the fluid.

The output signal is connected to the mA input of for example set point relays, chart recorders, indicating instruments, PLC, pump controllers etc. The level sensor has a ceramic pressure sensor which can withstand very high overpressures.

Measuring principle
The front side of the membrane senses the pressure of the liquid column, which is proportional to the level of the liquid and the atmospheric pressure, which is variable.

The change in atmospheric pressure effects the measurement and gives a measuring error. To eliminate this error the atmospheric pressure is passed to the backside of the membrane through an air hose in the sensor cable.

HSC2 can be adjusted and calibrated from a personal computer with the calibration system CB2 (accessory), which consists of a calibration box and a Windows program. The calibration box has an interface to enable communication between a personal computer and the sensor, and a precision instrument to measure the sensors mA-output signal.

Features:
- High overpressure
- Very robust, all stainless steel
- Programmable sensor with ceramic membrane
- High accuracy
- Integrated overvoltage protector
- Measuring ranges 1-40 mH_2O
- Non clogging, due to open membrane design

Measuring range	Max. overpressure
0-3.3 ftH_2O	-0,10.9 psi
0-6.6 ftH_2O	87 psi
0-13.1 ftH_2O	87 psi
0-33 ftH_2O	145 psi
0-66 ftH_2O	261 psi
0-131 ftH_2O	363 psi

Technical specifications

Description	
Output signal:	2-wire, 4-20 mA proportional to the media level
Supply:	9-60 VDC
Inaccuracy:	**or = ±0,15 % F.S./°C** (Sum of nonlinearity, hysteresis & repeatability)
Temp. shift Zero point:	**or = ±0,1 % F.S./°C**
Temp. shift Span:	**or = ±0,1 % F.S./°C**
Long term stability:	**or = ±0,15 % F.S./year** (F:S:=the range of the pressure cell)
Ambient temperature:	-4 to 140 °F compensated -22 to 140 °F uncompensated
Material:	Acid proof steel SS2343/1.4404/316L, Al_2O_3 (Aluminium oxide) and FPM (Viton)
Cable:	PVC, 5 x 0,5 mm^2 with shield and integrated air hose.
Encapsulation:	IP 68
Weight:	1.7 lb + 0.2 lb / cable

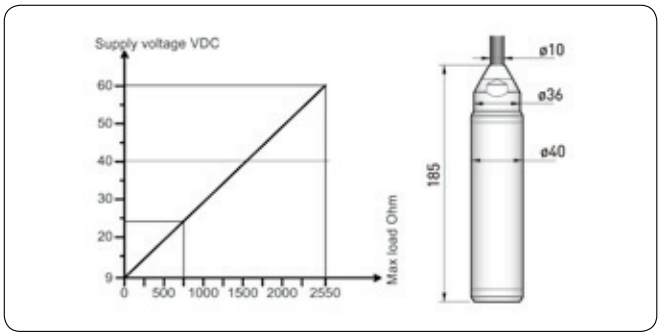
Mounting

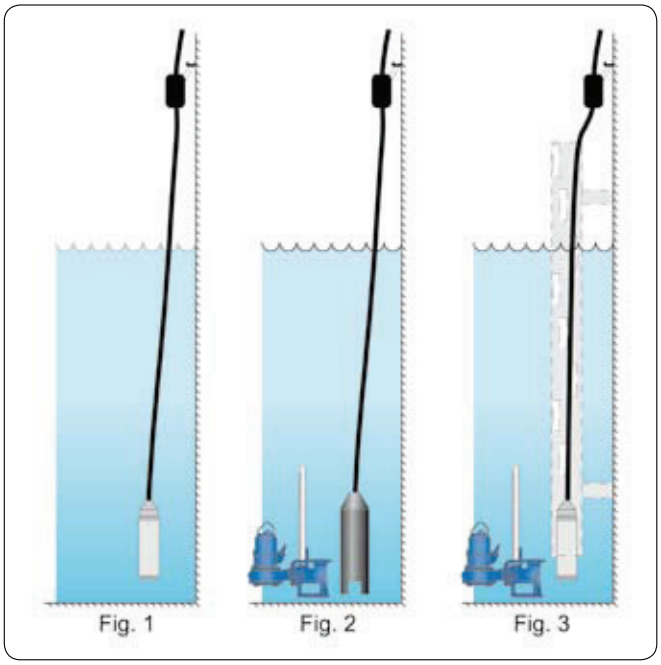
Aeration
The air hose in the cable of the sensor must be in connection with the atmospheric pressure. This means that if the sensor cable is connected inside an airtight box, this box must be airated.

