



Specialist for Pumping Technology

Session 36– Engineered Packaged Pumping Systems

Simon Smith Nov 2024



Presenter Profile – Simon Smith

Simon graduated with an honours degree in Chemical Engineering from the University of Surrey in 1978 and began a long career in the engineered pump industry spanning 44 years (so far!) with Peerless Pump, BW/IP International / Flowserve, SPP Pumps, Ruhrpumpen and Ebara Cryodynamics.

Over his long career he has filled various roles as Applications Engineer / Manager, Project Manager, Key Account Specialist, Vertical Pump Product Specialist, International Sales Engineer / Manager / Director and he has considerable experience in Training & Mentoring young engineers.





Ruh*RP*umpen Short Courses

Here is a listing of all the previous courses.

- No 1 – API610 12th v 11th editions
- No 2 - Curve Shape (1)
- No 3 – The Importance of System Curves (1)
- No 4 - Selecting the Right Pump for the Application
- No 5 - NPSH & Nss
- No 6 - Mechanical Seals & Systems (1)
- No 7 - Firepumps
- No 8 - BB5 Barrel Pumps
- No 9 - Pump Instrumentation
- No 10 – Non-Destructive Examination
- No 11 - Vertical Pumps (Part 1) Type VS1, VS2, VS3
- No 12 – Vertical Pumps (Part 2) Type VS4, VS5, VS6 & VS7
- No 13 – Performance Testing of Centrifugal Pumps; the What, the Why & the How
- No 14 – Testing & Inspection of API 610 Pumps
- No 15 – Start-Up, Commissioning & Troubleshooting Centrifugal Pumps
- No 16 – Introduction to Positive Displacement (Plunger) Pumps
- No 17 – Refresher Session
- No 18 – Overhung Process Pumps OH1 & OH2

Continued next slide

Any you have missed you can get from our website www.ruhrumpen.com

and follow the menu bar link to [RP Short Courses](#)

Ruhr*RP*umpen Short Courses

Here is a listing of all the previous courses. Contd

- No 19 – Vertical Overhung Process Pumps OH3-OH6
- No 20 – New Developments in the VS6 Market
- No 21 – BB4 Multistage Pumps for the Power Industry
- No 22 – Coking Process and Hydraulic Decoking Equipment
- No 23 – Pumps for the Desalination Market
- No 24 – Cryogenic Pumps
- No 25 – Magnetic Drive Pumps
- No 26 – Mechanical Seals & Systems (2)
- No 27 – The Importance of System Curves (2)
- No 28 – NPSH & Nss Made Simple (2)
- No 29 – Curve Shape, Head Rise & Allowable Tolerances (2)
- No 30 – Selecting the Right Pump for the Application (2)
- No 31 Comparison of API610 12th & 11th Editions (2)
- No 32 Pump Instrumentation (2)
- No 33 Handling Viscous Fluids with Centrifugal Pumps
- No 34 Fire Pumps for the Oil & Gas Industries (2)
- No 35 Vertical Sump Pumps (Type VS4)

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Ruh*RP*umpen Short Courses

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More Articles

- Introducing the new Ruhrpumpen Website
- Impeller Lift Procedure
- Newsletter Ruhrpumpen Fire Systems - December 2022
- VTP pumps for major water transfer project in Bolivia
- COVID-19 UPDATE
- Introducing the RP ANSI Process Pump Range
- Ruhrpumpen Resources
- Coolant System Maintenance
- RP delivers API 674 pumps for Gas Dehydration Package in Algeria
- Packing strips and packing gland tightening procedure

All Courses

Don't miss our
short course #25

COMING SOON



Simon Smith
Solutions Expert





RuhRPumpen Short Courses

SHORT COURSE 32

Pump Instrumentation

- Full Session
- Download presentation
- Q&A Report

SHORT COURSE 33

Handling Viscous Fluids in Centrifugal Pumps, & Handling Slurries in Centrifugal Pumps

- Full Session
- Download presentation
- Q&A Report
- Viscosity Correction Calculations

SHORT COURSE 34

Firepumps for the Oil & Gas Industries

- Full Session
- Download presentation
- Q&A Report

SHORT COURSE 35

Vertical Sump Pumps - VS4

- Full Session
- Download presentation
- Q&A Report

Session No / Topic	Downloads
7 Firepumps	3,747
8 Barrel Pumps	3,904
9 Instrumentation	8,309
10 NDE	4,701
11 Vertical Pumps VS1,2,3	11,726
12 Vertical Pumps VS4-7	10,169
13 Perf Test & Inspection Part 1	10,317
14 Perf Test & Inspection Part 2	10,370
15 Startup & Commissioning	8,491
16 PD Pumps	8,858
17 Refresher	2,969
18 OH2 vs OH1	5,766
19 OH3-OH6	5,961
20 VLT	9,913
21 BB4	8,202
22 Decoking	1,788
23 Desalination	2,284

Session 36 – Engineered Packaged Pumping Systems

*For those occasions when you would prefer to buy a **complete engineered pumping package** rather than buying just the pumps from a pump supplier and having to design, purchase and build the rest of the installation yourselves (skids, enclosures, piping, valves, heat exchangers, filters, control equipment, instrumentation, engineering etc). RuhRPumpen has the expertise and experienced engineering teams to meet your needs however great or small.*

Aimed at Process and Mechanical Engineers and Consultant Engineers specifying equipment for refineries, oilfields, and general industrial installations; and at Applications & Sales Engineers selecting and quoting them.

Engineered Systems

Why Buy a Complete System vs Building it Yourself?

1. Single source responsibility for the entire system

It requires time, effort and resources to ensure a successful implementation of a “system”...let us make this easy for you as we design/engineer/fabricate it complete.

2. Turnkey - One stop solution.

It's a plug and play into the process flow at your facility, just connect at tie-ins...it is as simple as that.

3. Lower administrative costs.

We take care of procuring all the many components in the system...a lot of time saved for you as you no longer need to concern yourself with issuing RFQs / evaluation / ordering / expediting etc.

4. Manage cash flow.

Much easier to manage cash flow if a single order is placed with one supplier.

Engineered Systems

Why Buy a Complete System vs Building it Yourself?

5. Reduced risk.

A single point of contact (SPOC). You are managing one supplier not many.

Decreasing the number of companies involved in a project greatly decreases the chances for mistakes.

6. Minimise design discrepancies.

Information is quickly & seamlessly transferred to a single supplier which improves quality.

7. Reduce the decision cycle.

Buying from one company ensure smooth communication/quicker decisions/better control by the customer of their project schedule and minimize the installation time.

8. Minimise construction time.

Reduces site erection time and cost will result in improving overall project schedule.



Engineered Systems

Why Buy a Complete System vs Building it Yourself?

9. Use our manpower not yours.

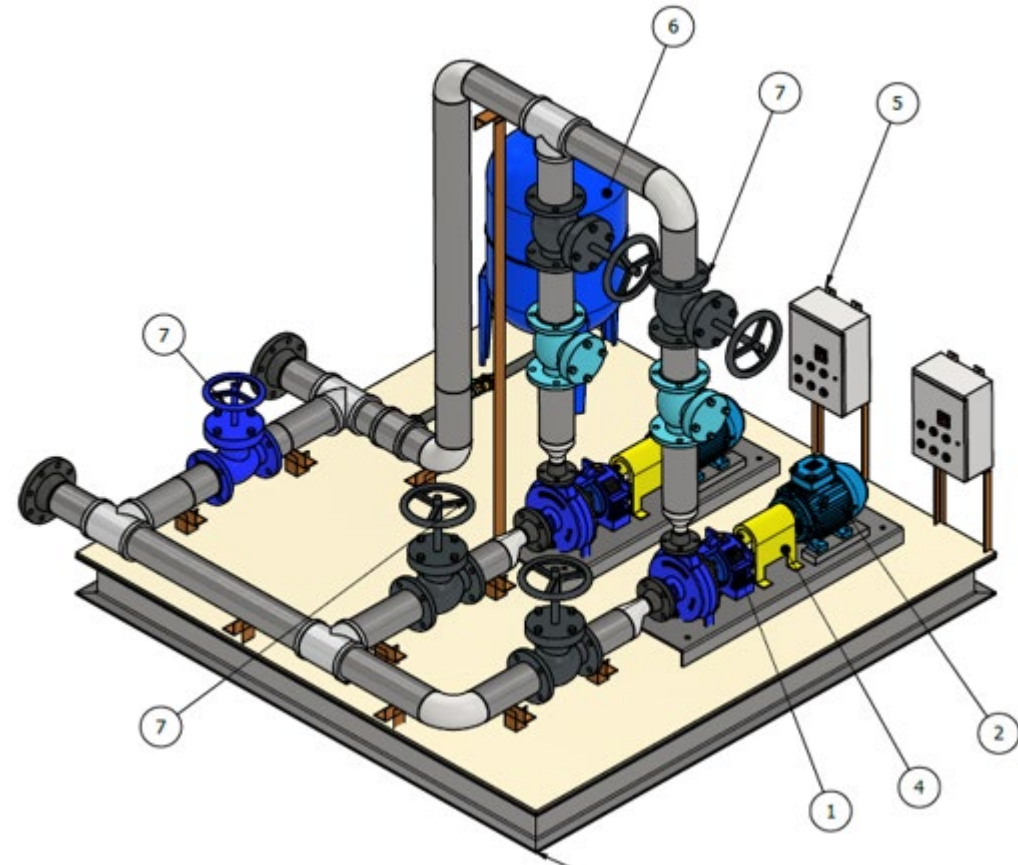
At a time where many companies are operating with *fewer* staff, we have been *hiring* highly trained and experienced Package Engineers.

So you can reserve your most skilled engineers to work on critical projects and use our highly skilled and trained engineers to handle suitable packages within your overall project scope .

Engineered Systems

Common Types of Engineered Systems RuhRPumpen Can Supply

- Heat Transfer / Hot Oil
- Process cooling systems
- Skid mounted multi-pump oil pipeline pumping systems
- Multistage centrifugal transfer pump systems
- Boiler Feed Systems
- Low Pressure Engineered Pump Systems
- High Pressure Engineered Pump Systems





Engineered Systems



Pumps



Drives



Coating



Steel base



Piping



Engineered Systems



Control
Panels



Enclosures

DIFFERENT TYPES OF VALVES USED IN PIPING



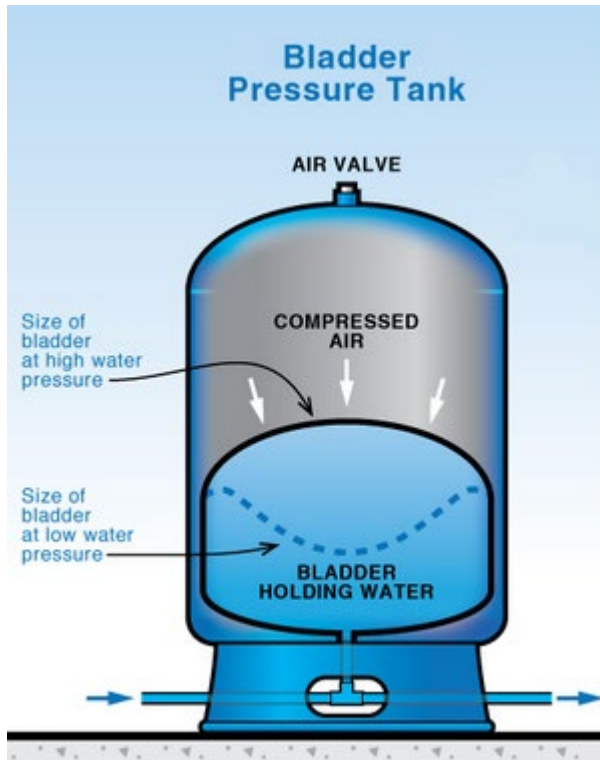
Valves



Instrumentation



Engineered Systems



Bladder
Tanks



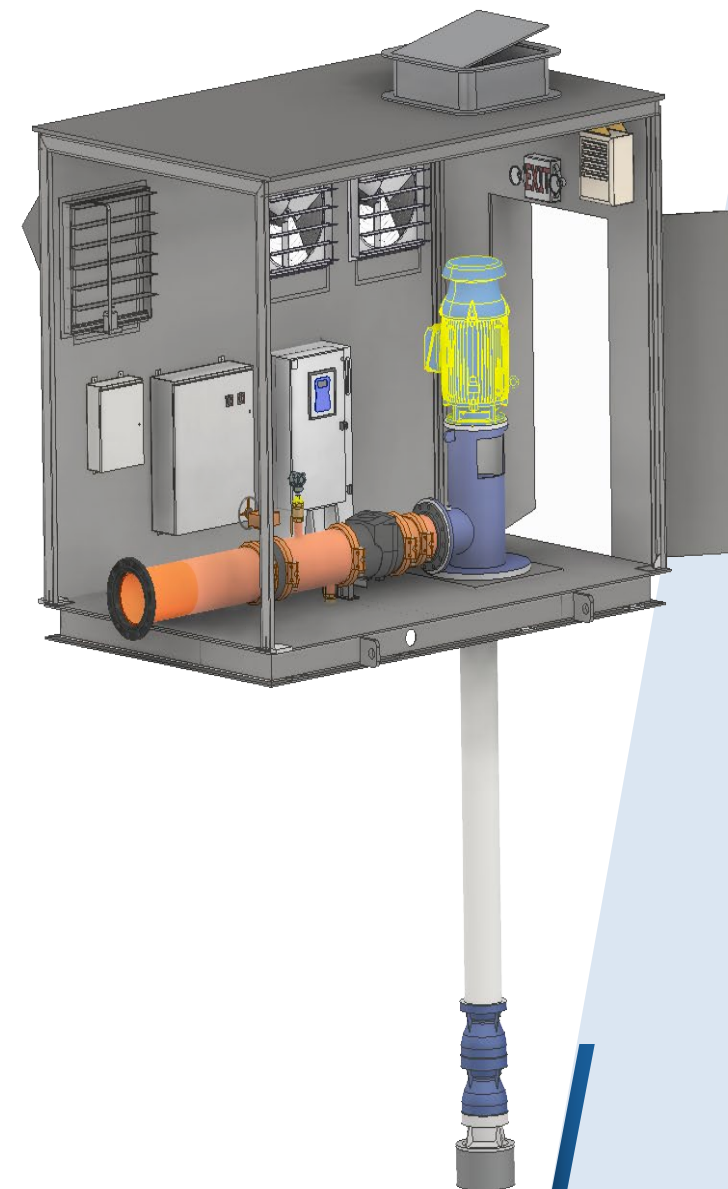
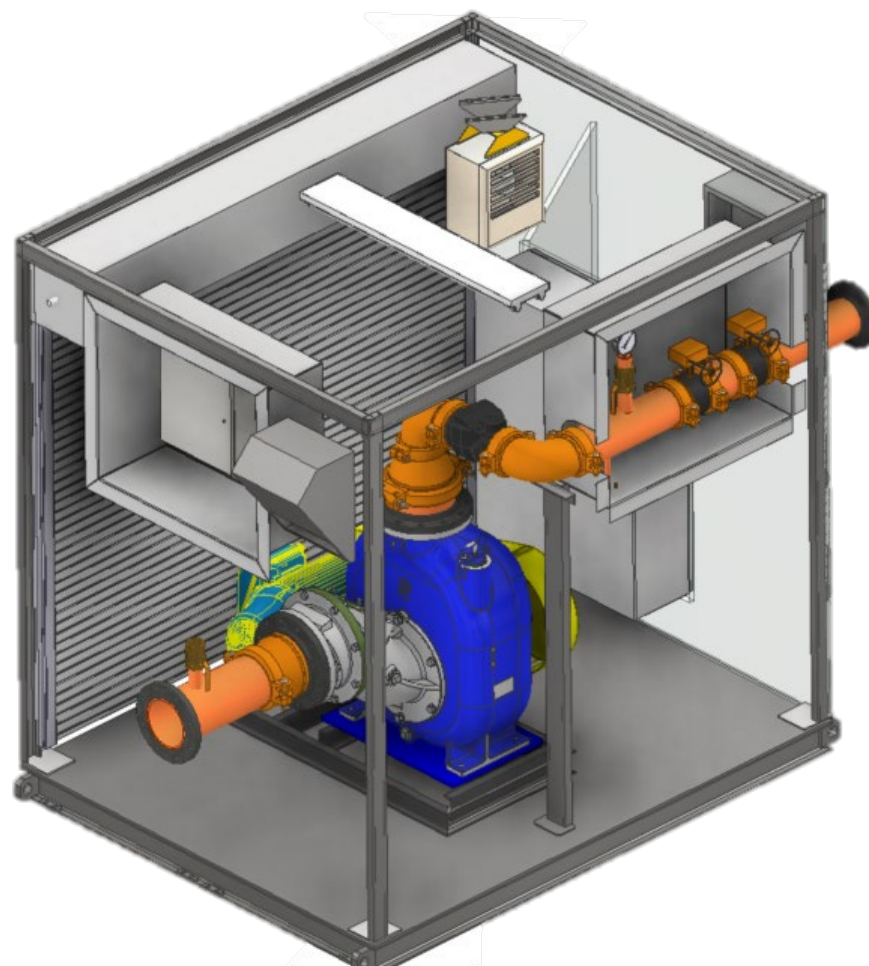
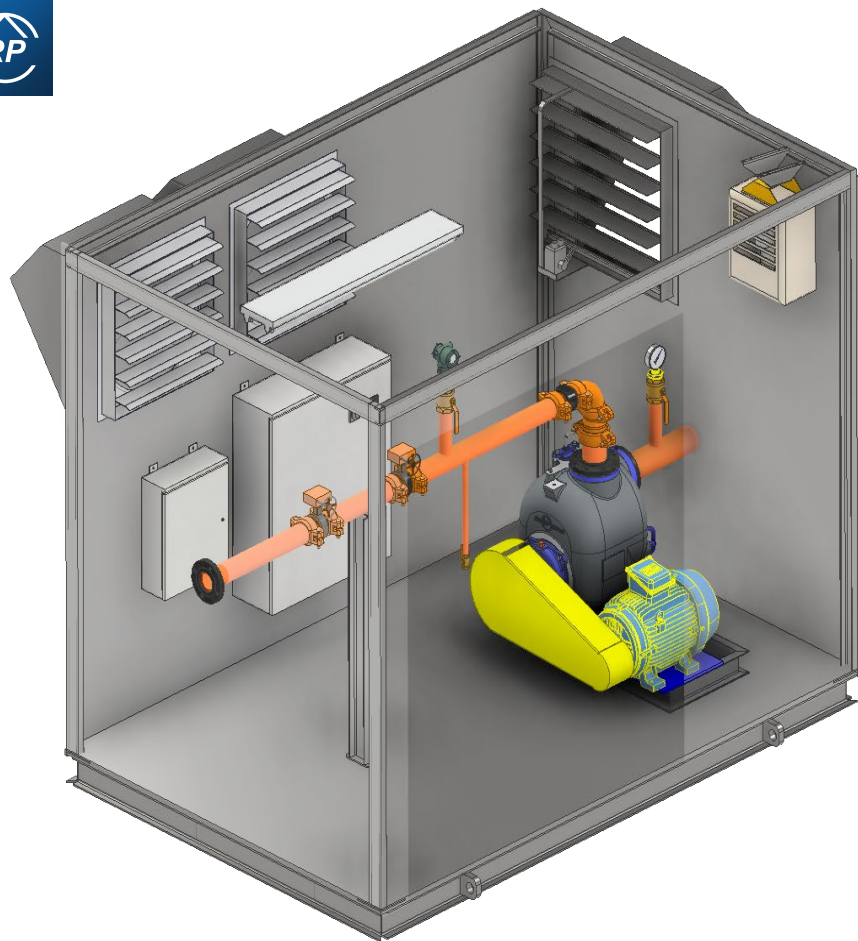
Variable
Frequency
Drives



