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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

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

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

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



3) Maximum Bending Stress at Proof Load of Leaf Spring

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

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



Leaf Springs

6) Length given Maximum Bending Stress of Leaf Spring

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

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

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

7) Load given Maximum Bending Stress of Leaf Spring

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

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

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

8) Maximum Bending Stress of Leaf Spring

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

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

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

10) Thickness given Maximum Bending Stress of Leaf Spring

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

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

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

11) Width given Maximum Bending Stress of Leaf Spring

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

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

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



Quarter Elliptical Springs

12) Length given Maximum Bending Stress in Quarter Elliptical Spring

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

[Open Calculator !\[\]\(950a62bbddad88d64435fd35607dfc42_img.jpg\)](#)

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

13) Load given Maximum Bending Stress in Quarter Elliptical Spring

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

[Open Calculator !\[\]\(73002692dd5e7a64e60946be3158e719_img.jpg\)](#)

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

14) Maximum Bending Stress in Quarter Elliptical Spring

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

[Open Calculator !\[\]\(104fbf564e2e5a8fbd84f31656d114c7_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5_img.jpg\)](#)

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

16) Thickness given Maximum Bending Stress in Quarter Elliptical Spring

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

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5_img.jpg\)](#)

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

17) Width given Maximum Bending Stress in Quarter Elliptical Spring

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

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2_img.jpg\)](#)

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






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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