



Riveted Joints Formulas

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Examples!

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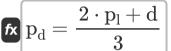


List of 36 Riveted Joints Formulas

Riveted Joints 🕑

Rivet Dimensions 🕑





ex 27.46667mm = $\frac{2 \cdot 32.2$ mm + 18mm}{3}

2) Diameter of Rivet given Margin of Rivet 🕑

 $27\mathrm{mm}$

1.5

18mm =

exl



Open Calculator

3) Diameter of Rivet given Pitch along Caulking Edge 🕑

$$\label{eq:constraint} \begin{split} & \textbf{fx} \ d = p_c - 14 \cdot \left(\frac{(h_c)^3}{P_f}\right)^{\frac{1}{4}} \\ & \textbf{ex} \ 17.93051 \text{mm} = 31.2 \text{mm} - 14 \cdot \left(\frac{(14 \text{mm})^3}{3.4 \text{N/mm}^2}\right)^{\frac{1}{4}} \end{split}$$

4) Diameter of rivets for lap joint 🕑

fx
$$\mathbf{d} = \left(4 \cdot \frac{\mathbf{P}}{\pi \cdot \mathbf{n} \cdot \mathbf{\tau}}\right)^{0.5}$$

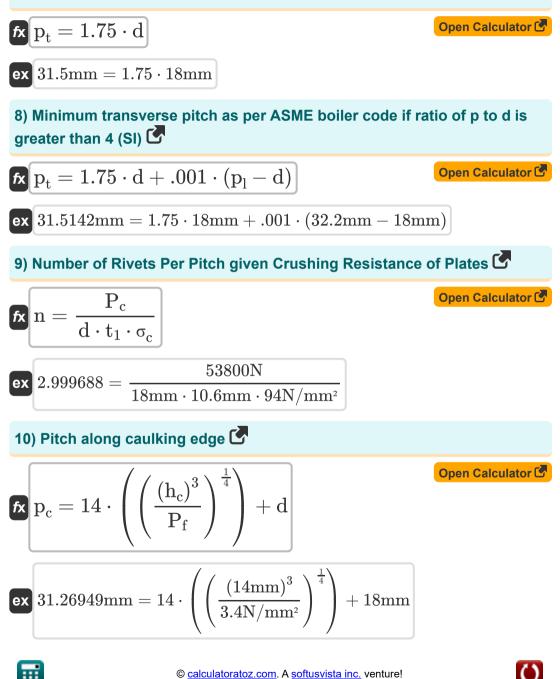
ex
$$18.03839 \mathrm{mm} = \left(4 \cdot \frac{46000 \mathrm{N}}{\pi \cdot 3 \cdot 60 \mathrm{N/mm^2}}\right)^{0.5}$$

$$p_{l} = \frac{3 \cdot p_{d} - d}{2}$$
Open Calculator (*)
$$p_{l} = \frac{3 \cdot 27.5 \text{mm} - 18 \text{mm}}{2}$$
(*)
$$32.25 \text{mm} = \frac{3 \cdot 27.5 \text{mm} - 18 \text{mm}}{2}$$
(*)
$$Margin \text{ of Rivet (*)}$$
(*)
$$m = 1.5 \cdot d$$
Open Calculator (*)
$$p_{l} = 1.5 \cdot 18 \text{mm}$$
(*)
$$27 \text{mm} = 1.5 \cdot 18 \text{mm}$$



Open Calculator 🕑

7) Minimum transverse pitch as per ASME boiler code if ratio of p is to d is less than 4



11) Pitch of Rivet

fx
$$\mathrm{p}=3\cdot\mathrm{d}$$

ex 54mm = $3 \cdot 18$ mm

12) Pitch of Rivets given Tensile Resistance of Plate between two Rivets

$$fx \quad p = \left(\frac{P_t}{t_1 \cdot \sigma_t}\right) + d$$

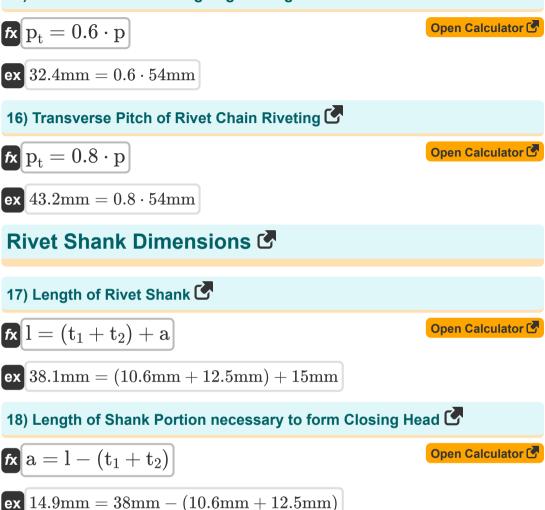
$$ex \quad 54.03774mm = \left(\frac{28650N}{10.6mm \cdot 75N/mm^2}\right) + 18mm$$
13) Rivet Diameter given Thickness of Plate C
$$fx \quad d = 0.2 \cdot \sqrt{t_1}$$

