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Torque-Tension Relationship for ASTM A574 Socket Head Cap Screws

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.	Basic Screw Dia.	Unified Coarse Thread Series					Fine Thread Series				
		threads per inch	Clamp Load (lbs)	Tightening Torque			threads per inch	Clamp Load (lbs)	Tightening Torque		
				Ecoguard	K = 0.15	K = 0.20			Ecoguard	K = 0.15	K = 0.20
2	0.0860	56	388		5 in-lbs	7 in-lbs	64	413		5 in-lbs	7 in-lbs
4	0.1120	40	633		11	14	48	693		12	16
6	0.1380	32	954		20	26	40	1065		22	29
8	0.1640	32	1471	31 in-lbs	36	48	36	1546	33 in-lbs	38	51
10	0.1900	24	1841	45	52	70	32	2099	52	60	80
12	0.2160	24	2537	71	82	110	28	2708	76	88	117
1/4	0.2500	20	3341	9 ft-lbs	10 ft-lbs	14 ft-lbs	28	3819	10 ft-lbs	12 ft-lbs	16 ft-lbs
5/16	0.3125	18	5505	19	22	29	24	6097	21	24	32
3/8	0.3750	16	8136	33	38	51	24	9222	37	43	58
7/16	0.4375	14	11162	53	61	81	20	12465	59	68	91
1/2	0.500	13	14899	81	93	124	20	16795	91	105	140
9/16	0.563	12	19104	116	134	179	18	21313	130	150	200
5/8	0.625	11	22883	155	179	238	18	25916	175	202	270
3/4	0.750	10	33864	275	317	423	16	37762	307	354	472
7/8	0.875	9	46751	443	511	682	14	51584	489	564	752
1	1.000	8	61332	664	767	1022	14	68839	746	860	1147
1 1/4	1.250	7	98123	1329	1533	2044	12	108636	1471	1697	2263
1 1/2	1.500	6	142282	2312	2668	3557	12	160079	2601	3001	4002

The torque values can only be achieved if nut (or tapped hole) that 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 for socket head cap screws as specified in ASTM A574.

Torque values up through Number 12 listing in inch-pounds. All other torque values are in foot-pounds.

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.