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Maximum Bending Stress in Spring Formulas

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List of 17 Maximum Bending Stress in Spring Formulas

Maximum Bending Stress in Spring

At Proof Load

1) Deflection given Maximum Bending Stress at Proof Load of Leaf Spring

Open Calculator

fx $$\delta = \frac{f_{\text{proof load}} \cdot L^2}{4 \cdot t \cdot E}$$

ex $$3.402176\text{mm} = \frac{7.2\text{MPa} \cdot (4170\text{mm})^2}{4 \cdot 460\text{mm} \cdot 20000\text{MPa}}$$

2) Length given Maximum Bending Stress at Proof Load of Leaf Spring

Open Calculator

fx $$L = \sqrt{\frac{4 \cdot t \cdot E \cdot \delta}{f_{\text{proof load}}}}$$

ex $$4168.666\text{mm} = \sqrt{\frac{4 \cdot 460\text{mm} \cdot 20000\text{MPa} \cdot 3.4\text{mm}}{7.2\text{MPa}}}$$

3) Maximum Bending Stress at Proof Load of Leaf Spring

Open Calculator

$$f_{\text{proof load}} = \frac{4 \cdot t \cdot E \cdot \delta}{L^2}$$

$$7.195395\text{MPa} = \frac{4 \cdot 460\text{mm} \cdot 20000\text{MPa} \cdot 3.4\text{mm}}{(4170\text{mm})^2}$$

4) Modulus of Elasticity given Maximum Bending Stress at Proof Load of Leaf Spring

Open Calculator

$$E = \frac{f_{\text{proof load}} \cdot L^2}{4 \cdot t \cdot \delta}$$

$$20012.8\text{MPa} = \frac{7.2\text{MPa} \cdot (4170\text{mm})^2}{4 \cdot 460\text{mm} \cdot 3.4\text{mm}}$$

5) Thickness given Maximum Bending Stress at Proof Load of Leaf Spring

Open Calculator

$$t = \frac{f_{\text{proof load}} \cdot L^2}{4 \cdot E \cdot \delta}$$

$$460.2944\text{mm} = \frac{7.2\text{MPa} \cdot (4170\text{mm})^2}{4 \cdot 20000\text{MPa} \cdot 3.4\text{mm}}$$

Leaf Springs

6) Length given Maximum Bending Stress of Leaf Spring

Open Calculator

fx $$L = \frac{2 \cdot f_{\text{leaf spring}} \cdot n \cdot b \cdot t^2}{3 \cdot W_{\text{load}}}$$

ex $$4170.263\text{mm} = \frac{2 \cdot 1047\text{Pa} \cdot 8 \cdot 300\text{mm} \cdot (460\text{mm})^2}{3 \cdot 85\text{N}}$$

7) Load given Maximum Bending Stress of Leaf Spring

Open Calculator

fx $$W_{\text{load}} = \frac{2 \cdot f_{\text{leaf spring}} \cdot n \cdot b \cdot t^2}{3 \cdot L}$$

ex $$85.00535\text{N} = \frac{2 \cdot 1047\text{Pa} \cdot 8 \cdot 300\text{mm} \cdot (460\text{mm})^2}{3 \cdot 4170\text{mm}}$$

8) Maximum Bending Stress of Leaf Spring

Open Calculator

fx $$f_{\text{leaf spring}} = \frac{3 \cdot W_{\text{load}} \cdot L}{2 \cdot n \cdot b \cdot t^2}$$

ex $$1046.934\text{Pa} = \frac{3 \cdot 85\text{N} \cdot 4170\text{mm}}{2 \cdot 8 \cdot 300\text{mm} \cdot (460\text{mm})^2}$$

9) Number of Plates given Maximum Bending Stress of Leaf Spring

Open Calculator

$$n = \frac{3 \cdot W_{load} \cdot L}{2 \cdot f_{leaf\ spring} \cdot b \cdot t^2}$$

$$7.999496 = \frac{3 \cdot 85\text{N} \cdot 4170\text{mm}}{2 \cdot 1047\text{Pa} \cdot 300\text{mm} \cdot (460\text{mm})^2}$$

