

STANDARD TORQUE SPECIFICATIONS FOR NON-LUBRICATED BOLTS

The information reprinted below provides torque specifications for dry assembling cadmium plated AN or MS hardware. The information below is not intended for non-structural fasteners, or fasteners threaded into a solid block.

If a lubricant is used (for example, oil, grease, anti-sieze, Loc-Tite, etc.) a table for lubricated bolts must be used since any product that provides lubrication allows for more bolt stretch at a given torque setting, and may result in over-stretching or breaking the bolt.

The following information is reprinted from:

<http://www.experimentalaircraft.info/articles/aircraft-building.php>

Bolts and Torque

Throughout the building process there will be instances where bolts are used to fasten parts or materials together. In some instances it may be for the builder to determine the correct length of the bolt to be used.

- The "Rule of Thumb" for determining bolt length is that the bolt must be long enough to pass through the parts or material being fastened together so that:
- The threaded part of the bolt is never in shear (no threads are allowed inside hole)
- No more than three and no less than one thread must be showing when the nut is attached and tightened to the correct torque value
- At least one flat washer must be used under the nut and no more than three are allowed



More precise determinations of grip length are found in a number of books including the Standard Aircraft Maintenance Handbook (its a must have, from Jeppesen Sanderson Inc.).

Bolting practices

Aircraft bolts are about .001 to .003 inch smaller than their nominal diameter. This permits them to be installed in a properly drilled hole. The bolt should lie solidly against the surface of the material. Burrs must be removed before the bolt is inserted and the shank (grip) should extend entirely through the hole, no threads should be in contact with the bearing surfaces.

Most applications with bolts require the use of a washer, use the specified type and torque to the specifications of the manufacturer.

Bolt Torquing

The following information is provided for reference when using AN grade hardware. But this table does provide a good outline. Occasionally bolts, other than a standard bolt will be called out for use in the builder's manual. Please ensure that these bolts are used where called out. The aircraft designer selected these as they provide the strength for the connection where a standard bolt can not provide.

Standard torque table (in inch/lbs):

Fine thread series			Coarse thread series		
Bolt Size	Standard Nuts	Shear Nuts	Bolt Size	Standard Nuts	Shear Nuts
10-32	20 - 25	12 - 15	8-32	12 - 15	7 - 9
1/4-28	50 - 70	30 - 40	10-24	20 - 25	12 - 15
5/16-24	100 - 140	60 - 85	1/4-20	40 - 50	25 - 30
3/8-24	160 - 190	95 - 110	5/16-18	80 - 90	48- 55
7/16-20	450 - 500	270 - 300	3/18-16	160 - 185	95 - 110
1/2-20	480 - 690	290 - 410	7/16-14	235 - 255	144 - 155
9/16-18	800 - 1000	480 - 600	1/2-13	400 - 480	240 - 290
5/8-18	1100 - 1300	660 - 740	9/16-12	500 - 700	300 - 420
-	-	-	5/8-11	700 - 900	420 - 540

Reference: Standard Aircraft Maintenance Handbook.

Standard nuts (amongst others) are: MS20365, AN310, AN315. Shear nuts are: MS20364, AN320, AN316, AN23-31

A conversion table for Metric Hardware can be found at the following link.

<http://www.boltdepot.com/fastener-information/bolts/Metric-Recommended-Torque.aspx>