

## TORQUE-TENSION REFERENCE GUIDE

### TORQUE-TENSION RELATIONSHIP FOR A307A, GRADE 5, 8 & 9 BOLTS

Nominal Dia. (in.)	Threads per inch	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 = 0.20		Ecoguard™	K = 0.15	K = 0.17		K = 0.20	Ecoguard™	K = 0.15		K = 0.17	K = 0.20	Ecoguard™		K = 0.15	K = 0.17	K = 0.20					
<b>Coarse Thread Series</b>																									
1/4	20	859	32 in-lbs	37 in-lbs	43 in-lbs	2029	61 in-lbs	76 in-lbs	86 in-lbs	10 in-lbs	2864	86 in-lbs	107 in-lbs	122 in-lbs	143 in-lbs	3357	101 in-lbs	126 in-lbs	143 in-lbs	168 in-lbs					
5/16	18	1416	66	75	88	3342	125	157	178	209	4719	177	221	251	295	5531	207	259	294	346					
3/8	16	2092	10 ft-lbs	11 ft-lbs	13 ft-lbs	4940	19 ft-lbs	23 ft-lbs	26 ft-lbs	31 ft-lbs	6974	26 ft-lbs	33 ft-lbs	37 ft-lbs	44 ft-lbs	8174	31 ft-lbs	38 ft-lbs	43 ft-lbs	51 ft-lbs					
7/16	14	2870	16	18	21	6777	30	37	42	49	9568	42	52	59	70	11214	49	61	70	82					
1/2	12	3831	24	27	32	9046	45	57	64	75	12771	64	80	90	106	14969	75	94	106	125					
9/16	12	4912	35	39	46	11599	65	82	92	109	16375	92	115	130	154	19193	108	135	153	180					
5/8	11	6102	48	54	64	14408	90	113	128	150	20340	127	159	180	212	23840	149	186	211	248					
3/4	10	9030	85	96	113	21322	160	200	227	267	30101	226	282	320	376	35281	265	331	375	441					
7/8	9	12467	136	155	182	29436	258	322	365	429	41556	364	455	515	606	48707	426	533	604	710					
1	8	16355	204	232	273	38616	386	483	547	644	54517	545	681	772	909	63899	639	799	905	1065					
1-1/4	7	26166	409	463	545	53786	672	840	952	1121	87220	1090	1363	1545	1817	102229	1278	1597	1810	2130					
1-3/8	6	31182	536	607	715	64096	881	1102	1249	1469	103939	1429	1768	2025	2382	121826	1675	2094	2373	2792					
1-1/2	6	37942	711	806	949	77991	1170	1462	1657	1950	126473	1897	2371	2688	3162	148237	2224	2779	3150	3706					
<b>Fine Thread Series</b>																									
1/4	28		2319	70 in-lbs	87 in-lbs	99 in-lbs	116 in-lbs	3274	98 in-lbs	123 in-lbs	139 in-lbs	164 in-lbs	3837	115 in-lbs	144 in-lbs	163 in-lbs	192 in-lbs								
5/16	24		3702	139	174	197	231	5226	196	245	278	327	6125	230	287	325	383								
3/8	24		5599	21 ft-lbs	26 ft-lbs	30 ft-lbs	35 ft-lbs	7905	30 ft-lbs	37 ft-lbs	42 ft-lbs	49 ft-lbs	9265	35 ft-lbs	43 ft-lbs	49 ft-lbs	58 ft-lbs								
7/16	20		7568	33	41	47	55	10684	47	58	66	78	12523	55	68	78	91								
1/2	20		10197	51	64	72	85	14396	72	90	102	120	16873	84	105	120	141								
9/16	18		12940	73	91	103	121	18268	103	128	146	171	21412	120	151	171	201								
5/8	18		16317	102	127	144	170	23036	144	180	204	240	27000	169	211	239	281								
3/4	16		23776	178	223	253	297	33566	252	315	357	420	39343	295	369	418	492								
7/8	14		32479	284	355	403	474	45853	401	502	568	669	53743	470	588	666	784								
1	14		43343	433	542	614	722	61190	612	765	867	1020	71720	717	896	1016	1195								
1-1/4	12		59548	744	930	1055	1241	96565	1207	1509	1710	2012	113182	1415	1768	2004	2358								
1-3/8	12		72967	1003	1254	1421	1672	118324	1627	2034	2305	2712	138686	1907	2384	2701	3278								
1-1/2	12		87747	1316	1645	1865	2194	142292	2134	2668	3024	3557	166778	2502	3127	3544	4169								

