Alcoa Fastening Systems

# RECOIL®

# Technical Catalogue

RECOIL®
QUALITY THREAD INSERT SYSTEMS

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# Introduction

Alcoa Fastening Systems' (AFS) Recoil manufacturing operations are located in Australia, with sales and warehouse facilities strategically located in North America,Asia,and Europe.Extensive worldwide distribution, coupled with the company's manufacturing strategy, offers significant advantages to end users.

Alcoa Fastening Systems ensures a global consistency of quality design standards in manufacturing the full range of wire thread inserts in one production facility. Users around the world can be assured of high standards and the consistency of all AFS products.

Inserts are manufactured in standard sizes for all metric and inch thread forms. A comprehensive design facility is available to ensure that non-standard inserts can be manufactured for special part requirements.

Prompt availability of products to customers worldwide is ensured by an efficient international freight service and a network of stocking distributors. Alcoa Fastening Systems is committed to the highest quality products and operating systems and employs a strict quality management system in accordance with:

- AS9100 accreditation
- ISO9001 accreditation
- TS16949 accreditation
- Society of British Aerospace Companies (SBAC)
- TS157 approval
- ISO14001 Environmental  Systems

Alcoa Fastening Systems will provide technical assistance to production engineers so that optimum installation efficiency can be achieved and maintained. Recoil brand coils are available to the following international and customer standards:

- NASM122076 Series - Free Running - UNC
- NASM124651 Series - Free Running - UNF
- NASM21209 Series – Locking UNC and UNF
- NASM8846
- BS7751 - Metric - Coarse
- BS7752 - Metric - Fine
- BS7753
- BS4377
- MA3279,MA3280,MA3281 - Metric - Free Running
- MA3329,MA3330,MA3331 - Metric - Self Locking
- AS6733 Series - UNF - Unplated
- AS8455 Series - UNF - Cadmium Plated
- AGS3600 Series - UNF - Cad. Plated - Self Locking
- AGS3700 Series - Nimonic Alloy 90 - Self Locking
- General Electric - C981, N926 Series, N913
- LN9499, LN9039
- DIN8140
- BACI12AE - Boeing

# Recoil Range

The Recoil system consists of precision inserts, quality high speed taps, and easy-to-use installation tools which are used for repairing damaged screw threads or creating strong new threads. Recoil helically wound screw-thread inserts are generally manufactured from Type 304 (18-8) stainless steel wire cold rolled into a diamond shaped cross section. Recoil inserts can be supplied in other materials such as Inconel X750, Inconel 625, Nimonic 90, Nitronic 60, Phosphor Bronze and Type 316 stainless steel.

Recoil inserts are available in either standard free running form or screw lock type which provides an internal locking feature. Inserts are manufactured for every thread form including UNC, UNF, BSC, BSW, BSP, BSF, BA, NPT and ISO Metric thread sizes. Inserts are available in 5 different standard lengths. 1D, 1.5D, 2D, 2.5D and 3D. Special lengths are available on request.

## Thread Repair Kits

A full range of Recoil thread repair kits, covering the majority of sizes commonly in use today, is available from AFS. Recoil kits contain an HSS tap, installation tools, tang break tools, drills, stainless steel inserts, and instructions, in a sturdy reusable container. Recoil problem-solving repair kits are available in single or multiple size format.

## Installation Tooling

Alcoa Fastening Systems also offers a selection of work arms and power tooling, including high efficiency pneumatic and electric installation tools for in-line production or repetitive maintenance situations. A range of associated tooling is available to facilitate insert installation, including manual installation tooling and manual, spring, and pneumatic operated tang breakoff tools.

## Taps and Gauges

Optimum results can be achieved with Recoil taps and gauges to suit hand-tapping through to volume production requirements. Using the "Go - NoGo" gauge, tapped holes can be gauged to enable a precision fit.

# How a Recoil Insert Works

Recoil inserts are formed from high quality stainless steel wire with a diamond shaped cross section, wound to the shape of a spring thread. Once the wire is wound into a helical coil and installed into a tapped hole, it provides a permanent and wear resistant thread in the parent material that is generally stronger than the original thread. The inserts are designed to be greater in diameter than the tapped hole and compress as they are installed. This allows maximum surface contact area with the tapped thread, safely and permanently anchoring the inserts into place. The insert's compensatory action shares the load over the entire bolt and hole, increasing pull out and torque out strength. With a Recoil insert in place, load and stress are more evenly distributed over the assembly.

## Where to Use Recoil Inserts

### Original Equipment Manufacture

AFS offers innovative manufacturers the opportunity to design high quality product using lighter weight materials such as aluminum and magnesium alloys while still achieving high strength and reliability in the threaded fastener assembly. Recoil brand inserts are widely used by manufacturers in:

- Automotive
- Consumer Electronics
- Ship Building
- Power Generation
- Manufacturing Equipment
- Industrial Electronics
- Aerospace – Avionics, Engines, Airframe
- Defense
- Transport

### Repair

When you encounter a damaged thread Recoil offers:

- Quickest and simplest method of repair to stripped or damaged threads
- A superior thread with great holding power
- Most cost-effective method of repair
- Returns thread to the original size
- Generally stronger than the original female thread

### Insert Material

Recoil inserts are generally manufactured from Type 304 stainless steel (18-8),however inserts are available in a range of materials for special applications:

- Stainless Steel Grade 304 (AS7245) Austenitic Corrosion Resistant Steel For normal applications up to 425°C (800°F)
- Stainless Steel Grade 316 (AISI316) Austenitic Corrosion Resistant Steel For Marine applications up to 425°C (800°F)
- Inconel X - 750 (AS7246) Nickel Alloy. For high temperature applications 425°C - 550°C (800°F - 1020°F) or where low permeability is required.
- Phosphor Bronze (DIN17677 or BS2783 PB 102) (300°C) For electrical bonding joints or low permeability
- Nimonic 90 (HR 503) for high temperature applications. (650°C/1200°F)
- Nitronic 60 (UNS S21800) Austenitic antigalling alloy

### Special purpose

- Materials such as Inconel 625 and Spring Steel Grade are also available to special order

### Type

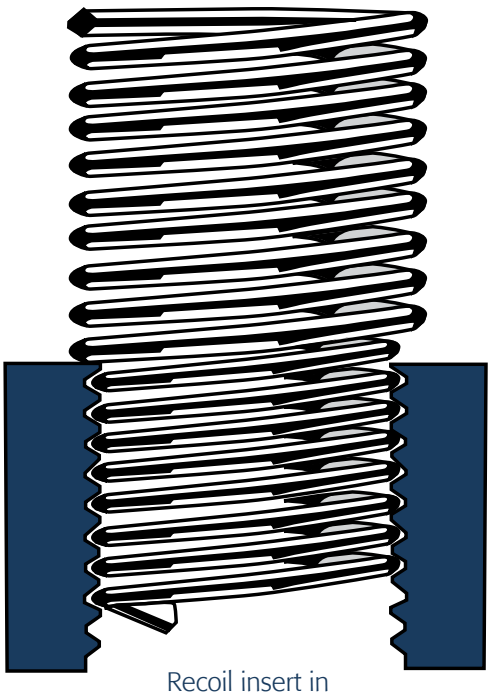
There are two basic types of Recoil inserts available:

- Free running inserts which provide a standard female thread
- Locking inserts which provide a locking function for the female thread when the fasteners installed

# How a Recoil Insert Works

## Insert installation and retention

Uninstalled, Recoil inserts are greater in diameter than the tapped hole in the parent material into which they are to be installed. During the assembly operation the diameter of the leading coil is reduced thereby permitting entry of the insert into the tapped hole. When the insert is installed at the correct depth, the coils expand and permanently retains the insert in place. Unlike many 'solid' insert types, it is not necessary to use locking, swaging or keying operations to locate and retain Recoil inserts. Stress concentration problems which typically occur in the parent material when using solid inserts are therefore eliminated. A Recoil insert will dimensionally adjust both radially and axially, to any expansion or contraction within the parent material.



Recoil insert in semi-installed position

Typical thread and angle errors may cause:

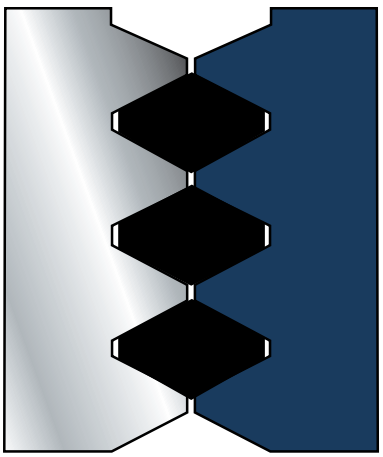
- Limited contact point
- Poor flank contact between bolt to parent thread
- Unequal distribution of bolt load over engaged threads
- Failure of threaded components when loaded

Recoil inserts reduce thread pitch and angle errors to provide:

- Greater fastener strength
- Greater contact area
- Equally distributed load over all tapped threads
- Reduced stress concentration thereby extending fatigue life

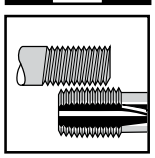
Angle error

Pitch error



Recoil compensation effect

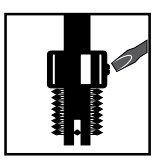
## How to install Recoil inserts.



