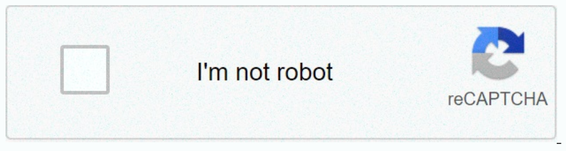

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Standard metric bolt torque chart pdf

There are several factors that determine the correct screw speed specification.
Some of them are listed below...
the material that contains the external thread (screw). Reference 2 below is recommended. 60-90% screw material. Proven load attachment bias. This correction of the bolt torque graph assumes that the region of this range has a value of... 75% of the yield strength. Yield strength is defined as the greatest force a material can withstand without permanent deformation. Although material properties vary, a rough estimate of yield strength is 85-90% of initial strength. As shown in the figure, the strength of the screw varies depending on the quality of the fastener and in some cases. The internal thread (nut) material (internal thread material) should be equal to or greater than the strength of the screw (external thread material). If the nut material is limited by the fastening ratio, it is clear that increasing the strength of the bolt material will not affect the clamp capacity of the node.
In addition, if the nut material is a limiting factor, the maximum mounting capability of the device (and corresponding screw tightening torque) must be evaluated accordingly.

ASTM Bolt Torque Chart

Suggested Starting Values

The below estimated torque calculations are only offered as a guide. Use of its content by anyone is the sole responsibility of that person and they assume all risk. **Due to many variables that affect the torque-tension relationship like human error, surface texture, and lubrication the only way to determine the correct torque is through experimentation under actual joint and assembly conditions.**

ASTM A307

Bolt Size	TPI	Proof Load (lbs)[1]	Clamp Load (lbs)[2]	Tightening Torque (ft lbs)		
				Waxed	Galv	Plain
¼	20	1145	859	2	4	4
5/16	18	1886	1415	4	9	7
⅜	16	2790	2093	7	16	13
7/16	14	3827	2870	10	26	21
½	13	5108	3831	16	40	32
9/16	12	6552	4914	23	58	46
⅝	11	8136	6102	32	79	64
¾	10	12024	9018	56	141	113
⅞	9	15200	11400	83	208	166
1	8	20000	15000	125	313	250
1⅛	7	25200	18900	177	443	354
1¼	7	32000	24000	250	625	500
1⅜	6	38100	28575	327	819	655
1½	6	46400	34800	435	1088	870
1¾	5	68400	51300	748	1870	1496
2	4½	90000	67500	1125	2813	2250
2¼	4½	117000	87750	1645	4113	3291
2½	4	144000	108000	2250	5625	4500
2¾	4	177480	133110	3050	7626	6101
3	4	214920	161190	4030	10074	8060
3¼	4	255600	191700	5192	12980	10384
3½	4	299880	224910	6560	16400	13120
3¾	4	347760	260820	8151	20377	16301
4						

The internal thread (nut) material (internal thread material) should be equal to or greater than the strength of the screw (external thread material). If the nut material is limited by the fastening ratio, it is clear that increasing the strength of the bolt material will not affect the clamp capacity of the node. In addition, if the nut material is a limiting factor, the maximum mounting capability of the device (and corresponding screw tightening torque) must be evaluated accordingly. Unlike most bolt charts, this chart also lists the clamping force and torque values that correspond to the bolt material stress at 10,000 and 25,000 psi...regardless of the fastener. This list can be helpful in determining the correct torque value if you are working with a smaller professionalB provides several factors that determine the correct specification of the vine. Some of them are listed below ... The material containing an external thread (screws) most of the butterflies, including this, including this, is based on the thickness of the screw material, a component that contains an external conductor. In the following link 2, we recommend the preload of the fixation element between 60% and 90% of the expanding screw material. This diagram of the torture screw to generate repair was created in the center of this area by assuming value ... in 75% of the material resistance. The screw resistance is defined as the maximum force that the material can carry without permanent deformation. Although the properties of the material differ, the approximate estimate of the extension limit is between 85% and 90% of the extension limit. As shown in the table, the screw resistance varies according to the type of fixation and in some cases also depending on the diameter. A material that contains an inner wire (mother). In order to determine the paired value of the Vite-Deod assembly group, based solely on the thickness of the screw material, the mounting materials of this instruction must be followed: the limit of the mother length (internal fiber material) must be the same to or higher than maximum resistance to the screw (material with outer thread). If the basic material is a limiting factor of the fixation system, the increase in the thickness of the screw material apparently has no effect on increasing the assembly capacity. If the base material also represents a limiting factor, the maximum tightening capacity (and the corresponding pair of the screw) must be reduced corresponding to the appropriate manner. Unlike most bolt torture tables, tightening forces and torque values that correspond to the voltage of the screw material 10 000 and 25,000 psi ... regardless of the quality of the element fixation are also listed. This list may be useful for determining the appropriate reduced torque value if unique.Force. In reality, however, only the first threads actually participate in sharing the compression force of the fastener. This is due to similar thread error, slight thread size, and pitch differences causing inconsistent cosmetics for external and internal threads. The usual rule is that the minimum connection length of the minimum threads is equal to the (major) diameter of the fastener. A more conservative rule is to use a threaded connection length of 1-1/2 diameter. The screw stress elongation of the thread stresses is determined by the thread stress range of the threaded part (diameter) and the thread pitch (distance) as follows. = 0.7854 x [d - (0.9743 /n)] 2 Here: AS = Bolt -Thread -Elongation (in2) d = Nominal Screw Diameter (inch) n = Thread (inch thread) Bolt Clamps against The load force Screw Clamps is calculated from the preload force using the bolt material strength and extension stress range. It is calculated according to the formula...