10) Thickness given Maximum Bending Stress of Leaf Spring

Open Calculator

$$t = \sqrt{\frac{3 \cdot W_{load} \cdot L}{2 \cdot n \cdot b \cdot f_{leaf\ spring}}}$$

$$459.9855\text{mm} = \sqrt{\frac{3 \cdot 85\text{N} \cdot 4170\text{mm}}{2 \cdot 8 \cdot 300\text{mm} \cdot 1047\text{Pa}}}$$

11) Width given Maximum Bending Stress of Leaf Spring

Open Calculator

$$b = \frac{3 \cdot W_{load} \cdot L}{2 \cdot n \cdot f_{leaf\ spring} \cdot t^2}$$

$$299.9811\text{mm} = \frac{3 \cdot 85\text{N} \cdot 4170\text{mm}}{2 \cdot 8 \cdot 1047\text{Pa} \cdot (460\text{mm})^2}$$

Quarter Elliptical Springs

12) Length given Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$L = \frac{f_{elliptical\ spring} \cdot n \cdot b \cdot t^2}{6 \cdot W_{load}}$$

ex $$4170mm = \frac{4187.736Pa \cdot 8 \cdot 300mm \cdot 460mm^2}{6 \cdot 85N}$$

13) Load given Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$W_{load} = \frac{f_{elliptical\ spring} \cdot n \cdot b \cdot t^2}{6 \cdot L}$$

ex $$84.99999N = \frac{4187.736Pa \cdot 8 \cdot 300mm \cdot (460mm)^2}{6 \cdot 4170mm}$$

14) Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$f_{elliptical\ spring} = \frac{6 \cdot W_{load} \cdot L}{n \cdot b \cdot t^2}$$

ex $$4187.736Pa = \frac{6 \cdot 85N \cdot 4170mm}{8 \cdot 300mm \cdot (460mm)^2}$$

15) Number of Plates given Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$n = \frac{6 \cdot W_{load} \cdot L}{f_{elliptical\ spring} \cdot b \cdot t^2}$$

ex $$8.000001 = \frac{6 \cdot 85N \cdot 4170mm}{4187.736Pa \cdot 300mm \cdot (460mm)^2}$$

16) Thickness given Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$t = \sqrt{\frac{6 \cdot W_{load} \cdot L}{n \cdot b \cdot f_{elliptical\ spring}}}$$

ex $$460mm = \sqrt{\frac{6 \cdot 85N \cdot 4170mm}{8 \cdot 300mm \cdot 4187.736Pa}}$$

17) Width given Maximum Bending Stress in Quarter Elliptical Spring

Open Calculator

fx $$b = \frac{6 \cdot W_{load} \cdot L}{n \cdot f_{elliptical\ spring} \cdot t^2}$$

ex $$300mm = \frac{6 \cdot 85N \cdot 4170mm}{8 \cdot 4187.736Pa \cdot (460mm)^2}$$

Variables Used

- **b** Width of Cross Section *(Millimeter)*
- **E** Young's Modulus *(Megapascal)*
- $f_{elliptical\ spring}$ Maximum Bending Stress in Elliptical Spring *(Pascal)*
- $f_{leaf\ spring}$ Maximum Bending Stress in Leaf Spring *(Pascal)*
- $f_{proof\ load}$ Maximum Bending Stress at Proof Load *(Megapascal)*
- **L** Length in Spring *(Millimeter)*
- **n** Number of Plates
- **t** Thickness of Section *(Millimeter)*
- W_{load} Spring Load *(Newton)*
- **δ** Deflection of Spring *(Millimeter)*

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Stress** in Megapascal (MPa), Pascal (Pa)
  Stress Unit Conversion

Check other formula lists

- **Deflection in Spring Formulas**
- **Maximum Bending Stress in Spring Formulas**

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