1. DRILL: Drill to clear out the damaged thread with drill size as specified on kit (if necessary).

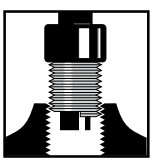
2. CHECK: Ensure tap thread matches bolt.

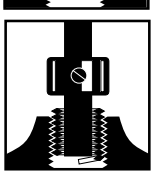
3. TAP: Place tap into tap wrench or use the square drive in the installation tool if provided. (Square drive tool only suitable for tapping non-ferrous alloys.)



3a. TAP HOLE: Tap hole to the required depth using correct procedures (if unsure contact your dealer).

4. SET TOOL: Place insert on installation tool, positioning the adjustable top so that the insert tang is centered in the tang slot.





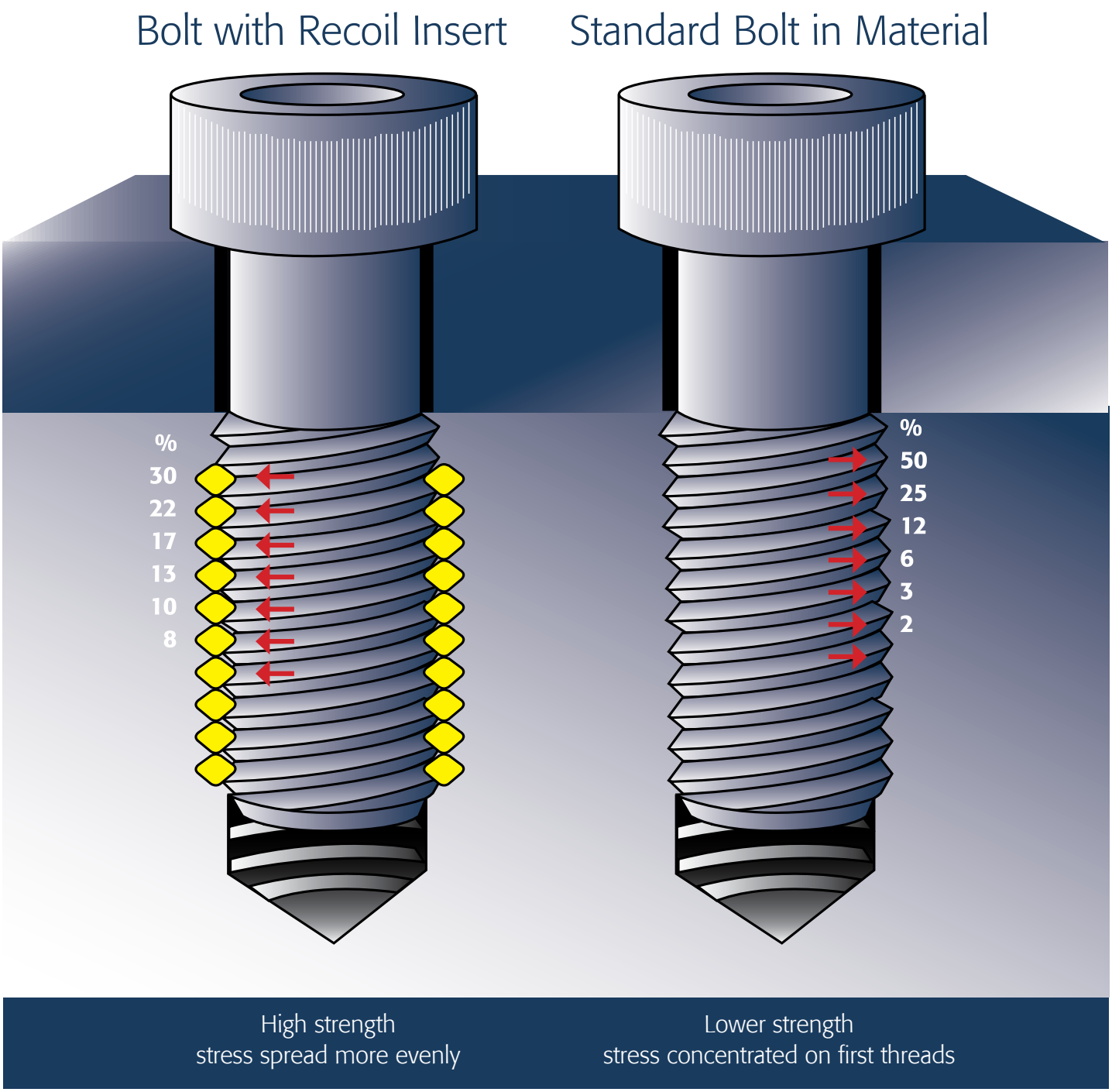
5. INSTALL: Wind insert in with light downward pressure until 1/4 to 1/2 turn below the surface.

6. TANG REMOVAL: Do not attempt to twist tang off with tool. Lift tool from tang, turn tool 90° and tap down sharply. Use Tang Break Tool where supplied. For sparkplug and large fine thread inserts, use long nose pliers to pull tang out.

# How a Recoil Insert Works

The diagram below depicts graphically the advantages a Recoil insert has over a conventional thread. In conventional threaded joints over 75% of the load is placed on the first three threads of the assembly. The Recoil insert on the left shows how the spring-like design of the insert allows the shear loading to be transformed into a preferable "hoop stress" or radial loading over the entire length of the insert. This provides a much stronger thread than can be obtained by conventional drilling or tapping.

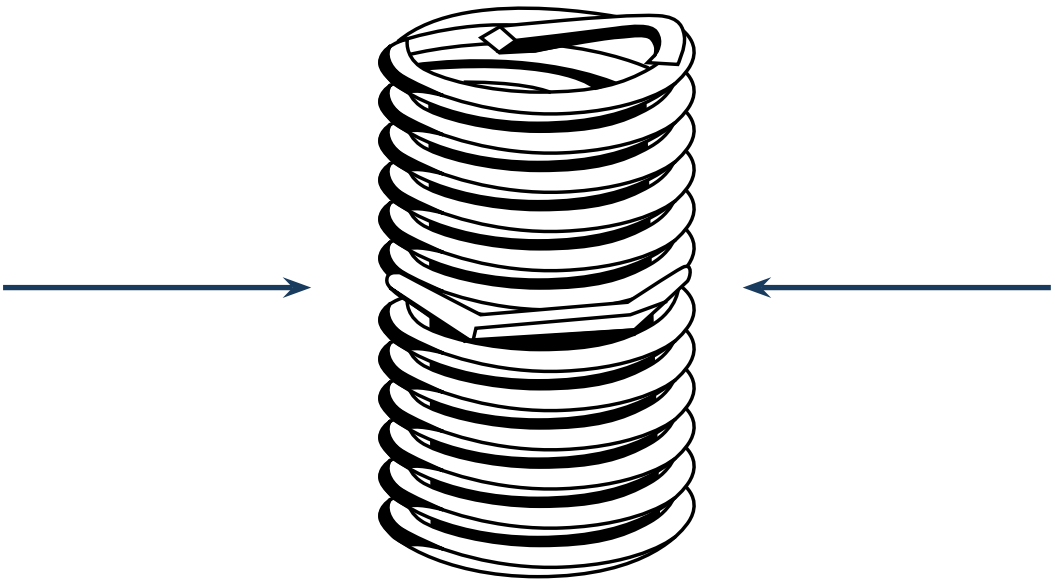
This improved strength allows designers to select a fastener based on the minimum strength of the bolt, also allowing them to select smaller diameters and shorter thread lengths confidently even in low strength materials such as magnesium or aluminium alloys. (Refer to page 62 - Design Considerations)



# How a Locking Insert Works

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 a series of uniquely designed locking chords which, upon the engagement of a screw or bolt, deflect radially 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 maximized. 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.

