

The mechanical advantage you get by twisting with a wrench is fantastic. By turning and turning you can stretch me completely out of shape, snap off my head, strip my threads or the nut threads, crack the nut, destroy my washers . . . not to mention damaging whatever I'm holding together.

Let's say you torque me beyond my built-in limits. If my head or nut doesn't give first, I stretch out so far I can't snap back. I've lost my elasticity. But you don't know I'm sprung so you keep on torquing. Even if you get the torque reading you're looking for, it's going to be wrong. Comes the first bit of stress or strain, I'm either going to snap, or else my nut will start backing off. It's a sure bet that what you've joined together is sooner or later going to split asunder.

AS YOU CAN SEE, IF YOU WERE TO APPLY GRADE 8 TORQUE TO A GRADE 5 BOLT YOU'D DESTROY IT!



DIAMETER/ THREADS PER INCH	TORQUE LB-FT NO DASHES (GRADE 2)	TORQUE LB-FT 3 DASHES (GRADE 5)	TORQUE LB-FT 6 DASHES (GRADE 8)
1/4-20	3-5	6-8	10-12
1/4-28	4-6	8-10	9-14
5/16-18	7-11	13-17	19-24
5/16-24	7-11	14-19	23-28
3/8-16	14-18	26-31	39-44
3/8-24	15-19	30-35	46-51
7/16-14	23-28	44-49	65-70
7/16-20	23-28	44-54	69-79
1/2-13	32-37	65-75	95-105
1/2-20	34-41	73-83	113-123
9/16-12	45-56	100-110	145-155
9/16-18	47-57	107-117	155-175
5/8-11	62-72	140-150	200-210
5/8-18	67-77	153-163	235-245
3/4-10	106-116	260-270	365-375
3/4-16	115-125	268-278	417-427
7/8-9	165-175	365-395	595-605
7/8-14	178-188	426-434	603-673
1-8	251-261	580-590	900-910
1-14	255-265	585-634	943-893
1 1/4-7	451-461	1075-1120	1767-1817
1 1/4-12	489-498	1211-1251	1963-2013
1 1/2-6	727-737	1899-1949	3111-3161
1 1/2-12	816-826	2144-2194	3506-3556

The first screw of each diameter is Unified Coarse threads, and the second is Unified Fine threads.

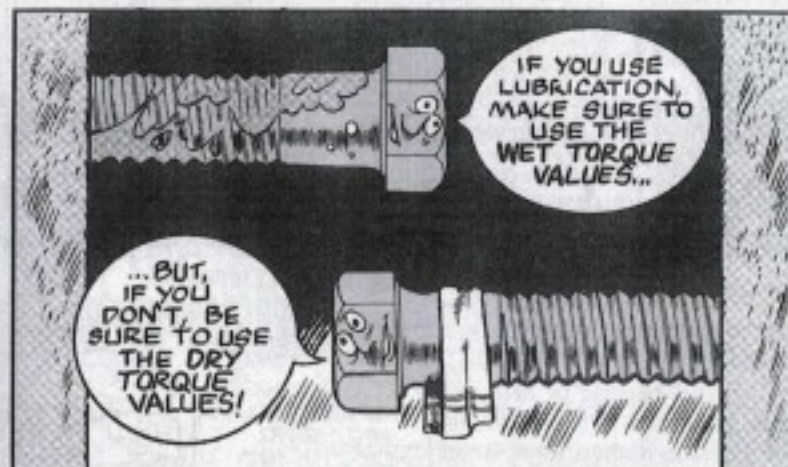
Use this chart only if your TM gives no torque values.

Also, if you tried to torque a grade eight with grade five torque, you'd never get the bolt to stretch like it should. Result—loose connections.

So, never substitute a bolt graded lower than one called for. If you substitute a higher grade bolt, the extra torque needed may be too much for the job. You could ruin the connection.

## WET TORQUE VS DRY TORQUE

About 90 percent of the torque you apply goes to overcome friction; only 10 percent is used for tightening. Anything you use to lubricate fasteners reduces friction. The same amount of torque will create more tightening force—probably too much. If you use lubrication, make sure you use a wet torque value, not a dry one. On the other hand, using a wet value torque on a dry fastener will not get the right amount of clamping force.



## WHAT ABOUT WASHERS?

If washers are called for, they must be able to withstand the torque without thinning out. A soft washer will "beat out" under load, leaving the fastener loose enough to cause a failure. If your TM calls for washers, use only those specified. Any washer just won't do.

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