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Torsion of Coil Spring Formulas

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List of 11 Torsion of Coil Spring Formulas

Torsion of Coil Spring

1) Compressed Length of Coil Spring

Open Calculator

fx $$L_c = L + G_A$$

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

2) Mean Radius of Spring Coil

Open Calculator

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

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

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

Open Calculator

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

ex $$5.521663\text{mm} = \frac{16\text{MPa} \cdot \pi \cdot (26\text{mm})^3}{16 \cdot 10\text{kN}}$$

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

Open Calculator

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

$$26.70304\text{mm} = \left(\frac{4\text{MPa} \cdot (26\text{mm})^4}{64 \cdot 0.75\text{kN/m} \cdot 2} \right)^{\frac{1}{3}}$$

5) Pitch of Coil Spring

Open Calculator

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

$$18.18182\text{mm} = \frac{200\text{mm}}{12 - 1}$$

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

Open Calculator

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

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

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

Open Calculator

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

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

8) Stress Concentration Factor at Outer Fibers of Coils

Open Calculator

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

ex $$0.866667 = \frac{4 \cdot (5)^2 + 5 - 1}{4 \cdot 5 \cdot (5 + 1)}$$

9) Total Axial Gap between Coils of Spring

Open Calculator

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

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

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

Open Calculator

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

ex $$10.83333\text{mm} = \left(\frac{5}{5-2}\right) \cdot 6.5\text{mm}$$

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

Open Calculator

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

ex $$9.166667\text{mm} = \left(\frac{5}{5-2}\right) \cdot 5.5\text{mm}$$

Variables Used

- **C** Spring Index of Coil Spring
- **d** Diameter of Spring Wire *(Millimeter)*
- **D** Twisting Moments on Shells *(Kilonewton Meter)*
- d_1 Wire Diameter of Outer Spring *(Millimeter)*
- d_2 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

- Constant: **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

Check other formula lists

- **Helical Springs Formulas**
- **Torsion of Coil Spring Formulas**
- **Torsion of Leaf Spring Formulas**

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