



# Singly Reinforced Sections Formulas

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# List of 12 Singly Reinforced Sections Formulas

# Singly Reinforced Sections 🕑

### Singly Reinforced Flanged Sections C

1) Moment Resistance of Concrete given Flange Thickness 🖸

fx 
$$\mathbf{M}_{\mathrm{c}} = rac{1}{2} \cdot \mathrm{f_{c}} \cdot \mathrm{W_{b}} \cdot \mathrm{t_{f}} \cdot \left(\mathrm{d_{eff}} - \left(rac{\mathrm{t_{f}}}{2}
ight)
ight)$$

Open Calculator 🕑

$$\boxed{53.06173 \text{kN*m} = \frac{1}{2} \cdot 15 \text{MPa} \cdot 18 \text{mm} \cdot 99.5 \text{mm} \cdot \left(4\text{m} - \left(\frac{99.5 \text{mm}}{2}\right)\right)}$$

#### 2) Moment Resistance of Steel

fx 
$$\mathbf{M}_{\mathrm{s}} = (\mathrm{T} \cdot \mathbf{r} \cdot \mathbf{d}_{\mathrm{eff}}) + (\mathrm{A} \cdot \mathbf{f}_{\mathrm{TS}} \cdot \mathbf{r} \cdot \mathbf{d}_{\mathrm{eff}})$$

Open Calculator

 $99.12568 \mathrm{kN*m} = (100.01 \mathrm{N} \cdot 10.1 \cdot 4 \mathrm{m}) + (10 \mathrm{m}^2 \cdot 24 \mathrm{kgf} / \mathrm{m}^2 \cdot 10.1 \cdot 4 \mathrm{m})$ 

#### 3) Total Compressive Force given Area and Tensile Steel Stress 🖒

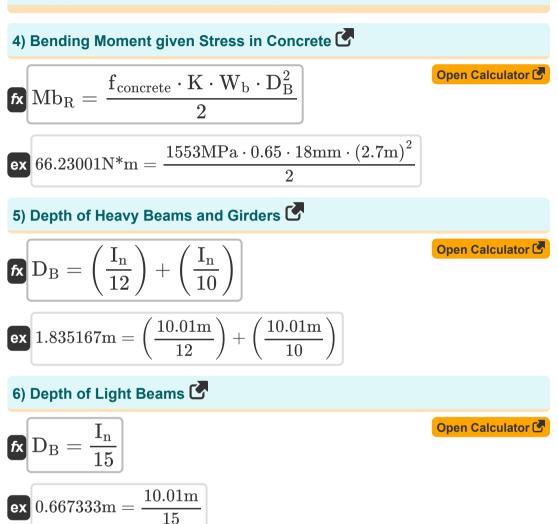
fx 
$$C = A \cdot f_{TS}$$
  
ex  $240 kN = 10 m^2 \cdot 24 kgf/m^2$ 



ex

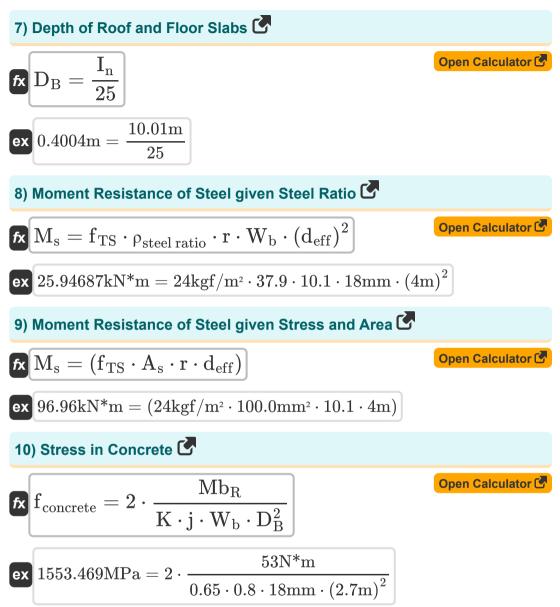
ex

### Singly Reinforced Rectangular Sections 🕑



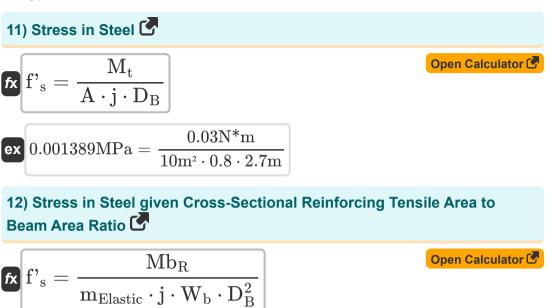












ex 841.4622MPa = 
$$\frac{53\text{N*m}}{0.6 \cdot 0.8 \cdot 18\text{mm} \cdot (2.7\text{m})^2}$$



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# Variables Used

- **A** Area of Tension Reinforcement (Square Meter)
- As Area of Steel required (Square Millimeter)
- C Total Compressive Force (Kilonewton)
- **D**<sub>B</sub> Depth of Beam (Meter)
- deff Effective Depth of Beam (Meter)
- **f**<sub>c</sub> 28 Day Compressive Strength of Concrete (Megapascal)
- fconcrete Stress in Concrete (Megapascal)
- **f**'s Stress in Compressive Steel (Megapascal)
- **f<sub>TS</sub>** Tensile Stress in Steel (Kilogram-Force per Square Meter)
- In Length of Span (Meter)
- j Constant j
- K Constant k
- M<sub>c</sub> Moment Resistance of Concrete (Kilonewton Meter)
- mElastic Modular Ratio for Elastic Shortening
- M<sub>s</sub> Moment Resistance of Steel (Kilonewton Meter)
- M<sub>t</sub> Moment in Structures (Newton Meter)
- Mb<sub>R</sub> Bending Moment (Newton Meter)
- r Ratio of Distance between Centroids
- **T** Total Tension (Newton)
- t<sub>f</sub> Flange Thickness (Millimeter)
- W<sub>b</sub> Width of Beam (Millimeter)



• Psteel ratio Steel Ratio



## **Constants, Functions, Measurements used**

- Measurement: Length in Millimeter (mm), Meter (m) Length Unit Conversion
- Measurement: Area in Square Meter (m<sup>2</sup>), Square Millimeter (mm<sup>2</sup>) Area Unit Conversion
- Measurement: Pressure in Kilogram-Force per Square Meter (kgf/m<sup>2</sup>), Megapascal (MPa)
   Pressure Unit Conversion
- Measurement: Energy in Newton Meter (N\*m)
   Energy Unit Conversion
- Measurement: Force in Newton (N), Kilonewton (kN) Force Unit Conversion
- Measurement: Torque in Kilonewton Meter (kN\*m) Torque Unit Conversion
- Measurement: Moment of Force in Newton Meter (N\*m) Moment of Force Unit Conversion
- Measurement: Stress in Megapascal (MPa) Stress Unit Conversion



### **Check other formula lists**

Doubly Reinforced Rectangular
 Singly Reinforced Sections
 Sections Formulas 
 Formulas

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