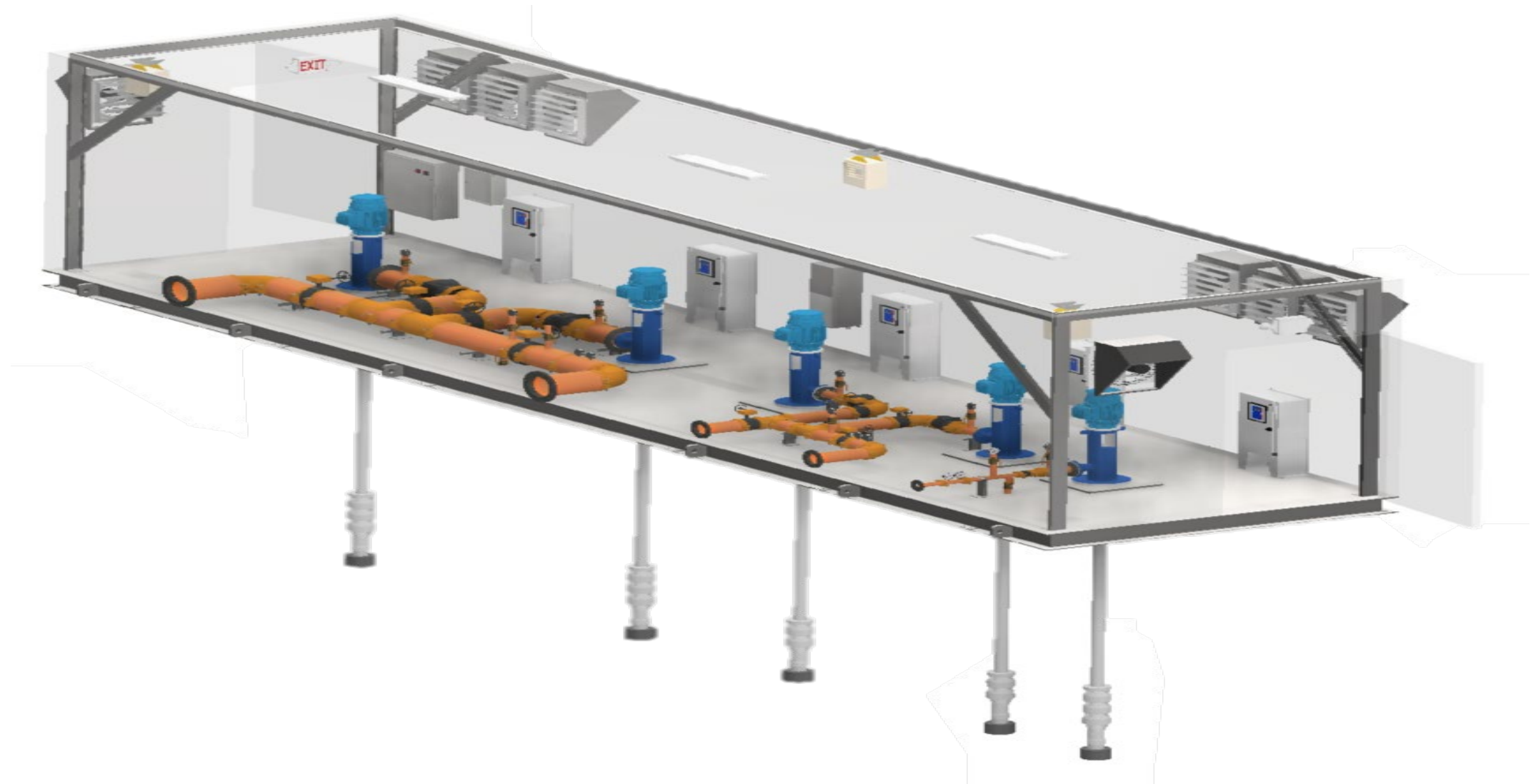
Heat
Exchangers



Pump - Shelters

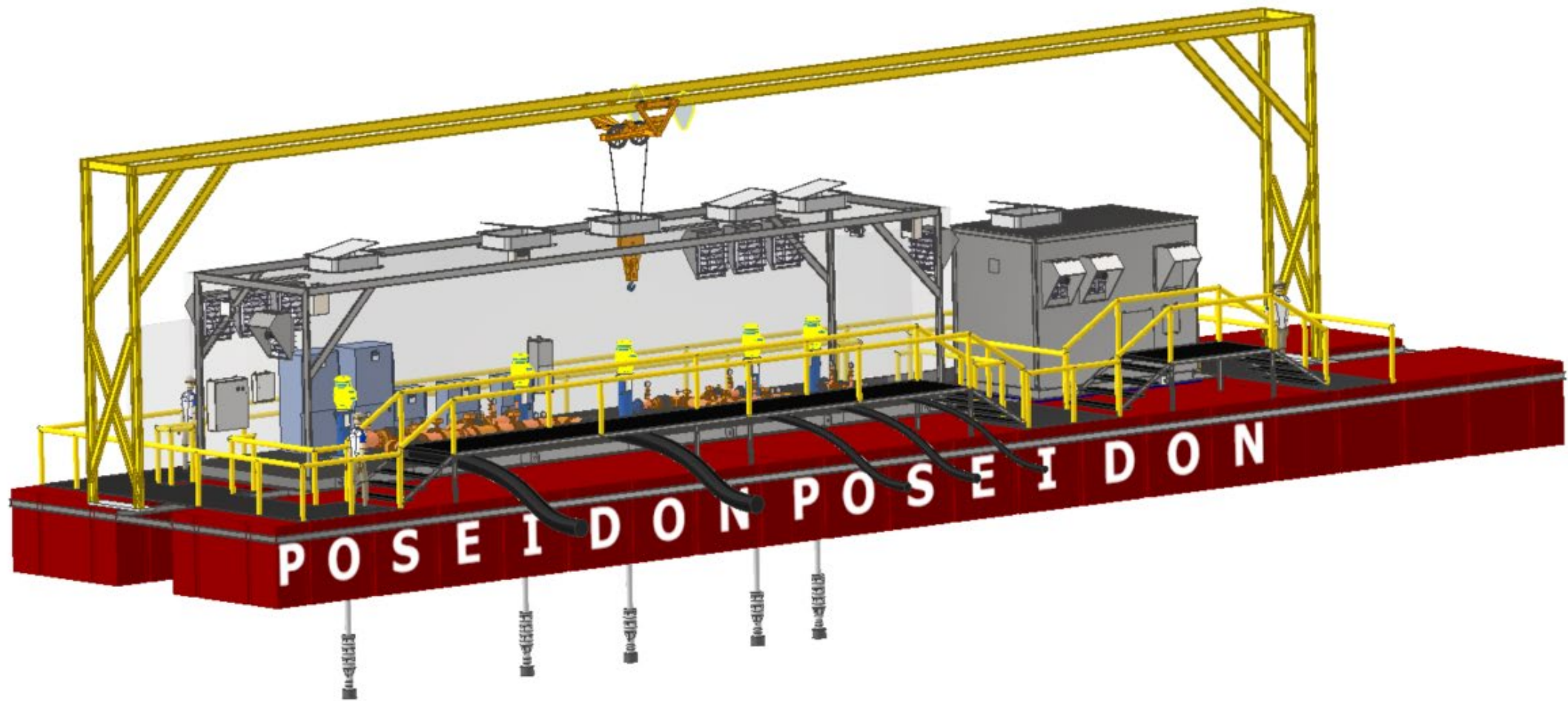


Pump Rooms





Pump Room on Barge



Engineered Systems

Why Buy a Complete System vs Building it Yourself?

Example Proposal #1

- Low Complexity
- 2 Cooling Water Pumps (OH1) (232usgpm @ 26psig)
- Bladder Tank
- 2 Electrical Panels with Variable Frequency Drives
- Interconnecting piping, valves and fittings
- Common skid for all equipment

**Scope of Supply**

Customer	Phoenix Power Group, Inc. - Tulsa	Size / Stages	CPP 4x3x8 (OH1) / 1
Item number	001	Pump speed	1800 rpm
Customer reference		Quote number	2334939

Scope of Supply

Qty	Description
2	CPP 4x3x8 Description: OH1 (enclosed impeller), overhung/flexibly coupled/horizontal/foot-mounted, ASME B73.1 (ANSI) design pump Materials Casing: Ductile Iron casing Impeller: CD4MCU Duplex Shaft / shaftsleeve: Solid 316SS Sleeveless Shaft Pump rotation: Clockwise rotation from coupling end Bearing bracket: Cast Iron Case Modifications Casing drain: Drain connection threaded and plugged Case Wear Ring: No case wear rings Impeller wear ring: No impeller wear rings Flange rating: 150# FF flanges Bearing housing Labyrinth seal bearing protector Lubrication type: Oil lubrication Casing gasket: Non-asbestos Casing Gasket Shaft sealing Shaft seal type Seal model: EagleBurgmann seal or equal, RP choice of manufacturer Seal size: Single cartridge Type Unitex. Big bore. 316SS/Silcar/Viton/Carbon Primary Seal Flush Material: SS tubing Seal flush plan - primary: Plan 7311 piping - recirculation from pump case through orifice (built into gland) to seal. Bearing housing cooling Air cooled bearing housing Driver Driver type: Motor drive Motor selection: TEFC NEMA Premium Efficiency IP54 Motor specification: 15HP, 1800RPM, Frame:254T, 3PH, 60Hz, 230/460V, Approx. Wgt:360lb, factory choice. Baseplate Baseplate construction: Standard groutable baseplate Baseplate 258 - 21" x 58" Driver mounting: Driver Mounting by RP Coupling Coupling Size: Flexible Coupling SC7 (Ruhropumpen choice of manufacturer) (with spacer) Coupling guard: Steel coupling guard Paint Ruhropumpen Global Coating Specification S490001 A02-M: corrosivity category C3 / SSPC-SP10 surface preparation / EP top coat / color code RAL 5003 ("Ruhropumpen blue") / exterior surfaces only [stainless steel parts (if any) not coated] Testing Performance Testing Certified Performance Test (non-witnessed) - Hydraulic Institute acceptance grade "2B" NPSH Test NPSH Test (non-witnessed) Hydrostatic Testing Hydrostatic Pressure Test (non-witnessed) Impeller & Rotor Balancing Trim and balance impeller

Scope of Supply

Qty	Description
1	Documentation Documentation RP Standard documentation package 1 Parts Spare Parts Parts offered at a discount price and this pricing honored only if parts included in the original revision of the same purchase order as the quoted pumping equipment. If ordering parts on a separate purchase order please contact Ruhropumpen for revised parts pricing. Recommended start-up spare parts. Gaskets, O-rings (set) Product Line Marketing Information Please see our product brochure for general information about this product line (some available features shown in brochure may not have been offered in above scope of supply) https://www.ruhropumpen.com/en/products/overhung-pumps/cpp-pump
2	

Optional Adders

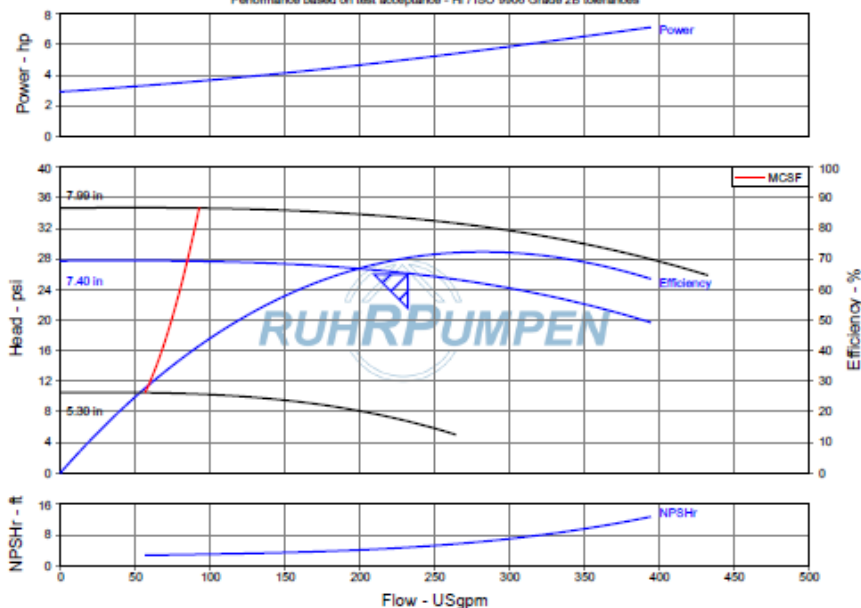
Qty	Description
2	CPP Repair Kit Contains: Bearings, Gaskets, O-Rings, Bearings Isolators. *Repair kit is offered at a discount price and this pricing honored only if included in the original revision of the same purchase order as the quoted pumping equipment.



Pump Performance Datasheet

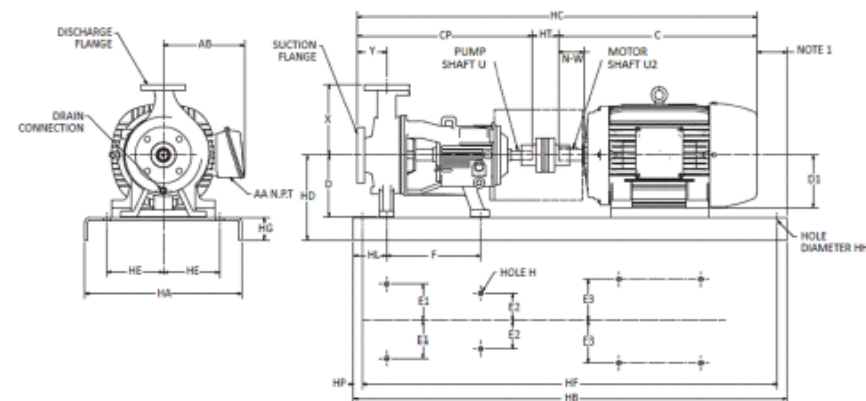
Customer	: Phoenix Power Group, Inc. - Tulsa	Quote number	: 2334939
Customer reference	:	Size	: CPP 4x3x8 (OH1)
Item number	: 001	Stages	: 1
Service	: Potable water	Based on curve number	: MS2011660.01
Quantity	: 2	Date last saved	: 09/24/2024 4:53 PM
Operating Conditions		Liquid	
Flow, rated	: 232.0 USgpm	Liquid type	: Water
Differential head / pressure, rated (requested)	: 26.00 psi	Additional liquid description	: Water
Differential head / pressure, rated (actual)	: 26.12 psi	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids concentration, by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 68.00 deg F
Site Supply Frequency	: 60 Hz	Fluid density, rated / max	: 1.000 / 1.000 SG
Performance		Viscosity, rated	: 1.00 cP
Speed, rated	: 1800 rpm	Vapor pressure, rated	: 0.34 psi.a
Impeller diameter, rated	: 7.40 in	Pressure Data	
Impeller diameter, maximum	: 7.99 in	Maximum discharge pressure	: 27.79 psi.g
Impeller diameter, minimum	: 5.30 in	Maximum allowable working pressure	: 275.0 psi.g
Efficiency	: 70.4 %	Maximum allowable suction pressure	: 143.0 psi.g
NPSH required / margin required	: 4.76 / 3.00 ft	Hydrostatic test pressure	: 375.6 psi.g
Ns (Imp. eye flow) / Nss (Imp. eye flow)	: 1,271 / 7,172 US Units	Driver & Power Data (@Max density)	
MCSF	: 84.76 USgpm	Driver sizing specification	: Rated power
Head, maximum, rated diameter	: 27.79 psi	Margin over specification	: 0.00 %
Head rise to shutoff	: 6.26 %	Service factor	: 1.00
Flow, best eff. point	: 282.0 USgpm	Power, hydraulic	: 3.54 hp
Flow ratio, rated / BEP	: 82.28 %	Power, rated	: 5.02 hp
Diameter ratio (rated / max)	: 92.61 %	Power, maximum, rated diameter	: 7.13 hp
Head ratio (rated dia / max dia)	: 78.32 %	Minimum recommended motor rating	: 7.50 hp / 5.59 kW
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00		
Selection status	: Acceptable		

Performance based on test acceptance - HI / ISO 9906 Grade 2B tolerances



General Arrangement - CPP 4x3x8 (OH1)

For information only - not for construction
Not to scale
All dimensions in inches unless otherwise stated



CP	D	2E1	2E2	F	X	Y	AB	C	AA	D1	2F	S	HC	HAMax	HB	HT MIN	HD	HE	HF	HG	HL
23.50	8.25	9.70	7.25	12.50	11.00	4.00	10.00	23.00	1.25	6.25	8.25	0.38	50.00	21.00	58.00	3.50	11.25	7.50	55.50	3.00	4.50

Nozzles	Suction	Discharge	Item	Size	Qty	Description	Connection
Size	4 inch	3 inch	-	-	-	-	-
Rating	ANSI 150	ANSI 150	-	-	-	-	-
Face	FF	FF	-	.50 NPT	1	Drain, pump case	-
Position	End	Top	-	.50 NPT	1	Drain, bearing lube oil	-
Driver			-	-	-	Drain, baseplate	-
Manufacturer	Special motor		-	-	-	-	-
Rating / Frame	7.50 hp / 254T		-	.50 NPT	1	Fill / vent, bearing lube oil	-
Speed / Poles	1800 / 4		-	-	-	-	-
Volts / Phase / Hz	- / - / -		-	-	-	Oil mist inlet	-
Piping			-	-	-	Oil mist outlet	-
Seal plan - primary/auxiliary	Plan 11 / -		-	.25 NPT	1	Seal recirculation connection (Discharge)	-
Cooling water plan	-		-	-	-	-	-
Mechanical Seal			-	-	-	-	-
Type	Special mechanical seal		U	1.13	-	Pump Shaft U	-
Coupling			N-W	4.00	-	N-W	-
Type & size	TBWoods_SC7		U2	1.63	-	Motor Shaft U2	-
Guard	Steel		H	0.63	-	Hole H	-
Weights (Approx.)			Phoenix Power Group, Inc. - Tulsa				
Pump	239.0 lb		Customer			Customer reference	
Baseplate	158.0 lb		Project name			2334939 / Linden Renewable Natural Gas Energy Project - 062924-LRE-Shop Fab Pump Skids	
Driver	360.0 lb		Service			Potable water	
Total	757.0 lb		Item number			001	
-	-		Pump size			CPP 4x3x8 (OH1)	
-	-		Quotation number			2334939	
-	-		Date last saved			09/24/2024	

**Scope of Supply**

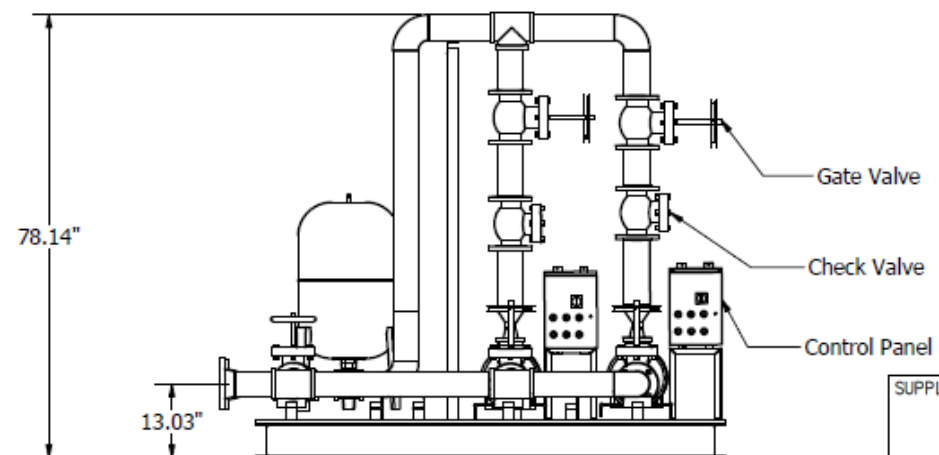
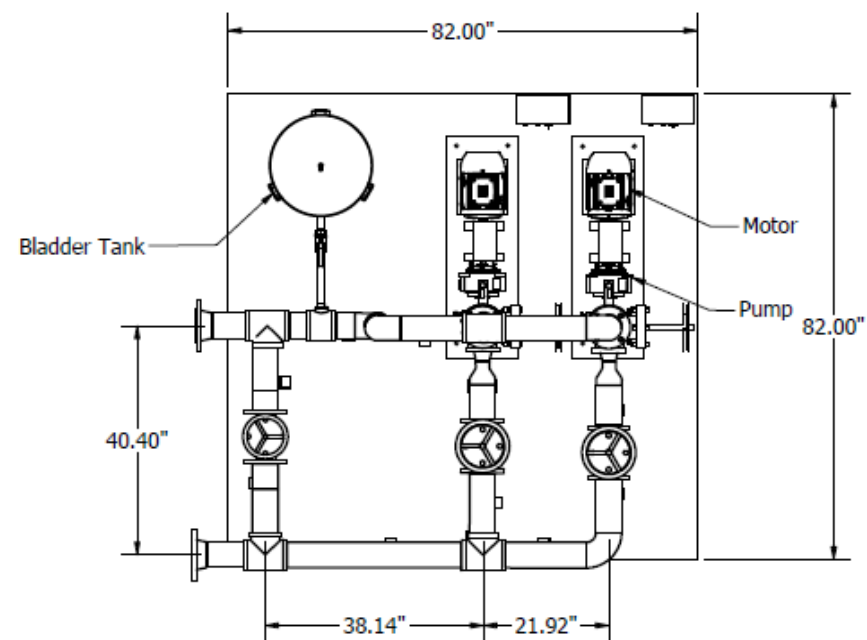
Customer	Phoenix Power Group, Inc. - Tulsa	Size / Stages	Skid / -
Item number	002 TBA	Pump speed	0 rpm
Customer reference		Quote number	2334939

Scope of Supply

Qty	Description
1	Skid Preliminary Data Design Design
2	Skid: Manufactured by: or equal manufacturer (Ruhpumpen choice of manufacturer) Carbon steel skid with piping supports. Fabrication, erection and coating.
1	Valves-Manufactured by: or equal manufacturer (Ruhpumpen choice of manufacturer) 1)Gate valve 4 Carbon steel body, class 150, ASME16.34, potable water, EA 3 2)Gate valve 3 Carbon steel body, class 150, ASME16.34, potable water, EA 3 3)Check valve 3 Carbon steel body, class 150, ASME16.34, potable water, EA 2 4)Ball valve 1 Carbon steel body, class 150, ASME16.34, potable water, EA 1 5)Gate Valve 6 Carbon steel body, class 150, ASME16.34, potable water, EA 3 6)Gate Valve 4 Carbon steel body, class 150, ASME16.34, potable water, EA 3 7)Check valve 4 Carbon steel body, class 150, ASME16.34, potable water, EA 2 8)Ball valve 1 Carbon steel body, class 150, ASME16.34, potable water, EA 1
2	Instrumentation: 1 Indicator/Transmitter 4-20mA, HART, LCD, Aluminum Housing 2 2 Gauge 0-140 ft, dia 4.5 in, bourdon 316L, inferior 1/2" NPT 2
1	Control Panel and VFD: Manufactured by: or equal manufacturer (Ruhpumpen choice of manufacturer) Skid 1 Controls: One (1) Pump Control Panel consisting of the following: Enclosure, NEMA 4, wall-mount, 36"Hx36"Wx12"D • One (1) 24VDC Power supply • One (1) Ethernet Switch • One (1) Allen-Bradley 5380 PLC Controller • I/O modules for 8 AI, 4 AO, 16 DI, 8 DO One (1) 6" Allen-Bradley Panelview 5310 HMI mounted in enclosure door • One (1) Hinged access cover to protect the HMI • One (1) Mushroom Head E-Stop Pushbutton with guard on door • Two (2) Eaton PowerXL VFD panels each factory-configured as follows: NEMA 12 enclosure • 480VAC/60Hz/3 phase Input • Circuit breaker with lockable disconnect • 7.5 HP Variable Frequency Drive (VFD) • Line Input and output reactors • Ethernet/IP communications • Panel-mounted keypad/display • Panel-mounted Indicator lights for Power On, Fault, and Run Skid 2 Controls: One (1) Pump Control Panel consisting of the following: Enclosure, NEMA 4, wall-mount, 36"Hx36"Wx12"D • One (1) 24VDC Power supply • One (1) Ethernet Switch • One (1) Allen-Bradley 5380 PLC Controller • I/O modules for 8 AI, 4 AO, 16 DI, 8 DO One (1) 6" Allen-Bradley Panelview 5310 HMI mounted in enclosure door • One (1) Hinged access cover to protect the HMI • One (1) Mushroom Head E-Stop Pushbutton with guard on door • Two (2) Eaton PowerXL VFD panels each factory-configured as follows: NEMA 12 enclosure • 480VAC/60Hz/3 phase Input • Circuit breaker with lockable disconnect • 10 HP Variable Frequency Drive (VFD) • Line Input and output reactors • Ethernet/IP communications • Panel-mounted keypad/display • Panel-mounted Indicator lights for Power On, Fault, and Run
2	Piping for pumps: Manufactured by: or equal manufacturer (Ruhpumpen choice of manufacturer) Seamless carbon steel pipe, ASTM A106 Gr B or ASTM A53 Gr B or ASTM A106 Gr C
2	Coating -

