

**Pressure Vessel Engineering, Ltd.**

Shell 1

Customer: **XYZ Vessel Corp**  
 Job No: PVE-Sample 2  
 Number: 1

Vessel Number: 1  
 Mark Number: S1

Date Printed: 10/30/2008

**Cylindrical Shell Design Information**

Design Pressure:	200.00 PSI	Design Temperature:	300 °F
Static Head:	0.00 PSI	Long. Joint Efficiency:	85 %
Shell Material:	SA-106 Gr B	Factor B Chart:	CS-2
Shell Length:	36.0000 in.	Material Stress (hot):	17100 PSI
Corrosion Allowance:	0.0000 in.	Material Stress (cold):	17100 PSI
External Corrosion Allowance:	0.0000 in.	Compressive Stress:	17247 PSI
Outside Diameter (new):	12.7500 in.	Actual Circumferential Stress:	4478 PSI
Outside Diameter (corroded):	12.7500 in.	Actual Longitudinal Stress:	2555 PSI
Shell Surface Area:	10.01 Sq. Ft.	Specific Gravity:	1.00
Shell Estimated Volume:	17.63 Gal.	Weight of Fluid:	147.26 lb.
Circ. Joint Efficiency:	70 %	Total Flooded Shell Weight:	295.79 lb.
		Shell Weight:	148.53 lb.

**Minimum Design Metal Temperature Data**

Min. Temperature Curve:	B	Pressure at MDMT:	200.00 PSI
UCS-66(b) reduction:	No	Minimum Design Metal Temperature:	-20 °F
UCS-68(c) reduction:	No	Computed Minimum Temperature:	-20 °F

**Design Thickness Calculations**

**Longitudinal Stress Calculations per Paragraph UG-27(c)(2)**

$$t = \frac{PR}{2SE + 0.4P} = \frac{200.00 * 6.0000}{2 * 17100 * 0.70 + 0.4 * 200.00}$$

= Greater Of (0.0500(Calculated), 0.0625(Minimum Allowed)) + 0.0000 (corrosion) + 0.0000 (ext. corrosion) + 0.0469 (12 1/2% for pipe)  
 = minimum of **0.1094 in.**

**Circumferential Stress Calculations per Appendix 1-1(a)(1)**

$$t = \frac{PR_o}{SE + 0.4P} = \frac{200.00 * 6.3750}{17100 * 0.85 + 0.4 * 200.00} = 0.0873 + 0.0000 (corrosion) + 0.0000 (ext. corrosion) + 0.0469 (12 1/2% for pipe)$$

= minimum of **0.1342 in.**

External loads do not control design.

Pipe Selected: Size = **12 in.**, Schedule = **STD**, Diameter = **12.7500 in.**, Wall = **0.3750 in.**

**Pressure Vessel Engineering, Ltd.**  
Head Left

Customer: **XYZ Vessel Corp**  
Job No: PVE-Sample 2  
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Vessel Number: 1  
Mark Number: H1

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**Ellipsoidal Head Design Information**

Design Pressure:	200.00 PSI	Design Temperature:	300 °F
Static Head:	0.00 PSI	Joint Efficiency:	85 %
Head Material:	SA-234 Gr WPB	Factor B Chart:	CS-2
Corrosion Allowance:	0.0000 in.	Material Stress (hot):	17100 PSI
External Corrosion Allowance:	0.0000 in.	Material Stress (cold):	17100 PSI
Head Location:	Left	Actual Head Stress:	4360 PSI
Outside Diameter :	12.7500 in.	Straight Flange :	2.8000 in.
12.5 % pipe undertolerance:	0.0469 in.	Head Depth (ho) :	3.3750 in.
K = $\frac{1}{6}[2 + (D/2h)^2]$ :	1.00		
Head Surface Area:	1.92 Sq. Ft.	Specific Gravity:	1.00
Head Estimated Volume:	2.35 Gal.	Weight of Fluid:	19.60 lb.
Head Weight:	29.27 lb.	Total Flooded Head Weight:	48.87 lb.

*-WRONG ON DWG*

**Minimum Design Metal Temperature Data**

Min. Temperature Curve:	B	Pressure at MDMT:	200.00 PSI
UCS-66(b) reduction:	No	Minimum Design Metal Temperature:	-20 °F
UCS-68(c) reduction:	No	Computed Minimum Temperature:	-20 °F

**Design Thickness Calculations**

**Design Thickness Calculations per Appendix 1-4(c)**

$$t = \frac{PD_0K}{2SE + 2P(K - 0.1)} = \frac{200.00 * 12.7500 * 1.00}{2 * 17100 * 0.85 + 2 * 200.00 * (1.00 - 0.1)}$$

= 0.0867 + 0.0000 (corrosion) + 0.0000 (ext. corrosion) + 0.0469(12.5 %) = minimum of **0.1336 in.**

Nominal Head Thickness Selected = **0.3750 in.**  
Minimum Thickness after forming,  $t_s$  (uncorroded) = **0.3281 in.**

**Pipe Cap**

**Size: 12 Schedule: STD**