Torque Required to Produce Bolt Stress

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

1. Diameter of Bolt;
2. Type and number of threads on bolt;
3. Material of bolt;
4. Condition of nut bearing surfaces; and,
5. Lubrication of bolt threads and n**ut** bearing surfaces.

The table below reflects the results of many tests to determine the relationship between torque and bolt stress. Values are based on steel bolting, well lubricated, with a friction value of **.20**

TORQUE-CLAMP LOAD CHART

Nominal Diameter of Stud (Inches)	Diameter at Root of Threads (Inches)	Area at Root of Threads (Sq. Inches)	Bolt 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	0.185	0.027	4	810	6	1215	8	1620
5/16	0.24	0.045	8	1350	12	2025	16	2700
3/8	0.294	0.068	12	2040	18	3060	24	4080
7/16	0.345	0.093	20	2790	30	4185	40	5580
1/2	0.4	0.126	30	3780	45	5670	60	7560
9/16	0.454	0.162	45	4860	68	7290	90	9720
5/8	0.507	0.202	60	6060	90	9090	120	12120
3/4	0.62	0.302	100	9060	150	13590	200	18120
7/8	0.731	0.419	160	12570	240	18855	320	25140
1	0.838	0.551	245	16530	368	24795	490	33060
1 1/8	0.963	0.728	355	21840	533	32760	710	43680
1 1/4	1.088	0.929	500	27870	750	41805	1000	55740
1 3/8	1.213	1.155	680	34650	1020	51975	1360	69300
1 1/2	1.338	1.405	800	42150	1200	63225	1600	84300
1 5/8	1.463	1.68	1100	50400	1650	75600	2200	100800
1 3/4	1.588	1.98	1500	59400	2250	89100	3000	118800
1 7/8	1.713	2.304	2000	69120	3000	103680	4000	138240
2	1.838	2.652	2200	79560	3300	119340	4400	159120
2 1/4	2.088	3.423	3180	102690	4770	154035	6360	205380
2 1/2	2.338	4.292	4400	128760	6600	193140	8800	257520
2 3/4	2.588	5.259	5920	157770	8880	236655	11840	315540
3	2.838	6.324	7720	189720	11580	284580	15440	379440