







Lubed means cleaned dry bolts lubricated with standard medium viscosity engine oil. Lubricate all contact areas of the bolts and washers. Produced by Barry Moore

Metric Bolts Steel Min Tensile Strength (MPa)	Class 8.8 		Class 10.9 		Class 12.9 	
	Dry	Lubed	Dry	Lubed	Dry	Lubed
Nominal Size & Pitch						
M5 x 0.80	6	5	9	7	10	8
M6 x 1.00	10	8	15	11	18	13
M7 x 1.00	18	13	25	19	29	22
M8 x 1.00	27	20	40	30	45	35
M8 x 1.25	25	19	37	27	42	32
M10 x 1.00	56	42	80	60	94	70
M10 x 1.25	53	40	76	57	90	67
M10 x 1.50	49	37	71	54	84	63
M12 x 1.25	94	70	130	100	155	120
M12 x 1.50	90	68	128	97	150	114
M12 x 1.75	87	66	125	94	145	109
M14 x 1.25	153	118	208	158	260	200
M14 x 1.50	147	111	200	150	255	192
M14 x 2.00	140	105	200	150	233	175
M16 x 1.50	229	174	336	255	393	298
M16 x 2.00	217	163	310	232	363	272
M18 x 1.50	340	260	480	380	568	440
M18 x 2.50	299	225	429	321	502	376
M20 x 1.50	470	360	670	515	800	630
M20 x 2.50	423	317	606	454	708	531
M22 x 1.50	630	540	920	720	1050	800
M22 x 2.50	530	433	827	621	966	724
M24 x 2.00	814	620	1160	900	1360	1060
M24 x 3.00	733	549	1047	785	1225	919
M27 x 3.00	1074	806	1537	1152	1796	1347
M30 x 3.50	1456	1092	2083	1563	2435	1826
Inch Bolts Steel Min Tensile Strength (PSI)	Grade 5 		Grade 8 		Socket Head Cap Screws 	
	120,000psi		150,000psi		170,000psi	
Nominal Dia. & Pitch	Dry	Lubed	Dry	Lubed	Dry	Lubed
1/4-20	11.4	8.6	16.2	12	19	13.6
1/4-28	13.1	9.8	16.6	13.9	21.7	16.3
5/16-18	23.6	17.7	33.3	25	39.3	29.8
5/16-24	26.1	19.7	36.9	27.7	43.4	32.5
3/8-16	42	31.2	60	45	69	52
3/8-24	47	35	66	50	79	58
7/16-14	66	50	95	71	110	83
7/16-20	75	56	106	79	123	92
1/2-13	102	77	144	108	168	126
1/2-20	115	87	163	122	190	142
5/8-11	203	153	287	216	323	243
5/8-18	230	172	325	244	366	274
3/4-10	362	271	510	382	574	430
3/4-16	403	302	569	427	640	480
7/8-9	582	437	822	617	925	693
7/8-14	643	481	907	681	1020	765
1"- 8	873	655	1232	923	1879	1040
1"-12	979	735	1383	1037	1555	1166

Bolt Torque Table - Estimated Clamp Load as 75% of Proof Load in Newton Metres Nm

