TIGHTENING TORGUE VALUES

It is clear from the start that the assembly torque values suggested are *often* offered as a general *guideline* as torque is *a* very indirect indication of tension and there are many factors such as friction, lubrication, surface texture, rust, material type, the use of washers or prevailing-torque nuts, thread conditions, debris etc. that *could possibly* affect the outcome.

The only way to determine *if the* torque *is correct*, especially when dealing with critical joints, is through *an* experiment under *an* actual joint and the assembly condition, *by* using a calibrated torque wrench and a **Skidmore-Wilhelm type** load indicating device, to equate torque to *the* desired tension.

Most *torque or tension tables* which have developed

(including the following tables) have been calculated using *a specific* formula:

T = K x d x P

Where T = Torque

K = Coefficient or friction factor

d = Nominal thread diameter (inches)

P = Tension (clamp-load or pre-load) induced in fasteners (lbs)

The value of "K" can range from 0.30 for rusted assembly to 0.10 or less for a clean, well lubricated assembly using a proven proprietary lubricant. *It is* noted that *the* accuracy of the "K" factor is subject*ed* to many application variables e.g the industry accepted "K" factor for plain fasteners is 0.20, however, this figure reduced to 0.10 should the fastener be well lubricated and as a result an entirely different torque would *be recorded*.

Clamp-load/pre-load has been calculated by arbitrarily assuming that usable bolt *strengths are at* 75% of bolt proof-load times *and* tensile stress area. The values offered below are a *good* starting point and *an* experiment is suggested in order to get the best results *possible*.

The most important point to remember *is* when using a torque wrench; to make sure that the instrument has been calibrated *correctly* by a recognized torque analyzer. In an experienced operator's hand, tension control *can be recorded at* ± 25% *more* accuracy *which* is possible *by* using a good quality hand operated torque wrench. When used in conjunction with a Skidmore- Wilhelm type device, an accuracy of ± 5% is *most likely* possible.

The following tables gives an indication of the *general acceptance for* figures *regarding* the "K" factor based on *the fastener* industry standards.

K FACTOR

Fasteners Finish (dry)	K Factor
Plain Steel (Black)	.20+
Zinc Plating (Dry)	.20+
Cadmium Plating (Dry)	.18 to .19
Black Oxide Treatment (Lightly Oiled)	.15 to .17
Moly - desulphide, White Lead , Wax	.10 to .14

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