



Riveted Joints Formulas

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Examples!

Conversions!

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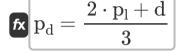


List of 36 Riveted Joints Formulas

Riveted Joints &

Rivet Dimensions

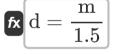
1) Diagonal pitch



Open Calculator

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

2) Diameter of Rivet given Margin of Rivet



Open Calculator

$$= \frac{27 \text{mm}}{1.5}$$

3) Diameter of Rivet given Pitch along Caulking Edge 🖸

Open Calculator

Open Calculator

Open Calculator 2

Open Calculator

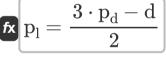
$$\mathbf{f}$$
 $\mathbf{d} = \mathbf{p}_{\mathrm{c}} - 14 \cdot \left(\frac{\left(\mathbf{h}_{\mathrm{c}}\right)^3}{\mathbf{P}_{\mathrm{f}}} \right)^{\frac{1}{4}}$

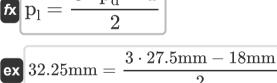
ex
$$17.93051 \mathrm{mm} = 31.2 \mathrm{mm} - 14 \cdot \left(\frac{(14 \mathrm{mm})^3}{3.4 \mathrm{N/mm^2}} \right)^{\frac{1}{4}}$$

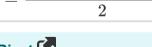
4) Diameter of rivets for lap joint 6

 $\mathbf{f} \mathbf{k} d = \left(4 \cdot \frac{\mathrm{P}}{\pi \cdot \mathrm{n} \cdot \mathrm{r}} \right)^{0.5}$

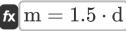
ex
$$18.03839 \mathrm{mm} = \left(4 \cdot \frac{46000 \mathrm{N}}{\pi \cdot 3 \cdot 60 \mathrm{N/mm^2}}\right)^{0.5}$$

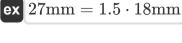


















7) Minimum transverse pitch as per ASME boiler code if ratio of p is to d is less than 4 🔽

fx $[\mathrm{p_t} = 1.75 \cdot \mathrm{d}]$

Open Calculator 2

 $\mathbf{ex} \ 31.5 \, \mathrm{mm} = 1.75 \cdot 18 \, \mathrm{mm}$

Minimum transverse pitch as per ASME boiler code if ratio of p to d is greater than 4 (SI)

fx $p_t = 1.75 \cdot d + .001 \cdot (p_l - d)$

Open Calculator

 $(31.5142 \text{mm} = 1.75 \cdot 18 \text{mm} + .001 \cdot (32.2 \text{mm} - 18 \text{mm}))$

53800N

9) Number of Rivets Per Pitch given Crushing Resistance of Plates 🗗

 $\mathbf{n} = \frac{\mathbf{P}_{\mathrm{c}}}{\mathbf{d} \cdot \mathbf{t} \cdot \mathbf{\sigma}_{\mathrm{c}}}$

Open Calculator

 $\mathbf{ex} \ 2.999688 = rac{53800 \mathrm{N}}{18 \mathrm{mm} \cdot 10.6 \mathrm{mm} \cdot 94 \mathrm{N/mm^2}}$

10) Pitch along caulking edge

 $\left|\mathbf{p}_{\mathrm{c}}=14\cdot\left(\left(rac{\left(\mathrm{h_{c}}
ight)^{3}}{\mathrm{P_{f}}}
ight)^{rac{1}{4}}
ight)+\mathrm{d}\left(\mathbf{p}_{\mathrm{c}}^{2}+\mathrm{d}\left(\mathbf{p}_{\mathrm{c}}^{2}
ight)^{2}\right)^{2}$

Open Calculator 6

 $ext{ 31.26949mm} = 14 \cdot \left(\left(rac{(14 ext{mm})^3}{3.4 ext{N/mm}^2}
ight)^{rac{1}{4}} + 18 ext{mm}$





11) Pitch of Rivet

 $p = 3 \cdot d$

Open Calculator 🖸

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

 \mathbf{f} $\mathbf{p} = \left(rac{\mathrm{P_t}}{\mathrm{t}\cdot \mathrm{\sigma_t}}
ight) + \mathrm{d}$