Scope of Supply

Qty	Description
	Ruhpumpen coating system A02-M: corrosivity category C2 / SSPC-SP10 surface preparation / EP top coat / color code RAL 5003 ("Ruhpumpen blue") / exterior surfaces only [stainless steel parts (if any) not coated]
2	Name plate -SS; Manufactured by: or equal manufacturer (Ruhpumpen choice of manufacturer)
2	Bladder tank with Volume bottle 1500 gallons Manufactured by Wessels or equal manufacturer (Ruhpumpen choice of manufacturer)



For Information Only

CUSTOMER DATA

CUSTOMER: _____
END USER: _____
SITE: _____
PROJECT: _____
GPS #: 2334939
CUSTOMER P.O.: _____
SERVICE: _____

SUPPLEMENTARY DATA:

DRAWN BY:

DATE:

RELEASED BY:

DATE:

DIMENSIONS: mm [in]

THIRD ANGLE PROJECTION



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ENGINEERED SYSTEMS

DRAWING TITLE:

General Arrangement

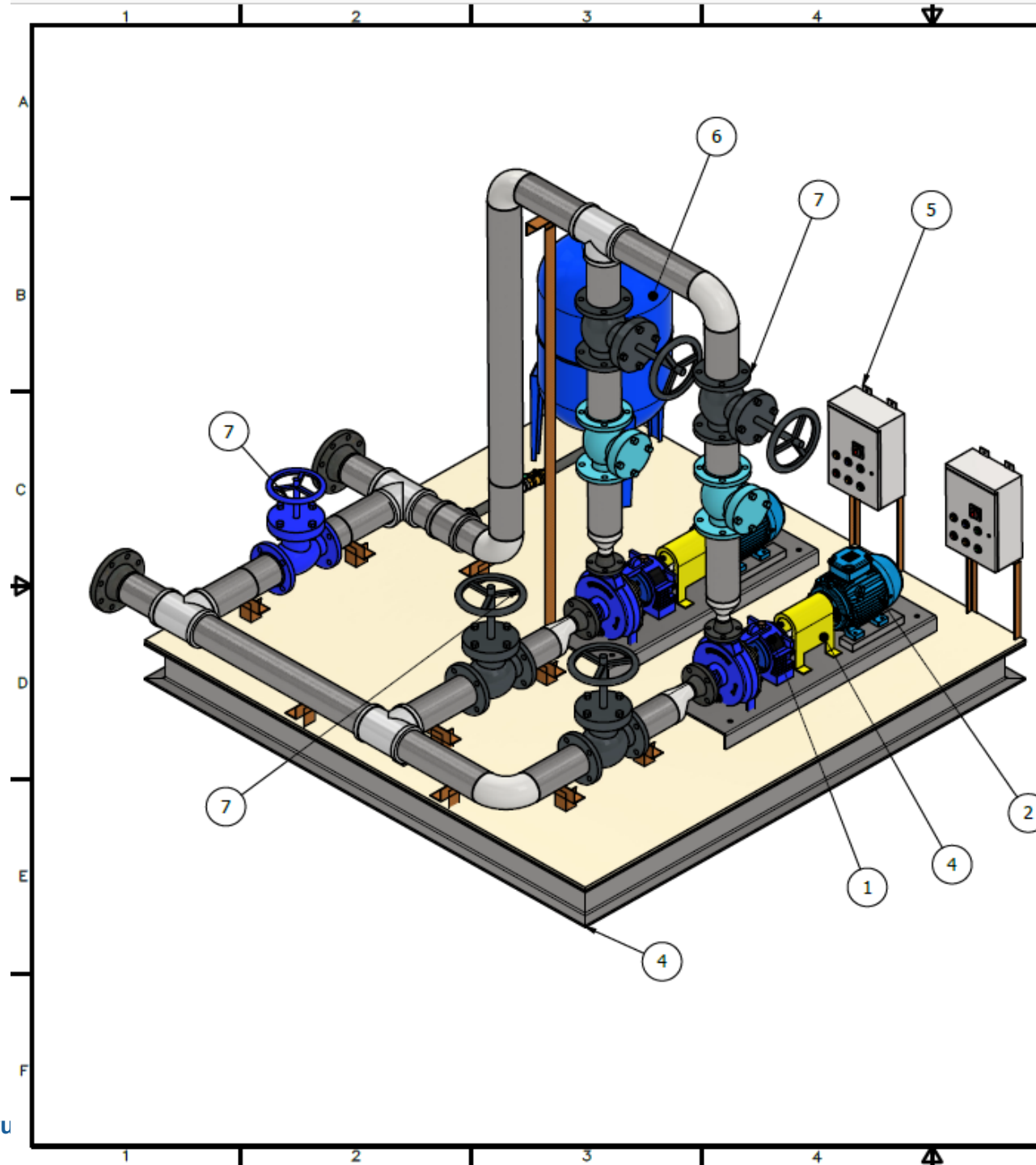
SIZE:
B

DRAWING NO.:

REV:

SCALE: 1 / 23 TYPE-SIZE:

Page 16 of 18 SHEET 1 OF 2



PARTS LIST

PART NUMBER	ITEM	QTY
Pump	1	2
Motor	2	2
Coupling guard	3	2
Skid	4	1
Gate Valve	7	1
Electrical Panel	5	2
Bladder Tank	6	1

For Information Only

CUSTOMER DATA

CUSTOMER: _____
END USER: _____
SITE: _____
PROJECT: _____
GPS #: 2334939
CUSTOMER P.O.: _____
SERVICE: _____

SUPPLEMENTARY DATA:

DRAWN BY:

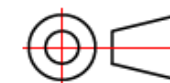
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ENGINEERED SYSTEMS

DRAWING TITLE:

General Arrangement

SIZE:
B

DRAWING NO.:

REV:

SCALE: 0.07

TYPE-SIZE:

Page 17 of 88 SHEET 2 OF 2

FIGURE 551

CARBON STEEL VALVES

FNW

150# CARBON STEEL OS&Y GATE VALVE WITH FLEXIBLE WEDGE

FEATURES

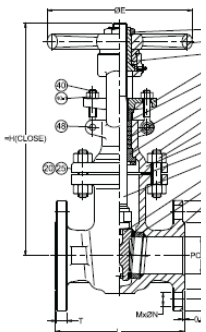
- Flexible wedge
- Seal welded seats
- Outside screw and yoke, rising stem design, non-rising hand wheel
- Seat face stellite, ground and lapped to a mirror finish
- Universal trim-13 Cr stem, wedge 13 Cr face and stellite seat API trim 8 suitable for applications up to 850°F (454°C)
- Body and bonnet joint accurately machined, full enclosed gasket

PRODUCT SPECIFICATIONS

- Shell wall thickness: 2"-24": API 600
- Pressure-temperature rating according to ASME
- Material according to ASTM
- Face to face according to ASME/ANSI B16.10
- End flanges: 2"-24": ASME/ANSI B16.5
- Pressure testing according to API 598

MATERIALS: SIZES 2" - 12"

No.	Part Name	Material
1	BODY	ASTM A216 GR.WCB
4	WEDGE	ASTM A216 GR.WCB+13Cr
5	STEM	ASTM A182 GR F6a
6	SEAT RING	ASTM A105N-STL46
9	BONNET	ASTM A216 GR.WCB
11	GASKET	SS304+GRAPHITE
14	STEM PACKING	GRAPHITE
15	GLAND	ASTM A276 TYPE 410
19	HANDWHEEL	DUCTILE IRON
20	RIVET	SS304
22	STEM NUT	ASTM A439 GR.D-2
24	HANDWHEEL NUT	ASTM A29 TYPE 1025
25	NAMEPLATE	SS304
35	BODY BOLT	ASTM A193 GR.B7
37	BOLT NUT	ASTM A194 GR.2H
40	EYE BOLT	ASTM A193 GR.B7
40-1	EYE BOLT NUT	ASTM A194 GR.2H
47	GLAND FLANGE	ASTM A216 GR.WCB
48	PIN	ASTM A29 TYPE 1025
52	BACK SEAT	ASTM A276 TYPE 410



DIMENSIONS

Item No.	Size	Port	L	H(CLOSE)	O1	OJ	OG	OE	T
FNW551K	2"	2.01	7.00	12.20	3.62	4.75	6.00	7.87	0.56
FNW551L	2-1/2"	2.52	7.50	14.17	4.12	5.50	7.00	7.87	0.62
FNW551M	3"	2.99	8.00	14.57	5.00	6.00	7.50	9.84	0.69
FNW551P	4"	4.02	9.00	17.09	6.19	7.50	9.00	9.84	0.88
FNW551U	6"	5.98	10.50	22.83	8.50	9.50	11.00	11.81	0.94
FNW551X	8"	7.99	11.50	28.74	10.62	11.75	13.50	13.78	1.06
FNW55110	10"	10.00	13.00	34.02	12.75	14.25	16.00	15.75	1.12
FNW55112	12"	12.01	14.00	39.96	15.00	17.00	19.00	17.72	1.19

FNW.COM

We reserve the right to modify or in specifications of our products at an

PA

April 2023

Rosemount 3051

Setting the standard for pressure measurement

Proven best-in-class performance, reliability, and safety

- More than ten million installed
- Reference accuracy 0.04 percent of span
- Installed total performance of 0.14 percent of span
- 10-year stability of 0.2 percent of URL
- SIL 2/3 certified (IEC 61508)



Maximize installation and application flexibility with the Coplanar™ platform

- Improve reliability and performance with integrated DP Flow meters, DP Level solutions, and integral manifolds.
- Easy installation with all solutions fully assembled, leak-tested, and calibrated.
- Meet your application needs with a broad offering.

Advanced functionality

Bluetooth® technology

- Increase productivity, reliability, and personnel safety. No hot work permit needed. No climbing tanks or building scaffolding.
- Quickly configure, service, and troubleshoot with access to all devices near the technician at speeds up to 10 times faster than traditional HART® connections.

Diagnostics

- The Loop Integrity diagnostic continuously monitors the electrical loop to detect issues that affect the communication signal and will alert you to corrosion, water in the housing, or an unstable power supply.
- The Plugged Impulse Line diagnostic continuously monitors for plugged impulse lines and alerts you to abnormal conditions so you can take proactive measures before it affects the quality of the process.
- Diagnostic events are tracked in the built-in diagnostic log which allows you to see the device status at all times.
- These capabilities are safety certified for your most critical applications.

Emerson.com/Rosemount



Page 27 of 38

Hoja Técnica WIKAI PM 02.10 - 04/2020

Página 1 de 4

Hoja Técnica de Instrumentos similares:
Acero inoxidable, versión de seguridad, modelo 232.34, véase hoja Técnica PM 02.04

WIKAI

Partes de repuesto

Page 21 of 38

Presión

Manómetro de muelle tubular, acero inoxidable

Process gauge, versión de seguridad según ASME B40.100

Modelos 232.34, 233.34, DN 4 1/2"

Hoja Técnica WIKAI PM 02.10



otras homologaciones
véase página 3

Aplicaciones

- Seguridad elevada para protección del operador
- Con líquido de relleno para realizar la amortiguación contra elevadas cargas dinámicas y vibraciones
- Para medios gaseosos y líquidos, agresivos, de baja viscosidad y no cristalizantes
- Industria de proceso: Química, petroquímica, plantas energéticas, minería, on/offshore, medio ambiente, maquinaria e ingeniería de instalaciones

Características

- Versión de seguridad con pared divisora antirrotura según los requisitos y condiciones de verificación de ASME B 40.100
- Muy elevada resistencia a cargas dinámicas y choques
- Rangos de indicación de 0 ... 0,6 a 0 ... 1.000 bar



Manómetro de Bourdon modelo 232.34

Descripción

Este manómetro con muelle tubular de alta calidad es un desarrollo especial para aplicaciones de elevada seguridad en la industria de proceso.

Gracias a la utilización de materiales de acero inoxidable para las piezas en contacto con el medio así como plástico altamente resistente para la caja, el modelo 232.34 destaca por una elevada resistencia a la corrosión. Por lo tanto, el instrumento es ideal para medios líquidos y gaseosos, también en entornos agresivos.

Los rangos de indicación de 0 ... 0,6 bar hasta 0 ... 1.000 bar permiten un uso en las más diversas aplicaciones.

WIKAI fabrica y califica el modelo 232.34 según las exigencias de la norma norteamericana ASME B 40.100 en la versión de seguridad.

La versión de seguridad dispone de un cristal de plástico inastillable, una pared divisora antirrotura entre el sistema de medición y la esfera así como de una pared trasera deflectora. En caso de fallo, el usuario ubicado en la parte frontal queda protegido dado que los medios y los componentes únicamente pueden salir a través de la parte posterior de la caja.

Para condiciones de uso extremas (p.ej. vibraciones), todos los instrumentos están disponibles opcionalmente con relleno de líquido en la caja.

SINCE 1908

wessels company

SUBMITTAL

FXA-SERIES

WATER WELL & PRESSURE BOOSTER EXPANSION TANKS

Models: FXA-1000 to FXA-15000

Submittal Sheet No. C-10048 Rev. 2 1/28/2019

FXA-1000 TO FXA-15000

sions & Weights:

Model Number	Dimensions in Inches							Approx. Shipping Weight (lbs)
	A	B	System Connection C	Charging Valve D	E	F	G	
FXA-1000		87						735
FXA-1200	36	98 1/2			30	8	9 1/8	745
FXA-1400		110 1/2	3				8 7/8	900
FXA-1600		84					9 1/8	1210
FXA-2000		96			42	9	8 7/8	1305
FXA-2500		110					8 7/8	1430
FXA-3000L		133		0.302-32NC			9	1575
FXA-3000S		93					9 3/4	2169
FXA-4000	60	115			54	10	9 7/16	2638
FXA-5000		138					9 7/8	3246
FXA-7500		140						4080
FXA-10000	72	172			60	11	8	4920
FXA-15000		243						6000

Notes:

- Tanks are factory pre-charged at 40 psig and field adjustable.
- California code-sight glass is available upon request.
- Tanks installed horizontally must have the system connection below the horizontal centerline of the tank.
- Mounting clips are available upon request.
- U.S. Patent No. 8,633,825 B2

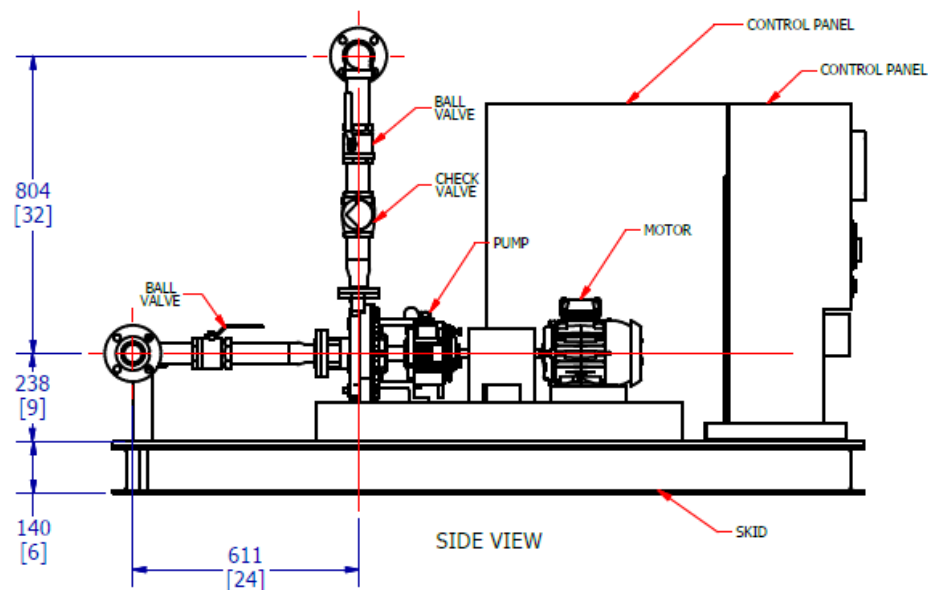
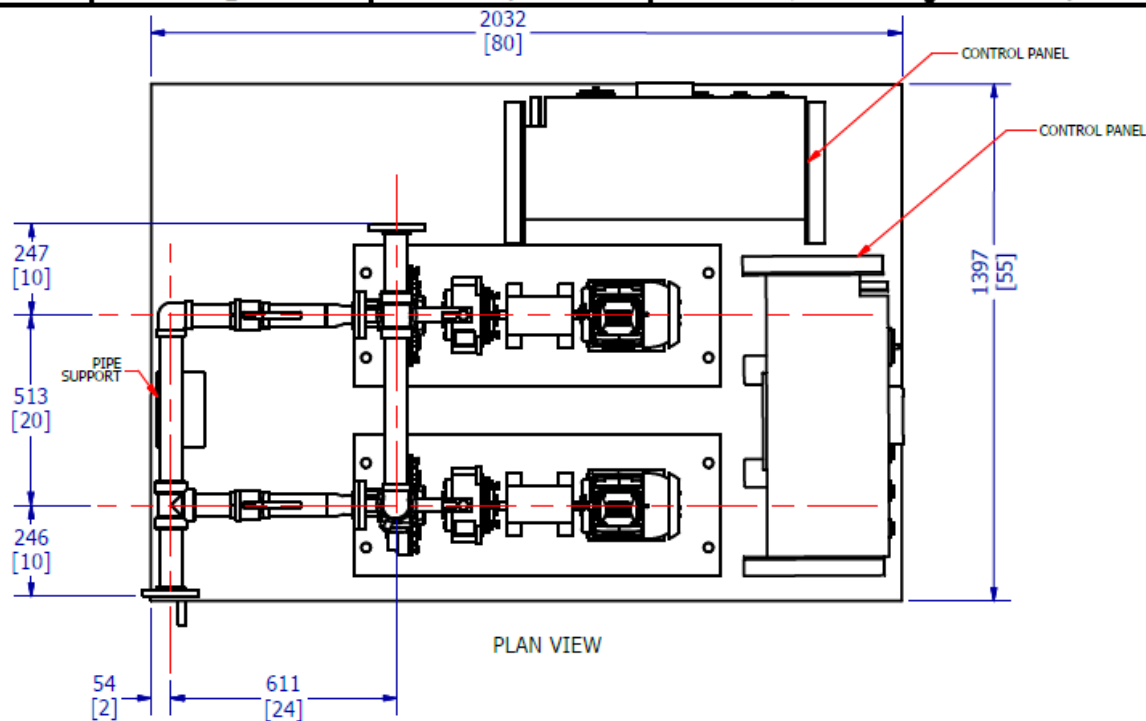


Engineered Systems

Why Buy a Complete System vs Building it Yourself?

Example Proposal #2

- Low Complexity (slightly larger than the previous example)
- 2 Cooling Water Pumps (OH1) (1000usgpm @ 100ft TDH)
- 2 Electrical Panels with Variable Frequency Drives
- Interconnecting piping, valves and fittings
- Common skid for all equipment



INFORMATIVE ONLY

PROCESS.WATER.PUMP

PUMP:
CPPL 1.5x1x8

ENGINE:
1 HP

CONTROL PANEL:
VFD

SUPPLEMENTARY DATA:
EXTENDED TITLE DESC. ???