Size	Class	Newton Meters		Foot Pounds (approx.)		Class
		Zinc Plated	Unplated	Zinc Plated	Unplated	
M4 x .70 Pitch	8.8	3.1	2.2	2.30	1.65	
M5 x .80 Pitch	8.8	6.1	5.5	4.58	4.13	
M6 x 1.00 Pitch	8.8	10.4	9.5	7.80	7.13	
M7 x 1.00 Pitch	8.8	17.0	15.5	12.75	11.63	
M8 x 1.25 Pitch	8.8	25.0	23.0	18.75	17.25	
M8 x 1.00 Pitch	8.8	27.0	24.5	20.25	18.38	
M10 x 1.50 Pitch	8.8	51.0	46.0	38.25	34.50	
M10 x 1.00 Pitch	8.8	57.0	52.0	42.75	39.00	
M10 x 1.25 Pitch	8.8	54.0	49.0	40.50	36.75	8.8
M12 x 1.75 Pitch	8.8	87.0	79.0	65.25	59.25	
M12 x 1.25 Pitch	8.8	96.0	87.0	72.00	65.25	
M12 x 1.50 Pitch	8.8	92.0	83.0	69.00	62.25	
M14 x 2.00 Pitch	8.8	140.0	125.0	105.00	93.75	
M14 x 1.50 Pitch	8.8	150.0	135.0	112.50	101.25	
M16 x 2.00 Pitch	8.8	215.0	195.0	161.25	146.25	
M18 x 2.50 Pitch	8.8	300.0	280.0	225.00	210.00	
M20 x 2.50 Pitch	8.8	430.0	390.0	322.50	292.50	
M22 x 2.50 Pitch	8.8	580.0	530.0	435.00	397.50	
M24 x 3.00 Pitch	8.8	740.0	670.0	555.00	502.50	
M6 x 1.00 Pitch	10.9	15.5	14.0	11.63	10.50	
M8 x 1.25 Pitch	10.9	37.0	34.0	27.75	25.50	
M10 x 1.50 Pitch	10.9	75.0	68.0	56.25	51.00	
M12 x 1.75 Pitch	10.9	160.0	117.0	97.50	87.75	
M14 x 2.00 Pitch	10.9	205.0	185.0	153.75	138.75	10.9
M16 x 2.00 Pitch	10.9	310.0	280.0	232.50	210.00	

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Metric Bolt Torque Table
Estimated with clamp load as 75% of proof load
as specified in ISO 898-1

Property Class	8.8	10.9	12.9 Socket Head Cap Screw
Minimum Tensile Strength MPa	M6 - M16: 800 M20 - M30: 830	1040	1220
Nominal Size and Thread Pitch	Bolt Torque Specs in Newton Meters - Nm		
	Dry / Lubed	Dry / Lubed	Dry / Lubed
M5 x 0.80	6.1 / 4.6	8.8 / 6.7	10.3 / 7.7
M6 x 1.00	10.4 / 7.8	15 / 11.2	17.6 / 13.1
M7 x 1.00	17.6 / 13.1	25.1 / 18.9	29.4 / 22
M8 x 1.25	25.4 / 19.1	37.6 / 27.3	42.6 / 32.1
M10 x 1.50	50 / 38	72 / 54	84 / 64
M12 x 1.75	88 / 66	126 / 94	146 / 110
M14 x 2.00	141 / 106	201 / 150	235 / 176
M16 x 2.00	218 / 164	312 / 233	365 / 274
M18 x 2.50	301 / 226	431 / 323	504 / 378
M20 x 2.50	426 / 319	609 / 457	712 / 534
M22 x 2.50	580 / 435	831 / 624	971 / 728
M24 x 3.00	736 / 552	1052 / 789	1231 / 923
M27 x 3.00	1079 / 809	1544 / 1158	1805 / 1353
M30 x 3.50	1463 / 1097	2092 / 1570	2446 / 1834
M33 x 3.50	1990 / 1493	2849 / 2137	3328 / 2497
M36 x 4.00	2557 / 1918	3659 / 2744	4276 / 3208

