



Base and Bearing Plates Formulas

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Examples!

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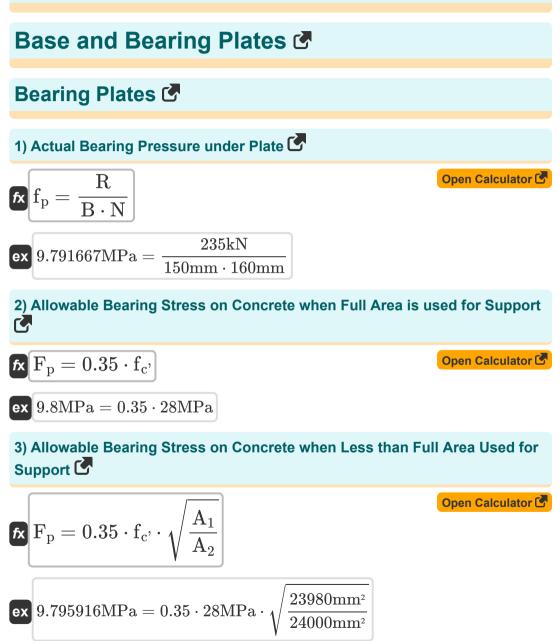
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List of 20 Base and Bearing Plates Formulas





4) Allowable Bending Stress given Plate Thickness 🚰

$$f_{R} = F_{b} = \left(\frac{\left(\left(\frac{1}{2}\right) \cdot B - k\right) \cdot \sqrt{3 \cdot f_{p}}}{t}\right)^{2}$$

$$f_{R} = \left(\frac{\left(\left(\frac{1}{2}\right) \cdot 150 \text{mm} - 70 \text{mm}\right) \cdot \sqrt{3 \cdot 10 \text{MPa}}}{16 \text{mm}}\right)^{2}$$

$$f_{R} = \frac{1}{2.929687 \text{MPa}} = \left(\frac{\left(\left(\frac{1}{2}\right) \cdot 150 \text{mm} - 70 \text{mm}\right) \cdot \sqrt{3 \cdot 10 \text{MPa}}}{16 \text{mm}}\right)^{2}$$

$$f_{R} = f_{p} \cdot B \cdot N$$

$$f_{R} = A_{1} \cdot 0.35 \cdot f_{c'}$$

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$$f_{R} = \frac{R}{0.35 \cdot f_{c'}}$$





8) Bearing Plate Area for Less than Full Concrete Area 🕑

$$\mathbf{K} \mathbf{A}_{1} = \left(\frac{\mathbf{R}}{0.35 \cdot \mathbf{f}_{c^{2}} \cdot \sqrt{\mathbf{A}_{2}}}\right)^{2}$$

$$\mathbf{E} \mathbf{X} 23959.2 \text{mm}^{2} = \left(\frac{235 \text{kN}}{0.35 \cdot 28 \text{MPa} \cdot \sqrt{24000 \text{mm}^{2}}}\right)^{2}$$

9) Minimum Bearing Length of Plate using Actual Bearing Pressure 🕑

fx
$$N = \frac{R}{B \cdot f_p}$$
 Open Calculator C

$$\begin{array}{l} \textbf{ex} \ 156.6667 \text{mm} = \frac{235 \text{kN}}{150 \text{mm} \cdot 10 \text{MPa}} \end{array}$$

10) Minimum Width of Plate given Plate Thickness 子

fx
$$B = 2 \cdot t \cdot \sqrt{rac{F_b}{3 \cdot f_p}} + 2 \cdot k$$

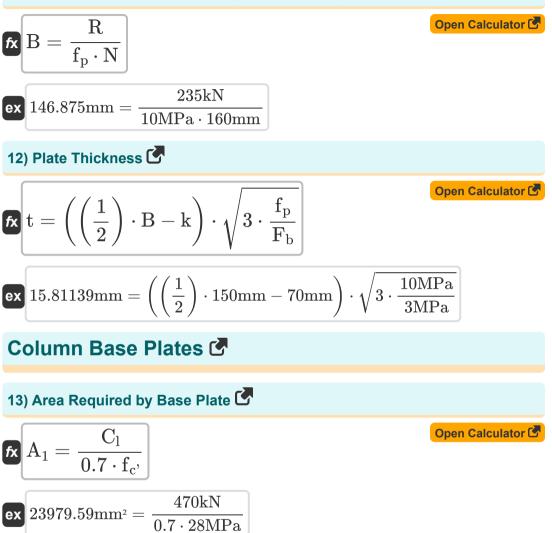
ex
$$150.1193 \mathrm{mm} = 2 \cdot 16 \mathrm{mm} \cdot \sqrt{\frac{3 \mathrm{MPa}}{3 \cdot 10 \mathrm{MPa}}} + 2 \cdot 70 \mathrm{mm}$$





