

Important Riveted Joints Formulas PDF



Formulas
Examples
with Units

List of 36
Important Riveted Joints Formulas

1) Rivet Dimensions Formulas ↗

1.1) Diagonal pitch Formula ↗

Formula

$$p_d = \frac{2 \cdot p_1 + d}{3}$$

Example with Units

$$27.4667 \text{ mm} = \frac{2 \cdot 32.2 \text{ mm} + 18 \text{ mm}}{3}$$

Evaluate Formula ↗

1.2) Diameter of Rivet given Margin of Rivet Formula ↗

Formula

$$d = \frac{m}{1.5}$$

Example with Units

$$18 \text{ mm} = \frac{27 \text{ mm}}{1.5}$$

Evaluate Formula ↗

1.3) Diameter of Rivet given Pitch along Caulking Edge Formula ↗

Formula

$$d = p_c - 14 \cdot \left(\frac{(h_c)^3}{P_f} \right)^{\frac{1}{4}}$$

Example with Units

$$17.9305 \text{ mm} = 31.2 \text{ mm} - 14 \cdot \left(\frac{(14 \text{ mm})^3}{3.4 \text{ N/mm}^2} \right)^{\frac{1}{4}}$$

Evaluate Formula ↗

1.4) Diameter of rivets for lap joint Formula ↗

Formula

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

Example with Units

$$18.0384 \text{ mm} = \left(4 \cdot \frac{46000 \text{ N}}{3.1416 \cdot 3 \cdot 60 \text{ N/mm}^2} \right)^{0.5}$$

Evaluate Formula ↗

1.5) Longitudinal pitch Formula ↗

Formula

$$p_l = \frac{3 \cdot p_d - d}{2}$$

Example with Units

$$32.25 \text{ mm} = \frac{3 \cdot 27.5 \text{ mm} - 18 \text{ mm}}{2}$$

Evaluate Formula ↗

1.6) Margin of Rivet Formula ↗

Formula

$$m = 1.5 \cdot d$$

Example with Units

$$27 \text{ mm} = 1.5 \cdot 18 \text{ mm}$$

Evaluate Formula ↗



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

Formula

Formula

$$p_t = 1.75 \cdot d$$

Example with Units

$$31.5 \text{ mm} = 1.75 \cdot 18 \text{ mm}$$

[Evaluate Formula !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

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

Formula

Formula

$$p_t = 1.75 \cdot d + .001 \cdot (p_1 - d)$$

Example with Units

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

[Evaluate Formula !\[\]\(e3275251d0893157c3584e20c81dc3ba_img.jpg\)](#)

1.9) Number of Rivets Per Pitch given Crushing Resistance of Plates Formula

Formula

$$n = \frac{P_c}{d \cdot t_1 \cdot \sigma_c}$$

Example with Units

$$2.9997 = \frac{53800 \text{ N}}{18 \text{ mm} \cdot 10.6 \text{ mm} \cdot 94 \text{ N/mm}^2}$$

[Evaluate Formula !\[\]\(166772600a13ad0a433053f90fe45649_img.jpg\)](#)

1.10) Pitch along caulking edge Formula

Formula

$$p_c = 14 \cdot \left(\left(\frac{\left(\frac{h_c}{P_f} \right)^3}{\frac{1}{4}} \right) \right)^{\frac{1}{4}} + d$$

Example with Units

$$31.2695 \text{ mm} = 14 \cdot \left(\left(\frac{\left(\frac{14 \text{ mm}}{3.4 \text{ N/mm}^2} \right)^3}{\frac{1}{4}} \right) \right)^{\frac{1}{4}} + 18 \text{ mm}$$

[Evaluate Formula !\[\]\(aceb1790ece33f2eac474d4a9431c6d6_img.jpg\)](#)

1.11) Pitch of Rivet Formula

Formula

$$p = 3 \cdot d$$

Example with Units

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

[Evaluate Formula !\[\]\(4a60014e8c124e85ae27c7d200855f3f_img.jpg\)](#)

1.12) Pitch of Rivets given Tensile Resistance of Plate between two Rivets Formula

Formula

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

Example with Units

$$54.0377 \text{ mm} = \left(\frac{28650 \text{ N}}{10.6 \text{ mm} \cdot 75 \text{ N/mm}^2} \right) + 18 \text{ mm}$$

