

Bolt Tightening Torque Chart

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1.0 Coarse Thread (UNC) Recommended tightening torque

Size & Threads per Inch	Tensile Stress Area (sq. in.)	Grade 5			Grade 8		
		Clamp Load (lbs)	Dry Torque (ft-lbs)	Lubricated Torque (ft-lbs)	Clamp Load (lbs)	Dry Torque (ft-lbs)	Lubricated Torque (ft-lbs)
1/4-20	0.0318	2,029	8	6	2,864	12	9
5/16-18	0.0524	3,342	17	13	4,719	25	18
3/8-16	0.0775	4,940	31	23	6,974	44	33
7/16-14	0.1063	6,777	49	37	9,568	70	52
1/2-13	0.1419	9,046	75	57	12,771	106	80
9/16-12	0.1819	11,599	109	82	16,375	154	115
5/8-11	0.2260	14,408	150	113	20,340	212	159
3/4-10	0.3345	21,322	267	200	30,101	376	282
7/8-9	0.4617	29,436	429	322	41,556	606	455
1-8	0.6057	38,616	644	483	54,517	909	681
1-1/8-7	0.7633	42,362	794	596	68,695	1,288	966
1-1/4-7	0.9691	53,786	1,121	840	87,220	1,817	1,363
1-3/8-6	1.1549	64,096	1,469	1,102	103,939	2,382	1,786
1-1/2-6	1.4053	77,991	1,950	1,462	126,473	3,162	2,371

2.0 Fine Thread (UNF)

Size & Threads per Inch	Tensile Stress Area (sq. in.)	Grade 5			Grade 8		
		Clamp Load (lbs)	Dry Torque (ft-lbs)	Lubricated Torque (ft-lbs)	Clamp Load (lbs)	Dry Torque (ft-lbs)	Lubricated Torque (ft-lbs)
1/4-28	0.0364	2,319	10	7	3,274	14	10
5/16-24	0.0581	3,702	19	14	5,226	27	20
3/8-24	0.0878	5,599	35	26	7,905	49	37
7/16-20	0.1187	7,568	55	41	10,684	78	58
1/2-20	0.1600	10,197	85	64	14,396	120	90
9/16-18	0.2030	12,940	121	91	18,268	171	128
5/8-18	0.2560	16,317	170	127	23,036	240	180
3/4-16	0.3730	23,776	297	223	33,566	420	315
7/8-14	0.5095	32,479	474	355	45,853	669	502
1-12	0.6630	42,269	704	528	59,674	995	746
1-1/8-12	0.8557	47,493	890	668	77,015	1,444	1,083
1-1/4-12	1.0729	59,548	1,241	930	96,565	2,012	1,509
1-3/8-12	1.3147	72,967	1,672	1,254	118,324	2,712	2,034
1-1/2-12	1.5810	87,747	2,194	1,645	142,292	3,557	2,668

Notes:

- **Clamp load** = 75% of SAE J429 proof load (Grade 5: 85,000 psi thru 1", 74,000 psi over 1"; Grade 8: 120,000 psi) × tensile stress area.
- **Torque** $T = K \times D \times P \div 12$ (ft-lbs), where D = nominal diameter (in.) and P = clamp load (lbs). **Dry** (plain / as received): K = 0.20. **Lubricated** (oiled, waxed or anti-seize): K = 0.15. Zinc plated is often taken as K ≈ 0.17–0.20.
- General guide for hex cap screws with nuts of equal grade in steel joints. Actual torque varies with finish, lubricant, washers and tooling; follow the equipment manufacturer's spec where one exists.

Disclaimer: The above is a compilation of data from various industry standards. The Nutty Company, Inc. has made every effort to present the data accurately. However, The Nutty Company, Inc. cannot be held liable for any claim traceable to any errors, typographical or otherwise, contained herein.