

Important Torsion of Coil Spring Formulas PDF



Formulas
Examples
with Units

List of 11 Important Torsion of Coil Spring Formulas

1) Compressed Length of Coil Spring Formula

Formula

$$L_c = L + G_A$$

Example with Units

$$44.5 \text{ mm} = 42 \text{ mm} + 2.5 \text{ mm}$$

Evaluate Formula 

2) Mean Radius of Spring Coil Formula

Formula

$$R = \frac{D}{P}$$

Example with Units

$$320 \text{ mm} = \frac{3.2 \text{ kN} \cdot \text{m}}{10 \text{ kN}}$$

Evaluate Formula 

3) Mean Radius of Spring Coil given Maximum Shear Stress Induced in Wire Formula

Formula

$$R = \frac{\tau_w \cdot \pi \cdot d^3}{16 \cdot P}$$

Example with Units

$$5.5217 \text{ mm} = \frac{16 \text{ MPa} \cdot 3.1416 \cdot 26 \text{ mm}^3}{16 \cdot 10 \text{ kN}}$$

Evaluate Formula 

4) Mean Radius of Spring Coil of Helical Spring given Stiffness of Spring Formula

Formula

$$R = \left(\frac{G \cdot d^4}{64 \cdot k \cdot N} \right)^{\frac{1}{3}}$$

Example with Units

$$26.703 \text{ mm} = \left(\frac{4 \text{ MPa} \cdot 26 \text{ mm}^4}{64 \cdot 0.75 \text{ kN/m} \cdot 2} \right)^{\frac{1}{3}}$$

Evaluate Formula 

5) Pitch of Coil Spring Formula

Formula

$$p = \frac{L_f}{N_t - 1}$$

Example with Units

$$18.1818 \text{ mm} = \frac{200 \text{ mm}}{12 - 1}$$

Evaluate Formula 

6) Spring Index given Wire Diameter of Inner and Outer Springs Formula

Formula

$$C = \frac{2 \cdot d_1}{d_1 - d_2}$$

Example with Units

$$13 = \frac{2 \cdot 6.5 \text{ mm}}{6.5 \text{ mm} - 5.5 \text{ mm}}$$

Evaluate Formula 

7) Stress Concentration Factor at Inner Fibers of Coil given Spring Index Formula

Formula

$$K_i = \frac{4 \cdot C^2 - C - 1}{4 \cdot C \cdot (C - 1)}$$

Example

$$1.175 = \frac{4 \cdot 5^2 - 5 - 1}{4 \cdot 5 \cdot (5 - 1)}$$

Evaluate Formula 

8) Stress Concentration Factor at Outer Fibers of Coils Formula

Formula

$$K_o = \frac{4 \cdot C^2 + C - 1}{4 \cdot C \cdot (C + 1)}$$

Example

$$0.8667 = \frac{4 \cdot 5^2 + 5 - 1}{4 \cdot 5 \cdot (5 + 1)}$$

Evaluate Formula 

9) Total Axial Gap between Coils of Spring Formula

Formula

$$G_A = (N_t - 1) \cdot G_m$$

Example with Units

$$198 \text{ mm} = (12 - 1) \cdot 18 \text{ mm}$$

Evaluate Formula 

10) Wire Diameter of Inner Spring given Wire Diameter of Outer Spring and Spring Index Formula

Formula

$$d_2 = \left(\frac{C}{C - 2} \right) \cdot d_1$$

Example with Units

$$10.8333 \text{ mm} = \left(\frac{5}{5 - 2} \right) \cdot 6.5 \text{ mm}$$

Evaluate Formula 

11) Wire Diameter of Outer Spring given Wire Diameter of Inner Spring and Spring Index Formula

Formula

$$d_1 = \left(\frac{C}{C - 2} \right) \cdot d_2$$

Example with Units

$$9.1667 \text{ mm} = \left(\frac{5}{5 - 2} \right) \cdot 5.5 \text{ mm}$$







Evaluate Formula 



Variables used in list of Torsion of Coil Spring Formulas above


- **C** Spring Index of Coil Spring
- **d** Diameter of Spring Wire (*Millimeter*)
- **D** Twisting Moments on Shells (*Kilonewton Meter*)
- **d₁** Wire Diameter of Outer Spring (*Millimeter*)
- **d₂** Wire Diameter of Inner Spring (*Millimeter*)
- **G** Modulus of Rigidity of Spring (*Megapascal*)
- **G_A** Total Axial Gap between Coils of Springs (*Millimeter*)
- **G_m** Axial Gap between Adjacent Coils Bearing Max Load (*Millimeter*)
- **k** Stiffness of Helical Spring (*Kilonewton per Meter*)
- **K_i** Stress Concentration Factor at Inner Fibers
- **K_O** Stress Concentration Factor at Outer Fibres
- **L** Solid Length of Spring (*Millimeter*)
- **L_C** Compressed Length of Spring (*Millimeter*)
- **L_f** Free Length of Spring (*Millimeter*)
- **N** Number of Coils
- **N_t** Total Number of Coils
- **p** Pitch of Coil Spring (*Millimeter*)
- **P** Axial Load (*Kilonewton*)
- **R** Mean Radius Spring Coil (*Millimeter*)
- **τ_w** Maximum Shear Stress in Wire (*Megapascal*)

Constants, Functions, Measurements used in list of Torsion of Coil Spring Formulas above


- **constant(s):** pi, 3.14159265358979323846264338327950288
Archimedes' constant
- **Measurement: Length** in Millimeter (mm)
Length Unit Conversion 
- **Measurement: Pressure** in Megapascal (MPa)
Pressure Unit Conversion 
- **Measurement: Force** in Kilonewton (kN)
Force Unit Conversion 
- **Measurement: Surface Tension** in Kilonewton per Meter (kN/m)
Surface Tension Unit Conversion 
- **Measurement: Moment of Force** in Kilonewton Meter (kN*m)
Moment of Force Unit Conversion 
- **Measurement: Stress** in Megapascal (MPa)
Stress Unit Conversion 



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