Important Stiffness Formulas PDF

Formulas
Examples
with Units

List of 10
Important Stiffness Formulas

1) Diameter of Spring Wire or Coil given Stiffness of Spring Formula

Evaluate Formula

Formula

$$d = \left(\frac{64 \cdot K \cdot R^3 \cdot N}{G_{Torsion}} \right)^{\frac{1}{4}}$$

Example with Units

$$45\,\text{mm} = \left(\frac{64 \cdot 25\,\text{N/mm} \cdot 225\,\text{mm}^3 \cdot 9}{40\,\text{GPa}} \right)^{\frac{1}{4}}$$

2) Mean Radius of Spring given Stiffness of Spring Formula

Evaluate Formula

Formula

$$d = \left(\frac{64 \cdot K \cdot R^3 \cdot N}{G_{Torsion}} \right)^{\frac{1}{4}}$$

Example with Units

$$d = \left(\frac{64 \cdot K \cdot R^3 \cdot N}{G_{Torsion}} \right)^{\frac{1}{4}}$$

3) Modulus of Rigidity given Stiffness of Spring Formula

Evaluate Formula

Formula

$$G_{Torsion} = \frac{64 \cdot K \cdot R^3 \cdot N}{d^4}$$

Example with Units

$$40\,\text{GPa} = \frac{64 \cdot 25\,\text{N/mm} \cdot 225\,\text{mm}^3 \cdot 9}{45\,\text{mm}^4}$$

4) Number of Spring Coils given Stiffness of Spring Formula

Evaluate Formula

Formula

$$N = \frac{G_{Torsion} \cdot d^4}{64 \cdot R^3 \cdot K}$$

Example with Units

$$9 = \frac{40\,\text{GPa} \cdot 45\,\text{mm}^4}{64 \cdot 225\,\text{mm}^3 \cdot 25\,\text{N/mm}}$$

5) Stiffness of Spring Formula

Evaluate Formula

Formula

$$K = \frac{G_{Torsion} \cdot d^4}{64 \cdot R^3 \cdot N}$$

Example with Units

$$25\,\text{N/mm} = \frac{40\,\text{GPa} \cdot 45\,\text{mm}^4}{64 \cdot 225\,\text{mm}^3 \cdot 9}$$

6) Square Section Wire Formulas

6.1) Mean Radius given Stiffness of Square Section Wire Spring Formula

Evaluate Formula

Formula

$$R_{sq} = \left(\frac{G_{Torsion} \cdot d^4}{44.7 \cdot N \cdot K} \right)^{\frac{1}{3}}$$

Example with Units

$$253.5946\,\text{mm} = \left(\frac{40\,\text{GPa} \cdot 45\,\text{mm}^4}{44.7 \cdot 9 \cdot 25\,\text{N/mm}} \right)^{\frac{1}{3}}$$

6.2) Modulus of Rigidity given Stiffness of Square Section Wire Spring Formula

Evaluate Formula

Formula

$$G_{sq} = \frac{K \cdot 44.7 \cdot R^3 \cdot N}{d^4}$$

Example with Units

$$27.9375\,\text{GPa} = \frac{25\,\text{N/mm} \cdot 44.7 \cdot 225\,\text{mm}^3 \cdot 9}{45\,\text{mm}^4}$$

6.3) Number of Spring Coils given Stiffness of Square Section Wire Spring Formula

Evaluate Formula

Formula

$$N_{sq} = \frac{G_{Torsion} \cdot d^4}{44.7 \cdot R^3 \cdot K}$$

Example with Units

$$12.8859 = \frac{40\,\text{GPa} \cdot 45\,\text{mm}^4}{44.7 \cdot 225\,\text{mm}^3 \cdot 25\,\text{N/mm}}$$

6.4) Stiffness of Square Section Wire Spring Formula

Evaluate Formula

Formula

$$K_{sq} = \frac{G_{Torsion} \cdot d^4}{44.7 \cdot R^3 \cdot N}$$

Example with Units

$$35.7942\,\text{N/mm} = \frac{40\,\text{GPa} \cdot 45\,\text{mm}^4}{44.7 \cdot 225\,\text{mm}^3 \cdot 9}$$

6.5) Width given Stiffness of Square Section Wire Spring Formula

Evaluate Formula

Formula

$$w_{sq} = \left(\frac{K \cdot 44.7 \cdot R^3 \cdot N}{G_{Torsion}} \right)^{\frac{1}{4}}$$

Example with Units

$$41.1381\,\text{mm} = \left(\frac{25\,\text{N/mm} \cdot 44.7 \cdot 225\,\text{mm}^3 \cdot 9}{40\,\text{GPa}} \right)^{\frac{1}{4}}$$

Variables used in list of Stiffness Formulas above

- **d** Diameter of Spring *(Millimeter)*
- G_{sq} Modulus of Rigidity of Square Section Wire Spring *(Gigapascal)*
- $G_{Torsion}$ Modulus of Rigidity *(Gigapascal)*
- **K** Stiffness of Spring *(Newton per Millimeter)*
- K_{sq} Stiffness of Square Section Wire Spring *(Newton per Millimeter)*
- **N** Number of Coils
- N_{sq} Number of Spring Coils of Sq. Sec. Wire Spring
- **R** Mean Radius *(Millimeter)*
- R_{sq} Mean Radius of Square Section Wire Spring *(Millimeter)*
- w_{sq} Width of Square Section Wire Spring *(Millimeter)*

Constants, Functions, Measurements used in list of Stiffness Formulas above

- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Pressure** in Gigapascal (GPa)
  Pressure Unit Conversion
- Measurement: **Stiffness Constant** in Newton per Millimeter (N/mm)
  Stiffness Constant Unit Conversion

Download other Important Spring PDFs

- Important Deflection in Spring Formulas
- Important Maximum Bending Stress in Spring Formulas
- Important Proof Load on Spring Formulas
- Important Stiffness Formulas

Try our Unique Visual Calculators

- Percentage change
- LCM of two numbers
- Proper 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

9/18/2024 | 11:58:00 AM UTC