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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2014 SESSION

SUBJECT CODE	:	**FFB32203**
SUBJECT TITLE	:	**DESIGN AND FABRICATION (VESSEL)**
LEVEL	:	**BACHELOR**
TIME/DURATION	:	**2.00 PM – 4.00 PM (2.0 HOURS)**
DATE	:	**10 JANUARY 2015**

INSTRUCTIONS TO CANDIDATES

1. **Please read the instructions given in the question paper CAREFULLY.**
2. **This question paper is printed on both sides of the paper.**
3. **Please write your answers on the answer booklet provided.**
4. **Answer should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consist only Section A.**
6. **Answer all questions in English.**

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 100 marks)
INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

1. The figure1 shows a vertical tall tower. Assuming that the height of the tower is 75 ft., and it is experiencing both windward and leeward wind. Determine the followings; what is the maximum deflection? Take 6 inches per 100 ft. for maximum deflection. Draw a simple schematic to show both the windward and leeward wind flow. (12 marks)

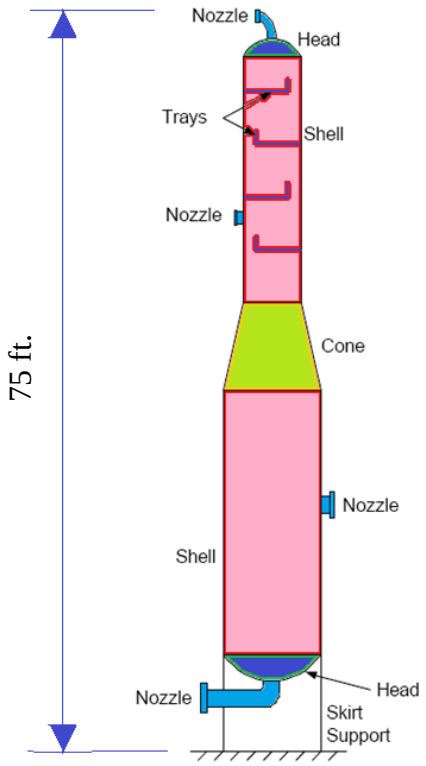


Figure 1 A Vertical Tall Tower

2. Find the optimum vessel diameter and length with the given design data with pressure is limited to 1000psi and ellipsoidal heads are assumed. The design pressure is 225psi, vessel volume is 1200ft.^{3}, stress value of metal is 16000psi, the joint are spot radiographed, and the corrosion allowance is 0.0625inches. (*Refer to Table 1 and formula provided*). (14 marks)