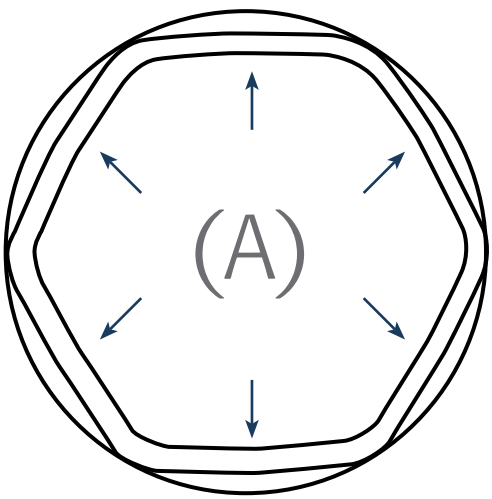
**Note: It is recommended that a cadmium plated or dry-film lubricated screw/bolt is used for screw-locking inserts applications. (See Lubricants and Coatings page)**



## Locking Insert Design

Should a specific locking torque or function be required, AFS 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 Recoil screw-locking inserts requires use of the Recoil Prewinder tooling.**



# Locking Insert Torque Values

Locking torque values for unified inserts conform to NASM8846. Locking torque values for metric Recoil inserts conform to MA3329, MA3330 and MA3331.

**Unified Coarse (UNC)**

| Nominal Thread Size | Max Locking Torque | Min Locking Torque |
|---|---|---|
| 2 (.086″) - 56 | 20 oz.in | 3 oz.in |
| 3 (.099″) - 48 | 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 |
| 11/8 (1.1250″) - 7 | 900 lb.in | 137.0 lb.in |
| 11/4 (1.250″) - 7 | 1000 lb.in | 165.0 lb.in |
| 13/8 (1.3750″) - 6 | 1150 lb.in | 185.0 lb.in |
| 11/2 (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 |
| 11/8 (1.1250) - 12 | 900 lb.in | 117.0 lb.in |
| 11/4 (1.2500) - 12 | 1000 lb.in | 143.0 lb.in |
| 13/8 (1.3750) - 12 | 1150 lb.in | 165.0 lb.in |
| 11/2 (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 x0.5 | 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 x1 | 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 |

Note: Unplated, heat-treated screws or stainless steel screws should not be used with screw-lock inserts. An antiseize compound (Molybdenum Disulphide, etc) should be applied to the screw to minimize 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-46010 (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.

# Lubricants and Coatings

It is important that correct selection of the most suitable fastening lubricant or coating is made at the design stage for long term security within the bolted joint. The ideal finish or coating for the insert is dependent upon the optimum coefficient of friction (governed by the bolt material and surface finish) and the required service conditions of the assembled parts, e.g. temperature, chemical influences, humidity, and dust. The coefficient of friction (μ) of most threaded components will generally vary between μ = 0.15 and μ = 0.35. For example differences occur between bolts made of Grade 8.8 steel (Werkstoff 1.0503), compared with the same size of bolt produced from an austenitic stainless steel X5 CrNi 18-9, (Werkstoff 1.4301). Differences also occur between bolts having different surface coatings, such as electro-galvanizing, hot galvanizing, cadmium plating, or chromium plating.

Typical Recoil wire thread insert finishes and coatings

| PLATING / FINISH | PART NUMBER SUFFIX | APPLICABLE PROCESS SPECIFICATION |
|---|---|---|
| Silver Plating | AG | DTD 939 |
| Cadmium Plating | C | QQP-416 or DEF STD 03-19 |
| Dry Film Lubricant | D | AS5272 |
| Red Dye | Not Applicable | Applied to all Recoil locking inserts for |
| Tin Plating | SN | identification where called for by specification* |
| Copper | Cu | identification where called for by specification* |

* Recoil inserts may also be dyed in other colors such as Green and Blue for identification purposes.

| MATERIAL TYPE | MAX. TEMPERATURE | | TYPICAL APPLICATIONS (SEE SECTION ON LUBRICANTS) | COATINGS |
|---|---|---|---|---|
| | PEAK | CONTINUOUS | | |
| Stainless 304 | 425°C (800°F) | 315°C (600°F) | Most general applications in all materials | Non-finished<br>Dry film lubricant<br>Silver<br>Cadmium |
| Stainless 316 (Y) | 425°C (800°F) | 315°C (600°F) | Improved corrosion resistance<br>Salt water applications | Non-finished<br>Dry film Lubricant<br>Silver<br>Cadmium |
| Nitronic 60 (T) | 425°C (800°F) | 315°C (600°F) | Anti-galling | Dry film lubricant |
| Phosphor Bronze (P) | 300°C (572°F) | 235°C (455°F) | Copper parts<br>Non magnetic / Low permeability applications | Cadmium<br>Silver |
| Inconel x 750 (X) | 650°C (1200°F) | 550°C (1020°F) | Aerospace / Turbines / Corrosive atmospheres / High temperature use | Silver<br>Copper |
| Nimonic 90 (N) | 650°C (1200°F) | 550°C (1020°F) | Aerospace / Turbine applications | Silver |

## Phosphor Bronze (P)

Designed for electrical applications, Recoil Phosphor Bronze inserts provide no outside interference of signals. This characteristic ensures their successful use in electrical bonding joints and related operations. These advanced inserts have been successfully employed in the manufacturing of a wide range of sensitive electrical equipment including circuit boards, telecommunications control boxes, and medical instrumentation and equipment.

## Inconel (X)

Inconel X-750 is an alloy material with excellent high heat resistance and strength characteristics. Used in demanding applications like gas turbines and auto lambda sensor repairs, these inserts can withstand temperatures of 1020°F and can be certified to GE Power Generation standards. Inconel X-625 material possesses very high corrosion resistance and is used in sub-sea platforms and other critical salt water and marine applications.

## 316 Stainless (Y)

Often used in highly corrosive applications, Recoil 316 Stainless Steel inserts provide a high degree of reliable corrosion resistance. In freshwater, saltwater, even chlorine environments, the inserts are designed to deliver years of failure-proof threadholding performance.

## Nitronic 60 Inserts (N)

Designed for applications where galling can be a problem, Recoil Nitronic 60 inserts' wear-resistant, anti-galling characteristics eliminate the need for additional lubrication. Based on the reduction in friction they provide, these inserts deliver more consistent clamping torque. In addition, Nitronic 60 inserts are suitable for use with stainless steel screws.

# Finishes and Coatings

## Silver Plating (AG)

Primarily used to reduce the effects of galling (seizure) of screw threads in high temperature service applications. Silver plating is the most commonly used coating for aero-engine fasteners providing an even degree of lubrication up to a maximum service temperature of about 650°C (1200°F). The plated silver is electrolytically deposited in typical thicknesses up to 6.3µm (0.00025″). Silver plated wire thread inserts may be installed into various housing materials including magnesium alloys, aluminum alloys, corrosion and heat resistant materials, etc.

**Caution must be emphasized where inserts are to be installed into titanium alloy components which may exceed a service temperature of 300°C (570°F). Silver plated inserts are not recommended with titanium housings as stress corrosion, resulting from the combination of silver with titanium may occur in the housing material.**

## Cadmium Plating (C)

In mildly corrosive or marine environments, cadmium plating is the preferred treatment for providing protection against pitting of the insert/bolt materials and to minimize the risk of thread seizure. Plating thickness may vary depending on particular applications,between 2µm - 5µm (0.0001″ - 0.0002″). Following cadmium plating, either a bronze or olive drab chromate finish will be used to provide uniformity in the overall finish. It should be noted that cadmium plated parts must not:

- Be subjected to temperatures exceeding 235°C (455°F)
- Come into contact with fuel or hot oil
- Come into contact with food or drinking water
- Be used with titanium components either directly or indirectly as, at elevated temperatures, embrittlement and subsequent component failure may occur

**Warning: Cadmium is a highly toxic compound. Because of its poisonous nature extreme care must be taken when handling.**

## Dry Film Lubricants (D)

Used for mildly corrosive or high temperature applications, dry film lubricants comprise suspensions of small particles of solid lubricants such as molybdenum disulphide (MoS2) or PTFE, in organic or inorganic binders. They are applied as a thin film (5µm - 20µm) to grease-free metal surfaces. Through careful selection of appropriate additives and solvents, specific lubricants may be formulated to suit most industrial applications to service temperatures around 315°C (600°F). Special high temperature lubricant coatings are available for use up to 425°C (800°F). Recoil inserts may be coated with dry film lubricant in either the non-finished (passivated) condition or after cadmium plating treatment for maximum corrosion protection.

## Tin Plating (SN)

As per ISO2093, used for moderate corrosive condition typically in automotive applications

## Red Dye Coating

Recoil screw-locking inserts are, generally color coded with a red dye coating for identification purposes only. This organic resin based dye does not affect the installation or function of the inserts and normally does not need to be removed. However, if in extreme conditions of cleanliness (such as precision instrument assembly in clean room conditions) removal of the dye may be desired. The red dye may be removed by soaking the inserts in a denatured alcohol solution prior to use. To prevent galling or seizing when using an unplated or corrosion resistant screw/bolt in a screw-locking insert, we recommend the use of an anti-seize compound on the bolt threads.

