

Equivalent Stress Check

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project

Part/Position: no real part

Prepared by: Sample, not released

Overall assessment: OK - the available safety factor against yielding meets the required safety factor.

Stress state

Input mode	Combined bar/shaft
Governing hypothesis	Von Mises (distortion energy)
Normal stress σ (tension/bending)	100 N/mm ²
Shear stress τ (torsion/shear)	50 N/mm ²
Yield strength R_p	355 N/mm ²
Required safety factor S_{req}	1.5

Principal stresses

Principal stress σ_1	120.71 N/mm ²
Principal stress σ_2	-20.71 N/mm ²
Principal stress σ_3	0 N/mm ²
Max. shear stress τ_{max}	70.71 N/mm ²

Equivalent stresses

Von Mises (distortion energy)	132.29 N/mm ²
Tresca (max. shear stress)	141.42 N/mm ²
Rankine (max. normal stress)	120.71 N/mm ²
Governing equivalent stress σ_v	132.29 N/mm ²
Allowable stress R_p/S_{req}	236.67 N/mm ²

Check

Criterion	Value	Limit	Status
Safety factor $S = R_p/\sigma_v$ (Von Mises (distortion energy))	2.68	1.5	● OK

Calculation basis

The multiaxial stress state is reduced to a uniaxial equivalent stress σ_v via a strength hypothesis, which is then compared with the yield strength R_p . The von Mises criterion (distortion energy theory) suits ductile materials, the Tresca criterion (maximum shear stress theory) is slightly more conservative, and the Rankine criterion (maximum normal stress theory) describes brittle material behavior. For the plane stress state the principal stresses follow from Mohr's circle $\sigma_{1,2} = (\sigma_x + \sigma_y)/2 \pm \sqrt{((\sigma_x - \sigma_y)/2)^2 + \tau_{xy}^2}$; the third principal stress is zero. The available safety factor is $S = R_p/\sigma_v$.

About this sample

All values on these pages come from a freely chosen example calculation and belong to no real part. The purchased export contains the same sections with your input, your header data (project, part, prepared by) and as searchable text. Pricing and scope: maschinenbaurechner.de/en/pricing

Note: The results are design and orientation aids. They do not replace independent verification, calculation and approval by a qualified person. The terms of use at maschinenbaurechner.de apply.