TORQUE FORMULAS

The first formula gives the recommended assembly torques for various grades of threaded fasteners and nuts with the following qualifications (related formulas are also listed):

1. All torque values shown are for turning the NUT while holding the head of the bolt with a wrench, with the exception of socket head cap screws. If the application demands tightening by the bolt head, increase the value shown by 20% (multiply by 1.20). This will allow for the natural torsional twist of the bolt shank.

2. Torque values are calculated at 75% of proof load. (This provides a 25% safety factor).

3. All dry torque values are given for the "as received" condition such as plated hex head cap screws and threaded rod stock or nonplated socket head cap screws.

4. All torque values are based on the use of through hardened flat washers under the bolt head and nut or only under the bolt head in a tapped hole application. (This provides a uniform hard, smooth bearing surface).

Standard torque formula is: T=KDW divided by 12=foot pounds

T=Torque
K=Friction Factor
D=Nominal Bolt Diameter in Decimal Inches
W=Clamp Load in Pounds
K=0.30 for nonplated fasteners, black finish
K=0.20 for electrodeposited zinc coatings
K=0.15-0.18 for oils (machine oil-0.15)
K=0.16 for cadmium electrodeposited coatings
K=0.14 for copper & graphite based (C5A Never Seez)
K=0.15 for nickel and graphite based (Nickel Ease, N5000, Never Seez Nickel Special)
K=0.125 for molybdenum, lead oxide and graphite based (C 100)
K=0.1 for molybdenum disulfide based (C 670 Moly Kote G Paste)

Related Formulas:
W = 75% x Proof Load
K=T divided by (DW divided by 12)
W=T(12) divided by KD
As x psi=LBS
LBS divided by As=psi
LBS divided by psi=As

Stress Area: As=0.7854 [D- (0.9743 divided by n)squared]

As=Stress Area (inch squared)
D=Basic Major Diameter in Inches
n=Threads per Inch (TPI)