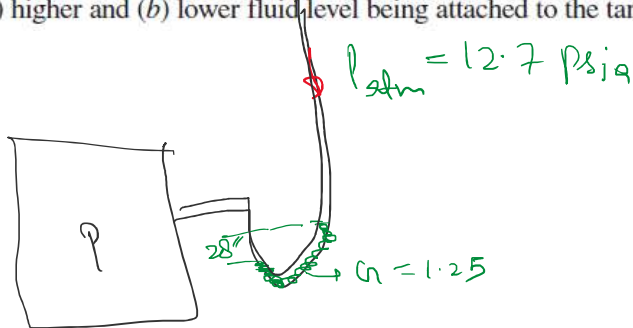


Fluid Statics Problem Solutions

Wednesday, 5 March, 2025 02:54 PM

3-11E A manometer is used to measure the air pressure in a tank. The fluid used has a specific gravity of 1.25, and the differential height between the two arms of the manometer is 28 in. If the local atmospheric pressure is 12.7 psia, determine the absolute pressure in the tank for the cases of the manometer arm with the (a) higher and (b) lower fluid level being attached to the tank.



$$\Delta P = \rho g h = 78 \frac{\text{lbm}}{\text{ft}^3} \times 32.174 \frac{\text{ft}}{\text{sec}^2} \times \left(\frac{28}{12} \text{ft}\right) \times \frac{1 \text{ lbf}}{32.174 \text{ lbm ft/s}^2} \times \frac{1 \text{ ft}^2}{144 \text{ in}^2}$$

$$\left. \begin{aligned} \rho &= SG \times \rho_{\text{H}_2\text{O}} = 1.25 \times 62.4 = 78 \text{ lbm/ft}^3 \\ g &= 32.174 \text{ ft/s}^2 \end{aligned} \right\}$$

$$\Rightarrow \Delta P = 1.26 \text{ psia}$$

$$(a) P_{\text{abs}} = P_{\text{atm}} - P_{\text{vac}} = 12.7 - 1.26 = 11.4 \text{ psia}$$

$$(b) P_{\text{abs}} = P_{\text{gauge}} + P_{\text{atm}} = 12.7 + 1.26 = 14 \text{ psia}$$

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