Eye Formulas... 1/9





Eye Formulas

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List of 16 Eye Formulas

Eye 🗗

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



Open Calculator

 $\sigma_{
m b} = rac{32 \cdot {
m M_b}}{\pi \cdot {
m d}^3}$

 $\mathbf{ex} \left[90.49143 \mathrm{N/mm^2} = rac{32 \cdot 450000 \mathrm{N*mm}}{\pi \cdot (37 \mathrm{mm})^3}
ight]$

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

$$\sigma_{
m b} = rac{32 \cdot rac{
m L}{2} \cdot \left(rac{
m b}{4} + rac{
m a}{3}
ight)}{\pi \cdot {
m d}^3}$$

Open Calculator 2

 $ext{ex} egin{aligned} 90.2275 ext{N/mm}^2 = rac{32 \cdot rac{45000 ext{N}}{2} \cdot \left(rac{44.3 ext{mm}}{4} + rac{26.6 ext{mm}}{3}
ight)}{\pi \cdot \left(37 ext{mm}
ight)^3} \end{aligned}$

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

 $\left|\sigma_{\mathrm{c}} = rac{\mathrm{L}}{\mathrm{b}\cdot\mathrm{d}}
ight|$

Open Calculator

 $\mathbf{ex} \left[27.45409 \mathrm{N/mm^2} = rac{45000 \mathrm{N}}{44.3 \mathrm{mm} \cdot 37 \mathrm{mm}}
ight]$





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

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

Open Calculator

 $\mathbf{ex} = 22.86121 \mathrm{N/mm^2} = rac{45000 \mathrm{N}}{2 \cdot 26.6 \mathrm{mm} \cdot 37 \mathrm{mm}}$

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

 $\mathbf{M}_{\mathrm{b}} = rac{\mathrm{L}}{2} \cdot \left(rac{\mathrm{b}}{4} + rac{\mathrm{a}}{3}
ight)$

Open Calculator

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

 $au_{
m e} = rac{
m L}{
m b\cdot (d_o-d)}$

Open Calculator

 $ext{ex} 23.62329 ext{N/mm}^2 = rac{45000 ext{N}}{44.3 ext{mm} \cdot (80 ext{mm} - 37 ext{mm})}$



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

 $au_{
m f} = rac{
m L}{2 \cdot {
m a} \cdot ({
m d}_{
m o} - {
m d})}$

- Open Calculator 🗗
- $ext{ex} 19.67127 ext{N/mm}^2 = rac{45000 ext{N}}{2 \cdot 26.6 ext{mm} \cdot (80 ext{mm} 37 ext{mm})}$
- 8) Shear Stress in Pin of Knuckle Joint given Load and Pin Diameter
- $\left| au_{
 m p} = rac{2\cdot {
 m L}}{\pi\cdot {
 m d}^2}
 ight|$

Open Calculator

- $ext{ex} \ 20.92614 ext{N/mm}^2 = rac{2 \cdot 45000 ext{N}}{\pi \cdot (37 ext{mm})^2}$
- 9) Tensile Stress in Eye of Knuckle Joint given Load, Outer Diameter of Eye and its Thickness
- $\sigma_{
 m te} = rac{L}{b \cdot (d_o d)}$

Open Calculator

$$ext{ex} 23.62329 ext{N/mm}^2 = rac{45000 ext{N}}{44.3 ext{mm} \cdot (80 ext{mm} - 37 ext{mm})}$$



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

 $\sigma_{
m tf} = rac{
m L}{2 \cdot {
m a} \cdot ({
m d}_{
m o} - {
m d})}$

Open Calculator 🗗

 $ext{ex} \ 19.67127 ext{N/mm}^2 = rac{45000 ext{N}}{2 \cdot 26.6 ext{mm} \cdot (80 ext{mm} - 37 ext{mm})}$

11) Tensile Stress in Rod of Knuckle Joint

 $\left| \mathbf{f}_{\mathbf{t}}
ight| \sigma_{\mathrm{t}} = rac{4 \cdot L}{\pi \cdot d_{\mathrm{r}1}^2}
ight|$

Open Calculator

 $ext{ex} 59.621 ext{N/mm}^2 = rac{4 \cdot 45000 ext{N}}{\pi \cdot (31 ext{mm})^2}$

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

 $b=4\cdot\left(2\cdotrac{
m M_b}{
m L}-rac{
m a}{3}
ight)$

Open Calculator



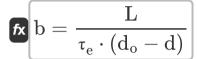
13) Thickness of Eye End of Knuckle Joint given Bending Stress in Pin

 $\left|\mathbf{b} = 4 \cdot \left(rac{\pi \cdot \mathrm{d}^3 \cdot \sigma_\mathrm{b}}{16 \cdot \mathrm{L}} - rac{\mathrm{a}}{3}
ight)
ight|$

Open Calculator 🗗

 $ag{44.09888 ext{mm}} = 4 \cdot \left(rac{\pi \cdot \left(37 ext{mm}
ight)^3 \cdot 90 ext{N/mm}^2}{16 \cdot 45000 ext{N}} - rac{26.6 ext{mm}}{3}
ight)$

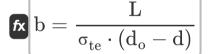
14) Thickness of Eye End of Knuckle Joint given Shear Stress in Eye



ess in Eye 🗷

 $oxed{43.60465 ext{mm} = rac{45000 ext{N}}{24 ext{N}/ ext{mm}^2 \cdot (80 ext{mm} - 37 ext{mm})}}$

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



Open Calculator

 $\mathbf{ex} \ 23.25581 \mathrm{mm} = rac{45000 \mathrm{N}}{45 \mathrm{N/mm^2 \cdot (80 \mathrm{mm} - 37 \mathrm{mm})}}$

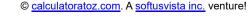
16) Thickness of Eye of Knuckle Joint given Rod Diameter



Open Calculator

 $| \mathbf{ex} | 38.75 \mathrm{mm} = 1.25 \cdot 31 \mathrm{mm}$







Eye Formulas... 7/9

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)
- do Outer Diameter of Eye of Knuckle Joint (Millimeter)
- **d**_{r1} Diameter of Rod of Knuckle Joint (Millimeter)
- 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)
- Tp Shear Stress in Knuckle Pin (Newton per Square Millimeter)





Eye Formulas... 8/9

Constants, Functions, Measurements used

- Constant: 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





Eye Formulas... 9/9

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