

Metric **Tightening** **Torque** **Guide**



Earnest



Earnest

Engineering &
Manufacturing Center



We make custom easy.

**Your source for
fastener reworks,
custom cap screws,
and to-print specials.**

Large diameter blanks in-stock and ready
to be reworked to your specifications

Engineering & sales support

Short run volume welcome

Supplied parts accepted for rework

Quick quote speed

97.4% on-time delivery

EarnestMachine.com • 800.327.6378

Index

Property Class 4.8 - Coarse Thread

Plain Finish	Table 1
Zinc Plated	Table 2
Phosphate & Oil	Table 3
Lubricated	Table 4

Property Class 4.8 - Fine Thread

Plain Finish	Table 5
Zinc Plated	Table 6
Phosphate & Oil	Table 7
Lubricated	Table 8

Property Class 8.8 - Coarse Thread

Plain Finish	Table 9
Zinc Plated	Table 10
Phosphate & Oil	Table 11
Lubricated	Table 12

Property Class 8.8 - Fine Thread

Plain Finish	Table 13
Zinc Plated	Table 14
Phosphate & Oil	Table 15
Lubricated	Table 16

Property Class 10.9 - Coarse Thread

Plain Finish	Table 17
Zinc Plated	Table 18
Phosphate & Oil	Table 19
Lubricated	Table 20

Property Class 10.9 - Fine Thread

Plain Finish	Table 21
Zinc Plated	Table 22
Phosphate & Oil	Table 23
Lubricated	Table 24

Knowing the right torque for your application is critical. Too much or too little can return disastrous results. Earnest has prepared this guide to assist you in determining the right torque. The values provided in this guide are a result of the engineering equation:

$$T = K \times D \times P$$

T = Tightening Torque (Newton-Meters)

K = Torque Coefficient

D = Nominal Fastener Diameter (millimeter)

P = Clamp Load (Bolt Tension in kiloNewtons)

The values obtained by these calculations are meant to establish a starting point for evaluating the torque required to properly pre-load (clamp load) an assembly. For many applications the torques listed in the following charts will provide dependable clamp loads to ensure a safe and secure assembly. For critical applications the torque must be evaluated in the actual application to ensure proper assembly.

It has been reported that approximately 50% of applied torque is needed to overcome the friction between the bearing face on the nut or bolt and the surface they are being clamped down onto. Approximately 40% of the applied torque is needed to overcome the friction of the mating thread surfaces. Only 10% of the applied torque develops the tension in the bolt.

Many variables can affect the torque tension relationship and these must be considered in every critical application. The following are some examples of known factors that can influence the actual clamp load achieved by a given application torque.

- The hardness and type of materials of the mating joint members
- Type and accuracy of tool used to tighten the fastener
- Hole clearance
- Perpendicularity of the contact surfaces
- Different coatings on mating fasteners
- Supplemental coatings, thickness and lubricity
- High performance additional lubricants
- Operator influence
- Threading practice (cut vs. rolled threads)

- Percentage of thread flank engagement
- The speed of tightening
- Where the torque is applied (head of bolt vs. nut)
- Post-assemble loss of pre-load due to relaxation
- Interference caused by burrs, thread nicks, dirt, etc.

Since many of these factors directly affect the clamp load achieved during installation, no single K factor is considered to be best for any specific application. The values provided in these tables are useful in determining a target torque; however, the only accurate way to establish a specific pre-load is through torque tension testing of the fasteners to be used in the actual joint.

Over many years of application experience and testing, it has commonly been assumed that a K factor of .20 best represents standard fasteners used in an as received condition. As received is considered to be a clean non-plated/coated fastener, manufactured from steel, with only a light coating of rust preventive oil applied during the manufacturing process.

The tables included in this handbook provide torque values based on a laboratory conditions with the torque being applied to the nut, and with all components of the assembly (nut, washer, screw) having the same coating and strength level. Listed below are the K factors for various coatings and surface conditions that are encountered in fastener assemblies.

- .10 for extreme lubricants or waxes on top of any coating (Lubricated)
- .15 for zinc phosphate and oil (Phos & Oil)
- .17 for cadmium plated fasteners (Cad)
- .20 clean non-coated fastener with light rust preventative oil (Plain)
- .22 for electroplated zinc coated fasteners (Zinc Plated - Zn/Clear or Zn/Y)
- .25 for hot dip galvanized fasteners (HDG)
- .30 for bare steel fasteners with rust in the threads

METRIC

TORQUE & TIGHTENING GUIDE

This handbook lists the torques for the most common metric strength levels used in industry (property class 4.8, 8.8 and 10.9) along with the most common platings and coatings that are encountered (Plain, Phos & Oil, Zinc Plated and Lubricated). Torque recommendations are listed for Coarse and Fine threads in sizes from M4 to M100. Torque values are listed in both Newton-Meters and Foot-Pounds for convenience.

TO USE THIS TORQUE GUIDE:

1. Determine the property class of the fasteners being assembled (4.8, 8.8 or 10.9)
2. Determine the diameter and thread pitch; Coarse or Fine
3. Determine the coating on the fasteners (plain, zinc plated, etc)

Go to the table that lists the Property Class, Thread Pitch and Coating for the fasteners being assembled. Apply the torque listed for the size being assembled.

