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Water Hammer Formulas

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List of 10 Water Hammer Formulas

Water Hammer

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

ex $$13.46549\text{m/s} = \frac{1.8\text{MPa} \cdot 1434}{191.69\text{MPa}}$$

5) Initial Velocity of Water given Water Hammer Pressure

Open Calculator

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

ex $$13.89744\text{m/s} = \frac{1.8\text{MPa} \cdot 1480\text{m/s}}{191.69\text{MPa}}$$

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

Open Calculator

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

ex $$0.00939 = \frac{1.8\text{MPa}}{191.69\text{MPa}}$$

7) Velocity of Sound in Water given Water Hammer Pressure

Open Calculator

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

ex $$1434.48\text{m/s} = \frac{13.47\text{m/s} \cdot 191.69\text{MPa}}{1.8\text{MPa}}$$

8) Water Hammer Pressure

Open Calculator

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

ex $$1.744638\text{MPa} = \frac{13.47\text{m/s} \cdot 191.69\text{MPa}}{1480\text{m/s}}$$

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

Open Calculator

fx $$P_w = (V_R \cdot K_w)$$

ex $$1.799969\text{MPa} = (0.00939 \cdot 191.69\text{MPa})$$

10) Water Hammer Pressure given Velocity of Sound in Water

Open Calculator

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

ex $$1.800603\text{MPa} = \frac{13.47\text{m/s} \cdot 191.69\text{MPa}}{1434}$$

Variables Used

- **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

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

Check other formula lists

- **Internal Water Pressure Formulas**
- **Stresses at Bends Formulas**
- **Stresses Due to External Loads Formulas**
- **Temperature Stresses Formulas**
- **Water Hammer Formulas**

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