

36.61 1200gpm of water flows through a 50ft length of pipe with a 8in inside diameter and a friction factor of 0.02. What is the pressure drop?

- A. 0.2psi
- B. 0.6psi
- C. 1.4psi
- D. 5.9psi

Determine the velocity of water flowing in the pipe. The **Steel Pipe Friction Tables** provide a reasonable approximation, however the problem does not state 'nominal' or 'standard weight' or 'schedule 40.' Therefore, it is recommended to calculate the values manually.

$$Q = vA$$

$$v = \frac{Q}{A} = \frac{\left(1200 \frac{\text{gal}}{\text{min}}\right) \left(\frac{1\text{ft}^3}{7.48\text{gal}}\right) \left(\frac{1\text{min}}{60\text{s}}\right)}{\frac{\pi}{4} \left(\frac{8\text{in}}{12 \frac{\text{in}}{\text{ft}}}\right)^2} = 7.66 \frac{\text{ft}}{\text{s}}$$

Use the **Darcy-Weisbach Equation** to find the head loss in ft. Then use the rule of thumb conversion factor for water to convert the units to psi for the pressure drop.

$$h_f = \frac{fLv^2}{2Dg}$$

$$h_f = \frac{(0.02)(50\text{ft}) \left(7.66 \frac{\text{ft}}{\text{s}}\right)^2}{2 \left(\frac{8\text{in}}{12 \frac{\text{in}}{\text{ft}}}\right) \left(32.2 \frac{\text{ft}}{\text{s}^2}\right)} = 1.37\text{ft}$$

$$\Delta P = \frac{1.37\text{ft}}{2.31 \frac{\text{ft}}{\text{psi}}} = 0.59\text{psi}$$

Answer B