Important Static Loads Formulas PDF

Formulas
Examples
with Units

List of 10
Important Static Loads Formulas

1) Archimedes Law and Buoyancy Formulas

1.1) Buoyant Force of Body Submerged in Fluid Formula

Evaluate Formula

Formula

$$F_B = \nabla \cdot \rho \cdot [g]$$

Example with Units

$$4888.615\,\text{N} = 0.5\,\text{m}^3 \cdot 997\,\text{kg/m}^3 \cdot 9.8066\,\text{m/s}^2$$

1.2) Mass Density of Fluid for Buoyant Force Submerged in Fluid Formula

Evaluate Formula

Formula

$$\rho = \frac{F_B}{[g] \cdot \nabla}$$

Example with Units

$$997\,\text{kg/m}^3 = \frac{4888.615\,\text{N}}{9.8066\,\text{m/s}^2 \cdot 0.5\,\text{m}^3}$$

1.3) Volume of Submerged Part of Object given Buoyant Force of Body Submerged in Fluid Formula

Evaluate Formula

Formula

$$\nabla = \frac{F_B}{\rho \cdot [g]}$$

Example with Units

$$0.5\,\text{m}^3 = \frac{4888.615\,\text{N}}{997\,\text{kg/m}^3 \cdot 9.8066\,\text{m/s}^2}$$

2) Drill String Buckling Formulas

2.1) Column Slenderness Ratio for Critical Buckling Load Formula

Evaluate Formula

Formula

$$Lcr_{ratio} = \sqrt{\frac{A \cdot \pi^2 \cdot E}{P_{cr}}}$$

Example with Units

$$160 = \sqrt{\frac{0.0688\,\text{m}^2 \cdot 3.1416^2 \cdot 2E11\,\text{N/m}^2}{5304.912\,\text{kN}}}$$

2.2) Critical Buckling Load Formula

Evaluate Formula

Formula

$$P_{cr} = A \cdot \left(\frac{\pi^2 \cdot E}{Lcr_{ratio}^2} \right)$$

Example with Units

$$5304.9124\,\text{kN} = 0.0688\,\text{m}^2 \cdot \left(\frac{3.1416^2 \cdot 2E11\,\text{N/m}^2}{160^2} \right)$$

2.3) Cross Section Area of Column for Critical Buckling Load Formula

Evaluate Formula

Formula

$$A = \frac{P_{cr} \cdot Lcr_{ratio}^{2}}{\pi^{2} \cdot E}$$

Example with Units

$$0.0688\,\text{m}^2 = \frac{5304.912\,\text{kN} \cdot 160^{2}}{3.1416^{2} \cdot 2E11\,\text{N/m}^2}$$

2.4) Flow Velocity given Reynolds Number in Shorter Length of Pipe Formula

Evaluate Formula

Formula

$$V_{flow} = \frac{Re \cdot v}{D_p}$$

Example with Units

$$1.1198\,\text{m/s} = \frac{1560 \cdot 7.25\,\text{St}}{1.01\,\text{m}}$$

2.5) Kinematic Viscosity of Fluid given Reynolds Number in Shorter Length of Pipe Formula

Evaluate Formula

Formula

$$v = \frac{V_{flow} \cdot D_p}{Re}$$

Example with Units

$$7.2513\,\text{St} = \frac{1.12\,\text{m/s} \cdot 1.01\,\text{m}}{1560}$$

2.6) Pipe Diameter given Reynolds Number in Shorter Length of Pipe Formula

Evaluate Formula

Formula

$$D_p = \frac{Re \cdot v}{V_{flow}}$$

Example with Units

$$1.0098\,\text{m} = \frac{1560 \cdot 7.25\,\text{St}}{1.12\,\text{m/s}}$$

2.7) Reynolds Number in Shorter Length of Pipe Formula

Evaluate Formula

Formula

$$Re = \frac{V_{flow} \cdot D_p}{v}$$

Example with Units

$$1560.2759 = \frac{1.12\,\text{m/s} \cdot 1.01\,\text{m}}{7.25\,\text{St}}$$

Variables used in list of Static Loads Formulas above

- ∇ Volume of Submerged part of Object *(Cubic Meter)*
- **A** Cross Section Area of Column *(Square Meter)*
- D_p Diameter of Pipe *(Meter)*
- **E** Elastic Modulus *(Newton per Square Meter)*
- F_B Buoyant Force *(Newton)*
- Lcr_{ratio} Column Slenderness Ratio
- P_{cr} Critical Buckling Load for Drill String *(Kilonewton)*
- **Re** Reynolds Number
- **v** Kinematic Viscosity *(Stokes)*
- V_{flow} Flow Velocity *(Meter per Second)*
- **ρ** Mass Density *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used in list of Static Loads Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- constant(s): **[g]**, 9.80665 *Gravitational acceleration on Earth*
- 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: **Volume** in Cubic Meter (m³) *Volume Unit Conversion*
- Measurement: **Area** in Square Meter (m²) *Area Unit Conversion*
- Measurement: **Speed** in Meter per Second (m/s) *Speed Unit Conversion*
- Measurement: **Force** in Newton (N), Kilonewton (kN) *Force Unit Conversion*
- Measurement: **Mass Concentration** in Kilogram per Cubic Meter (kg/m³) *Mass Concentration Unit Conversion*
- Measurement: **Kinematic Viscosity** in Stokes (St) *Kinematic Viscosity Unit Conversion*
- Measurement: **Stress** in Newton per Square Meter (N/m²) *Stress Unit Conversion*

Download other Important Hydrostatics PDFs

- Important Static Loads Formulas

Try our Unique Visual Calculators

- Percentage decrease
- HCF of three numbers
- Multiply fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

7/8/2024 | 11:25:00 AM UTC