Important Level Measurement Formulas PDF

Formulas
Examples
with Units

List of 18
Important Level Measurement Formulas

1) Buoyancy Formula

Evaluate Formula

Formula

$$F_b = D_{im} \cdot A \cdot \gamma$$

Example with Units

$$10.8\,\text{N} = 0.27\,\text{m} \cdot 0.05\,\text{m}^2 \cdot 800\,\text{N/m}^3$$

2) Buoyancy Force on Cylindrical Displacer Formula

Evaluate Formula

Formula

$$F_b = \frac{\gamma \cdot \pi \cdot D^2 \cdot L}{4}$$

Example with Units

$$10.7757\,\text{N} = \frac{800\,\text{N/m}^3 \cdot 3.1416 \cdot 0.07\,\text{m}^2 \cdot 3.5\,\text{m}}{4}$$

3) Capacitance with No Liquid Formula

Evaluate Formula

Formula

$$C_a = \frac{C \cdot R}{\left(D_L \cdot \mu\right) + R}$$

Example with Units

$$4.5909\,\text{F} = \frac{10.1\,\text{F} \cdot 1.05\,\text{m}}{\left(0.021\,\text{m} \cdot 60\right) + 1.05\,\text{m}}$$

4) Cross-Sectional Area of Object Formula

Evaluate Formula

Formula

$$A = \frac{F_b}{D_{im} \cdot \gamma}$$

Example with Units

$$0.0498\,\text{m}^2 = \frac{10.75\,\text{N}}{0.27\,\text{m} \cdot 800\,\text{N/m}^3}$$

5) Depth of Fluid Formula

Evaluate Formula

Formula

$$d = \frac{\Delta P}{\gamma}$$

Example with Units

$$11.25\,\text{m} = \frac{9000\,\text{Pa}}{800\,\text{N/m}^3}$$

6) Float diameter Formula

Evaluate Formula

Formula

$$D = \sqrt{\frac{4 \cdot F_b}{\gamma \cdot \pi \cdot L}}$$

Example with Units

$$0.0699\,\text{m} = \sqrt{\frac{4 \cdot 10.75\,\text{N}}{800\,\text{N/m}^3 \cdot 3.1416 \cdot 3.5\,\text{m}}}$$

7) Height of plates Formula

Evaluate Formula

Formula

$$R = D_L \cdot \frac{C_a \cdot \mu}{C - C_a}$$

Example with Units

$$1.0538\,\text{m} = 0.021\,\text{m} \cdot \frac{4.6\,\text{F} \cdot 60}{10.1\,\text{F} - 4.6\,\text{F}}$$

8) Immersed Depth Formula

Evaluate Formula

Formula

$$D_{im} = \frac{F_b}{A \cdot \gamma}$$

Example with Units

$$0.2688\,\text{m} = \frac{10.75\,\text{N}}{0.05\,\text{m}^2 \cdot 800\,\text{N/m}^3}$$

9) Length of displacer submerged in liquid Formula

Evaluate Formula

Formula

$$L = \frac{4 \cdot F_b}{\gamma \cdot \pi \cdot D^2}$$

Example with Units

$$3.4917\,\text{m} = \frac{4 \cdot 10.75\,\text{N}}{800\,\text{N/m}^3 \cdot 3.1416 \cdot 0.07\,\text{m}^2}$$

10) Liquid Level Formula

Evaluate Formula

Formula

$$D_L = \frac{\left(C - C_a\right) \cdot R}{C_a \cdot \mu}$$

Example with Units

$$0.0209\,\text{m} = \frac{\left(10.1\,\text{F} - 4.6\,\text{F}\right) \cdot 1.05\,\text{m}}{4.6\,\text{F} \cdot 60}$$

11) Magnetic Permeability of Liquid Formula

Evaluate Formula

Formula

$$\mu = \frac{R \cdot \left(C - C_a\right)}{D_L \cdot C_a}$$

Example with Units

$$59.7826 = \frac{1.05\,\text{m} \cdot \left(10.1\,\text{F} - 4.6\,\text{F}\right)}{0.021\,\text{m} \cdot 4.6\,\text{F}}$$

