calcgen	Calcgen **Solutions** **Project Specifications**	**Document No.:**	
		Page:	of
VesselExpress			

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Title			
Date	2019-02-21		

Revision Log

Rev. No	Description of Change	Date:
01	Initial Release	2019-Feb-02

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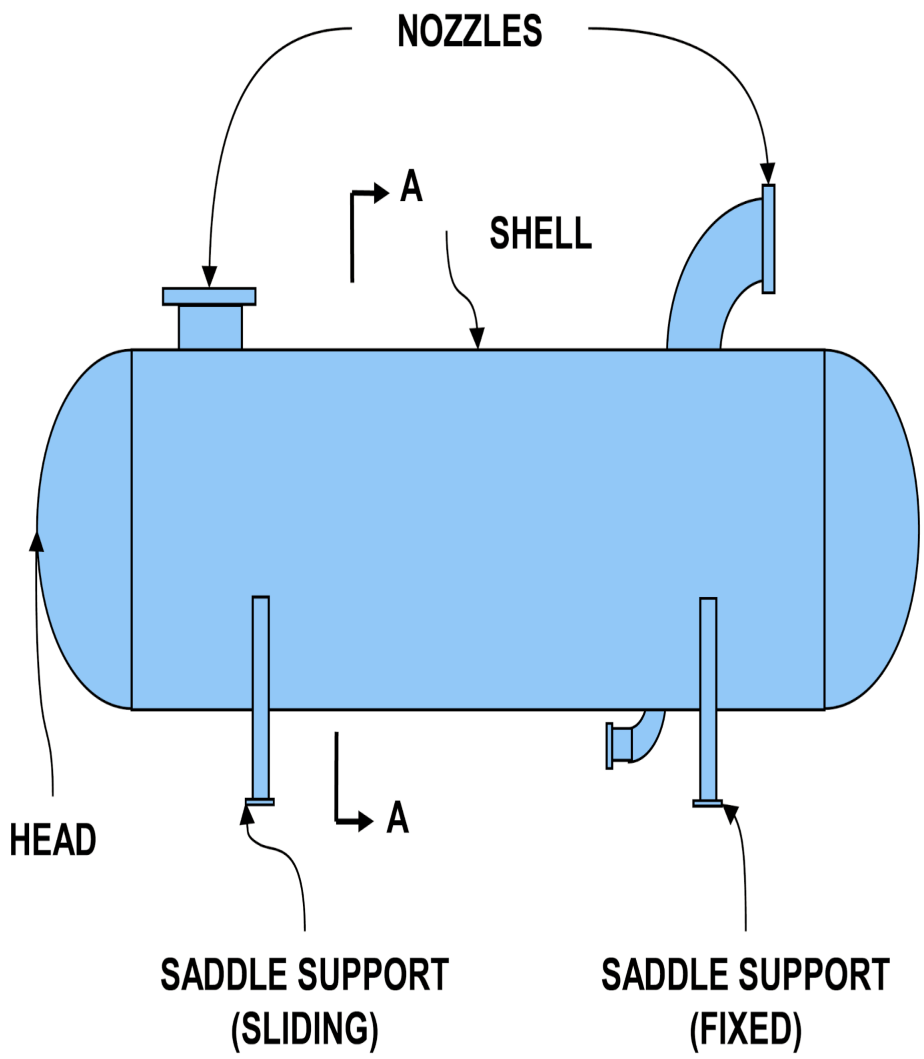
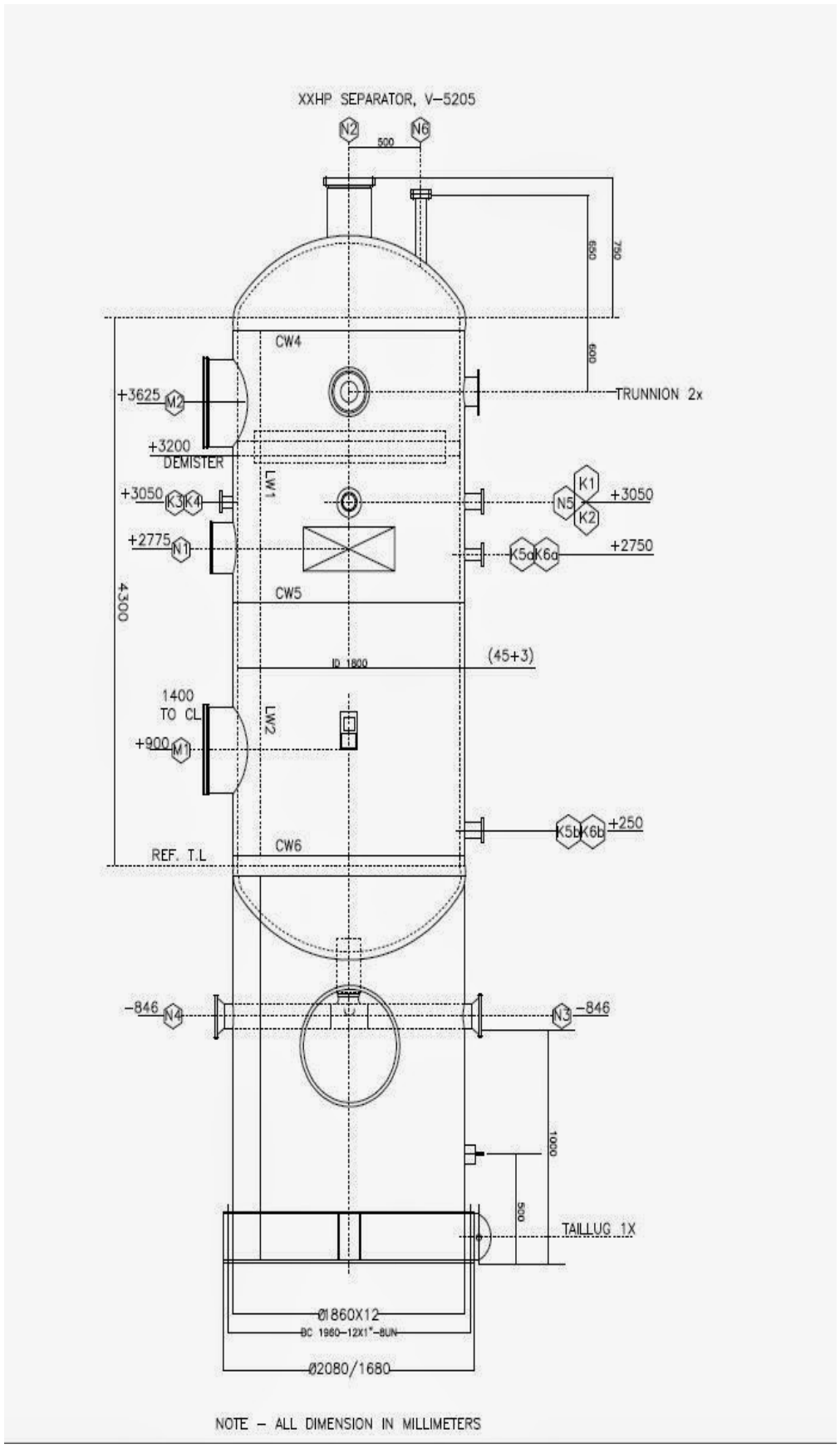
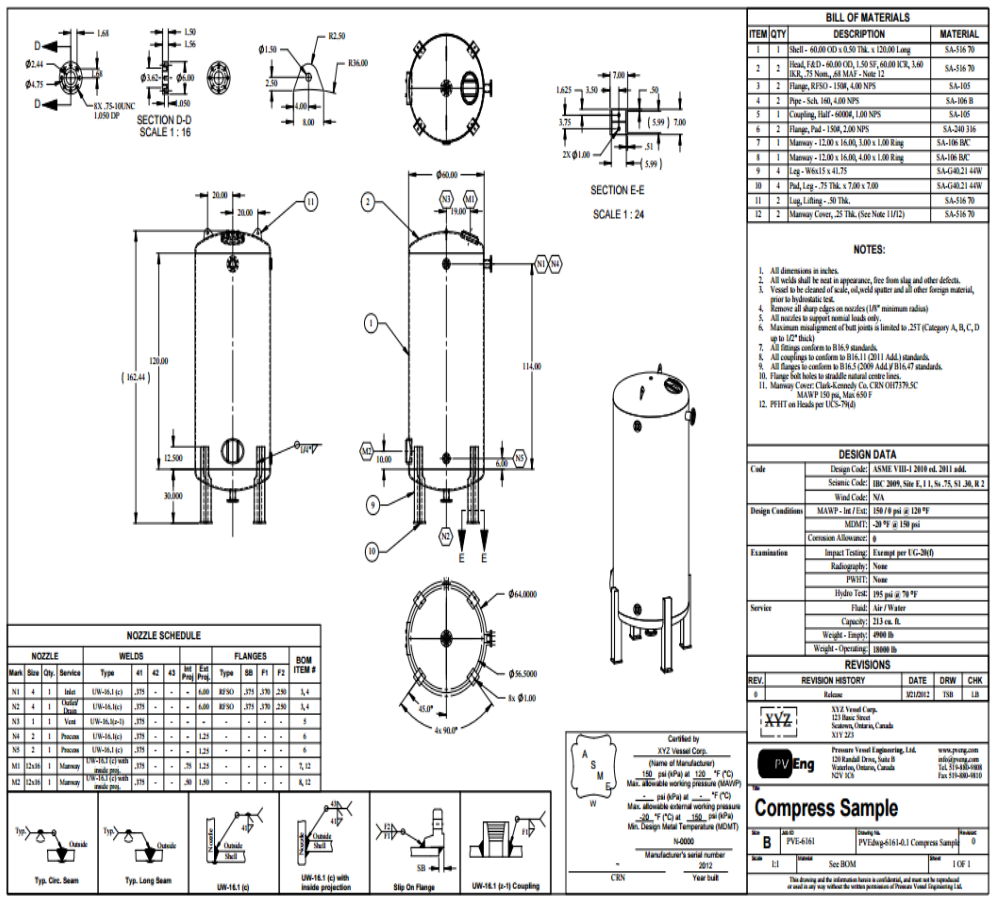
1.0 SCOPE

