



# Joint Geometry and Dimensions Formulas

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## List of 27 Joint Geometry and Dimensions Formulas

## Joint Geometry and Dimensions C

1) Cross Section Area of Socket End Resisting Shear Failure 🕑

fx 
$$\mathbf{A} = (\mathbf{d}_4 - \mathbf{d}_2) \cdot \mathbf{c}$$

ex  $1000 \text{mm}^2 = (80 \text{mm} - 40 \text{mm}) \cdot 25.0 \text{mm}$ 

2) Cross Section Area of Socket of Cotter Joint Prone to Failure

$$\mathbf{A} = rac{\pi}{4} \cdot \left( \mathrm{d}_1^2 - \mathrm{d}_2^2 
ight) - \mathrm{t_c} \cdot \left( \mathrm{d}_1 - \mathrm{d}_2 
ight)$$

ex 
$$732.892 \text{mm}^2 = \frac{\pi}{4} \cdot \left( (54 \text{mm})^2 - (40 \text{mm})^2 \right) - 21.478 \text{mm} \cdot (54 \text{mm} - 40 \text{mm})$$

#### 3) Cross Section Area of Spigot of Cotter Joint Prone to Failure

fx 
$$\mathbf{A}_{\mathrm{s}} = rac{\pi \cdot \mathrm{d}_2^2}{4} - \mathrm{d}_2 \cdot \mathrm{t}_{\mathrm{c}}$$

ex 
$$397.5171 \text{mm}^2 = \frac{\pi \cdot (40 \text{mm})^2}{4} - 40 \text{mm} \cdot 21.478 \text{mm}$$

#### 4) Diameter of Rod of Cotter Joint given Socket Collar Diameter 🗹





Open Calculator

Open Calculator 🕑

Open Calculator

#### 5) Diameter of Rod of Cotter Joint given Spigot Collar Diameter 🕑

3/11



10) Diameter of Socket Collar of Cotter Joint given Compressive Stress













#### 18) Minimum Rod Diameter in Cotter Joint given Axial Tensile Force and Stress 🕑

$$\int d = \sqrt{\frac{4 \cdot L}{\sigma t_{rod} \cdot \pi}}$$

$$ex 35.68248 mm = \sqrt{\frac{4 \cdot 50000 N}{50 N / mm^2 \cdot \pi}}$$





$$= \frac{50000 \text{N}}{(80 \text{mm} - 40 \text{mm}) \cdot 58.20 \text{N}/\text{mm}^2}$$

#### 20) Thickness of Cotter given Compressive Stress in Spigot 🕑

fx 
$$t_c = \frac{L}{\sigma_{c1} \cdot d_2}$$
 Open Calculator C   
ex  $21.47766mm = \frac{50000N}{58.2N/mm^2 \cdot 40mm}$ 













$$f \times b = \left(3 \cdot \frac{L}{t_c \cdot \sigma_b} \cdot \left(\frac{d_2}{4} + \frac{d_4 - d_2}{6}\right)\right)^{0.5}$$

$$e \times$$

$$34.46355 \text{mm} = \left(3 \cdot \frac{50000 \text{N}}{21.478 \text{mm} \cdot 98 \text{N/mm}^2} \cdot \left(\frac{40 \text{mm}}{4} + \frac{80 \text{mm} - 40 \text{mm}}{6}\right)\right)^{0.5}$$

$$27) \text{ Width of Cotter by Shear Consideration } \bullet$$

$$f \times b = \frac{V}{2 \cdot \tau_{co} \cdot t_c}$$

$$e \times 23.08564 \text{mm} = \frac{23800 \text{N}}{2 \cdot 24 \text{N/mm}^2 \cdot 21.478 \text{mm}}$$





## Variables Used

- A Cross Sectional Area of Socket (Square Millimeter)
- As Cross Sectional Area of Spigot (Square Millimeter)
- **b** Mean Width of Cotter (Millimeter)
- C Axial Distance From Slot to End of Socket Collar (Millimeter)
- **d** Diameter of Rod of Cotter Joint (*Millimeter*)
- d1 Outside Diameter of Socket (Millimeter)
- d<sub>2</sub> Diameter of Spigot (Millimeter)
- **d**<sub>3</sub> Diameter of Spigot Collar (*Millimeter*)
- **d**<sub>4</sub> Diameter of Socket Collar (*Millimeter*)
- F<sub>c</sub> Force on Cotter Joint (Newton)
- L Load on Cotter Joint (Newton)
- La Gap between End of Slot to End of Spigot (Millimeter)
- t<sub>1</sub> Thickness of Spigot Collar (Millimeter)
- **t**<sub>c</sub> Thickness of Cotter (*Millimeter*)
- V Shear Force on Cotter (Newton)
- σ<sub>b</sub> Bending Stress in Cotter (Newton per Square Millimeter)
- σ<sub>c</sub> Crushing Stress induced in Cotter (Newton per Square Millimeter)
- σ<sub>c1</sub> Compressive Stress in Spigot (Newton per Square Millimeter)
- σ<sub>cso</sub> Compressive Stress In Socket (Newton per Square Millimeter)
- σtso Tensile Stress In Socket (Newton per Square Millimeter)
- σt<sub>rod</sub> Tensile Stress in Cotter Joint Rod (Newton per Square Millimeter)
- T<sub>co</sub> Shear Stress in Cotter (Newton per Square Millimeter)
- T<sub>SO</sub> Shear Stress in Socket (Newton per Square Millimeter)
- T<sub>sp</sub> Shear Stress in Spigot (Newton per Square Millimeter)

## **Constants, Functions, Measurements used**

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- 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 (mm<sup>2</sup>) Area Unit Conversion
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Stress in Newton per Square Millimeter (N/mm<sup>2</sup>) Stress Unit Conversion

## **Check other formula lists**

- Forces and Loads on Joint Formulas
- Joint Geometry and Dimensions
   Formulas
- Strength and Stress Formulas C

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