Mounting in fluid without turbulence
Normally the HSC2 can be mounted hanging freely in the delivered cable hanger and not touch the bottom. See fig 1.

Mounting in liquid with turbulence
If there is a strong turbulence, we recommend that the weight is mounted. See fig 2. Alternatively the sensor is protected inside a pipe, with an inside diameter of at least 2 in, which is mounted vertical alongside the tank or pit wall to above 4 in from the bottom. See fig 3.

The HSC2 is lowered through the tube until its lower end is free of the tube, but still free from the bottom. Slots in the tube prevent floating sludge to collect in the tube which can make lifting of the sensor difficult.





Accessories

Calibration systeme CB2
- Calibration box
- Net adapter
- Connecting cable for PC
- 3 connectors

Weight
Weight in bluepainted cast iron, weight 4.4 lb

DESCRIPTION and OPERATION

HSC2 is a sewage water resistant, stainless steel encapsulated, submersible, hydrostatic level sensor of high accuracy. It is designed for level measurement in liquids like storm water and wastewater in pump sumps. When connected in series with a DC power supply, the HSC2 gives a 4 to 20 mA output signal which is proportional to the level of the liquid.

The output signal can be connected to the mA – input of set point relays, chart recorders, indicating instruments, PLC, pump-controls, etc. The number of devices in series and the length of the cable from sensor to the devices are dependent on the supply voltage. The ceramic sensing element can withstand very high overpressures without damage.

MEASURING PRINCIPLE

The level sensor has a pressure sensor of the piezoresistive type with a silicate glass membrane. The front side of the membrane senses the pressure of the liquid column, which is proportional to the level of the liquid. To eliminate the measuring error caused by the change of the atmospheric pressure the backside of the membrane is subjected to the atmospheric pressure through an air hose in the sensor cable.

APPLICATION

The HSC2 sensor sends a 4 – 20 mA signal, which is proportional to the level of the fluid. The output signal is connected to the mA input of for ex. set point relays chart recorders, indicating instruments, PLC, pump controllers i.e.

The sensors are normally mounted in pump pits for measuring the level of storm water and sewage water. The sensors are also used to measure water levels in rivers, levels in low/high reservoirs etc.

The sensor can also be used to measure the level of other types of liquids. Parameters to be considered are among others density, temperature, if the sensor material withstands the media etc.

SPECIFICATIONS

- Capacitive sensor element with ceramic membrane
- High overpressure resistant
- Long term stability <0,15% year
- Output 4-20 mA loop powered, 9-60 VDC
- Integrated over voltage protection
- Material: Acid proof steel SS2348 (316L), Noryl and PE cable
- Cenelec Ex approved, zone 1 & 2 without external zener barrier

