

TORQUE CHART

Tightening Torque Guide

Hex Head Cap Screws



GRADE 5

Coarse Thread

| Size | Clamp Load | Plain | Plated |
|-----------------|------------|---------------|---------------|
| 1/4-20 (.250) | 2,025 | 8 ft. lbs. | 76 in. lbs. |
| 5/16-18 (.3125) | 3,338 | 17 ft. lbs. | 13 ft. lbs. |
| 3/8-16 (.375) | 4,950 | 31 ft. lbs. | 23 ft. lbs. |
| 7/16-14 (.4375) | 6,788 | 50 ft. lbs. | 37 ft. lbs. |
| 1/2-13 (.500) | 9,075 | 76 ft. lbs. | 57 ft. lbs. |
| 9/16-12 (.5625) | 11,625 | 109 ft. lbs. | 82 ft. lbs. |
| 5/8-11 (.625) | 14,400 | 150 ft. lbs. | 112 ft. lbs. |
| 3/4-10 (.750) | 21,300 | 266 ft. lbs. | 200 ft. lbs. |
| 7/8-9 (.875) | 29,475 | 430 ft. lbs. | 322 ft. lbs. |
| 1-8 (1.000) | 38,625 | 644 ft. lbs. | 483 ft. lbs. |
| 1 1/8-7 (1.125) | 42,375 | 794 ft. lbs. | 596 ft. lbs. |
| 1 1/4-7 (1.250) | 53,775 | 1120 ft. lbs. | 840 ft. lbs. |
| 1 3/8-6 (1.375) | 64,125 | 1470 ft. lbs. | 1102 ft. lbs. |
| 1 1/2-6 (1.500) | 78,000 | 1950 ft. lbs. | 1462 ft. lbs. |

Fine Thread

| | | | |
|------------------|--------|---------------|---------------|
| 1/4-28 (.250) | 2,325 | 10 ft. lbs. | 87 in. lbs. |
| 5/16-24 (.3125) | 3,675 | 19 ft. lbs. | 14 ft. lbs. |
| 3/8-24 (.375) | 5,588 | 35 ft. lbs. | 26 ft. lbs. |
| 7/16-20 (.4375) | 7,575 | 55 ft. lbs. | 41 ft. lbs. |
| 1/2-20 (.500) | 10,200 | 85 ft. lbs. | 64 ft. lbs. |
| 9/16-18 (.5625) | 12,975 | 122 ft. lbs. | 91 ft. lbs. |
| 5/8-18 (.625) | 16,350 | 170 ft. lbs. | 128 ft. lbs. |
| 3/4-16 (.750) | 23,775 | 297 ft. lbs. | 223 ft. lbs. |
| 7/8-14 (.875) | 32,475 | 474 ft. lbs. | 355 ft. lbs. |
| 1-12 (1.000) | 42,300 | 705 ft. lbs. | 529 ft. lbs. |
| 1-14 (1.000) | 32,275 | 721 ft. lbs. | 541 ft. lbs. |
| 1 1/8-12 (1.125) | 47,475 | 890 ft. lbs. | 668 ft. lbs. |
| 1 1/4-12 (1.250) | 59,550 | 1241 ft. lbs. | 930 ft. lbs. |
| 1 3/8-12 (1.375) | 72,975 | 1672 ft. lbs. | 1254 ft. lbs. |
| 1 1/2-12 (1.500) | 87,750 | 2194 ft. lbs. | 1645 ft. lbs. |