$$ex \quad 20.59126mm = 0.2 \cdot \sqrt{10.6mm}$$
14) Transverse pitch C
$$fx \quad p_t = \sqrt{\left(\frac{2 \cdot p_1 + d}{3}\right)^2 - \left(\frac{p_1}{2}\right)^2}$$

$$ex \quad 22.25326mm = \sqrt{\left(\frac{2 \cdot 32.2mm + 18mm}{3}\right)^2 - \left(\frac{32.2mm}{2}\right)^2}$$

Open Calculator

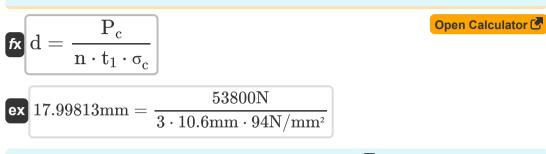
15) Transverse Pitch for Zig-Zag riveting





0

19) Shank Diameter of Rivet given Crushing Resistance of Plates 🕑



20) Shank Diameter of Rivet given Pitch of Rivet 🕑



21) Shank diameter of Rivet subjected to double shear given Shear resistance of Rivet per Pitch

fx
$$d = \sqrt{2 \cdot \frac{p_s}{\pi \cdot \tau}}$$
 Open Calculator (2)

ex
$$17.9893$$
mm = $\sqrt{2 \cdot \frac{30500}{\pi \cdot 60}}$



Stresses and Resistances 🕑

22) Crushing Resistance of Plates per Pitch Length 🕑

fx
$$P_c = d \cdot n \cdot t_1 \cdot \sigma_c$$
Open Calculator (*)ex53805.6N = 18mm · 3 · 10.6mm · 94N/mm²cs53805.6N = 18mm · 3 · 10.6mm · 94N/mm²csSistence of Plates (*)fx $\sigma_c = \frac{P_c}{d \cdot n \cdot t_1}$ fx $\sigma_c = \frac{P_c}{d \cdot n \cdot t_1}$ ex93.99022N/mm² = $\frac{53800N}{18mm · 3 · 10.6mm}$ cs93.99022N/mm² = $\frac{53800N}{18mm · 3 · 10.6mm}$ cs $\tau = \frac{P_s}{\left(\frac{\pi}{4}\right) \cdot n \cdot d^2}$ fx $\tau = \frac{P_s}{\left(\frac{\pi}{4}\right) \cdot n \cdot d^2}$ ex39.95248N/mm² = $\frac{30500N}{\left(\frac{\pi}{4}\right) \cdot 3 \cdot (18mm)^2}$



25) Permissible Shear Stress for Rivet given Shear Resistance of Rivet Per Pitch Length

$$fx \tau = \frac{p_s}{\left(\frac{\pi}{4}\right) \cdot d^2}$$

$$ex 119.8574 \text{N/mm}^2 = \frac{30500 \text{N}}{\left(\frac{\pi}{4}\right) \cdot (18 \text{mm})^2}$$

26) Permissible Tensile Stress of Plate given Tensile Resistance of Plate between two Rivets

fx
$$\sigma_{\mathrm{t}} = rac{\mathrm{P}_{\mathrm{t}}}{(\mathrm{p}-\mathrm{d})\cdot\mathrm{t}_{1}}$$

ex $75.07862 \text{N/mm}^2 = rac{28650 \text{N}}{(54 \text{mm} - 18 \text{mm}) \cdot 10.6 \text{mm}}$

27) Shear Resistance of Rivet per Pitch Length 🕑

fx
$$\mathbf{p}_{\mathrm{s}} = \left(rac{\pi}{4}
ight) \cdot \mathrm{d}^2 \cdot \mathbf{r}$$

$$15268.14\mathrm{N} = \left(rac{\pi}{4}
ight) \cdot (18\mathrm{mm})^2 \cdot 60\mathrm{N/mm^2}$$