This document outlines the requirements for VesselExpress applications. VesselExpress is intended to perform a quick calculations based on user's inputs. As a result of calculations, user should be able to generate a calculations report (similar to Compress report) and an outline drawing. Version control is important. Each version of user's input and derived calculated data needs to be stored on the database. In addition, the chosen instances of outline drawing and report should also be stored to see the history. User should have option to chose US Customary ro SI units to build the pressure vessel.

2.0 **DEFINITION**







BILL OF MATERIALS

ITEM	QTY	DESCRIPTION	MATERIAL
1	1	Shell - 60.00 OD x 0.50 Thk. x 120.00 Long	SA-516 70
2	2	Head, F&D - 60.00 OD, 1.50 SF, 60.00 ICR, 3.60 IKR, .75 Nom., .66 MAF - Note 12	SA-516 70
3	2	Flange, RFSO - 1500, 4.00 NPS	SA-105
4	2	Pipe - Sch. 160, 4.00 NPS	SA-106 B
5	1	Coupling, Half - 6000#, 1.00 NPS	SA-105
6	2	Flange, Pad - 1500, 2.00 NPS	SA-240 316
7	1	Manway - 12.00 x 16.00, 3.00 x 1.00 Ring	SA-106 B/C
8	1	Manway - 12.00 x 16.00, 4.00 x 1.00 Ring	SA-106 B/C
9	4	Leg - Wrkl 5 x 41.75	SA-G40.21 44W
10	4	Pad, Leg - .75 Thk. x 7.00 x 7.00	SA-G40.21 44W
11	2	Lug, Lifting - .50 Thk.	SA-516 70
12	2	Manway Cover, .25 Thk. (See Note 11/12)	SA-516 70

NOTES:

1. All dimensions in inches.
2. All welds shall be neat in appearance, free from slag and other defects.
3. Vessel to be cleaned of scale, oil,weld spatter and all other foreign material, prior to hydrostatic test.
4. Remove all sharp edges on nozzles (1/8" minimum radius)
5. All nozzles to support normal loads only.
6. Maximum misalignment of butt joints is limited to .25T (Category A, B, C, D up to 1/2" thick)
7. All fittings conform to B16.9 standards.
8. All couplings to conform to B16.11 (2011 Add.) standards.
9. All flanges to conform to B16.5 (2009 Add.)/ B16.47 standards.
10. Flange bolt holes to straddle natural centre lines.
11. Manway Cover: Clark-Kennedy Co. CRN 0H7379.5C
    MAWP 150 psi, Max 650 F
12. PFHT on Heads per UCS-79(d)

