

Spiralock Corporation Engineering Document

Information on Torque - Appendix A

Notes on Appendix A torque tables:

1. Metric proof load values (MPa) are taken from ASTM A563M and ISO 898-2. Inch proof load values (ksi) are taken from SAE J995. Numbers listed are for common size and pitch combinations.

2. All values are assumed when using the appropriate grade or class of bolt. Inch fasteners should be mated with identical grades (i.e: Grade 8 bolt with Grade 8 nut), and metric fasteners should be mated according to the table below:

ISO 898-2		
Class of Nut	Mating Bolts	
	Class	Dia.
9	8.8	> M16 < M39
	9.8	< M16
10	10.9	all
12	12.9	< M39

3. K factor values are approximations for dry steel and steel with oil only. Actual tested K values on these components may vary.

4. Torque values assume applying torque to achieve 75% of the fastener's proof load with an allowance of $\pm 5\%$.

5. These torque values are recommended starting ranges only. Actual values should be attained through testing and field usage. The best torque range for a particular application may fall outside of these values.

6. When using different materials, coatings, or sizes see www.spiralock.com/technology/torque recommendations to calculate a specific torque value or contact Spiralock engineering.



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CAGE CODE:

17353

ENG. STD. NO.:

SPL-9030-1003.A

SHEET:

1 OF 3

REV.:

5.0

DATE:

