

ENGR 292 Fluids and Thermodynamics

Design a Pump and Pipe System Step 10

Supporting Docs

Feb.03, 2017

Step 10

- **Friction Loss in Turbulent Flow**
 - For turbulent flow of fluids in circular pipes it is most convenient to use Darcy's equation to calculate the energy loss due to friction.

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Step 10

- **Darcy's Equation – Pipe Friction Head Loss**

$$h_L = f \frac{L v^2}{D 2g}$$

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Step 10

- **Darcy's Equation**

Darcy's Equation can be used to calculate the energy loss due to friction in long straight sections of round pipe for both laminar and turbulent flow. The difference between two is in the evaluation of the dimensionless friction factor f .

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Step 10

- **Friction Loss in Laminar Flow**
 - Hagen-Poiseuille Equation

$$h_L = \frac{32\eta Lv}{\gamma D^2}$$

$$h_L = f \frac{L v^2}{D 2g}$$

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Step 10

- **Friction Loss in Laminar Flow**
 - Hagen-Poiseuille Equation
 - If $N_R < 2000$

$$h_L = \frac{32\eta Lv}{\gamma D^2} = f \frac{L v^2}{D 2g}$$

$$f = \frac{64\eta}{vD\rho}$$

$$N_R = \frac{vD\rho}{\mu}$$

$$f = \frac{64}{N_R}$$

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