ENVE 2061 BASIC FLUID MECHANICS

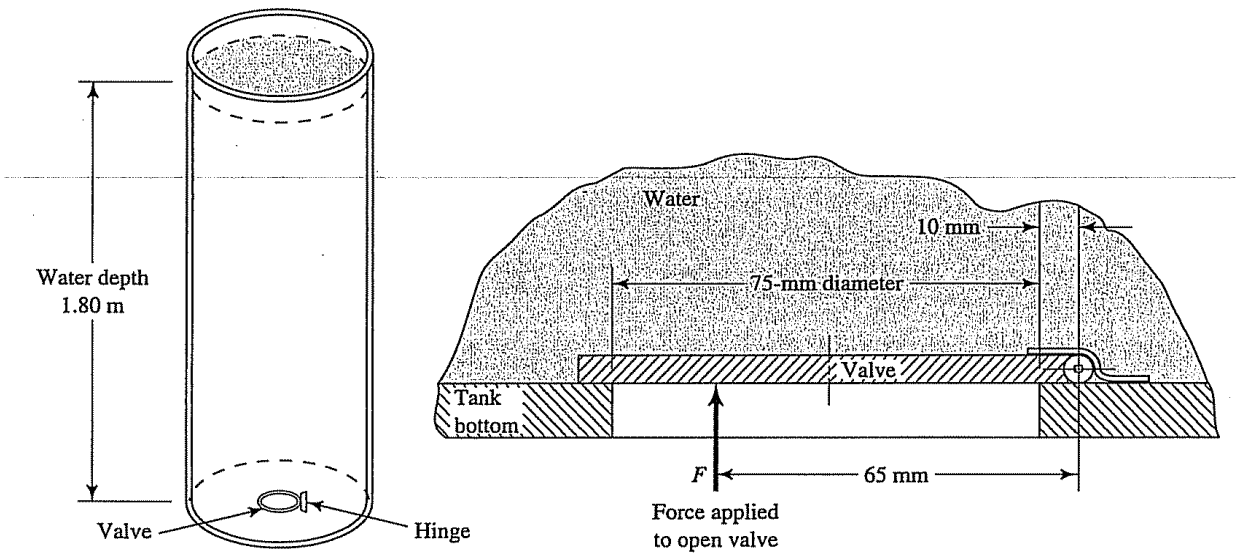
Problem Session

HYDROSTATIC FORCES-2

Assoc. Prof. Neslihan Semerci

İlişki kimliği rId2 olan resim yolu dosyada bulunamadı.

