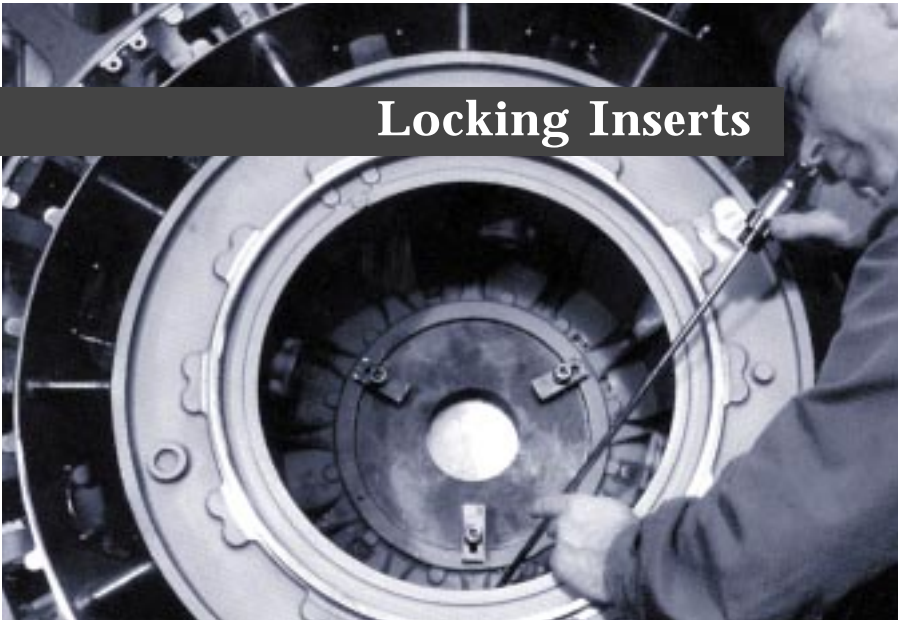


# Locking Inserts

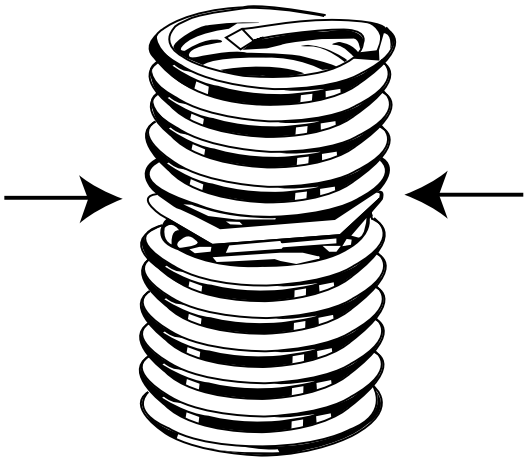


### How Locking Inserts Work:

The Recoil screw-locking insert is designed to provide a screw-locking feature which will retain screws or bolts under the most severe vibration or varying temperature conditions.

The insert locking configuration comprises of a series of uniquely designed locking chords which, upon the engagement of a screw or bolt, deflect radially, sufficiently enough to permit the installation of the bolt. Upon bolt entry, these straight segments are flexed outwardly, creating pressure on the bolt. This pressure is applied between the flanks of the bolt thread so that contact area is maximised. Locking inserts retain locking torque over numerous assembly cycles. Refer to relevant specifications for insert life.

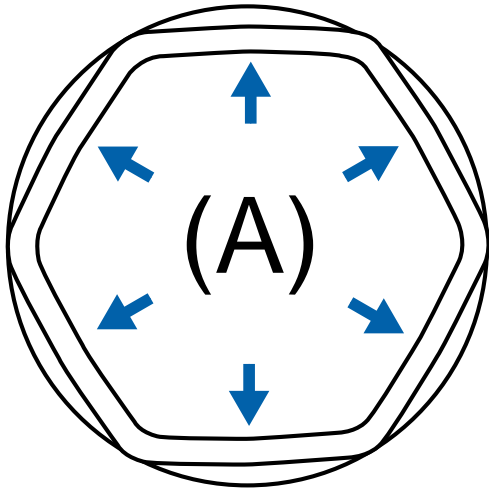
Each Recoil 'screw-locking' insert type has a specifically designed locking configuration. This ensures that the insert meets its design specification requirements. Therefore the shape, depth and number of locking chords will inevitably vary for differing thread types and sizes.



Note: It is recommended that a cadmium plated or dry-film lubricated screw/bolt is used for screw-locking inserts applications. (See page 9 - Lubricants and Coatings)

### Locking Insert Design

Should a specific locking torque or function be required, Recoil engineers can develop parts to suit customers needs. As the bolt is wound through the locking chords of the insert it deflects the wire as shown by the internal arrows (A). This deflection causes the insert to push against the bolt resulting in a repeatable locking function from the insert.



Note: Installation of the Recoil Screw Locking inserts require use of the Recoil Prewinder tooling. (Refer page 25 - Tooling)

# Locking Insert Torque Values

Locking torque values for unified inserts conform to MIL - I - 8846. These locking torque values are shown below.