[Evaluate Formula !\[\]\(3de86287d784100917a1f65e56813707_img.jpg\)](#)

1.13) Rivet Diameter given Thickness of Plate Formula

Formula

$$d = 0.2 \cdot \sqrt{t_1}$$

Example with Units

$$20.5913 \text{ mm} = 0.2 \cdot \sqrt{10.6 \text{ mm}}$$

[Evaluate Formula !\[\]\(9c1bd5a68bb1bbd6cc910c91238328cc_img.jpg\)](#)

1.14) Transverse pitch Formula

Formula

$$p_t = \sqrt{\left(\frac{2 \cdot p_l + d}{3}\right)^2 - \left(\frac{p_l}{2}\right)^2}$$

Evaluate Formula 

Example with Units

$$22.2533 \text{ mm} = \sqrt{\left(\frac{2 \cdot 32.2 \text{ mm} + 18 \text{ mm}}{3}\right)^2 - \left(\frac{32.2 \text{ mm}}{2}\right)^2}$$

1.15) Transverse Pitch for Zig-Zag riveting Formula

Formula

$$p_t = 0.6 \cdot p$$

Example with Units

$$32.4 \text{ mm} = 0.6 \cdot 54 \text{ mm}$$

Evaluate Formula 

1.16) Transverse Pitch of Rivet Chain Riveting Formula

Formula

$$p_t = 0.8 \cdot p$$

Example with Units

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

Evaluate Formula 

2) Rivet Shank Dimensions Formulas

2.1) Length of Rivet Shank Formula

Formula

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

Example with Units

$$38.1 \text{ mm} = (10.6 \text{ mm} + 12.5 \text{ mm}) + 15 \text{ mm}$$

Evaluate Formula 

2.2) Length of Shank Portion necessary to form Closing Head Formula

Formula

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

Example with Units

$$14.9 \text{ mm} = 38 \text{ mm} - (10.6 \text{ mm} + 12.5 \text{ mm})$$

Evaluate Formula 

2.3) Shank Diameter of Rivet given Crushing Resistance of Plates Formula

Formula

$$d = \frac{P_c}{n \cdot t_1 \cdot \sigma_c}$$

Example with Units

$$17.9981 \text{ mm} = \frac{53800 \text{ N}}{3 \cdot 10.6 \text{ mm} \cdot 94 \text{ N/mm}^2}$$

Evaluate Formula 

2.4) Shank Diameter of Rivet given Pitch of Rivet Formula

Formula

$$d = \frac{p}{3}$$

Example with Units

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

Evaluate Formula 



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

Formula

$$d = \sqrt{2 \cdot \frac{p_s}{\pi \cdot \tau}}$$

Example with Units

$$17.9893 \text{ mm} = \sqrt{2 \cdot \frac{30500 \text{ N}}{3.1416 \cdot 60 \text{ N/mm}^2}}$$

Evaluate Formula 

3) Stresses and Resistances Formulas

3.1) Crushing Resistance of Plates per Pitch Length Formula

Formula

$$P_c = d \cdot n \cdot t_1 \cdot \sigma_c$$

Example with Units

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

Evaluate Formula 

3.2) Permissible Compressive Stress of Plate Material given Crushing Resistance of Plates Formula

Formula

$$\sigma_c = \frac{P_c}{d \cdot n \cdot t_1}$$

Example with Units

$$93.9902 \text{ N/mm}^2 = \frac{53800 \text{ N}}{18 \text{ mm} \cdot 3 \cdot 10.6 \text{ mm}}$$

Evaluate Formula 

3.3) Permissible Shear Stress for Rivet for Single Shear Formula

Formula

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

Example with Units

$$39.9525 \text{ N/mm}^2 = \frac{30500 \text{ N}}{\left(\frac{3.1416}{4}\right) \cdot 3 \cdot 18 \text{ mm}^2}$$

Evaluate Formula 

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

Formula

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

Example with Units

$$119.8574 \text{ N/mm}^2 = \frac{30500 \text{ N}}{\left(\frac{3.1416}{4}\right) \cdot 18 \text{ mm}^2}$$

Evaluate Formula 

3.5) Permissible Tensile Stress of Plate given Tensile Resistance of Plate between two Rivets Formula

Formula

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

Example with Units

$$75.0786 \text{ N/mm}^2 = \frac{28650 \text{ N}}{(54 \text{ mm} - 18 \text{ mm}) \cdot 10.6 \text{ mm}}$$