$$F = \frac{P}{CSE} \qquad L = \frac{4V}{\pi D^2}$$

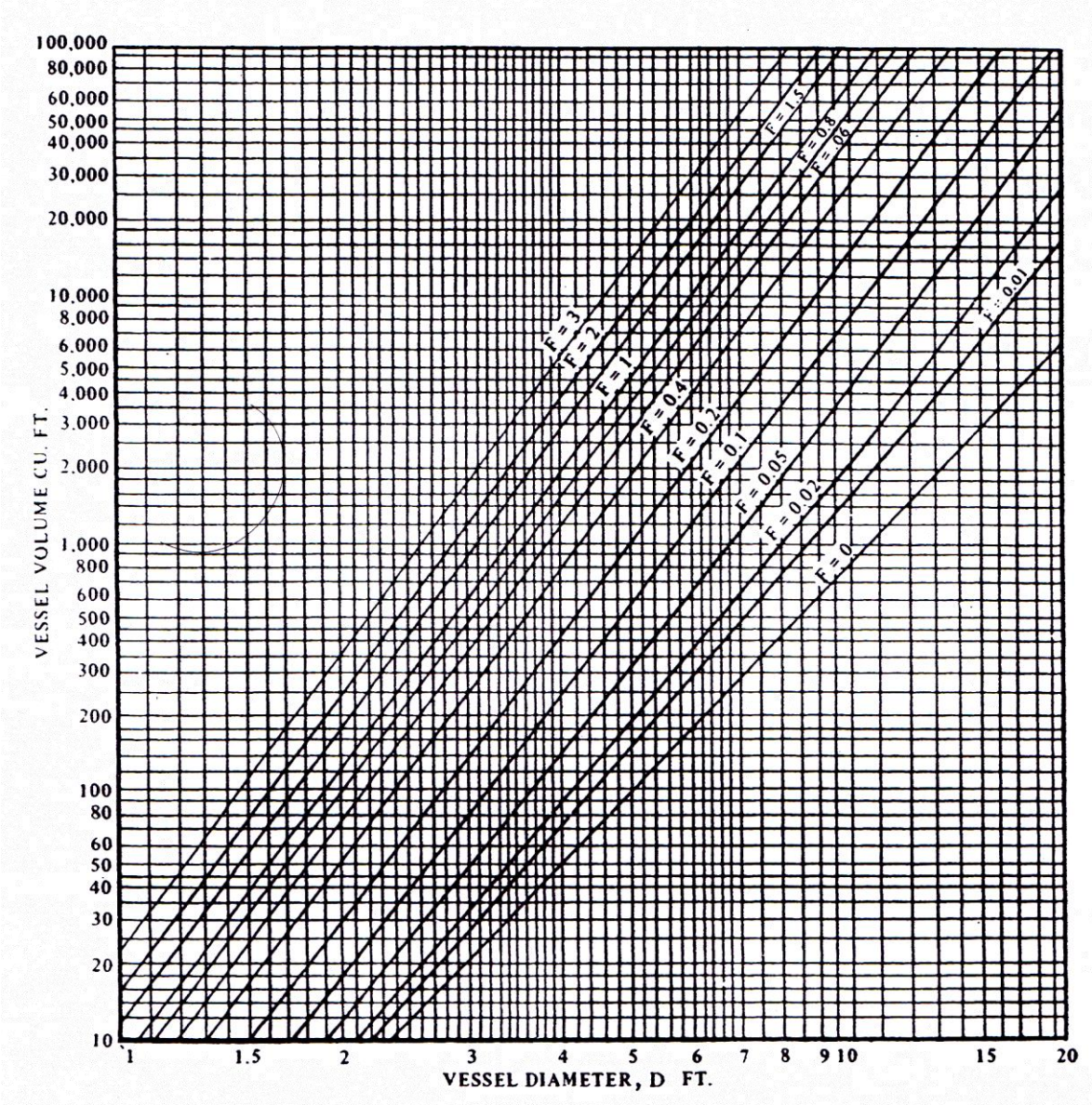
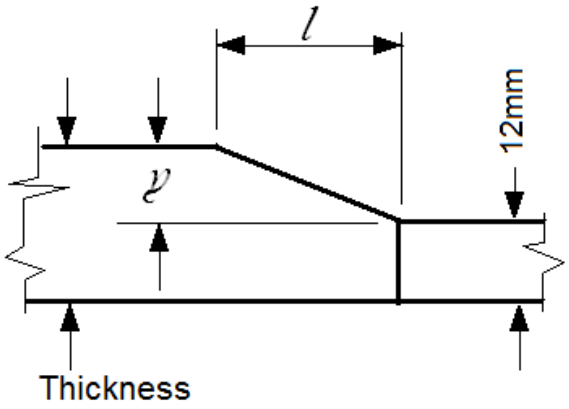


Table 1 Chart for determining the optimum pressure vessel size

3. From the figure 2 calculate l, if y = 17.5mm. If the thinner plate is 12.0mm, what is the thickness of the thicker plate? *Convert your answer to inches. Take 25.4mm = 1 inch.* (14 marks)

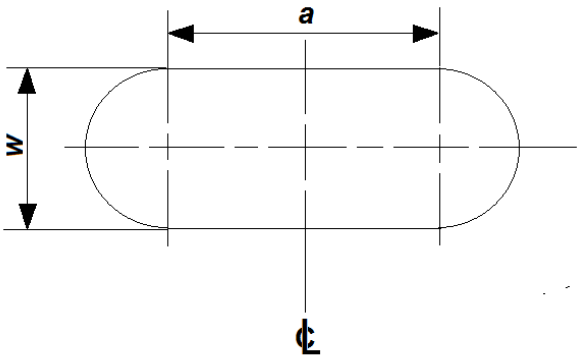


$l \geq 3y$

Taper either inside or outside of vessel

Figure 2 The thicker plate will be tapered as per the design requirement.

4. When pressure and heat is induced into a pressure vessel, then it will expand. Due to this, a horizontal vessel is supported by two saddles; one of its saddles is allowed to move. At the sliding saddle, the anchor bolt slots will be used. Find the minimum length dimension ***a*** of the slot base (diagram below) on the given data, and width ***w.*** *Use the Table 2 provided below.* Describe the movement of the sliding saddle. State **TWO (2)** reasons for the use of wear plate at the saddles. (15 marks)



Center line for saddle and Slot.

The width of the slot equals the diameter of the anchor bolt plus $\frac{1}{4}$ inches.

