Important Pin Formulas PDF

Formulas
Examples
with Units

List of 13
Important Pin Formulas

1) Diameter of Knuckle Pin given Bending Moment in Pin Formula

Evaluate Formula

Formula

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

Example with Units

$$37.0672\,\text{mm} = \left(\frac{32 \cdot 450000\,\text{N*mm}}{3.1416 \cdot 90\,\text{N/mm}^2}\right)^{\frac{1}{3}}$$

2) Diameter of Knuckle Pin given Bending Stress in Pin Formula

Evaluate Formula

Formula

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

Example with Units

$$37.0311\,\text{mm} = \left(\frac{32 \cdot \frac{45000\,\text{N}}{2} \cdot \left(\frac{44.3\,\text{mm}}{4} + \frac{26.6\,\text{mm}}{3}\right)}{3.1416 \cdot 90\,\text{N/mm}^2}\right)^{\frac{1}{3}}$$

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

Evaluate Formula

Formula

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

Example with Units

$$33.86\,\text{mm} = \frac{45000\,\text{N}}{30\,\text{N/mm}^2 \cdot 44.3\,\text{mm}}$$

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

Evaluate Formula

Formula

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

Example with Units

$$28.1955\,\text{mm} = \frac{45000\,\text{N}}{2 \cdot 30\,\text{N/mm}^2 \cdot 26.6\,\text{mm}}$$

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

Evaluate Formula

Formula

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

Example with Units

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

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

Evaluate Formula

Formula

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

Example with Units

$$35.14\,\text{mm} = \sqrt{\frac{2 \cdot 45000\,\text{N}}{3.1416 \cdot 23.2\,\text{N/mm}^2}}$$

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

Evaluate Formula

Formula

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

Example with Units

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

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

Evaluate Formula

Formula

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

Example with Units

$$37.6749\,\text{mm} = 80\,\text{mm} - \frac{45000\,\text{N}}{44.3\,\text{mm} \cdot 24\,\text{N/mm}^2}$$

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

Evaluate Formula

Formula

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

Example with Units

$$46.1654\,\text{mm} = 80\,\text{mm} - \frac{45000\,\text{N}}{2 \cdot 25\,\text{N/mm}^2 \cdot 26.6\,\text{mm}}$$

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

Evaluate Formula

Formula

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

Example with Units

$$57.4266\,\text{mm} = 80\,\text{mm} - \frac{45000\,\text{N}}{44.3\,\text{mm} \cdot 45\,\text{N/mm}^2}$$

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

Evaluate Formula

Formula

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

Example with Units

$$48.0806\,\text{mm} = 80\,\text{mm} - \frac{45000\,\text{N}}{2 \cdot 26.5\,\text{N/mm}^2 \cdot 26.6\,\text{mm}}$$

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

Evaluate Formula

Formula

$$d_1 = 1.5 \cdot d$$

Example with Units

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

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

Evaluate Formula

Formula

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

Example with Units

$$40.5405\,\text{mm} = \frac{45000\,\text{N}}{30\,\text{N/mm}^2 \cdot 37\,\text{mm}}$$

Variables used in list of Pin Formulas above

- **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 in list of Pin Formulas above

- constant(s): **pi**, 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: **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*

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