calculatoratoz.com

unitsconverters.com

Design of Knuckle Joint Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

Please leave your feedback here...

List of 45 Design of Knuckle Joint Formulas

Design of Knuckle Joint

Eye

1) Bending Stress in Knuckle Pin given Bending Moment in Pin

Open Calculator

fx $$\sigma_b = \frac{32 \cdot M_b}{\pi \cdot d^3}$$

ex $$90.49143\text{N/mm}^2 = \frac{32 \cdot 450000\text{N*mm}}{\pi \cdot (37\text{mm})^3}$$

2) Bending Stress in Knuckle Pin given Load, Thickness of Eyes and Pin Diameter

Open Calculator

fx $$\sigma_b = \frac{32 \cdot \frac{L}{2} \cdot \left(\frac{b}{4} + \frac{a}{3}\right)}{\pi \cdot d^3}$$

ex $$93.84296\text{N/mm}^2 = \frac{32 \cdot \frac{50000\text{N}}{2} \cdot \left(\frac{40\text{mm}}{4} + \frac{26\text{mm}}{3}\right)}{\pi \cdot (37\text{mm})^3}$$

3) Compressive Stress in Pin Inside Eye of Knuckle Joint given Load and Pin Dimensions

Open Calculator

fx $$\sigma_c = \frac{L}{b \cdot d}$$

ex $$33.78378\text{N/mm}^2 = \frac{50000\text{N}}{40\text{mm} \cdot 37\text{mm}}$$

4) Compressive Stress in Pin Inside Fork of Knuckle Joint given Load and Pin Dimensions

Open Calculator

fx $$\sigma_c = \frac{L}{2 \cdot a \cdot d}$$

ex $$25.98753\text{N/mm}^2 = \frac{50000\text{N}}{2 \cdot 26\text{mm} \cdot 37\text{mm}}$$

5) Max Bending Moment in Knuckle Pin given Load, Thickness of Eye and Fork

Open Calculator

fx $$M_b = \frac{L}{2} \cdot \left(\frac{b}{4} + \frac{a}{3}\right)$$

ex $$466666.7\text{N*mm} = \frac{50000\text{N}}{2} \cdot \left(\frac{40\text{mm}}{4} + \frac{26\text{mm}}{3}\right)$$

6) Shear Stress in Eye of Knuckle Joint given Load, Outer Diameter of Eye and its Thickness

Open Calculator

$$\tau_{eye} = \frac{L}{b \cdot (d_o - d)}$$

$$29.06977\text{N/mm}^2 = \frac{50000\text{N}}{40\text{mm} \cdot (80\text{mm} - 37\text{mm})}$$

7) Shear Stress in Fork of Knuckle Joint given Load, Outer Diameter of Eye and Pin Diameter

Open Calculator

$$\tau_{fork} = \frac{L}{2 \cdot a \cdot (d_o - d)}$$

$$22.36136\text{N/mm}^2 = \frac{50000\text{N}}{2 \cdot 26\text{mm} \cdot (80\text{mm} - 37\text{mm})}$$

8) Shear Stress in Pin of Knuckle Joint given Load and Pin Diameter

Open Calculator

$$\tau_{pin} = \frac{2 \cdot L}{\pi \cdot d^2}$$

$$23.25127\text{N/mm}^2 = \frac{2 \cdot 50000\text{N}}{\pi \cdot (37\text{mm})^2}$$

9) Tensile Stress in Eye of Knuckle Joint given Load, Outer Diameter of Eye and its Thickness

Open Calculator

fx $$(\sigma_t eye) = \frac{L}{b \cdot (d_o - d)}$$

ex $$29.06977 N/mm^2 = \frac{50000N}{40mm \cdot (80mm - 37mm)}$$

10) Tensile Stress in Fork of Knuckle Joint given Load, Outer Diameter of Eye and Pin Diameter

Open Calculator

fx $$(\sigma_t fork) = \frac{L}{2 \cdot a \cdot (d_o - d)}$$

ex $$22.36136 N/mm^2 = \frac{50000N}{2 \cdot 26mm \cdot (80mm - 37mm)}$$

11) Tensile Stress in Rod of Knuckle Joint

Open Calculator

fx $$(\sigma_t rod) = \frac{4 \cdot L}{\pi \cdot d_{rk}^2}$$

ex $$66.24555 N/mm^2 = \frac{4 \cdot 50000N}{\pi \cdot (31mm)^2}$$

12) Thickness of Eye End of Knuckle Joint given Bending Moment in Pin

Open Calculator

fx $$b = 4 \cdot \left(2 \cdot \frac{M_b}{L} - \frac{a}{3} \right)$$

ex $$37.33333\text{mm} = 4 \cdot \left(2 \cdot \frac{450000\text{N*mm}}{50000\text{N}} - \frac{26\text{mm}}{3} \right)$$

