

4.2.2 Strength Grade Designation

The continental system of strength grading introduced with the ISO system is now used in this country. The strength grade for bolts is given by two figures separated by a point. The first figure is one tenth of the minimum ultimate stress in kgf/mm². The second figure is one tenth of the percentage of the ratio of minimum yield stress to minimum ultimate.

Thus '4.6 grade' means that the minimum ultimate stress is 40 kgf/mm² and the yield stress 60% of this. It follows that the yield stress is obtained by multiplying the two figures together to give 24 kgf/mm².

For higher tensile products where the yield point is not clearly defined, the stress at a permanent set limit is quoted instead of yield stress.

The single grade number given for nuts indicates one tenth of the proof load stress in kgf/mm² and corresponds with the bolt ultimate strength to which it is matched, e.g. an 8 grade nut is used with an 8.8 grade bolt. It is permissible to use a higher strength grade nut than the matching bolt number and grade 10.9 bolts are supplied with grade 12 nuts since grade 10 does not appear in the British Standard series. To minimise risk of thread stripping at high loads, BS4395 high strength friction grip bolts are matched with nuts one class higher than the bolt.

4.2.3 Grade 4.6 Black Mild Steel and grade 8.8 high tensile Bolts and Nuts - Mechanical Properties and Dimensions



ISO Metric coarse threads	(M12)	M16	M20	(M22)	M24	(M27)	M30	(M33)	M36
Grade 4.6	1.74	2.00	2.50	2.50	3.00	3.00	3.50	3.50	4.00
	84.3	157	245	303	353	459	561	694	817
Grade 8.8	10.863	14.701	18.376	20.376	22.051	25.051	27.727	30.727	33.402
	Ultimate load kgf 3375 KN 33.1	6280 61.6 3550 KN 34.8	9800 96.1 5540 KN 54.3	12120 118.8 6850 KN 67.3	14120 138 7980 KN 78.2	18360 180 10400 KN 102	22400 220 12700 KN 124	27727 272 15700 KN 154	32700 321 18500 KN 181
Grade 8.8	Proof load kgf 1910 KN 18.7	3550 34.8 2550 KN 25.5	5540 54.3 36720 KN 360	6850 67.3 44800 KN 439	7980 78.2 44800 KN 439	10400 102 32700 KN 321	12700 124 26700 KN 262	15700 154 40400 KN 396	18500 181 47500 KN 466
	Ultimate load kgf 6750 KN 66.2	12550 123 9140 KN 89.6	19600 192 14300 KN 140	24200 238 17600 KN 173	28200 277 20500 KN 201	36720 360 26700 KN 262	44800 439 20500 KN 201	44800 439 32700 KN 321	55200 544 40400 KN 396
Length of threads	Up to and inc. 125mm	30	38	46	50	54	60	66	72
	Over 125mm up to and inc. 200mm	36	44	52	56	60	66	72	78
Dimensions	BS4190	49	57	65	69	73	79	85	91
	BS3692	24	24	30	33	36	40	40	40
Max. width across flats	19.0	24.0	30.0	32.0	36.0	41.0	46.0	50.0	55.0
	21.9	27.7	34.6	36.9	41.6	47.3	53.1	57.7	63.5
Nominal head depth of bolts	8.0	10.0	13.0	14.0	15.0	17.0	19.0	22.0	23.0
	10.0	13.0	16.0	18.0	19.0	22.0	24.0	26.0	29.0
Nominal depth of nuts									

Non-preferred diameters in brackets ()
 U.H. Load = Tensile Stress Area * min ultimate stress
 6150 = 84.3 * 80