International Acceptance Criteria For Plated and Nicked Threads

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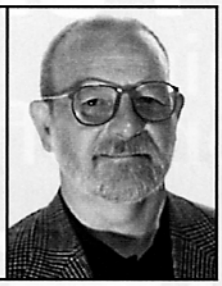


Several international standards rely on the torque evaluation approach to the acceptance of threads that do not freely enter a GO ring gage.

Each month I receive several calls asking me if there is a criterion for the acceptance of threads that do not freely enter a GO ring gage. These questions usually have to do with threaded products that are plated or coated, and/or slightly nicked. Fortunately, there are several international standards that are in agreement on this issue. These standards are:

- *ISO 6157-3.*
- *DIN 276*, part 19.
- European Standard *EN26157-3.*

In addition to these three international standards, **Ford Motor Company** has adopted the same criteria in its standard *WA-990* published in 1993.

All of these standards provide the same formula for the determination of how much torque can be applied to a given externally threaded product when inserting it into a "basic size" threaded GO ring gage (3A GO for inch threads and 6g GO for metric threads). The formulas for deriving these maximum allowable torque values are:

$T = 0.001 \times d^3$, where

T = maximum torque in Nm, and

d = diameter in mm, or

$T = 145 \times d^3$, where

T = maximum torque in in-lb, and

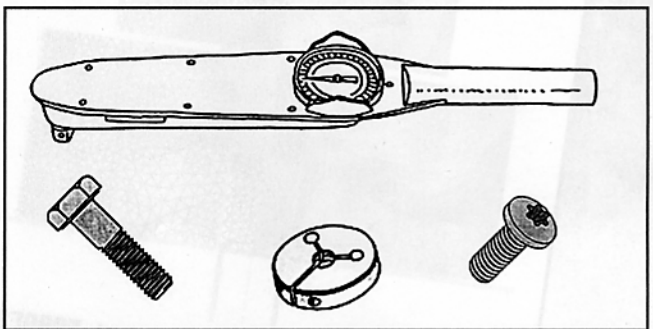
d = diameter in inches

These formulas translate into the torque values in the chart below.

Many modern platings and coatings that provide high corrosion resistance sometimes apply slightly unevenly and are somewhat thicker than more common platings like electroplated zinc. Many of the platings and coatings are relatively soft and even though parts having these finishes may not freely enter into a GO ring gage, very little torque is required to make them go through the gage.

Nominal Thread Size	Maximum Inch Pounds	Maximum Newton Meters
M6	1.9	.22
M8	4.3	.51
M10	8.9	1.00
M12	15.3	1.72
M14	24.3	2.74
M16	36.3	4.10
M20	70.7	7.99
1/4	2.3	.26
5/16	4.4	.50
3/8	7.6	.86
7/16	12.1	1.37
1/2	18.1	2.05
9/16	25.7	2.91
5/8	35.4	4.00
3/4	61.2	6.91

Maximum allowable torque values.



Torque gage (top), ring gage (bottom) and screws.

Bolts starting at about M10 or 3/8" and larger have a tendency to become nicked as they progress through the various manufacturing and finishing processes. Even though they are perfectly functional they may not freely enter a GO ring gage. Using this torque acceptance criterion provides fastener suppliers and users an objective means of evaluating and determining the acceptance of bolts with nicked threads.

Some people raise the concern that these acceptance values might adversely affect the clamping force generated when the bolts are seated. This is not a problem because the recommended seating values are so much greater than the acceptance torque values that the torque values are totally insignificant here. To illustrate this point, consider that these standards allow a ¾" bolt to be accepted if the torque does not exceed 61.2 in-lb when driven into a 3A GO ring gage. The recommended seating value for a ¾-10 zinc plated Grade 5 bolt is 3804 in-lb. The acceptance torque of 61.2 in-lb is less than 2% of the recommended seating value in this example. This is completely irrelevant when one considers the widely accepted fact that the clamp force created in a joint under standard assembly conditions varies ±25% due to all of the variables in the assembly process.

The torque evaluation approach to the acceptance of threads that do not freely enter a GO ring is both practical and reasonable. Threaded component suppliers and users should be aware of and adopt these international standards for determining the acceptance of externally threaded products. FTI

Greenslade & Company, Inc. *is a supplier of gages, tooling and other equipment to the fastener manufacturing industry.*
Joe Greenslade *is a regular contributor of articles to this magazine. He has been active in the fastener industry since 1970 and has held positions with major fastener producers.*