



Torque-Tension Relationship for A307A, Grade 5, 8 & 9 Bolts

Nominal Dia. (in.)	threads per inch	Tensile Stress Area (sq. in.)	ASTM A307 Grade A				SAE J429 Grade 5				SAE J429 Grade 8				FNL Grade 9			
			Tightening Torque		Clamp Load (Lbs.)	Tightening Torque		Clamp Load (Lbs.)	Tightening Torque		Clamp Load (Lbs.)	Tightening Torque		Clamp Load (Lbs.)	Tightening Torque			
			K = 0.15	K = 0.17		K = 0.15	K = 0.17		K = 0.15	K = 0.17		K = 0.15	K = 0.17		K = 0.15	K = 0.17	K = 0.15	K = 0.17
Unified Coarse Thread Series																		
1/4	20	0.0318	859	32 in-lbs	37 in-lbs	43 in-lbs	2029	76 in-lbs	101 in-lbs	122 in-lbs	143 in-lbs	168 in-lbs	192 in-lbs	216 in-lbs	248 in-lbs	284 in-lbs	324 in-lbs	368 in-lbs
5/16	18	0.0524	1416	66	75	88	3342	157	178	209	251	295	345	399	459	525	597	675
3/8	16	0.0775	2092	10 ft-lbs	11 ft-lbs	13 ft-lbs	4940	23 ft-lbs	31 ft-lbs	37 ft-lbs	44 ft-lbs	51 ft-lbs	58 ft-lbs	66 ft-lbs	74 ft-lbs	83 ft-lbs	93 ft-lbs	104 ft-lbs
7/16	14	0.1063	2870	16	18	21	6777	37	42	49	59	70	82	94	106	125	145	166
1/2	13	0.1419	3831	24	27	32	9046	57	64	75	90	106	125	145	166	187	209	232
9/16	12	0.1819	4912	35	39	46	11599	82	92	109	130	154	175	200	223	250	280	312
5/8	11	0.2260	6102	48	54	64	14408	113	128	150	180	212	238	274	311	350	392	438
3/4	10	0.3345	9030	85	96	113	21322	200	227	267	301	342	381	426	475	528	584	643
7/8	9	0.4617	12467	136	155	182	29436	322	365	429	515	606	702	804	918	1045	1186	1342
1	8	0.6057	16355	204	232	273	38616	483	547	644	772	909	1065	1238	1439	1666	1919	2198
1 1/4	7	0.9691	26166	409	463	545	53786	840	952	1121	1363	1545	1817	2022	2229	2507	2810	3139
1 1/2	6	1.4053	37942	711	806	949	77991	1462	1657	1950	2371	2688	3162	3510	3906	4350	4844	5388
Fine Thread Series																		
1/4	28	0.0364	982	37 in-lbs	42 in-lbs	49 in-lbs	2319	87 in-lbs	116 in-lbs	139 in-lbs	164 in-lbs	192 in-lbs	216 in-lbs	248 in-lbs	284 in-lbs	324 in-lbs	368 in-lbs	416 in-lbs
5/16	24	0.0581	1568	73	83	98	3702	174	197	231	278	327	381	441	507	579	657	741
3/8	24	0.0878	2371	11 ft-lbs	13 ft-lbs	15 ft-lbs	5599	26 ft-lbs	35 ft-lbs	42 ft-lbs	49 ft-lbs	58 ft-lbs	66 ft-lbs	74 ft-lbs	83 ft-lbs	93 ft-lbs	104 ft-lbs	116 ft-lbs
7/16	20	0.1187	3205	18	20	23	7568	41	47	55	66	78	91	105	120	138	158	180
1/2	20	0.1600	4319	27	31	36	10197	64	72	85	102	120	141	161	183	207	234	264
9/16	18	0.2030	5480	39	44	51	12940	91	103	121	146	171	201	229	261	296	334	374
5/8	18	0.2560	6911	54	61	72	16317	127	144	170	204	240	279	319	363	411	463	519
3/4	16	0.3730	10070	94	107	126	23776	223	253	297	357	420	489	563	642	734	839	958
7/8	14	0.5095	13756	150	171	201	32479	355	403	474	568	669	784	915	1054	1214	1396	1599
1	14	0.6799	18357	229	260	306	43343	542	614	722	867	1016	1179	1358	1554	1768	2000	2258
1 1/4	12	1.0729	28970	453	513	604	59548	930	1055	1241	1509	1710	2012	2314	2638	2984	3354	3758
1 1/2	12	1.5810	42688	800	907	1067	87747	1645	1865	2194	2668	3024	3557	4044	4598	5180	5794	6438

The torque values can only be achieved if nut (or tapped hole) has a proof load greater than or equal to the bolt's minimum ultimate tensile strength.

Clamp load calculated as 75% of the proof load when specified by the standard. ASTM A307 utilized 75% of 36,000 PSI.

Torque values for 1/4 and 5/16-in series are in inch-pounds. All other torque values are in foot-pounds.

Torque values calculated from formula $T = KDF$, where

K = 0.15 for "lubricated" conditions

K = 0.17 for zinc plated and dry conditions; we have also found various forms of customer applied thread lockers to have a similar K value.

K = 0.20 for plain and dry conditions

D = Nominal Diameter

F = Clamp Load

Note: When using Zinc Plated (lubricated with wax) Top Lock Nuts, the K value can vary between 0.12-0.16

Caution: All material included in this chart is advisory only, and its use by anyone is voluntary. In developing this information, Fastenal has made a determined effort to present its contents accurately. Extreme caution should be used when using a formula for torque/tension relationships. Torque is only an indirect indication of tension. Under/over tightening of fasteners can result in costly equipment failure or personal injury.