DIMENSIONS: mm [in]
FIRST ANGLE PROJECTION



DRAWN BY:
PHC
RELEASED BY:
RSM

DATE:
DATE:

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OPERATION CONDITION

FLOW/PRESSURE: 14.64 US GPM/17.9psi
FLUID: RAW WATER

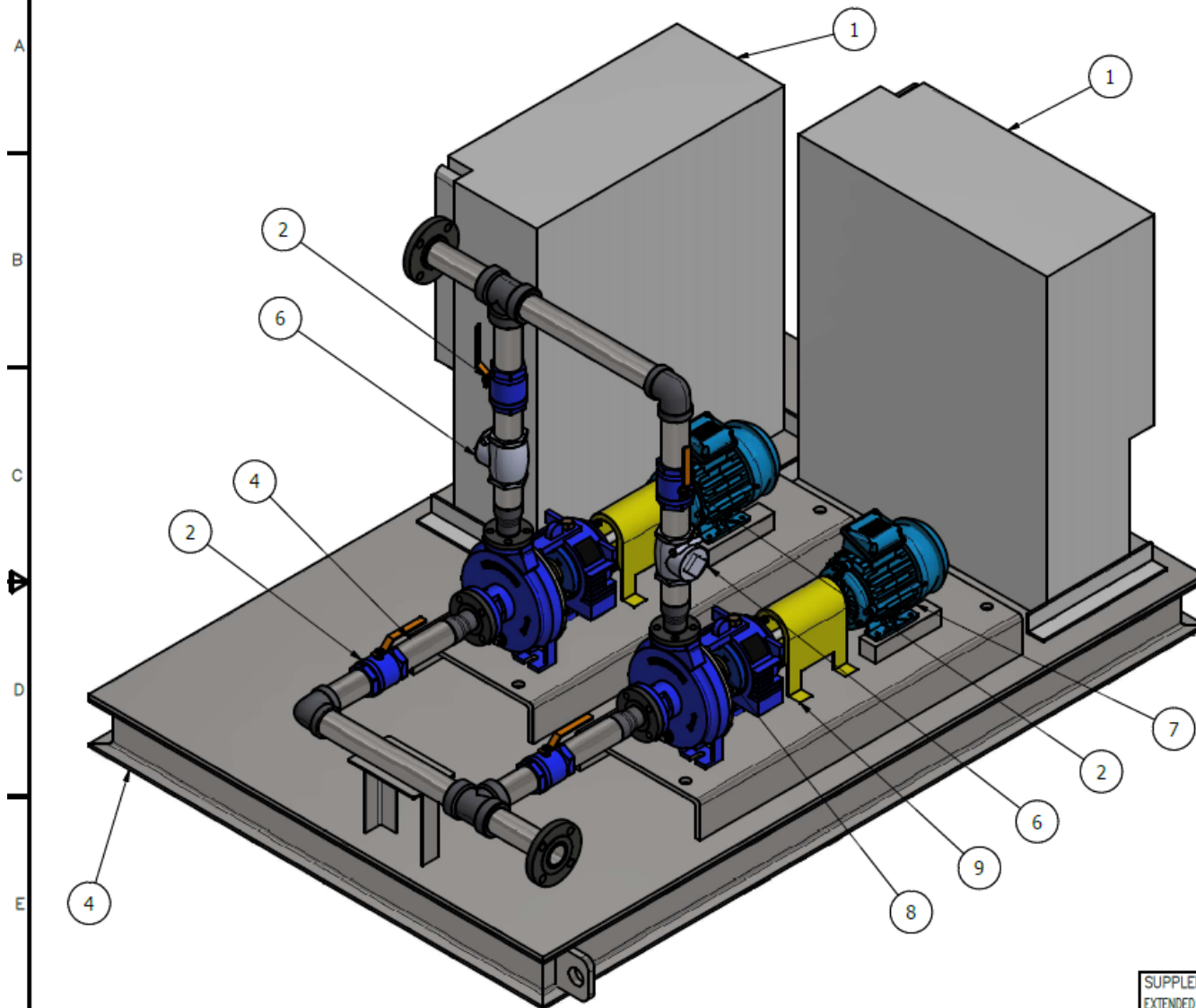
CUSTOMER DATA

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END USER: SAME AS CUSTOMER
SITE: OH
PROJECT: 2197509 / CDM Smith Wadsworth
GPS #: 2197509
CUSTOMER P.O.: N/A
SERVICE: PROCESS WATER PUMP



DRAWING TITLE:
GENERAL ARRANGEMENT
PROCESS.WATER.PUMP

SIZE: B
DRAWING NO.: 02-00-00
REV: 2
SCALE: TYPE-SIZE: ----- Page 21 of 28 SHEET 1 OF 2

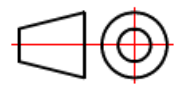


ISOMETRIC VIEW

ITEM	Part_Description	Quantity
1	CONTROL PANEL	2
2	BALL VALVE	4
3	PUMP PLATE	2
4	SKID PLATE	1
5	PIPE SUPPORT	1
6	CHECK VALVE	2
7	MOTOR	2
8	PUMP	2
9	GUARD	2

INFORMATIVE ONLY

CUSTOMER DATA	
CUSTOMER:	CDM Smith Wadsworth
END USER:	SAME AS CUSTOMER
SITE:	OH
PROJECT:	2197509 / CDM Smith Wadsworth
GPS #:	2197509
CUSTOMER P.O.:	N/A
SERVICE:	PROCESS WATER PUMP

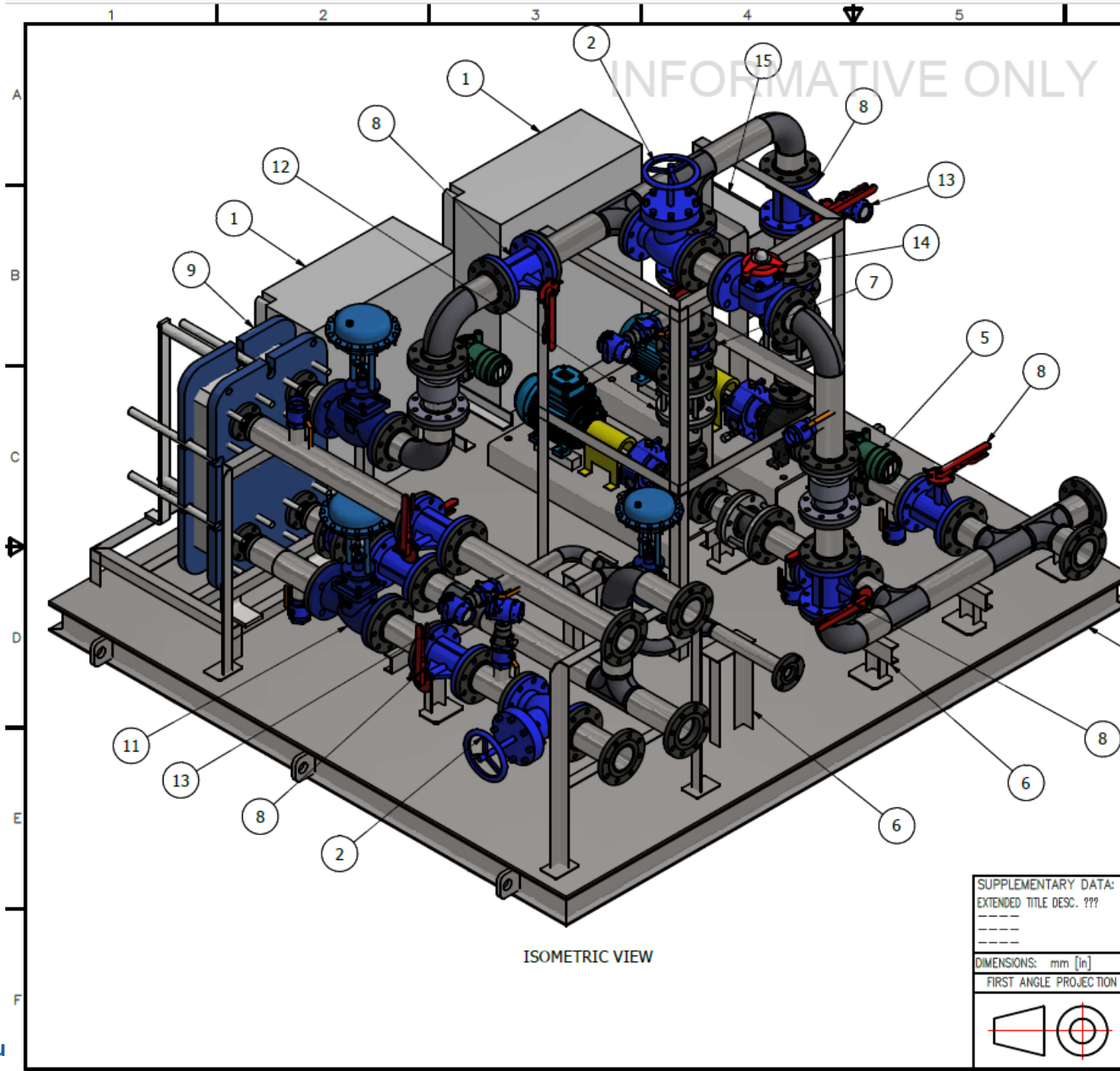
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FIRST ANGLE PROJECTION				
				
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SCALE:		TYPE-SIZE: -----	Page 22 of 28 SHEET 20F2	

Engineered Systems

Why Buy a Complete System vs Building it Yourself?

Example Proposal #3

- Medium Complexity
- 2 Cooling Water Pumps (OH1) (128usgpm @ 46psig)
- 2 Electrical Panels with Variable Frequency Drives
- Plate type heat exchanger
- Interconnecting piping, valves and fittings
- Common skid for all equipment

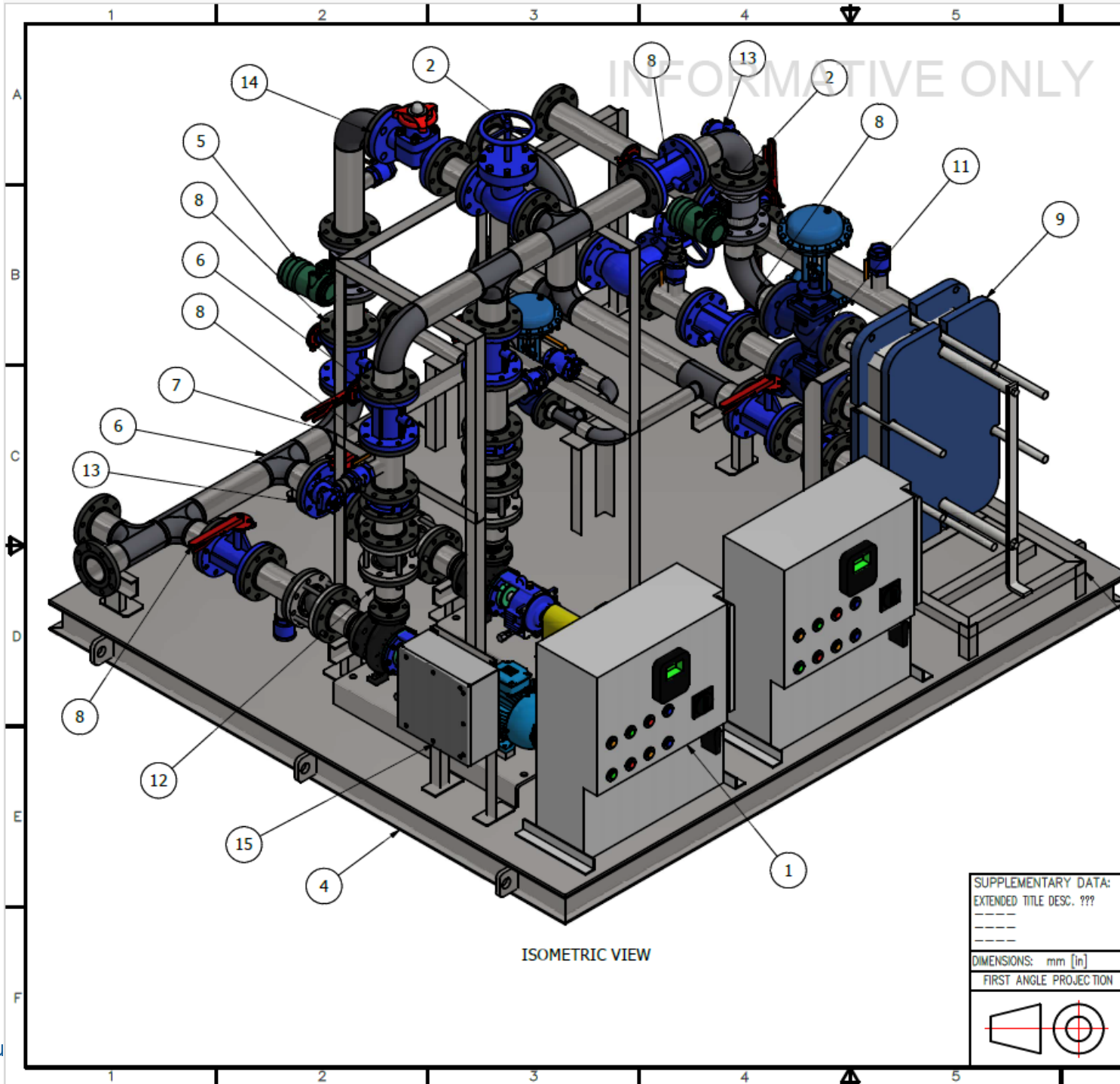


ISOMETRIC VIEW

ITEM	Part_Description	Quantity
1	CONTROL PANEL	2
2	BALL VALVE	2
3	PUMP PLATE	1
4	SKID PLATE	1
5	FIT	1
6	PIPE SUPPORT	10
7	CHECK VALVE	3
8	BUTTERFLY VALVE	8
9	DCC PLATE EXCHANGER	1
10	DCC SUPPORT	1
11	CONTROL VALVE	3
12	EXPANTION JOINT	4
13	PIT	4
14	DIAPHRAGM VALVE	1
15	JUNCTION BOX	1

CUSTOMER DATA	
CUSTOMER:	CDM Smith Wadsworth
END USER:	SAME AS CUSTOMER
SITE:	OH
PROJECT:	2197509 / CDM Smith Wadsworth
GPS #:	2197509
CUSTOMER P.O.:	N/A
SERVICE:	DCC Cooling Water Pump Skid

SUPPLEMENTARY DATA: EXTENDED TITLE DESC. ??? ----- ----- -----		DRAWN BY: PHC		DATE:	
		RELEASED BY: RSM		DATE:	
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FIRST ANGLE PROJECTION					
					
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SIZE: B		DRAWING NO.: 01-00-00		REV: 2	
SCALE:		TYPE-SIZE: ----- Page 24 of 18 SHEET 2 OF 3			



ITEM	Part_Description	Quantity
1	CONTROL PANEL	2
2	BALL VALVE	2
3	PUMP PLATE	1
4	SKID PLATE	1
5	FIT	1
6	PIPE SUPPORT	10
7	CHECK VALVE	3
8	BUTTERFLY VALVE	8
9	DCC PLATE EXCHANGER	1
10	DCC SUPPORT	1
11	CONTROL VALVE	3
12	EXPANTION JOINT	4
13	PIT	4
14	DIAPHRAGM VALVE	1
15	JUNCTION BOX	1

CUSTOMER DATA

CUSTOMER: CDM Smith Wadsworth
END USER: SAME AS CUSTOMER
SITE: OH
PROJECT: 2197509 / CDM Smith Wadsworth
GPS #: 2197509
CUSTOMER P.O.: N/A
SERVICE: DCC Cooling Water Pump Skid

SUPPLEMENTARY DATA:

EXTENDED TITLE DESC. ???

DIMENSIONS: mm [in]

FIRST ANGLE PROJECTION



DRAWN BY:

PHC

RELEASED BY:

RSM

DATE:

DATE:

DATE:

DATE:



DRAWING TITLE:

GENERAL ARRANGEMENT
H2.DCC.PUMP.SKID

SIZE:

DRAWING NO.:

01-00-00

REV:

2

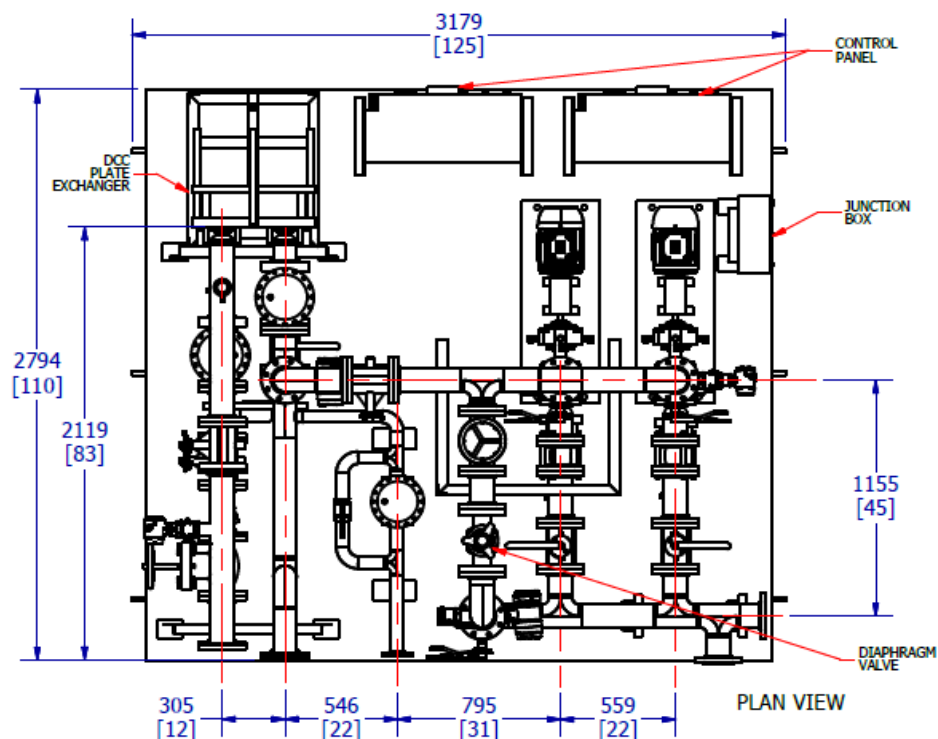
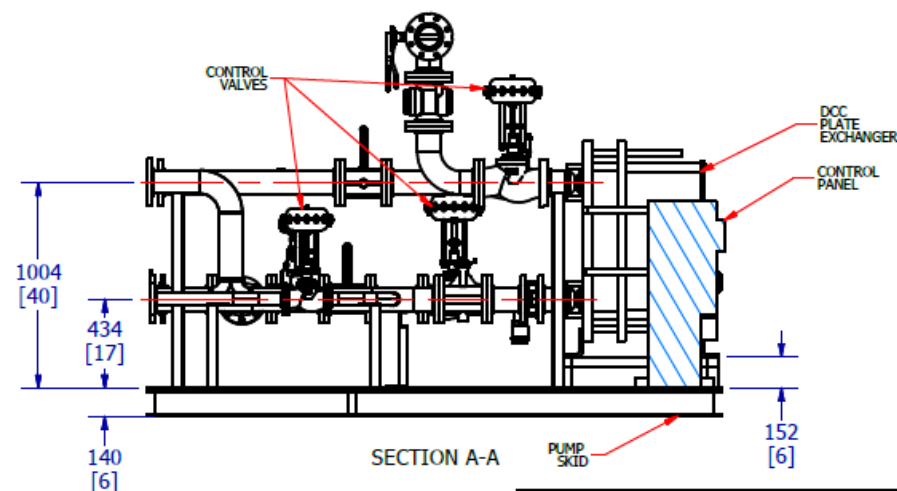
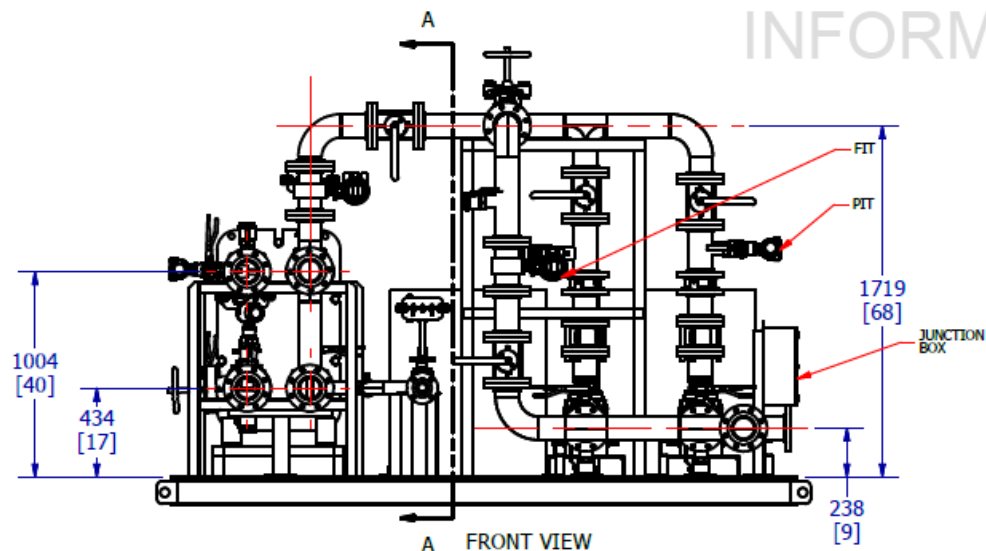
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TYPE-SIZE: ----

Page 25 of 18 SHEET 3 OF 3



INFORMATIVE ONLY



OPERATION CONDITION	
FLOW/PRESSURE:	128 US GPM/43.05psi
FLUID:	RAW WATER

CUSTOMER DATA	
CUSTOMER:	CDM Smith Wadsworth
END USER:	SAME AS CUSTOMER
SITE:	OH
PROJECT:	2197509 / CDM Smith Wadsworth
GPS #:	2197509
CUSTOMER P.O.:	N/A
SERVICE:	DCC Cooling Water Pump Skid

H2.DCC.PUMP.SKID	
PUMP:	CPP 3x1.5x5
ENGINE:	5 HP
CONTROL PANEL:	VFD

SUPPLEMENTARY DATA:	DRAWN BY:	DATE:
EXTENDED TITLE DESC. ???	PHC	
---	RELEASED BY:	DATE:
---	RSM	
DIMENSIONS: mm [in]		
FIRST ANGLE PROJECTION		

DRAWING TITLE:	
GENERAL ARRANGEMENT	
H2.DCC.PUMP.SKID	
SIZE: B	DRAWING NO.: 01-00-00
SCALE:	REV: 2
TYPE-SIZE: --- Page 23 of 28 SHEET 1 OF 3	



API Steel Check Valve

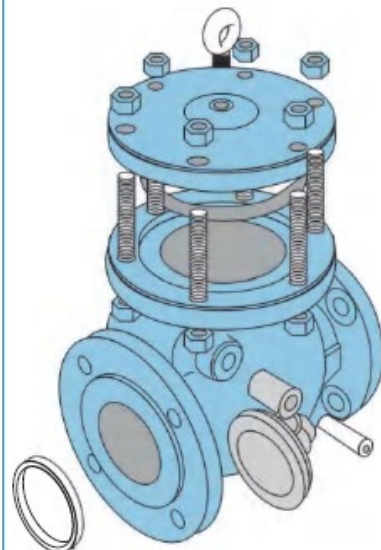
TEK VALVE

API SERIES

DIN SERIES

JIS SERIES

Steel Check Valve TEK VALVE



Reliable seat seal

Design and Manufacture: Cast steel check valve to BS1868, ASME B16.34 and API 6D;
Forged steel check valve to API 602.
Inspection and Test: API 598.
End flange dimension: ASME B16.5 for NPS 24J, ASME B 16.47 series B, ASME B16.47 series A, MSS SP-44 for NPS J24J.
BW end dimension: ASME B16.25.
Socket-weld dimension: ASME B16.11.
Face to face and end to end: ASME B16.10.
Pressure-temperature ratings: ASME B16.34.