13) Thickness of Eye End of Knuckle Joint given Bending Stress in Pin

Open Calculator

fx $$b = 4 \cdot \left(\frac{\pi \cdot d^3 \cdot \sigma_b}{16 \cdot L} - \frac{a}{3} \right)$$

ex $$30.57708\text{mm} = 4 \cdot \left(\frac{\pi \cdot (37\text{mm})^3 \cdot 82\text{N/mm}^2}{16 \cdot 50000\text{N}} - \frac{26\text{mm}}{3} \right)$$

14) Thickness of Eye End of Knuckle Joint given Shear Stress in Eye

Open Calculator

fx $$b = \frac{L}{\tau_{eye} \cdot (d_o - d)}$$

ex $$48.44961\text{mm} = \frac{50000\text{N}}{24\text{N/mm}^2 \cdot (80\text{mm} - 37\text{mm})}$$

15) Thickness of Eye End of Knuckle Joint given Tensile Stress in Eye

Open Calculator

fx $$b = \frac{L}{(\sigma_t eye) \cdot (d_o - d)}$$

ex $$25.83979\text{mm} = \frac{50000\text{N}}{45\text{N/mm}^2 \cdot (80\text{mm} - 37\text{mm})}$$

16) Thickness of Eye of Knuckle Joint given Rod Diameter

Open Calculator

fx $$b = 1.25 \cdot d_{rk}$$

ex $$38.75\text{mm} = 1.25 \cdot 31\text{mm}$$

Fork

17) Outer Diameter of Eye of Knuckle Joint given Diameter of Pin

Open Calculator

fx $$d_o = 2 \cdot d$$

ex $$74\text{mm} = 2 \cdot 37\text{mm}$$

18) Outer Diameter of Eye of Knuckle Joint given Shear Stress in Eye

Open Calculator

fx $$d_o = d + \frac{L}{b \cdot \tau_{eye}}$$

ex $$89.08333\text{mm} = 37\text{mm} + \frac{50000\text{N}}{40\text{mm} \cdot 24\text{N/mm}^2}$$

19) Outer Diameter of Eye of Knuckle Joint given Shear Stress in Fork

Open Calculator

$$d_o = \frac{L}{2 \cdot \tau_{fork} \cdot a} + d$$

$$75.46154\text{mm} = \frac{50000\text{N}}{2 \cdot 25\text{N/mm}^2 \cdot 26\text{mm}} + 37\text{mm}$$

20) Outer Diameter of Eye of Knuckle Joint given Tensile Stress in Eye

Open Calculator

$$d_o = d + \frac{L}{b \cdot (\sigma_t eye)}$$

$$64.77778\text{mm} = 37\text{mm} + \frac{50000\text{N}}{40\text{mm} \cdot 45\text{N/mm}^2}$$

21) Outer Diameter of Eye of Knuckle Joint given Tensile Stress in Fork

Open Calculator

$$d_o = \frac{L}{2 \cdot (\sigma_t fork) \cdot a} + d$$

$$73.28447\text{mm} = \frac{50000\text{N}}{2 \cdot 26.5\text{N/mm}^2 \cdot 26\text{mm}} + 37\text{mm}$$

22) Thickness of Fork Eye of Knuckle Joint given Bending Moment in Pin

Open Calculator

fx $$a = 3 \cdot \left(2 \cdot \frac{M_b}{L} - \frac{b}{4} \right)$$

ex $$24\text{mm} = 3 \cdot \left(2 \cdot \frac{450000\text{N*mm}}{50000\text{N}} - \frac{40\text{mm}}{4} \right)$$

23) Thickness of Fork Eye of Knuckle Joint given Bending Stress in Pin

Open Calculator

fx $$a = 3 \cdot \left(\frac{\pi \cdot d^3 \cdot \sigma_b}{16 \cdot L} - \frac{b}{4} \right)$$

ex $$18.93281\text{mm} = 3 \cdot \left(\frac{\pi \cdot (37\text{mm})^3 \cdot 82\text{N/mm}^2}{16 \cdot 50000\text{N}} - \frac{40\text{mm}}{4} \right)$$

24) Thickness of Fork Eye of Knuckle Joint given Compressive Stress in Pin Inside Fork End