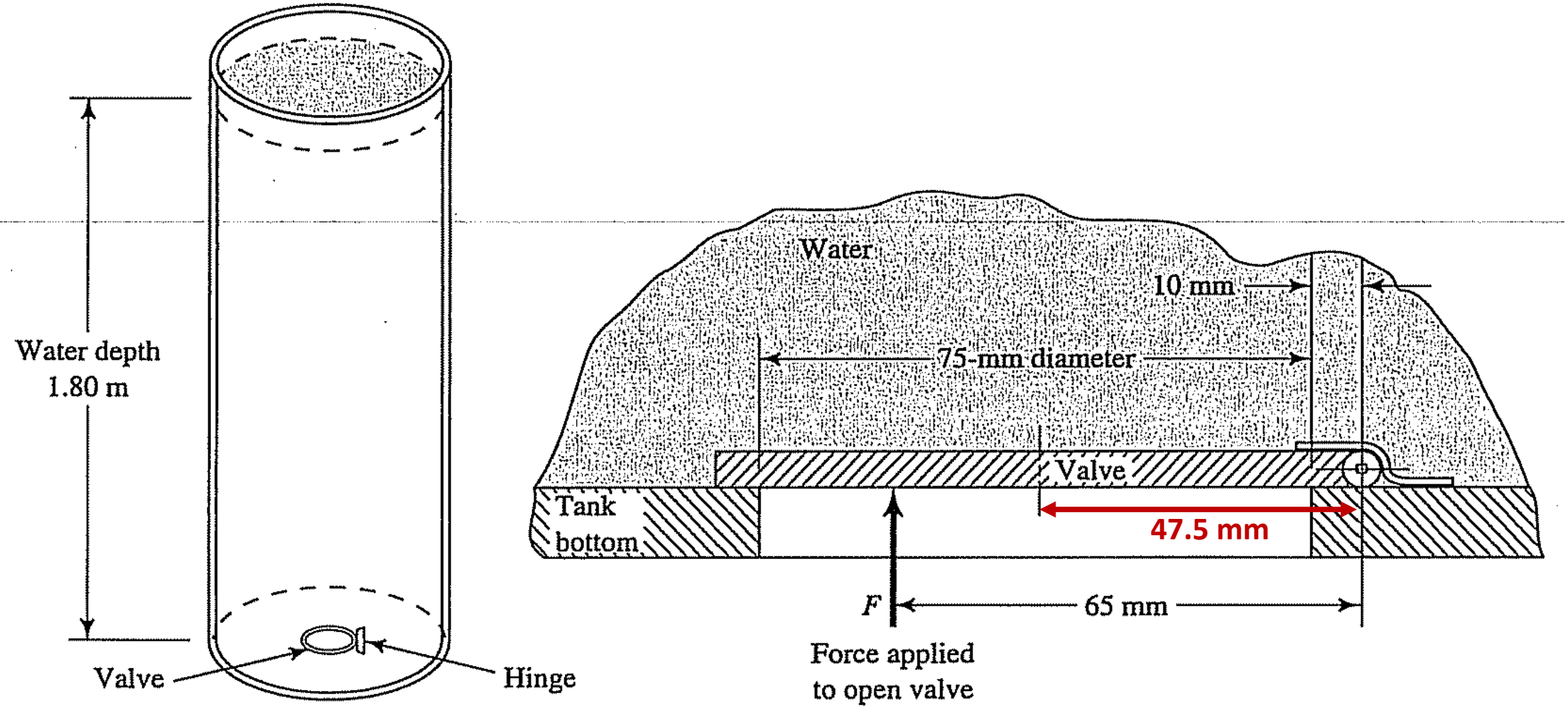
4.10 A simple shower for remote locations is designed with a cylindrical tank 500 mm in diameter and 1.800 m high as shown in Fig. 4.22. The water flows through a flapper valve in the bottom through a 75-mm-diameter opening. The flapper must be pushed upward to open the valve. How much force is required to open the valve?



(a) General view of shower tank and valve

(b) Detail of valve

FIGURE 4.22 Shower tank and valve for Problem 4.10.



(a) General view of shower tank and valve

(b) Detail of valve

FIGURE 4.22 Shower tank and valve for Problem 4.10.

Forces on Rectangular Walls

4.14 A rectangular gate is installed in a vertical wall of a reservoir, as shown in Fig. 4.26. Compute the magnitude of the resultant force on the gate and the location of the center of pressure. Also compute the force on each of the two latches shown.