STYLE	PART NUMBER
HSC2 submersible pressure transducer , 0-130’ range,	C/F

Specifications subject to change without notice

LEVEL CONTROL TRANSDUCER

AQUALEVEL HSC2

Dwg: DS-C00-223 **Rev:** **Date:** 5/04 **Section** **Tab** **Page**

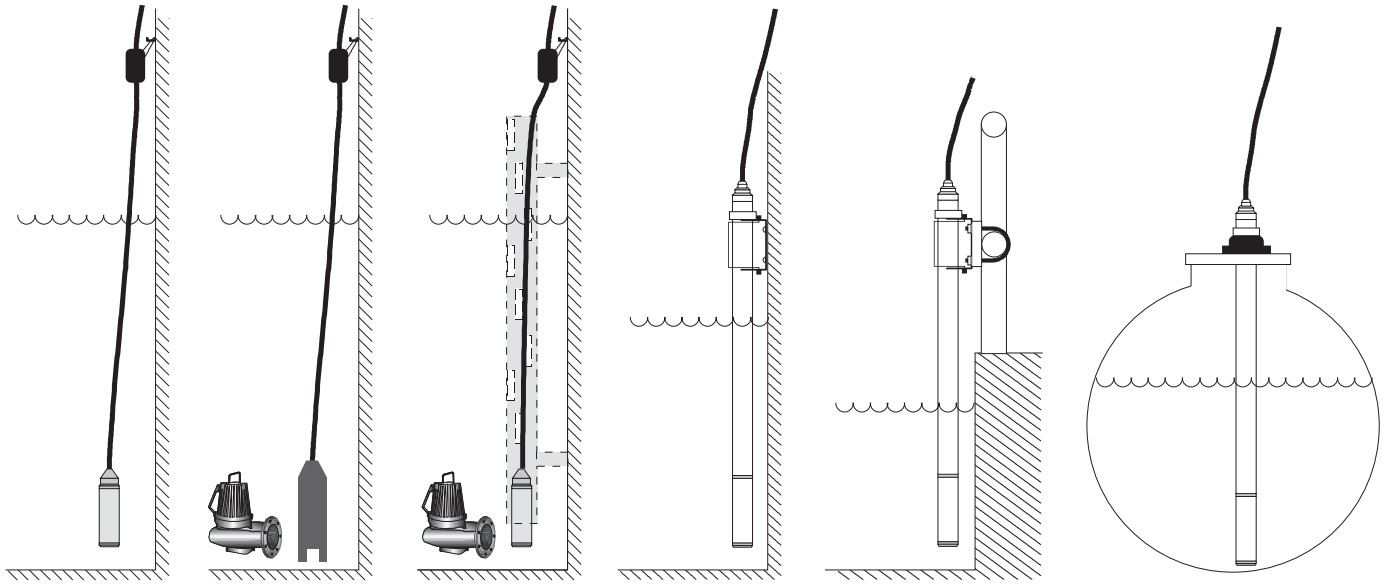
The ABS Aqualevel HSC2 is supplied with a standard 39 ft cable and a 13ft range. Please consult factory if different range transducers are required.

Type ABS	**HSC2**
Type	Submersible hydrostatic level sensor
Materials	
Cable	PE, halogen free
Body	1.4404 (316L) acid resistant + PRO
Membrane	Ceramic, Al_2O_3
Dimensions	
Body	1.5 x 7.25 in
Cable	32 ft, with compensation air hose
Stud	n.a.
Type of sensing element	Capacitive, temp. compensated
Measuring range	13/ 32 ft water column
max. overpressure (peak)	196 / 328 ft water column
Power supply	
standard	9 to 60 VDC
EEx zone 1 & 2	9 to 30 VDC
Output signal	4 to 20 mA
Linearity, repeatability, hysteresis	±0.15 % FS
Temp. shift zero point & span	< ±0.01 % FS/°C
Long term stability	< ±0.015 % FS/year
Ambient temperature	
standard	-4 to +158 °F
Transient protection	10 kV
CE approval	Yes

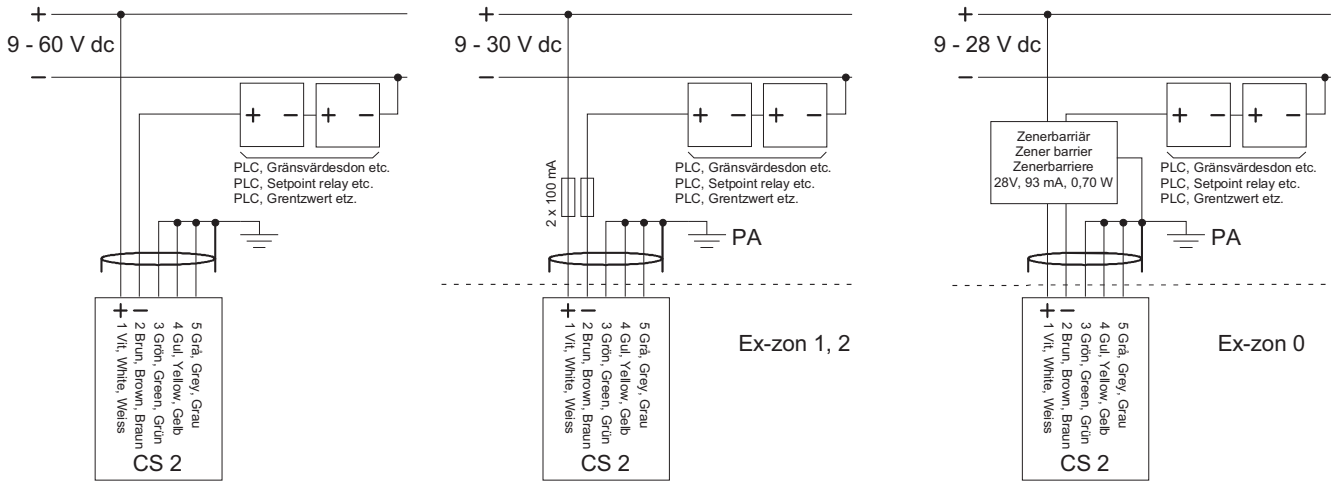
Specifications subject to change without notice

