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Darcy's Weisbach Equation Formulas

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List of 10 Darcy's Weisbach Equation Formulas

Darcy's Weisbach Equation

1) Average Velocity of Flow given Head Loss

$$\text{fx } v_{\text{avg}} = \sqrt{\frac{h_f \cdot 2 \cdot [g] \cdot D_p}{4 \cdot f \cdot L_p}}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 4.573932\text{m/s} = \sqrt{\frac{1.2\text{m} \cdot 2 \cdot [g] \cdot 0.4\text{m}}{4 \cdot 0.045 \cdot 2.5\text{m}}}$$

2) Average Velocity of Flow given Internal Radius of Pipe

$$\text{fx } v_{\text{avg}} = \sqrt{\frac{h_f \cdot [g] \cdot R}{f \cdot L_p}}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 4.573932\text{m/s} = \sqrt{\frac{1.2\text{m} \cdot [g] \cdot 200\text{mm}}{0.045 \cdot 2.5\text{m}}}$$



3) Darcy's Coefficient of Friction given Head Loss

$$fx \quad f = \frac{h_f \cdot 2 \cdot [g] \cdot D_p}{4 \cdot L_p \cdot (v_{avg})^2}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 0.045077 = \frac{1.2m \cdot 2 \cdot [g] \cdot 0.4m}{4 \cdot 2.5m \cdot (4.57m/s)^2}$$

4) Darcy's Coefficient of Friction given Internal Radius of Pipe

$$fx \quad f = \frac{h_f \cdot [g] \cdot R}{L_p \cdot (v_{avg})^2}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 0.045077 = \frac{1.2m \cdot [g] \cdot 200mm}{2.5m \cdot (4.57m/s)^2}$$

5) Head Loss due to Friction by Darcy Weisbach Equation

$$fx \quad h_f = \frac{4 \cdot f \cdot L_p \cdot (v_{avg})^2}{2 \cdot [g] \cdot D_p}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 1.197938m = \frac{4 \cdot 0.045 \cdot 2.5m \cdot (4.57m/s)^2}{2 \cdot [g] \cdot 0.4m}$$



6) Head Loss due to Friction given Internal Radius of Pipe

$$fx \quad h_f = \frac{f \cdot L_p \cdot (v_{avg})^2}{[g] \cdot R}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 1.197938m = \frac{0.045 \cdot 2.5m \cdot (4.57m/s)^2}{[g] \cdot 200mm}$$

7) Internal Diameter of Pipe given Head Loss

$$fx \quad D_p = \frac{4 \cdot f \cdot L_p \cdot (v_{avg})^2}{2 \cdot [g] \cdot h_f}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$ex \quad 0.399313m = \frac{4 \cdot 0.045 \cdot 2.5m \cdot (4.57m/s)^2}{2 \cdot [g] \cdot 1.2m}$$

8) Internal Radius of Pipe given Head Loss

$$fx \quad R = \frac{f \cdot L_p \cdot (v_{avg})^2}{[g] \cdot h_f}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 199.6563mm = \frac{0.045 \cdot 2.5m \cdot (4.57m/s)^2}{[g] \cdot 1.2m}$$



9) Length of Pipe given Head Loss due to Friction

$$\text{fx } L_p = \frac{h_f \cdot 2 \cdot [g] \cdot D_p}{4 \cdot f \cdot (v_{\text{avg}})^2}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 2.504304\text{m} = \frac{1.2\text{m} \cdot 2 \cdot [g] \cdot 0.4\text{m}}{4 \cdot 0.045 \cdot (4.57\text{m/s})^2}$$

10) Length of Pipe given Internal Radius of Pipe

$$\text{fx } L_p = \frac{h_f \cdot [g] \cdot R}{f \cdot (v_{\text{avg}})^2}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$\text{ex } 2.504304\text{m} = \frac{1.2\text{m} \cdot [g] \cdot 200\text{mm}}{0.045 \cdot (4.57\text{m/s})^2}$$





Variables Used

- D_p Diameter of Pipe (Meter)
- f Darcy's Coefficient of Friction
- h_f Head Loss (Meter)
- L_p Length of Pipe (Meter)
- R Pipe Radius (Millimeter)
- v_{avg} Average Velocity in Pipe Fluid Flow (Meter per Second)



Constants, Functions, Measurements used

- **Constant:** **[g]**, 9.80665
Gravitational acceleration on Earth
- **Function:** **sqrt**, sqrt(Number)
A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- **Measurement:** **Length** in Meter (m), Millimeter (mm)
Length Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s)
Speed Unit Conversion 



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