DESIGN DATA

Code	Design Code:	ASME VIII-1 2010 ed. 2011 add.
	Seismic Code:	IBC 2009, Site E, I 1, Ss .75, S1 .30, R 2
	Wind Code:	N/A
Design Conditions	MAWP - Int / Ext:	150 / 0 psi @ 120 °F
	MDMT:	-20 °F @ 150 psi
	Corrosion Allowance:	0
Examination	Impact Testing:	Exempt per UG-20(f)
	Radiography:	None
	PWHT:	None
	Hydro Test:	195 psi @ 70 °F
Service	Fluid:	Air / Water
	Capacity:	213 cu. ft.
	Weight - Empty:	4900 lb
	Weight - Operating:	18000 lb

REVISIONS

REV.	REVISION HISTORY	DATE	DRW	CHK
0	Release	3/21/2012	TSB	LB

NOZZLE SCHEDULE

Mark	Size	Qty.	Service	NOZZLE: Type	WELDS: 41	42	43	Int Proj.	Ext Proj.	FLANGES: Type	SB	F1	F2	BOM ITEM #
N1	4	1	Inlet	UW-16.1 (c)	.375	-	-	-	6.00	RFSO	.375	.370	.250	3, 4
N2	4	1	Outlet/ Drain	UW-16.1(c)	.375	-	-	-	6.00	RFSO	.375	.370	.250	3, 4
N3	1	1	Vent	UW-16.1(c-1)	.375	-	-	-	-	-	-	-	-	5
N4	2	1	Process	UW-16.1(c)	.375	-	-	-	1.25	-	-	-	-	6
N5	2	1	Process	UW-16.1 (c)	.375	-	-	-	1.25	-	-	-	-	6
M1	12x16	1	Manway	UW-16.1 (c) with inside proj.	.375	-	-	.75	1.25	-	-	-	-	7, 12
M2	12x16	1	Manway	UW-16.1 (c) with inside proj.	.375	-	-	.50	1.50	-	-	-	-	8, 12

Certified by XYZ Vessel Corp. (Name of Manufacturer)
150 psi (kPa) at 120 °F (°C) Max. allowable working pressure (MAWP)
- - psi (kPa) at - - °F (°C) Max. allowable external working pressure
-20 °F (°C) at 150 psi (kPa) Min. Design Metal Temperature (MDMT)
N-0000 Manufacturer's serial number
- 2012 CRN Year built

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Scatown, Ontario, Canada
XYY 223

Pressure Vessel Engineering, Ltd.
120 Randall Drive, Suite B
Waterloo, Ontario, Canada
N2V 1C6
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Compress Sample

Size	Job ID	Drawing No.	Revision
B	PVE-6161	PVEdwg-6161-0.1 Compress Sample	0
Scale 1:1	Material See BOM		Sheet 1 OF 1

3.0 **PIPE AND FLANGE DATA NEEDED**

Pipe data should come from a pipe chart. A pipe chart like this(link) needs to be available to pull the property based on the pipe and selected pipe schedule. For VesselExpress, we will only use ASME B16.5 welding neck flanges. The flange data is also available on this link. All classes (150, 300, 400,

600, 900, 1500 and 2500) classes of flange data shall be available. The flange dimensions should also be stored on database. The pipe and flange data do not change frequently so it should be on read only database for the users. Admins should be able to modify the information if required. Many other application need to pull these information as well.