Open Calculator 🗗

ex $54.03774 \mathrm{mm} = \left(\frac{28650 \mathrm{N}}{10.6 \mathrm{mm} \cdot 75 \mathrm{N/mm^2}}\right) + 18 \mathrm{mm}$

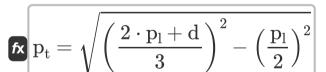
13) Rivet Diameter given Thickness of Plate

fx $ext{d} = 0.2 \cdot \sqrt{ ext{t}}$

Open Calculator

ex $20.59126 \mathrm{mm} = 0.2 \cdot \sqrt{10.6 \mathrm{mm}}$

14) Transverse pitch



Open Calculator 🗗

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



15) Transverse Pitch for Zig-Zag riveting

fx $m p_t = 0.6 \cdot p$

Open Calculator

 $43.2 \text{mm} = 0.8 \cdot 54 \text{mm}$

16) Transverse Pitch of Rivet Chain Riveting

Open Calculator 2

fx $p_t = 0.8 \cdot p$

Rivet Shank Dimensions

17) Length of Rivet Shank

Open Calculator

18) Length of Shank Portion necessary to form Closing Head C

 $\mathbf{f}\mathbf{x} \ \mathbf{a} = \mathbf{l} - (\mathbf{t}_1 + \mathbf{t}_2)$

fx $l = (t_1 + t_2) + a$

Open Calculator

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

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



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

 $\mathrm{d} = rac{\mathrm{P_c}}{\mathrm{n} \cdot \mathrm{t} \cdot \mathrm{\sigma_c}}$

Open Calculator 2

53800N= 17.99813mm = $\frac{3 \cdot 10.6 \text{mm} \cdot 94 \text{N/mm}^2}{3 \cdot 10.6 \text{mm} \cdot 94 \text{N/mm}^2}$

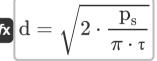
20) Shank Diameter of Rivet given Pitch of Rivet



Open Calculator

 $18 \text{mm} = \frac{54 \text{mm}}{3}$

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



Open Calculator

ex
$$17.9893 ext{mm} = \sqrt{2 \cdot rac{30500 ext{N}}{\pi \cdot 60 ext{N/mm}^2}}$$



Stresses and Resistances 🗗

22) Crushing Resistance of Plates per Pitch Length

 $P_{c} = d \cdot n \cdot t \cdot \sigma_{c}$

Open Calculator

 $\texttt{ex} \ 53805.6 \text{N} = 18 \text{mm} \cdot 3 \cdot 10.6 \text{mm} \cdot 94 \text{N/mm}^2$

23) Permissible Compressive Stress of Plate Material given Crushing Resistance of Plates

fx $\sigma_{
m c} = rac{{
m P}_{
m c}}{{
m d}\cdot{
m n}\cdot{
m t}}$

Open Calculator 🗗

 $93.99022 \mathrm{N/mm^2} = rac{53800 \mathrm{N}}{18 \mathrm{mm} \cdot 3 \cdot 10.6 \mathrm{mm}}$

24) Permissible Shear Stress for Rivet for Single Shear

fx $au = rac{ ext{p}_{ ext{s}}}{\left(rac{\pi}{4}
ight)\cdot ext{n}\cdot ext{d}^2}$

Open Calculator 🗗

 $ext{ex} 39.95248 ext{N/mm}^2 = rac{30500 ext{N}}{\left(rac{\pi}{4}
ight) \cdot 3 \cdot \left(18 ext{mm}
ight)^2}$



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

 $au = rac{\mathrm{p_s}}{\left(rac{\pi}{4}
ight)\cdot\mathrm{d}^2}$

Open Calculator

 $ext{ex} 119.8574 ext{N/mm}^2 = rac{30500 ext{N}}{\left(rac{\pi}{4}
ight) \cdot \left(18 ext{mm}
ight)^2}$

