



Economical Structural Steel 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 26 Economical Structural Steel Formulas

Economical Structural Steel





Economical Structural Steel Formulas... 3/13 4) Material Price p1 given Material Cost Ratio 🖸 Open Calculator fx $\mathrm{P}_1 = rac{\mathrm{A}_2 \cdot \mathrm{P}_2}{\mathrm{C2}_{/\mathrm{C1}} \cdot \mathrm{A}_1}$ ex $33.29264 = \frac{720000 \text{mm}^2 \cdot 25}{0.9011 \cdot 600000 \text{mm}^2}$ 5) Material Price p1 using Relative Material Cost Ratio 💪 Open Calculator $\mathbf{F}_1 = rac{\left(rac{\mathbf{F}_{y1}}{\mathbf{F}_{y2}} ight)\cdot\mathbf{P}_2}{\mathrm{C2}_{/\mathrm{C1}}}$ $\begin{array}{c|c} \textbf{ex} & 23.0829 = \hline & \left(\frac{104 \text{N/m}^2}{125 \text{N/m}^2} \right) \cdot 25 \\ \hline \end{array}$ 0.90116) Material Price p2 given Material Cost Ratio 🕻 Open Calculator fx $\mathbf{P}_2 = rac{\mathrm{C2}_{/\mathrm{C1}}\cdot\mathbf{P}_1\cdot\mathbf{A}_1}{\mathbf{A}_2}$ ex $19.52383 = \frac{0.9011 \cdot 26 \cdot 600000 \text{mm}^2}{720000 \text{mm}^2}$





7) Material Price p2 using Relative Material Cost Ratio 🕑



fx
$$C2_{/C1} = \left(\frac{P_2}{P_1}\right) \cdot \left(\frac{F_{y1}}{F_{y2}}\right)^{\frac{1}{2}}$$

ex $0.877058 = \left(\frac{25}{26}\right) \cdot \left(\frac{104N/m^2}{125N/m^2}\right)^{\frac{1}{2}}$

9) Relative Cost given Yield Stress

fx
$$C2_{/C1} = \left(\frac{P_2}{P_1}\right) \cdot \left(\frac{F_{y1}}{F_{y2}}\right)^{\frac{2}{3}}$$

ex $0.850581 = \left(\frac{25}{26}\right) \cdot \left(\frac{104N/m^2}{125N/m^2}\right)^{\frac{2}{3}}$

Open Calculator











Open Calculator

13) Yield Stress Fy1 given Relative Cost 子

fx
$$\mathbf{F}_{y1} = \left(\mathbf{C2}_{/\mathrm{C1}} \cdot \frac{\mathbf{P}_1}{\mathbf{P}_2}\right)^{\frac{3}{2}} \cdot \mathbf{F}_{y2}$$

ex $113.4017\mathrm{N/m^2} = \left(0.9011 \cdot \frac{26}{25}\right)^{\frac{3}{2}} \cdot 125\mathrm{N/m^2}$

14) Yield Stress Fy1 given Relative Cost for Designing Fabricated Plate Girders

fx
$$\mathbf{F}_{\mathrm{y1}} = \left(\mathrm{C2}_{/\mathrm{C1}}\cdot rac{\mathrm{P}_1}{\mathrm{P}_2}
ight)^2 \cdot (\mathrm{F}_{\mathrm{y2}})$$

ex
$$109.7799 \mathrm{N/m^2} = \left(0.9011 \cdot \frac{26}{25}\right)^2 \cdot (125 \mathrm{N/m^2})$$

15) Yield Stress Fy1 given Relative Weight 子

fx
$$\mathrm{F}_{\mathrm{y1}} = \left(\mathrm{W2}_{/\mathrm{W1}}
ight)^{rac{3}{2}}\cdot(\mathrm{F}_{\mathrm{y2}})$$

Open Calculator 🕑

Open Calculator

Open Calculator

x
$$106.3713$$
N/m² = $(0.898)^{\frac{3}{2}} \cdot (125$ N/m²)

