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Manning's Formula Formulas

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List of 18 Manning's Formula Formulas

Manning's Formula

1) Diameter of Pipe given Head loss by Manning Formula

Open Calculator

fx $$D_p = \left(\frac{Lp, \cdot (n \cdot v_f)^2}{0.157 \cdot h_f} \right)^{\frac{3}{4}}$$

ex $$0.406721\text{m} = \left(\frac{4.90\text{m} \cdot (0.009 \cdot 11.96\text{m/s})^2}{0.157 \cdot 1.2\text{m}} \right)^{\frac{3}{4}}$$

2) Diameter of Pipe given Velocity of Flow in Pipe by Manning Formula

Open Calculator

fx $$D_p = \left(\frac{v_f \cdot n}{0.397 \cdot \left(S^{\frac{1}{2}} \right)} \right)^{\frac{3}{2}}$$

ex $$0.399319\text{m} = \left(\frac{11.96\text{m/s} \cdot 0.009}{0.397 \cdot \left((0.25)^{\frac{1}{2}} \right)} \right)^{\frac{3}{2}}$$

3) Head loss by Manning Formula

Open Calculator

$$h_f = \frac{Lp, \cdot (n \cdot v_f)^2}{0.157 \cdot (D_p)^{\frac{4}{3}}}$$

$$1.22696\text{m} = \frac{4.90\text{m} \cdot (0.009 \cdot 11.96\text{m/s})^2}{0.157 \cdot (0.4\text{m})^{\frac{4}{3}}}$$

4) Head loss by Manning Formula given Radius of Pipe

Open Calculator

$$h_f = \frac{Lp, \cdot (n \cdot v_f)^2}{0.157 \cdot (2 \cdot R)^{\frac{4}{3}}}$$

$$1.22696\text{m} = \frac{4.90\text{m} \cdot (0.009 \cdot 11.96\text{m/s})^2}{0.157 \cdot (2 \cdot 200\text{mm})^{\frac{4}{3}}}$$

5) Hydraulic Gradient by Manning Formula given Diameter

Open Calculator

$$S = \left(\frac{v_f \cdot n}{0.397 \cdot \left(D_p^{\frac{2}{3}} \right)} \right)^2$$

$$0.249433 = \left(\frac{11.96\text{m/s} \cdot 0.009}{0.397 \cdot \left((0.4\text{m})^{\frac{2}{3}} \right)} \right)^2$$

6) Hydraulic Gradient given Velocity of Flow in Pipe by Manning Formula

Open Calculator

fx $$S = \left(\frac{v_f \cdot n}{R_h^{\frac{2}{3}}} \right)^2$$

ex $$0.249621 = \left(\frac{11.96\text{m/s} \cdot 0.009}{(0.10\text{m})^{\frac{2}{3}}} \right)^2$$

7) Length of Pipe by Manning Formula given Radius of Pipe

Open Calculator

fx $$Lp, = \frac{h_f \cdot 0.157 \cdot (2 \cdot R)^{\frac{4}{3}}}{(n \cdot v_f)^2}$$

ex $$4.792331\text{m} = \frac{1.2\text{m} \cdot 0.157 \cdot (2 \cdot 200\text{mm})^{\frac{4}{3}}}{(0.009 \cdot 11.96\text{m/s})^2}$$

8) Length of Pipe given Head loss by Manning Formula

Open Calculator

fx $$Lp, = \frac{h_f \cdot 0.157 \cdot D_p^{\frac{4}{3}}}{(n \cdot v_f)^2}$$

ex $$4.792331\text{m} = \frac{1.2\text{m} \cdot 0.157 \cdot (0.4\text{m})^{\frac{4}{3}}}{(0.009 \cdot 11.96\text{m/s})^2}$$

9) Manning's Coefficient by Manning Formula given Radius of Pipe

Open Calculator

fx $$n = \sqrt{\frac{h_f \cdot 0.157 \cdot (2 \cdot R)^{\frac{4}{3}}}{Lp, \cdot v_f^2}}$$

ex $$0.008901 = \sqrt{\frac{1.2\text{m} \cdot 0.157 \cdot (2 \cdot 200\text{mm})^{\frac{4}{3}}}{4.90\text{m} \cdot (11.96\text{m/s})^2}}$$

10) Manning's Coefficient given Diameter of Pipe

Open Calculator

fx $$n = \left(\frac{0.397}{v_f}\right) \cdot \left(D_p^{\frac{2}{3}}\right) \cdot \left(S^{\frac{1}{2}}\right)$$

ex $$0.00901 = \left(\frac{0.397}{11.96\text{m/s}}\right) \cdot \left((0.4\text{m})^{\frac{2}{3}}\right) \cdot \left((0.25)^{\frac{1}{2}}\right)$$

