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Static Loads Formulas

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List of 10 Static Loads Formulas

Static Loads

Archimedes Law and Buoyancy

1) Buoyant Force of Body Submerged in Fluid

Open Calculator

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

ex $$4888.615\text{N} = 0.5\text{m}^3 \cdot 997\text{kg/m}^3 \cdot [g]$$

2) Mass Density of Fluid for Buoyant Force Submerged in Fluid

Open Calculator

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

ex $$997\text{kg/m}^3 = \frac{4888.615\text{N}}{[g] \cdot 0.5\text{m}^3}$$

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

Open Calculator

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

ex $$0.5\text{m}^3 = \frac{4888.615\text{N}}{997\text{kg/m}^3 \cdot [g]}$$

Drill String Buckling

4) Column Slenderness Ratio for Critical Buckling Load

Open Calculator

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

ex $$160 = \sqrt{\frac{0.0688\mathrm{m^2} \cdot \pi^2 \cdot 2\mathrm{E11N/m^2}}{5304.912\mathrm{kN}}}$$

5) Critical Buckling Load

Open Calculator

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

ex $$5304.912\mathrm{kN} = 0.0688\mathrm{m^2} \cdot \left(\frac{\pi^2 \cdot 2\mathrm{E11N/m^2}}{(160)^2} \right)$$

6) Cross Section Area of Column for Critical Buckling Load

Open Calculator

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

ex $$0.0688\mathrm{m^2} = \frac{5304.912\mathrm{kN} \cdot (160)^2}{\pi^2 \cdot 2\mathrm{E11N/m^2}}$$

7) Flow Velocity given Reynolds Number in Shorter Length of Pipe

Open Calculator

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

ex $$1.119802\text{m/s} = \frac{1560 \cdot 7.25\text{St}}{1.01\text{m}}$$

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

Open Calculator

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

ex $$7.251282\text{St} = \frac{1.12\text{m/s} \cdot 1.01\text{m}}{1560}$$

9) Pipe Diameter given Reynolds Number in Shorter Length of Pipe

Open Calculator

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

ex $$1.009821\text{m} = \frac{1560 \cdot 7.25\text{St}}{1.12\text{m/s}}$$

10) Reynolds Number in Shorter Length of Pipe

Open Calculator

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

ex $$1560.276 = \frac{1.12\text{m/s} \cdot 1.01\text{m}}{7.25\text{St}}$$

Variables Used

- ∇ 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

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- Function: **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 (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  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/m^3)
  Mass Concentration Unit Conversion
- Measurement: **Kinematic Viscosity** in Stokes (St)
  Kinematic Viscosity Unit Conversion
- Measurement: **Stress** in Newton per Square Meter (N/m^2)
  Stress Unit Conversion

Check other formula lists

- **Static Loads Formulas**

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