For example, for a M12 x 1.75 Property Class 10.9 hex cap screw and nut with a Zinc Yellow Plating the recommended torque is found in Table 18 (138 N-m or 102 ft-lbs).

All materials included in these tables are for reference purpose only and its use by anyone is entirely voluntary. Reliance on the contents by anyone for any purpose is at the sole risk of that person. Earnest is not responsible for any loss, claim, or damage arising there from. In developing these tables, Earnest has made a determined effort to present the contents accurately.

**Table 1: Property Class 4.8 Coarse Thread
Plain Finish (K = .20)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	2.72	2.04	459	1.6	1.2
M5	0.8	4.40	3.30	741	3.3	2.4
M6	1	6.24	4.68	1,052	5.6	4
M8	1.25	11.3	8.51	1,913	14	10
M10	1.5	18.0	13.5	3,031	27	20
M12	1.75	26.1	19.6	4,404	47	35
M14	2	35.8	26.8	6,034	75	55
M16	2	48.6	36.4	8,189	117	86
M18	2.5	59.7	44.7	10,060	161	119
M20	2.5	75.9	56.9	12,795	228	168
M22	2.5	94.1	70.5	15,858	310	229
M24	3	109	82.0	18,425	393	290
M27	3	142	107	24,012	577	425
M30	3.5	174	130	29,301	782	577
M33	3.5	215	161	36,251	1064	785
M36	4	253	190	42,689	1367	1,008
M39	4	302	227	51,001	1770	1,305
M42	4.5	347	261	58,588	2189	1,615
M48	5	457	343	76,999	3288	2,425
M52	5	545	409	91,879	4250	3,135
M56	5.5	629	472	106,106	5286	3,899
M64	6	830	622	139,869	7964	5,874
M72	6	1073	804	180,835	11583	8,543
M80	6	1347	1010	227,057	16160	11,919
M90	6	1733	1300	292,223	23398	17,257
M100	6	2168	1626	365,599	32525	23,989

**Table 2: Property Class 4.8 Coarse Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	2.72	2.04	459	1.8	1.3
M5	0.8	4.40	3.30	741	3.6	2.7
M6	1	6.24	4.68	1,052	6.2	4.6
M8	1.25	11.3	8.51	1,913	15.0	11.0
M10	1.5	18.0	13.5	3,031	30	22
M12	1.75	26.1	19.6	4,404	52	38
M14	2	35.8	26.8	6,034	83	61
M16	2	48.6	36.4	8,189	128	95
M18	2.5	59.7	44.7	10,060	177	131
M20	2.5	75.9	56.9	12,795	250	185
M22	2.5	94.1	70.5	15,858	341	252
M24	3	109	82.0	18,425	433	319
M27	3	142	107	24,012	634	468
M30	3.5	174	130	29,301	860	634
M33	3.5	215	161	36,251	1171	863
M36	4	253	190	42,689	1504	1,109
M39	4	302	227	51,001	1946	1,436
M42	4.5	347	261	58,588	2408	1,776
M48	5	457	343	76,999	3617	2,668
M52	5	545	409	91,879	4675	3,448
M56	5.5	629	472	106,106	5815	4,289
M64	6	830	622	139,869	8760	6461
M72	6	1073	804	180,835	12742	9,398
M80	6	1347	1010	227,057	17776	13,111
M90	6	1733	1300	292,223	25737	18,983
M100	6	2168	1626	365,599	35778	26,388

**Table 3: Property Class 4.8 Coarse Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	2.72	2.04	459	1.2	0.9
M5	0.8	4.40	3.30	741	2.5	1.8
M6	1	6.24	4.68	1,052	4.2	3
M8	1.25	11.3	8.51	1,913	10	8
M10	1.5	18.0	13.5	3,031	20	15
M12	1.75	26.1	19.6	4,404	35	26
M14	2	35.8	26.8	6,034	56	42
M16	2	48.6	36.4	8,189	87	64
M18	2.5	59.7	44.7	10,060	121	89
M20	2.5	75.9	56.9	12,795	171	126
M22	2.5	94.1	70.5	15,858	233	172
M24	3	109	82.0	18,425	295	218
M27	3	142	107	24,012	433	319
M30	3.5	174	130	29,301	587	433
M33	3.5	215	161	36,251	798	589
M36	4	253	190	42,689	1025	756
M39	4	302	227	51,001	1327	979
M42	4.5	347	261	58,588	1642	1,211
M48	5	457	343	76,999	2466	1,819
M52	5	545	409	91,879	3188	2,351
M56	5.5	629	472	106,106	3965	2,924
M64	6	830	622	139,869	5973	4,405
M72	6	1073	804	180,835	8687	6,408
M80	6	1347	1010	227,057	12120	8,939
M90	6	1733	1300	292,223	17548	12,943
M100	6	2168	1626	365,599	24394	17,992