12) Non-Conductive Liquid Capacitance Formula

Evaluate Formula

Formula

$$C = \left(\mu \cdot D_L \cdot C_a\right) + \left(R \cdot C_a\right)$$

Example with Units

$$10.626\,\text{F} = \left(60 \cdot 0.021\,\text{m} \cdot 4.6\,\text{F}\right) + \left(1.05\,\text{m} \cdot 4.6\,\text{F}\right)$$

13) Volume of Material in Container Formula

Evaluate Formula

Formula

$$V_m = A \cdot d$$

Example with Units

$$0.56\,\text{m}^3 = 0.05\,\text{m}^2 \cdot 11.2\,\text{m}$$

14) Weight of Air Formula

Evaluate Formula

Formula

$$W_a = \left(D_{im} \cdot \gamma \cdot A\right) + W_b$$

Example with Units

$$61.8\,\text{kg} = \left(0.27\,\text{m} \cdot 800\,\text{N/m}^3 \cdot 0.05\,\text{m}^2\right) + 51\,\text{kg}$$

15) Weight of Body in Liquid Formula

Evaluate Formula

Formula

$$W_b = W_a - \left(D_{im} \cdot \gamma \cdot A \right)$$

Example with Units

$$51.2\,\text{kg} = 62\,\text{kg} - \left(0.27\,\text{m} \cdot 800\,\text{N/m}^3 \cdot 0.05\,\text{m}^2 \right)$$

16) Weight of Displacer Formula

Evaluate Formula

Formula

$$W_b = W_f + F$$

Example with Units

$$51\,\text{kg} = 18.4\,\text{kg} + 32.6\,\text{N}$$

17) Weight of Material in Container Formula

Evaluate Formula

Formula

$$W_{ml} = V_m \cdot \gamma$$

Example with Units

$$448\,\text{kg} = 0.56\,\text{m}^3 \cdot 800\,\text{N/m}^3$$

18) Weight on Force Sensor Formula

Evaluate Formula

Formula

$$W_f = W_b - F$$

Example with Units

$$18.4\,\text{kg} = 51\,\text{kg} - 32.6\,\text{N}$$

Variables used in list of Level Measurement Formulas above

- **A** Cross Section Area Level *(Square Meter)*
- **C** Capacitance *(Farad)*
- C_a No Fluid Capacitance *(Farad)*
- **d** Depth *(Meter)*
- **D** Pipe Diameter Level *(Meter)*
- D_{im} Immersed Depth *(Meter)*
- D_L Liquid Level between Plates *(Meter)*
- **F** Force Level *(Newton)*
- F_b Buoyancy Force *(Newton)*
- **L** Displacer Length *(Meter)*
- **R** Plate Height *(Meter)*
- V_m Material Volume *(Cubic Meter)*
- W_a Air Weight *(Kilogram)*
- W_b Body Weight *(Kilogram)*
- W_f Force Sensor Weight *(Kilogram)*
- W_{ml} Material Weight Level *(Kilogram)*
- **γ** Fluid Specific Weight *(Newton per Cubic Meter)*
- **ΔP** Pressure Change *(Pascal)*
- **μ** Dielectric Constant

Constants, Functions, Measurements used in list of Level Measurement Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Measurement: **Length** in Meter (m) *Length Unit Conversion*
- Measurement: **Weight** in Kilogram (kg) *Weight Unit Conversion*
- Measurement: **Volume** in Cubic Meter (m³) *Volume Unit Conversion*
- Measurement: **Area** in Square Meter (m²) *Area Unit Conversion*
- Measurement: **Pressure** in Pascal (Pa) *Pressure Unit Conversion*
- Measurement: **Force** in Newton (N) *Force Unit Conversion*
- Measurement: **Capacitance** in Farad (F) *Capacitance Unit Conversion*
- Measurement: **Specific Weight** in Newton per Cubic Meter (N/m³) *Specific Weight Unit Conversion*

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