



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2013 SESSION**

SUBJECT CODE : FFB 32203
SUBJECT TITLE : DESIGN AND FABRICATION (VESSEL)
LEVEL : BACHELOR
TIME/DURATION : 2.0 HOURS
DATE :

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 consists of **TWO (2)** sections. Section A and B. Answer all questions in Section A. For Section B, answer **THREE (3)** questions only.
 6. Answer all questions in English.
 7. Pressure Vessel Handbook 14th Edition is authorized.
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THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.**

1. 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?

(8 marks)
2. The code UG-22, explain about loadings of pressure vessel. Internal or external pressure is one of the loadings that a pressure vessel must be able to withstand. Explain the meaning of both internal and external pressure aided with diagrams to express your answer. What would be the right pressure relief valve for either one of them?

(8 marks)
3. Vessel openings normally have three shapes. Sketch the three opening shapes of the pressure vessel. In order to determine the right size of the opening, the Code UG-36 through UG-43 apply. For maximum 60 inches Inside Diameter Vessel (IDV), one half of the vessel diameter, but maximum 20 inches. Find the right diameter of opening if the IDV is 54 inches.

(8 marks)
4. For tall towers, the maximum deflection, Δ_M is 6 inches to 100 feet. A process company having five tall towers with a 90 feet, three 70 feet, and a 60 feet. Find the maximum deflection, Δ_M of all the towers.

(8 marks)
5. Joints preparation will fall under the economy of welding. Joint types such as V joints will cost lesser to prepare, compare to J or U joint. Justify your answers with the suitable reasons.

(8 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Based on Figure 1 below, answer the following questions;

- a) Describe the weld joint categories of A and B; symbols, its definition and significance.

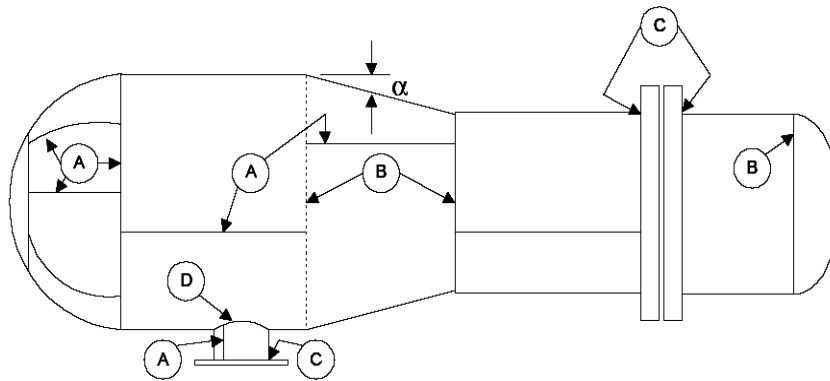


Figure 1 Illustration of Weld Joint Categories

(8 marks)

- b) In doing non-destructive tests or inspections of the vessel, describe the difference of visual examination, dye penetrant test and magnetic particle inspection.

(12 marks)

Question 2

- a) From Figure 2, of UW-9, butt welding of plates of unequal thickness, calculate the distance, l both (a) where $y = 4.5$ mm and (b) where $y = 12.8$ mm and as per the formula.

(6 marks)

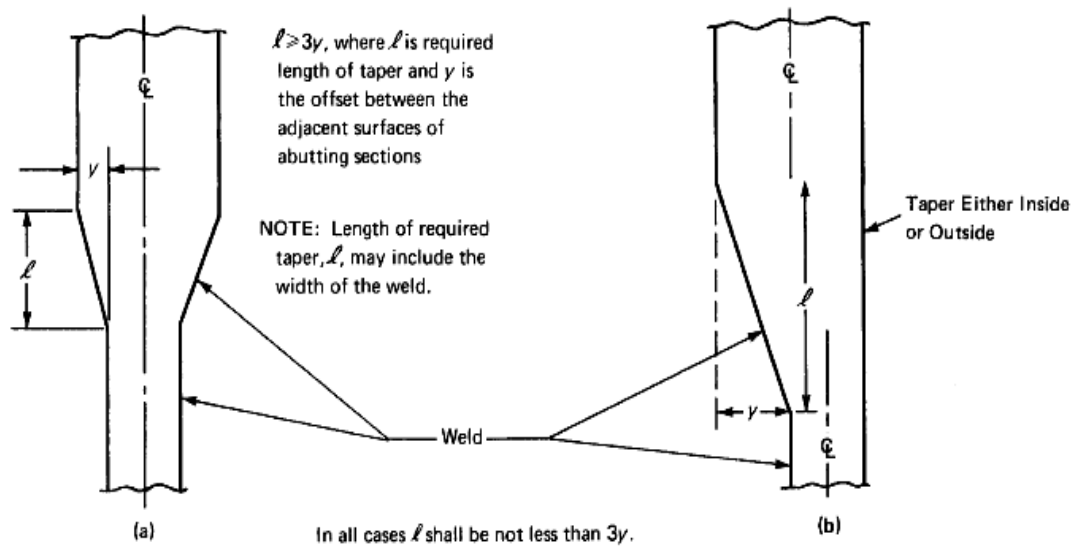


Figure 2 Butt Welding of Plates of Unequal Thickness

b) The shell thickness t , is 1 ½ inches, and the 2:1 ellipsoidal will be used. If the diameter of the shell is 60 inches, find the height of the dish head. Draw the schematic joint of the shell to dish head base on the given data above.

