



RECOMMENDED ASSEMBLY TORQUES

Class 4.6 ISO Metric Coarse Pitch Bolts & Screws

Diameter	Pitch	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		kN	Nm
M1.6	0.35	0.19	0.06
M2	0.40	0.31	0.12
M2.5	0.45	0.50	0.25
M3	0.50	0.73	0.44
M4	0.70	1.29	1.00
M5	0.80	2.08	2.1
M6	1.00	2.94	3.5
M8	1.25	5.34	8.5
M10	1.5	8.45	17
M12	1.75	12.4	30
M14	2.00	16.8	47
M16	2.00	22.9	73
M18	2.5	28.1	101
M20	2.5	35.8	143
M22	2.5	44.3	195
M24	3.00	51.6	248
M27	3.00	67.0	362
M30	3.50	81.9	491
M33	3.50	101	669
M36	4.00	120	864
M39	4.00	143	1115
M42	4.50	164	1378
M48	5.00	215	2064
M56	5.50	298	3338
M64	6.00	393	5030

To convert kN to lbf: Multiply kN by 224.809

To convert Nm to lbft: Multiply Nm by 0.737562

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7



RECOMMENDED ASSEMBLY TORQUES

Class 8.8 ISO Metric Coarse Pitch Bolts & Screws

Diameter	Pitch	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		kN	Nm
M1.6	0.35	0.48	0.15
M2	0.40	0.78	0.31
M2.5	0.45	1.28	0.64
M3	0.50	1.9	1.1
M4	0.70	3.32	2.7
M5	0.80	5.35	5
M6	1.00	7.54	9
M8	1.25	13.8	22
M10	1.5	21.9	44
M12	1.75	31.8	77
M14	2.00	43.4	122
M16	2.00	59.2	190
M18	2.5	74.8	269
M20	2.5	95.6	372
M22	2.5	118	519
M24	3.00	138	640
M27	3.00	179	967
M30	3.50	219	1314
M33	3.50	270	1782
M36	4.00	319	2297
M39	4.00	380	2970
M42	4.50	437	3671
M48	5.00	573	5500
M56	5.50	792	8870
M64	6.00	1045	13376

To convert kN to lbf: Multiply kN by 224.809
 To convert Nm to lbf: Multiply Nm by 0.737562

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7



RECOMMENDED ASSEMBLY TORQUES

Class 10.9 ISO Metric Coarse Pitch Bolts & Screws

Diameter	Pitch	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		kN	Nm
M5	0.80	7.67	8
M6	1.00	10.9	13
M8	1.25	19.8	32
M10	1.5	31.3	63
M12	1.75	45.5	109
M14	2.00	62.1	174
M16	2.00	84.5	270
M18	2.5	103	371
M20	2.5	132	528
M22	2.5	164	722
M24	3.00	190	914
M27	3.00	248	1339
M30	3.50	303	1817
M33	3.50	371	2449
M36	4.00	441	31173
M39	4.00	527	4110

Class 12.9 ISO Metric Coarse Pitch Bolts & Screws

Diameter	Pitch	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		kN	Nm
M3	0.50	3.17	1.9
M4	0.70	5.54	4.4
M5	0.80	8.97	8.9
M6	1.00	12.7	15
M8	1.25	23.1	37
M10	1.5	36.6	73
M12	1.75	53.2	128
M14	2.00	72.8	203
M16	2.00	98.8	316
M18	2.5	121	436
M20	2.5	155	620
M22	2.5	191	840
M24	3.00	222	1066
M27	3.00	289	1561
M30	3.50	354	2124
M33	3.50	437	2884
M36	4.00	515	3708

To convert kN to lbf: Multiply kN by 224.809

To convert Nm to lbft: Multiply Nm by 0.737562

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7



RECOMMENDED ASSEMBLY TORQUES

SAE Grade 5 Bolts & Screws - UNF Thread

Diameter	TPI	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		lbf	lbft
1/4	28	2010	8
5/16	24	3180	17
3/8	24	4840	30
7/16	20	6560	48
1/2	20	8840	74
9/16	18	11240	105
5/8	18	14170	148
3/4	16	20600	258
7/8	14	28100	410
1	12	36600	610
1.1/8	12	41100	771
1.1/4	12	51600	1075
1.3/8	12	63200	1448
1.1/2	12	76000	1900

