Important Deflection in Spring Formulas PDF



Examples with Units

List of 23

Important Deflection in Spring Formulas

Evaluate Formula

Evaluate Formula (

Evaluate Formula 🕝

1) Close Coiled Helical Spring Formulas (7)

1.1) Deflection for Close-Coiled Helical Spring Formula C



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

$$3.4 \text{ mm} = \frac{64 \cdot 85 \text{ N} \cdot 225 \text{ mm}^3 \cdot 9}{40 \text{ GPa} \cdot 45 \text{ mm}^4}$$

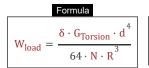
1.2) Diameter of Spring Wire or Coil given Deflection for Close-Coiled Helical Spring Formula



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

$$45 \, \text{mm} = \left(\frac{64 \cdot 85 \, \text{N} \cdot 225 \, \text{mm}}{40 \, \text{GPa} \cdot 3.4 \, \text{mm}}\right)^{\frac{1}{4}}$$

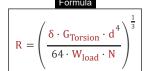
1.3) Load Applied on Spring Axially given Deflection for Close-Coiled Helical Spring Formula

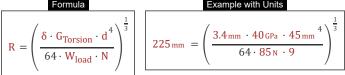


$$W_{load} = \frac{\delta \cdot G_{Torsion} \cdot d^{4}}{64 \cdot N \cdot R^{3}}$$

$$85_{N} = \frac{3.4_{mm} \cdot 40_{GPa} \cdot 45_{mm}}{64 \cdot 9 \cdot 225_{mm}}$$

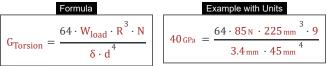
1.4) Mean Radius of Spring given Deflection for Close-Coiled Helical Spring Formula 🗂 Evaluate Formula [





1.5) Modulus of Rigidity given Deflection for Close-Coiled Helical Spring Formula 🕝 Evaluate Formula C

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



1.6) Number of Spring Coils given Deflection for Close-Coiled Helical Spring Formula 🕝



Formula Example with Units
$$N = \frac{\delta \cdot G_{Torsion} \cdot d^4}{64 \cdot W_{load} \cdot R^3} \qquad 9 = \frac{3.4 \, \text{mm} \cdot 40 \, \text{GPa} \cdot 45 \, \text{mm}}{64 \cdot 85 \, \text{N} \cdot 225 \, \text{mm}}^3$$

Evaluate Formula (

Evaluate Formula

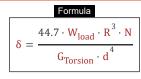
Evaluate Formula

Evaluate Formula (

Evaluate Formula [

2) Spring of Square Section Wire Formulas

2.1) Deflection of Square Section Wire Spring Formula C



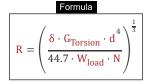


2.2) Load given Deflection of Square Section Wire Spring Formula





2.3) Mean radius given Deflection of Square Section Wire Spring Formula 🕝





2.4) Modulus of Rigidity using Deflection of Square Section Wire Spring Formula 🕝



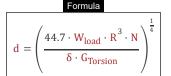
$$G_{Torsion} = \frac{44.7 \cdot W_{load} \cdot R^3 \cdot N}{\delta \cdot d^4}$$

$$27.9375 \text{ GPa} = \frac{44.7 \cdot 85 \text{ N} \cdot 225 \text{ mm}^3 \cdot 9}{3.4 \text{ mm} \cdot 45 \text{ mm}^4}$$

2.5) Number of Coils given Deflection of Square Section Wire Spring Formula [7]

Example with Units $N = \frac{\delta \cdot G_{Torsion} \cdot d^{4}}{44.7 \cdot R^{3} \cdot W_{load}}$ | 12.8859 = $\frac{3.4 \text{ mm} \cdot 40 \text{ GPa} \cdot 45 \text{ mm}^{4}}{44.7 \cdot 225 \text{ mm}^{3} \cdot 85 \text{ N}}$

2.6) Width given Deflection of Square Section Wire Spring Formula 🕝



Formula Example with Units
$$d = \left(\frac{44.7 \cdot W_{load} \cdot R^3 \cdot N}{\delta \cdot G_{Torsion}}\right)^{\frac{1}{4}} \qquad 41.1381 \, \text{mm} = \left(\frac{44.7 \cdot 85 \, \text{N} \cdot 225 \, \text{mm}^3 \cdot 9}{3.4 \, \text{mm} \cdot 40 \, \text{GPa}}\right)^{\frac{1}{4}}$$

Evaluate Formula (

2.7) Leaf Springs Formulas

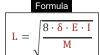
2.7.1) Deflection in Leaf Spring given Moment Formula 🕝

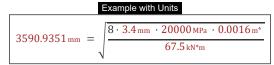


Formula Example with Units
$$\delta = \left(\frac{\text{M} \cdot \text{L}^2}{8 \cdot \text{E} \cdot \text{I}}\right) \boxed{ 4.585 \, \text{mm} = \left(\frac{67.5 \, \text{kN*m} \cdot 4170 \, \text{mm}^2}{8 \cdot 20000 \, \text{MPa} \cdot 0.0016 \, \text{m}^4}\right) }$$