28) Shear Resistance of Rivet Per Pitch Length for Double Shear 🕑

$$\begin{array}{l} \text{fx} \\ \mathbf{p}_{\mathrm{s}} = 2 \cdot \left(\frac{\pi}{4}\right) \cdot \mathrm{d}^{2} \cdot \mathbf{\tau} \cdot \mathbf{n} \\ \\ \text{ex} \end{array} \begin{array}{l} 91608.84\mathrm{N} = 2 \cdot \left(\frac{\pi}{4}\right) \cdot (18\mathrm{mm})^{2} \cdot 60\mathrm{N/mm^{2}} \cdot 3 \end{array} \end{array}$$



ex



C7

Open Calculator

Open Calculator

29) Shear Resistance of Rivet Per Pitch Length for Single Shear 子

$$f_{X} \ p_{s} = \left(\frac{\pi}{4}\right) \cdot d^{2} \cdot \tau \cdot n$$
Open Calculator (*)

eX 45804.42N = $\left(\frac{\pi}{4}\right) \cdot (18mm)^{2} \cdot 60N/mm^{2} \cdot 3$

30) Tensile Resistance of Plate between two Rivets (*)

f_{X} P_{t} = (p - d) \cdot t_{1} \cdot \sigma_{t}
Open Calculator (*)

eX 28620N = $(54mm - 18mm) \cdot 10.6mm \cdot 75N/mm^{2}$

Thickness of Plates (*)

31) Thickness of plate 1 given Length of Rivet Shank (*)

f_{X} t_{1} = 1 - (a + t_{2})
Open Calculator (*)

eX 10.5mm = 38mm - (15mm + 12.5mm)

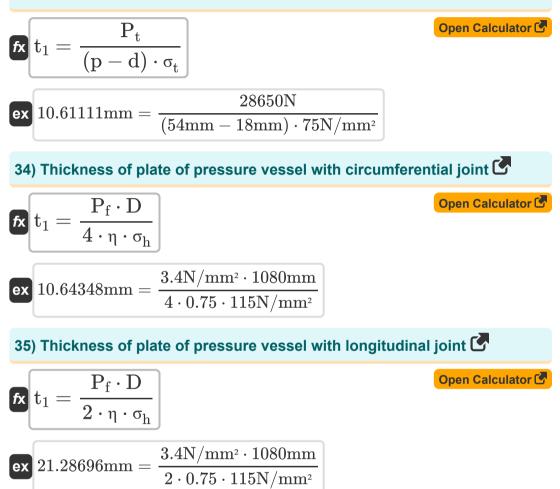
32) Thickness of Plate 2 given Length of Rivet Shank (*)

f_{X} t_{2} = 1 - (t_{1} + a)
Open Calculator (*)

eX 12.4mm = 38mm - (10.6mm + 15mm)

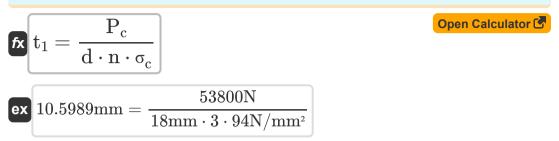


33) Thickness of Plate given Tensile Resistance of Plate between two Rivets 🖸





36) Thickness of Plates given Crushing Resistance 🕑



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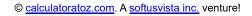


Variables Used

- **a** Length of Shank Portion for Closing Head (*Millimeter*)
- d Diameter of Rivet (Millimeter)
- D Inner Diameter of Riveted Pressure Vessel (Millimeter)
- hc Riveted Joint Cover Plate Thickness (Millimeter)
- I Length of Rivet Shank (Millimeter)
- **m** Margin of Rivet (Millimeter)
- **n** Rivets Per Pitch
- p Pitch of Rivet (Millimeter)
- P Tensile Force on Riveted Plates (Newton)
- **p**_c Pitch Along Caulking Edge (*Millimeter*)
- **P**_c Crushing Resistance of Riveted Plate per Pitch (*Newton*)
- pd Diagonal Pitch of Rivet Joint (Millimeter)
- **P**f Intensity of Fluid Pressure (Newton per Square Millimeter)
- **p** Longitudinal Pitch of Rivet Joint (*Millimeter*)
- **p**_s Shear Resistance of Rivet per Pitch Length (*Newton*)
- **p**t Transverse Pitch of Rivet (Millimeter)
- Pt Tensile Resistance of Plate Per Rivet Pitch (Newton)
- t₁ Thickness of Plate 1 of Riveted Joint (Millimeter)
- t₂ Thickness of Plate 2 of Riveted Joint (Millimeter)
- η Riveted Joint Efficiency
- σ_c Permissible Compressive Stress of Riveted Plate (Newton per Square Millimeter)



- σ_h Circumferential Hoop Stress in Riveted Vessel (Newton per Square Millimeter)
- σ_t Tensile Stress in Riveted Plate (Newton per Square Millimeter)
- **T** Permissible Shear Stress for Rivet (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: **Pressure** in Newton per Square Millimeter (N/mm²) *Pressure Unit Conversion*
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Stress in Newton per Square Millimeter (N/mm²)
 Stress Unit Conversion



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