# Corrosion Protection

Under some service conditions, Recoil inserts and their mating parts may be subjected to a degree of corrosion, the severity of which is dependent upon the particular application. Factors such as differing material types, atmospheric conditions, chemical attack, and even frequency of use will have an appreciable effect on the longevity of the bolted joint.

The following are recommendations to minimize corrosion within the bolted Recoil insert assemblies. Normal Service: Natural atmospheric environment with the screw/bolt permanently installed into the insert not adjacent to salt water.

### Normal Service:
Natural atmospheric environment with the screw/bolt permamently installed into the insert not adjacent to salt water.

### Severe Service:
Mildly contaminated atmospheric environments involving moisture, occasional exposure to a chloride air or sea spray, and where the screw/bolt may be removed from the insert for extended periods of time.

### Extreme Severe Service:
Assembly is exposed to salt water, corrosive atmosphere, high temperature, or the screw/bolt is frequently removed from the assembly, allowing the ingress of water into a blind hole. In addition to methods 1, 2 and 3 below, further corrosion protection can be achieved by:

- Using blind holes wherever possible
- Using a sealing, insulating, or step-down type washer under the head of the bolt
- Using bolts that extend completely through the entire length of the insert
- In critical applications, the use of a non-hardening seal or compound over the joint and protecting bolt thread is recommended

Note - For extremely severe service conditions involving temperatures in excess of 425°C (800°F) or contact with acids, alkalies or sea water, stainless steel inserts are not recommended.

### Gas and Water Applications
Where gas or water threads are being manufactured or repaired it is important that an AFS sales office be consulted regarding the type of seal that will be provided in this situation. A wire insert may not provide a satisfactory thread seal.

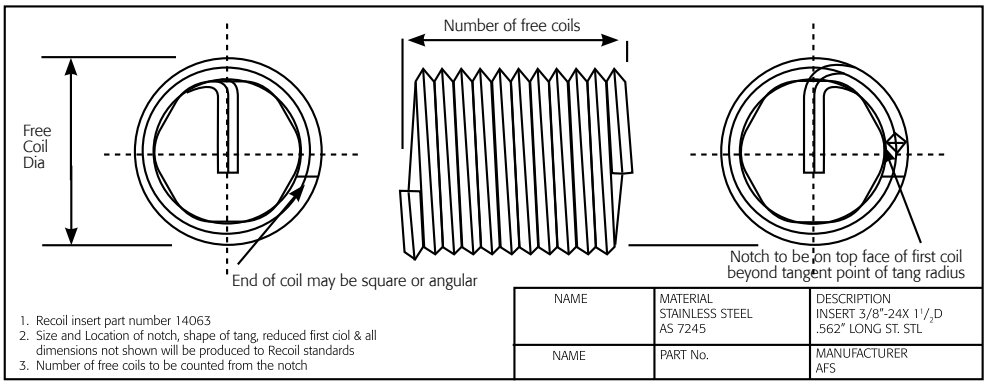
| | SERVICE CONDITIONS | | |
|---|---|---|---|
| PARENT MATERIAL | NORMAL | SEVERE | EXTREME SEVERE |
| Aluminum | None | Methods 2 or 3 | Methods 1, 2 & 3 |
| Magnesium | Methods 2 or 3 | Methods 2 and 3 | Methods 1, 2 & 3 |

| TYPICAL CORROSION RECOMMENDATIONS | | |
|---|---|---|
| METHOD 1 | METHOD 2 | METHOD 3 |
| Parent Material Protection Aluminum: For oxide coating use Alodine, Anodize,Iridite, or similar. Iridite 14 or 14-2 (MIL-C-554) is recommended for critical parts rather then anodizing (MIL-S-5002) | Coat the insert with one of the following: Cadmium per QQ-P-416, Type II 0.0001" thick; or Dry Film Lubricant per MIL- L-893 (must be free of graphite) | Separate the parent material from the insert by using liquid zinc chromate primer, Federal Specification TT-P-1757. Apply the primer to the hole sparingly and install while the primer is still wet. |

# MS Insert Dimensional Data

## Drawing Call-Out

An example of a typical drawing specification for a Recoil insert is shown below:




A typical drawing call-out for a Recoil screw-locking insert 3/8" - 24 x 11/2 dia. long Class 3B Unified Fine Thread (UNF) is shown. Drawing call-outs can be simply defined by using a production sequence process sheet to provide the operational steps with the drawing showing dimensional limits and data. (Example shown below)

1) Drill hole 25/64" (.3906") diameter, depth .812" plus your normal standard for drilling depth.
2) Countersink 120° +/-5° .42"/.45" diameter.
3) Tap with Recoil STI Tap No. 44065 (class 3B) full thread depth .600".
4) Gauge with Recoil Gauge No. 64063 or according to your inspection requirements.
5) Install Recoil screw-lock insert 14063 with Recoil Inserting Tool No. 54061.
6) Break off driving tang with Recoil Tang Break-off Tool No. 59280M.

## Recoil Thread Insert Part Numbering System

Recoil insert product part numbering system uses a logically structured 5 digit basic part number. Suffixes are typically added to differentiate between special or non-standard features. This guide defines the structure of Recoil part numbers and may be used for reference to identify a Recoil insert from its part number.

## Diagram of Recoil Insert Part Number Example

**0 5 0 8 2 Y A G**

**First Digit = Product Group**
0 = Inserts Bulk - Free Running
1 = Inserts Bulk - Self Locking
2 = Insert Packets (Free running only)

**Second Digit = Thread Type**
0 = BSF, BA
1 = BSP
2 = BSW
3 = UNC
4 = UNF, UNEF, UNS, ETC.
5 = METRIC Coarse
6 = NPT, BSC, 8UN
7 = Metric Medium
8 = Metric Fine & Spark-Plug
9 = Tang break tool

**Third and Fourth Digit = Thread Diameter**
0 = size in 1/16"s (ie 08 = 1/2" )
1 = size in 1/16"s (ie 08 = 1/2" )
2 = size in 1/16"s (ie 08 = 1/2" )
3 = size in 1/16"s (ie 08 = 1/2" )
4 = size in 1/16"s (ie 08 = 1/2" )
5 = size in 1mm's (ie 08 = 8mm )
6 = size in 1/16"s (ie 08 = 1/2" )
7 = size in 1mm's (ie 08 = 8mm )
8 = size in 1mm's (ie 08 = 8mm )

**Fifth Digit = Length**
Length in 1/2 Diameters
2 = 1D
3 = 1.5D
4 = 2D
5 = 2.5D
6 = 3D

**Special Suffixes**
AG = Silver plated
C = Cadmium plated
D = Dry film lubrication
LH = Left Hand
P = Phosphor Bronze
SF = Strip Feed
T = Nitronic 60
X = Inconel X750
Y = 316 Stainless Steel

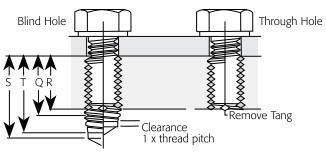
Example - O5082-YAG = M8 - 1.25 x1D 316SS, silver plated insert

# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | MA Spec | | | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | | | | | | | 05022 | | 0.079 | 2.0 | | | 2.00 | 1.60 | 3.80 | 3.40 |
| | 1.5 | | | | | | | 05023 | | 0.118 | 3.0 | 5.5 | 2.5 | 3.00 | 2.60 | 4.80 | 4.40 |
| M2 x 0.4 | 2 | | | | | | | 05024 | Upon Request | 0.157 | 4.0 | 7.75 | 2.7 | 4.00 | 3.60 | 5.80 | 5.40 |
| | 2.5 | | | | | | | 05025 | | 0.197 | 5.0 | 10.125 | | 5.00 | 4.60 | 6.80 | 6.40 |
| | 3 | | | | | | | 05026 | | 0.236 | 6.0 | 12.375 | | 6.00 | 5.60 | 7.80 | 7.40 |
| | 1 | 05012 | | | 15012 | | 3.0 | 05012MA | 15012MA | 0.087 | 2.2 | 3.125 | | 2.20 | 1.75 | 4.23 | 3.98 |
| | 1.5 | 05013 | | | 15013 | 2.8 | 5.25 | 05013MA | 15013MA | 0.13 | 3.3 | 5.375 | 2.80 | 3.30 | 2.85 | 5.33 | 4.88 |
| M2.2 x 0.45 | 2 | 05014 | | | 15014 | 2.95 | 7.55 | 05014MA | 15014MA | 0.173 | 4.4 | 7.625 | 3.00 | 4.40 | 3.95 | 6.43 | 5.98 |
| | 2.5 | 05015 | | | 15015 | | 9.75 | 05015MA | 15015MA | 0.217 | 5.5 | 9.875 | | 5.50 | 5.05 | 7.53 | 7.08 |
| | 3 | 05016 | | | 15016 | | 12.0 | 05016MA | 15016MA | 0.26 | 6.6 | 12.125 | | 6.60 | 6.15 | 8.63 | 8.18 |
| | 1 | 05252 | | 3.40 | 15252 | | 3.2 | 05252MA | 15252MA | 0.098 | 2.5 | 3.375 | | 2.50 | 2.05 | 4.53 | 4.08 |
| | 1.5 | 05253 | 3.10 | 6.20 | 15253 | 3.25 | 5.6 | 05253MA | 15253MA | 0.15 | 3.8 | 5.750 | 3.20 | 3.75 | 3.30 | 5.78 | 5.33 |
| M2.5 x 0.45 | 2 | 05254 | 3.20 | 8.95 | 15254 | 3.45 | 8.0 | 05254MA | 15254MA | 0.197 | 5.0 | 8.125 | 3.70 | 5.00 | 4.55 | 7.03 | 6.58 |
| | 2.5 | 05255 | | 11.45 | 15255 | | 10.35 | 05255MA | 15255MA | 0.248 | 6.3 | 10.500 | | 6.25 | 5.80 | 8.28 | 7.83 |
| | 3 | 05256 | | 14.05 | 15256 | | 12.6 | 05256MA | 15256MA | 0.295 | 7.5 | 12.750 | | 7.50 | 7.05 | 9.53 | 9.08 |
| | 1 | 05032 | | | 15032 | | 3.6 | 05032MA | 15032MA | 0.118 | 3.0 | 3.750 | | 3.00 | 2.50 | 5.25 | 4.75 |
| | 1.5 | 05033 | 3.65 | 6.95 | 15033 | 3.80 | 6.22 | 05033MA | 15033MA | 0.177 | 4.5 | 6.375 | 3.80 | 4.50 | 4.00 | 6.75 | 6.25 |
| M3 x 0.5 | 2 | 05034 | 3.80 | 9.75 | 15034 | 3.95 | 8.73 | 05034MA | 15034MA | 0.236 | 6.0 | 8.875 | 4.35 | 6.00 | 5.50 | 8.25 | 7.75 |
| | 2.5 | 05035 | | 12.55 | 15035 | | 11.22 | 05035MA | 15035MA | 0.295 | 7.5 | 11.375 | | 7.50 | 7.00 | 9.75 | 9.25 |
| | 3 | 05036 | | 15.35 | 15036 | | 13.72 | 05036MA | 15036MA | 0.354 | 9.0 | 13.875 | | 9.00 | 8.50 | 11.25 | 10.75 |
| | 1 | 05352 | | 4.00 | 15352 | | 3.6 | 05352MA | 15352MA | 0.138 | 3.5 | 3.750 | | 3.50 | 2.90 | 6.20 | 5.60 |
| | 1.5 | 05353 | 4.30 | 6.75 | 15353 | 4.40 | 6.23 | 05353MA | 15353MA | 0.209 | 5.3 | 6.375 | 4.40 | 5.25 | 4.65 | 7.95 | 7.35 |
| M3.5 x 0.6 | 2 | 05354 | 4.46 | 9.45 | 15354 | 4.55 | 8.6 | 05354MA | 15354MA | 0.276 | 7.0 | 8.625 | 4.95 | 7.00 | 6.40 | 9.70 | 9.10 |
| | 2.5 | 05355 | | 12.15 | 15355 | | 11.23 | 05355MA | 15355MA | 0.346 | 8.8 | 11.375 | | 8.75 | 8.15 | 11.45 | 10.85 |
| | 3 | 05356 | | 14.85 | 15356 | | 13.6 | 05356MA | 15356MA | 0.413 | 10.5 | 13.625 | | 10.50 | 9.90 | 13.20 | 12.60 |
| | 1 | 05042 | | 3.85 | 15042 | | | 05042MA | 15042MA | 0.157 | 4.0 | 3.625 | | 4.00 | 3.30 | 7.15 | 6.45 |
| | 1.5 | 05043 | 4.90 | 6.55 | 15043 | AS PER "MA SPECIFICATION" | | 05043MA | 15043MA | 0.236 | 6.0 | 6.125 | 5.05 | 6.00 | 5.30 | 9.15 | 8.45 |
| M4 x 0.7 | 2 | 05044 | 5.15 | 9.15 | 15044 | | | 05044MA | 15044MA | 0.315 | 8.0 | 8.625 | 5.60 | 8.00 | 7.30 | 11.15 | 10.45 |
| | 2.5 | 05045 | | 11.85 | 15045 | | | 05045MA | 15045MA | 0.394 | 10.0 | 11.125 | | 10.00 | 9.30 | 13.15 | 12.45 |
| | 3 | 05046 | | 14.45 | 15046 | | | 05046MA | 15046MA | 0.472 | 12.0 | 13.625 | | 12.00 | 11.30 | 15.15 | 14.45 |
| | 1 | 05052 | | 4.45 | 15052 | | | 05052MA | 15052MA | 0.197 | 5.0 | 4.125 | | 5.00 | 4.20 | 8.60 | 7.80 |
| | 1.5 | 05053 | 6.00 | 7.35 | 15053 | AS PER "MA SPECIFICATION" | | 05053MA | 15053MA | 0.295 | 7.5 | 6.875 | 6.25 | 7.50 | 6.70 | 11.10 | 10.30 |
| M5 x 0.8 | 2 | 05054 | 6.20 | 10.25 | 15054 | | | 05054MA | 15054MA | 0.394 | 10.0 | 9.625 | 6.80 | 10.00 | 9.20 | 13.60 | 12.80 |
| | 2.5 | 05055 | | 13.15 | 15055 | | | 05055MA | 15055MA | 0.492 | 12.5 | 12.375 | | 12.50 | 11.70 | 16.10 | 15.30 |
| | 3 | 05056 | | 16.05 | 15056 | | | 05056MA | 15056MA | 0.591 | 15.0 | 15.125 | | 15.00 | 14.20 | 18.60 | 17.80 |
| | 1 | 05062 | | 4.15 | 15062 | | | 05062MA | 15062MA | 0.236 | 6.0 | 4.000 | | 6.00 | 5.00 | 10.50 | 9.50 |
| | 1.5 | 05063 | 7.25 | 6.95 | 15063 | AS PER "MA SPECIFICATION" | | 05063MA | 15063MA | 0.354 | 9.0 | 6.750 | 7.40 | 9.00 | 8.00 | 13.50 | 12.50 |
| M6 x 1 | 2 | 05064 | 7.45 | 9.75 | 15064 | | | 05064MA | 15064MA | 0.472 | 12.0 | 9.500 | 7.95 | 12.00 | 11.00 | 16.50 | 15.50 |
| | 2.5 | 05065 | | 12.55 | 15065 | | | 05065MA | 15065MA | 0.591 | 15.0 | 12.125 | | 15.00 | 14.00 | 19.50 | 18.50 |
| | 3 | 05066 | | 15.35 | 15066 | | | 05066MA | 15066MA | 0.709 | 18.0 | 14.875 | | 18.00 | 17.00 | 22.50 | 21.50 |
| | 1 | 05072 | | 5.15 | 15072 | | | 05072MA | 15072MA | 0.276 | 7.0 | 4.875 | 8.65 | 7.00 | 6.00 | 11.50 | 10.50 |
| | 1.5 | 05073 | 8.35 | 8.45 | 15073 | AS PER "MA SPECIFICATION" | | 05073MA | 15073MA | 0.413 | 10.5 | 8.000 | 9.20 | 10.50 | 9.50 | 15.00 | 14.00 |
| M7 x 1 | 2 | 05074 | 8.65 | 11.70 | 15074 | | | 05074MA | 15074MA | 0.551 | 14.0 | 11.125 | | 14.00 | 13.00 | 18.50 | 17.50 |
| | 2.5 | 05075 | | 15.00 | 15075 | | | 05075MA | 15075MA | 0.689 | 17.5 | 14.125 | | 17.50 | 16.50 | 22.00 | 21.00 |
| | 3 | 05076 | | 18.30 | 15076 | | | 05076MA | 15076MA | 0.827 | 21.0 | 17.250 | | 21.00 | 20.00 | 25.50 | 24.50 |