Seat

For carbon steel check valve, the seat is usually forged steel. The sealing surface of the seat is spray welded with hard alloy specified by the customer. Renewable threaded seat is used for NPS ≤ 10 check valves, and welded on seat can be also optional if being requested by the customer. Welded on seat is used for NPS ≥ 12 carbon steel check valves. For stainless steel check valve, integral seat is usually adopted, or to weld hard alloy directly integrally. Threaded or welded on seat is also optional for stainless steel check valve if being requested by the customer.

The features of check valve

Bolted Bonnet;
Swing and lift disc;
Metallic seating surfaces.

Body-To-Bonnet Joint

Stainless steel + flexible graphite wounded gasket is used for Class150 and Class300 check valve; Stainless steel + flexible graphite wounded gasket is used for Class600 check valve, and joint gasket is also optional for Class600 check valve; Ring joint gasket is used for Class900 check valve; Pressure seal design is used for Class1500 ~ Class2500 check valves.

Body and Bonnet Connection

The body and bonnet of Class150~Class900 check valves are usually with studs and nuts. And the body and bonnet of Class1500~Class2500 check valves are usually of pressure seal design.

You are center of our world

API Steel Check Valve

TEK VALVE

API SERIES

DIN SERIES

JIS SERIES



Trim material

Trim code	Seat ring surface	Wedge seat surface	Hinge Pin
1	13Cr	13Cr	A182 F6a
2	18Cr-8Ni	18Cr-8Ni	A182 F304
3	25Cr-20Ni	25Cr-20Ni	A182 F310
4	Hard 13Cr	Hard 13Cr	A182 F6a
5	Stellite	Stellite	A182 F6a
6	13Cr	Cu-Ni Alloy	Monel
7	13Cr	Hard 13Cr	A182 F6a
8	Stellite	13Cr	A182 F6a
9	Cu-Ni Alloy	Cu-Ni Alloy	Monel
10	18Cr-8Ni-Mo	18Cr-8Ni-Mo	A182 F316
11	Cu-Ni Alloy	Cu-Ni Alloy	Monel
12	Stellite	18Cr-8Ni-Mo	A182 F316
13	19Cr-29Ni	19Cr-29Ni	20 Alloy

ASTM Material list of BS1868 Swing Check Valve

No.	Part name	Carbon Steel to ASTM		Stainless Steel to ASTM				Alloy Steel to ASTM		
1	Body	A216 WCB	A352 LCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A217 WC6	A217 WC9	A217 C
2	Cover	A216 WCB	A352 LCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A217 WC6	A217 WC9	A217 C
3	Seat Ring	A105N	A352 LF2	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A182 F11	A182 F22	A182 F
4	Disc	A216 WCB	A352 LCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A217 WC6	A217 WC9	A217 C
5	Hinge	A216 WCB	A352 LCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A217 WC6	A217 WC9	A217 C
6	Yoke	A216 WCB	A352 LCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M	A217 WC6	A217 WC9	A217 C
7	Gasket	Graphite+SS304, PTFE								
8	Disc Washer	A182 F6a	A182 F6a	A182 F304	A182 F316	A182 F304L	A182 F316L	A182 F304		
9	Disc Nut	A182 F6a	A182 F304	A182 F304	A182 F316	A182 F304L	A182 F316L	A182 F304		
10	Pin	A182 F6a	A182 F304	A182 F304	A182 F316	A182 F304L	A182 F316L	A182 F304		
11	Nut	A194 2H	A194 4	A194 8				A194 7		
12	Bolt	A193 B7	A320 L7	A193 B8				A193 B16		
13	Screw	19B B7	A320 L7	A182 F304	A182 F316	A182 F304L	A182 F316L	A193 B16		
14	Lifting Lug	A194 2H								



DESIGN SPECIFICATION REPORT



Project & Configuration Details

Customer:	Order/Quote No.:	
Project:	PO No.:	Contact:
Tag No.:	Item/Ref. No.:	Phone No.:

System Details

PART NO:	3604-DFS564570L
MAX DP SHUTOFF @ 100°F:	290 PSIG

Valve Details

PART NO:	360-4AFW-1FP2-VES4
MODEL:	360 CONTROL VALVE ASSEMBLY
BODY:	4" ASME CL150 RF
BODY STYLE:	GLOBE
BODY MATERIAL:	WCC (ASTM A216)
BONNET MATERIAL:	WCC (A216) OR LF2 (A350)*
BODY MAX CWP (@ 100°F):	290 PSIG
FACE TO FACE DIMENSION:	13.88"
NACE:	NON-COMPLIANT
BODY/BONNET BOLTING:	B7 / 2H
YOKE BOSS SIZE:	2-13/16" (1/2" STEM)
BONNET STYLE:	STANDARD
PACKING:	SINGLE PTFE V-RING
SEAL DESIGN:	2 PIECE
SEAL MATERIAL:	CARBON FILLED PTFE
BACK-UP RING MATERIAL:	VITON
CHARACTERISTIC:	EQUAL PERCENT
PLUG MATERIAL:	S41600
STEM MATERIAL:	S20910
SEAT RING MATERIAL:	S41600
CAGE MATERIAL:	S17400 PH
PORT DIAMETER:	4-3/8" (FULL PORT)
TRIM DESIGN:	BALANCED
TRAVEL:	2"
FLOW DIRECTION:	DOWN
PROCESS TEMP RATING:	0 TO 400°F (-18 TO 204°C)
AMBIENT LOW-TEMP RATING:	-20°F (-29°C)
MAX RATED CV:	224
SHUT-OFF CLASS:	IV
PAINT:	DFPS-01 (STANDARD PAINT)
PAINT COLOR:	DF STANDARD GREY (RAL 7015)



GENERIC PRODUCT PHOTO

* The maximum shutoff and cold working pressures described on this document unless otherwise specified are at 100°F. Maximum allowable pressures are typically reduced by increased temperatures. Refer to the product bulletin for detailed pressure/temperature charts.
* Unless otherwise stated, all temperature ratings are for use in Non-Oxidizing service. For use in Oxidizing service refer to the product bulletin, or contact Dyna-Flo for temperature ratings.
* Options marked with an asterisk (*) may not be available in the product literature, and do not follow the standard product model build.
* Dyna-Flo reserves the right to substitute a cost material with the closest equivalent of the same grade.

Valve (In-Body Process) Temperature Limits

Overall Rating	Min	Max
VALVE ASSEMBLY	0°F (-18°C)	400°F (204°C)
Component Breakdown		
→ MODEL 360	-100°F (-73°C)	600°F (316°C)
→ BODY MATERIAL	-20°F (-29°C)	800°F (427°C)
→ PACKING & BONNET STYLE	0°F (-18°C)	450°F (232°C)
→ BONNET BOLTING	-55°F (-48°C)	800°F (427°C)
→ TRIM MATERIAL	-20°F (-29°C)	800°F (427°C)
→ SEAL RING	0°F (-18°C)	400°F (204°C)

Conditions

NOT RECOMMENDED FOR WATER ABOVE 180°F (82°C)

Valve Recommended Spare Parts

Item No.	Description	Quantity
RGASKETX36D	GASKET KIT	1
RPACKX0002D	PACKING REPAIR KIT	1
1V65980509D	SEAL RING	1
1V65980529D	BACK-UP RING	1
1V6581XN04D	PLUG/STEM ASSEMBLY	1
2U23633327D	CAGE	1
1U22294617D	SEAT RING	1

Actuator Details

PART NO:	DFO-2105-D0642BN-N
MODEL:	DFO SPRING & DIAPHRAGM ACTUATOR
FAIL POSITION:	OPEN
ACTUATOR SIZE:	2105
SPRING NUMBER:	1E8263
TRAVEL:	2"
BENCH SET:	6-42 PSIG
INPUT SIGNAL:	0-50 PSIG
MAX CASING PRESSURE:	60 PSIG
DIAPHRAGM EFFECTIVE AREA:	105 IN ²
PAINT:	DFPS-01 (STANDARD PAINT)
PAINT COLOR:	DF STANDARD BLUE (RAL 5010)



GENERIC PRODUCT PHOTO

Actuator Recommended Spare Parts

Item No.	Description	Quantity
2E85950220D	DIAPHRAGM	1

Positioner Details

PART NO:	6DR5115-0EN30-0AA3
MODEL:	SIEMENS PS2 DIGITAL SMART
ACTION:	SINGLE ACTING
INPUT / OUTPUT:	4-20 MA / 60 PSIG MAX
GAUGES:	SUPPLY & OUTPUT - 1 1/2" FACE 0-60 PSIG
PROTOCOL:	HART
SUPPLY MEDIUM:	INSTRUMENT AIR
CSA/IFM:	CL1 ZN1 (A)EX DB IIC GB/XP CL1 DIV1 GP C-D
ATEX/IEC:	II 2 G EX DB IIC T6/T4 GB
ENCLOSURE:	IP66 / NEMA 4X
HOUSING MATERIAL:	ALUMINUM
CONNECTION:	1/2"-18 NPT / 1/2"-14 NPT & M20x1.5
LIMIT MONITOR:	LIMIT SWITCH
AMBIENT TEMPERATURE:	-22°F TO 176°F



GENERIC PRODUCT PHOTO

Mounting Kit Details

PART NO:	MK-B4-1E0000-20FL
MODEL:	MOUNTING KIT - DFO2105
POSITIONER TYPE:	PS2
INCLUDES:	MOUNTING AND CALIBRATION
FITTINGS:	STANDARD
TUBING:	3/8" - 0.035" S31600 SEAMLESS
AIRSET TYPE:	PRO-50 1/4" NPT LOW TEMP -40°F
OPERATING RANGE:	0-60 PSI
AIRSET PART NO:	PRO-50-06AFL-NSB



GENERIC PRODUCT PHOTO



POWER-SEAL

Manual and Automated
High Performance Butterfly Valves

ANSI/ASME Class 150 and 300



Featuring **TRIAC** Actuators and Accessories

Standard Materials of Construction for **POWER-SEAL Class 300**

Soft Seat Materials

Component	Carbon Steel Standard Material	Stainless Steel Standard Material	Options
Body	A216-WCB	A351 Gr CF8M-316	Alloy 20, Monel, CD3MN, Hastelloy C-276, Inconel 625, Alum-Bronze, LCB, Other
Disc	A351 Gr CF8M-316	A351 Gr CF8M-316	Same as body: except CS (316 standard)
Shaft	17-4 pH	17-4 pH	XM-19, K-Monel, Duplex 2205, Inconel 718
Seat	RTFE	RTFE	PTFE, 50/50 STFE, PEEK, UHMWPE, TFM-1600
Packing	Graphite	Graphite	PTFE V-Ring (Pressure, Vacuum, Pressure & Vacuum)
Bearing	Composite	Composite	Bronze, Carbon Graphite

Fire Safe Seat Materials

Component	Carbon Steel Standard Material	Stainless Steel Standard Material	Options
Body	A216-WCB	A351 Gr CF8M-316	Alloy 20, Monel, CD3MN, Hastelloy C-276, Inconel 625, Alum-Bronze, LCB, Other
Disc	A351 Gr CF8M-316/ HCr	A351 Gr CF8M-316/ HCr	Same as body: except CS (316 standard)
Shaft	17-4 pH	17-4 pH	XM-19, K-Monel, Duplex 2205, Inconel 718
Seat	RTFE	RTFE	PTFE, 50/50 STFE, PEEK, UHMWPE, TFM-1600
Secondary Seat	A240-316L	A240-316L	
Packing	Graphite	Graphite	
Bearing	Composite	Composite	Bronze, Carbon Graphite

Metal Seat Materials (Carbon Steel)

Component	Carbon Steel Standard		Options
	Material (-20°F to 660°F)	Material (-20°F to 800°F)	
Body	A216-WCB	A216-WCB	Alloy 20, Monel, CD3MN, Hastelloy C-276, Inconel 625, Alum-Bronze, LCB, Other
Disc	A351 Gr CF8M-316/ HCr	A351 Gr CF8M-316/ Stellite	
Shaft	17-4 pH	17-4 pH	XM-19
Seat	A240-316L	Inconel 625	
Packing	Graphite	Graphite	PTFE V-Ring to 450°F
Bearing	Carbon Graphite	Carbon Graphite	Bronze

Metal Seat Materials (Stainless Steel)

Component	Stainless Steel Standard		Options
	Material (-100°F to 660°F)	Material (-100°F to 1100°F)	
Body	A351 Gr CF8M-316	A351 Gr CF8M-316	Alloy 20, Monel, CD3MN, Hastelloy C-276, Inconel 625, Alum-Bronze, LCB, Other
Disc	A351 Gr CF8M-316/ HCr	A351 Gr CF8M-316/ Stellite	
Shaft	17-4 pH	XM-19	
Seat	A240-316L	Inconel 625	
Packing	Graphite	Graphite	PTFE V-Ring to 450°F
Bearing	Carbon Graphite	Carbon Graphite	Bronze



CLIENT:	PLUSPETROL PERÚ CORPORATION S.A.	Date:
PROJECT:	TURNKEY MIPAYA STANDALONE COMPRESSION - LOTE 56	Rev.No.
DOCUMENT TITLE:	PIPING MATERIAL SPECIFICATION (PMS)	PIPING CLASS
CLIENT DOC. NO.:	PMIP-281-ET-C-201	LAM DOC NO.: E004675-EFX-P-SPC-0001



Puma5 - Tearg Tools

4/25/2016 4:11:42 PM

PIPING CLASS DETAIL

PROJ:	3799	REV:	B
DOC:	PGRAL-100-ET-C-017		

ITEM AND DESCRIPTION	SIZE RANGE (NPS) FROM TO	SCH/ THK. (mm)	RA
----------------------	--------------------------	----------------	----

CLASS	B1M	CORR. ALLOW.(CA)	0.125 Inch (3.175 mm)
RATING	300#	BASE MATERIAL	Carbon Steel

TEMP. (°F)	-20	100	200
PRESS. (Psig)	680	680	680

NOTES:

- 1) This piping class shall be commonly used for hydrocarbons service
- 2) Threaded fittings shall be exclusively used for instrument connections. These threaded fittings shall be seal welded. All instrument connections shall be seal welded.
- 3) Pipe and fittings thicker than 1/2" may require impact test when mill certified. Impact testing shall be performed according to ASME B31.3 paragraph 304.4.2.
- 4) Threaded piping is only permitted where socket weld items are not permitted.
- 5) Use of ball valve shall be limited to 250°F design temperature.
- 6) Refer Doc.No: PMIP-281-ET-C-202 for Valve Datasheet Specification
- 7) Pipe shall be SAW (straight seam) with 100% of X-ray

PIPE

PIPE, Smls, PE	0.5	0.75	160
PIPE, Smls, PE	1	1.5	80
PIPE, Smls, BE	2	4	80
PIPE, Smls, BE	6	10	STD
PIPE, Smls, BE	12	12	40
PIPE, Welded, BE	14	14	40
PIPE, Welded, BE	16	20	XS
PIPE, Welded, BE	24	24	15.88
NIPPLE, TBE, 100 mm Lg	0.5	1.5	160
NIPPLE, TOE, 100 mm Lg	0.5	1.5	160

FLANGE

FLANGE SWRF, 125-250 AARH	0.5	0.75	160	3
FLANGE SWRF, 125-250 AARH	1	1.5	80	3
FLANGE WNRF, 125-250 AARH	2	4	80	3
FLANGE WNRF, 125-250 AARH	6	10	STD	3
FLANGE WNRF, 125-250 AARH	12	14	40	3

TITLE:		DOCUMENT NO.:	
PIPING VALVES DATA SHEETS		GRAL-100-HD-C-001	
PIPING		REVISION:	A
		Pag.:	1 de 1
VALVES DATA SHEET			
TYPE: VALVE BALL F.B. FLOATING	TAG No.	VBA1WC004	Ref. Note Number
RATING	1500LB WOG		
VALVE DESIGN	API 608		
SIZE RANGE	1/2" THRU 1 1/2"		
DESIGN PRESSURE	ASME B16.34		
DESIGN TEMP.	-20° F TO 250° F		
DESCRIPTION	BI-DIRECTIONAL, FULL BORE, FLOATING BALL, ANTISTATIC, FIRESAFE, ANTIBLOWOUT STEM, SPLIT OR THREE PIECE BODY, POSITION INDICATOR		4
GENERAL			3
FACE TO FACE STD	MANUFACTURER STANDARD		
END CONNECTIONS	SOCKET WELD TO ASME B16.11 + PIPE EXTENDED		
OPERATION	WRENCH		6
MATERIALS			
BODY/BONNET/COVER	CARBON STEEL ASTM A105		
STEM/TRUNIONS/PINS	316 SS		
DISC/PLATES/BALL	316 SS		
SEAT	PTFE + G OR APPROVED EQUAL		5
SPRINGS	N/A		
SEALS	PTFE + G OR APPROVED EQUAL		1.5
GASKETS	SELLER TO ADVISE		1.5
BODY/BONNET BOLTING	ASTM A193-B7 STUDS C/W ASTM A194-2H HEAVY HEX.NUTS		2
GLAND BOLTING	N/A		
GLAND PACKING	N/A		
Trim Number:			
PRESSURE TESTING	PROCEDURES & RESULTS TO API-598		
CERTIFICATION	FIRESAFE API 607 600#		

Notes:

1. ASBESTOS IS NOT ACCEPTABLE FOR SEALS & GASKETS.
2. BONNET/COVER/ENDS RETAINED BY AT LEAST 4 BOLTS.
3. VALVES SHALL BE MARKED IN ACCORDANCE WITH MSS-SP-25, IN ADDITION A STAINLESS STEEL TAG SHOWING VALVE TAG No. SHALL BE SECURELY ATTACHED TO THE VALVE WITH CORROSION RESISTANT WIRE.
4. SEAT AND SEAL MATERIALS SHALL NOT BE SUSCEPTIBLE TO EXPLOSIVE DECOMPRESSION.
5. PIPE LENGTH - 100 MM (4") BLANK, BOTH SIDE OF THE BODY. MATERIAL - ASTM A105 GR. C SCH. 40 1/2" TO 1

Servicio de Ingenieria Perú Lotes 56/88	Size: In	Thk: Sch. m	Temp: °F	Pres: PSI
---	----------	-------------	----------	-----------

ing	Finish	Construction	Material	Other req.	Notes	Alt. Thk.	Data Sheet
		Wrought S	ASTM A 234 Gr. WPB SMLS		See note 19		
		Wrought S	ASTM A 234 Gr. WPB SMLS		See note 19		
		Wrought S	ASTM A 234 Gr. WPB SMLS		See note 19		
#	Forged	ASTM A 105					
#	Forged	ASTM A 105			See Note 18		
	Forged	ASTM A 105				SCH. XS	
	Forged	ASTM A 105		TRIM N°8 - Horizontal swing - Bolted Cover - Body drain 1/2" NPT		SCH. 160	
LB	RF	Forged	ASTM A 105				
LB	RF	Forged	ASTM A 105	WITH JACK			
LB	RF	Forged	ASTM A 105				
LB	RF	Forged	ASTM A 105	WITH JACK			
LB	RTJ	Forged	ASTM A 105		Optional/Alternate Flange		
LB	RF	Forged	ASTM A 105				
LB	RF	From Plate	ASTM A 285 Gr.C		Thk Acc. To PCSE-100-ET-C-100		
LB	RF	From Plate	ASTM A 285 Gr.C		Thk Acc. To PCSE-100-ET-C-100	See note 19	
LB		Forged	ASTM A 105		Extended Pipes See note 16		VBA1WC004

