calculatoratoz.com

unitsconverters.com

Base and Bearing Plates Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

Please leave your feedback here...

List of 20 Base and Bearing Plates Formulas

Base and Bearing Plates

Bearing Plates

1) Actual Bearing Pressure under Plate

Open Calculator

$$f_p = \frac{R}{B \cdot N}$$

$$9.791667\text{MPa} = \frac{235\text{kN}}{150\text{mm} \cdot 160\text{mm}}$$

2) Allowable Bearing Stress on Concrete when Full Area is used for Support

Open Calculator

$$F_p = 0.35 \cdot f_{c'}$$

$$9.8\text{MPa} = 0.35 \cdot 28\text{MPa}$$

3) Allowable Bearing Stress on Concrete when Less than Full Area Used for Support

Open Calculator

$$F_p = 0.35 \cdot f_{c'} \cdot \sqrt{\frac{A_1}{A_2}}$$

$$9.795916\text{MPa} = 0.35 \cdot 28\text{MPa} \cdot \sqrt{\frac{23980\text{mm}^2}{24000\text{mm}^2}}$$

4) Allowable Bending Stress given Plate Thickness

Open Calculator

fx $$F_b = \left(\frac{\left(\left(\frac{1}{2}\right) \cdot B - k\right) \cdot \sqrt{3 \cdot f_p}}{t} \right)^2$$

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

5) Beam Reaction given Actual Bearing Pressure

Open Calculator

fx $$R = f_p \cdot B \cdot N$$

ex $$240\text{kN} = 10\text{MPa} \cdot 150\text{mm} \cdot 160\text{mm}$$

6) Beam Reaction given Area Required by Bearing Plate

Open Calculator

fx $$R = A_1 \cdot 0.35 \cdot f_{c'}$$

ex $$235.004\text{kN} = 23980\text{mm}^2 \cdot 0.35 \cdot 28\text{MPa}$$

7) Bearing Plate Area for Full Concrete Area Support

Open Calculator

fx $$A_1 = \frac{R}{0.35 \cdot f_{c'}}$$

ex $$23979.59\text{mm}^2 = \frac{235\text{kN}}{0.35 \cdot 28\text{MPa}}$$

8) Bearing Plate Area for Less than Full Concrete Area

Open Calculator

fx $$A_1 = \left(\frac{R}{0.35 \cdot f_{c'} \cdot \sqrt{A_2}} \right)^2$$

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

9) Minimum Bearing Length of Plate using Actual Bearing Pressure

Open Calculator

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

ex $$156.6667\text{mm} = \frac{235\text{kN}}{150\text{mm} \cdot 10\text{MPa}}$$

10) Minimum Width of Plate given Plate Thickness

Open Calculator

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

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

11) Minimum Width of Plate using Actual Bearing Pressure

Open Calculator

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

ex $$146.875\text{mm} = \frac{235\text{kN}}{10\text{MPa} \cdot 160\text{mm}}$$

12) Plate Thickness

Open Calculator

fx $$t = \left(\left(\frac{1}{2}\right) \cdot B - k\right) \cdot \sqrt{3 \cdot \frac{f_p}{F_b}}$$

ex $$15.81139\text{mm} = \left(\left(\frac{1}{2}\right) \cdot 150\text{mm} - 70\text{mm}\right) \cdot \sqrt{3 \cdot \frac{10\text{MPa}}{3\text{MPa}}}$$

Column Base Plates

13) Area Required by Base Plate

Open Calculator

fx $$A_1 = \frac{C_l}{0.7 \cdot f_{c'}}$$

ex $$23979.59\text{mm}^2 = \frac{470\text{kN}}{0.7 \cdot 28\text{MPa}}$$

14) Bearing Pressure given Plate Thickness

Open Calculator

$$f_p = \left(\frac{t}{2 \cdot p}\right)^2 \cdot F_y$$

$$10\text{MPa} = \left(\frac{16\text{mm}}{2 \cdot 40\text{mm}}\right)^2 \cdot 250\text{MPa}$$

15) Column Depth using Plate Length

Open Calculator

$$d = \frac{N - \left(\sqrt{A_1}\right) + (0.80 \cdot B)}{0.95}$$

$$131.7318\text{mm} = \frac{160\text{mm} - \left(\sqrt{23980\text{mm}^2}\right) + (0.80 \cdot 150\text{mm})}{0.95}$$

16) Column Flange Width given Plate Length

Open Calculator

$$B = \frac{0.95 \cdot d - \frac{N - \sqrt{A_1}}{0.5}}{0.80}$$

$$153.3869\text{mm} = \frac{0.95 \cdot 140\text{mm} - \frac{160\text{mm} - \sqrt{23980\text{mm}^2}}{0.5}}{0.80}$$

17) Column Load for given Base Plate Area

Open Calculator

$$C_l = A_1 \cdot 0.7 \cdot f_{c'}$$

$$470.008\text{kN} = 23980\text{mm}^2 \cdot 0.7 \cdot 28\text{MPa}$$

18) Plate Length

Open Calculator

$$N = \sqrt{A_1} + (0.5 \cdot ((0.95 \cdot d) - (0.80 \cdot B)))$$

ex

$$161.3548\text{mm} = \sqrt{23980\text{mm}^2} + (0.5 \cdot ((0.95 \cdot 140\text{mm}) - (0.80 \cdot 150\text{mm})))$$

19) Thickness of Plate

Open Calculator

$$t = 2 \cdot p \cdot \sqrt{\frac{f_p}{F_y}}$$

ex

$$16\text{mm} = 2 \cdot 40\text{mm} \cdot \sqrt{\frac{10\text{MPa}}{250\text{MPa}}}$$

20) Thickness of Plate for H shaped Column

Open Calculator

$$t = T_f \cdot \sqrt{\frac{3 \cdot f_p}{F_b}}$$

ex

$$15.81139\text{mm} = 5\text{mm} \cdot \sqrt{\frac{3 \cdot 10\text{MPa}}{3\text{MPa}}}$$

Variables Used

- A_1 Area required by Bearing Plate *(Square Millimeter)*
- A_2 Full Cross Sectional Area of Concrete Support *(Square Millimeter)*
- **B** Width of Plate *(Millimeter)*
- C_l Column Load *(Kilonewton)*
- **d** Column Depth *(Millimeter)*
- F_b 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_y 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

Check other formula lists

- **Allowable-Stress Design Formulas**
- **Base and Bearing Plates Formulas**
- **Cold Formed or Light Weighted Steel Structures Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

3/5/2024 | 4:57:19 AM UTC

Please leave your feedback here...