Stiffness Formulas... 1/8





# Stiffness Formulas

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#### List of 10 Stiffness Formulas

### Stiffness (\*\*

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



 $\mathbf{d} = \left( \frac{64 \cdot \mathbf{K} \cdot \mathbf{R}^3 \cdot \mathbf{N}}{\mathbf{G}_{\text{Torsion}}} \right)^{\frac{2}{4}}$ 

Open Calculator 2

2) Mean Radius of Spring given Stiffness of Spring



Open Calculator

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



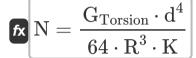
### 3) Modulus of Rigidity given Stiffness of Spring

 $\mathbf{K} \boxed{ \mathbf{G}_{\mathrm{Torsion}} = rac{64 \cdot \mathbf{K} \cdot \mathbf{R}^3 \cdot \mathbf{N}}{\mathrm{d}^4} }$ 

Open Calculator

 $oxed{ex} 40 ext{GPa} = rac{64 \cdot 25 ext{N/mm} \cdot \left(225 ext{mm}
ight)^3 \cdot 9}{\left(45 ext{mm}
ight)^4}$ 

# 4) Number of Spring Coils given Stiffness of Spring



Open Calculator

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

## 5) Stiffness of Spring

 $\mathbf{K} = rac{\mathrm{G}_{\mathrm{Torsion}} \cdot \mathrm{d}^4}{64 \cdot \mathrm{R}^3 \cdot \mathrm{N}}$ 

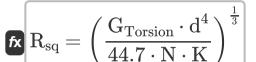
Open Calculator 🗗

 $ext{ex} \ 25 ext{N/mm} = rac{40 ext{GPa} \cdot (45 ext{mm})^4}{64 \cdot (225 ext{mm})^3 \cdot 9}$ 

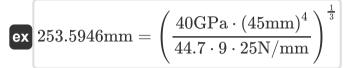


## Square Section Wire 🗗

6) Mean Radius given Stiffness of Square Section Wire Spring



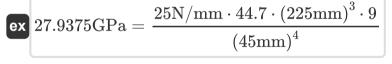
Open Calculator 🚰



7) Modulus of Rigidity given Stiffness of Square Section Wire Spring



Open Calculator 🗗



8) Number of Spring Coils given Stiffness of Square Section Wire Spring



Open Calculator 🗗





### 9) Stiffness of Square Section Wire Spring

 $extbf{K} ext{K}_{ ext{sq}} = rac{ ext{G}_{ ext{Torsion}} \cdot ext{d}^4}{44.7 \cdot ext{R}^3 \cdot ext{N}}$ 

Open Calculator

ex 
$$35.79418\text{N/mm} = \frac{40\text{GPa} \cdot (45\text{mm})^4}{44.7 \cdot (225\text{mm})^3 \cdot 9}$$

### 10) Width given Stiffness of Square Section Wire Spring



Open Calculator

ex 
$$41.13812$$
mm =  $\left(\frac{25\text{N/mm} \cdot 44.7 \cdot (225\text{mm})^3 \cdot 9}{40\text{GPa}}\right)^{\frac{1}{4}}$ 



Stiffness Formulas... 6/8

#### Variables Used

- d Diameter of Spring (Millimeter)
- G<sub>sq</sub> Modulus of Rigidity of Square Section Wire Spring (Gigapascal)
- G<sub>Torsion</sub> Modulus of Rigidity (Gigapascal)
- **K** Stiffness of Spring (Newton per Millimeter)
- K<sub>sq</sub> Stiffness of Square Section Wire Spring (Newton per Millimeter)
- N Number of Coils
- N<sub>sq</sub> Number of Spring Coils of Sq. Sec. Wire Spring
- R Mean Radius (Millimeter)
- R<sub>sq</sub> Mean Radius of Square Section Wire Spring (Millimeter)
- W<sub>SQ</sub> Width of Square Section Wire Spring (Millimeter)





Stiffness Formulas... 7/8

## Constants, Functions, Measurements used

- 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





#### **Check other formula lists**

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

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