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Shear Stress in Rectangular Section Formulas

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List of 10 Shear Stress in Rectangular Section Formulas

Shear Stress in Rectangular Section

1) Average Shear Stress for Rectangular Section

Open Calculator

fx $$\tau_{avg} = \frac{V}{b \cdot d}$$

ex $$0.177285\text{MPa} = \frac{4.8\text{kN}}{95\text{mm} \cdot 285\text{mm}}$$

2) Average Shear Stress given Maximum Shear Stress for Rectangular Section

Open Calculator

fx $$\tau_{avg} = \frac{2}{3} \cdot \tau_{max}$$

ex $$7.333333\text{MPa} = \frac{2}{3} \cdot 11\text{MPa}$$

3) Distance of C.G of Area (above Considered Level) from Neutral Axis for Rectangular Section

Open Calculator

fx $$\bar{y} = \frac{1}{2} \cdot \left(\sigma + \frac{d}{2}\right)$$

ex $$73.75\text{mm} = \frac{1}{2} \cdot \left(5\text{mm} + \frac{285\text{mm}}{2}\right)$$

4) Distance of Considered Level from Neutral Axis for Rectangular Section

Open Calculator

fx $$\sigma = 2 \cdot \left(\bar{y} - \frac{d}{4} \right)$$

ex $$21.5\text{mm} = 2 \cdot \left(82\text{mm} - \frac{285\text{mm}}{4} \right)$$

5) Maximum Shear Stress for Rectangular Section

Open Calculator

fx $$\tau_{max} = \frac{3}{2} \cdot \tau_{avg}$$

ex $$0.075\text{MPa} = \frac{3}{2} \cdot 0.05\text{MPa}$$

6) Moment of Inertia of Rectangular Section about Neutral Axis

Open Calculator

fx $$I = \frac{V}{2 \cdot \tau} \cdot \left(\frac{d^2}{4} - \sigma^2 \right)$$

ex $$8.1\text{E}\hat{}\text{-}6\text{m}^4 = \frac{4.8\text{kN}}{2 \cdot 6\text{MPa}} \cdot \left(\frac{(285\text{mm})^2}{4} - (5\text{mm})^2 \right)$$

7) Shear Force for Rectangular Section

Open Calculator

fx $$V = \frac{2 \cdot I \cdot \tau}{\frac{d^2}{4} - \sigma^2}$$

ex $$994.0216\text{kN} = \frac{2 \cdot 0.00168\text{m}^4 \cdot 6\text{MPa}}{\frac{(285\text{mm})^2}{4} - (5\text{mm})^2}$$

8) Shear Force Variation across Neutral Axis for Rectangular Section

Open Calculator

fx $$V = \frac{2}{3} \cdot \tau \cdot b \cdot d$$

ex $$108.3\text{kN} = \frac{2}{3} \cdot 6\text{MPa} \cdot 95\text{mm} \cdot 285\text{mm}$$

9) Shear Stress for Rectangular Section

Open Calculator

fx $$\tau = \frac{V}{2 \cdot I} \cdot \left(\frac{d^2}{4} - \sigma^2 \right)$$

ex $$0.028973\text{MPa} = \frac{4.8\text{kN}}{2 \cdot 0.00168\text{m}^4} \cdot \left(\frac{(285\text{mm})^2}{4} - (5\text{mm})^2 \right)$$

10) Shear Stress Variation across Neutral Axis for Rectangular Section

Open Calculator

fx $$\tau = \frac{3}{2} \cdot \frac{V}{b \cdot d}$$

ex $$0.265928\text{MPa} = \frac{3}{2} \cdot \frac{4.8\text{kN}}{95\text{mm} \cdot 285\text{mm}}$$

Variables Used

- **b** Beam Width at Considered Level *(Millimeter)*
- **d** Depth of Rectangular Section *(Millimeter)*
- **I** Moment of Inertia of Area of Section *(Meter⁴)*
- **V** Shear Force on Beam *(Kilonewton)*
- **$\bar{y}$** Distance to CG of Area from NA *(Millimeter)*
- **σ** Distance from Neutral Axis *(Millimeter)*
- τ Shear Stress in Beam *(Megapascal)*
- τ_{avg} Average Shear Stress on Beam *(Megapascal)*
- τ_{max} Maximum Shear Stress on Beam *(Megapascal)*

Constants, Functions, Measurements used

- 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

Check other formula lists

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

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