Grades

from screws, nuts and grub screws

The different materials (steel and stainless steel) have different strength classes. In addition, there are differences in the strength classes of the steel screws, nuts and grub screws.
The listing of material codes is based on ISO 898-1 (for screws), ISO 898-2 (for nuts) and ISO 898-5 (for grub screws).

Strength values for screws

The strength values (grade) for steel screws are expressed by two digits separated by a dot.

The first digit corresponds to one hundredth of the tensile strength Rm in N/mm^2. The tensile strength indicates the tensile stress at which the screw breaks.

Example of a screw with grade 10.9:
Tensile strength R_m = first digit * 100 = 10 N/mm^2 * 100 = 1,000 N/mm^2

From the second digit, the yield strength Re or the yield point or equivalent yield strength R_p 0.2 of the screw can be determined. The yield strength Re and the yield point R_p 0.2 indicate the maximum stress before the screw deforms plastically. With plastic deformation, the screw is permanently deformed (as compared to elastic deformation where the screw returns to its original shape after the tension is released). The second digit specifies 10 times the ratio between the yield strength Re or the equivalent yield point R_p 0.2 and the tensile strength Rm.

Example of a screw with grade 10.9:
Yield strength R_e = Tensile strength R_m x second digit x 0.1 = 1,000 N/mm^2 x 9 x 0.1 = 900 N/mm^2

The elongation at break A indicates the percentage of plastic deformation at break.

Material properties	**Grade**					
	4.6	**5.8**	**6.8**	**8.8**	**10.9**	**12.9**
Tensile strength R_m in N/mm^2	400	500	600	800	1000	1200
Yield strength R_E or yield point R_p 0.2 in N/mm^2	240	400	480	640	900	1080
Elongation at fracture A in %	22	10	8	12	9	8

Strength value for nuts

In contrast to screws, the strength class for steel nuts is given by only one code value. This is the test stress Sp. It can be equated with the tensile strength Rm of the screw. Nuts with a two-digit number (e.g. 04) describe thin nuts.

Test stress S_p in N/mm^2		**Grade**				
over	**to**	**04**	**6**	**8**	**10**	**12**
	M4	380	600	800	1040	1140
M4	**M7**		670	855	1040	1140
M7	**M10**		680	870	1040	1140
M10	**M16**		700	880	1050	1170
M16	**M39**		720	920	1060	1200

Strength value for grub screws

The steel grub screws are designated with a digit and an H at the end. The digit here indicates a tenth of the Vickers hardness HV min. The H stands for hardness

Example of a grub screw with a grade 45H:

Vickers hardness = 45 HV x 10 = 450 HV

That corresponds to a tensile strength Rm of 1,455 N/mm^2.

Strength value for stainless steel

The stainless steel specifications are uniformly formatted for screws, nuts and grub screws.

The first letter indicates the steel structure.

Example for stainless steel A2-70:

The A stands for austenitic (F stands for ferritic).

The first number describes the steel group and the associated material characteristics.

Example for stainless steel A2-70:

With A2-70, the stainless steel is alloyed with chromium and nickel (different to A4 stainless steel which is alloyed with chromium, nickel and molybdenum).

The number after the hyphen indicates 0.1 times the tensile strength Rm.

Example for stainless steel A2-70:

Tensile strength R_m = number behind the hyphen x 10 = 70 N/mm^2 x 10 = 700 N/mm^2

Material properties	**Grade**			
	A2-50	**A2-70**	**A4-50**	**A4-70**
Tensile strength R_m in N/mm^2	400	500	600	800
Yield strength R_E or yield point R_p0.2 in N/mm^2	240	400	480	640
Elongation at fracture A in %	22	10	8	12