

Important Fluid Pressure and Its Measurement Formulas PDF



Formulas
Examples
with Units

List of 15 Important Fluid Pressure and Its Measurement Formulas

1) Pressure at Point in Liquid given Pressure Head Formula

Formula

$$p = h \cdot S$$

Example with Units

$$825 \text{ Pa} = 1.1 \text{ m} \cdot 0.75 \text{ kN/m}^3$$

Evaluate Formula 

2) Pressure Difference between Two Points in Liquid Formula

Formula

$$\Delta P = S \cdot (D - D_2)$$

Example with Units

$$750 \text{ N/m}^2 = 0.75 \text{ kN/m}^3 \cdot (16 \text{ m} - 15 \text{ m})$$

Evaluate Formula 

3) Pressure Head of Liquid Formula

Formula

$$h = \frac{p}{S}$$

Example with Units

$$1.1 \text{ m} = \frac{825 \text{ Pa}}{0.75 \text{ kN/m}^3}$$

Evaluate Formula 

4) Pressure Head of Liquid given Pressure Head of another Liquid having same Pressure Formula

Formula

$$h_1 = \frac{h_2 \cdot w_2}{S W_1}$$

Example with Units

$$13.8429 \text{ m} = \frac{10.2 \text{ m} \cdot 19 \text{ kN/m}^3}{14 \text{ kN/m}^3}$$

Evaluate Formula 

5) Equilibrium of Compressible Fluid Atmospheric Equilibrium Formulas

5.1) Adiabatic Exponent or Adiabatic Index Formula

Formula

$$k = \frac{C_p}{C_v}$$

Example with Units

$$12.6316 = \frac{24 \text{ J/kg}^\circ\text{C}}{1.9 \text{ J/kg}^\circ\text{C}}$$

Evaluate Formula 



5.2) Atmospheric Pressure According to Polytropic Process Formula

Formula

$$P_{\text{atm}} = \frac{P_i \cdot \rho_0^a}{\rho_1}$$

Example with Units

$$349.9863 \text{ Pa} = \frac{66.31 \text{ Pa} \cdot 1000 \text{ kg/m}^3^{2.4}}{500 \text{ kg/m}^3^{2.4}}$$

Evaluate Formula 

5.3) Density According to Polytropic Process Formula

Formula

$$\rho_0 = \rho_1 \cdot \left(\frac{P_{\text{atm}}}{P_i} \right)^{\frac{1}{a}}$$

Example with Units

$$1000.0163 \text{ kg/m}^3 = 500 \text{ kg/m}^3 \cdot \left(\frac{350 \text{ Pa}}{66.31 \text{ Pa}} \right)^{\frac{1}{2.4}}$$

Evaluate Formula 

5.4) Height of Fluid Column of Constant Specific Weight Formula

Formula

$$h_c = \frac{P_0}{\rho_0 \cdot g}$$

Example with Units

$$20.4082 \text{ mm} = \frac{10 \text{ N/m}^2}{50 \text{ kg/m}^3 \cdot 9.8 \text{ m/s}^2}$$

Evaluate Formula 

5.5) Initial Density According to Polytropic Process Formula

Formula

$$P_i = P_{\text{atm}} \cdot \left(\frac{\rho_1}{\rho_0} \right)^a$$

Example with Units

$$66.3126 \text{ Pa} = 350 \text{ Pa} \cdot \left(\frac{500 \text{ kg/m}^3}{1000 \text{ kg/m}^3} \right)^{2.4}$$

Evaluate Formula 

5.6) Initial Pressure according to Polytropic Process Formula

Formula

$$P_i = \frac{P_{\text{atm}} \cdot \rho_1^a}{\rho_0^a}$$

Example with Units

$$66.3126 \text{ Pa} = \frac{350 \text{ Pa} \cdot 500 \text{ kg/m}^3^{2.4}}{1000 \text{ kg/m}^3^{2.4}}$$