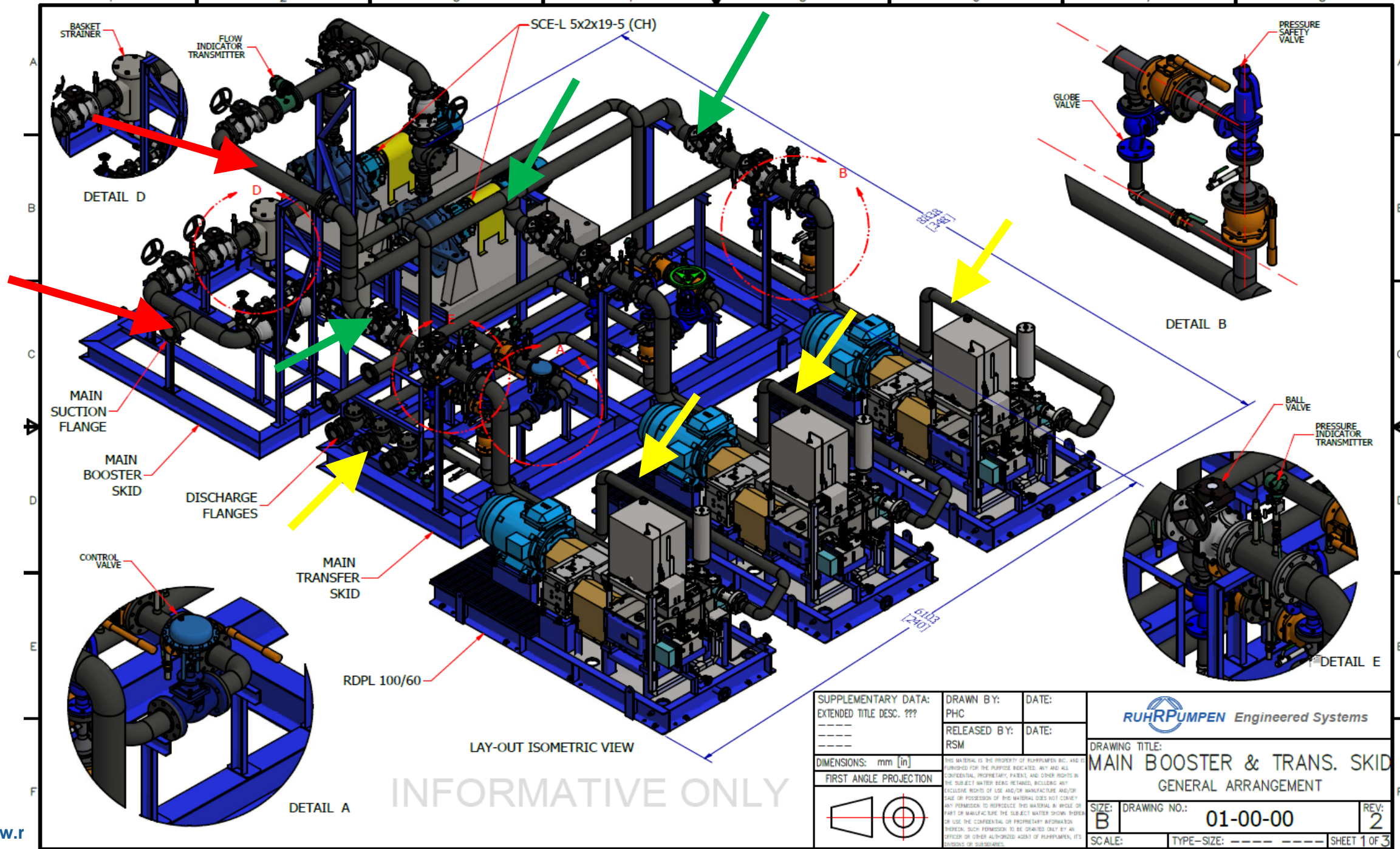


Engineered Systems

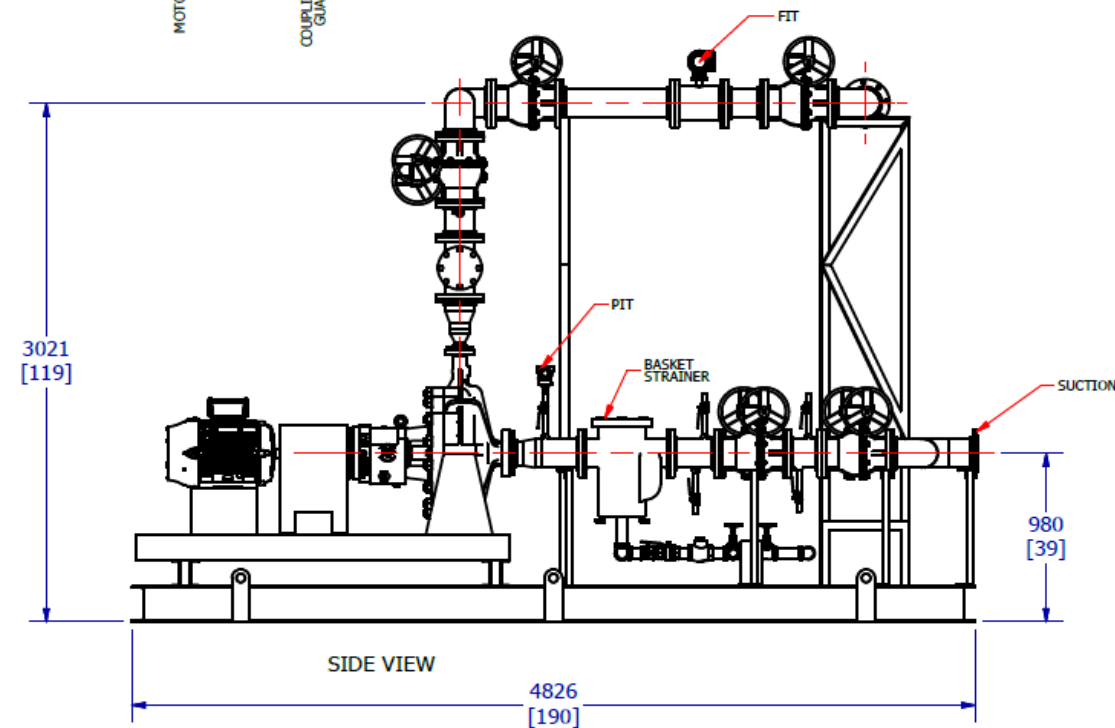
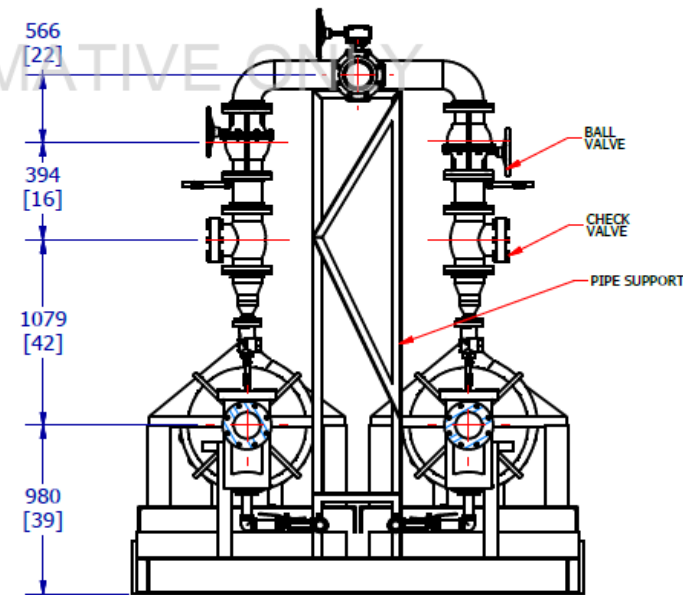
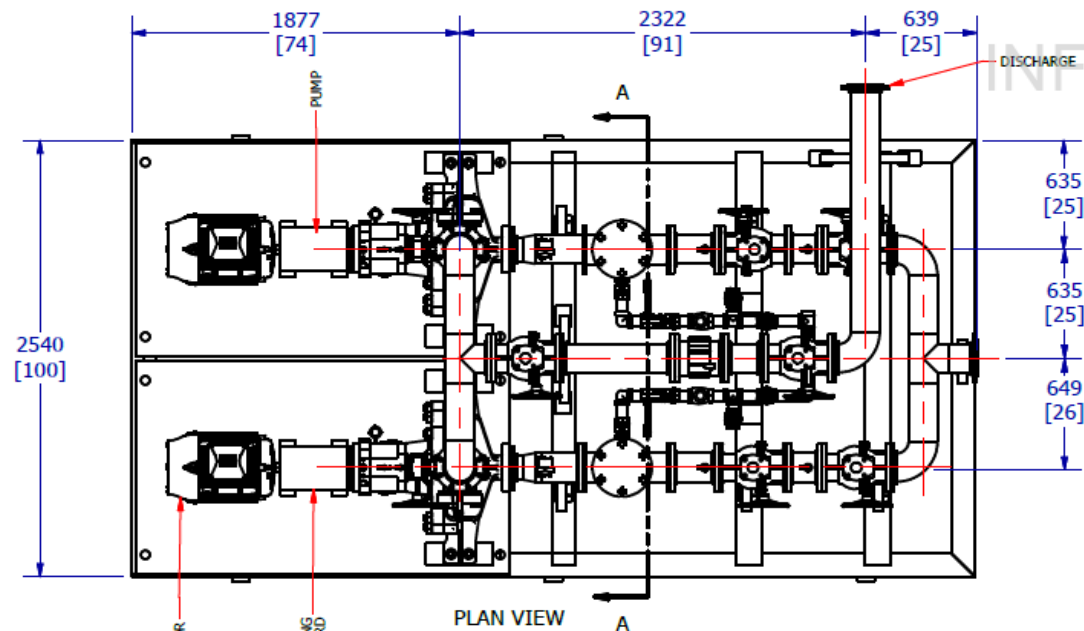
Why Buy a Complete System vs Building it Yourself?

Example Proposal #4

- High Complexity 5 skid package
- 2 Booster Pumps (API 610 type OH2) (5x2x19.5 SCE) (114 usgpm @ 46psi) on common skid
- 3 Plunger Pumps (API 674) (RDP 100/60) (56usgpm @ 96psi) on individual skids
- Transfer skid for all 5 pumpsets
- Interconnecting piping, valves and fittings
- Structural calculations, natural resonant frequency analysis.
- Extensive NDE (RXE, LPE, PMI, MPE)
- Order in production at the moment



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		SCALE:		TYPE-SIZE: -----	REV: 2
				SHEET 1 OF 3	



SECTION A-A

OPERATION CONDITION

FLOW/PRESSURE: 3,900 USbl per day / 145 psi

FLUID: Hydrocarbon

CUSTOMER DATA

CUSTOMER: SEPCON

END USER: PLUSPETROL PERU CORP.

SITE: LIMA, PERU

PROJECT: MAIN BOOSTER AND TRANSF. SKID

GPS #: 2202089 -01

CUSTOMER P.O.: N/A

SERVICE: CONDENSATE BOOSTER PUMP

PAH-28101A /B

PUMP:
SCE-L 5x2x19-5 (CH)

ENGINE:
40 HP

CONTROL PANEL:
VFD

SUPPLEMENTARY DATA:
EXTENDED TITLE DESC. ???

DRAWN BY:
PHC

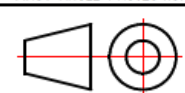
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FIRST ANGLE PROJECTION



RUHRPUMPEN Engineered Systems

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MAIN BOOSTER & TRANS. SKID
GENERAL ARRANGEMENT

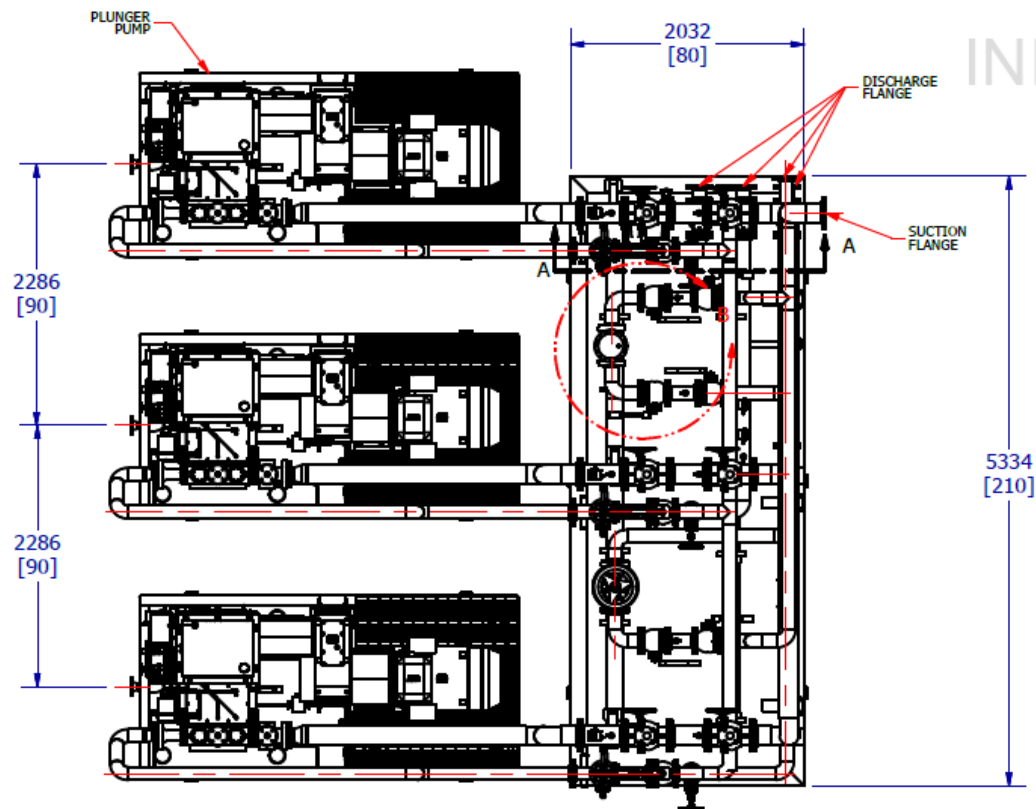
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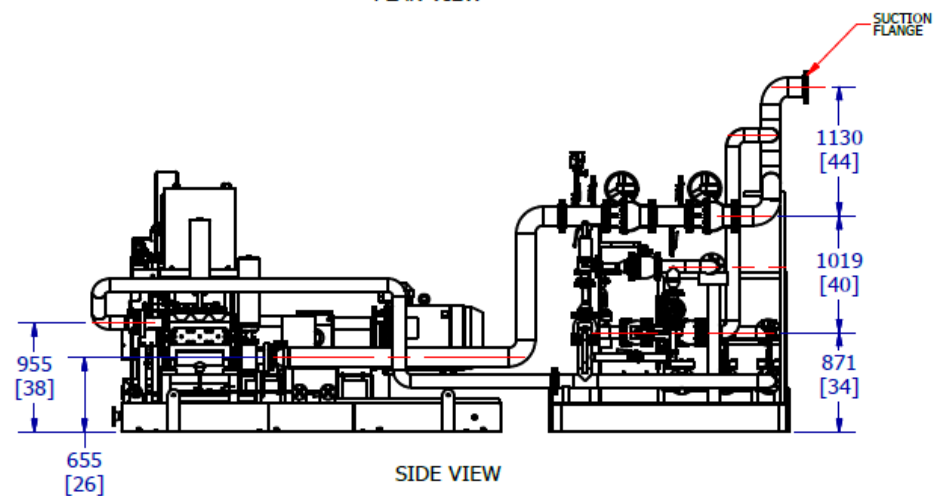
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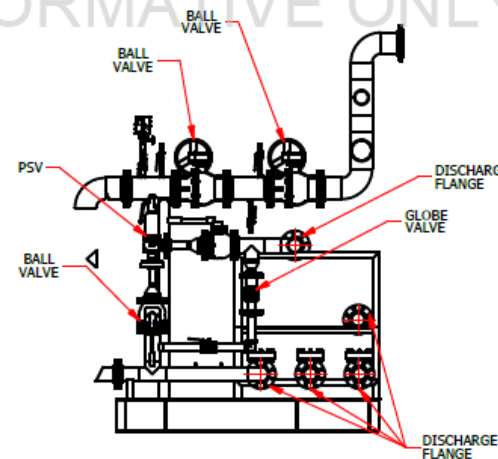
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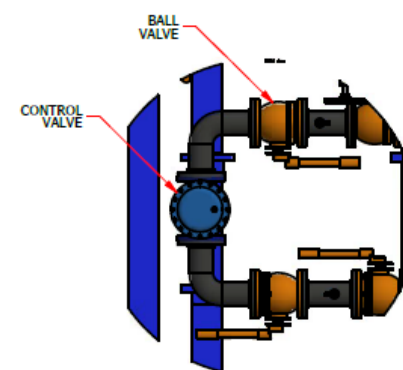
PLAN VIEW



SIDE VIEW



SECTION A-A



DETAIL B

OPERATION CONDITION

FLOW/PRESSURE: 56.84USgpm / 96 psi

FLUID: Hydrocarbon

CUSTOMER DATA

CUSTOMER: SEPCON

END USER: PLUSPETROL PERU CORP.

SITE: LIMA, PERU

PROJECT: MAIN BOOSTER AND TRANSF. SKID

GPS #: 2202089 -01

CUSTOMER P.O.: N/A

SERVICE: CONDENSATE TRANSFER PUMP

PAY-28102 A/B/C

PUMP:
RDPL 100/60

ENGINE:
125 HP

CONTROL PANEL:
VFD

SUPPLEMENTARY DATA:
EXTENDED TITLE DESC. ???

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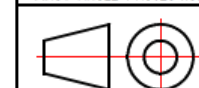
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RUHRPUMPEN Engineered Systems

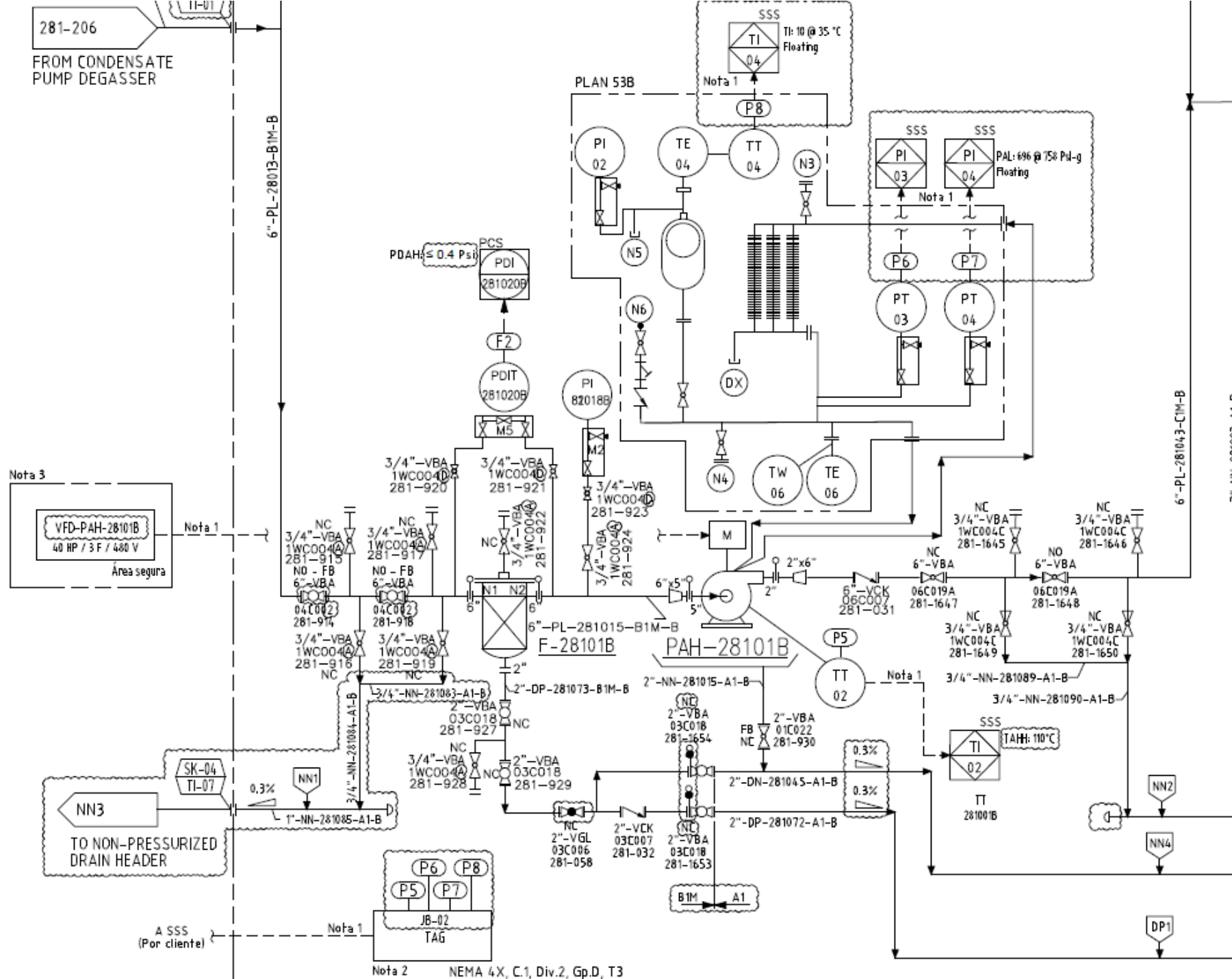
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MAIN BOOSTER & TRANS. SKID
GENERAL ARRANGEMENT

SIZE: **B** DRAWING NO.: **03-00-00**

REV: **2**

SCALE: TYPE-SIZE: SHEET 3 OF 3







Engineered Systems

Why Buy a Complete System vs Building it Yourself?

Example Proposal #5

- Low Complexity
- 2 Self Priming Pumps (Gormann Rupp) (250 usgpm @ 162 ft)
- 1 Electrical Panel with Variable Frequency Drives
- 1 Bladder Tank
- Interconnecting piping, valves and fittings
- Common skid for all equipment



CDS

Self Priming Centrifugal Pump

Model U3A60S-B

Size 3" x 3"

**Super
U SERIES**
VARIOUS PATENTS APPLY

PUMP SPECIFICATIONS

Size: 3" (76 mm) Flange Suction x 3" (76 mm) NPT Discharge.

Casing: Gray Iron 30.

Maximum Operating Pressure 139 psi (958 kPa).*

Semi-Open Type, Six Vane Impeller: Ductile Iron 60-40-18.

Handles 13/16" (20,6 mm) Diameter Spherical Solids.

Impeller Shaft: Alloy Steel 4150.

Replaceable Wear Plate: Gray Iron 30.

Removable Adjustable Cover Plate: Gray Iron 30; 60 lbs. (27 kg).

Suction Extension Pipe: Schedule 40 Steel w/Gray Iron Flange.

Bearing Housing: Gray Iron 30.

Seal Plate: Gray Iron 30.

Shaft Sleeve: Alloy Steel 4130.

Radial Bearing: Open Single Row Ball.

Thrust Bearing: Open Double Row Ball.

Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.

Flanges: Gray Iron 30.

Gaskets: Cork, Rubber, Vegetable Fiber and PTFE.