Open Calculator

fx $$a = \frac{L}{2 \cdot \sigma_c \cdot d}$$

ex $$22.52252\text{mm} = \frac{50000\text{N}}{2 \cdot 30\text{N/mm}^2 \cdot 37\text{mm}}$$

25) Thickness of Fork Eye of Knuckle Joint given Rod Diameter

Open Calculator

fx $$a = 0.75 \cdot d_{rk}$$

ex $$23.25\text{mm} = 0.75 \cdot 31\text{mm}$$

26) Thickness of Fork Eye of Knuckle Joint given Shear Stress in Fork

Open Calculator

fx $$a = \frac{L}{2 \cdot \tau_{fork} \cdot (d_o - d)}$$

ex $$23.25581\text{mm} = \frac{50000\text{N}}{2 \cdot 25\text{N/mm}^2 \cdot (80\text{mm} - 37\text{mm})}$$

27) Thickness of Fork Eye of Knuckle Joint given Tensile Stress in Fork

Open Calculator

fx $$a = \frac{L}{2 \cdot (\sigma_t \text{fork}) \cdot (d_o - d)}$$

ex $$21.93945\text{mm} = \frac{50000\text{N}}{2 \cdot 26.5\text{N/mm}^2 \cdot (80\text{mm} - 37\text{mm})}$$

Pin

28) Diameter of Knuckle Pin given Bending Moment in Pin

Open Calculator

fx $$d = \left(\frac{32 \cdot M_b}{\pi \cdot \sigma_b} \right)^{\frac{1}{3}}$$

ex $$38.23545\text{mm} = \left(\frac{32 \cdot 450000\text{N*mm}}{\pi \cdot 82\text{N/mm}^2} \right)^{\frac{1}{3}}$$

29) Diameter of Knuckle Pin given Bending Stress in Pin

Open Calculator

fx $$d = \left(\frac{32 \cdot \frac{L}{2} \cdot \left(\frac{b}{4} + \frac{a}{3} \right)}{\pi \cdot \sigma_b} \right)^{\frac{1}{3}}$$

ex $$38.70179\text{mm} = \left(\frac{32 \cdot \frac{50000\text{N}}{2} \cdot \left(\frac{40\text{mm}}{4} + \frac{26\text{mm}}{3} \right)}{\pi \cdot 82\text{N/mm}^2} \right)^{\frac{1}{3}}$$

30) Diameter of Pin of Knuckle Joint given Compressive Stress in Eye End Portion of Pin

Open Calculator

fx $$d = \frac{L}{\sigma_c \cdot b}$$

ex $$41.66667\text{mm} = \frac{50000\text{N}}{30\text{N/mm}^2 \cdot 40\text{mm}}$$

31) Diameter of Pin of Knuckle Joint given Compressive Stress in Fork End Portion of Pin

Open Calculator

fx $$d = \frac{L}{2 \cdot \sigma_c \cdot a}$$

ex $$32.05128\text{mm} = \frac{50000\text{N}}{2 \cdot 30\text{N/mm}^2 \cdot 26\text{mm}}$$

32) Diameter of Pin of Knuckle Joint given Diameter of Pinhead

Open Calculator

fx $$d = \frac{d_1}{1.5}$$

ex $$40\text{mm} = \frac{60\text{mm}}{1.5}$$

33) Diameter of Pin of Knuckle Joint given Load and Shear Stress in Pin

Open Calculator

fx $$d = \sqrt{\frac{2 \cdot L}{\pi \cdot \tau_{pin}}}$$

ex $$37.04086\text{mm} = \sqrt{\frac{2 \cdot 50000\text{N}}{\pi \cdot 23.2\text{N/mm}^2}}$$

34) Diameter of Pin of Knuckle Joint given Outer Diameter of Eye

Open Calculator

fx $$d = \frac{d_o}{2}$$

ex $$40\text{mm} = \frac{80\text{mm}}{2}$$

35) Diameter of Pin of Knuckle Joint given Shear Stress in Eye

Open Calculator

fx $$d = d_o - \frac{L}{b \cdot \tau_{eye}}$$

ex $$27.91667\text{mm} = 80\text{mm} - \frac{50000\text{N}}{40\text{mm} \cdot 24\text{N/mm}^2}$$

36) Diameter of Pin of Knuckle Joint given Shear Stress in Fork

Open Calculator

fx $$d = d_o - \frac{L}{2 \cdot \tau_{fork} \cdot a}$$

ex $$41.53846\text{mm} = 80\text{mm} - \frac{50000\text{N}}{2 \cdot 25\text{N/mm}^2 \cdot 26\text{mm}}$$