**Table 4: Property Class 4.8 Coarse Thread
Lubricated (K = .10)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	2.72	2.04	459	0.8	0.6
M5	0.8	4.40	3.30	741	1.6	1.2
M6	1	6.24	4.68	1,052	2.8	2
M8	1.25	11.3	8.51	1,913	7	5
M10	1.5	18.0	13.5	3,031	13	10
M12	1.75	26.1	19.6	4,404	24	17
M14	2	35.8	26.8	6,034	38	28
M16	2	48.6	36.4	8,189	58	43
M18	2.5	59.7	44.7	10,060	81	59
M20	2.5	75.9	56.9	12,795	114	84
M22	2.5	94.1	70.5	15,858	155	114
M24	3	109	82.0	18,425	197	145
M27	3	142	107	24,012	288	213
M30	3.5	174	130	29,301	391	288
M33	3.5	215	161	36,251	532	392
M36	4	253	190	42,689	684	504
M39	4	302	227	51,001	885	653
M42	4.5	347	261	58,588	1095	807
M48	5	457	343	76,999	1644	1,213
M52	5	545	409	91,879	2125	1,567
M56	5.5	629	472	106,106	2643	1,949
M64	6	830	622	139,869	3982	2,937
M72	6	1073	804	180,835	5792	4,272
M80	6	1347	1010	227,057	8080	5,959
M90	6	1733	1300	292,223	11699	8,629
M100	6	2168	1626	365,599	16263	11,995

Table 5: Property Class 4.8 Fine Thread Plain (K = .20)

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	3.04	2.28	512	1.8	1.3
M5	0.5	5.00	3.75	843	3.7	2.8
M6	0.75	6.83	5.12	1,152	6	4.5
M8	1	12.1	9.11	2,047	15	11
M10	1.25	19.0	14.2	3,199	28	21
M12	1.25	28.5	21.4	4,812	51	38
M14	1.5	38.6	29.0	6,510	81	60
M16	1.5	51.8	38.9	8,742	124	92
M18	1.5	67.0	50.3	11,302	181	133
M20	1.5	84.2	63.1	14,191	252	186
M22	1.5	103	77.4	17,408	341	251
M24	2	119	89.4	20,093	429	316
M27	2	154	115	25,912	622	459
M30	2	193	144	32,469	867	639
M33	2	236	177	39,766	1167	861
M36	3	268	201	45,209	1448	1,068
M39	3	319	239	53,752	1865	1,376
M42	3	374	280	63,034	2355	1,737
M48	3	497	373	83,816	3579	2,640
M52	3	589	442	99,312	4594	3,389
M56	4	665	498	112,061	5583	4,118
M64	4	884	663	149,006	8484	6,257
M72	4	1134	851	191,205	12247	9,033
M80	4	1415	1062	238,659	16986	12,528
M90	4	1811	1358	305,365	24450	18,033
M100	4	2255	1692	380,282	33831	24,953

**Table 6: Property Class 4.8 Fine Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	3.04	2.28	512	2.0	1.5
M5	0.5	5.00	3.75	843	4.1	3.0
M6	0.75	6.83	5.12	1,152	7	5.0
M8	1	12.1	9.11	2,047	16	12
M10	1.25	19.0	14.2	3,199	31	23
M12	1.25	28.5	21.4	4,812	57	42
M14	1.5	38.6	29.0	6,510	89	66
M16	1.5	51.8	38.9	8,742	137	101
M18	1.5	67.0	50.3	11,302	199	147
M20	1.5	84.2	63.1	14,191	278	205
M22	1.5	103	77.4	17,408	375	276
M24	2	119	89.4	20,093	472	348
M27	2	154	115	25,912	685	505
M30	2	193	144	32,469	953	703
M33	2	236	177	39,766	1284	947
M36	3	268	201	45,209	1593	1,175
M39	3	319	239	53,752	2051	1,513
M42	3	374	280	63,034	2591	1,911
M48	3	497	373	83,816	3937	2,904
M52	3	589	442	99,312	5054	3,727
M56	4	665	498	112,061	6141	4,529
M64	4	884	663	149,006	9332	6,883
M72	4	1134	851	191,205	13472	9,937
M80	4	1415	1062	238,659	18684	13,781
M90	4	1811	1358	305,365	26895	19,837
M100	4	2255	1692	380,282	37215	27,448

**Table 7: Property Class 4.8 Fine Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	3.04	2.28	512	1.4	1.0
M5	0.5	5.00	3.75	843	2.8	2.1
M6	0.75	6.83	5.12	1,152	5	3.4
M8	1	12.1	9.11	2,047	11	8
M10	1.25	19.0	14.2	3,199	21	16
M12	1.25	28.5	21.4	4,812	39	28
M14	1.5	38.6	29.0	6,510	61	45
M16	1.5	51.8	38.9	8,742	93	69
M18	1.5	67.0	50.3	11,302	136	100
M20	1.5	84.2	63.1	14,191	189	140
M22	1.5	103	77.4	17,408	256	188
M24	2	119	89.4	20,093	322	237
M27	2	154	115	25,912	467	344
M30	2	193	144	32,469	650	479
M33	2	236	177	39,766	876	646
M36	3	268	201	45,209	1086	801
M39	3	319	239	53,752	1399	1,032
M42	3	374	280	63,034	1766	1,303
M48	3	497	373	83,816	2684	1,980
M52	3	589	442	99,312	3446	2,541
M56	4	665	498	112,061	4187	3,088
M64	4	884	663	149,006	6363	4,693
M72	4	1134	851	191,205	9186	6,775
M80	4	1415	1062	238,659	12739	9,396
M90	4	1811	1358	305,365	18337	13,525
M100	4	2255	1692	380,282	25374	18,715