O-Rings: Buna-N and Fluorocarbon (DuPont Viton® or Equivalent).

Hardware: Standard Plated Steel.

Brass Pressure Relief Valve.

Victaulic® Suction Coupling.

Bearing and Seal Cavity Oil Level Sight Gauges.

Optional Equipment: Stainless Steel 316 Pressure Relief Valve, G-R

Hard Iron and Stainless Steel Impeller, Seal Plate, and Wear Plate.

Automatic Air Release Valve, 120V/240V Casing Heater, High Pump

Temperature Shutdown Kit, Peralon, Kalrez or Fluorocarbon Metal

Bellows Seals, Stainless Steel Cartridge Seal.

Discharge Spool Flange: Gray Iron 30.

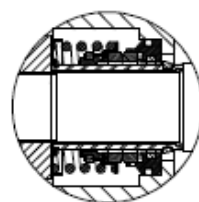
3" ASA (Specify Model U3A60S-B /F).

80 mm DIN 2527 (PN 16). Gray Iron 30 Suction and Discharge

Spool Flanges.

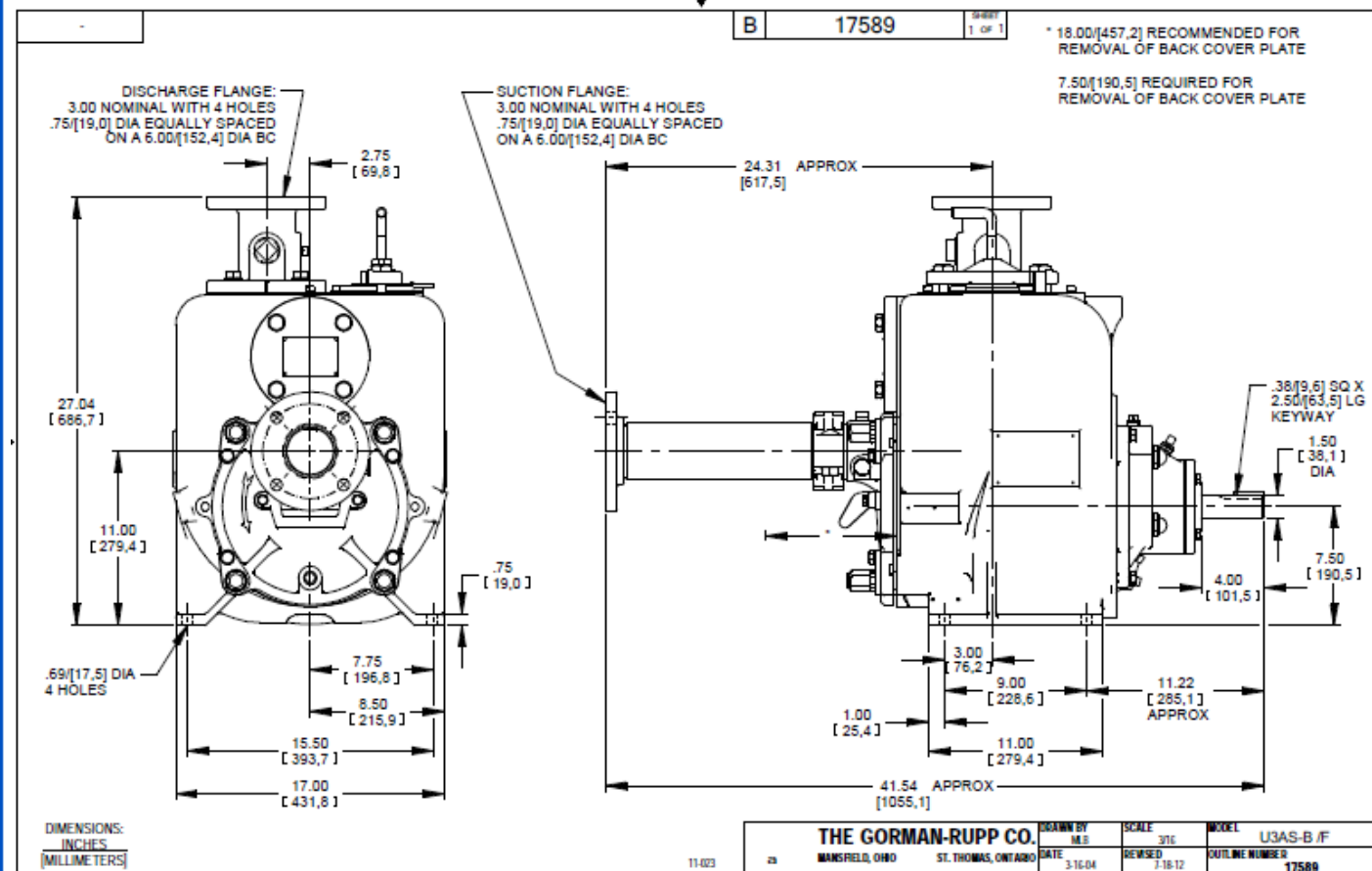
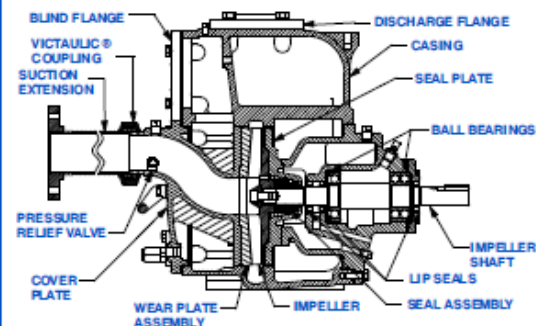
*Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.

Victaulic is a Registered Trademark of Victaulic Company of America.

Shown w/Optional
Discharge Spool Flange

SEAL DETAIL

Cartridge Type, Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*



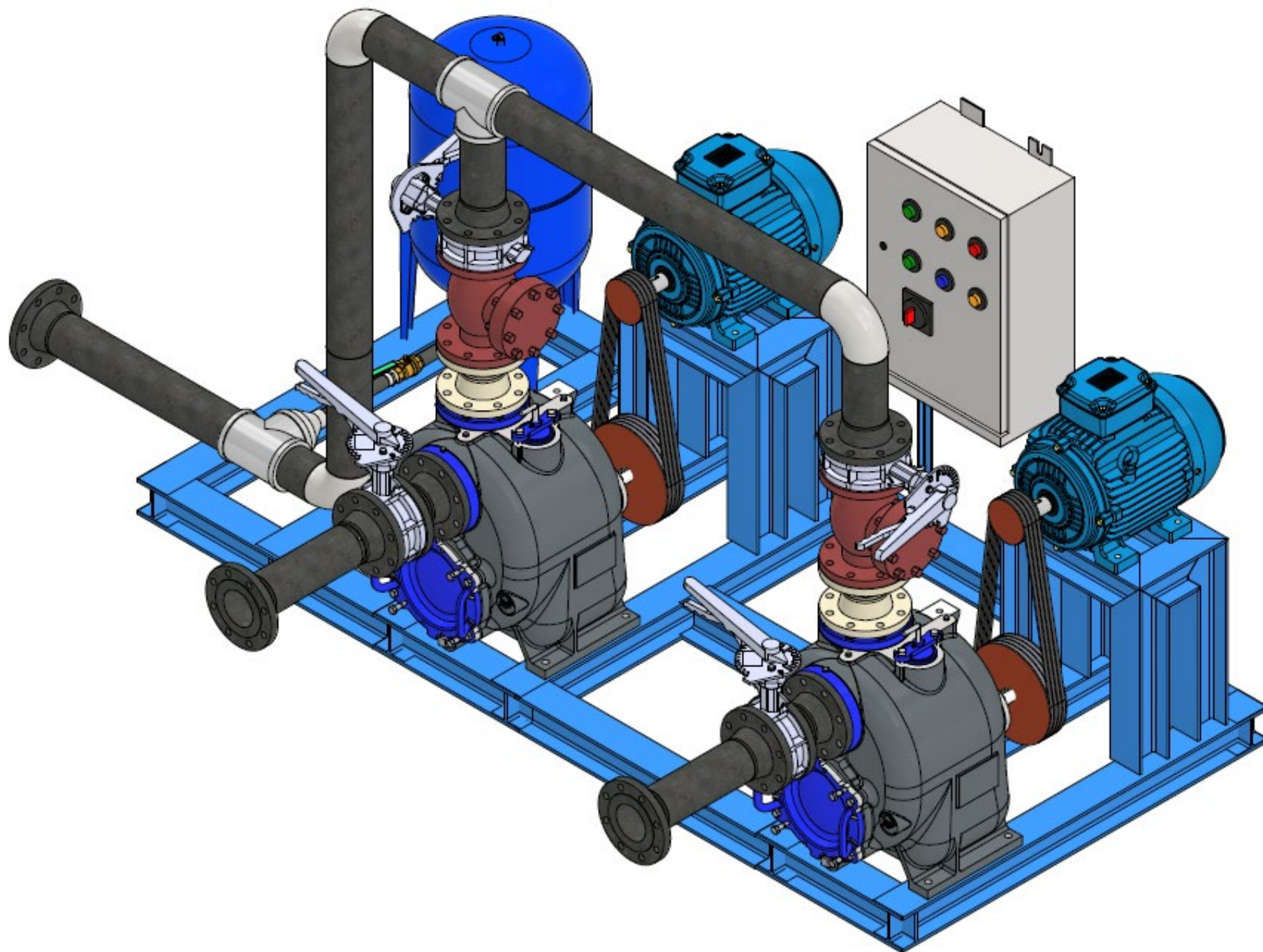
THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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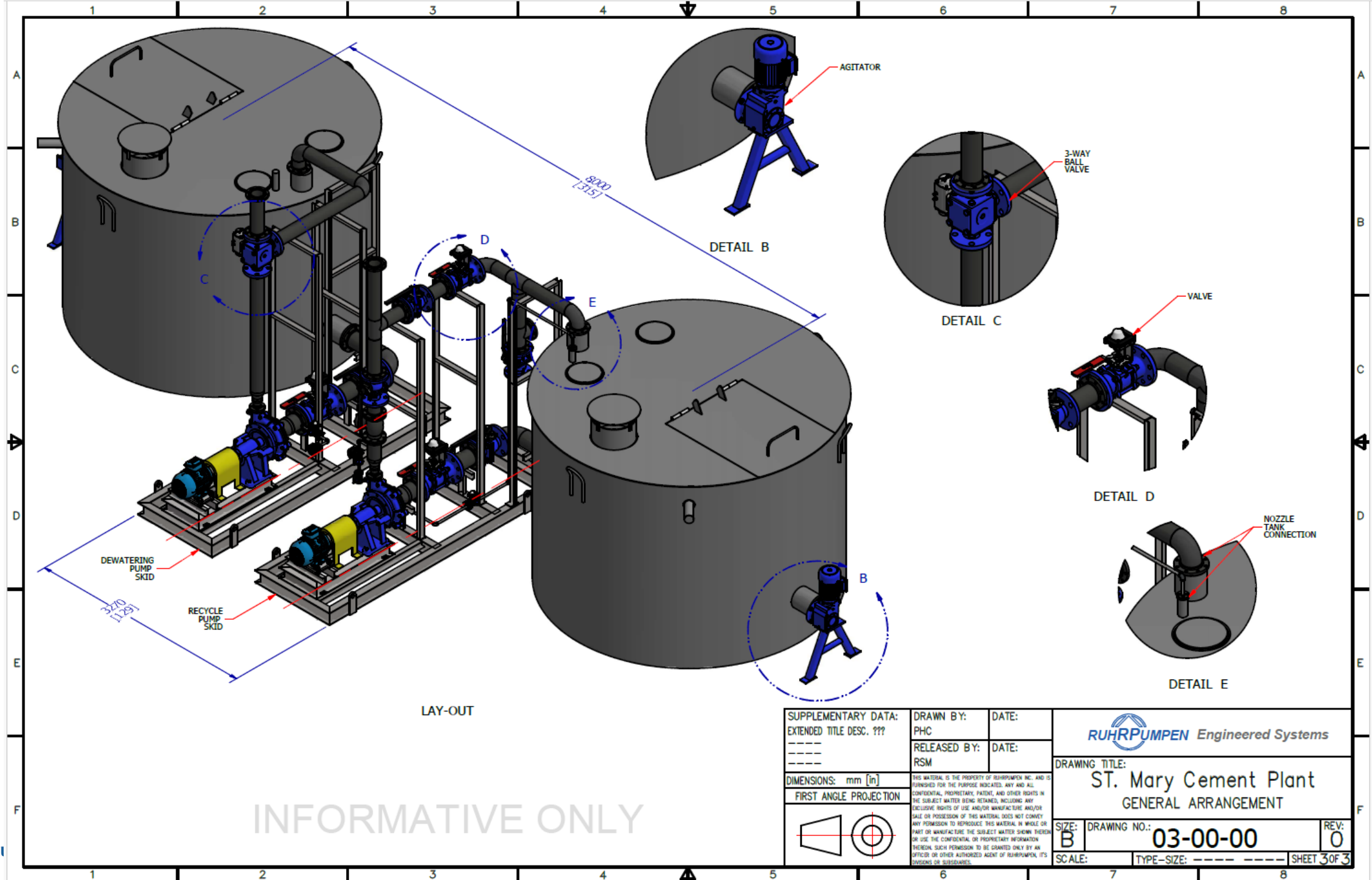


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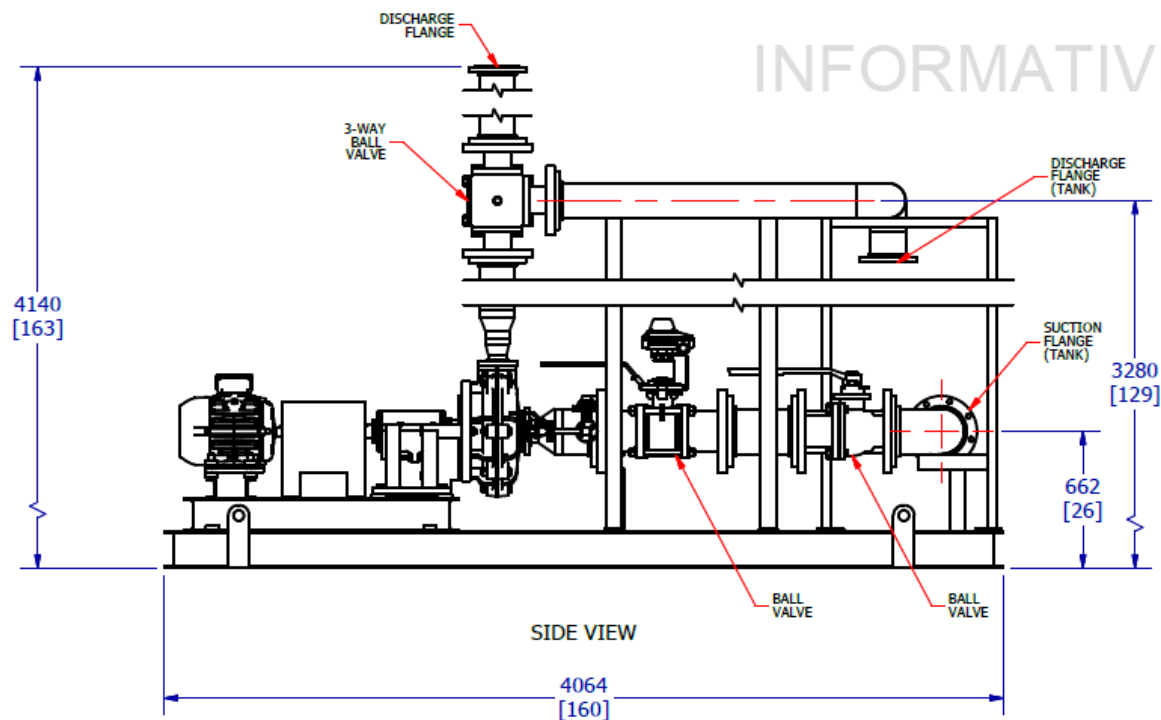
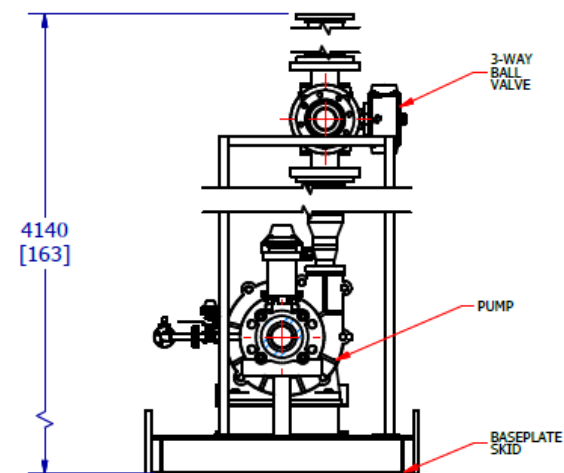
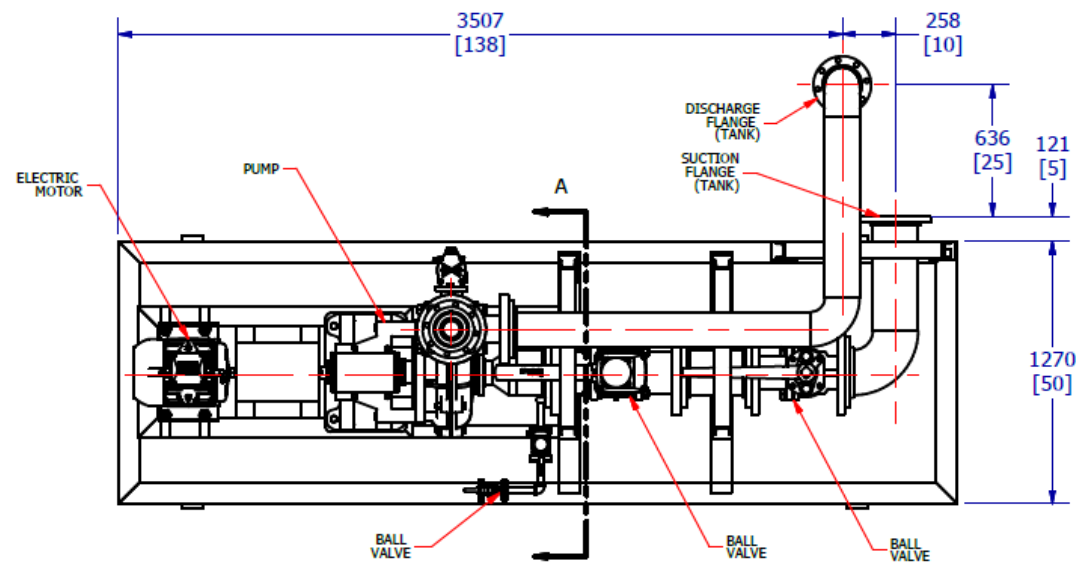
Why Buy a Complete System vs Building it Yourself?

