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Pin Formulas

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List of 13 Pin Formulas

Pin

1) 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 $$37.06722\text{mm} = \left(\frac{32 \cdot 450000\text{N*mm}}{\pi \cdot 90\text{N/mm}^2} \right)^{\frac{1}{3}}$$

2) 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 $$37.03115\text{mm} = \left(\frac{32 \cdot \frac{45000\text{N}}{2} \cdot \left(\frac{44.3\text{mm}}{4} + \frac{26.6\text{mm}}{3} \right)}{\pi \cdot 90\text{N/mm}^2} \right)^{\frac{1}{3}}$$

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

Open Calculator

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

$$33.86005\text{mm} = \frac{45000\text{N}}{30\text{N/mm}^2 \cdot 44.3\text{mm}}$$

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

Open Calculator

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

$$28.19549\text{mm} = \frac{45000\text{N}}{2 \cdot 30\text{N/mm}^2 \cdot 26.6\text{mm}}$$

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

Open Calculator

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

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

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

Open Calculator

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

ex $$35.14005\text{mm} = \sqrt{\frac{2 \cdot 45000\text{N}}{\pi \cdot 23.2\text{N/mm}^2}}$$

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

Open Calculator

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

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

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

Open Calculator

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

ex $$37.67494\text{mm} = 80\text{mm} - \frac{45000\text{N}}{44.3\text{mm} \cdot 24\text{N/mm}^2}$$

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

Open Calculator

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

ex $$46.16541\text{mm} = 80\text{mm} - \frac{45000\text{N}}{2 \cdot 25\text{N/mm}^2 \cdot 26.6\text{mm}}$$

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

Open Calculator

fx $$d = d_o - \frac{L}{b \cdot \sigma_{te}}$$

ex $$57.42664\text{mm} = 80\text{mm} - \frac{45000\text{N}}{44.3\text{mm} \cdot 45\text{N/mm}^2}$$

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

Open Calculator

fx $$d = d_o - \frac{L}{2 \cdot \sigma_{tf} \cdot a}$$

ex $$48.08058\text{mm} = 80\text{mm} - \frac{45000\text{N}}{2 \cdot 26.5\text{N/mm}^2 \cdot 26.6\text{mm}}$$

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

Open Calculator

fx $$d_1 = 1.5 \cdot d$$

ex $$55.5\text{mm} = 1.5 \cdot 37\text{mm}$$

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

Open Calculator

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

ex $$40.54054\text{mm} = \frac{45000\text{N}}{30\text{N/mm}^2 \cdot 37\text{mm}}$$

Variables Used

- **a** Thickess of Fork 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_o Outer Diameter of Eye of Knuckle Joint *(Millimeter)*
- **l** Length of Knuckle Pin in Eye End *(Millimeter)*
- **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_{te} Tensile Stress in Eye of Knuckle Joint *(Newton per Square Millimeter)*
- σ_{tf} Tensile Stress in Fork of Knuckle Joint *(Newton per Square Millimeter)*
- τ_e Shear Stress in Eye of Knuckle Joint *(Newton per Square Millimeter)*
- τ_f Shear Stress in Fork of Knuckle Joint *(Newton per Square Millimeter)*
- τ_p 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

- **Eye Formulas**
- **Pin Formulas**

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