(14 marks)

Question 3

By referring to Figure 3 below, answer the following questions;

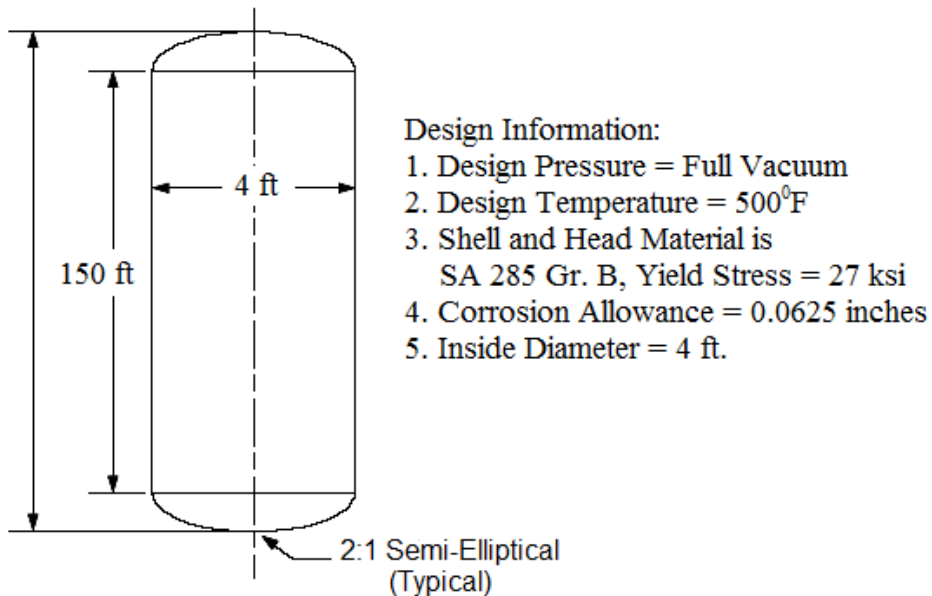


Figure 3: Vessel under internal pressure

- a) Differentiate the design pressure and maximum allowable pressure. (10 marks)
- b) Calculate the total length of the vessel. Assuming the minimum thickness of the shell and semi elliptical dish head is ¼ inches. (10 marks)

Question 4

By referring to Figure 4 and the given design information, answer the following questions.

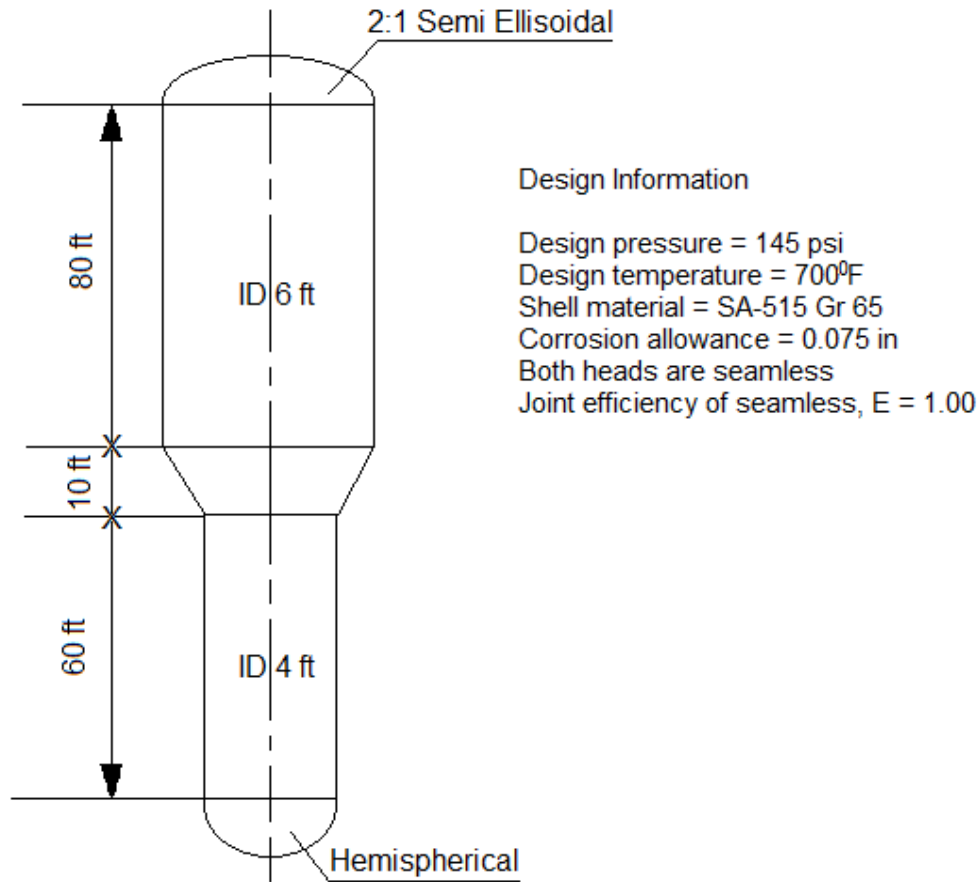


Figure 4: Pressure vessel under internal pressure

- a) If the leg design as per diagram B, of the pressure vessel handbook, and the leg length is 12 feet, calculate the total height of the vessel in Figure 4. (10 marks)

- b) What are the thicknesses of both shells? Convert your answers to millimeter with 2 decimal places. From the given product catalog find 2 steps higher than the calculated thickness of each shell. This will be your final answer.

(10 marks)

END OF QUESTION