

Pressure Vessel/Pipe Verification (Preliminary Sizing)

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.

Preliminary sizing only. A certified design per AD 2000 or EN 13445 (safety factors, weld joint factor, allowances for wear and manufacturing, temperature effects) is not included.

Loading and Geometry

Internal pressure p	1 N/mm ²
Model	Thin-wall (boiler formula), cylinder
Inside diameter D	500 mm
Wall thickness s	5 mm
Ratio D/s	100
Ends	closed (with axial stress)
Yield strength R _e	235 N/mm ²
Required safety factor S _{req}	1.5

Stresses

Tangential (hoop) stress σ_t (inside)	50 N/mm ²
Axial stress σ_{ax}	25 N/mm ²
Radial stress σ_r (inside)	0 N/mm ²
Equivalent stress σ_v (von Mises)	43.3 N/mm ²
Equivalent stress σ_v (Tresca)	50 N/mm ²
Allowable stress R _e /S _{req}	156.67 N/mm ²
Required wall thickness s _{req}	1.6 mm

Verification against yielding

Criterion	Value	Limit	Status
Safety factor S = R _e /σ _v (von Mises)	5.43	1.5	● OK

Calculation basis

Thin-wall (boiler formula, membrane theory): cylinder $\sigma_t = p \cdot D / (2 \cdot s)$ and $\sigma_{ax} = p \cdot D / (4 \cdot s)$, sphere $\sigma = p \cdot D / (4 \cdot s)$; required wall thickness $s = p \cdot D / (2 \cdot \sigma_{allow})$ or $p \cdot D / (4 \cdot \sigma_{allow})$ respectively. Thick-wall (Lamé, internal pressure): at the governing inner fibre $\sigma_t = p \cdot (r_a^2 + r_i^2) / (r_a^2 - r_i^2)$, $\sigma_r = -p$; the radial stress decreases to 0 at the outer fibre. The equivalent stress is formed per the distortion energy theory (von Mises) and the maximum shear stress theory (Tresca); the safety factor against yielding is $S = R_e / \sigma_v$ (von Mises). Stability (external pressure, buckling) and fatigue verifications, as well as heads, nozzles and weld seams, are not included.

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.