22 AUG 08

Inch

Recommended Spirallock Applied Torque - 75% of Yield

Size	SAE J995 Grade 2 55000 psi, Proof Load Stress				Units	SAE J995 Grade 5 85000 psi, Proof Load Stress				Units	SAE J995 Grade 8 120000 psi, Proof Load Stress				Units
	Dry		Lubricated			Dry		Lubricated			Dry		Lubricated		
	k= 0.2		k= 0.15			k= 0.2		k= 0.15			k= 0.2		k= 0.15		
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.	
#0-80	15.7	17.1	11.8	12.8	in-oz	24.2	26.4	18.2	19.8	in-oz	34.2	37.3	25.7	28.0	in-oz
#2-56	46.2	50.4	34.7	37.8	in-oz	71.4	77.9	53.6	58.4	in-oz	100.8	110.0	75.6	82.5	in-oz
#2-64	49.2	53.7	36.9	40.3	in-oz	76.0	82.9	57.0	62.2	in-oz	6.7	7.3	5.0	5.5	in-lb
#3-48	70.0	76.4	52.5	57.3	in-oz	108.2	118.0	81.1	88.5	in-oz	9.5	10.4	7.2	7.8	in-lb
#3-56	75.2	82.0	56.4	61.5	in-oz	116.2	126.8	87.1	95.1	in-oz	10.3	11.2	7.7	8.4	in-lb
#4-40	98.2	107.2	73.7	80.4	in-oz	9.5	10.4	7.1	7.8	in-lb	13.4	14.6	10.0	11.0	in-lb
#4-48	107.5	117.3	80.6	88.0	in-oz	10.4	11.3	7.8	8.5	in-lb	15	16	11	12	in-lb
#5-40	9.0	9.9	6.8	7.4	in-lb	14.0	15.2	10.5	11.4	in-lb	20	21	15	16	in-lb
#5-44	9.4	10.3	7.1	7.7	in-lb	14.6	15.9	10.9	11.9	in-lb	21	22	15	17	in-lb
#6-32	11.4	12.4	8.5	9.3	in-lb	17.6	19.2	13.2	14.4	in-lb	25	27	19	20	in-lb
#6-40	12.7	13.9	9.5	10.4	in-lb	19.6	21.4	14.7	16.1	in-lb	28	30	21	23	in-lb
#8-32	21	23	16	17	in-lb	32	35	24	26	in-lb	45	50	34	37	in-lb
#8-36	22	24	16	18	in-lb	34	37	25	28	in-lb	48	52	36	39	in-lb
#10-24	30	33	23	25	in-lb	47	51	35	38	in-lb	66	72	49	54	in-lb
#10-32	34	38	26	28	in-lb	53	58	40	44	in-lb	75	82	56	62	in-lb
#12-24	47	52	36	39	in-lb	73	80	55	60	in-lb	103	113	78	85	in-lb
#12-28	51	55	38	41	in-lb	78	85	59	64	in-lb	110	120	83	90	in-lb
1/4-20	72	79	54	59	in-lb	112	122	84	91	in-lb	158	172	118	129	in-lb
1/4-28	83	90	62	68	in-lb	128	139	96	104	in-lb	180	196	135	147	in-lb
5/16-18	12	14	9	10	ft-lb	19	21	14	16	ft-lb	27	29	20	22	ft-lb
5/16-24	14	15	10	11	ft-lb	21	23	16	17	ft-lb	30	33	22	24	ft-lb
3/8-16	22	24	16	18	ft-lb	34	37	25	28	ft-lb	48	52	36	39	ft-lb
3/8-24	25	27	19	20	ft-lb	38	42	29	31	ft-lb	54	59	41	44	ft-lb
7/16-14	35	38	26	29	ft-lb	54	59	41	44	ft-lb	77	84	58	63	ft-lb
7/16-20	39	43	29	32	ft-lb	61	66	46	50	ft-lb	86	93	64	70	ft-lb
1/2-13	54	59	40	44	ft-lb	83	90	62	68	ft-lb	117	128	88	96	ft-lb
1/2-20	60	66	45	49	ft-lb	93	102	70	76	ft-lb	132	144	99	108	ft-lb
9/16-12	77	84	58	63	ft-lb	120	130	90	98	ft-lb	169	184	127	138	ft-lb
9/16-18	86	94	65	71	ft-lb	133	146	100	109	ft-lb	188	206	141	154	ft-lb
5/8-11	107	117	80	87	ft-lb	165	180	124	135	ft-lb	233	254	175	191	ft-lb
5/8-18	121	132	91	99	ft-lb	187	204	140	153	ft-lb	264	288	198	216	ft-lb
3/4-10	190	207	142	155	ft-lb	293	320	220	240	ft-lb	414	452	310	339	ft-lb
3/4-16	212	231	159	173	ft-lb	327	357	245	267	ft-lb	462	503	346	378	ft-lb
7/8-9	306	334	229	250	ft-lb	472	515	354	387	ft-lb	667	728	500	546	ft-lb
7/8-14	337	367	253	276	ft-lb	521	568	390	426	ft-lb	735	802	551	601	ft-lb
1-8	458	500	344	375	ft-lb	708	772	531	579	ft-lb	999	1090	750	818	ft-lb
1-12	501	547	376	410	ft-lb	775	845	581	634	ft-lb	1094	1193	821	895	ft-lb
1-14	516	563	387	422	ft-lb	798	870	598	653	ft-lb	1126	1229	845	922	ft-lb
1 1/8-7	649	708	487	531	ft-lb	1003	1094	752	821	ft-lb	1416	1545	1062	1159	ft-lb
1 1/8-12	728	794	546	596	ft-lb	1126	1228	844	921	ft-lb	1589	1733	1192	1300	ft-lb
1 1/4-7	916	999	687	749	ft-lb	1416	1544	1062	1158	ft-lb	1999	2180	1499	1635	ft-lb
1 1/4-12	1014	1107	761	830	ft-lb	1568	1710	1176	1283	ft-lb	2213	2414	1660	1811	ft-lb
1 3/8-6	1201	1310	901	983	ft-lb	1856	2025	1392	1519	ft-lb	2620	2859	1965	2144	ft-lb
1 3/8-12	1367	1492	1026	1119	ft-lb	2113	2305	1585	1729	ft-lb	2983	3255	2238	2441	ft-lb
1 1/2-6	1594	1739	1195	1304	ft-lb	2463	2687	1847	2015	ft-lb	3477	3794	2608	2845	ft-lb
1 1/2-12	1793	1956	1345	1467	ft-lb	2772	3024	2079	2268	ft-lb	3913	4269	2935	3202	ft-lb

