Pipes Formulas... 1/9





Pipes Formulas

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Examples!

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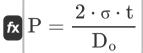




List of 12 Pipes Formulas

Pipes 2

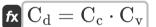
1) Barlow's Formula for Pipe



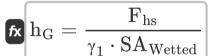
24351.3Pa = $\frac{2 \cdot 93.3$ Pa $\cdot 7.83$ m



0.06m



ex $0.315 = 15 \cdot 0.021$



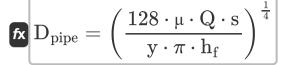
 $\mathbf{ex} = 0.012351 \mathrm{m} = rac{121 \mathrm{N}}{1342 \mathrm{N/m^3 \cdot 7.3m^2}}$

Open Calculator

Open Calculator



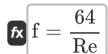
4) Diameter of Pipe given Head Loss due to Laminar Flow



Open Calculator 🗗

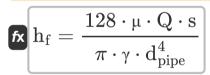
 $\boxed{1.024934 m = \left(\frac{128 \cdot 94.18672 N \cdot 13.5 m^3 / s \cdot 0.002232 m}{87.32 N / m^3 \cdot \pi \cdot 1.2 m}\right)^{\frac{1}{4}} }$

5) Frictional Factor of Laminar flow



Open Calculator

6) Head Loss due to Laminar Flow



Open Calculator

 $\boxed{1.2 \text{m} = \frac{128 \cdot 94.18672 \text{N} \cdot 13.5 \text{m}^3/\text{s} \cdot 0.002232 \text{m}}{\pi \cdot 92.6 \text{N/m}^3 \cdot (1.01 \text{m})^4}}$

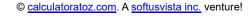
7) Head Loss using Efficiency of Hydraulic Transmission



Open Calculator

 $\boxed{\textbf{ex} \ 1.2 \text{m} = 6 \text{m} - 0.80 \cdot 6 \text{m}}$







8) Heat Loss due to Pipe

 $oldsymbol{eta} ext{Qpipeloss} = rac{F_{viscous} \cdot L_{pipe} \cdot u_{Fluid}^2}{2 \cdot d \cdot g}$

Open Calculator

9) Length of Pipe given Head loss

 $\left|\mathbf{f}\mathbf{x}
ight| \mathrm{s} = \mathrm{h_f} \cdot \mathbf{\gamma} \cdot \mathbf{\pi} \cdot rac{\mathrm{d_{pipe}^4}}{128 \cdot \mathrm{Q} \cdot \mathbf{\mu}}$

Open Calculator

 $ext{ex} \ 0.002232 ext{m} = 1.2 ext{m} \cdot 92.6 ext{N/m}^{_3} \cdot \pi \cdot rac{\left(1.01 ext{m}
ight)^4}{128 \cdot 13.5 ext{m}^3/ ext{s} \cdot 94.18672 ext{N}}$

10) Viscous Force Per Unit Area

 $\mathbf{F_v} = rac{\mathbf{F_{viscous}}}{\mathbf{A}}$

Open Calculator

ex $0.05 \mathrm{Pa} = rac{2.5 \mathrm{N}}{50 \mathrm{m}^2}$



11) Viscous Force using Head loss Due to Laminar Flow 🛂

Open Calculator

 $\mu = h_f \cdot \gamma \cdot \pi \cdot rac{d_{pipe}^4}{128 \cdot Q \cdot s}$

12) Viscous Stress



Open Calculator

 $= 3.820225 \mathrm{N} = 10.2 \mathrm{P} \cdot \frac{20 \mathrm{m/s}}{5.34 \mathrm{m}}$



Pipes Formulas... 6/9

Variables Used

- A Area (Square Meter)
- Cc Coefficient of Contraction
- Cd Coefficient of Discharge
- C_v Coefficient of Velocity
- **d** Diameter (Meter)
- D_O Outside Diameter (Meter)
- dpipe Pipe Diameter (Meter)
- D_{pipe} Diameter of Pipe (Meter)
- **DL** Fluid Thickness (Meter)
- f Friction Factor
- F_{hs} Hydrostatic Force (Newton)
- F_v Viscous Force (Pascal)
- F_{viscous} Force (Newton)
- g Acceleration Due To Gravity (Meter per Square Second)
- Hent Total Head at Entrance (Meter)
- h_f Head loss (Meter)
- h_G Depth of Centroid (Meter)
- Lpipe Length (Meter)
- P Pressure (Pascal)
- Q Rate of Flow (Cubic Meter per Second)
- Qpipeloss Heat Loss due to Pipe (Joule)
- Re Reynolds Number





- S Change in Drawdown (Meter)
- SA_{Wetted} Surface Area (Square Meter)
- **t** Wall Thickness (Meter)
- u_{Fluid} Fluid Velocity (Meter per Second)
- **V**_s Viscous Stress (Newton)
- **VG** Velocity Gradient (Meter per Second)
- **y** Specific Weight of Liquid (Newton per Cubic Meter)
- **V** Specific Weight (Newton per Cubic Meter)
- V1 Specific Weight 1 (Newton per Cubic Meter)
- **η** Efficiency
- µ Viscous Force head loss (Newton)
- μ_{viscosity} Dynamic Viscosity (Poise)
- **σ** Applied Stress (Pascal)





Pipes Formulas... 8/9

Constants, Functions, Measurements used

Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant

- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Area in Square Meter (m²)

 Area Unit Conversion
- Measurement: Pressure in Pascal (Pa)
 Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Acceleration in Meter per Square Second (m/s²)

 Acceleration Unit Conversion
- Measurement: Energy in Joule (J)
 Energy Unit Conversion
- Measurement: Force in Newton (N)
 Force Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s)
 Volumetric Flow Rate Unit Conversion
- Measurement: Dynamic Viscosity in Poise (P)
 Dynamic Viscosity Unit Conversion
- Measurement: Specific Weight in Newton per Cubic Meter (N/m³)
 Specific Weight Unit Conversion





Pipes Formulas... 9/9

Check other formula lists

- Fluid Force Formulas
- Fluid in Motion Formulas
- Hydrostatic Fluid Formulas
- Liquid Jet Formulas

- Pipes Formulas
- Pressure Relations Formulas
- Specific Weight Formulas

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