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11) Minimum Width of Plate using Actual Bearing Pressure 🕻





14) Bearing Pressure given Plate Thickness 🕑

$$f_{p} = \left(\frac{t}{2 \cdot p}\right)^{2} \cdot F_{y}$$

$$f_{p} = \left(\frac{t}{2 \cdot p}\right)^{2} \cdot F_{y}$$

$$f_{p} = \left(\frac{16mm}{2 \cdot 40mm}\right)^{2} \cdot 250MPa$$

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$$f_{p} = \left(\frac{N - \left(\sqrt{A_{1}}\right) + (0.80 \cdot B\right)}{0.95}\right)$$

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$$f_{p} = \left(\frac{N - \left(\sqrt{A_{1}}\right) + (0.80 \cdot B\right)}{0.95}\right)$$

$$f_{p} = \left(\frac{160mm - \left(\sqrt{23980mm^{2}}\right) + (0.80 \cdot 150mm)}{0.95}\right)$$

$$f_{p} = \left(\frac{0.95 \cdot d - \frac{N - \sqrt{A_{1}}}{0.5}}{0.80}\right)$$

$$f_{p} = \left(\frac{0.95 \cdot d - \frac{N - \sqrt{A_{1}}}{0.5}}{0.80}\right)$$

$$f_{p} = \left(\frac{153.3869mm}{0.95 \cdot 140mm - \frac{160mm - \sqrt{23980mm^{2}}}{0.80}\right)$$

$$f_{p} = \left(\frac{153.3869mm}{0.95 \cdot 140mm - \frac{160mm - \sqrt{23980mm^{2}}}{0.80}\right)$$

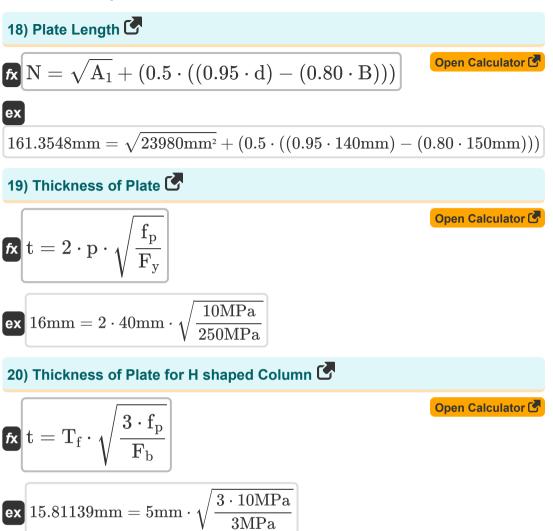
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Variables Used

- **A₁** Area required by Bearing Plate (Square Millimeter)
- A₂ Full Cross Sectional Area of Concrete Support (Square Millimeter)
- **B** Width of Plate (Millimeter)
- CI Column Load (Kilonewton)
- **d** Column Depth (*Millimeter*)
- Fb Allowable Bending Stress (Megapascal)
- **f**_C · Specified Compressive Strength of Concrete (*Megapascal*)
- **f**p Actual Bearing Pressure (Megapascal)
- F_p Allowable Bearing Stress (Megapascal)
- **F**_v Yield Stress of Steel (*Megapascal*)
- k Distance from Beam Bottom to Web Fillet (Millimeter)
- N Bearing or Plate Length (Millimeter)
- **p** Limiting Size (*Millimeter*)
- R Concentrated Load of Reaction (Kilonewton)
- **t** Minimum Plate Thickness (Millimeter)
- T_f Flange Thickness of H Shaped Columns (Millimeter)





Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number) A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- 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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 Formulas

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