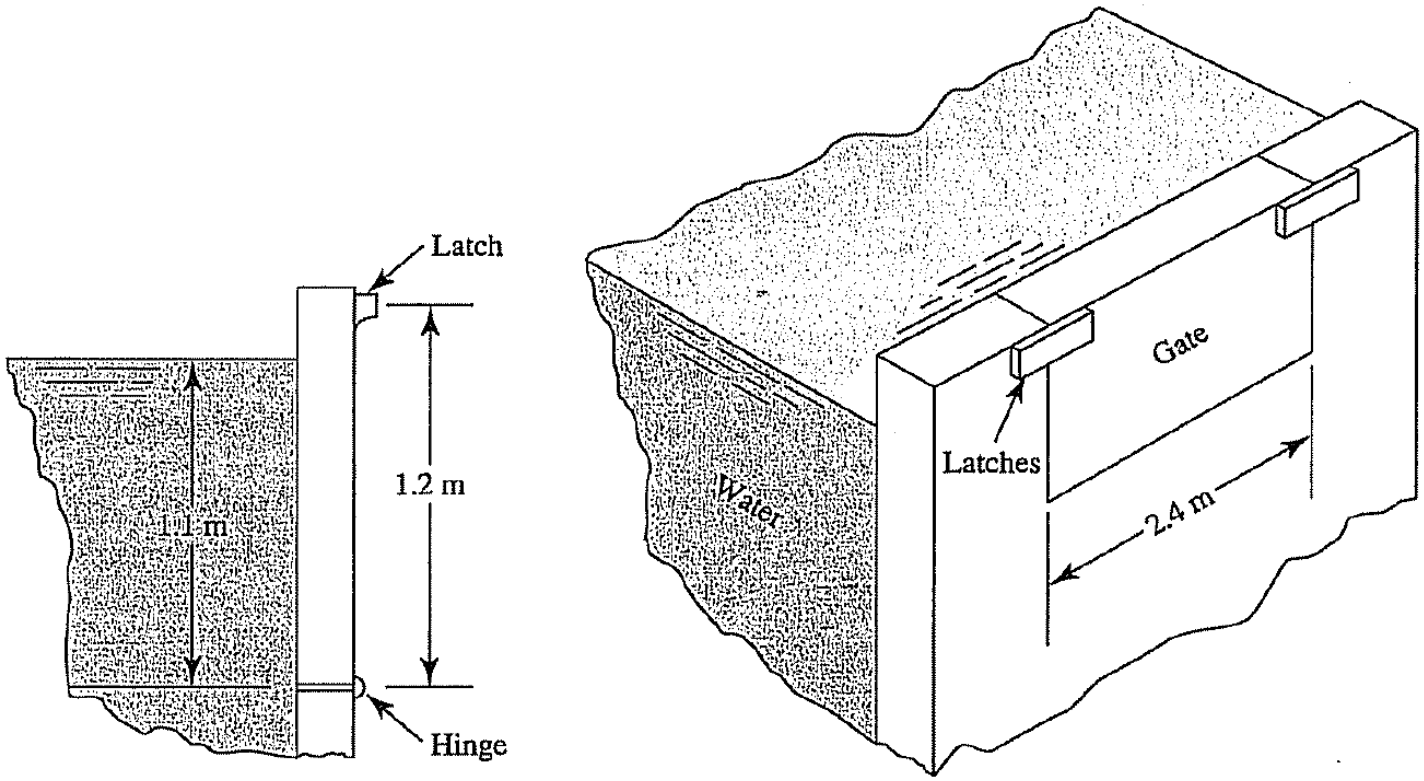


FIGURE 4.26 Gate in a reservoir wall for Problem 4.14.

Forces on Submerged Plane Areas

For each of the cases shown in Figs. 4.30–4.41, compute the magnitude of the resultant force on the indicated area and the location of the center of pressure. Show the resultant force on the area and clearly dimension its location.

