

Bolt Torque Chart

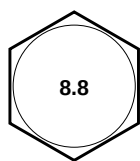
Mining and Industrial Suppliers (Pvt) Ltd

No 2 Hood Road, Southerton, Harare

Metric bolts - ISO 898-1 grades, friction 0.14 (zinc plated or lightly oiled), about 90% of yield.

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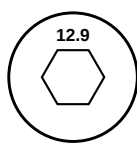
Grade 8.8

general high tensile



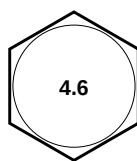
Grade 10.9

high strength



Grade 12.9

socket screws



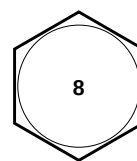
Grade 4.6

mild steel, often unmarked



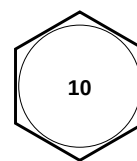
Stainless A2-70

304 (A4 = 316)



Nut class 8

use with 8.8



Nut class 10

use with 10.9

Metric grade 8.8: first number x 100 = tensile strength (800 MPa); second x 10 = yield as a % of tensile (80%). Match the nut class to the bolt (8 with 8.8, 10 with 10.9, 12 with 12.9) and use a hardened washer under high-grade bolts.

Metric coarse thread - tightening torque

Thread	Pitch	4.6 Nm	5.8 Nm	8.8 Nm	10.9 Nm	12.9 Nm	8.8 ft-lb	10.9 ft-lb
M3	0.5	0.5	0.9	1.4	2	2.4	1	1.5
M4	0.7	1.1	1.9	3	4.4	5.1	2.2	3.2
M5	0.8	2.2	3.8	6	8.8	10	4.4	6.5
M6	1	3.8	6.2	10	15	18	7.4	11
M8	1.25	9.4	16	25	36	43	18	27
M10	1.5	18	31	49	72	84	36	53
M12	1.75	32	54	86	125	145	63	93
M14	2	51	84	135	200	235	100	150
M16	2	79	130	210	310	365	155	230
M18	2.5	110	190	300	425	500	220	315
M20	2.5	160	265	425	610	710	315	450
M22	2.5	220	360	580	820	960	430	605
M24	3	275	455	730	1050	1220	540	775
M27	3	410	690	1100	1550	1800	810	1140
M30	3.5	545	905	1450	2100	2450	1070	1550
M33	3.5	740	1230	1970	2800	3300	1450	2070
M36	4	950	1580	2530	3600	4200	1870	2660

Metric fine thread (grades 8.8 - 12.9) and stainless steel

Thread	8.8 Nm	10.9 Nm	12.9 Nm
M8 x 1	27	39	46
M10 x 1.25	52	76	90
M10 x 1	55	81	95
M12 x 1.5	90	130	155
M12 x 1.25	94	140	160
M14 x 1.5	145	215	250
M16 x 1.5	225	330	390
M18 x 1.5	340	485	570
M20 x 1.5	475	680	790
M22 x 1.5	630	900	1050
M24 x 2	790	1130	1330

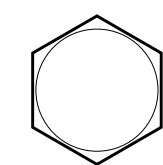
Thread	A2-70 / A4-70 Nm	A4-80 Nm
M3	1	1.3
M4	2.3	3.1
M5	4.7	6.3
M6	7.9	11
M8	19	25
M10	38	51
M12	65	86
M14	105	140
M16	160	210
M20	310	410
M24	535	710
M30	1060	1410

Bolt Torque Chart

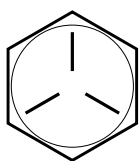
Imperial bolts - SAE J429 grades, dry threads (K = 0.20, 75% of proof load).

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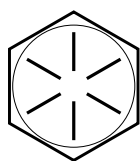
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SAE Grade 2
no marks - low carbon



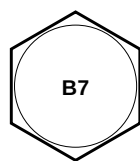
SAE Grade 5
3 radial lines



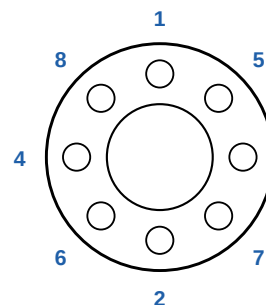
SAE Grade 8
6 radial lines



ASTM A325
structural bolt



ASTM A193 B7
studs for flanges



Tighten flanges and covers in a star pattern, in three passes: 30%, 70%, 100% - then one more round at 100%.

UNC (coarse)

Thread	Grade 2 ft-lb	Grade 5 ft-lb	Grade 8 ft-lb	Grade 2 Nm	Grade 5 Nm	Grade 8 Nm
1/4"-20	6	8	12	8.1	11	16
5/16"-18	11	17	25	15	23	34
3/8"-16	20	31	44	27	42	60
7/16"-14	32	49	70	43	66	95
1/2"-13	49	75	105	66	100	145
9/16"-12	70	110	155	95	150	210
5/8"-11	97	150	210	130	205	285
3/4"-10	175	265	375	235	360	510
7/8"-9	165	430	605	225	580	820
1"-8	250	645	910	340	875	1230
1.1/8"-7	355	795	1290	480	1080	1750
1.1/4"-7	500	1120	1820	680	1520	2460

UNF (fine)

Thread	Grade 2 ft-lb	Grade 5 ft-lb	Grade 8 ft-lb	Grade 2 Nm	Grade 5 Nm	Grade 8 Nm
1/4"-28	7	10	14	9.5	14	19
5/16"-24	12	19	27	16	26	37
3/8"-24	23	35	49	31	47	66
7/16"-20	36	55	78	49	75	105
1/2"-20	55	85	120	75	115	165
9/16"-18	78	120	170	105	165	230
5/8"-18	110	170	240	150	230	325
3/4"-16	190	295	420	260	405	570
7/8"-14	185	475	670	250	645	905
1"-12	275	705	995	370	955	1350

Lubrication - adjust the torque

Thread condition	Friction	Use this % of the table
Zinc plated or lightly oiled (metric table basis)	0.14	100%
Dry plain / black oxide steel (imperial table basis)	0.16 - 0.20	Metric +10 - 15%; imperial 100%
Engine oil on threads and under the head	0.10 - 0.12	Metric 85 - 90%; imperial 75%
Molybdenum (MoS2) paste or copper anti-seize	0.08 - 0.10	Metric 65 - 75%; imperial 60 - 65%
Wax or PTFE coated fasteners	0.08 - 0.10	As MoS2
Stainless on stainless, dry	0.25 +	Galls and seizes - always use anti-seize, then 75%
Thread locker (medium strength)	about 0.14	Treat as lightly oiled - 100%

From	To	Multiply by
Nm	ft-lb	0.738
ft-lb	Nm	1.356
Nm	in-lb	8.851
in-lb	Nm	0.113
kgf.m	Nm	9.807
Nm	kgf.m	0.102
ft-lb	in-lb	12
kgf.cm	Nm	0.098