

Table b Mechanical and Physical Properties

Mechanical and physical property			Property class										
			3.6	4.6	4.8	5.6	5.8	6.8	8.8 ^(A)		9.8 ^(B)	10.9	12.9
									d ≤ 16 mm ^(C)	d > 16 mm ^(C)			
Nominal tensile strength, $R_{m, nom}$	N/mm ²	300	400		500		600	800	800	900	1,000	1,200	
Minimum tensile strength, $R_{m, min}$ ^(D) ^(E)	N/mm ²	330	400	420	500	520	600	800	830	900	1,040	1,220	
Vickers hardness	HV	min.	95	120	130	155	160	190	250	255	290	320	385
		F ≥ 98N	max.	220 ^(F)					250	320	335	360	380
Brinell hardness	HB	min.	90	114	124	147	152	181	238	242	276	304	366
		F = 30D ²	max.	209 ^(F)					238	304	318	342	361
Rockwell hardness	HR	min.	HRB	52	67	71	79	82	89	—			
			HRC	—					—	22	23	28	32
		max.	HRB	95.0 ^(F)					99.5	—			
			HRC	—					—	32	34	37	39
Surface hardness	HV 0.3	max.	—					^(G)					
Lower yield stress, R_{eL} ^(H)	N/mm ²	nom.	180	240	320	300	400	480	—				
		min.	190	240	340	300	420	480	—				
Stress at 0.2% non-proportional elongation, $R_{p0.2}$ ^(I)	N/mm ²	nom.	—					—	640	640	720	900	1,080
		min.	—					—	640	660	720	940	1,100
Stress under proof load	S_p	S_p / R_{eL} or $S_p / R_{p0.2}$	0.94	0.94	0.91	0.93	0.90	0.92	0.91	0.91	0.90	0.88	0.88
		N/mm ²	180	225	310	280	380	440	580	600	650	830	970
Breaking torque, M_B	NM	min.	—					See ISO 898-7					
Percent elongation after fracture, A	min.	25	22	—	20	—	—	12	12	10	9	8	
Reduction area after fracture, Z	%	min.	—					52		48	48	44	
Strength under wedge loading ^(J)	The values for full size bolts and screws (no studs) shall not be smaller than the minimum values for tensile strength												
Impact strength, KU	J	min.	—		25	—		30	30	25	20	15	
Head soundness	No fracture												
Minimum height of non-decarburized thread zone	E	—					1/2 H ₁			2/3 H ₁	3/4 H ₁		
Maximum depth of complete decarburization	G	mm	—					0.015					
Hardness after retempering	—					Reduction of hardness 20 HV maximum							
Surface integrity	In accordance with ISO 6157-1 or ISO 6157-3 as appropriate												

- A. For bolts of property class 8.8 in diameters $d \leq 16$ mm, there is an increased risk of nut stripping in the case of inadvertent over-tightening inducing a load in excess of proof load. Reference to ISO 898-2 is recommended.
- B. Applies only to nominal thread diameters $d \leq 16$ mm.
- C. For structural bolting the limit is 12mm.
- D. Minimum tensile properties apply to products of nominal length $L \geq 2.5 d$. Minimum hardness applies to products of length $L < 2.5 d$ and other products which cannot be tensile-tested (e.g. due to head configuration).
- E. When testing full-size bolts, screws and studs, the tensile loads, which are to be applied for the calculation of R_m shall meet the values given in tables f and g.
- F. A hardness reading taken at the end of bolts, screws and studs shall be 250 HV, 238 HB or 99.5 HRB maximum.
- G. Surface hardness shall not be more than 30 Vickers points above the measured core hardness on the product when readings of both surface and core are carried out at HV 0.3. For property class 10.9, any increase in hardness at the surface which indicates that the surface hardness exceeds 390 HV is not acceptable.
- H. In cases where the lower yield stress R_{eL} cannot be determined, it is permissible to measure the stress at 0.2% non-proportional elongation $R_{p0.2}$. For the property classes 4.8, 5.8 and 6.8 the values for R_{eL} are given for calculation purposes only, they are not test values.
- I. The yield stress ratio according to the designation of the property class and the minimum stress at 0.2% non-proportional elongation $R_{p0.2}$ apply to machined test specimens. These values if received from tests of full size bolts and screws will vary because of processing method and size effects.