Bolted Joint Verification

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

Verification M12 8.8, centrically clamped

Overall assessment: OK (all verifications satisfied)

Inputs

Thread / property class	M12 8.8
Head shape / joint type	Hex head / DSV
Friction coefficients µG / µK / µT	0.12 / 0.12 / 0.12
Tightening factor α_A	1.6
Load introduction factor n	0.5
Axial force FA,O / FA,U	10 / 0 kN
Transverse force FQ	0 kN
Required residual clamp force FK,req	0 kN
Clamp length lK / shank portion	36 / 18 mm
Effective outer diameter DA	40 mm
Material of the clamped parts	S355

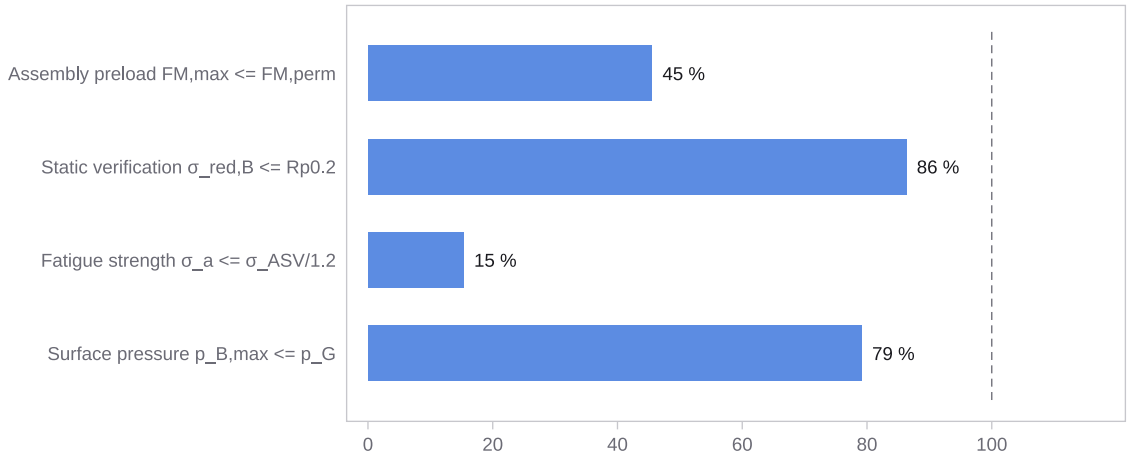
Intermediate values

Quantity	Value
Bolt compliance δ_S	$2.778 \cdot 10^{-6}$ mm/N
Plate compliance δ_P	$0.652 \cdot 10^{-6}$ mm/N
Force ratio Φ_K / Φ_n	0.19 / 0.095
Embedding amount fZ / preload loss FZ	11 µm / 3.21 kN
Required clamp force FK,req,total	0 kN
Assembly preload FM,min / FM,max	12.26 / 19.61 kN
Permissible assembly preload FM,perm	43.11 kN
Tightening torque MA	83.6 Nm
Tensile stress σ_z,max / torsion τ_M	522.9 / 204.7 N/mm²
Equivalent stress σ_red,B	552.1 N/mm²
Fatigue strength σ_a / σ_ASV	6.2 / 48.9 N/mm²
Surface pressure p_M,max / p_B,max	588.2 / 601.2 N/mm²
Residual clamp force FKR	14.69 kN

Verifications

Criterion	Value	Limit	Status
Assembly preload FM,max <= FM,perm	19.6 kN	43.1 kN	● OK
Static verification σ_red,B <= Rp0.2	552.1 N/mm²	640 N/mm²	● OK
Fatigue strength σ_a <= σ_ASV/1.2	6.2 N/mm²	40.7 N/mm²	● OK
Surface pressure p_B,max <= p_G	601.2 N/mm²	760 N/mm²	● OK

Utilization diagram



Calculation basis

Verification per the systematics of VDI 2230 sheet 1 for centrically clamped and centrically loaded tapped and through-bolt joints: compliances of the bolt and the clamped parts (equivalent deformation cone), force ratio with load introduction factor, embedding force loss, minimum and maximum assembly preload via the tightening factor, permissible assembly preload at 90 % utilization of the yield strength, static verification via the equivalent stress (kTau = 0.5), fatigue strength of quenched-and-tempered bolts, surface pressure under the head bearing area, as well as residual clamp force and slip safety.

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