

CHE 4253

Chemical Engineering Process Design and Safety, Fall 2018

QUIZ # 6- Canvas Part II

Multiple Choice part: (20 minutes total) (30 points)

Assume a pipe

Length (including fittings equivalent lengths): 12.0 m;

Height of beginning of pipe=0.5 m

Pressure at beginning of suction pipe= 1 atm

ID of the suction pipe 0.4064 m

Water flow at 0.75 m³/min.

The Fanning friction factor can be assumed at 0.008.

1 atm= 101,325 Pascal. $\rho=1,000 \text{ kg/m}^3$, $g=9.81 \text{ m/s}^2$.

Find friction loss in the pipe in m²/s² units

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Answer:

$$F = \frac{2V^2 f}{D} L$$

$$V = \frac{Q}{A} = \frac{0.75 \text{ m}^3/\text{min}}{\pi (0.4064)^2} = 0.09636 \text{ m/s}$$

$$F = \frac{2V^2 f}{D} L = \frac{2 (0.09636)^2 (0.008)}{0.4064} 12 = 0.0044 \text{ m}^2/\text{s}^2$$