Important Eye Formulas PDF



Formulas Examples with Units

List of 16 Important Eye Formulas

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



$$\sigma_{b} = \frac{32 \cdot M_{b}}{\pi \cdot d^{3}}$$

$$\sigma_{b} = \frac{32 \cdot M_{b}}{\pi \cdot d^{3}} = \frac{32 \cdot 450000 \,\text{N*mm}}{3.1416 \cdot 37 \,\text{mm}^{3}}$$

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

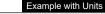


Evaluate Formula (

Evaluate Formula (

Evaluate Formula C

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





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



Example with Units

$$\sigma_{c} = \frac{L}{b \cdot d}$$
 $27.4541 \, \text{N/mm}^{2} = \frac{45000 \, \text{N}}{44.3 \, \text{mm} \cdot 37 \, \text{mm}}$

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

Formula

$$\sigma_{c} = \frac{L}{2 \cdot a \cdot d}$$

Example with Units

$$\sigma_{\rm c} = \frac{\rm L}{2 \cdot a \cdot d}$$
 $22.8612 \, \text{N/mm}^2 = \frac{45000 \, \text{N}}{2 \cdot 26.6 \, \text{mm} \cdot 37 \, \text{mm}}$

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

Evaluate Formula (

$$\mathsf{M}_b = \frac{\mathsf{L}}{2} \cdot \left(\frac{\mathsf{b}}{4} + \frac{\mathsf{a}}{3} \right)$$

Example with Units

$$M_b = \frac{L}{2} \cdot \left(\frac{b}{4} + \frac{a}{3}\right) \qquad 448687.5 \, N^* mm = \frac{45000 \, N}{2} \cdot \left(\frac{44.3 \, mm}{4} + \frac{26.6 \, mm}{3}\right)$$

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

Example with Units

Evaluate Formula (

Evaluate Formula (

Evaluate Formula (

Evaluate Formula

Evaluate Formula (

Evaluate Formula 🕝

 $\tau_{e} = \frac{L}{b \cdot (d_{o} - d)}$ $23.6233 \, \text{N/mm}^{2} = \frac{45000 \, \text{N}}{44.3 \, \text{mm} \cdot (80 \, \text{mm} - 37 \, \text{mm})}$

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

$$\tau_f = \frac{L}{2 \cdot a \cdot \left(\left. d_o - d \right. \right)}$$

 $\tau_{f} = \frac{L}{2 \cdot a \cdot (d_{o} - d)} \left| 19.6713 \,\text{N/mm}^{2} = \frac{45000 \,\text{N}}{2 \cdot 26.6 \,\text{mm} \cdot (80 \,\text{mm} - 37 \,\text{mm})} \right|$

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

Example with Units

Formula Example with Units
$$\tau_{p} = \frac{2 \cdot L}{\pi \cdot d^{2}}$$

$$20.9261 \, \text{N/mm}^{2} = \frac{2 \cdot 45000 \, \text{N}}{3.1416 \cdot 37 \, \text{mm}^{2}}$$

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



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

$$\sigma_{tf} = \frac{L}{2 \cdot a \cdot \left(d_o - d \right)} \left[\begin{array}{c} \text{Example with Units} \\ \\ 19.6713 \, \text{N/mm}^2 \end{array} \right. = \frac{45000 \, \text{N}}{2 \cdot 26.6 \, \text{mm} \cdot \left(80 \, \text{mm} - 37 \, \text{mm} \right)}$$

11) Tensile Stress in Rod of Knuckle Joint Formula 🕝

Formula Example with Units
$$\sigma_{t} = \frac{4 \cdot L}{7 \cdot d^{2}}$$

$$59.621 \text{ N/mm}^{2} = \frac{4 \cdot 45000 \text{ N}}{21416 \cdot 21}$$

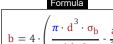
$\sigma_{t} = \frac{4 \cdot L}{\pi \cdot d_{r1}^{2}}$ $59.621 \, \text{N/mm}^{2} = \frac{4 \cdot 45000 \, \text{N}}{3.1416 \cdot 31 \, \text{mm}^{2}}$

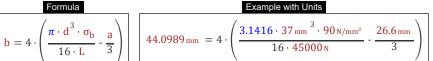
12) Thickness of Eye End of Knuckle Joint given Bending Moment in Pin Formula 🕝 Formula

Formula Example with Units
$$b = 4 \cdot \left(2 \cdot \frac{M_b}{L} - \frac{a}{3}\right) \boxed{ 44.5333 \, \text{mm} = 4 \cdot \left(2 \cdot \frac{450000 \, \text{N*mm}}{45000 \, \text{N}} - \frac{26.6 \, \text{mm}}{3}\right) }$$

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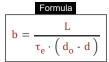






Evaluate Formula (

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



Formula Example with Units
$$b = \frac{L}{\tau_e \cdot \left(d_o - d \right)} = \frac{45000 \, \text{N}}{24 \, \text{N/mm}^2 \cdot \left(80 \, \text{mm} - 37 \, \text{mm} \right)}$$

Evaluate Formula [

Evaluate Formula (

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

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

Example with Units
$$23.2558 \,\text{mm} = \frac{45000 \,\text{N}}{45 \,\text{N/mm}^2 \cdot \left(80 \,\text{mm} - 37 \,\text{mm}\right)}$$

16) Thickness of Eye of Knuckle Joint given Rod Diameter Formula 🕝



Evaluate Formula [

Variables used in list of Eye 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_o Outer Diameter of Eye of Knuckle Joint (Millimeter)
- d_{r1} Diameter of Rod of Knuckle Joint (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_t Tensile Stress in Knuckle Joint Rod (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)
- T_e Shear Stress in Eye of Knuckle Joint (Newton per Square Millimeter)
- T_f Shear Stress in Fork of Knuckle Joint (Newton per Square Millimeter)
- T_p Shear Stress in Knuckle Pin (Newton per Square Millimeter)

Constants, Functions, Measurements used in list of Eye Formulas above

- constant(s): pi,
 3.14159265358979323846264338327950288
 Archimedes' constant
- 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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