**Table 8: Property Class 4.8 Fine Thread
Lubricated (K = .10)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	3.04	2.28	512	0.9	0.7
M5	0.5	5.00	3.75	843	1.9	1.4
M6	0.75	6.83	5.12	1,152	3	2.3
M8	1	12.1	9.11	2,047	7	5
M10	1.25	19.0	14.2	3,199	14	10
M12	1.25	28.5	21.4	4,812	26	19
M14	1.5	38.6	29.0	6,510	41	30
M16	1.5	51.8	38.9	8,742	62	46
M18	1.5	67.0	50.3	11,302	90	67
M20	1.5	84.2	63.1	14,191	126	93
M22	1.5	103	77.4	17,408	170	126
M24	2	119	89.4	20,093	215	158
M27	2	154	115	25,912	311	230
M30	2	193	144	32,469	433	320
M33	2	236	177	39,766	584	431
M36	3	268	201	45,209	724	534
M39	3	319	239	53,752	932	688
M42	3	374	280	63,034	1178	869
M48	3	497	373	83,816	1790	1,320
M52	3	589	442	99,312	2297	1,694
M56	4	665	498	112,061	2791	2,059
M64	4	884	663	149,006	4242	3,129
M72	4	1134	851	191,205	6124	4,517
M80	4	1415	1062	238,659	8493	6,264
M90	4	1811	1358	305,365	12225	9,017
M100	4	2255	1692	380,282	16916	12,476

**Table 9: Property Class 8.8 Coarse Thread
Plain (K = .20)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	5.09	3.82	858	3.1	2.3
M5	0.8	8.23	6.17	1,387	6.2	4.6
M6	1	11.67	8.75	1,968	10.5	7.7
M8	1.25	21.23	15.92	3,580	25.5	19
M10	1.5	33.63	25.23	5,671	50.5	37
M12	1.75	48.87	36.66	8,241	88.0	65
M14	2	66.95	50.22	11,289	141	104
M16	2	90.09	68.20	15,321	218	161
M18	2.5	115.48	86.61	19,471	312	230
M20	2.5	146.88	110.16	24,765	441	325
M22	2.5	182.04	136.53	30,693	601	443
M24	3	211.50	158.63	35,661	761	562
M27	3	275.64	206.73	46,476	1116	823
M30	3.5	336.35	252.26	56,712	1514	1,116
M33	3.5	416.13	312.10	70,163	2060	1,519
M36	4	490.03	367.53	82,623	2646	1,952
M39	4	585.45	439.09	98,712	3425	2,526
M42	4.5	672.55	504.41	113,396	4237	3,125
M48	5	883.89	662.92	149,031	6364	4,694
M52	5	1054.7	791.03	177,831	8227	6,068
M56	5.5	1218.0	913.51	205,366	10231	7,546
M64	6	1605.6	1204.2	270,714	15414	11,368
M72	6	2075.9	1556.9	350,004	22419	16,536
M80	6	2606.4	1954.8	439,465	31277	23,069
M90	6	3354.5	2515.9	565,592	45286	33,401
M100	6	4196.8	3147.6	707,611	62952	46,431

**Table 10: Property Class 8.8 Coarse Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
			mm	kN	kN	(Lbs)
M4	0.7	5.09	3.82	858	3.4	2.5
M5	0.8	8.23	6.17	1,387	6.8	5.0
M6	1	11.67	8.75	1,968	11.6	8.5
M8	1.25	21.23	15.92	3,580	28	21
M10	1.5	33.63	25.23	5,671	55	41
M12	1.75	48.87	36.66	8,241	97	71
M14	2	66.95	50.22	11,289	155	114
M16	2	94.00	70.05	15,748	240	177
M18	2.5	115.48	86.61	19,471	343	253
M20	2.5	146.88	110.16	24,765	485	357
M22	2.5	182.04	136.53	30,693	661	487
M24	3	211.50	158.63	35,661	838	618
M27	3	275.64	206.73	46,476	1228	906
M30	3.5	336.35	252.26	56,712	1665	1,228
M33	3.5	416.13	312.10	70,163	2266	1,671
M36	4	490.03	367.53	82,623	2911	2,147
M39	4	585.45	439.09	98,712	3767	2,779
M42	4.5	672.55	504.41	113,396	4661	3,438
M48	5	883.89	662.92	149,031	7000	5,163
M52	5	1054.70	791.03	177,831	9049	6,674
M56	5.5	1218.01	913.51	205,366	11254	8,301
M64	6	1605.59	1204.19	270,714	16955	12,505
M72	6	2075.85	1556.89	350,004	24661	18,189
M80	6	2606.44	1954.83	439,465	34405	25,376
M90	6	3354.49	2515.87	565,592	49814	36,741
M100	6	4196.79	3147.59	707,611	69247	51,074

