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Riveted Joints Formulas

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List of 36 Riveted Joints Formulas

Riveted Joints

Rivet Dimensions

1) Diagonal pitch

Open Calculator

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

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

2) Diameter of Rivet given Margin of Rivet

Open Calculator

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

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

3) Diameter of Rivet given Pitch along Caulking Edge

Open Calculator

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

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

4) Diameter of rivets for lap joint

Open Calculator

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

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

5) Longitudinal pitch

Open Calculator

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

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

6) Margin of Rivet

Open Calculator

$$m = 1.5 \cdot d$$

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

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

Open Calculator

fx $p_t = 1.75 \cdot d$

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

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

Open Calculator

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

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

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

Open Calculator

fx $n = \frac{P_c}{d \cdot t \cdot \sigma_c}$

ex $2.999688 = \frac{53800\text{N}}{18\text{mm} \cdot 10.6\text{mm} \cdot 94\text{N/mm}^2}$

10) Pitch along caulking edge

Open Calculator

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

ex $31.26949\text{mm} = 14 \cdot \left(\left(\frac{(14\text{mm})^3}{3.4\text{N/mm}^2} \right)^{\frac{1}{4}} \right) + 18\text{mm}$

11) Pitch of Rivet

Open Calculator

fx $p = 3 \cdot d$

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

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

Open Calculator

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

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

13) Rivet Diameter given Thickness of Plate

Open Calculator

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

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

14) Transverse pitch

Open Calculator

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

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

15) Transverse Pitch for Zig-Zag riveting

Open Calculator

fx $p_t = 0.6 \cdot p$

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

16) Transverse Pitch of Rivet Chain Riveting

Open Calculator

fx $p_t = 0.8 \cdot p$

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

Rivet Shank Dimensions

17) Length of Rivet Shank

Open Calculator

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

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

18) Length of Shank Portion necessary to form Closing Head

Open Calculator

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

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

19) Shank Diameter of Rivet given Crushing Resistance of Plates

Open Calculator

fx $$d = \frac{P_c}{n \cdot t \cdot \sigma_c}$$

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

20) Shank Diameter of Rivet given Pitch of Rivet

Open Calculator

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

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

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

Open Calculator

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

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

Stresses and Resistances

22) Crushing Resistance of Plates per Pitch Length

Open Calculator

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

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

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

Open Calculator

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

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

24) Permissible Shear Stress for Rivet for Single Shear

Open Calculator

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

$$39.95248\text{N/mm}^2 = \frac{30500\text{N}}{\left(\frac{\pi}{4}\right) \cdot 3 \cdot (18\text{mm})^2}$$

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

Open Calculator

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

Open Calculator

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

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

27) Shear Resistance of Rivet per Pitch Length

Open Calculator

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

ex $$15268.14\text{N} = \left(\frac{\pi}{4}\right) \cdot (18\text{mm})^2 \cdot 60\text{N/mm}^2$$

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

Open Calculator

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

ex $$91608.84\text{N} = 2 \cdot \left(\frac{\pi}{4}\right) \cdot (18\text{mm})^2 \cdot 60\text{N/mm}^2 \cdot 3$$

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

Open Calculator

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

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

30) Tensile Resistance of Plate between two Rivets

Open Calculator

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

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

Thickness of Plates

31) Thickness of plate 1 given Length of Rivet Shank

Open Calculator

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

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

32) Thickness of Plate 2 given Length of Rivet Shank

Open Calculator

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

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

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

Open Calculator

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

ex $$10.61111\text{mm} = \frac{28650\text{N}}{(54\text{mm} - 18\text{mm}) \cdot 75\text{N/mm}^2}$$

34) Thickness of plate of pressure vessel with circumferential joint

Open Calculator

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

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

35) Thickness of plate of pressure vessel with longitudinal joint

Open Calculator

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

ex $$21.28696\text{mm} = \frac{3.4\text{N/mm}^2 \cdot 1080\text{mm}}{2 \cdot 0.75 \cdot 115\text{N/mm}^2}$$

36) Thickness of Plates given Crushing Resistance

Open Calculator

fx $$t = \frac{P_c}{d \cdot n \cdot \sigma_c}$$

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

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)*
- **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** Thickness of Plate of Riveted joint *(Millimeter)*
- 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)*
- τ 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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