37) Diameter of Pin of Knuckle Joint given Tensile Stress in Eye

Open Calculator

fx $$d = d_o - \frac{L}{b \cdot (\sigma_t eye)}$$

ex $$52.22222\text{mm} = 80\text{mm} - \frac{50000\text{N}}{40\text{mm} \cdot 45\text{N/mm}^2}$$

38) Diameter of Pin of Knuckle Joint given Tensile Stress in Fork

Open Calculator

fx $$d = d_o - \frac{L}{2 \cdot (\sigma_t fork) \cdot a}$$

ex $$43.71553mm = 80mm - \frac{50000N}{2 \cdot 26.5N/mm^2 \cdot 26mm}$$

39) Diameter of Pinhead of Knuckle Joint given Diameter of Pin

Open Calculator

fx $$d_1 = 1.5 \cdot d$$

ex $$55.5mm = 1.5 \cdot 37mm$$

40) Length of Pin of Knuckle Joint in Contact with Eye End

Open Calculator

fx $$l = \frac{L}{\sigma_c \cdot d}$$

ex $$45.04505mm = \frac{50000N}{30N/mm^2 \cdot 37mm}$$

Rod

41) Diameter of Rod of Knuckle Joint given its Enlarged Diameter near Joint

Open Calculator

fx $$d_r = \frac{D_1}{1.1}$$

ex $$35.45455mm = \frac{39mm}{1.1}$$

42) Diameter of Rod of Knuckle Joint given Tensile Stress in Rod

Open Calculator

fx $$d_r = \sqrt{\frac{4 \cdot L}{\pi \cdot \sigma_t}}$$

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

43) Enlarged Diameter of Rod of Knuckle Joint near Joint

Open Calculator

fx $$D_1 = 1.1 \cdot d_r$$

ex $$39\text{mm} = 1.1 \cdot 35.45455\text{mm}$$

44) Rod Diameter of Knuckle Joint given Thickness of Eye

Open Calculator

fx $$d_r = \frac{b}{1.25}$$

ex $$35.44\text{mm} = \frac{44.3\text{mm}}{1.25}$$

45) Rod Diameter of Knuckle Joint given Thickness of Fork Eye

Open Calculator

fx $$d_r = \frac{a}{0.75}$$

ex $$35.46667\text{mm} = \frac{26.6\text{mm}}{0.75}$$

Variables Used

- **a** Thickess of Fork Eye of Knuckle Joint *(Millimeter)*
- **a** Thickess of Fork Eye of Knuckle Joint *(Millimeter)*
- **b** Thickess of Eye of Knuckle Joint *(Millimeter)*
- **b** Thickess of Eye of Knuckle Joint *(Millimeter)*
- **d** Diameter of Knuckle Pin *(Millimeter)*
- d_1 Diameter of Knuckle Pin Head *(Millimeter)*
- D_1 Enlarged Diameter of Knuckle Joint Rod *(Millimeter)*
- d_o Outer Diameter of Eye of Knuckle Joint *(Millimeter)*
- d_r Diameter of Rod of Knuckle Joint *(Millimeter)*
- d_{rk} Diameter of Rod of Knuckle Joint *(Millimeter)*
- **l** Length of Knuckle Pin in Eye End *(Millimeter)*
- **L** Load on Knuckle Joint *(Newton)*
- **L** Load on Knuckle Joint *(Newton)*
- M_b Bending Moment in Knuckle Pin *(Newton Millimeter)*
- σ_b Bending Stress in Knuckle Pin *(Newton per Square Millimeter)*
- σ_c Compressive Stress in Knuckle Pin *(Newton per Square Millimeter)*
- σ_t Tensile Stress in Knuckle Joint Rod *(Newton per Square Millimeter)*
- σ_t**eye** Tensile Stress in Eye of Knuckle Joint *(Newton per Square Millimeter)*
- σ_t**fork** Tensile Stress in Fork of Knuckle Joint *(Newton per Square Millimeter)*
- σ_t**rod** Tensile Stress in Knuckle Joint Rod *(Newton per Square Millimeter)*

- τ_{eye} Shear Stress in Eye of Knuckle Joint *(Newton per Square Millimeter)*
- τ_{fork} Shear Stress in Fork of Knuckle Joint *(Newton per Square Millimeter)*
- τ_{pin} Shear Stress in Knuckle Pin *(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: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Torque** in Newton Millimeter (N*mm)
  Torque 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
- Seals Formulas
- Threaded Bolted Joints Formulas
- Welded Joints Formulas

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

7/1/2024 | 8:53:03 AM UTC *Please leave your feedback here...*