Example Proposal #6

- High Complexity
- 2 Slurry Pumps MPP 4x3 (700usgpm @ 34psi & 650usgpm @ 26psi)
- 2 Storage tanks in RP scope of supply
- Individual pump skids
- All interconnecting piping, valves and fittings



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		SCALE:		TYPE-SIZE: _____	REV: 0 SHEET 3 OF 3



INFORMATIVE ONLY

PROCESS.WATER.PUMP	
PUMP:	MPP-4X3-C & MPP-4X3-C
ENGINE:	22 KW
CONTROL PANEL:	--

SUPPLEMENTARY DATA:	DRAWN BY:	DATE:
EXTENDED TITLE DESC. ???	PHC	
---	RELEASED BY:	DATE:
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FIRST ANGLE PROJECTION		



OPERATION CONDITION	
MPP-4X3-C & MPP-4X3-Q59 m3/hr 235 kpa & 147.5 m3/hr 180 Kpa	
FLUID: Gypsum Slurry & Recycled slurry solution	
CUSTOMER DATA	
CUSTOMER:	St Marys Cement Group
END USER:	SAME AS CUSTOMER
SITE:	Bowmanville, ON
PROJECT:	Slurry Bypass Tanks and Pump Skids
GPS #:	2234004
CUSTOMER P.O.:	N/A
SERVICE:	SLURRY PUMP SKIDS



DRAWING TITLE:
ST. Mary Cement Plant
GENERAL ARRANGEMENT

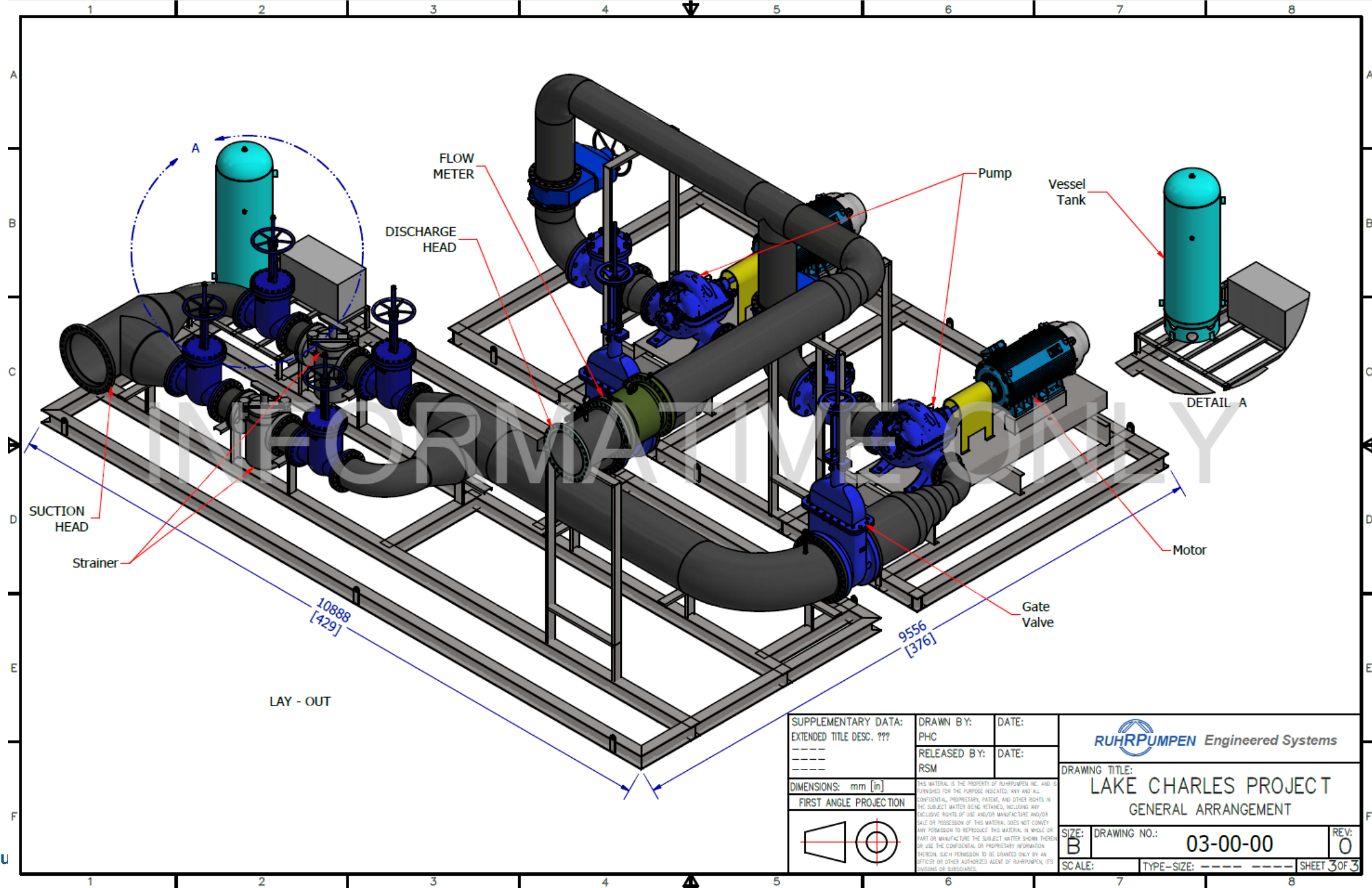
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SCALE:	TYPE-SIZE: ---	SHEET 1 OF 3

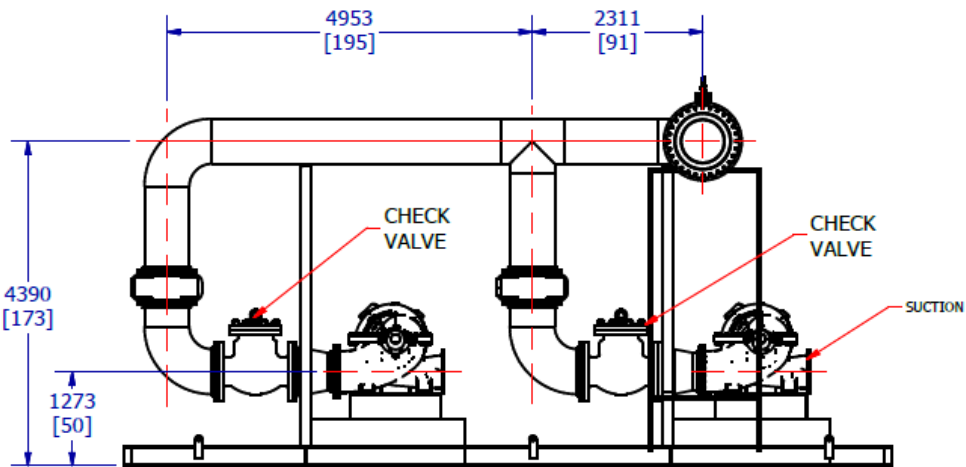
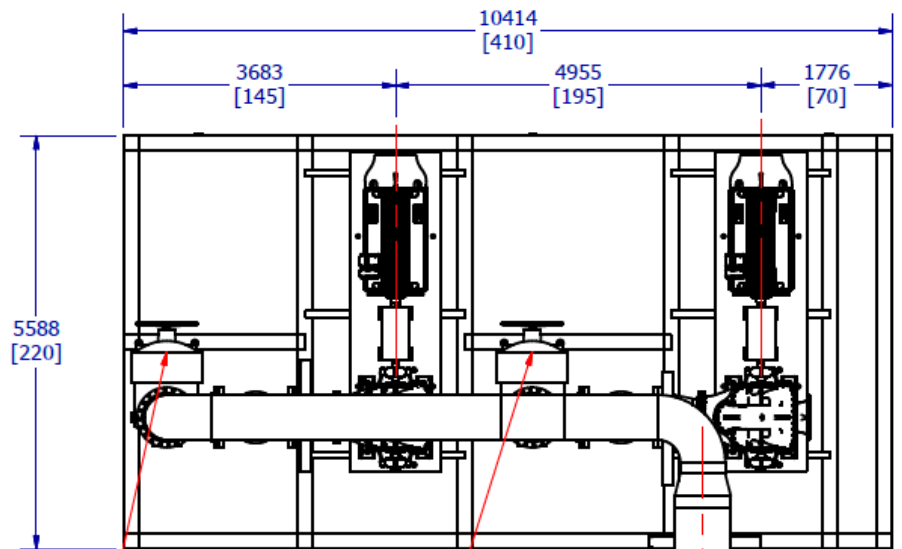
Engineered Systems

Why Buy a Complete System vs Building it Yourself?

Example Proposal #7

- High Complexity
- VERY large package with 2 skids. Overall Package 10.9m x 9.6m x 5m tall (36ft x 32ft x 16.5ft)
- One skid 10.9m x 5.6m x 5m tall (36ft x 18.5ft), One skid 13.3m x 5.3m (44ft x 17.5ft)
- 2 Split Case (BB1) Pumps HSC 16x20x23, 500BHP (9900 usgpm @ 64psi)
- 1 Flow meter
- 1 Bladder Tank
- Interconnecting piping, valves and fittings





P-90001-Electric Driver
PUMP: HSC 16x20x23B (B)
ENGINE: 500 HP
CONTROL PANEL: N/A

SUPPLEMENTARY DATA:
EXTENDED TITLE DESC. ???

DIMENSIONS: mm [in]
FIRST ANGLE PROJECTION



DRAWN BY: PHC
RELEASED BY: RSM
DATE: _____
DATE: _____

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OPERATION CONDITION

FLOW/PRESSURE: 9,900 USgpm / 64 psi
FLUID: Water

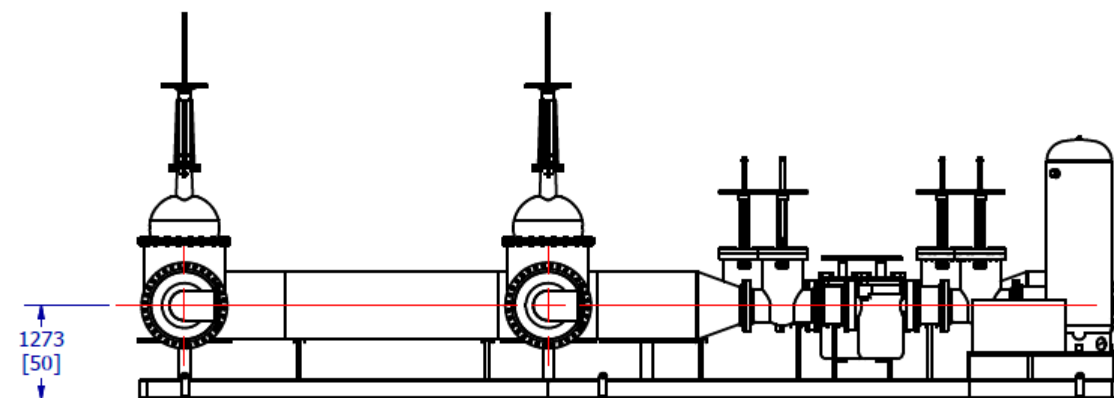
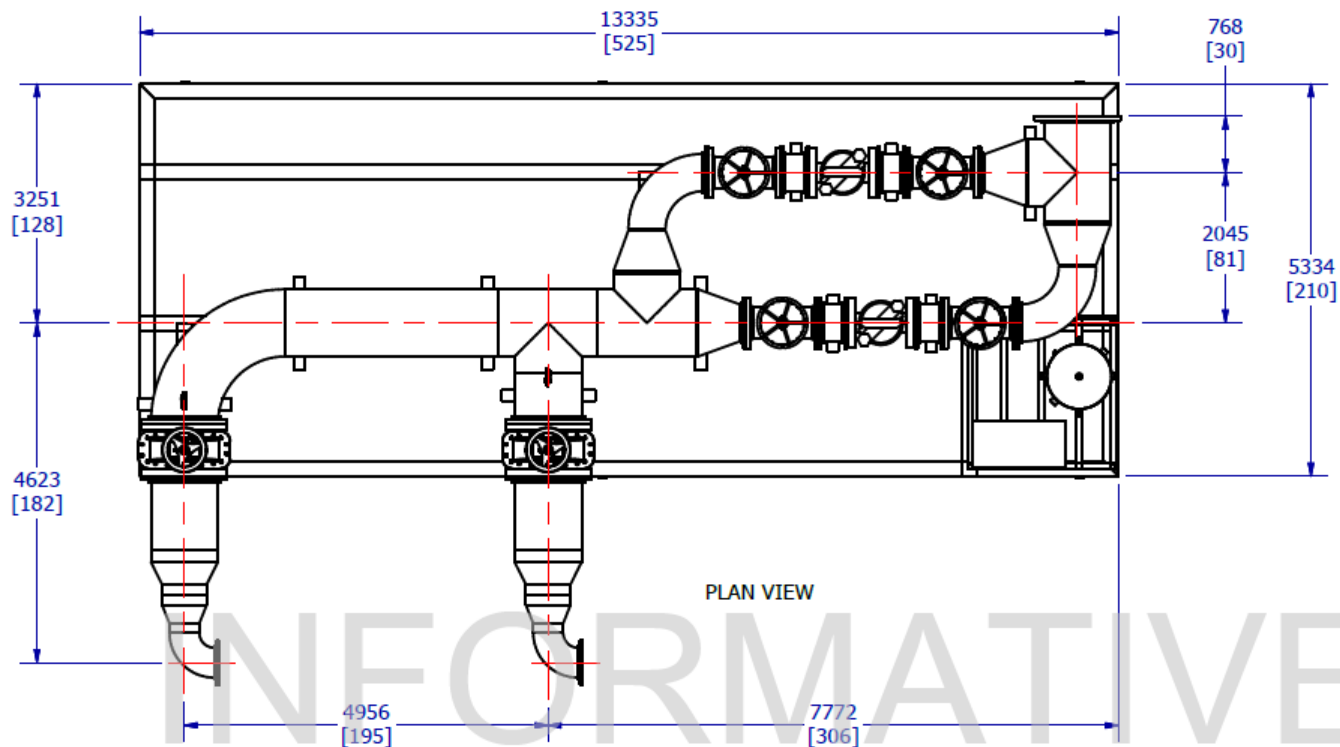
CUSTOMER DATA

CUSTOMER: Phoenix Power Group
END USER: LAKE CHARLES METHANOL LLC
SITE: Houston, TX.
PROJECT: LAKE CHARLES METHANOL PROJ. PUMPHOUSE
GPS #: 2218693
CUSTOMER P.O.: N/A
SERVICE: Raw Water PumpHouse

RUHRPUMPEN Engineered Systems

DRAWING TITLE:
LAKE CHARLES PROJECT
GENERAL ARRANGEMENT

SIZE: B
DRAWING NO.: 01-00-00
REV: 0
SCALE: TYPE-SIZE: SHEET 1 OF 3



PAH-28101A /B
PUMP: SCE-L 5x2x19-5 (CH)
ENGINE: 40 HP
CONTROL PANEL: VFD

SUPPLEMENTARY DATA:
EXTENDED TITLE DESC. ???

DIMENSIONS: mm [in]
FIRST ANGLE PROJECTION



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OPERATION CONDITION	
FLOW/PRESSURE:	3,900 USbl per day / 145 psi
FLUID:	Hydrocarbon
CUSTOMER DATA	
CUSTOMER:	SEPCON
END USER:	PLUSPETROL PERU CORP.
SITE:	LIMA, PERU
PROJECT:	MAIN BOOSTER AND TRANSF. SKID
GPS #:	2202089 -01
CUSTOMER P.O.:	N/A
SERVICE:	CONDENSATE BOOSTER PUMP



DRAWING TITLE:
LAKE CHARLES PROJECT
GENERAL ARRANGEMENT

SIZE: B DRAWING NO.: 02-00-00 REV: 0
SCALE: TYPE-SIZE: SHEET 2 OF 3

Coming Attractions 😊

“Double Case Pumps (Barrel Pumps – BB5)”

Thur 19th December – 08.00 (UK GMT) (Eastern Hemisphere) & 17.00 (UK GMT) (Western Hemisphere)

Aimed at Process and Mechanical Engineers and Consultant Engineers specifying pumping equipment for refineries and oilfield installations as well as Applications & Sales Engineers selecting and quoting them.

This seminar is going to look specifically at Double Case (Barrel) Pumps API Type BB5 but I am going to spend time looking at why and when you need them and what the alternatives are.



Specialist for Pumping Technology

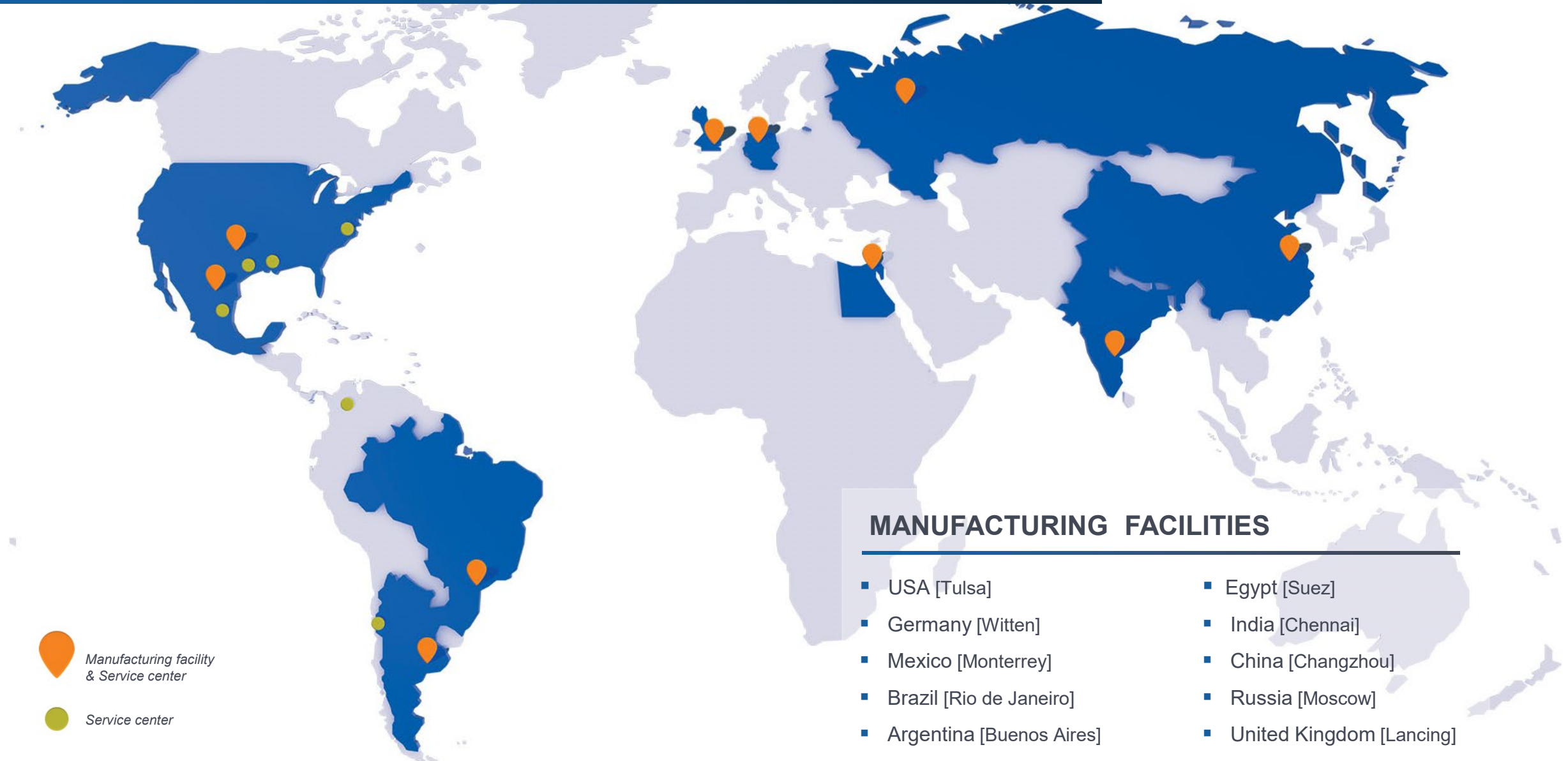
Q & A

ssmith@ruhrpumpen.com

www.ruhrpumpen.com

marketing@ruhrpumpen.com

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RUHRPUMPEN AT A GLANCE

**VERTICAL
INTEGRATION**

**SALES
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+35 COUNTRIES**

**MANUFACTURING
FACILITIES
IN 10 COUNTRIES**

**+70 YEARS
OF EXPERIENCE**

**+2,000
EMPLOYEES**

**15 SERVICE
CENTERS**

+70,000 PUMPING SOLUTIONS INSTALLED WORLDWIDE

MARKETS WE SERVE

Our commitment to create innovations that offer reliable solutions to our customers allow us to provide a complete range of pump systems to support **core markets** as:





OUR PUMP LINES

Ruhrpumpen offers a broad range of highly engineered and standard pumping products that meet and exceed the requirements of the most demanding quality specifications and industry standards.

Our pumps can handle head requirements as high as 13,000 ft (4,000 m) and capacities up to 300,000 gpm (68,000 m³/hr).

Moreover, our pump designs cover temperatures from cryogenic temperatures of -310 °F (-196 °C) up to 752 °F (400 °C).

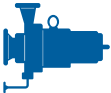
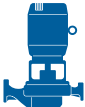
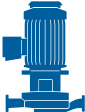


Products include:

- Single Stage Overhung Pumps
- Between Bearings Pumps
- Horizontal Multi-Stage Pumps
- Vertical Multi-Stage Pumps
- Vertical Mixed Flow & Axial Flow Pumps
- Positive Displacement Pumps
- Full Range of Industrial Pumps
- Submersible Pumps
- Magnetic Drive Pumps
- Decoking Systems
- Packaged Systems
- Fire Systems



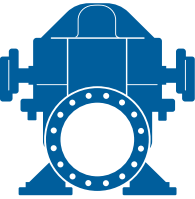
OVERHUNG PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Sealless Magnetic Drive Pumps	CRP-M / CRP-M-CC	ISO 2858 & 15783 HI design (OH11)	
	SCE-M	API 685	
Foot Mounted OH1 and General End Suction Pumps	IPP	HI design (OH1)	
	CPP / CPP-L	HI design (OH1) ANSI B73.1	
	CPO / CPO-L	HI design (OH1) ANSI B73.1	
	CRP	HI design (OH1) ISO 2858 & 5199	
	GSD	HI design (OH0)	
	SHD / ESK / SK / SKO SKV / ST / STV	HI design (OH1)	
	SWP	HI design (OH3A)	
Centerline Mounted	SCE	API 610 (OH2)	
Vertical In-Line Pumps	SPI	API 610 (OH3)	
	IVP / IVP-CC	HI design (OH4 / OH5)	
	IIL	HI design (OH5) Dimensionally compliant with ANSI B73.2	
	SPN	API 610 (OH5)	





BETWEEN BEARING PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
1 and 2 stage	Axially split	HSC / HSD / HSL HSR / ZW	HI design (BB1)	
		HSM	HI design (BB3)	
		ZM / ZMS ZLM / ZME	API design (BB1)	
	Radially split	HVN / J	API design (BB2)	
		RON / RON-D	API design (BB2)	
Multi-stage	Axially split	SM / SM-I	API design (BB3)	
		JTN	API design (BB3)	
	Radially split <i>single casing</i>	GP	API design (BB4)	
	Radially split <i>double casing</i>	A LINE	API design (BB5)	





VERTICAL PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
Single casing	Diffuser	VTP	HI & API 610 (VS1)	
		VCT	HI & API 610 (VS1)	
		HQ	HI & API 610 (VS1)	
		VLT	HI & API 610 (VS1)	
	Volute	DSV / DX	HI & API 610 (VS2)	
	Discharge through column – Axial flow	VAF	HI & API 610 (VS3)	
	Separate discharge line	VSP / VSP-Chem	HI & API 610 (VS4)	
Double casing	Diffuser	VLT / VMT	HI & API 610 (VS6)	
	Volute	DSV / DX	HI & API 610 (VS7)	
Submersible pumps		SMF	HI design (OH8A)	
		VLT-Sub / VTP-Sub	HI design (VS0)	





SPECIAL SERVICE PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Pitot tube pumps	COMBITUBE	HI design	
Reciprocating pumps	RDP	API 674 ISO 13710	
Vertical turbine generator	VTG	HI design (VS6)	
Barge	LS BARGE	HI design	
Floating dock pumps	ZVZ	HI design	
	LVZ	HI design	
Cryogenic pumps	SVNV	-	
	VTG Cryogenic	-	
	VLT Cryogenic VLTV	-	
Pre-packaged fire pump systems	Fire systems incorporate pumps, drivers, control systems and pipework in a single container. They can be skid mounted, with or without enclosure and supplied with electric motor or diesel engine.		
		NFPA-20-850 UL and FM approved components	