75% of the yield strength.
Yield strength is defined as the greatest force a material can withstand without permanent deformation. Although material properties vary, a rough estimate of yield strength is 85-90% of initial strength. As shown in the figure, the strength of the screw varies depending on the quality of the fastener and in some cases. The internal thread (nut) material (internal thread material) should be equal to or greater than the strength of the screw (external thread material). If the nut material is limited by the fastening ratio, it is clear that increasing the strength of the bolt material will not affect the clamp capacity of the node.
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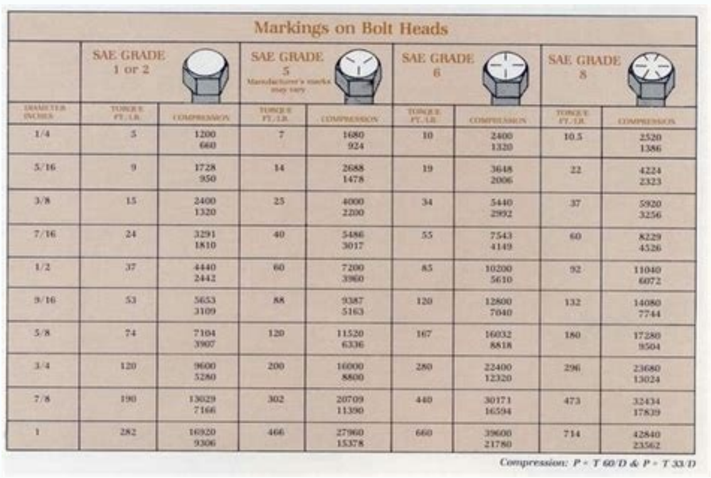

Markings on Bolt Heads

DIAMETER INCHES	SAE GRADE 1 or 2 TORQUE FT.-LB.	SAE GRADE 1 or 2 COMPRESSION	SAE GRADE 5 Manufacturer's marks may vary TORQUE FT.-LB.	SAE GRADE 5 COMPRESSION	SAE GRADE 6 TORQUE FT.-LB.	SAE GRADE 6 COMPRESSION	SAE GRADE 8 TORQUE FT.-LB.	SAE GRADE 8 COMPRESSION
1/4	5	1200 660	7	1680 924	10	2400 1320	10.5	2520 1386
5/16	9	1728 950	14	2688 1478	19	3648 2006	22	4224 2323
3/8	15	2400 1320	25	4000 2200	34	5440 2992	37	5920 3256
7/16	24	3291 1810	40	5486 3017	55	7543 4149	60	8229 4526
1/2	37	4440 2442	60	7200 3960	85	10200 5610	92	11040 6072
9/16	53	5653 3109	88	9387 5163	120	12800 7040	132	14080 7744
5/8	74	7104 3907	120	11520 6336	167	16032 8818	180	17280 9504
3/4	120	9600 5280	200	16000 8800	280	22400 12320	296	23680 13024
7/8	190	13029 7166	302	20709 11390	440	30171 16594	473	32434 17839
1	282	16920 9306	466	27960 15378	660	39600 21780	714	42840 23562

Compression: P = T 60/D & P = T 33/D

75% of the yield strength. Yield strength is defined as the greatest force a material can withstand without permanent deformation.