Evaluate Formula 



3.6) Shear Resistance of Rivet per Pitch Length Formula

Formula

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

Example with Units

$$15268.1403 \text{ N} = \left(\frac{3.1416}{4} \right) \cdot 18 \text{ mm}^2 \cdot 60 \text{ N/mm}^2$$

Evaluate Formula 

3.7) Shear Resistance of Rivet Per Pitch Length for Double Shear Formula

Formula

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

Example with Units

$$91608.8418 \text{ N} = 2 \cdot \left(\frac{3.1416}{4} \right) \cdot 18 \text{ mm}^2 \cdot 60 \text{ N/mm}^2 \cdot 3$$

Evaluate Formula 

3.8) Shear Resistance of Rivet Per Pitch Length for Single Shear Formula

Formula

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

Example with Units

$$45804.4209 \text{ N} = \left(\frac{3.1416}{4} \right) \cdot 18 \text{ mm}^2 \cdot 60 \text{ N/mm}^2 \cdot 3$$

Evaluate Formula 

3.9) Tensile Resistance of Plate between two Rivets Formula

Formula

$$P_t = (p - d) \cdot t_1 \cdot \sigma_t$$

Example with Units

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

Evaluate Formula 

4) Thickness of Plates Formulas

4.1) Thickness of plate 1 given Length of Rivet Shank Formula

Formula

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

Example with Units

$$10.5 \text{ mm} = 38 \text{ mm} - (15 \text{ mm} + 12.5 \text{ mm})$$

Evaluate Formula 

4.2) Thickness of Plate 2 given Length of Rivet Shank Formula

Formula

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

Example with Units

$$12.4 \text{ mm} = 38 \text{ mm} - (10.6 \text{ mm} + 15 \text{ mm})$$

Evaluate Formula 

4.3) Thickness of Plate given Tensile Resistance of Plate between two Rivets Formula

Formula

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

Example with Units

$$10.6111 \text{ mm} = \frac{28650 \text{ N}}{(54 \text{ mm} - 18 \text{ mm}) \cdot 75 \text{ N/mm}^2}$$

Evaluate Formula 

4.4) Thickness of plate of pressure vessel with circumferential joint Formula

Formula

$$t_1 = \frac{P_f \cdot D}{4 \cdot \eta \cdot \sigma_h}$$

Example with Units

$$10.6435 \text{ mm} = \frac{3.4 \text{ N/mm}^2 \cdot 1080 \text{ mm}}{4 \cdot 0.75 \cdot 115 \text{ N/mm}^2}$$

Evaluate Formula 



4.5) Thickness of plate of pressure vessel with longitudinal joint Formula

Formula

$$t_1 = \frac{P_f \cdot D}{2 \cdot \eta \cdot \sigma_h}$$

Example with Units

$$21.287_{\text{mm}} = \frac{3.4_{\text{N/mm}^2} \cdot 1080_{\text{mm}}}{2 \cdot 0.75 \cdot 115_{\text{N/mm}^2}}$$

Evaluate Formula 

4.6) Thickness of Plates given Crushing Resistance Formula

Formula

$$t_1 = \frac{P_c}{d \cdot n \cdot \sigma_c}$$

Example with Units

$$10.5989_{\text{mm}} = \frac{53800_{\text{N}}}{18_{\text{mm}} \cdot 3 \cdot 94_{\text{N/mm}^2}}$$

Evaluate Formula 



Variables used in list of Riveted Joints Formulas above

- **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)
- **l** 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)
- **p_d** Diagonal Pitch of Rivet Joint (Millimeter)
- **P_f** Intensity of Fluid Pressure (Newton per Square Millimeter)
- **p_l** Longitudinal Pitch of Rivet Joint (Millimeter)
- **p_s** Shear Resistance of Rivet per Pitch Length (Newton)
- **p_t** Transverse Pitch of Rivet (Millimeter)
- **P_t** Tensile Resistance of Plate Per Rivet Pitch (Newton)
- **t_1** Thickness of Plate 1 of Riveted Joint (Millimeter)
- **t_2** 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)

Constants, Functions, Measurements used in list of Riveted Joints Formulas above

- **constant(s):** π , 3.14159265358979323846264338327950288
Archimedes' constant
- **Functions:** **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 



- **T** Permissible Shear Stress for Rivet (*Newton per Square Millimeter*)



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