Thread sizes and Tapping Drill Chart produced by Barry Moore

Size	Metric mm	Thou	Clear Drill	METRIC		UNF/S		UNC : BSW		
				Pitch mm	Tapping Drill size	TPI	Tap Drill	Tapping Drill mm : Imp	TPI UNC:W	
1/16	1.59	0.063	1.7	-	-			1.1 : 3/64	60	
M2	2.00	0.079	2.2	0.4	1.6 : 1/16					
3/32	2.38	0.094	2.5	-	-			1.9	48	
M2.5	2.50	0.098	2.6	0.4	2.0					
M3	3.00	0.118	3.2	0.5	2.5					
1/8(5)	3.18	0.125	3.3	-	-	44	2.6	2.6 : 3/32	40	
M3.5	3.50	0.138	3.7	0.6	2.9					
5/32	3.97	0.156	4.1	-	-	32	3.3	3.2 : 1/8	32	
M4	4.00	0.157	4.2	0.7	3.3					
M4.5	4.50	0.177	4.7	0.75	3.7					
3/16	4.76	0.188	4.9	-	-	32	4.1	3.7 : 9/64	24	
M5	5.00	0.197	5.2	0.8	4.2 : 11/64					
7/32	5.56	0.219	5.7	-	-			4.5 : 11/64	24	
M6	6.00	0.236	6.1	1.0	5.0 : 13/64					
1/4	6.35	0.250	6.5	-	-	28	5.5	5.1 : 3/16	20	
M7	7.00	0.276	7.2	1.0	6.0 : 15/64					
5/16	7.94	0.313	8.1	-	-	24	6.9	6.6 : 1/4	18	
M8	8.00	0.315	8.2	1.0	7.0 : 9/32					
				1.25	6.9 : 17/64					
M9	9.00	0.354	9.2	1.25	7.8 : 5/16					
3/8	9.53	0.375	9.8	-	-	24	8.5	8.0 : 5/16	16	
M10	10.00	0.394	10.2	1.0	8.9 : 11/32					
				1.25	8.8 : 11/32					
				1.5	8.5 : 11/32					
M11	11.00	0.433	11.2	1.5	9.5 : 3/8					
7/16	11.11	0.438	11.5	-	-	20	9.8	9.4 : 3/8	14	
M12	12.00	0.472	12.2	1.25	10.8 : 27/64					
				1.5	10.5 : 27/64					
				1.75	10.2 : 27/64					
1/2	12.70	0.500	13.0	-	-	20	11.5	10.5 : 27/64	13:12	
13	13.00	0.512	<i>No bolt size only dimension</i>							
M14	14.00	0.551	14.5	1.25	12.8 : 1/2					
				1.5	12.5 : 1/2					
				2.0	12 : 31/64					
9/16	14.29	0.563	14.5	-	-	18	12.8	12.2 : 31/64	12	
5/8	15.88	0.625	16.5	-	-	18	14.5	13.5 : 35/64	11	
M16	16.00	0.630	16.5	1.5	14.5 : 37/64					
				2.0	14.0 : 9/16					
17	17.00	0.694	<i>No bolt size only dimension</i>							
M18	18.00	0.709	18.5	1.5	16.5 : 21/32					
				2.5	15.5 : 39/64					
19	19.00	0.748	<i>No bolt size only dimension</i>							
3/4	19.05	0.750	19.5	-	-	16	17.5	16.5 : 41/64	10	
M20	20.00	0.787	22.5	1.5	18.5 : 47/64					
				2.5	17.5 : 45/64					
M22	22.00	0.866	22.5	1.5	20.5 : 13/16					
				2.5	19.5 : 25/32					
7/8	22.23	0.875	22.5	-	-	14	20.5	19.5 : 3/4	9	
M24	24.00	0.945	24.5	2.0	22.0 : 7/8					
				3.0	21 : 53/64					
1	25.40	1.000	26	-	-	12	23.5	22.0 : 7/8	8	
M27	27.00	1.063	27.5	3.0	24 : 61/64					
1-1/8	28.58	1.125	29.0	-	-	12	26.5	25.0 : 31/32	7	
M30	30.00	1.181	30.5	3.5	26.5 : 1-3/64					
1-1/4	31.75	1.250	32.0	-	-	12	29.5	28.0 : 1-7/64	7	
M33	33.00	1.299	33.5	3.5	29.5 : 1-11/64					
1-3/8	34.93	1.375	35.5	-	-	12	32.5	31.0 : 1-7/32	6	
M36	36.00	1.417	36.5	4.0	32.0 : 1-17/64					
1-1/2	38.10	1.500	38.5	-	-	12	36.0	34.0 : 1-11/32	6	
M39	39.00	1.535	39.5	4.0	35.0 : 1-25/64					
1-5/8	41.28	1.625	42.0	-	-			36.0 : 1-14/32	5	
1-3/4	44.45	1.750	45.0	-	-			39.0 : 1-17/32	5	
2	50.80	2.000	52.0	-	-			45.0 : 1-49/64	4.5	

10:1 Line

