Pin Joint (Clevis) in Double Shear and Bearing

Shear stress in a clevis pin in double shear, bearing stress on the pin and eye, and the smallest pin diameter for allowable stresses.

Method: Direct shear and projected-area bearing (textbook strength of materials)

Input parameters

Unit system: SI

Parameter	Value	Unit
Load on the joint	50.000	kN
Pin diameter	25.000	mm
Thickness of the eye (middle plate)	30.000	mm
Allowable shear stress of the pin	80.000	MPa
Allowable bearing stress	120.00	MPa

Calculated results

Parameter	Value	Unit
Shear stress in the pin F/(2 π d²/4)	50.930	MPa
Bearing stress on the eye F/(d t)	66.667	MPa
Pin diameter needed for shear	19.947	mm
Pin diameter needed for bearing	13.889	mm

Notes for this case

- Pin shear within the allowable.
- Bearing on the eye within the allowable.
- Bearing on the fork plates, bending of the pin and tear-out of the eye are separate checks.

Formula and method

$$\tau = \frac{F}{2\,\pi d^2/4}, \quad \sigma_b = \frac{F}{d\,t}$$

Variables

F	Load on the joint	N
d	Pin diameter	m
t	Thickness of the eye (middle plate)	m
τ_a	Allowable shear stress of the pin	Pa
$\sigma_{b,a}$	Allowable bearing stress	Pa
τ	Shear stress in the pin F/(2 π d²/4)	Pa
σ_b	Bearing stress on the eye F/(d t)	Pa
d_s	Pin diameter needed for shear	m
d_b	Pin diameter needed for bearing	m

Method and standards

Direct shear and bearing.

Assumptions and limits

- Static load; double shear with the eye as the middle plate.
- Bearing on the fork plates, bending of the pin and tear-out of the eye are not checked.

References

- Direct shear and projected-area bearing (textbook strength of materials)

Report details

Report reference	FCC-ZYQF-3Y0Q (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Pin Joint (Clevis) in Double Shear and Bearing
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/machine-design/pin-joint-shear-bearing

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.