Evaluate Formula (

2.7.2) Length given Deflection in Leaf Spring Formula





Evaluate Formula (

2.7.3) Modulus of Elasticity given Deflection in Leaf Spring and Moment Formula (







2.7.4) Moment given Deflection in Leaf Spring Formula 🕝

$$M = \frac{8 \cdot \delta \cdot E \cdot I}{L^2}$$

Formula Example with Units
$$M = \frac{8 \cdot \delta \cdot E \cdot I}{L^2} = \frac{8 \cdot 3.4 \, \text{mm} \cdot 20000 \, \text{MPa} \cdot 0.0016 \, \text{m}^4}{4170 \, \text{mm}^2}$$

Evaluate Formula (

2.7.5) Moment of Inertia given Deflection in Leaf Spring Formula C



Evaluate Formula [

2.7.6) For Centrally Loaded Beam Formulas

2.7.6.1) Deflection in Leaf Spring given Load Formula 🕝

 $\delta_{Leaf} = \frac{3 \cdot W_{load} \cdot L^{3}}{8 \cdot F \cdot P \cdot F^{-1}}$

 $494.702 \, \text{mm} = \frac{3 \cdot 85 \, \text{N} \cdot 4170 \, \text{mm}}{8 \cdot 20000 \, \text{MPa} \cdot 8 \cdot 300 \, \text{mm} \cdot 460 \, \text{mm}}$

Evaluate Formula

Evaluate Formula

Evaluate Formula (

Evaluate Formula

Evaluate Formula

Evaluate Formula C

2.7.6.2) Load given Deflection in Leaf Spring Formula 🕝

$$W_{load} = \frac{8 \cdot \delta_{Leaf} \cdot E \cdot n \cdot b \cdot t^{3}}{3 \cdot L^{3}}$$

Example with Units

 $84.8794_{\text{N}} = \frac{8 \cdot 494_{\text{mm}} \cdot 20000_{\text{MPa}} \cdot 8 \cdot 300_{\text{mm}} \cdot 460_{\text{mm}}}{3 \cdot 4170_{\text{mm}}}^{3}$

2.7.6.3) Modulus of Elasticity in Leaf Spring given Deflection Formula [7]

Example with Units

 $E = \frac{3 \cdot W_{load} \cdot L^{3}}{8 \cdot \delta_{Leaf} \cdot n \cdot b \cdot t^{3}} = \frac{3 \cdot 85 \, \text{N} \cdot 4170 \, \text{mm}^{3}}{8 \cdot 494 \, \text{mm} \cdot 8 \cdot 300 \, \text{mm} \cdot 460 \, \text{mm}^{3}}$

2.7.6.4) Number of plates given Deflection in Leaf Spring Formula C

 $n = \frac{3 \cdot W_{load} \cdot L^{3}}{8 \cdot \delta_{Leaf} \cdot E \cdot b \cdot t^{3}} \left| 8.0114 = \frac{3 \cdot 85 \,\text{N} \cdot 4170 \,\text{mm}^{3}}{8 \cdot 494 \,\text{mm} \cdot 20000 \,\text{MPa} \cdot 300 \,\text{mm} \cdot 460 \,\text{m}} \right|$

2.7.6.5) Thickness given Deflection in Leaf Spring Formula C

Formula

Example with Units

2.7.6.6) Width given Deflection in Leaf Spring Formula C

Example with Units

 $b = \frac{3 \cdot W_{load} \cdot L^{3}}{8 \cdot \delta_{Leaf} \cdot E \cdot n \cdot t^{3}} \left| \quad 300.4263 \, \text{mm} \right| = \frac{3 \cdot 85 \, \text{N} \cdot 4170 \, \text{mm}^{3}}{8 \cdot 494 \, \text{mm} \cdot 20000 \, \text{MPa} \cdot 8 \cdot 460 \, \text{mm}^{3}}$



Variables used in list of Deflection in Spring Formulas above

- **b** Width of Cross Section (Millimeter)
- d Diameter of Spring (Millimeter)
- E Young's Modulus (Megapascal)
- G_{Torsion} Modulus of Rigidity (Gigapascal)
- I Area Moment of Inertia (Meter⁴)
- L Length in Spring (Millimeter)
- M Bending Moment (Kilonewton Meter)
- n Number of Plates
- N Number of Coils
- R Mean Radius (Millimeter)
- t Thickness of Section (Millimeter)
- Wload Spring Load (Newton)
- δ Deflection of Spring (Millimeter)
- δ_{l eaf} Deflection of Leaf Spring (Millimeter)

Constants, Functions, Measurements used in list of Deflection in Spring Formulas above

- 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 Millimeter (mm)
 Length Unit Conversion
- Measurement: Pressure in Gigapascal (GPa)
 Pressure Unit Conversion
- Measurement: Force in Newton (N)
 Force Unit Conversion
- Measurement: Moment of Force in Kilonewton Meter (kN*m)
 Moment of Force Unit Conversion
- Measurement: Second Moment of Area in Meter⁴ (m⁴)
 Second Moment of Area Unit Conversion
- Measurement: Stress in Megapascal (MPa)
 Stress Unit Conversion

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环 Simple fraction 🕝

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