



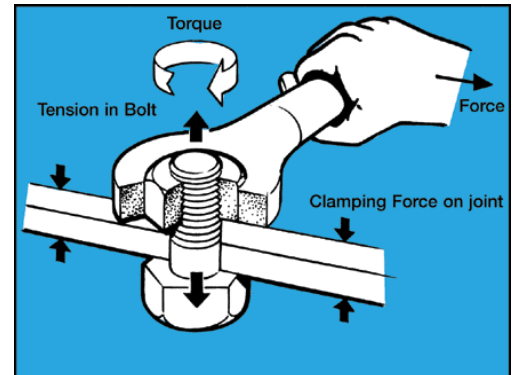
Bolting Torque Data

Torque required to Produce Bolt Stress

Torque, is the measurement of the turning or twisting force applied to an object. This desired result is to hold two parts together with a tension or clamping force that is greater than any external force that could possibly separate them. The part then remains under constant stress and is immune to fatigue.

The torque required to produce a certain stress in bolting is dependent upon a number of conditions, some of which are:

- Diameter of bolt
- Type and number of threads on bolt.
- Material on bolt.
- Condition of nut bearing surfaces.
- Lubrication of bolt threads and nut bearing surfaces.



The tables below reflect the results of many tests to determine the relation between torque and bolt stress. Values are based on steel bolting well lubricated with a heavy graphite and oil mixture. It was found that a non-lubricated bolt has an efficiency of about 50% of a well lubricated bolt and also that different lubricants produce results varying between the limits of 50% - 100% of the tabulated stress figures.

Nominal Diameter of Bolt (inches)	Number of Threads (per inch)	Diameter at Root of Thread (inches)	Area at Root of Thread (Sq. Inch)	STRESS					
				30,000 psi		45,000 psi		60,000 psi	
				Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs
<i>Data for Use with Alloy Steel Stud Bolts</i>									
<i>Load in Pounds on Stud Bolts when Torque Loads are applied.</i>									
1/4	20	0.185	0.027	4	810	6	1215	8	1620
5/16	18	0.240	0.045	8	1350	12	2025	16	2700
3/8	16	0.294	0.068	12	2040	18	3060	24	4080
7/16	14	0.345	0.093	20	2790	30	4185	40	5580
1/2	13	0.400	0.126	30	3780	45	5670	60	7560
9/16	12	0.454	0.162	45	4860	68	7290	90	9720
5/8	11	0.507	0.202	60	6060	90	9090	120	12120
3/4	10	0.620	0.302	100	9060	150	13590	200	18120
7/8	9	0.731	0.419	160	12570	240	18855	320	25140
1	8	0.838	0.551	245	16530	368	24795	490	33060
1 1/8	8	0.963	0.728	355	21840	533	32760	710	43680
1 1/4	8	1.088	0.929	500	27870	750	41805	1000	55740
1 3/8	8	1.213	1.155	680	34650	1020	51975	1360	69300
1 1/2	8	1.338	1.405	800	42150	1200	63225	1600	84300
1 5/8	8	1.463	1.680	1100	50400	1650	75600	2200	100800
1 3/4	8	1.588	1.980	1500	59400	2250	89100	3000	118800
1 7/8	8	1.713	2.304	2000	69120	3000	103680	4000	138240
2	8	1.838	2.652	2200	79560	3300	119340	4400	159120
2 1/4	8	2.088	3.423	3180	102690	4770	154035	6360	250380
2 1/2	8	2.338	4.292	4400	128760	6600	193140	8800	257520
2 3/4	8	2.588	5.259	5920	157770	8880	236655	11840	315540
3	8	2.838	6.324	7720	189720	11580	284580	15440	379440

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Nominal Diameter of Bolt (inches)	Number of Threads (per inch)	Diameter at Root of Thread (inches)	Area at Root of Thread (Sq. Inch)	STRESS					
				30,000 psi		45,000 psi		60,000 psi	
				Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs
1/4	20	0.185	0.027	1	203	2	405	4	810
5/16	18	0.240	0.045	2	338	4	675	8	1350
3/8	16	0.294	0.068	3	510	6	1020	12	2040
7/16	14	0.345	0.093	5	698	10	1395	20	2790
1/2	13	0.400	0.126	8	945	15	1890	30	3780
9/16	12	0.454	0.162	12	1215	23	2430	45	4860
5/8	11	0.507	0.202	15	1515	30	3030	60	6060
3/4	10	0.620	0.302	25	2265	50	4530	100	9060
7/8	9	0.731	0.419	40	3143	80	6285	160	12570
1	8	0.838	0.551	62	4133	123	8265	245	16530
1 1/8	7	0.939	0.693	98	5190	195	10380	390	20760
1 1/4	7	1.064	0.890	137	6675	273	13350	545	26700
1 3/8	6	1.158	1.054	183	7905	365	15810	730	31620
1 1/2	6	1.283	1.294	219	9705	437	19410	875	38820
1 5/8	5.5	1.389	1.515	300	11363	600	22725	1200	45450
1 3/4	5	1.490	1.744	390	13080	775	26160	1550	52320
1 7/8	5	1.615	2.049	525	15368	1050	30735	2100	61470
2	4.5	1.711	2.300	563	17250	1125	34500	2250	69000

Data for use with Machine Bolts and Cold Rolled Steel Stud Bolts
load in pounds on Bolts and Stud Bolts when Torque Loads are applied.

Torque Conversion Chart English to Metric									
$N-m = (Torque Ft/Lbs * 1.35582)$									
	Newton		Newton		Newton		Newton		Newton
Ft/Lbs	Meters	Ft/Lbs	Meters	Ft/Lbs	Meters	Ft/Lbs	Meters	Ft/Lbs	Meters
4	5.4	68	92.2	533	722.7	1650	2237.1	6600	8948.4
6	8.1	90	122.0	680	922.0	2000	2711.6	7720	10466.9
8	10.8	100	135.6	710	962.6	2200	2982.8	8800	11931.2
12	16.3	120	162.7	750	1016.9	2250	3050.6	11580	15700.4
16	21.7	150	203.4	800	1084.7	3000	4067.5	11840	16052.9
18	24.4	160	216.9	1000	1355.8	3180	4311.5	15440	20933.9
20	27.1	200	271.2	1020	1382.9	3300	4474.2		
24	32.5	320	433.9	1100	1491.4	4000	5423.3		
30	40.7	355	481.3	1200	1627.0	4400	5965.6		
40	54.2	368	498.9	1360	1843.9	4770	6467.3		
45	61.0	490	664.4	1500	2033.7	5920	8026.5		
60	81.3	500	677.9	1600	2169.3	6360	8623.0		

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