

Important Shear Stress in Rectangular Section Formulas PDF



Formulas
Examples
with Units

List of 10 Important Shear Stress in Rectangular Section Formulas

1) Average Shear Stress for Rectangular Section Formula ↗

Formula

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

Example with Units

$$0.1773 \text{ MPa} = \frac{4.8 \text{ kN}}{95 \text{ mm} \cdot 285 \text{ mm}}$$

Evaluate Formula ↗

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

Formula

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

Example with Units

$$7.3333 \text{ MPa} = \frac{2}{3} \cdot 11 \text{ MPa}$$

Evaluate Formula ↗

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

Formula

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

Example with Units

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

Evaluate Formula ↗

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

Formula

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

Example with Units

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

Evaluate Formula ↗

5) Maximum Shear Stress for Rectangular Section Formula ↗

Formula

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

Example with Units

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

Evaluate Formula ↗

6) Moment of Inertia of Rectangular Section about Neutral Axis Formula ↗

Formula

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

Example with Units

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

Evaluate Formula ↗



7) Shear Force for Rectangular Section Formula

Formula

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

Example with Units

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

Evaluate Formula 

8) Shear Force Variation across Neutral Axis for Rectangular Section Formula

Formula

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

Example with Units

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

Evaluate Formula 

9) Shear Stress for Rectangular Section Formula

Formula

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

Example with Units

$$0.029 \text{ MPa} = \frac{4.8 \text{ kN}}{2 \cdot 0.00168 \text{ m}^4} \cdot \left(\frac{285 \text{ mm}^2}{4} - 5 \text{ mm}^2 \right)$$

Evaluate Formula 

10) Shear Stress Variation across Neutral Axis for Rectangular Section Formula

Formula

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

Example with Units

$$0.2659 \text{ MPa} = \frac{3}{2} \cdot \frac{4.8 \text{ kN}}{95 \text{ mm} \cdot 285 \text{ mm}}$$

Evaluate Formula 



Variables used in list of Shear Stress in Rectangular Section Formulas above

- **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 in list of Shear Stress in Rectangular Section Formulas above

- **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* 



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