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

 $\boxed{\mathbf{fx}} \sigma_t = \frac{P_t}{(p-d) \cdot t_1}$

Open Calculator

 $ext{ex} 75.79365 ext{N/mm}^2 = rac{28650 ext{N}}{(54 ext{mm} - 18 ext{mm}) \cdot 10.5 ext{mm}}$

27) Shear Resistance of Rivet per Pitch Length

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

Open Calculator

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

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

 $\mathbf{f}_{\mathbf{x}} \mathbf{p}_{\mathbf{s}} = 2 \cdot \left(\frac{\pi}{4} \right) \cdot \mathbf{d}^2 \cdot \mathbf{r} \cdot \mathbf{n}$

Open Calculator

(4)

 $extstyle extstyle 91608.84 extstyle N = 2 \cdot \left(rac{\pi}{4}
ight) \cdot (18 ext{mm})^2 \cdot 60 ext{N/mm}^2 \cdot 3$



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

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

Open Calculator 🗗

30) Tensile Resistance of Plate between two Rivets

 $\mathbf{f} \mathbf{x} \left[P_t = (p - d) \cdot t \cdot \sigma_t \right]$

Open Calculator

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

Thickness of Plates 2

31) Thickness of plate 1 given Length of Rivet Shank

fx $egin{aligned} \mathbf{f}_1 = \mathbf{l} - (\mathbf{a} + \mathbf{t}_2) \end{aligned}$

Open Calculator

 $[20.5 \mathrm{mm} = 38 \mathrm{mm} - (15 \mathrm{mm} + 12.5 \mathrm{mm})]$

32) Thickness of Plate 2 given Length of Rivet Shank

fx $t_2 = l - (t_1 + a)$

Open Calculator

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

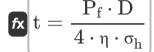
33) Thickness of Plate given Tensile Resistance of Plate between two Rivets

fx $t = rac{P_t}{(p-d) \cdot \sigma_t}$

Open Calculator

$$= \frac{28650 N}{(54 mm - 18 mm) \cdot 75 N / mm^2}$$

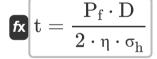
34) Thickness of plate of pressure vessel with circumferential joint



Open Calculator

$$ext{ex} 10.64348 ext{mm} = rac{3.4 ext{N/mm}^2 \cdot 1080 ext{mm}}{4 \cdot 0.75 \cdot 115 ext{N/mm}^2}$$

35) Thickness of plate of pressure vessel with longitudinal joint 🗹



Open Calculator 🗗

$$\mathbf{ex} \ 21.28696 \mathrm{mm} = rac{3.4 \mathrm{N/mm^2 \cdot 1080 mm}}{2 \cdot 0.75 \cdot 115 \mathrm{N/mm^2}}$$



36) Thickness of Plates given Crushing Resistance 🗗



Open Calculator

$$ag{t} = rac{ ext{P}_{ ext{c}}}{ ext{d} \cdot ext{n} \cdot ext{\sigma}_{ ext{c}}}$$

$$=$$
 $10.5989 \mathrm{mm} = rac{53800 \mathrm{N}}{18 \mathrm{mm} \cdot 3 \cdot 94 \mathrm{N/mm^2}}$



Variables Used

- a Length of Shank Portion for Closing Head (Millimeter)
- **d** Diameter of Rivet (Millimeter)
- **D** Inner diameter of riveted pressure vessel (Millimeter)
- **h**_c Riveted Joint Cover Plate Thickness (Millimeter)
- 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)
- Pc Crushing Resistance of Riveted Plate per Pitch (Newton)
- p_d Diagonal Pitch of Rivet Joint (Millimeter)
- Pf Intensity of Fluid Pressure (Newton per Square Millimeter)
- p_I 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)
- t Thickness of Plate of Riveted joint (Millimeter)
- t₁ Thickness of Plate 1 of Riveted Joint (Millimeter)
- t2 Thickness of Plate 2 of Riveted Joint (Millimeter)
- n 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) Square root function
- 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





Check other formula lists

- Design of Clamp and Muff Coupling Formulas
- Design of Cotter Joint Formulas
- Design of Knuckle Joint Formulas

- Packing Formulas
- Retaining Rings and Circlips
 Formulas
- Riveted Joints Formulas
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