16) Yield Stress Fy1 given Relative Weight for Designing Fabricated Plate Girders

fx
$$\mathrm{F_{y1}} = \left(\mathrm{W2}_{/\mathrm{W1}}
ight)^2 \cdot \mathrm{F_{y2}}$$

$$\times 100.8005 \mathrm{N/m^2} = (0.898)^2 \cdot 125 \mathrm{N/m^2}$$

6

е



17) Yield Stress Fy2 given Relative Cost 🕻

$$\label{eq:Fy2} \mbox{fx} F_{y2} = \frac{F_{y1}}{\left(\frac{P_1}{P_2} \cdot C2_{/C1}\right)^{\frac{3}{2}}}$$

$$\mbox{fx} 114.6367 N/m^2 = \frac{104 N/m^2}{\left(\frac{26}{25} \cdot 0.9011\right)^{\frac{3}{2}}}$$

18) Yield Stress Fy2 given Relative Cost for Designing Fabricated Plate Girders







20) Yield Stress Fy2 given Relative Weight for Designing Fabricated Plate Girders

fx
$$F_{y2} = \frac{F_{y1}}{W2^2_{/W1}}$$
 Open Calculator C
ex $128.9676N/m^2 = \frac{104N/m^2}{(0.898)^2}$

21) Yield Stress of Steel1 using Relative Material Cost Ratio 🖆



$$110.9755 \text{N/m}^2 = \frac{104 \text{N/m}^2 \cdot 23}{0.9011 \cdot 26}$$



9/13

Open Calculator

Columns 🕑

23) Column Buckling Stress Fc1 given Relative Material Cost 🕑

fx
$$\mathbf{Fc}_1 = \mathrm{C2}_{/\mathrm{C1}} \cdot \left(rac{\mathrm{P}_1}{\mathrm{P}_2}
ight) \cdot \mathrm{F}_{\mathrm{c2}}$$

ex
$$1405.716 \mathrm{N/m^2} = 0.9011 \cdot \left(\frac{26}{25}\right) \cdot 1500 \mathrm{N/m^2}$$

24) Column Buckling Stress Fc2 given Relative Material Cost



Same Load

fx
$$C2_{/C1} = \left(\frac{Fc_1}{F_{c2}}\right) \cdot \left(\frac{P_2}{P_1}\right)$$

ex $0.8 = \left(\frac{1248N/m^2}{1500N/m^2}\right) \cdot \left(\frac{25}{26}\right)$





26) Relative Price Factors using Relative Material Cost Ratio and Column Buckling Stress

fx
$$P2_{/P1} = C2_{/C1} \cdot \left(rac{F_{c2}}{Fc_1}
ight)$$
 ex $1.083053 = 0.9011 \cdot \left(rac{1500 N/m^2}{1248 N/m^2}
ight)$

Open Calculator 🕑





Variables Used

- A1 Cross-Sectional Area of Material 1 (Square Millimeter)
- A2 Cross-Sectional Area of Material 2 (Square Millimeter)
- C2/C1 Relative Cost
- **F_{c2}** Column Bulking Stress2 (Newton per Square Meter)
- F_{v1} Yield Stress 1 (Newton per Square Meter)
- **F_{v2}** Yield Stress 2 (Newton per Square Meter)
- Fc1 Column Bulking Stress1 (Newton per Square Meter)
- P₁ Material Cost p1
- P2 Material Cost p2
- P2/P1 Relative Price Factors
- W2/W1 Relative Weight





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: Area in Square Millimeter (mm²) Area Unit Conversion
- Measurement: Pressure in Newton per Square Meter (N/m²) Pressure Unit Conversion



Check other formula lists

- Allowable-Stress Design
 Formulas
- Base and Bearing Plates
 Formulas
- Cold Formed or Light Weighted Steel Structures Formulas
- Composite Construction in Buildings Formulas

- Design of Stiffeners under Loads
 Formulas
- Economical Structural Steel
 Formulas
- Webs under Concentrated Loads
 Formulas

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

3/21/2024 | 8:19:02 AM UTC

Please leave your feedback here...



