

هندبوک مهندسی نرم افزار Autodesk Inventor

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Joints / Movable Joints

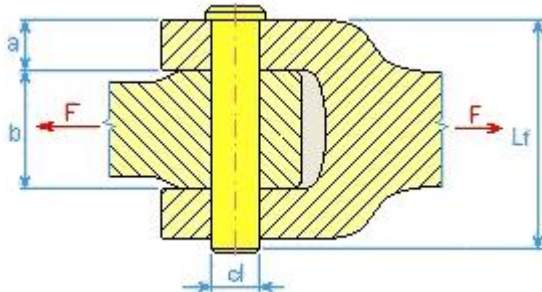
Clevis Pin Generator

[قابل توجه خوانندگان عزیز: کلیه مطالب

این هندبوک از سایت شرکت Autodesk

کپی برداری شده است.]

Calculation formulas for metric units



Bending stress

$$\sigma_o = \frac{M_o}{W_o} = \frac{F(b+2a)}{8 \frac{\pi \cdot d^3}{32}} = \frac{4F(b+2a)}{\pi \cdot d^3} \leq \sigma_{oD} \quad [MPa]$$

Pressure in rod

$$p_1 = \frac{F}{d \cdot b} \leq p_{1D} \quad [MPa]$$

Pressure in clevis

$$p_2 = \frac{F}{2d \cdot a} \leq p_{2D} \quad [MPa]$$

Shear stress

$$\tau = \frac{2F}{\pi \cdot d^2} \leq \tau_D \quad [MPa]$$

where:

F force [N]

σ_o bending stress [MPa]

σ_{oD} allowable bending stress [MPa]

M_o bending moment [N mm]

W_0 bending section modulus [mm^3]

τ shear stress [MPa]

τ_D allowable shear stress [MPa]

d pin diameter [mm]

p_1 pressure in rod [MPa]

p_2 pressure in clevis [MPa]

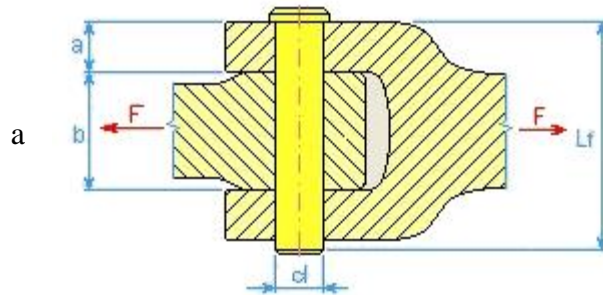
P_{1D} allowable pressure in rod [MPa]

P_{2D} allowable pressure in clevis [MPa]

b rod width [mm]

clevis arm width [mm]

Calculation formulas for English units



Bending stress

$$\sigma_o = \frac{M_o}{W_o} = \frac{F(b+2a)}{8 \frac{\pi \cdot d^3}{32}} = \frac{4F(b+2a)}{\pi \cdot d^3} \leq \sigma_{oD} \quad [\text{psi}]$$

Pressure in rod

$$p_1 = \frac{F}{d \cdot b} \leq p_{1D} \quad [\text{psi}]$$

Pressure in clevis

$$p_2 = \frac{F}{2d \cdot a} \leq p_{2D} \quad [\text{psi}]$$

Shear stress

Shear stress

$$\tau = \frac{2F}{\pi \cdot d^2} \leq \tau_D \quad [\text{psi}]$$

where:

F force [lb]

σ_0 bending stress [psia]

σ_{0D} allowable bending stress [psi]

M_0 bending moment [lb ft]

W_0 bending section modulus [in^3]

τ shear stress [psi]

τ_D allowable shear stress [psi]

d pin diameter [in]

p_1 pressure in rod [psia]

p_2 pressure in clevis [psi]

p_{1D} allowable pressure in rod [psi]

p_{2D} allowable pressure in clevis [psi]

b rod width [in]

clevis arm width [in]

a

Allowable stresses for metric calculation of clevis pin joints

| <i>Part Material</i> | Unmovable joint mounting p_A [MPa] | | | Movable joint mounting p_A [MPa] | | |
|---|--------------------------------------|----------|-------------|------------------------------------|----------|-------------|
| | static | repeated | alternating | static | repeated | alternating |
| Steel grade. 37, 42 | 84 | 65 | 50 | 30 | 3 24 | 12 |
| Steel grade 50, 60 high-grade and Alloy Steel | 120 | 90 | 60 | 30 | 24 | 12 |
| Cast Steel | 80 | 60 | 40 | 30 | 3 24 | 12 |
| gray Cast Iron | 70 | 50 | 30 | 40 | 4 32 | 16 |
| <i>Pin Material</i> | σ_{BA} [MPa] | | | τ_A [MPa] | | |
| | static | repeated | alternating | static | repeated | alternating |
| 11 373, 11 423, 11 110 | 80 | 55 | 35 | 50 | 35 | 25 |
| 11 500 | 110 | 80 | 50 | 70 | 50 | 35 |
| 11 600 | 130 | 95 | 60 | 85 | 60 | 42 |
| 11 700, 12 040 | 150 | 110 | 68 | 100 | 68 | 48 |

where:

p_A allowable pressure [MPa]

σ_{BA} allowable bending stress [MPa]

τ_A allowable shear stress [MPa]

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