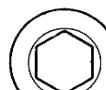




Torque-Tension Relationship ASTM A307 Grade A, SAE J429 Grade 5 & 8, Holo-Krome Grade 9 and ASTM A574 Coarse Thread

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.

	Nominal Dia (in)	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2			
	threads per inch	20	18	16	14	13	12	11	10	9	8	7	7	6	6			
ASTM A307 Grade A 	Min Tensile (lbs)	1909	3146	4649	6379	8514	10917	13560	20068	27704	36345	45797	58147	69293	84315			
	Clamp Load (lbs)	859	1416	2092	2870	3831	4912	6102	9030	12467	16355	20608	26166	31182	37942			
	Torque (ft-lbs)																	
	Lubricated	2.7	5.5	9.8	15.7	23.9	34.5	47.7	85	136	204	290	409	536	711			
	Dry	3.6	7.4	13.1	20.9	31.9	46.1	63.6	113	182	273	386	545	715	949			
SAE J429 Grade 5 	Min Tensile (lbs)	3819	6292	9299	12757	17028	21833	27120	40135	55408	72689	80144	101757	121263	147551			
	Min Proof Strength (lbs)	2705	4457	6587	9036	12061	15465	19210	28429	39247	51488	56482	71714	85461	103989			
	Clamp Load (lbs)	2029	3342	4940	6777	9046	11599	14408	21322	29436	38616	42362	53786	64096	77991			
	Torque (ft-lbs)																	
	Ecoguard	5.5	11.3	20.1	32.1	49.0	70.7	97.6	173	279	418	516	728	955	1267			
	Lubricated	6.3	13.1	23.2	37.1	56.5	81.6	112.6	200	322	483	596	840	1102	1462			
SAE J429 Grade 8 	Dry	8.5	17.4	30.9	49.4	75.4	108.7	150.1	267	429	644	794	1121	1469	1950			
	Min Tensile (lbs)	4773	7865	11623	15946	21285	27292	33900	50169	69260	90862	114491	145367	173232	210788			
	Min Proof Strength (lbs)	3819	6292	9299	12757	17028	21833	27120	40135	55408	72689	91593	116293	138586	168630			
	Clamp Load (lbs)	2864	4719	6974	9568	12771	16375	20340	30101	41556	54517	68695	87220	103939	126473			
	Torque (ft-lbs)																	
	Ecoguard	7.8	16.0	28.3	45.3	69.2	99.8	137.7	245	394	591	837	1181	1548	2055			
Holo-Krome Grade 9 	Lubricated	8.9	18.4	32.7	52.3	79.8	115.1	158.9	282	455	681	966	1363	1786	2371			
	Dry	11.9	24.6	43.6	69.8	106.4	153.5	211.9	376	606	909	1288	1817	2382	3162			
	Min Tensile (lbs)	5728	9437	13948	19136	25542	32750	40680	60203	83112	109034							
	Min Proof Strength (lbs)	4476	7374	10899	14952	19958	25590	31787	47042	64943	85198							
	Clamp Load (lbs)	3357	5531	8174	11214	14969	19193	23840	35281	48707	63899							
	Torque (ft-lbs)																	
Ecoguard	9.1	18.7	33.2	53.2	81.1	117.0	161.4	287	462	692								
ASTM A574 																		
	Min Tensile (lbs)	5728	9437	13948	19136	25542	30930	38420	56858	78495	102977	129757	164749	196330	238893			
	Min Proof Strength (lbs)	4455	7340	10849	14883	19866	24562	30510	45152	62334	81776	103042	130830	155909	189709			
	Clamp Load (lbs)	3341	5505	8136	11162	14899	18422	22883	33864	46751	61332	77282	98123	116932	142282			
	Torque (ft-lbs)																	
	Ecoguard	9.0	18.6	33.1	52.9	80.7	112.3	154.9	275	443	664	942	1329	1742	2312			
	Lubricated	10.4	21.5	38.1	61.0	93.1	129.5	178.8	317	511	767	1087	1533	2010	2668			
	Dry	13.9	28.7	50.9	81.4	124.2	172.7	238.4	423	682	1022	1449	2044	2680	3557			

Minimum tensile and proof strengths per ASTM A307, SAE J429, ASTM A574 and H-K Gr 9 where applicable.

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 calculated from formula $T = KDF$, where

K estimated at 0.13 for Ecoguard, 0.15 used for "lubricated" conditions and 0.20 for "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.