11) Manning's Coefficient given Head loss by Manning Formula

Open Calculator

fx $$n = \sqrt{\frac{h_f \cdot 0.157 \cdot D_p^{\frac{4}{3}}}{Lp, \cdot v_f^2}}$$

ex $$0.008901 = \sqrt{\frac{1.2\text{m} \cdot 0.157 \cdot (0.4\text{m})^{\frac{4}{3}}}{4.90\text{m} \cdot (11.96\text{m/s})^2}}$$

12) Manning's Coefficient given Velocity of Flow

Open Calculator

$$n = \frac{\left(R_h^{\frac{2}{3}}\right) \cdot \left(S^{\frac{1}{2}}\right)}{v_f}$$

$$0.009007 = \frac{\left((0.10\text{m})^{\frac{2}{3}}\right) \cdot \left((0.25)^{\frac{1}{2}}\right)}{11.96\text{m/s}}$$

13) Radius of Pipe given Head loss by Manning Formula

Open Calculator

$$R = \left(\frac{Lp, \cdot (n \cdot v_f)^2}{0.157 \cdot h_f \cdot (2)^{\frac{4}{3}}}\right)^{\frac{3}{4}}$$

$$203.3607\text{mm} = \left(\frac{4.90\text{m} \cdot (0.009 \cdot 11.96\text{m/s})^2}{0.157 \cdot 1.2\text{m} \cdot (2)^{\frac{4}{3}}}\right)^{\frac{3}{4}}$$

14) Radius of Pipe given Velocity of Flow in Pipe by Manning Formula

Open Calculator

$$R_h = \left(\frac{v_f \cdot n}{S^{\frac{1}{2}}}\right)^{\frac{3}{2}}$$

$$0.099886\text{m} = \left(\frac{11.96\text{m/s} \cdot 0.009}{(0.25)^{\frac{1}{2}}}\right)^{\frac{3}{2}}$$

15) Velocity of Flow in Pipe by Manning Formula

Open Calculator

$$v_f = \left(\frac{1}{n}\right) \cdot \left(R_h^{\frac{2}{3}}\right) \cdot \left(S^{\frac{1}{2}}\right)$$

$$11.96908\text{m/s} = \left(\frac{1}{0.009}\right) \cdot \left((0.10\text{m})^{\frac{2}{3}}\right) \cdot \left((0.25)^{\frac{1}{2}}\right)$$

16) Velocity of Flow in Pipe by Manning Formula given Diameter

Open Calculator

$$v_f = \left(\frac{0.397}{n}\right) \cdot \left(D_p^{\frac{2}{3}}\right) \cdot \left(S^{\frac{1}{2}}\right)$$

$$11.9736\text{m/s} = \left(\frac{0.397}{0.009}\right) \cdot \left((0.4\text{m})^{\frac{2}{3}}\right) \cdot \left((0.25)^{\frac{1}{2}}\right)$$

17) Velocity of Flow in Pipe by Manning Formula given Radius of Pipe

Open Calculator

$$v_f = \sqrt{\frac{h_f \cdot 0.157 \cdot (2 \cdot R)^{\frac{4}{3}}}{Lp, \cdot n^2}}$$

$$11.82787\text{m/s} = \sqrt{\frac{1.2\text{m} \cdot 0.157 \cdot (2 \cdot 200\text{mm})^{\frac{4}{3}}}{4.90\text{m} \cdot (0.009)^2}}$$

18) Velocity of Flow in Pipe given Head loss by Manning Formula

Open Calculator

fx $$v_f = \sqrt{\frac{h_f \cdot 0.157 \cdot D_p^{\frac{4}{3}}}{L_p \cdot n^2}}$$

ex $$16.55902\text{m/s} = \sqrt{\frac{1.2\text{m} \cdot 0.157 \cdot (0.4\text{m})^{\frac{4}{3}}}{2.5\text{m} \cdot (0.009)^2}}$$

Variables Used

- D_p Diameter of Pipe *(Meter)*
- h_f Head Loss *(Meter)*
- L_p Length of Pipe *(Meter)*
- Lp' Pipe Length *(Meter)*
- **n** Manning Coefficient
- **R** Pipe Radius *(Millimeter)*
- R_h Hydraulic Radius *(Meter)*
- **S** Hydraulic Gradient
- v_f Flow Velocity *(Meter per Second)*

Constants, Functions, Measurements used

- 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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