4.0 **COMPONENTS REQUIRED**

ASME 2:1 Ellip. Head

Cylinder(s)

Nozzles (Built with Pipe and Flange)

Skirt (Applicable to Vertical Vessel Only)

Saddle (Applicable to Horizontal Vessel Only)

5.0 **OUTPUT REQUIRED**

Vessel Calculations (HTML and PDF) showing the vessel wall thickness

MAWP

Weight of Pressure Vessel (entire Weight)

Center of Gravity with Fluid or without fluid

Nozzle Schedule Table

An outline drawing

Version Control ability

Area

	Abbreviation	Unit
0	km²	square kilometer
1	m²	square meter
2	dm²	square decimeter
3	cm²	square centimeter
4	mm²	square millimeter
5	ha	hectare
6	a	are
7	ca	centiare
8	mile²	square mile
9	in²	square inch
10	yd²	square yard
11	ft²	square foot
12	ro	rood
13	acre	acre
14	nautical mile²	square nautical mile

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TEMP

	Abbreviation	Unit
0	°C	Celsius
1	°F	Fahrenheit
2	K	Kelvin
3	°Ré	Reaumur
4	°N	Newton
5	°Ra	Rankine

ANGLE

	bbreviation	Unit
0	°	Degree
1	grad(gon)	Grad
2	Angular mil	Angular mil
3	'	Minute of arc
4	rad	Radian
5	"	Second of arc

DISTANCE

	Abbreviation	Unit
0	km	kilometer
1	m	meter
2	dm	decimeter
3	cm	centimeter
4	mm	millimeter
5	mi	mile
6	in	inch
7	ft	foot
8	yd	yard
9	nautical mile	nautical mile

FREQUENCY

	Abbreviation	Unit
0	Hz	Hertz
1	KHz	Kilohertz
2	MHz	Megahertz
3	GHz	Gigahertz

MAX

	2	SA-516	Carbon Steel	Plate	60	K02100	none	none.1	1	1.1	60.1	32	850	700	1000	650	CS-2	G10, S1, T2	17.1	17.1.1	17.1.2	0	17.1.3	17.1.4	17.1.5	16.4	15.8	15.3	13	10.8	8.7	5.9	4	2.5
0	3	SA-516	Carbon Steel	Plate	55	K01800	none	none	1	1	55	30	850	700	1000	650	CS-2	G10, S1, T2	15.7	15.7	15.7	0	15.7	15.7	15.7	15.3	14.8	14.3	13	10.8	8.75	5.9	4	2.5

PIPE

	4	0.125	0.405	0.307	10S	0.049	0.1863
0	5	0.125	0.405	0.269	40	0.068	0.2447
1	6	0.125	0.405	0.269	STD	0.068	0.2447
2	7	0.250	0.540	0.410	10	0.065	0.3297
3	8	0.250	0.540	0.410	10S	0.065	0.3297
4	9	0.250	0.540	0.364	40	0.088	0.4248
5	10	0.250	0.540	0.364	STD	0.088	0.4248

PRESSURE

	Abbreviation	Unit
0	psi	Pound Per Square Inch
1	in Hg	Inch of Mercury
2	mm Hg	Millimeters of Mercury
3	ft H2O	Ftch of Mercury
4	in H2O	Milimiters of Mercury
5	torr	Torr
6	atm	Atmosphere
7	bar	Bar
8	mbar	millibar
9	kg / cm2	kg per square centimeter
10	kPa	kilopascal
11	Pa	pascal

WEIGHT

	Abbreviation	Unit
0	t	tonne
1	kg	kilogram
2	hg	hectogram
3	g	gram
4	dg	decigram
5	cg	centigram
6	mg	milligram
7	µg	microgram
8	carat	carat
9	grain	grain
10	oz (av)	ounce avoirdupois
11	lb (av)	pound avoirdupois
12	cwt(UK)	long hundredweight
13	cwt(US)	short hundredweight
14	ton(UK)	long ton
15	ton(US)	short ton
16	st(UK)	stone

SPEED

	Abbreviation	Unit
0	km/h	kilometer per hour
1	m/s	meter per second
2	mph	mile per hour

VOLUME

	Abbreviation	Unit
0	m^3	cubic meter
1	dm^3	cubic decimeter
2	cm^3	cubic centimeter
3	l	liter
4	dl	deciliter
5	cl	centiliter
6	ml	milliliter
7	fl oz(UK)	fluid ounce(UK)
8	fl oz(US)	fluid ounce(US)
9	in^3	cubic inch
10	ft^3	cubic foot
11	yd^3	cubic yard
12	gal(UK)	gallon uk
13	gal(US)	gallon us
14	bbl	petroleum barrel
15	pt(Imp)	pint(UK)
16	pt(US fl)	fluid pint(US)
17	pt(US dry)	dry pint(US)