



# Fluid Pressure and Its Measurement Formulas

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## List of 15 Fluid Pressure and Its Measurement Formulas

#### Fluid Pressure and Its Measurement &

1) Pressure at Point in Liquid given Pressure Head

fx  $p=h\cdot S$ 

Open Calculator

 $\textbf{ex} \ 825 Pa = 1.1 m \cdot 0.75 kN/m^{_3}$ 

2) Pressure Difference between Two Points in Liquid

fx  $\Delta ext{P} = ext{S} \cdot ( ext{D} - ext{D}_2)$ 

Open Calculator

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

3) Pressure Head of Liquid

 $h = rac{p}{S}$ 

Open Calculator

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



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

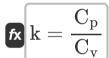
 $\mathbf{h}_{1} = rac{\mathbf{h}_{2} \cdot \mathbf{w}_{2}}{\mathbf{SW}_{1}}$ 

Open Calculator 🚰

 $ext{ex} 13.84286 ext{m} = rac{10.2 ext{m} \cdot 19 ext{kN/m}^3}{14 ext{kN/m}^3}$ 

### Equilibrium of Compressible Fluid Atmospheric Equilibrium

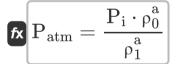
#### 5) Adiabatic Exponent or Adiabatic Index



Open Calculator

ex  $12.63158 = \frac{24 J/kg^{*} ^{\circ}C}{1.9 J/kg^{*} ^{\circ}C}$ 

#### 6) Atmospheric Pressure According to Polytropic Process



Open Calculator

 $extbf{ex} egin{aligned} 349.9863 ext{Pa} &= rac{66.31 ext{Pa} \cdot (1000 ext{kg/m}^3)^{2.4}}{(500 ext{kg/m}^3)^{2.4}} \end{aligned}$ 



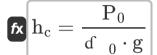
#### 7) Density According to Polytropic Process

$$ho_0 = 
ho_1 \cdot \left(rac{\mathrm{P}_{\mathrm{atm}}}{\mathrm{P}_{\mathrm{i}}}
ight)^{rac{1}{\mathrm{a}}}$$

Open Calculator

 $extbf{ex} 1000.016 ext{kg/m}^{_3} = 500 ext{kg/m}^{_3} \cdot \left(rac{350 ext{Pa}}{66.31 ext{Pa}}
ight)^{rac{1}{2.4}}$ 

#### 8) Height of Fluid Column of Constant Specific Weight



Open Calculator

 $oxed{ex} 20.40816 \mathrm{mm} = rac{10 \mathrm{N/m^2}}{50 \mathrm{kg/m^3 \cdot 9.8 m/s^2}}$ 

#### 9) Initial Density According to Polytropic Process

$$\left|\mathbf{F}_{i}=\mathrm{P}_{\mathrm{atm}}\cdot\left(rac{
ho_{1}}{
ho_{0}}
ight)^{\mathrm{a}}
ight|$$

Open Calculator

 $ext{ex} 66.3126 ext{Pa} = 350 ext{Pa} \cdot \left( rac{500 ext{kg/m}^3}{1000 ext{kg/m}^3} 
ight)^{2.4}$ 



#### 10) Initial Pressure according to Polytropic Process

 $extbf{P}_{ ext{i}} = rac{ ext{P}_{ ext{atm}} \cdot 
ho_{1}^{ ext{a}}}{
ho_{0}^{ ext{a}}}$ 

Open Calculator

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

#### 11) Positive Constant

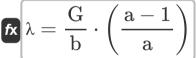
 $\mathbf{f}\mathbf{x} = rac{1}{1 - \mathrm{K_h} \cdot rac{\lambda}{G}}$ 

Open Calculator

Open Calculator G

ex  $1.000006 = \frac{1}{1 - 0.000001 \text{Hz} \cdot \frac{58}{10}}$ 

#### 12) Temperature Lapse Rate



$$= 58.33333 = \frac{10}{0.1} \cdot \left(\frac{2.4 - 1}{2.4}\right)$$



#### Measurement of Pressure 🗗

#### 13) Pressure at Point m in Pizometer

fx  $p = S \cdot h$ 

Open Calculator 🚰

 $m ex~825Pa = 0.75kN/m^3 \cdot 1.1m$ 

#### 14) Pressure Head at Point in Piezometer



Open Calculator

$$=$$
  $1.1 ext{m} = rac{825 ext{Pa}}{0.75 ext{kN/m}^3}$ 

#### 15) Specific Weight of Liquid in Peizometer



Open Calculator

=  $0.75 {
m kN/m^3} = rac{825 {
m Pa}}{1.1 {
m m}}$ 



#### Variables Used

- a Constant a
- b Constant b
- C<sub>p</sub> Specific Heat at Constant Pressure (Joule per Kilogram per Celcius)
- C<sub>v</sub> Specific Heat at Constant Volume (Joule per Kilogram per Celcius)
- D Depth of Point 1 (Meter)
- d<sub>0</sub> Density of Gas (Kilogram per Cubic Meter)
- **D**<sub>2</sub> Depth of Point 2 (Meter)
- g Acceleration due to Gravity (Meter per Square Second)
- G Specific Gravity of Fluid
- **h** Pressure Head (Meter)
- h 1 Pressure Head of Liquid 1 (Meter)
- h<sub>2</sub> Pressure Head of Liquid 2 (Meter)
- h<sub>c</sub> Height of Fluid Column (Millimeter)
- k Adiabatic Index
- K<sub>h</sub> Rate Constant (Hertz)
- p Pressure (Pascal)
- P<sub>0</sub> Pressure of Gas (Newton per Square Meter)
- P<sub>atm</sub> Atmospheric Pressure (Pascal)
- Pi Initial Pressure of System (Pascal)
- S Specific Weight of Liquid in Piezometer (Kilonewton per Cubic Meter)
- SW<sub>1</sub> Specific Weight 1 (Kilonewton per Cubic Meter)
- W 2 Specific Weight of Liquid 2 (Kilonewton per Cubic Meter)





- **AP** Pressure Difference (Newton per Square Meter)
- λ Temperature Lapse Rate
- ρ<sub>0</sub> Density of Fluid (Kilogram per Cubic Meter)
- ρ<sub>1</sub> Density 1 (Kilogram per Cubic Meter)





#### Constants, Functions, Measurements used

- 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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