

Sample Calculations

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Calculation of Reynolds number:

general formula for Reynolds number: $Re = \frac{\rho v D}{\mu}$

$$\rho = 1000 \text{ kg/m}^3$$

$$D = 1 \text{ inch} \cdot \frac{0.0254 \text{ m}}{1 \text{ inch}} = 0.0254 \text{ m} \quad (\text{from Table 2})$$

$$\mu = 0.00089 \text{ Pa}\cdot\text{s}$$

to obtain v , convert Q to v :

$$v = \frac{Q}{A}$$

$$Q = 2 \text{ gpm} \quad (\text{from table 2})$$

$$\frac{2 \text{ gallons}}{\text{minute}} \cdot \frac{3.79 \times 10^{-3} \text{ m}^3}{1 \text{ gallon}} \cdot \frac{1 \text{ minute}}{60 \text{ s}} = 1.26 \times 10^{-4} \frac{\text{m}^3}{\text{s}}$$

$$A = \pi \cdot \left(\frac{D}{2}\right)^2$$

convert to metric units

$$\pi \cdot \left(\frac{0.0254 \text{ m}}{2}\right)^2 = 5.07 \times 10^{-4} \text{ m}^2$$

$$v = 1.26 \times 10^{-4} \frac{\text{m}^3}{\text{s}} \cdot \frac{1}{5.07 \times 10^{-4} \text{ m}^2} = 0.25 \text{ m/s}$$

$$Re = \frac{1000 \frac{\text{kg}}{\text{m}^3} \cdot 0.25 \frac{\text{m}}{\text{s}} \cdot 0.0254 \text{ m}}{0.00089 \text{ Pa}\cdot\text{s}} = \boxed{7107}$$