## Unified Coarse (UNC)

NOMINAL THREAD SIZE	Max Locking Torque	Min Locking Torque
2 (.086") - 56	20 oz.in	3 oz.in
3 (.099") - 40	32 oz.in	7 oz.in
4 (.112") - 40	48 oz.in	10 oz.in
5 (.125") - 40	75 oz.in	13 oz.in
6 (.138") - 32	6 lb.in	1.0 lb.in
8 (.164") - 32	9 lb.in	1.5 lb.in
10 (.190") - 24	13 lb.in	2.0 lb.in
12 (.216") - 24	24 lb.in	3.0 lb.in
1/4 (.250") - 20	30 lb.in	4.5 lb.in
5/16 (.3125") - 18	60 lb.in	7.5 lb.in
3/8 (.3750") - 18	80 lb.in	12.0 lb.in
7/16 (.4375") - 14	100 lb.in	16.5 lb.in
1/2 (.5000") - 13	150 lb.in	24.0 lb.in
9/16 (.5625") - 12	200 lb.in	30.0 lb.in
5/8 (.6250") - 11	300 lb.in	40.0 lb.in
3/4 (.7500") - 10	400 lb.in	60.0 lb.in
7/8 (.8750") - 9	600 lb.in	82.0 lb.in
1 (1.000") - 8	800 lb.in	110.0 lb.in
1 1/8 (1.1250") - 7	900 lb.in	137.0 lb.in
1 1/4 (1.1250") - 7	1000 lb.in	165.0 lb.in
1 3/8 (1.3750") - 6	1150 lb.in	185.0 lb.in
1 1/2 (1.5000") - 6	1350 lb.in	210.0 lb.in

## Unified Fine (UNF)

NOMINAL THREAD SIZE	Max Locking Torque	Min Locking Torque
3 (.099) - 56	32 oz.in	7oz.in
4 (.112) - 48	48 oz.in	10 oz.in
6 (.138) - 40	6 lb.in	1.0 lb.in
8 (.164) - 36	9 lb.in	1.5 lb.in
10 (.190) - 32	13lb.in	2.0 lb.in
1/4 (.2500) - 28	30 lb.in	3.5 lb.in
5/16 (.3125) - 24	60 lb.in	6.5 lb.in
3/8 (.3750) - 24	80 lb.in	9.5 lb.in
7/16 (.4375) -20	100 lb.in	14.0 lb.in
1/2 (.5000) - 20	150 lb.in	18.0 lb.in
9/16 (.5625) - 18	200 lb.in	24.0 lb.in
5/8 (.6250) - 18	300 lb.in	32.0 lb.in
3/4 (.7500) - 16	400 lb.in	50.0 lb.in
7/8 (.8750) - 14	600 lb.in	70.0 lb.in
1 (1.0000) - 12	800 lb.in	90.0 lb.in
1 1/8 (1.1250) - 12	900 lb.in	117.0 lb.in
1 1/4 (1.2500) - 12	1000 lb.in	143.0 lb.in
1 3/8 (1.3750) - 12	1150 lb.in	165.0 lb.in
1 1/2 (1.5000) -12	1350 lb.in	190.0 lb.in

## Metric Coarse Series

NOMINAL THREAD SIZE	Max Locking Torque	Min Locking Torque
M2.2 x 0.45	0.14 Nm	0.02 Nm
M2.5 x 0.45	0.23 Nm	0.05 Nm
M3 x 0.5	0.45 Nm	0.1 Nm
M3.5 x 0.6	0.68 Nm	0.12 Nm
M4 x 0.7	0.9 Nm	0.15 Nm
M5 x 0.8	1.6 Nm	0.3 Nm
M6 x 1	3 Nm	0.4 Nm
M7 x 1	4.5 Nm	0.6 Nm
M8 x 1.25	6 Nm	0.8 Nm
M10 x 1.5	10.5 Nm	1.4 Nm
M12 x 1.75	15.5 Nm	2.1Nm
M14 x 2	23.5 Nm	3 Nm
M16 x 2	31.5 Nm	4.2 Nm
M18 x 2.5	42 Nm	5.5 Nm
M20 x 2.5	54 Nm	7 Nm
M22 x 2.5	67.5 Nm	9 Nm
M24 x 3	80 Nm	10.5 Nm
M27 x 3	94 Nm	12 Nm
M30 x 3.5	108 Nm	14 Nm
M33 x 3.5	122 Nm	15.5 Nm
M36 x 4	136 Nm	17.5 Nm
M39 x 4	150 Nm	19.5 Nm

## Metric Fine Series

NOMINAL THREAD SIZE	Max Locking Torque	Min Locking Torque
M8 x 1	6 Nm	0.8 Nm
M10 x 1	10.5 Nm	1.4 Nm
M10 x 1.25	10.5 Nm	1.4 Nm
M12 x 1.25	15.5 Nm	2.1 Nm
M12 x 1.5	15.5 Nm	2.1 Nm
M14 x 1.5	23.5 Nm	3 Nm
M16 x 1.5	31.5 Nm	4.2 Nm
M18 x 1.5	42 Nm	5.5 Nm
M20 x 1.5	54 Nm	7 Nm
M22 x 1.5	67.5 Nm	9 Nm
M18 x 2	42 Nm	5.5 Nm
M20 x 2	54 Nm	7 Nm
M22 x 2	67.5 Nm	9 Nm
M24 x 2	80 Nm	10.5 Nm
M27 x 2	94 Nm	12 Nm
M30 x 2	108 Nm	14 Nm
M33 x 2	122 Nm	15.5 Nm
M36 x 2	136 Nm	17.5 Nm
M39 x 2	150 Nm	19.5 Nm
M36 x 3	136 Nm	17.5 Nm
M39 x 3	150 Nm	19.5 Nm

Locking torque values for Metric Recoil inserts conform to MA3329, MA3330 and MA3331. These locking torque limits are shown above.

Note: Unplated, heat-treated screws or stainless steel screws should not be used with screw-lock inserts. An anti-seize compound (Molybdenum Disulphide, etc) should be applied to the screw to minimise galling and achieve maximum cycle life. Also available are inserts plated with cadmium per QQ-P-416, Type II, or dry film lubricant per MIL-L-8937 (no graphite) which improves wear life of the screw and insert.

Note: It is imperative that the bolts fully engage all locking coils for correct torque and all insert coils for maximum strength.