Nominal Size (Basic Screw Diamter)	D Body Diameter		A Head Diameter		H Head Height	G Protrusion Gage Diameter		P Protrusion		J Hexagon Socket Size		T Key Engagement	F Fillet Transition Diameter
	Max	Min	Max	Min	Ref	Max	Min	Max	Min	Nominal		Min	Max
0 (0.0600)	0.0600	0.0568	0.138	0.117	0.044	0.078	0.077	0.044	0.026	...	0.035	0.025	0.072
1 (0.0730)	0.0730	0.0695	0.168	0.143	0.054	0.101	0.100	0.048	0.028	....	0.050	0.031	0.089
2 (0.0860)	0.0860	0.0822	0.197	0.168	0.064	0.124	0.123	0.051	0.031	....	0.050	0.038	0.106
3 (0.0990)	0.0990	0.0949	0.226	0.193	0.073	0.148	0.147	0.054	0.033	1/16	0.062	0.044	0.119
4 (0.1120)	0.1120	0.1075	0.255	0.218	0.083	0.172	0.171	0.057	0.036	1/16	0.062	0.055	0.136
5 (0.1250)	0.1250	0.1202	0.281	0.240	0.090	0.196	0.195	0.059	0.037	5/64	0.078	0.061	0.153
6 (0.1380)	0.1380	0.1329	0.307	0.263	0.097	0.220	0.219	0.060	0.037	5/64	0.078	0.066	0.168
8 (0.1640)	0.1640	0.1585	0.359	0.311	0.112	0.267	0.266	0.063	0.039	3/32	0.094	0.076	0.194
10 (0.1900)	0.1900	0.1840	0.411	0.359	0.127	0.313	0.312	0.066	0.041	1/8	0.125	0.087	0.220
12 (0.2158)	0.2158	0.2102	0.450	0.410	0.135	0.360	0.359	0.069	0.042	1/8	0.125	0.094	0.246
1/4 (0.2500)	0.2500	0.2435	0.531	0.480	0.161	0.424	0.423	0.072	0.043	5/32	0.156	0.111	0.280
5/16 (0.3125)	0.3125	0.3053	0.656	0.600	0.198	0.539	0.538	0.078	0.047	3/16	0.188	0.135	0.343
3/8 (0.3750)	0.3750	0.3678	0.781	0.720	0.234	0.653	0.652	0.088	0.050	7/32	0.219	0.159	0.405
7/16 (0.4375)	0.4375	0.4294	0.844	0.781	0.234	0.690	0.689	0.104	0.063	1/4	0.250	0.159	0.468
1/2 (0.5000)	0.5000	0.4919	0.938	0.872	0.251	0.739	0.738	0.131	0.087	5/16	0.312	0.172	0.530
5/8 (0.6250)	0.6250	0.6163	1.188	1.112	0.324	0.952	0.951	0.146	0.096	3/8	0.375	0.220	0.655
3/4 (0.7500)	0.7500	0.7406	1.438	1.355	0.396	1.186	1.185	0.170	0.105	1/2	0.500	0.220	0.780
7/8 (0.8750)	0.8750	0.8647	1.688	1.604	0.468	1.411	1.410	0.165	0.118	9/16	0.562	0.248	0.905
1 (1.0000)	1.0000	0.9886	1.938	1.841	0.540	1.635	1.634	0.181	0.130	5/8	0.625	0.297	1.030
1-1/8 (1.1250)	1.1250	1.1086	2.188	2.079	0.611	1.859	1.858	0.196	0.140	3/4	0.750	0.325	1.187
1-1/4 (1.2500)	1.2500	1.2336	2.438	2.316	0.683	2.083	2.082	0.212	0.150	7/8	0.875	0.358	1.312
1-3/8 (1.3750)	1.3750	1.3568	2.688	2.553	0.755	2.306	2.305	0.228	0.162	7/8	0.875	0.402	1.437
1-1/2 (1.5000)	1.5000	1.4818	2.938	2.791	0.827	2.530	2.529	0.243	0.173	1	1.000	0.435	1.562

60-90% screw material. Proven load attachment bias.
This correction of the bolt torque graph assumes that the region of this range has a value of... 75% of the yield strength. Yield strength is defined as the greatest force a material can withstand without permanent deformation. Although material properties vary, a rough estimate of yield strength is 85-90% of initial strength. As shown in the figure, the strength of the screw varies depending on the quality of the fastener and in some cases.
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It is calculated according to the formula... fi = 0.75 x sp influences the connection between the screw torque and the screw tension. All of these factors are added together to form a separate variable called the "K factor" rate. The following table provides a typical K-factor range as well as values for calculating repair screw torque. Note that the "K factor" values used to calculate the implicit torque diagram of the repair bolts were chosen slightly arbitrarily. Any other "K-Factor" value in the range may be equally valid, taking into account the specific requirements of the specific program. “K Quotient” Bolt Condition Typical “K Quotient” value range.A 10% torque pull actually causes the bolts to stress. The remaining 90% is lost due to various types of friction that occur during the tensioning process. Additionally, the correct screw torque value may vary from fastener to fastener due to various factors including materials, coating, surface finish, tolerances, installation methods, etc. because of.
For these reasons, it is not practical to provide an exact torque table or single bolt formula value for all situations. This information is voluntary and provided for general information only as explained in this disclaimer. It is advisable to check the actual mounting components to determine the correct torque values for all critical applications. This screw torque table was created using reference information from a variety of sources including the following ... machine manual - 24. 2nd edition This preview is not displayed. Review.