**Table 11: Property Class 8.8 Coarse Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	5.09	3.82	858	2.3	1.7
M5	0.8	8.23	6.17	1,387	4.6	3.4
M6	1	11.67	8.75	1,968	7.9	5.8
M8	1.25	21.23	15.92	3,580	19	14
M10	1.5	33.63	25.23	5,671	38	28
M12	1.75	48.87	36.66	8,241	66	49
M14	2	66.95	50.22	11,289	105	78
M16	2	94.00	70.05	15,748	164	121
M18	2.5	115.48	86.61	19,471	234	172
M20	2.5	146.88	110.16	24,765	330	244
M22	2.5	182.04	136.53	30,693	451	332
M24	3	211.50	158.63	35,661	571	421
M27	3	275.64	206.73	46,476	837	618
M30	3.5	336.35	252.26	56,712	1135	837
M33	3.5	416.13	312.10	70,163	1545	1,139
M36	4	490.03	367.53	82,623	1985	1,464
M39	4	585.45	439.09	98,712	2569	1,895
M42	4.5	672.55	504.41	113,396	3178	2,344
M48	5	883.89	662.92	149,031	4773	3,520
M52	5	1054.70	791.03	177,831	6170	4,551
M56	5.5	1218.01	913.51	205,366	7673	5,660
M64	6	1605.59	1204.19	270,714	11560	8,526
M72	6	2075.85	1556.89	350,004	16814	12,402
M80	6	2606.44	1954.83	439,465	23458	17,302
M90	6	3354.49	2515.87	565,592	33964	25,051
M100	6	4196.79	3147.59	707,611	47214	34,823

**Table 12: Property Class 8.8 Coarse Thread
Lubricated (K = .10)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	5.09	3.82	858	1.5	1.1
M5	0.8	8.23	6.17	1,387	3.1	2.3
M6	1	11.67	8.75	1,968	5.3	3.9
M7	1	16.74	12.55	2,822	9	6
M8	1.25	21.23	15.92	3,580	13	9
M10	1.5	33.63	25.23	5,671	25	19
M12	1.75	48.87	36.66	8,241	44	32
M14	2	66.95	50.22	11,289	70	52
M16	2	94.00	70.05	15,748	109	80
M18	2.5	115.48	86.61	19,471	156	115
M20	2.5	146.88	110.16	24,765	220	162
M22	2.5	182.04	136.53	30,693	300	222
M24	3	211.50	158.63	35,661	381	281
M27	3	275.64	206.73	46,476	558	412
M30	3.5	336.35	252.26	56,712	757	558
M33	3.5	416.13	312.10	70,163	1030	760
M36	4	490.03	367.53	82,623	1323	976
M39	4	585.45	439.09	98,712	1712	1,263
M42	4.5	672.55	504.41	113,396	2119	1,563
M45	4.5	783.60	587.70	132,121	2645	1,951
M48	5	883.89	662.92	149,031	3182	2,347
M52	5	1054.70	791.03	177,831	4113	3,034
M56	5.5	1218.01	913.51	205,366	5116	3,773
M60	5.5	1417.21	1062.91	238,953	6377	4,704
M64	6	1605.59	1204.19	270,714	7707	5,684
M72	6	2075.85	1556.89	350,004	11210	8,268
M80	6	2606.44	1954.83	439,465	15639	11,534
M90	6	3354.49	2515.87	565,592	22643	16,700
M100	6	4196.79	3147.59	707,611	31476	23,215

**Table 13: Property Class 8.8 Fine Thread
Plain (K = .20)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	5.68	4.26	958	3.4	2.5
M5	0.5	9.35	7.01	1,577	7	5.2
M6	0.75	12.8	9.58	2,155	11.5	8.5
M8	1	22.7	17.0	3,830	27	20
M10	1.25	35.5	26.6	5,985	53	39
M12	1.25	53.4	40.1	9,004	96	71
M14	1.5	72.2	54.2	12,180	152	112
M16	1.5	97.0	72.8	16,356	233	172
M18	1.5	130	97.3	21,875	350	258
M20	1.5	163	122	27,467	489	360
M22	1.5	200	150	33,693	659	486
M24	2	231	173	38,889	830	612
M27	2	297	223	50,151	1205	889
M30	2	373	280	62,844	1677	1,237
M33	2	456	342	76,966	2260	1,667
M36	3	519	389	87,501	2802	2,067
M39	3	617	463	104,037	3610	2,662
M42	3	724	543	122,002	4559	3,362
M48	3	962	722	162,224	6927	5,109
M52	3	1140	855	192,217	8892	6,559
M56	4	1286	965	216,893	10806	7,970
M64	4	1710	1283	288,398	16421	12,111
M72	4	2195	1646	370,074	23705	17,484
M80	4	2740	2055	461,920	32875	24,248
M90	4	3505	2629	591,029	47322	34,903
M100	4	4365	3274	736,030	65480	48,296

**Table 14: Property Class 8.8 Fine Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
			mm	kN	kN	(Lbs)
M4	0.5	5.68	4.26	958	3.7	2.8
M5	0.5	9.35	7.01	1,577	7.7	5.7
M6	0.75	12.8	9.58	2,155	12.7	9.3
M8	1	22.7	17.0	3,830	30	22
M10	1.25	35.5	26.6	5,985	59	43
M10	1	37.4	28.1	6,307	62	46
M12	1.5	51.1	38.3	8,618	101	75
M12	1.25	53.4	40.1	9,004	106	78
M14	1.5	72.2	54.2	12,180	167	123
M16	1.5	97.0	72.8	16,356	256	189
M18	1.5	130	97.3	21,875	385	284
M20	1.5	163	122	27,467	538	396
M22	1.5	200	150	33,693	725	535
M24	2	231	173	38,889	913	674
M27	2	297	223	50,151	1325	977
M30	2	373	280	62,844	1845	1,361
M33	2	456	342	76,966	2486	1,833
M36	3	519	389	87,501	3083	2,274
M39	3	617	463	104,037	3971	2,929
M42	3	724	543	122,002	5014	3,698
M48	3	962	722	162,224	7620	5,620
M52	3	1140	855	192,217	9781	7,214
M56	4	1286	965	216,893	11886	8,767
M64	4	1710	1283	288,398	18063	13,322
M72	4	2195	1646	370,074	26075	19,232
M80	4	2740	2055	461,920	36163	26,672
M90	4	3505	2629	591,029	52055	38,393
M100	4	4365	3274	736,030	72028	53,125

