Important Water Hammer Formulas PDF

Formulas
Examples
with Units

List of 10
Important Water Hammer Formulas

1) Bulk Modulus of Elasticity of Water given Ratio of Velocities Formula

Evaluate Formula

Formula

$$K_w = \frac{P_w}{V_R}$$

Example with Units

$$191.6933\,\text{MPa} = \frac{1.8\,\text{MPa}}{0.00939}$$

2) Bulk Modulus of Elasticity of Water given Velocity of Sound in Water Formula

Evaluate Formula

Formula

$$K_w = \frac{1434 \cdot P_w}{V_w}$$

Example with Units

$$191.6258\,\text{MPa} = \frac{1434 \cdot 1.8\,\text{MPa}}{13.47\,\text{m/s}}$$

3) Bulk Modulus of Elasticity of Water given Water Hammer Pressure Formula

Evaluate Formula

Formula

$$K_w = \frac{C \cdot P_w}{V_w}$$

Example with Units

$$197.7728\,\text{MPa} = \frac{1480\,\text{m/s} \cdot 1.8\,\text{MPa}}{13.47\,\text{m/s}}$$

4) Initial Velocity of Water given Velocity of Sound in Water Formula

Evaluate Formula

Formula

$$V_w = \frac{P_w \cdot 1434}{K_w}$$

Example with Units

$$13.4655\,\text{m/s} = \frac{1.8\,\text{MPa} \cdot 1434}{191.69\,\text{MPa}}$$

5) Initial Velocity of Water given Water Hammer Pressure Formula

Evaluate Formula

Formula

$$V_w = \frac{P_w \cdot C}{K_w}$$

Example with Units

$$13.8974\,\text{m/s} = \frac{1.8\,\text{MPa} \cdot 1480\,\text{m/s}}{191.69\,\text{MPa}}$$

6) Ratio of Velocity of Water to Velocity of Sound in Water Formula

Evaluate Formula

Formula

$$V_R = \frac{P_w}{K_w}$$

Example with Units

$$0.0094 = \frac{1.8\,\text{MPa}}{191.69\,\text{MPa}}$$

7) Velocity of Sound in Water given Water Hammer Pressure Formula

Evaluate Formula

Formula

$$C = \frac{V_w \cdot K_w}{P_w}$$

Example with Units

$$1434.4802\,\text{m/s} = \frac{13.47\,\text{m/s} \cdot 191.69\,\text{MPa}}{1.8\,\text{MPa}}$$

8) Water Hammer Pressure Formula

Evaluate Formula

Formula

$$P_w = \frac{V_w \cdot K_w}{C}$$

Example with Units

$$1.7446\,\text{MPa} = \frac{13.47\,\text{m/s} \cdot 191.69\,\text{MPa}}{1480\,\text{m/s}}$$

9) Water Hammer Pressure given Ratio of Velocity of Water to Velocity of Sound in Water Formula

Evaluate Formula

Formula

$$P_w = \left(V_R \cdot K_w \right)$$

Example with Units

$$1.8\,\text{MPa} = \left(0.00939 \cdot 191.69\,\text{MPa} \right)$$

10) Water Hammer Pressure given Velocity of Sound in Water Formula

Evaluate Formula

Formula

$$P_w = \frac{V_w \cdot K_w}{1434}$$

Example with Units

$$1.8006\,\text{MPa} = \frac{13.47\,\text{m/s} \cdot 191.69\,\text{MPa}}{1434}$$

Variables used in list of Water Hammer Formulas above

- **C** Velocity of Sound in Water *(Meter per Second)*
- K_w Bulk Modulus of Water *(Megapascal)*
- P_w Water Hammer Pressure in Environmental Eng. *(Megapascal)*
- V_R Ratio of Velocities
- V_w Flow Velocity of Fluid *(Meter per Second)*

Constants, Functions, Measurements used in list of Water Hammer Formulas above

- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion

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