4.18 Refer to Fig. 4.30.

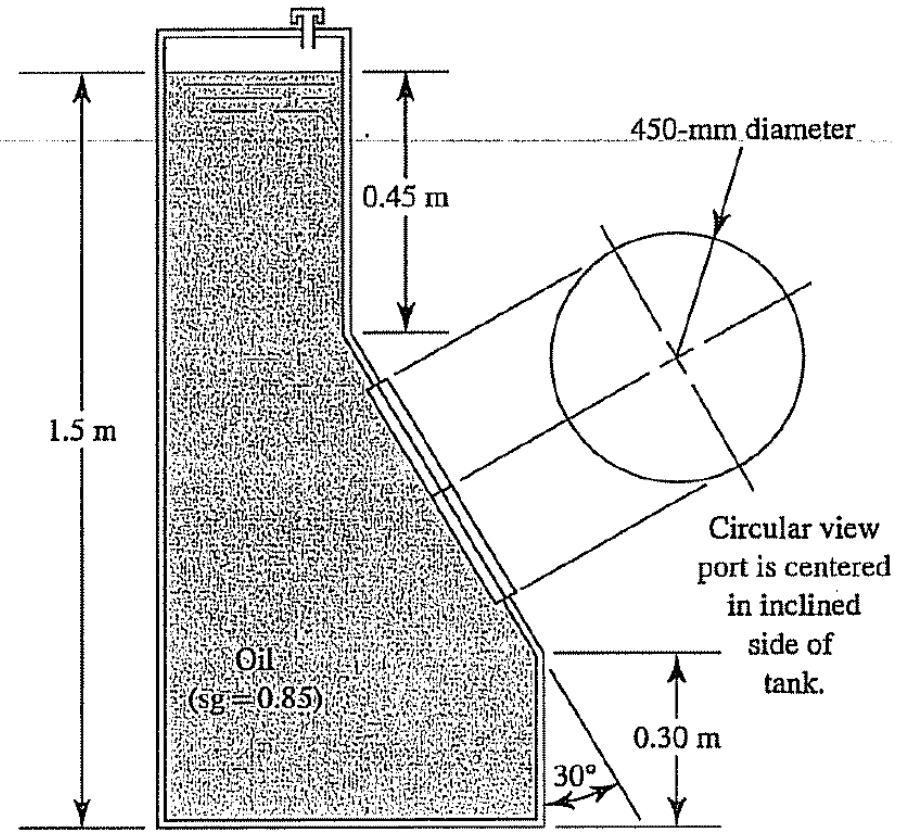
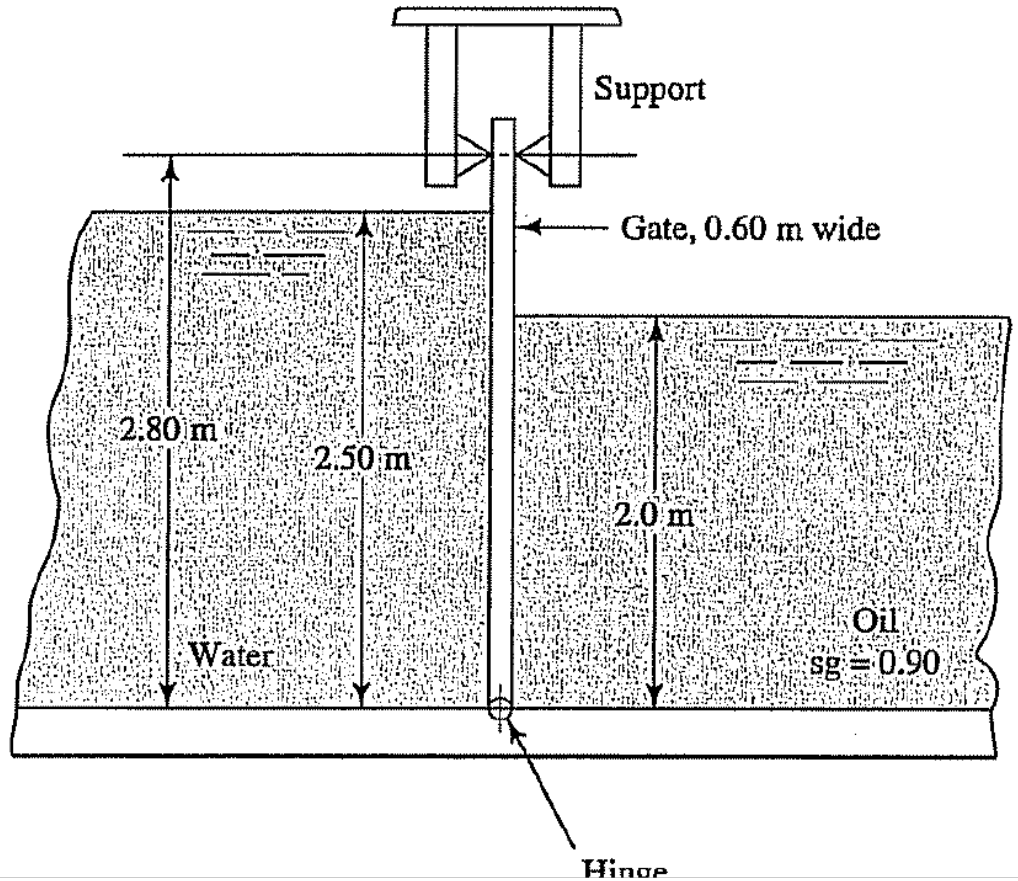


FIGURE 4.31 Problems 4.19 and 4.43.

4.41 Figure 4.45 shows a gate hinged at its bottom and held by a simple support at its top. The gate separates two fluids. Compute the net force on the gate due to the fluid on each side. Then compute the force on the hinge and on the support.

FIGURE 4.45 Problem 4.41.



Forces on Curved Surfaces

General Note for Problems 4.47–4.54. For each problem, one curved surface is shown restraining a body of static fluid. Compute the magnitude of the horizontal component of the force and compute the vertical component of the force exerted by the fluid on that surface. Then compute the magnitude of the resultant force and its direction. Show the resultant force acting on the curved surface. In each case the surface of interest is a portion of a cylinder with the length of the surface given in the problem statement.