**Table 15: Property Class 8.8 Fine Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	5.68	4.26	958	2.6	1.9
M5	0.5	9.35	7.01	1,577	5.3	3.9
M6	0.75	12.8	9.58	2,155	8.6	6.4
M8	1	22.7	17.0	3,830	20	15
M10	1.25	35.5	26.6	5,985	40	29
M12	1.25	53.4	40.1	9,004	72	53
M14	1.5	72.2	54.2	12,180	114	84
M16	1.5	97.0	72.8	16,356	175	129
M18	1.5	130	97.3	21,875	263	194
M20	1.5	163	122	27,467	367	270
M22	1.5	200	150	33,693	495	365
M24	2	231	173	38,889	623	459
M27	2	297	223	50,151	903	666
M30	2	373	280	62,844	1258	928
M33	2	456	342	76,966	1695	1,250
M36	3	519	389	87,501	2102	1,550
M39	3	617	463	104,037	2707	1,997
M42	3	724	543	122,002	3419	2,522
M48	3	962	722	162,224	5196	3,832
M52	3	1140	855	192,217	6669	4,919
M56	4	1286	965	216,893	8104	5,977
M64	4	1710	1283	288,398	12315	9,083
M72	4	2195	1646	370,074	17779	13,113
M80	4	2740	2055	461,920	24657	18,186
M90	4	3505	2629	591,029	35492	26,177
M100	4	4365	3274	736,030	49110	36,222

**Table 16: Property Class 8.8 Fine Thread
Lubricated (K = .10)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	5.68	4.26	958	1.7	1.3
M5	0.5	9.35	7.01	1,577	3.5	2.6
M6	0.75	12.8	9.58	2,155	5.8	4.2
M8	1	22.7	17.0	3,830	14	10
M10	1.25	35.5	26.6	5,985	27	20
M10	1	37.4	28.1	6,307	28	21
M12	1.5	51.1	38.3	8,618	46	34
M12	1.25	53.4	40.1	9,004	48	35
M14	1.5	72.2	54.2	12,180	76	56
M16	1.5	97.0	72.8	16,356	116	86
M18	1.5	130	97.3	21,875	175	129
M20	1.5	163	122	27,467	244	180
M22	1.5	200	150	33,693	330	243
M24	2	231	173	38,889	415	306
M27	2	297	223	50,151	602	444
M30	2	373	280	62,844	839	619
M33	2	456	342	76,966	1130	833
M36	3	519	389	87,501	1401	1,033
M39	3	617	463	104,037	1805	1,331
M42	3	724	543	122,002	2279	1,681
M48	3	962	722	162,224	3464	2,555
M52	3	1140	855	192,217	4446	3,279
M56	4	1286	965	216,893	5403	3,985
M64	4	1710	1283	288,398	8210	6,056
M72	4	2195	1646	370,074	11852	8,742
M80	4	2740	2055	461,920	16438	12,124
M90	4	3505	2629	591,029	23661	17,452
M100	4	4365	3274	736,030	32740	24,148

Table 17: Property Class 10.9 Coarse Thread Plain (K = .20)

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	7.29	5.46	1,229	4.4	3
M5	0.8	11.8	8.83	1,985	8.8	7
M6	1	16.7	12.5	2,816	15	11
M8	1.25	30.4	22.8	5,123	36	27
M10	1.5	48.1	36.1	8,115	72	53
M12	1.75	69.9	52.5	11,793	126	93
M14	2	95.8	71.9	16,155	201	148
M16	2	130	97.5	21,925	312	230
M18	2.5	160	120	26,935	431	318
M20	2.5	203	152	34,258	610	450
M22	2.5	252	189	42,459	831	613
M24	3	293	219	49,331	1053	777
M27	3	381	286	64,291	1544	1,139
M30	3.5	465	349	78,451	2094	1,544
M33	3.5	576	432	97,059	2849	2,102
M36	4	678	508	114,296	3661	2,700
M39	4	810	607	136,551	4738	3,494
M42	4.5	930	698	156,865	5861	4,323
M48	5	1223	917	206,159	8804	6,493
M52	5	1459	1094	245,999	11380	8,394
M56	5.5	1685	1264	284,090	14153	10,439
M64	6	2221	1666	374,487	21322	15,726
M72	6	2872	2154	484,172	31013	22,874
M80	6	3606	2704	607,926	43267	31,912
M90	6	4640	3480	782,402	62645	46,205
M100	6	5806	4354	978,861	87083	64,229