Evaluate Formula 

5.7) Positive Constant Formula

Formula

$$a = \frac{1}{1 - K_h \cdot \frac{\lambda}{G}}$$

Example with Units

$$1 = \frac{1}{1 - 0.000001 \text{ Hz} \cdot \frac{58}{10}}$$

Evaluate Formula 

5.8) Temperature Lapse Rate Formula

Formula

$$\lambda = \frac{G}{b} \cdot \left(\frac{a - 1}{a} \right)$$

Example

$$58.3333 = \frac{10}{0.1} \cdot \left(\frac{2.4 - 1}{2.4} \right)$$

Evaluate Formula 



6) Measurement of Pressure Formulas

6.1) Pressure at Point m in Pizometer Formula

Formula

$$p = S \cdot h$$

Example with Units

$$825 \text{ Pa} = 0.75 \text{ kN/m}^3 \cdot 1.1 \text{ m}$$

Evaluate Formula 

6.2) Pressure Head at Point in Piezometer Formula

Formula

$$h = \frac{p}{S}$$

Example with Units

$$1.1 \text{ m} = \frac{825 \text{ Pa}}{0.75 \text{ kN/m}^3}$$

Evaluate Formula 

6.3) Specific Weight of Liquid in Peizometer Formula

Formula

$$S = \frac{p}{h}$$

Example with Units

$$0.75 \text{ kN/m}^3 = \frac{825 \text{ Pa}}{1.1 \text{ m}}$$

Evaluate Formula 



Variables used in list of Fluid Pressure and Its Measurement Formulas above



















- **a** Constant a
- **b** Constant b
- **C_p** Specific Heat at Constant Pressure (*Joule per Kilogram per Celcius*)
- **C_v** Specific Heat at Constant Volume (*Joule per Kilogram per Celcius*)
- **D** Depth of Point 1 (*Meter*)
- **d₀** Density of Gas (*Kilogram per Cubic Meter*)
- **D₂** Depth of Point 2 (*Meter*)
- **g** Acceleration due to Gravity (*Meter per Square Second*)
- **G** Specific Gravity of Fluid
- **h** Pressure Head (*Meter*)
- **h₁** Pressure Head of Liquid 1 (*Meter*)
- **h₂** Pressure Head of Liquid 2 (*Meter*)
- **h_c** Height of Fluid Column (*Millimeter*)
- **k** Adiabatic Index
- **K_h** Rate Constant (*Hertz*)
- **p** Pressure (*Pascal*)
- **P₀** Pressure of Gas (*Newton per Square Meter*)
- **P_{atm}** Atmospheric Pressure (*Pascal*)
- **P_i** Initial Pressure of System (*Pascal*)
- **S** Specific Weight of Liquid in Piezometer (*Kilonewton per Cubic Meter*)
- **SW₁** Specific Weight 1 (*Kilonewton per Cubic Meter*)
- **w₂** Specific Weight of Liquid 2 (*Kilonewton per Cubic Meter*)
- **ΔP** Pressure Difference (*Newton per Square Meter*)
- **λ** Temperature Lapse Rate
- **ρ₀** Density of Fluid (*Kilogram per Cubic Meter*)
- **ρ₁** Density 1 (*Kilogram per Cubic Meter*)

Constants, Functions, Measurements used in list of Fluid Pressure and Its Measurement Formulas above

- **Measurement: Length** in Meter (m), Millimeter (mm)
Length Unit Conversion ↻
- **Measurement: Pressure** in Pascal (Pa), Newton per Square Meter (N/m²)
Pressure Unit Conversion ↻
- **Measurement: Acceleration** in Meter per Square Second (m/s²)
Acceleration Unit Conversion ↻
- **Measurement: Frequency** in Hertz (Hz)
Frequency Unit Conversion ↻
- **Measurement: Specific Heat Capacity** in Joule per Kilogram per Celcius (J/kg*°C)
Specific Heat Capacity Unit Conversion ↻
- **Measurement: Density** in Kilogram per Cubic Meter (kg/m³)
Density Unit Conversion ↻
- **Measurement: Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
Specific Weight Unit Conversion ↻



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