SAE Grade 8 Bolts & Screws - UNF Thread

Diameter	TPI	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		lbf	lbft
1/4	28	2820	12
5/16	24	4510	23
3/8	24	6820	43
7/16	20	9230	67
1/2	20	12480	104
9/16	18	15860	149
5/8	18	19950	208
3/4	16	29120	364
7/8	14	39700	579
1	12	51700	862
1.1/8	12	66700	1251
1.1/4	12	83700	1744
1.3/8	12	102500	2349
1.1/2	12	123300	3083

SAE Grades 5 & 8 Bolts & Screws - 1" SAE

1" SAE	TPI	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		lbf	lbft
Grade 5	14	37500	625
Grade 8	14	53000	883

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7

To convert lbf to kN: Multiply kN by 224.809

To convert lbft to Nm: Multiply lbft by 1.35582



RECOMMENDED ASSEMBLY TORQUES

SAE Grade 5 Bolts & Screws - UNC Thread

Diameter	TPI	Bolt Tension Corresponding to 65% of Proof Load		Recommended Assembly Torque	
		lbf		lbft	
1/4	20	1760		7	
5/16	18	2890		15	
3/8	16	4290		27	
7/16	14	5880		43	
1/2	13	7860		66	
9/16	12	10070		94	
5/8	11	12480		130	
3/4	10	18460		231	
7/8	9	25550		373	
1	8	33470		558	
1.1/8	7	36700		688	
1.1/4	7	46600		971	
1.3/8	6	55500		1272	
1.1/2	6	67600		1690	
1.3/4	5	91300		2663	
2	4.5	120200		4007	
2.1/4	4.5	156300		5861	
2.1/2	4	192400		8017	
2.3/4	4	237100		10867	
3	4	287100		14355	
3.1/4	4	341500		18498	
3.1/2	4	400600		23368	
3.3/4	4	464600		29038	
4	4	532900		35527	

To convert lbf to kN: Multiply kN by 224.809

To convert lbft to Nm: Multiply lbft by 1.35582

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7



RECOMMENDED ASSEMBLY TORQUES

SAE Grade 8 Bolts & Screws - UNC Thread

Diameter	TPI	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		lbf	lbft
1/4	20	2470	10
5/16	18	4090	21
3/8	16	6040	38
7/16	14	8320	61
1/2	13	11050	92
9/16	12	14170	133
5/8	11	17610	183
3/4	10	26060	326
7/8	9	36000	525
1	8	47200	787
1.1/8	7	59500	1116
1.1/4	7	75500	1573
1.3/8	6	90000	2063
1.1/2	6	109500	2738
1.3/4	5	148200	4323
2	4.5	195000	6500
2.1/4	4.5	253500	9506
2.1/2	4	312000	13000
2.3/4	4	384500	17623
3	4	465600	23280
3.1/4	4	553800	29998
3.1/2	4	649700	37899
3.3/4	4	753400	47088
4	4	864200	57613

BSW Mild Steel Bolts & Screws

Diameter	TPI	Bolt Tension Corresponding to 65% of Proof Load	Recommended Assembly Torque
		lbf	lbft
1/4	20	736	3
5/16	18	1208	6
3/8	16	1786	11
7/16	14	2451	18
1/2	12	3176	26
5/8	11	5206	54
3/4	10	7705	96
7/8	9	10641	155
1	8	13943	232
1.1/8	7	17566	329
1.1/4	7	22473	468
1.1/2	6	32334	808

Surface Condition Torque Adjustment Factors

Plain Steel, as supplied	X 1.0
Plain Steel, degreased	X 2.0
Zinc Plated, as supplied	X 1.0
Zinc Plated, lightly oiled	X 0.9
Galvanised, degreased	X 2.1
Galvanised, lightly oiled	X 1.1
Heavily greased	X 0.7

To convert lbf to kN: Multiply kN by 224.809

To convert lbft to Nm: Multiply lbft by 1.35582