**Table 18: Property Class 10.9 Coarse Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	7.29	5.46	1,229	4.8	3.5
M5	0.8	11.8	8.83	1,985	9.7	7
M6	1	16.7	12.5	2,816	16.5	12
M8	1.25	30.4	22.8	5,123	40	30
M10	1.5	48.1	36.1	8,115	79	59
M12	1.75	69.9	52.5	11,793	138	102
M14	2	95.8	71.9	16,155	221	163
M16	2	130	97.5	21,925	343	253
M18	2.5	160	120	26,935	474	350
M20	2.5	203	152	34,258	670	495
M22	2.5	252	189	42,459	914	674
M24	3	293	219	49,331	1159	855
M27	3	381	286	64,291	1699	1,253
M30	3.5	465	349	78,451	2303	1,699
M33	3.5	576	432	97,059	3134	2,312
M36	4	678	508	114,296	4027	2,970
M39	4	810	607	136,551	5212	3,844
M42	4.5	930	698	156,865	6447	4,755
M48	5	1223	917	206,159	9684	7,142
M52	5	1459	1094	245,999	12518	9,233
M56	5.5	1685	1264	284,090	15569	11,483
M64	6	2221	1666	374,487	23454	17,299
M72	6	2872	2154	484,172	34115	25,162
M80	6	3606	2704	607,926	47594	35,103
M90	6	4640	3480	782,402	68910	50,825
M100	6	5806	4354	978,861	95792	70,652

**Table 19: Property Class 10.9 Coarse Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	7.29	5.46	1,229	3.3	2.4
M5	0.8	11.8	8.83	1,985	6.6	5
M6	1	16.7	12.5	2,816	11.3	8
M8	1.25	30.4	22.8	5,123	27	20
M10	1.5	48.1	36.1	8,115	54	40
M12	1.75	69.9	52.5	11,793	94	70
M14	2	95.8	71.9	16,155	151	111
M16	2	130	97.5	21,925	234	173
M18	2.5	160	120	26,935	323	239
M20	2.5	203	152	34,258	457	337
M22	2.5	252	189	42,459	623	460
M24	3	293	219	49,331	790	583
M27	3	381	286	64,291	1158	854
M30	3.5	465	349	78,451	1570	1,158
M33	3.5	576	432	97,059	2137	1,576
M36	4	678	508	114,296	2745	2,025
M39	4	810	607	136,551	3553	2,621
M42	4.5	930	698	156,865	4396	3,242
M48	5	1223	917	206,159	6603	4,870
M52	5	1459	1094	245,999	8535	6,295
M56	5.5	1685	1264	284,090	10615	7,829
M64	6	2221	1666	374,487	15992	11,795
M72	6	2872	2154	484,172	23260	17,156
M80	6	3606	2704	607,926	32450	23,934
M90	6	4640	3480	782,402	46984	34,653
M100	6	5806	4354	978,861	65313	48,172

**Table 20: Property Class 10.9 Coarse Thread
Lubricated (K = .10)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.7	7.29	5.46	1,229	2.2	1.6
M5	0.8	11.8	8.83	1,985	4.4	3
M6	1	16.7	12.5	2,816	7.5	6
M8	1.25	30.4	22.8	5,123	18	13
M10	1.5	48.1	36.1	8,115	36	27
M12	1.75	69.9	52.5	11,793	63	46
M14	2	95.8	71.9	16,155	101	74
M16	2	130	97.5	21,925	156	115
M18	2.5	160	120	26,935	216	159
M20	2.5	203	152	34,258	305	225
M22	2.5	252	189	42,459	416	306
M24	3	293	219	49,331	527	388
M27	3	381	286	64,291	772	570
M30	3.5	465	349	78,451	1047	772
M33	3.5	576	432	97,059	1425	1,051
M36	4	678	508	114,296	1830	1,350
M39	4	810	607	136,551	2369	1,747
M42	4.5	930	698	156,865	2931	2,162
M48	5	1223	917	206,159	4402	3,247
M52	5	1459	1094	245,999	5690	4,197
M56	5.5	1685	1264	284,090	7077	5,219
M64	6	2221	1666	374,487	10661	7,863
M72	6	2872	2154	484,172	15507	11,437
M80	6	3606	2704	607,926	21633	15,956
M90	6	4640	3480	782,402	31323	23,102
M100	6	5806	4354	978,861	43542	32,115

Table 21: Property Class 10.9 Fine Thread Plain (K = .20)

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
			mm	kN	(Lbs)	N-m
M4	0.5	8.13	6.10	1,370	4.9	3.6
M5	0.5	13.4	10.0	2,256	10	7
M6	0.75	18.3	13.7	3,083	16	12
M8	1	32.5	24.4	5,481	39	29
M10	1.25	50.8	38.1	8,564	76	56
M12	1.25	76.4	57.3	12,885	138	101
M14	1.5	103	77.5	17,429	217	160
M16	1.5	139	104	23,405	333	246
M18	1.5	179	135	30,261	485	357
M20	1.5	225	169	37,995	676	499
M22	1.5	276	207	46,609	912	673
M24	2	319	239	53,797	1149	847
M27	2	411	309	69,376	1666	1,229
M30	2	516	387	86,934	2320	1,711
M33	2	631	474	106,470	3126	2,305
M36	3	718	538	121,043	3877	2,859
M39	3	854	640	143,917	4993	3,683
M42	3	1001	751	168,770	6306	4,651
M48	3	1331	998	224,410	9583	7,068
M52	3	1577	1183	265,900	12301	9,073
M56	4	1779	1335	300,035	14948	11,025
M64	4	2366	1775	398,951	22715	16,754
M72	4	3036	2277	511,936	32792	24,186
M80	4	3790	2842	638,989	45478	33,542
M90	4	4849	3637	817,591	65463	48,283
M100	4	6039	4529	1,018,174	90581	66,809