1. Distance between saddles = 70 ft.
2. Temperature = 600^0F
3. Diameter of anchor bolt = ¾ inches

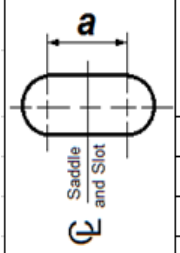
Minimum Length of Slot (Dimension "*a* ")										
	Distance between Saddles (Ft.)	For Temperature °F								
		-50	100	200	300	400	500	600	700	800	900
	10	0	0	0	1/4	3/8	3/8	1/2	5/8	3/4	3/4
	20	0	0	1/4	3/8	5/8	3/4	1	1 1/8	1 1/4	1 3/8
	30	1/4	1/8	3/8	5/8	7/8	1 1/8	1 3/8	1 5/8	1 5/8	2
	40	3/8	1/8	3/8	3/4	1 1/8	1 1/2	1 7/8	2 1/8	2 3/8	2 1/2
The width of the slot equals the diameter of anchor bolt + 1/4"	50	3/8	1/4	1/2	1	1 3/8	1 5/8	2 1/4	2 5/8	3	3 3/8
	60	3/8	1/4	5/8	1 1/4	1 5/8	2 1/8	2 3/4	3 1/8	3 5/8	4 1/8
	70	1/2	1/4	3/4	1 3/8	1 7/8	2 1/2	3 1/8	3 5/8	4 1/4	4 5/8
	80	1/2	3/8	3/4	1 1/2	2 1/8	2 7/8	3 5/8	4 1/4	4 7/8	5 3/8
	90	5/8	3/8	7/8	1 3/4	2 3/8	3 1/4	4	4 5/8	5 3/8	6
	100	5/8	3/8	1	1 7/8	2 5/8	3 5/8	4 1/2	5 1/8	6	6 5/8

Table 2 Slot length table

5. Explain vortexing of fluid or gas in a vessel. What is the function of a vortex breaker and its location in a horizontal pressure vessel? (15 marks)

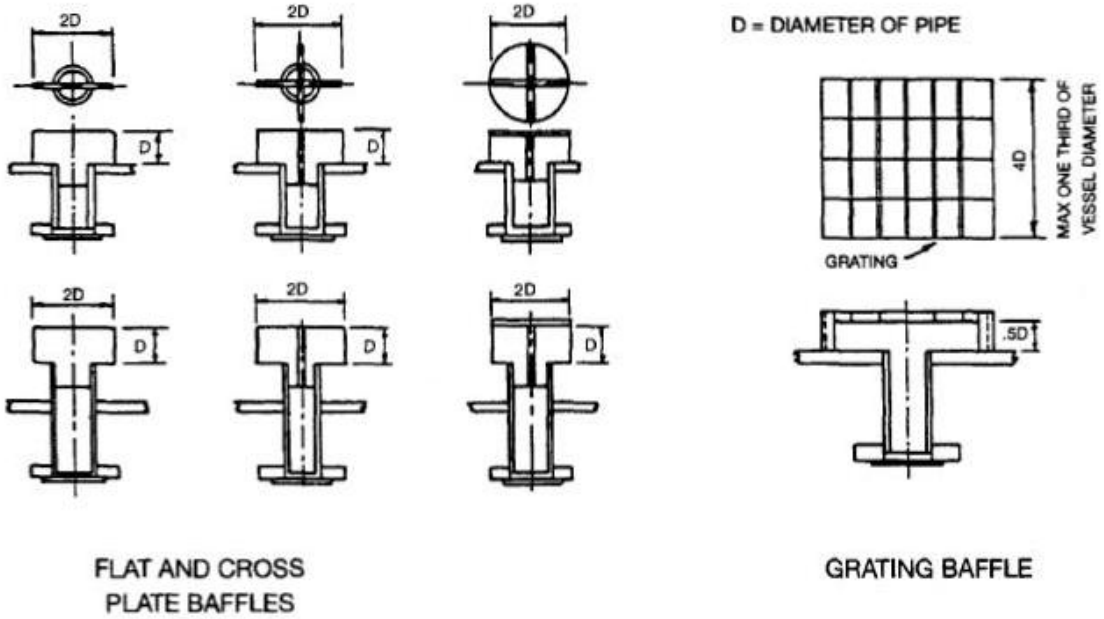


Figure 3 Typical Vortex Breakers

6. Where would the recommended location to fix the nameplate? Briefly explain what information that must be stamped to a nameplate as per the ASME Code VIII. Explain the difference between of a telltale hole and a weep hole. State their locations. (15 marks)

7. Any parts of vessel will encounter thinning due to corrosion, erosion or mechanical abrasion. ASME Code Section VIII Div. 1, UG-25b does not prescribe the magnitude of corrosion allowance. A pressure vessel has been in service for 12 years and has a history of corrosion over its service life. The original thickness was 1.9375 inches; the current thickness is 1.405 inches. What is the corrosion rate for this vessel? What is meant by thinning of the pressure vessel? Suggest TWO (2) methods to overcome this matter. ***(Do not rounded up your answer)*** (15 marks)

END OF QUESTION