GRADE 8

Coarse Thread

| Size | Clamp Load | Plain | Plated |
|-----------------|------------|---------------|---------------|
| 1/4-20 (.250) | 2,850 | 12 ft. lbs. | 9 ft. lbs. |
| 5/16-18 (.3125) | 4,725 | 25 ft. lbs. | 18 ft. lbs. |
| 3/8-16 (.375) | 6,975 | 44 ft. lbs. | 33 ft. lbs. |
| 7/16-14 (.4375) | 9,600 | 70 ft. lbs. | 52 ft. lbs. |
| 1/2-13 (.500) | 12,750 | 106 ft. lbs. | 80 ft. lbs. |
| 9/16-12 (.5625) | 16,350 | 153 ft. lbs. | 115 ft. lbs. |
| 5/8-11 (.625) | 20,325 | 212 ft. lbs. | 159 ft. lbs. |
| 3/4-10 (.750) | 30,075 | 376 ft. lbs. | 282 ft. lbs. |
| 7/8-9 (.875) | 41,550 | 606 ft. lbs. | 454 ft. lbs. |
| 1-8 (1.000) | 54,525 | 909 ft. lbs. | 682 ft. lbs. |
| 1 1/8-7 (1.125) | 68,700 | 1288 ft. lbs. | 966 ft. lbs. |
| 1 1/4-7 (1.250) | 87,225 | 1817 ft. lbs. | 1363 ft. lbs. |
| 1 3/8-6 (1.375) | 103,950 | 2382 ft. lbs. | 1787 ft. lbs. |
| 1 1/2-6 (1.500) | 126,450 | 3161 ft. lbs. | 2371 ft. lbs. |

Fine Thread

| | | | |
|------------------|---------|---------------|---------------|
| 1/4-28 (.250) | 3,263 | 14 ft. lbs. | 10 ft. lbs. |
| 5/16-24 (.3125) | 5,113 | 27 ft. lbs. | 20 ft. lbs. |
| 3/8-24 (.375) | 7,875 | 49 ft. lbs. | 37 ft. lbs. |
| 7/16-20 (.4375) | 10,650 | 78 ft. lbs. | 58 ft. lbs. |
| 1/2-20 (.500) | 14,400 | 120 ft. lbs. | 90 ft. lbs. |
| 9/16-18 (.5625) | 18,300 | 172 ft. lbs. | 129 ft. lbs. |
| 5/8-18 (.625) | 23,025 | 240 ft. lbs. | 180 ft. lbs. |
| 3/4-16 (.750) | 33,600 | 420 ft. lbs. | 315 ft. lbs. |
| 7/8-9 (.875) | 45,825 | 668 ft. lbs. | 501 ft. lbs. |
| 1-12 (1.000) | 59,700 | 995 ft. lbs. | 746 ft. lbs. |
| 1-14 (1.000) | 61,125 | 1019 ft. lbs. | 764 ft. lbs. |
| 1 1/8-12 (1.125) | 77,025 | 1444 ft. lbs. | 1083 ft. lbs. |
| 1 1/4-12 (1.250) | 96,600 | 2012 ft. lbs. | 1509 ft. lbs. |
| 1 3/8-12 (1.375) | 118,350 | 2712 ft. lbs. | 2034 ft. lbs. |
| 1 1/2-12 (1.500) | 142,275 | 3557 ft. lbs. | 2668 ft. lbs. |

NOTES:

1. Always use the torque values above when specific torque values are not available.
2. Do not use above values in place of those specified in other sections of this manual; special attention should be observed when using SAE Grade 6, 7 and 8 capscrews.
3. The above is based on use of clean, dry threads.
4. Reduce torque by 10% when engine oil is used as a lubricant.
5. Reduce torque by 20% if new plated capscrews are used.
6. Capscrews threaded into aluminum may require reductions in torque of 30% or more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

Caution: If replacement capscrews are of a higher grade than originally supplied, adhere to torque specifications for that placement.

**Based on IFI 5th Edition Technical Data N-12/N-16, using Equation (1) and a torque coefficient, K=0.20 for nonplated steel fasteners and K=0.15 for plated fasteners.

These Figures represent an estimate of torque (torque being the measurement of friction, not tension) required to induce given preload (clampload) in a bolt for noncritical applications only. For critical or special applications where greater control is desired this should be experimentally determined. This applies to washer faced or double chamfered hex nuts (or bolts, if bolt is torqued) having a width across flats of approximately 1.5 times the nominal diameter and having threads free of interference.

Because of the many interrelated variables that directly or indirectly affect friction, such as surface texture, type of coating or finish, lubrication, speed of tightening, human error, etc., it is possible to experience as much as $\pm 25\%$ deviation in preload (clampload) with the use of a torque wrench.