**Table 22: Property Class 10.9 Fine Thread
Zinc Plating (K = .22)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
			mm	kN	(Lbs)	N-m
M4	0.5	8.13	6.10	1,370	5.4	4.0
M5	0.5	13.4	10.0	2,256	11.0	8.1
M6	0.75	18.3	13.7	3,083	18	13
M8	1	32.5	24.4	5,481	43	32
M10	1.25	50.8	38.1	8,564	84	62
M12	1.25	76.4	57.3	12,885	151	112
M14	1.5	103	77.5	17,429	239	176
M16	1.5	139	104	23,405	366	270
M18	1.5	179	135	30,261	533	393
M20	1.5	225	169	37,995	744	548
M22	1.5	276	207	46,609	1003	740
M24	2	319	239	53,797	1264	932
M27	2	411	309	69,376	1833	1,352
M30	2	516	387	86,934	2552	1,882
M33	2	631	474	106,470	3438	2,536
M36	3	718	538	121,043	4264	3,145
M39	3	854	640	143,917	5493	4,051
M42	3	1001	751	168,770	6937	5,116
M48	3	1331	998	224,410	10541	7,775
M52	3	1577	1183	265,900	13531	9,980
M56	4	1779	1335	300,035	16442	12,127
M64	4	2366	1775	398,951	24987	18,429
M72	4	3036	2277	511,936	36071	26,604
M80	4	3790	2842	638,989	50025	36,897
M90	4	4849	3637	817,591	72009	53,111
M100	4	6039	4529	1,018,174	99639	73,490

**Table 23: Property Class 10.9 Fine Thread
Phosphate and Oil (K = .15)**

Dia.	Thread Pitch	Proof Load	Clamp Load (75% of Proof Load)		Torque	
	mm	kN	kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	8.13	6.10	1,370	3.7	2.7
M5	0.5	13.4	10.0	2,256	7.5	5.6
M6	0.75	18.3	13.7	3,083	12	9
M8	1	32.5	24.4	5,481	29	22
M10	1.25	50.8	38.1	8,564	57	42
M12	1.25	76.4	57.3	12,885	103	76
M14	1.5	103	77.5	17,429	163	120
M16	1.5	139	104	23,405	250	184
M18	1.5	179	135	30,261	363	268
M20	1.5	225	169	37,995	507	374
M22	1.5	276	207	46,609	684	505
M24	2	319	239	53,797	861	635
M27	2	411	309	69,376	1250	922
M30	2	516	387	86,934	1740	1,283
M33	2	631	474	106,470	2344	1,729
M36	3	718	538	121,043	2907	2,144
M39	3	854	640	143,917	3745	2,762
M42	3	1001	751	168,770	4730	3,488
M48	3	1331	998	224,410	7187	5,301
M52	3	1577	1183	265,900	9226	6,804
M56	4	1779	1335	300,035	11211	8,269
M64	4	2366	1775	398,951	17036	12,565
M72	4	3036	2277	511,936	24594	18,139
M80	4	3790	2842	638,989	34108	25,157
M90	4	4849	3637	817,591	49097	36,212
M100	4	6039	4529	1,018,174	67936	50,107

**Table 24: Property Class 10.9 Fine Thread
Lubricated (K = .10)**

Dia.	Thread Pitch mm	Proof Load kN	Clamp Load (75% of Proof Load)		Torque	
			kN	(Lbs)	N-m	(Ft-Lb)
M4	0.5	8.13	6.10	1,370	2.4	1.8
M5	0.5	13.4	10.0	2,256	5	4
M6	0.75	18.3	13.7	3,083	8	6
M8	1	32.5	24.4	5,481	20	14
M10	1.25	50.8	38.1	8,564	38	28
M12	1.25	76.4	57.3	12,885	69	51
M14	1.5	103	77.5	17,429	109	80
M16	1.5	139	104	23,405	167	123
M18	1.5	179	135	30,261	242	179
M20	1.5	225	169	37,995	338	249
M22	1.5	276	207	46,609	456	336
M24	2	319	239	53,797	574	424
M27	2	411	309	69,376	833	615
M30	2	516	387	86,934	1160	856
M33	2	631	474	106,470	1563	1,153
M36	3	718	538	121,043	1938	1,430
M39	3	854	640	143,917	2497	1,841
M42	3	1001	751	168,770	3153	2,326
M48	3	1331	998	224,410	4791	3,534
M52	3	1577	1183	265,900	6150	4,536
M56	4	1779	1335	300,035	7474	5,512
M64	4	2366	1775	398,951	11358	8,377
M72	4	3036	2277	511,936	16396	12,093
M80	4	3790	2842	638,989	22739	16,771
M90	4	4849	3637	817,591	32731	24,141
M100	4	6039	4529	1,018,174	45290	33,404