



# **Joint Analysis Formulas**

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## **List of 8 Joint Analysis Formulas**

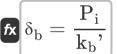
## Joint Analysis 🗗

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 🛂



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



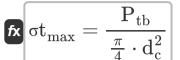
$$\mathbf{f_s} = rac{\pi}{4} \cdot \mathrm{d_c^2} \cdot rac{\mathrm{S_{yt}}}{\mathrm{P_{tb}}}$$

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

Open Calculator 2

Open Calculator

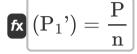
### 4) Maximum Tensile Stress in Bolt



Open Calculator

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

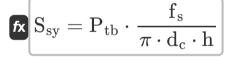
# 5) Primary Shear Force of Eccentrically Loaded Bolted Connection



Open Calculator

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

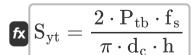
## 6) Yield Strength of Bolt in Shear given Tensile Force on Bolt in Shear



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 🗗

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





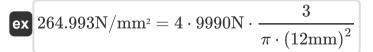


# 8) Yield Strength of Bolt in Tension given Tensile Force on Bolt in Tension



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

Open Calculator





#### Variables Used

- d<sub>c</sub> Core Diameter of Bolt (Millimeter)
- δ<sub>h</sub> 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)
- P<sub>1</sub>' Primary Shear Force on Bolt (Newton)
- P<sub>i</sub> Pre Load in Bolt (Newton)
- P<sub>th</sub> Tensile Force in Bolt (Newton)
- S<sub>SV</sub> Shear Yield Strength of Bolt (Newton per Square Millimeter)
- S<sub>vt</sub> Tensile Yield Strength of Bolt (Newton per Square Millimeter)
- δ<sub>c</sub> Amount of Compression of Bolted Joint (Millimeter)
- σt<sub>max</sub> 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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