LEVEL CONTROL TRANSDUCER	AQUALEVEL HSC2
Dwg: DS-C00-223 **Rev:** **Date:** 5/04	**Section** **Tab** **Page**

INSTALLATION



ELECTRICAL CONNECTION



Specifications subject to change without notice

SULZER

abs

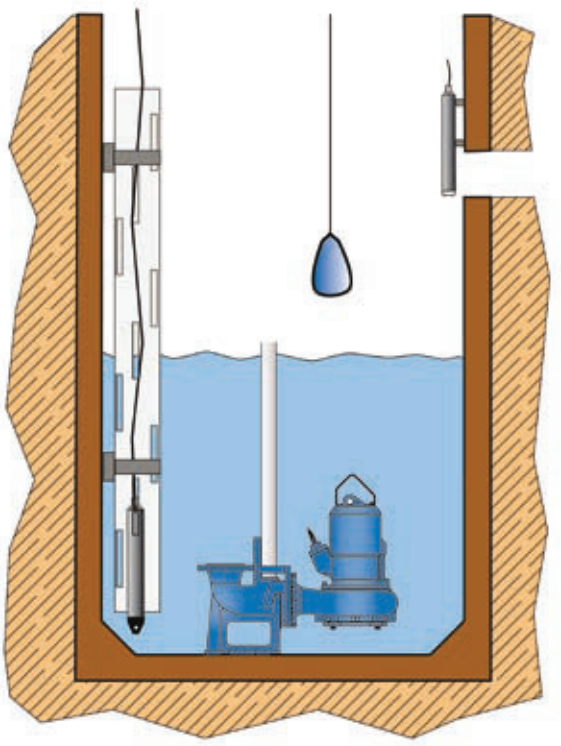
ABS submersible pressure sensor HSR (2-wire)

Features:

- Piezoresistive fullbridge with temperature compensation
- Gas- and water tight
- Material: PVC, silicate glass
- Temperature range, -4 °F to 140 °F
- Output signal: 4-20 mA, fixed to the measuring range

Technical specifications

Description	
Material:	
Cable:	PVC
Body:	PVC
Membrane:	Silicate glass
Dimensions:	
Body:	ø 1.3 in x 10.6 in (Diameter x Length)
Cable:	Screened 4-wire with aeration hose, 2-wires are used. Length, 40 ft Diameter, ø 0.39 in
Construction:	Gas and water tight
Sensing element:	Piezoresistive fullbridge with with temp. compensation
Measuring range:	0-11.4,0-16.4,0-32.8 ftH_2O
Max overpressure:	32 ftH_2O or 98 ftH_2O (3 times)
Power supply:	9.0 VDC to 60.0 VDC
Output signal:	4-20 mA, fixed to the sensors measuring range
Option:	4-20 mA, on customer request within 2-3.5 mWG or 5-10 mWG
Temperature range:	-4 °F to 140 °F
Compensated range:	32 °F to 122 °F
Linearity, repeatability and hysteresis:	±0.5% of measuring range [%FSO]
Long term stability:	±0.5% of measuring range [%FSO]
Temperature shift:	77-32 °F, 77-122 °F ±2% [%FSO]
Transient prot., voltage:	10 kV
Transient prot., current:	2 500 operations at 10 A (10/1 000 ms) 500 operations at 500 A (10/100 ms)

