



Shear Stress in Circular Section Formulas

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List of 19 Shear Stress in Circular Section Formulas

Shear Stress in Circular Section 🗗

1) Shear Force in Circular Section

$$\mathbf{F}_{\mathrm{s}} = rac{ au_{\mathrm{beam}} \cdot \mathbf{I} \cdot \mathbf{B}}{rac{2}{3} \cdot \left(\mathbf{R}^2 - \mathbf{y}^2
ight)^{rac{3}{2}}}$$

Open Calculator

$$= \frac{0.875023 \text{kN} = \frac{6 \text{MPa} \cdot 0.00168 \text{m}^4 \cdot 100 \text{mm}}{\frac{2}{3} \cdot \left((1200 \text{mm})^2 - (5 \text{mm})^2 \right)^{\frac{3}{2}} }$$

2) Shear Force using Maximum Shear Stress

$$\mathbf{F}_{\mathrm{s}} = rac{3 \cdot I \cdot au_{\mathrm{max}}}{R^2}$$

Open Calculator

$$ext{ex} 38.5 ext{kN} = rac{3 \cdot 0.00168 ext{m}^4 \cdot 11 ext{MPa}}{\left(1200 ext{mm}
ight)^2}$$



3) Shear Stress Distribution for Circular Section

 $au_{
m max} = rac{{
m F_s} \cdot rac{2}{3} \cdot \left({
m R}^2 - {
m y}^2
ight)^{rac{3}{2}}}{{
m I} \cdot {
m B}}$

Open Calculator

 $= \frac{4.8 \text{kN} \cdot \frac{2}{3} \cdot \left((1200 \text{mm})^2 - (5 \text{mm})^2 \right)^{\frac{3}{2}}}{0.00168 \text{m}^4 \cdot 100 \text{mm}}$

4) Width of Beam at Considered Level given Radius of Circular Section

 $\left| \mathbf{K}
ight| \mathrm{B} = 2 \cdot \sqrt{\mathrm{R}^2 - \mathrm{y}^2}$

 $\mathbf{ex} \ 2399.979 \mathrm{mm} = 2 \cdot \sqrt{\left(1200 \mathrm{mm}\right)^2 - \left(5 \mathrm{mm}\right)^2}$

5) Width of Beam at Considered Level given Shear Stress for Circular Section

 $ext{B} = rac{ ext{F}_{ ext{s}} \cdot rac{2}{3} \cdot \left(ext{R}^2 - ext{y}^2
ight)^{rac{1}{2}}}{ ext{I} \cdot au_{ ext{beam}}}$

Open Calculator

Open Calculator 2



Average Shear Stress

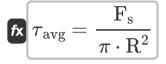
6) Average Shear Force for Circular Section 🛂

fx
$$F_{
m s} = \pi \cdot R^2 \cdot au_{
m avg}$$

Open Calculator 🚰

 $ag{226.1947} ext{kN} = \pi \cdot {(1200 ext{mm})}^2 \cdot 0.05 ext{MPa}$

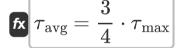
7) Average Shear Stress for Circular Section



Open Calculator

= $0.001061 \mathrm{MPa} = rac{4.8 \mathrm{kN}}{\pi \cdot \left(1200 \mathrm{mm}\right)^2}$

8) Average Shear Stress for Circular Section given Maximum Shear Stress



Open Calculator



Maximum Shear Stress

9) Maximum Shear Force given Radius of Circular Section 🗗

$$\mathbf{F}_{\mathrm{s}} = au_{\mathrm{max}} \cdot rac{3}{4} \cdot \pi \cdot \mathrm{R}^2$$

Open Calculator

 $= 37322.12 \mathrm{kN} = 11 \mathrm{MPa} \cdot \frac{3}{4} \cdot \pi \cdot (1200 \mathrm{mm})^2$

10) Maximum Shear Stress for Circular Section 🖸

 $\left| au_{
m max}
ight| au_{
m max}=rac{F_{
m s}}{3\cdot 1}\cdot {
m R}^2$

Open Calculator

 $= 1.371429 \text{MPa} = \frac{4.8 \text{kN}}{3.0.00168 \text{m}^4} \cdot (1200 \text{mm})^2$