### ELECTRODEPOSITED ZINC & LUBRICATED PREVAILING-TORQUE ALL-METAL TYPE NUTS

Locknut Size	Threads per inch	Steel Hex Locknut						Steel Hex Flange Nut					
		Grade C			FNL Grade 9	Grade F			Grade G				
		Clamp Load (lbs.)	Tightening Torque			Clamp Load (lbs.)	Tightening Torque		Clamp Load (lbs.)	Tightening Torque			
<b>Coarse Thread Series</b>													
1/4	20	2864	93.1 in-lbs	144 in-lbs	3357	100.7 in-lbs	134.3 in-lbs	2029	76.1 in-lbs	96.4 in-lbs	2864	107.4 in-lbs	136 in-lbs
5/16	18	4719	192	251	5631	207	277	3342	157	198	4719	221	280
3/8	16	6974	28.3 ft-lbs	37 ft-lbs	8174	30.7 ft-lbs	40.9 ft-lbs	4940	23.2 ft-lbs	29.3 ft-lbs	6974	32.7 ft-lbs	41.4 ft-lbs
7/16	14	9568	45	59	11214	49	65	6777	37	47	9568	52	66
1/2	13	12771	69	90	14969	75	100	9046	57	72	12771	80	101
9/16	12	16375	100	130	19193	108	144	11599	82	103	16375	115	146
5/8	11	20340	138	180	23840	149	199	14408	113	143	20340	159	201
3/4	10	30101	245	320	35281	265	353	21322	200	253	30101	282	357
7/8	9	41556	394	515	48707	426	568						
1	8	54517	591	772	63899	639	852						
1-1/8	7	68695	837	1095	80516	906	1208						
1-1/4	7	87220	1181	1545	102229	1278	1704						
<b>Fine Thread Series</b>													
1/4	28	3274	90 in-lbs	130.9 in-lbs	3837	105.5 in-lbs	153.5 in-lbs						
5/16	24	5226	180	261	6125	211	306						
3/8	24	7905	27.2 ft-lbs	39.5 ft-lbs	9265	31.8 ft-lbs	46.3 ft-lbs						
7/16	20	10684	43	62	12523	50	73						
1/2	20	14396	66	96	16873	77	112						
9/16	18	18268	94	137	21412	110	161						
5/8	18	23036	132	192	27000	155	225						
3/4	16	33566	231	336	39343	270	393						
7/8	14	45853	368	535	53743	431	627						
1	14	61190	561	816	71720	657	956						
1-1/8	12	77015	794	1155	90268	931	1354						
1-1/4	12	96565	1106	1609	113182	1297	1886						

### METRIC FASTENERS

Nominal Dia. (mm)	Pitch	Class 4.6				Class 8.8				Class 10.9				Class 12.9			
		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 = 0.20	(lbs)	K = 0.15	K = 0.17	K = 0.20	(lbs)	K = 0.15	K = 0.17	K = 0.20	(lbs)	K = 0.15	K = 0.17	K = 0.20	(lbs)
4	0.7	333	7.9 in-lbs	8.9 in-lbs	10.5 in-lbs	858	20.3 in-lbs	23 in-lbs	27 in-lbs	1228	29 in-lbs	32.9 in-lbs	38.7 in-lbs	1436	33.9 in-lbs	38.4 in-lbs	45.2 in-lbs
5	0.8	538	15.9	18.0	21.2	1387	40.9	46.4	54.6	1995	58.6	66.4	78.1	2319	68.5	77.6	91.3
6	1	763	27.0	30.7	36.1	1968	69.7	79.0	92.9	2816	99.8	113.1	133.0	3291	116.6	132.1	155.4
7	1	1095	45.3	51.3	60.3	2822	116.6	132.2	155.5	4039	167	189	223	4720	195	221	260
8	1.25	1389	65.6	74.4	87.5	3580	169.1	191.6	225.4	5123	242	274	323	5987	283	320	377
10	1.5	2200	10.8 ft-lbs	12.3 ft-lbs	14.4 ft-lbs	5671	27.9 ft-lbs	31.6 ft-lbs	37.2 ft-lbs	8115	39.9 ft-lbs	45.2 ft-lbs	53.2 ft-lbs	9484	46.7 ft-lbs	52.9 ft-lbs	62.2 ft-lbs
12	1.75	3197	18.9	21.4	25.2	8240	48.7	55.1	64.9	11792	69.6	78.9	92.8	13781	81.4	92.2	108.5
14	2	4379	30.2	34.2	40.2	11289	77.8	88.1	103.7	16154	111.3	126.1	148.4	18879	130.0	147.4	173.4
16	2	5943	47	53	62	15320	121	137	161	21924	173	196	230	25622	202	229	269
18	2.5	7301	65	73	86	18822	167	189	222	26934	239	270	318	31477	279	316	372
20	2.5	9286	91	104	122	23938	236	267	314	34256	337	382	449	40034	394	446	525
22	2.5	11509	125	141	166	29669	321	364	428	42457	460	521	613	49619	537	609	716
24	3	13372	158	179	211	34471	407	461	543	49329	582	660	777	57649	681	771	908
27	3	17428	232	262	309	44924	597	676	796	64288	854	968	1139	75132	998	1131	1331
30	3.5	21266	314	356	419	54819	809	917	1079	78448	1158	1312	1544	91680	1353	1534	1804
33	3.5	26310	427	484	570	67821	1101	1248	1468	97055	1576	1786	2101	113425	1842	2087	2455
36	4	30982	549	622	732	79866	1415	1603	1886	114291	2024	2294	2699	133569	2366	2681	3154

### A2 OR A4 METRIC STAINLESS STEEL FASTENERS

Nominal Dia. (mm)	Pitch	Torque (in-lbs through M8, M10 & over ft-lbs)	
		Dry	Lubricated
3	0.5	7.5 in-lbs	7.0 in-lbs
4	0.7	17.5	16.2
5	0.8	35.4	32.7
6	1	60.3	55.8
8	1.25	146.2	135.2
10	1.5	24.1 ft-lbs	22.3 ft-lbs
12	1.75	42.1	38.9
14	2	67.2	62.2
16	2	104	96
18	2.5	144	133
20	2.5	204	188
22	2.5	208	