



Joint Analysis Formulas

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Examples!

Conversions!

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List of 8 Joint Analysis Formulas

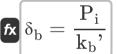
Joint Analysis 🗗

1) Amount of Compression in Parts Joined by Bolt 6

$$\delta_{
m c} = rac{{
m P_i}}{{
m k}}$$

= $11 \text{mm} = \frac{16500 \text{N}}{1500 \text{N/mm}}$

2) Elongation of Bolt under Action of Pre Load 🛂



 $oxed{ex} 0.05205 \mathrm{mm} = rac{16500 \mathrm{N}}{3.17 \mathrm{E} \hat{\ } 5 \mathrm{N/mm}}$



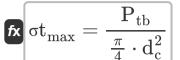
$$\mathbf{f_s} = rac{\pi}{4} \cdot \mathrm{d_c^2} \cdot rac{\mathrm{S_{yt}}}{\mathrm{P_{tb}}}$$

 $\mathbf{ex} \ 3.00574 = rac{\pi}{4} \cdot (12 \mathrm{mm})^2 \cdot rac{265.5 \mathrm{N/mm^2}}{9990 \mathrm{N}}$

Open Calculator 2

Open Calculator

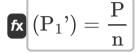
4) Maximum Tensile Stress in Bolt



Open Calculator

 $ext{ex} 88.33099 ext{N/mm}^2 = rac{9990 ext{N}}{rac{\pi}{4} \cdot \left(12 ext{mm}
ight)^2}$

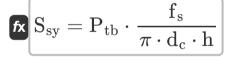
5) Primary Shear Force of Eccentrically Loaded Bolted Connection



Open Calculator

 $= \frac{3000N}{4}$

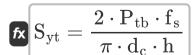
6) Yield Strength of Bolt in Shear given Tensile Force on Bolt in Shear



Open Calculator 🖸

 $ag{2.4965 ext{N/mm}^2 = 9990 ext{N} \cdot rac{3}{\pi \cdot 12 ext{mm} \cdot 6 ext{mm}}}$

7) Yield Strength of Bolt in Tension given Tensile Force on Bolt in Shear



Open Calculator 🗗

 $extbf{ex} 264.993 ext{N/mm}^2 = rac{2 \cdot 9990 ext{N} \cdot 3}{\pi \cdot 12 ext{mm} \cdot 6 ext{mm}}$





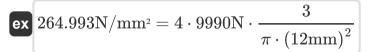


8) Yield Strength of Bolt in Tension given Tensile Force on Bolt in Tension



 $\left[\mathbf{f_x}
ight] \mathrm{S_{yt}} = 4 \cdot \mathrm{P_{tb}} \cdot rac{\mathrm{f_s}}{\pi \cdot \mathrm{d_c^2}}$

Open Calculator





Variables Used

- d_c Core Diameter of Bolt (Millimeter)
- δ_h Elongation of Bolt (Millimeter)
- fs Factor of Safety of Bolted Joint
- h Height of Nut (Millimeter)
- **k** Combined Stiffness of Bolt (Newton per Millimeter)
- kh' Stiffness of Bolt (Newton per Millimeter)
- n Number of Bolts in Bolted Joint
- **P** Imaginary Force on Bolt (Newton)
- P₁' Primary Shear Force on Bolt (Newton)
- P_i Pre Load in Bolt (Newton)
- P_{th} Tensile Force in Bolt (Newton)
- S_{SV} Shear Yield Strength of Bolt (Newton per Square Millimeter)
- S_{vt} Tensile Yield Strength of Bolt (Newton per Square Millimeter)
- δ_c Amount of Compression of Bolted Joint (Millimeter)
- σt_{max} Maximum Tensile Stress in Bolt (Newton per Square Millimeter)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Measurement: Length in Millimeter (mm)

 Length Unit Conversion
- Measurement: Force in Newton (N)

 Force Unit Conversion
- Measurement: Stiffness Constant in Newton per Millimeter (N/mm)
 Stiffness Constant Unit Conversion
- Measurement: Stress in Newton per Square Millimeter (N/mm²)
 Stress Unit Conversion





Check other formula lists

- Joint Analysis Formulas
- Load and Strength
 Characteristics Formulas

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