11) Maximum Shear Stress for Circular Section given Average Shear Stress

fx $au_{ ext{max}} = rac{4}{3} \cdot au_{ ext{avg}}$

Open Calculator 2

 $0.066667 \text{MPa} = \frac{4}{3} \cdot 0.05 \text{MPa}$



12) Maximum Shear Stress given Radius of Circular Section 🗗

$$au_{
m beam} = rac{4}{3} \cdot rac{
m F_s}{\pi \cdot
m R^2}$$

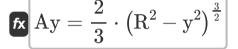
Open Calculator 2

$$oxed{ex} 0.001415 ext{MPa} = rac{4}{3} \cdot rac{4.8 ext{kN}}{\pi \cdot (1200 ext{mm})^2}$$

Moment of Inertia

13) Area Moment of Considered Area about Neutral Axis 🗗

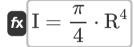




Open Calculator

ex
$$1.2 \text{E}^9 \text{mm}^3 = \frac{2}{3} \cdot \left((1200 \text{mm})^2 - (5 \text{mm})^2 \right)^{\frac{3}{2}}$$

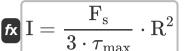
14) Moment of Inertia of Circular Section 🖸



$$oxed{ex} 1.628602 \mathrm{m}^{\scriptscriptstyle 4} = rac{\pi}{4} \cdot \left(1200 \mathrm{mm}
ight)^4$$



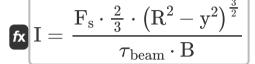
15) Moment of Inertia of Circular Section given Maximum Shear Stress 🗹



Open Calculator 🗗

 $0.000209 \mathrm{m}^{\scriptscriptstyle 4} = rac{4.8 \mathrm{kN}}{3 \cdot 11 \mathrm{MPa}} \cdot (1200 \mathrm{mm})^2$

16) Moment of Inertia of Circular Section given Shear Stress

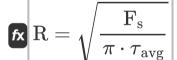


Open Calculator

 $= \frac{4.8 \mathrm{kN} \cdot \frac{2}{3} \cdot \left((1200 \mathrm{mm})^2 - (5 \mathrm{mm})^2 \right)^{\frac{3}{2}} }{6 \mathrm{MPa} \cdot 100 \mathrm{mm} }$

Radius of Circular Section 🗗

17) Radius of Circular Section given Average Shear Stress



Open Calculator

 $\boxed{\texttt{ex}} \ 174.8077 \mathrm{mm} = \sqrt{\frac{4.8 \mathrm{kN}}{\pi \cdot 0.05 \mathrm{MPa}}}$



18) Radius of Circular Section given Maximum Shear Stress



Open Calculator

$$m R = \sqrt{rac{4}{3} \cdot rac{F_s}{\pi \cdot au_{max}}}$$

$$= \sqrt{\frac{4}{3} \cdot \frac{4.8 \mathrm{kN}}{\pi \cdot 11 \mathrm{MPa}} }$$

19) Radius of Circular Section given Width of Beam at Considered Level



$$R = \sqrt{\left(rac{B}{2}
ight)^2 + y^2}$$

 $oxed{ex} 50.24938 \mathrm{mm} = \sqrt{\left(rac{100 \mathrm{mm}}{2}
ight)^2 + \left(5 \mathrm{mm}
ight)^2}$



Variables Used

- Ay First Moment of Area (Cubic Millimeter)
- **B** Width of Beam Section (Millimeter)
- **F**_s Shear Force on Beam (Kilonewton)
- I Moment of Inertia of Area of Section (Meter⁴)
- R Radius of Circular Section (Millimeter)
- **y** Distance from Neutral Axis (Millimeter)
- τ_{avq} Average Shear Stress on Beam (Megapascal)
- τ_{beam} Shear Stress in Beam (Megapascal)
- $\tau_{ extbf{max}}$ Maximum Shear Stress on Beam (Megapascal)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Function: sqrt, sqrt(Number) Square root function
- 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: Second Moment of Area in Meter⁴ (m⁴)
 Second Moment of Area Unit Conversion
- Measurement: First Moment of Area in Cubic Millimeter (mm³)
 First Moment of Area Unit Conversion





Check other formula lists

- Shear Stress in Circular Section Shear Stress in Rectangular Formulas
 - Section Formulas
- Shear Stress in I Section Formulas

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