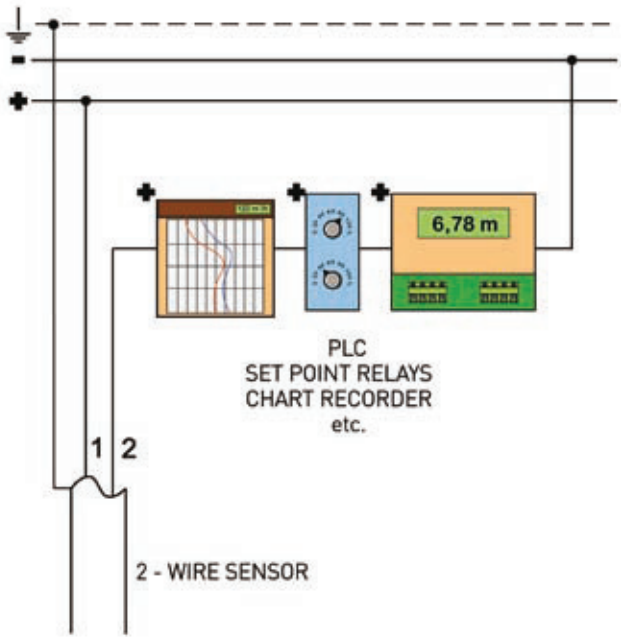


Mounting pressure sensors HSR
In pits or tanks without turbulence the sensor can be mounted hanging freely in its cable.

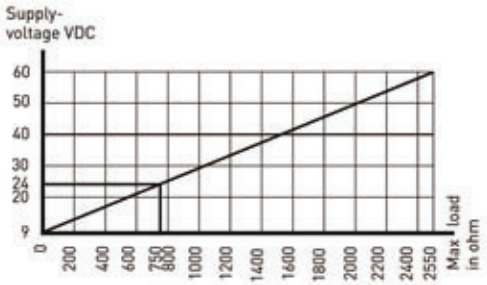
If there is a strong turbulence we recommend that the sensor is protected inside a pipe, with a diameter of at least 2.0 in, which is mounted vertical alongside the tank or pit wall.

CE
HSR conform with the following Council Directives and Generic standards:
89/336/EEC
relating to electromagnetic compability (EMC)
EN 50 081-1:1992 Emission
EN 50 082-2:1995 Immunity

73/23/EEC
relating to safety requirements (LVD)
EN 61 010-1:1993



Load diagram



ABS submersible pressure sensor HSR US 2009-07-08 | We reserve the rights to alter specifications due to technical developments.

DESCRIPTION and OPERATION

HSR is a sewage water resistant, PVC encapsulated, 2-wire loop powered, submersible, hydrostatic level sensor. It is designed for level measurement in liquids like storm water and wastewater in pump sumps. When connected in series with a DC power supply, the HSR gives a 4 to 20 mA output signal which is proportional to the level of the liquid.

The output signal can be connected to the mA – input of set point relays, chart recorders, indicating instruments, PLC, pump-controls, etc. The number of devices in series and the length of the cable from sensor to the devices are dependent on the supply voltage. The silicate glass-sensing element can withstand moderate overpressures.

MEASURING PRINCIPLE

The level sensor has a pressure sensor of the piezoresistive type with a silicate glass membrane. The front side of the membrane senses the pressure of the liquid column, which is proportional to the level of the liquid. To eliminate the measuring error caused by the change of the atmospheric pressure the backside of the membrane is subjected to the atmospheric pressure through an air hose in the sensor cable.

APPLICATION

The HSR sensor sends a 4 – 20 mA signal, which is proportional to the level of the fluid. The output signal is connected to the mA input of for ex. set point relays chart recorders, indicating instruments, PLC, pump controllers i.e.

The sensors are normally mounted in pump pits for measuring the level of storm water and sewage water. The sensors are also used to measure water levels in rivers, levels in low/high reservoirs etc.

The sensor can also be used to measure the level of other types of liquids. Parameters to be considered are among others density, temperature, if the sensor material withstands the media etc.

SPECIFICATIONS

- Piezoresistive full bridge with temperature compensation
- Gas- and Water tight
- Temperature range: -4^{o} F to + 140^{o}F
- Output 4-20 mA loop powered, 9-60 VDC
- Integrated over voltage protection

STYLE	**PART NUMBER**
HSR submersible pressure transducer , 0-130ft range	C/F

Specifications subject to change without notice

The ABS Aqualevel HSR is supplied with a standard 39 ft cable and a 11.5ft range. Please consult factory if different range transducers are required.

