Important Newton's Friction Postulation Formulas PDF

Formulas
Examples
with Units

List of 9
Important Newton's Friction Postulation Formulas

1) Dynamic Viscosity given Kinematic Viscosity Formula

Evaluate Formula

Formula

$$\mu = v_s \cdot \rho_f$$

Example with Units

$$924\,\text{Pa*s} = 12\,\text{m}^2/\text{s} \cdot 77\,\text{kg/m}^3$$

2) Dynamic Viscosity of Fluid given Fluid Filling Width between Plates Formula

Evaluate Formula

Formula

$$\mu = \frac{\sigma \cdot y}{V_f}$$

Example with Units

$$924\,\text{Pa*s} = \frac{18.48\,\text{Pa} \cdot 1000\,\text{mm}}{20\,\text{m/s}}$$

3) Dynamic Viscosity of Fluid given Shear Force per Unit Area or Shear Stress Formula

Evaluate Formula

Formula

$$\mu = \frac{\sigma}{du/dy}$$

Example with Units

$$924\,\text{Pa*s} = \frac{18.48\,\text{Pa}}{0.02}$$

4) Fluid Filling Width between Plates given Shear Force Per Unit Area or Shear Stress Formula

Evaluate Formula

Formula

$$y = \frac{\mu \cdot V_f}{\sigma}$$

Example with Units

$$1000\,\text{mm} = \frac{924\,\text{Pa*s} \cdot 20\,\text{m/s}}{18.48\,\text{Pa}}$$

5) Mass Density of Fluid for given Kinematic Viscosity Formula

Evaluate Formula

Formula

$$\rho_f = \frac{\mu}{v_s}$$

Example with Units

$$77\,\text{kg/m}^3 = \frac{924\,\text{Pa*s}}{12\,\text{m}^2/\text{s}}$$

6) Relationship between Dynamic Viscosity and Kinematic Viscosity Formula

Evaluate Formula

Formula

$$v_s = \frac{\mu}{\rho_f}$$

Example with Units

$$12\,\text{m}^2/\text{s} = \frac{924\,\text{Pa*s}}{77\,\text{kg/m}^3}$$

7) Shear Force Per Unit Area or Shear Stress Formula

Evaluate Formula

Formula

$$\sigma = \mu \cdot du_{/dy}$$

Example with Units

$$18.48\,\text{Pa} = 924\,\text{Pa*s} \cdot 0.02$$

8) Velocity Gradient given Shear Force per unit Area or Shear Stress Formula

Evaluate Formula

Formula

$$du_{/dy} = \frac{\sigma}{\mu}$$

Example with Units

$$0.02 = \frac{18.48\,\text{Pa}}{924\,\text{Pa*s}}$$

9) Velocity of Upper Plate given Shear force per unit Area or Shear Stress Formula

Evaluate Formula

Formula

$$V_f = \frac{\sigma \cdot y}{\mu}$$

Example with Units

$$20\,\text{m/s} = \frac{18.48\,\text{Pa} \cdot 1000\,\text{mm}}{924\,\text{Pa*s}}$$

Variables used in list of Newton's Friction Postulation Formulas above

- $du_{/dy}$ Velocity Gradient
- V_f Velocity of Fluid *(Meter per Second)*
- v_s Kinematic Viscosity at 20° C *(Square Meter per Second)*
- y Width between the Plates *(Millimeter)*
- μ Dynamic Viscosity *(Pascal Second)*
- ρ_f Mass Density of Fluid *(Kilogram per Cubic Meter)*
- σ Shear Stress of Fluid *(Pascal)*

Constants, Functions, Measurements used in list of Newton's Friction Postulation Formulas above

- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Dynamic Viscosity** in Pascal Second (Pa*s)
  Dynamic Viscosity Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m^2/s)
  Kinematic Viscosity Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density Unit Conversion
- Measurement: **Stress** in Pascal (Pa)
  Stress Unit Conversion

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