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Types of Stresses Formulas

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List of 14 Types of Stresses Formulas

Types of Stresses

1) Axial Push Acting on Body given Compressive Stress

$$fx \quad P_{axial} = \sigma_c \cdot A$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$ex \quad 9.9968kN = 0.1562MPa \cdot 64000mm^2$$

2) Compressive Strain on Body

$$fx \quad \epsilon_{compressive} = \frac{\Delta L}{L_0}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$ex \quad 0.1 = \frac{500mm}{5000mm}$$

3) Compressive Stress given Axial Push Acting on Body

$$fx \quad \sigma_c = \frac{P_{axial}}{A}$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$ex \quad 0.15625MPa = \frac{10kN}{64000mm^2}$$



4) Compressive Stress given Resisting Force

$$fx \quad \sigma_c = \frac{F_{\text{resistance}}}{A}$$

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

$$ex \quad 0.15\text{MPa} = \frac{9.6\text{kN}}{64000\text{mm}^2}$$

5) Resisting Force given Compressive Stress

$$fx \quad F_{\text{resistance}} = \sigma_c \cdot A$$

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

$$ex \quad 9.9968\text{kN} = 0.1562\text{MPa} \cdot 64000\text{mm}^2$$

6) Resisting Force given Tensile Stress

$$fx \quad F_{\text{resistance}} = \sigma_t \cdot A$$

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

$$ex \quad 9.6\text{kN} = 0.15\text{MPa} \cdot 64000\text{mm}^2$$

7) Shear Resistance given Shear Stress

$$fx \quad R_{\text{shear}} = \tau \cdot A_{\text{shear}}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 1.6\text{kN} = 200\text{MPa} \cdot 8\text{mm}^2$$

8) Shear Strain given Transversal Displacement

$$fx \quad \eta = \frac{x}{H_{\text{body}}}$$

[Open Calculator !\[\]\(aff7c69c44a5e015f18c35867ef3f5c3_img.jpg\)](#)

$$ex \quad 24 = \frac{38400\text{mm}}{1600\text{mm}}$$



9) Shear Stress given Shear Resistance

$$fx \quad \tau = \frac{R_{\text{shear}}}{A_{\text{shear}}}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 200MPa = \frac{1.6kN}{8mm^2}$$

10) Tensile Load given Tensile Stress

$$fx \quad P_{\text{load}} = \sigma_t \cdot A$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$ex \quad 9.6kN = 0.15MPa \cdot 64000mm^2$$

11) Tensile Strain on Body

$$fx \quad \epsilon_{\text{tensile}} = \frac{\Delta L_{\text{Bar}}}{L_0}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 0.45 = \frac{2250mm}{5000mm}$$

12) Tensile Stress given Resisting Force

$$fx \quad \sigma_t = \frac{F_{\text{resistance}}}{A}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 0.15MPa = \frac{9.6kN}{64000mm^2}$$



13) Tensile Stress given Tensile Load

$$\text{fx } \sigma_t = \frac{P_{\text{load}}}{A}$$

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

$$\text{ex } 0.150156\text{MPa} = \frac{9.61\text{kN}}{64000\text{mm}^2}$$

14) Transversal Displacement given Shear Strain

$$\text{fx } x = \eta \cdot H_{\text{body}}$$

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

$$\text{ex } 38400\text{mm} = 24 \cdot 1600\text{mm}$$








Variables Used

- **A** Cross Sectional Area of Bar (Square Millimeter)
- **A_{shear}** Shear Area (Square Millimeter)
- **F_{resistance}** Resistance Force (Kilonewton)
- **H_{body}** Height Of Body (Millimeter)
- **L₀** Original Length (Millimeter)
- **P_{axial}** Axial Push (Kilonewton)
- **P_{load}** Tensile Load (Kilonewton)
- **R_{shear}** Shear Resistance (Kilonewton)
- **x** Transverse Displacement (Millimeter)
- **ΔL** Decrease in Length (Millimeter)
- **ΔL_{Bar}** Increase in Bar Length (Millimeter)
- **ε_{compressive}** Compressive Strain
- **ε_{tensile}** Tensile Strain
- **σ_c** Compressive Stress on Body (Megapascal)
- **σ_t** Tensile Stress on Body (Megapascal)
- **η** Shear Strain
- **τ** Shear Stress in body (Megapascal)











Constants, Functions, Measurements used

- **Measurement: Length** in Millimeter (mm)
Length Unit Conversion 
- **Measurement: Area** in Square Millimeter (mm²)
Area Unit Conversion 
- **Measurement: Pressure** in Megapascal (MPa)
Pressure Unit Conversion 
- **Measurement: Force** in Kilonewton (kN)
Force Unit Conversion 
- **Measurement: Stress** in Megapascal (MPa)
Stress Unit Conversion 



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- [Elastic Constants Formulas](#) 
- [Mohr's Circle Formulas](#) 
- [Principal Stresses and Strains Formulas](#) 
- [Relationship between Stress and Strain Formulas](#) 
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