Type ABS	**HSR**
Type	Submersible hydrostatic level sensor
Materials	
Cable	PVC
Body	PVC
Membrane	Silicate glass
Dimensions	
Body	1.25 x 10.6 in
Cable	32 ft, with compensation air hose
Stud	n.a.
Type of sensing element	Piezoresistive, temp. compensated
Measuring range	10 / 32 ft water column
max. overpressure (peak)	34 / 96 ft water column
Power supply	
Standard	9 to 60 VDC
EEx zone 1 & 2	n.a.
Output signal	4 to 20 mA
Linearity, repeatability, hysteresis	±0.5 % FS
Temp. shift zero point & span	±2 % FSO
Long term stability	±0.5 % FS
Ambient temperature	
Standard	-4 to +140 °F
Eex	n.a.
Transient protection	10 kV

Specifications subject to change without notice

TYPICAL INSTALLATION

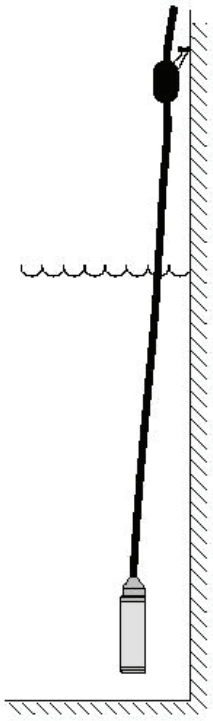


Fig. 1

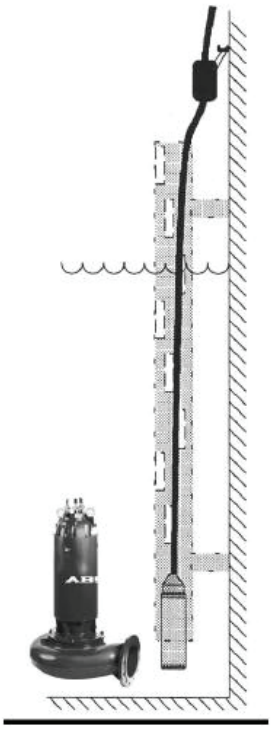


Fig. 2

ELECTRICAL CONNECTION

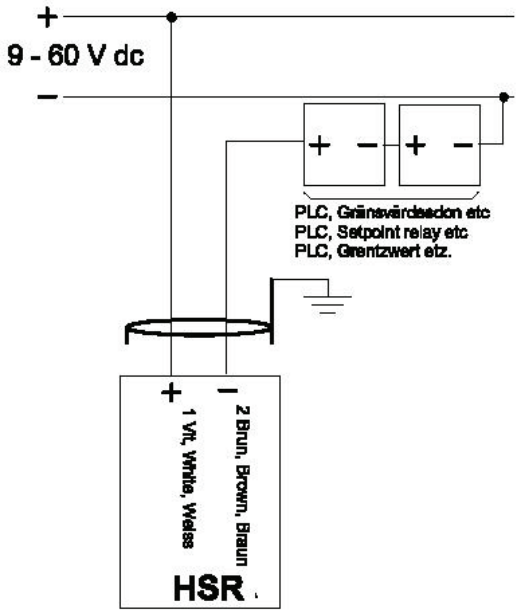


Fig. 3

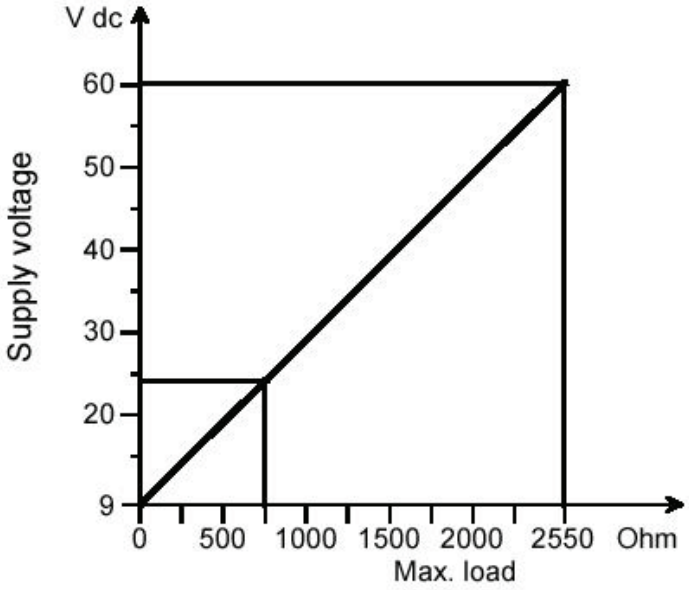


Fig. 4

Specifications subject to change without notice