Metric															
Recommended Spiralock Applied Torque - 75% of Yield															
Size	ASTM A563M/ISO 898-2 Class 9.8					ASTM A563M/ISO 898-2 Class 10.9					ASTM A563M/ISO 898-2 Class 12.9				
	650 MPa, Proof Load Stress					830 MPa, Proof Load Stress					970 MPa, Proof Load Stress				
	Dry		Lubricated		Units	Dry		Lubricated		Units	Dry		Lubricated		Units
	k= 0.2		k= 0.15			k= 0.2		k= 0.15			k= 0.2		k= 0.15		
Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.		
M2.5x0.45	0.9	1.0	0.7	0.7	Nm	1.2	1.3	0.9	0.9	Nm	1.4	1.5	1.0	1.1	Nm
M3x0.5	1.6	1.8	1.2	1.3	Nm	2.1	2.3	1.6	1.7	Nm	2.4	2.6	1.8	2.0	Nm
M3.5x0.6	2.5	2.8	1.9	2.1	Nm	3.2	3.5	2.4	2.7	Nm	3.8	4.1	2.8	3.1	Nm
M4x0.7	3.8	4.1	2.8	3.1	Nm	4.8	5.2	3.6	3.9	Nm	5.6	6.1	4.2	4.6	Nm
M4.5x0.75	5.5	6.0	4.1	4.5	Nm	7.0	7.7	5.3	5.7	Nm	8.2	9.0	6.2	6.7	Nm
M5x0.8	7.6	8.3	5.7	6.2	Nm	9.7	10.6	7.3	7.9	Nm	11.3	12.4	8.5	9.3	Nm
M6x1.0	12.9	14.1	9.7	10.6	Nm	16.5	18.0	12.4	13.5	Nm	19.3	21.1	14.5	15.8	Nm
M7x1.0	21.7	23.6	16.2	17.7	Nm	27.7	30.2	20.7	22.6	Nm	32.3	35.3	24.2	26.4	Nm
M8x1.0	33.6	36.7	25.2	27.5	Nm	42.9	46.8	32.2	35.1	Nm	50.1	54.7	37.6	41.0	Nm
M8x1.25	31.4	34.3	23.6	25.7	Nm	40.1	43.8	30.1	32.8	Nm	46.9	51.1	35.2	38.4	Nm
M9x1.25	46.4	50.7	34.8	38.0	Nm	59.3	64.7	44.5	48.5	Nm	69.3	75.6	52.0	56.7	Nm
M10x1.25	65.6	71.6	49.2	53.7	Nm	83.8	91.4	62.9	68.6	Nm	97.9	107	73.5	80.1	Nm
M10x1.5	62.2	67.8	46.6	50.9	Nm	79.4	86.6	59.6	65.0	Nm	92.8	101	69.6	75.9	Nm
M12x1.25	118	129	88.9	97.0	Nm	151	165	113	124	Nm	177	193	133	145	Nm
M12x1.75	108	118	81.3	88.7	Nm	138	151	104	113	Nm	162	177	121	132	Nm
M14x1.25	194	212	146	159	Nm	248	270	186	203	Nm	290	316	217	237	Nm
M14x1.5	187	204	140	153	Nm	239	260	179	195	Nm	279	304	209	228	Nm
M14x2.0	173	189	130	142	Nm	221	241	166	181	Nm	259	282	194	212	Nm
M16x1.5	287	313	215	235	Nm	366	400	275	300	Nm	428	467	321	350	Nm
M16x2.0	269	293	202	220	Nm	343	375	257	281	Nm	401	438	301	328	Nm
M18x1.5	417	455	313	342	Nm	533	581	400	436	Nm	623	680	467	510	Nm
M18x2.5	372	405	279	304	Nm	474	518	356	388	Nm	554	605	416	454	Nm
M20x1.5	582	635	437	476	Nm	744	811	558	608	Nm	869	948	652	711	Nm
M20x2.5	525	573	394	430	Nm	670	731	503	549	Nm	784	855	588	641	Nm
M22x1.5	779	850	584	637	Nm	994	1085	746	814	Nm	1162	1268	872	951	Nm
M22x2.5	716	781	537	586	Nm	914	997	686	748	Nm	1068	1165	801	874	Nm
M24x3.0	907	990	681	742	Nm	1159	1264	869	948	Nm	1354	1477	1016	1108	Nm
M27x3.0	1330	1451	998	1088	Nm	1699	1853	1274	1390	Nm	1985	2166	1489	1624	Nm
M28x1.5	1668	1820	1251	1365	Nm	2130	2323	1597	1743	Nm	2489	2715	1867	2036	Nm
M30x2.0	1999	2180	1499	1635	Nm	2552	2784	1914	2088	Nm	2983	3254	2237	2440	Nm
M33x2.0	2693	2937	2019	2203	Nm	3438	3751	2579	2813	Nm	4018	4384	3014	3288	Nm
M33x3.5	2455	2678	1841	2008	Nm	3134	3419	2351	2565	Nm	3663	3996	2747	2997	Nm
M36x4.0	3153	3440	2365	2580	Nm	4027	4393	3020	3294	Nm	4706	5134	3529	3850	Nm
M39x4.0	4081	4452	3061	3339	Nm	5212	5685	3909	4264	Nm	6091	6644	4568	4983	Nm