4.47 Use Fig. 4.47. The surface is 2.00 m long.

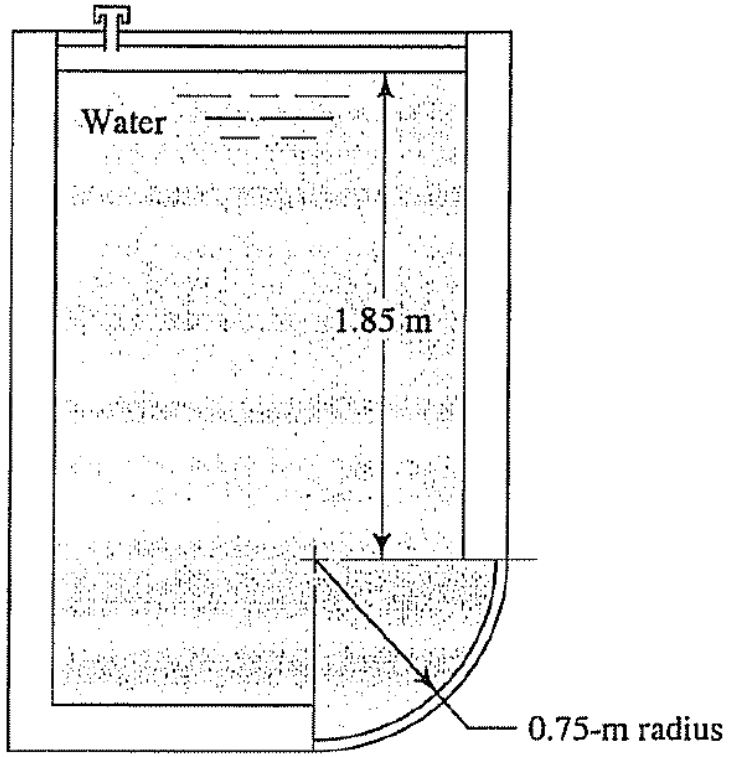


FIGURE 4.47 Problems 4.47 and 4.55.

Forces on Curved Surfaces

General Note for Problems 4.47–4.54. For each problem, one curved surface is shown restraining a body of static fluid. Compute the magnitude of the horizontal component of the force and compute the vertical component of the force exerted by the fluid on that surface. Then compute the magnitude of the resultant force and its direction. Show the resultant force acting on the curved surface. In each case the surface of interest is a portion of a cylinder with the length of the surface given in the problem statement.

4.48 Use Fig. 4.48. The surface is 2.50 m long.

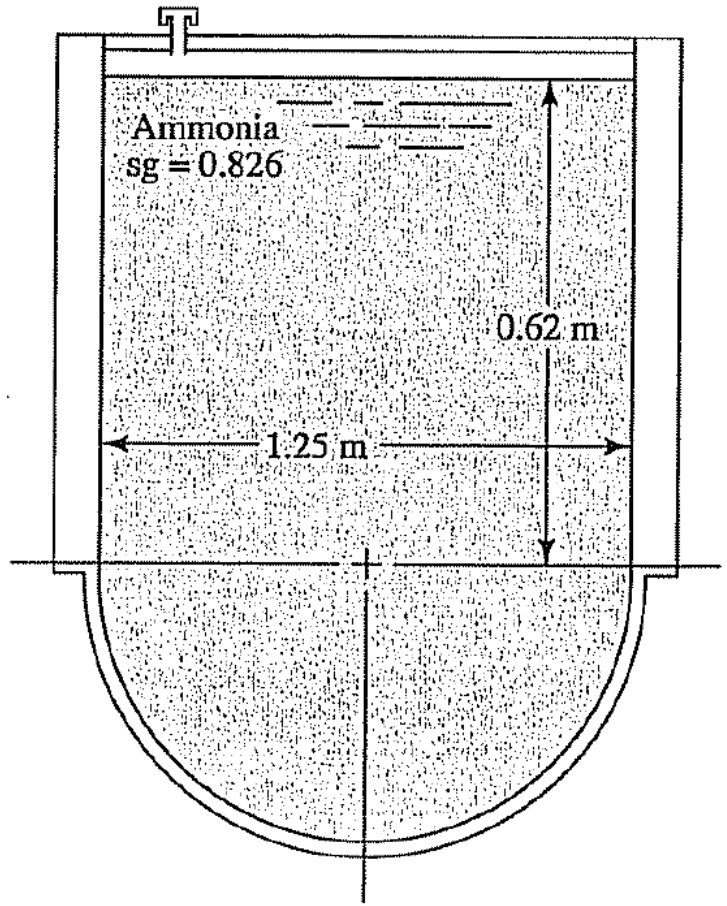


FIGURE 4.48 Problems 4.48 and 4.56.