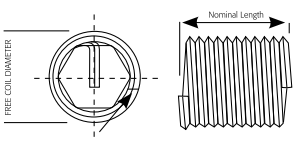
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

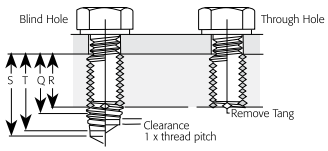


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | MA Spec | | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 08082 | | 8.60 | 18082 | | | | 18082 | 0.315 | 8 | 7.85 | | 8.00 | 7.25 | 11.38 | 10.63 |
| M8 x 0.75 | 1.5 | 08083 | 9.00 | 13.75 | 18083 | | | | 18083 | 0.472 | 12 | 12.6 | | 12.00 | 11.25 | 15.38 | 14.63 |
| | 2 | 08084 | 9.18 | 18.75 | | | | | | | | | | 16.00 | 15.25 | 19.38 | 18.63 |
| | 1 | 07082 | | 6.15 | 17082 | | | 07082MA | 17082 | 0.315 | 8.0 | 5.875 | | 8.00 | 7.00 | 12.50 | 11.50 |
| | 1.5 | 07083 | 9.40 | 9.85 | 17083 | | | 07083MA | 17083 | 0.472 | 12.0 | 9.375 | 9.70 | 12.00 | 11.00 | 16.50 | 15.50 |
| M8 x 1 | 2 | 07084 | 9.65 | 13.65 | 17084 | AS PER "MA SPECIFICATION" | | 07084MA | 17084 | 0.63 | 16.0 | 13.000 | 10.25 | 16.00 | 15.00 | 20.50 | 19.50 |
| | 2.5 | 07085 | | 17.45 | 17085 | | | 07085MA | 17085 | 0.787 | 20.0 | 16.500 | | 20.00 | 19.00 | 24.50 | 23.50 |
| | 3 | 07086 | | 21.15 | 17086 | | | 07086MA | 17086 | 0.945 | 24.0 | 20.125 | | 24.00 | 23.00 | 28.50 | 27.50 |
| | 1 | 05082 | | 4.55 | 15082 | | | 05082MA | 15082MA | 0.394 | 10.0 | 4.500 | | 8.00 | 6.75 | 13.63 | 12.38 |
| | 1.5 | 05083 | 9.60 | 7.55 | 15083 | | | 05083MA | 15083MA | 0.472 | 12.0 | 7.375 | 9.80 | 12.00 | 10.75 | 17.63 | 16.38 |
| M8 x 1.25 | 2 | 05084 | 9.80 | 10.55 | 15084 | AS PER "MA SPECIFICATION" | | 05084MA | 15084MA | 0.63 | 16.0 | 10.250 | 10.35 | 16.00 | 14.75 | 21.63 | 20.38 |
| | 2.5 | 05085 | | 13.55 | 15085 | | | 05085MA | 15085MA | 0.787 | 20.0 | 13.250 | | 20.00 | 18.75 | 25.63 | 24.38 |
| | 3 | 05086 | | 16.55 | 15086 | | | 05086MA | 15086MA | 0.945 | 24.0 | 16.125 | | 24.00 | 22.75 | 29.63 | 28.38 |
| | 1 | 07092 | | 7.05 | | | | | | 0.354 | 9.0 | | | 9.00 | 8.00 | 13.50 | 12.50 |
| | 1.5 | 07093 | 10.41 | 11.35 | | | | | | 0.531 | 13.5 | | | 13.50 | 12.50 | 18.00 | 17.00 |
| M9 x 1 | 2 | 07094 | 10.65 | 15.65 | Upon Request | | | | | 0.709 | 18.0 | | | 18.00 | 17.00 | 22.50 | 21.50 |
| | 2.5 | 07095 | | 19.85 | | | | | | 0.886 | 22.5 | | | 22.50 | 21.50 | 27.00 | 26.00 |
| | 3 | 07096 | | 24.15 | | | | | | 1.063 | 27.0 | | | 27.00 | 26.00 | 31.50 | 30.50 |
| | 1 | 05092 | | 5.35 | | | | | | 0.354 | 9.0 | | | 9.00 | 7.75 | 14.63 | 13.38 |
| | 1.5 | 05093 | 10.68 | 8.75 | | | | | | 0.531 | 13.5 | | | 13.50 | 12.25 | 19.13 | 17.88 |
| M9 x 1.25 | 2 | 05094 | 10.92 | 12.15 | Upon Request | | | | | 0.709 | 18.0 | | | 18.00 | 16.75 | 23.63 | 22.38 |
| | 2.5 | 05095 | | 15.55 | | | | | | 0.886 | 22.5 | | | 22.50 | 21.25 | 28.13 | 26.88 |
| | 3 | 05096 | | 18.95 | | | | | | 1.063 | 27.0 | | | 27.00 | 25.75 | 32.63 | 31.38 |
| | 1 | 08102 | | 8.05 | | | | 08102MA | 18102MA | 0.394 | 10.0 | 7.625 | | 10.00 | 9.00 | 14.50 | 13.50 |
| | 1.5 | 08103 | 11.34 | 12.75 | | | | 08103MA | 18103MA | 0.591 | 15.0 | 12.00 | 11.95 | 15.00 | 14.00 | 19.50 | 18.50 |
| M10 x 1 | 2 | 08104 | 11.63 | 17.55 | | | | 08104MA | 18104MA | 0.787 | 20.0 | 16.50 | 12.5 | 20.00 | 19.00 | 24.50 | 23.50 |
| | 2.5 | 08105 | | 22.25 | | | | 08105MA | 18105MA | 0.984 | 25.0 | 21.00 | | 25.00 | 24.00 | 29.50 | 28.50 |
| | 3 | 08106 | | 26.95 | | | | 08106MA | 18106MA | 1.181 | 30.0 | 25.50 | | 30.00 | 29.00 | 34.50 | 33.50 |
| | 1 | 07102 | | 6.05 | 17102 | | | 07102MA | 17102MA | 0.394 | 10.0 | 5.875 | | 10.00 | 8.75 | 15.63 | 14.38 |
| | 1.5 | 07103 | 11.80 | 9.85 | 17103 | | | 07103MA | 17103MA | 0.591 | 15.0 | 9.500 | 12.10 | 15.00 | 13.75 | 20.63 | 19.38 |
| M10 x 1.25 | 2 | 07104 | 12.10 | 13.55 | 17104 | | | 07104MA | 17104MA | 0.787 | 20.0 | 13.125 | 12.65 | 20.00 | 18.75 | 25.63 | 24.38 |
| | 2.5 | 07105 | | 17.35 | 17105 | | | 07105MA | 17105MA | 0.984 | 25.0 | 16.750 | | 25.00 | 23.75 | 30.63 | 29.38 |
| | 3 | 07106 | | 21.15 | 17106 | | | 07106MA | 17106MA | 1.181 | 30.0 | 20.375 | | 30.00 | 28.75 | 35.63 | 34.38 |
| | 1 | | | | 15102 | | | 05102 | 15102MA | 0.394 | 10.0 | 4.875 | | 10.00 | 8.50 | 16.75 | 15.25 |
| | 1.5 | | | | 15103 | | | 05103 | 15103MA | 0.591 | 15.0 | 8.000 | 11.95 | 15.00 | 13.50 | 21.75 | 20.25 |
| M10 x 1.5 | 2 | | | | 15104 | | | 05104 | 15104MA | 0.787 | 20.0 | 11.125 | 12.50 | 20.00 | 18.50 | 26.75 | 25.25 |
| | 2.5 | | | | 15105 | | | 05105 | 15105MA | 0.984 | 25.0 | 14.250 | | 25.00 | 23.50 | 31.75 | 30.25 |
| | 3 | | | | 15106 | | | 05106 | 15106MA | 1.181 | 30.0 | 17.375 | | 30.00 | 28.50 | 36.75 | 35.25 |
| | 1 | 08112 | | 8.95 | | | | | | 0.433 | 11.0 | | | 11.00 | 12.00 | 15.50 | 14.50 |
| M11 x 1 | 1.5 | 08113 | 12.40 | 14.15 | | | | | | 0.866 | 22.0 | | | 16.50 | 15.50 | 21.00 | 20.00 |
| | 2 | 08114 | 12.70 | 19.35 | Upon Request | | | | | 1.083 | 27.5 | | | 22.00 | 21.00 | 26.50 | 25.50 |
| | 2.5 | 08115 | | 24.55 | | | | | | 1.299 | 33.0 | | | 27.50 | 26.50 | 32.00 | 31.00 |
| | 3 | 08116 | | 29.75 | | | | | | 0.433 | 11.0 | | | 33.00 | 32.00 | 37.50 | 36.50 |

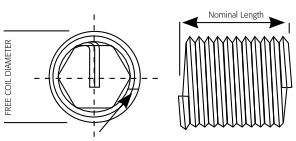
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.



# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | | | MA Spec | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 07112 | | 6.90 | | | | | | | | | | 11.00 | 9.75 | 16.63 | 15.38 |
| | 1.5 | 07113 | 12.83 | 11.00 | | | | | | 0.650 | 16.5 | | | 16.50 | 15.25 | 22.13 | 20.88 |
| M11 x 1.25 | 2 | 07114 | 13.10 | 15.15 | Upon Request | | | | | 0.866 | 22.0 | | | 22.00 | 20.75 | 27.63 | 26.38 |
| | 2.5 | 07115 | | 19.35 | | | | | | 1.083 | 27.5 | | | 27.50 | 26.25 | 33.13 | 31.88 |
| | 3 | 07116 | | 23.45 | | | | | | 1.299 | 33.0 | | | 33.00 | 31.75 | 38.63 | 37.38 |
| | 1 | 05112 | | 5.55 | | | | | | 0.433 | 11.0 | | | 11.00 | 9.50 | 17.75 | 16.25 |
| | 1.5 | 05113 | 12.95 | 9.05 | | | | | | 0.650 | 16.5 | | | 16.50 | 15.00 | 23.25 | 21.75 |
| M11 x 1.5 | 2 | 05114 | 13.25 | 12.55 | Upon Request | | | | | 0.866 | 22.0 | | | 22.00 | 20.50 | 28.75 | 27.25 |
| | 2.5 | 05115 | | 16.05 | | | | | | 1.083 | 27.5 | | | 27.50 | 26.00 | 34.25 | 32.75 |
| | 3 | 05116 | | 19.45 | | | | | | 1.299 | 33.0 | | | 33.00 | 31.50 | 39.75 | 38.25 |
| | 1 | 08122-1.0 | | 10.25 | | | | | | 0.472 | 12.0 | | | 12.00 | 11.00 | 16.50 | 15.50 |
| | 1.5 | 08123-1.0 | 13.55 | 15.35 | | | | | | 0.709 | 18.0 | | | 18.00 | 17.00 | 22.50 | 21.50 |
| M12 x 1 | 2 | 08124-1.0 | 13.90 | 21.30 | Upon Request | | | | | 0.945 | 24.0 | | | 24.00 | 23.00 | 28.50 | 27.50 |
| | 2.5 | 08125-1.0 | | | | | | | | 1.181 | 30.0 | | | 30.00 | 29.00 | 34.50 | 33.50 |
| | 3 | 08126-1.0 | | | | | | | | 1.417 | 36.0 | | | 36.00 | 35.00 | 40.50 | 39.50 |
| | 1 | 08122 | | 7.65 | 18122 | | | | 18122MA | 0.472 | 12.0 | 7.250 | | 12.00 | 10.75 | 17.63 | 16.38 |
| | 1.5 | 08123 | 13.70 | 12.15 | 18123 | AS PER "MA SPECIFICATION" | | | 18123MA | 0.709 | 18.0 | 11.625 | 14.30 | 18.00 | 16.75 | 23.63 | 22.38 |
| M12 x 1.25 | 2 | 08124 | 14.05 | 16.65 | 18124 | | | | 18124MA | 0.945 | 24.0 | 15.875 | 15.00 | 24.00 | 22.75 | 29.63 | 27.38 |
| | 2.5 | 08125 | | 21.25 | 18125 | | | | 18125MA | 1.181 | 30.0 | 20.250 | | 30.00 | 28.75 | 35.63 | 34.38 |
| | 3 | 08126 | | 25.75 | 18126 | | | | 18126MA | 1.417 | 36.0 | 24.500 | | 36.00 | 34.75 | 41.63 | 40.38 |
| | 1 | 07122 | | 5.85 | 17122 | | | 07122MA | 17122MA | 0.472 | 12.0 | 6.000 | | 12.00 | 10.50 | 18.75 | 17.25 |
| | 1.5 | 07123 | 14.00 | 9.50 | 17123 | AS PER "MA SPECIFICATION" | | 07123MA | 17123MA | 0.709 | 18.0 | 9.625 | 14.25 | 18.00 | 16.50 | 24.75 | 23.25 |
| M12 x 1.5 | 2 | 07124 | 14.30 | 13.23 | 17124 | | | 07124MA | 17124MA | 0.945 | 24.0 | 13.375 | 14.95 | 24.00 | 22.50 | 30.75 | 29.25 |
| | 2.5 | 07125 | | 16.85 | 17125 | | | 07125MA | 17125MA | 1.181 | 30.0 | 17.000 | | 30.00 | 28.50 | 36.75 | 32.25 |
| | 3 | 07126 | | 20.6 | 17126 | | | 07126MA | 17126MA | 1.417 | 36.0 | 20.750 | | 36.00 | 34.50 | 42.75 | 41.25 |
| | 1 | | | | 15122 | | | 05122 | 15122MA | 0.472 | 12.0 | 5.000 | | 12.00 | 10.25 | 19.88 | 18.13 |
| | 1.5 | | | | 15123 | AS PER "MA SPECIFICATION" | | 05123 | 15123MA | 0.709 | 18.0 | 8.250 | 14.30 | 18.00 | 16.25 | 25.88 | 24.13 |
| M12 x 1.75 | 2 | | | | 15124 | | | 05124 | 15124MA | 0.945 | 24.0 | 11.500 | 15.00 | 24.00 | 22.25 | 31.88 | 30.13 |
| | 2.5 | | | | 15125 | | | 05125 | 15125MA | 1.181 | 30.0 | 14.625 | | 30.00 | 28.25 | 37.88 | 36.13 |
| | 3 | | | | 15126 | | | 05126 | 15126MA | 1.417 | 36.0 | 17.875 | | 36.00 | 34.25 | 43.88 | 42.13 |
| | 1 | 07132 | 15.20 | 6.65 | | | | | | 0.512 | 13.0 | | | 13.00 | 11.50 | 19.75 | 18.25 |
| M13 x 1.5 | 1.5 | 07133 | 15.53 | 10.75 | | | | | | | | | | 19.50 | 18.00 | 26.25 | 24.75 |
| | 2 | 07134 | | 14.95 | | | | | | | | | | 26.00 | 24.50 | 32.75 | 31.25 |
| | 1 | 05132 | | 5.50 | | | | | | | | | | 13.00 | 11.25 | 20.88 | 19.13 |
| | 1.5 | 05133 | 15.35 | 9.05 | | | | | | 0.768 | 19.5 | | | 19.50 | 17.75 | 27.38 | 25.63 |
| M13 x 1.75 | 2 | 05134 | 15.75 | 12.60 | Upon Request | | | | | | | | | 26.00 | 24.25 | 33.88 | 32.13 |
| | 2.5 | 05135 | | 16.1 | | | | | | | | | | 32.50 | 30.75 | 40.38 | 38.63 |
| | 3 | 05136 | | 19.65 | | | | | | | | | | 39.00 | 37.25 | 46.88 | 45.13 |
| | 1 | 08132 | | 8.35 | | | | | | 0.512 | 13.0 | | | 13.00 | 11.75 | 18.63 | 17.38 |
| | 1.5 | 08133 | 14.70 | 13.25 | | | | | | | | | | 19.50 | 18.25 | 25.13 | 23.88 |
| M13 x 1.25 | 2 | 08134 | 15.05 | 18.25 | Upon Request | | | | | | | | | 26.00 | 24.75 | 31.63 | 30.38 |
| | 2.5 | 08135 | | 23.15 | | | | | | | | | | 32.50 | 31.25 | 38.13 | 36.88 |
| | 3 | 08136 | | 28.15 | | | | | | | | | | 39.00 | 37.75 | 44.63 | 43.38 |

Drill Depth: The minimum drilling depth "S" allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole. "S" minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
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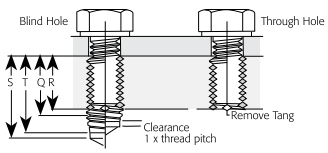
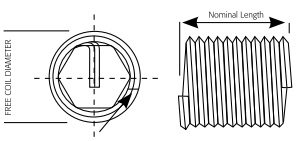



Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

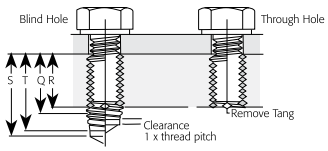


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | MA Spec | | | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 07142 | | 7.35 | 17142 | | 6.98 | 07142MA | 17142MA | 0.551 | 14.0 | 7.125 | | 14.00 | 12.50 | 20.75 | 19.25 |
| | 1.5 | 07143 | 16.15 | 11.75 | 17143 | 17.30 | 11.23 | 07143MA | 17143MA | 0.827 | 21.0 | 11.375 | 16.55 | 21.00 | 19.50 | 27.75 | 26.25 |
| M14 x 1.5 | 2 | 07144 | 16.55 | 16.25 | 17144 | 17.60 | 15.48 | 07144MA | 17144MA | 1.102 | 28.0 | 15.625 | 17.25 | 28.00 | 26.50 | 34.75 | 33.25 |
| | 2.5 | 07145 | | 20.65 | 17145 | | 19.85 | 07145MA | 17145MA | 1.378 | 35.0 | 20.000 | | 35.00 | 33.50 | 41.75 | 40.25 |
| | 3 | 07146 | | 25.05 | 17146 | | 24.10 | 07146MA | 17146MA | 1.654 | 42.0 | 24.250 | | 42.00 | 40.50 | 48.75 | 47.25 |
| | 1 | | | | 15142 | | | 05142 | 15142MA | 0.551 | 14.0 | 5.125 | | 14.00 | 12.00 | 23.00 | 21.00 |
| | 1.5 | | | | 15143 | AS PER "MA SPECIFICATION" | | 05143 | 15143MA | 0.827 | 21.0 | 8.500 | 16.65 | 21.00 | 19.00 | 30.00 | 28.00 |
| M14 x 2 | 2 | | | | 15144 | | | 05144 | 15144MA | 1.102 | 28.0 | 11.750 | 17.35 | 28.00 | 26.00 | 37.00 | 35.00 |
| | 2.5 | | | | 15145 | | | 05145 | 15145MA | 1.378 | 35.0 | 15.000 | | 35.00 | 33.00 | 44.00 | 42.00 |
| | 3 | | | | 15146 | | | 05146 | 15146MA | 1.654 | 42.0 | 18.375 | | 42.00 | 40.00 | 51.00 | 49.00 |
| | 1 | 07152 | | 7.95 | | | | | | 0.591 | 15.0 | | | 15.00 | 13.50 | 21.75 | 20.25 |
| | 1.5 | 07153 | 17.25 | 12.75 | | | | | | 0.886 | 22.5 | | | 22.50 | 21.00 | 29.25 | 27.75 |
| M15 x 1.5 | 2 | 07154 | 17.65 | 17.45 | Upon Request | | | | | 1.181 | 30.0 | | | 30.00 | 28.50 | 36.75 | 35.25 |
| | 2.5 | 07155 | | 22.25 | | | | | | 1.476 | 37.5 | | | 37.50 | 36.00 | 44.25 | 42.75 |
| | 3 | 07156 | | 26.95 | | | | | | 1.772 | 45.0 | | | 45.00 | 43.50 | 51.75 | 50.25 |
| | 1 | 05152 | | 5.55 | | | | | | 0.591 | 15.0 | | | 15.00 | 13.00 | 24.00 | 22.00 |
| | 1.5 | 05153 | 17.70 | 9.15 | | | | | | 0.886 | 22.5 | | | 22.50 | 20.50 | 31.50 | 29.50 |
| M15 x 2 | 2 | 05154 | 18.10 | 12.70 | Upon Request | | | | | 1.181 | 30.0 | | | 30.00 | 28.00 | 39.00 | 37.00 |
| | 2.5 | 05155 | | 16.30 | | | | | | 1.476 | 37.5 | | | 37.50 | 35.50 | 46.50 | 44.50 |
| | 3 | 05156 | | 19.85 | | | | | | 1.772 | 45.0 | | | 45.00 | 43.00 | 54.00 | 52.00 |
| | 1 | 07162 | | 8.65 | 17162 | | 8.65 | 07162MA | 17162MA | 0.63 | 16.0 | 8.250 | | 16.00 | 14.50 | 22.75 | 21.25 |
| | 1.5 | 07163 | 18.20 | 13.75 | 17163 | 18.20 | 13.75 | 07163MA | 17163MA | 0.945 | 24.0 | 13.125 | 18.90 | 24.00 | 22.50 | 30.75 | 29.25 |
| M16 x 1.5 | 2 | 07164 | 18.60 | 18.85 | 17164 | 18.60 | 18.85 | 07164MA | 17164MA | 1.26 | 32.0 | 18.000 | 19.60 | 32.00 | 30.50 | 38.75 | 37.25 |
| | 2.5 | 07165 | | 23.85 | 17165 | | 23.85 | 07165MA | 17165MA | 1.575 | 40.0 | 22.750 | | 40.00 | 38.50 | 46.75 | 45.25 |
| | 3 | 07166 | | 28.95 | 17166 | | 28.95 | 07166MA | 17166MA | 1.89 | 48.0 | 27.625 | | 48.00 | 46.50 | 54.75 | 53.25 |
| | 1 | 05162 | | 6.10 | 15162 | | | 05162MA | 15162MA | 0.63 | 16.0 | 6.125 | | 16.00 | 14.00 | 25.00 | 23.00 |
| | 1.5 | 05163 | 18.35 | 9.60 | 15163 | AS PER "MA SPECIFICATION" | | 05163MA | 15163MA | 0.945 | 24.0 | 9.750 | 18.80 | 24.00 | 22.00 | 33.00 | 31.00 |
| M16 x 2 | 2 | 05164 | 18.55 | 13.70 | 15164 | | | 05164MA | 15164MA | 1.26 | 32.0 | 13.500 | 19.60 | 32.00 | 30.00 | 41.00 | 39.00 |
| | 2.5 | 05165 | | 17.50 | 15165 | | | 05165MA | 15165MA | 1.575 | 40.0 | 17.250 | | 40.00 | 38.00 | 49.00 | 47.00 |
| | 3 | 05166 | | 21.15 | 15166 | | | 05166MA | 15166MA | 1.89 | 48.0 | 21.000 | | 48.00 | 46.00 | 57.00 | 55.00 |
| | 1 | 08182 | | 9.85 | 18182 | | | 08182MA | 18182MA | 0.709 | 18.0 | 9.500 | | 18.00 | 16.50 | 24.75 | 23.25 |
| | 1.5 | 08183 | 20.35 | 15.45 | 18183 | AS PER "MA SPECIFICATION" | | 08183MA | 18183MA | 1.063 | 27.0 | 15.000 | 21.05 | 27.00 | 25.50 | 33.75 | 32.25 |
| M18 x 1.5 | 2 | 08184 | 20.75 | 21.05 | 18184 | | | 08184MA | 18184MA | 1.417 | 36.0 | 20.375 | 21.75 | 36.00 | 34.50 | 42.75 | 41.25 |
| | 2.5 | 08185 | | 26.75 | 18185 | | | 08185MA | 18185MA | 1.772 | 45.0 | 25.875 | | 45.00 | 43.50 | 51.75 | 50.25 |
| | 3 | 08186 | | 32.35 | 18186 | | | 08186MA | 18186MA | 2.126 | 54.0 | 31.375 | | 54.00 | 52.50 | 60.75 | 59.25 |
| | 1 | 07182 | | | 17182 | | | | 17182MA | 0.709 | 18.0 | 7.000 | | 18.00 | 16.00 | 27.00 | 25.00 |
| | 1.5 | 07183 | AS PER "MA SPECIFICATION" | | 17183 | AS PER "MA SPECIFICATION" | | | 17183MA | 1.063 | 27.0 | 11.125 | 21.15 | 27.00 | 25.00 | 36.00 | 34.00 |
| M18 x 2 | 2 | 07184 | | | 17184 | | | | 17184MA | 1.417 | 36.0 | 15.375 | 21.85 | 36.00 | 34.00 | 45.00 | 43.00 |
| | 2.5 | 07185 | | | 17185 | | | | 17185MA | 1.772 | 45.0 | 19.500 | | 45.00 | 43.00 | 54.00 | 52.00 |
| | 3 | 07186 | | | 17186 | | | | 17186MA | 2.126 | 54.0 | 23.625 | | 54.00 | 52.00 | 63.00 | 61.00 |
| | 1 | 05182 | | | 15182 | | | | 15182MA | 0.709 | 18.0 | 5.375 | | 18.00 | 15.50 | 29.25 | 26.75 |
| | 1.5 | 05183 | AS PER "MA SPECIFICATION" | | 15183 | AS PER "MA SPECIFICATION" | | | 15183MA | 1.063 | 27.0 | 8.875 | 21.30 | 27.00 | 24.50 | 38.25 | 35.75 |
| M18 x 2.5 | 2 | 05184 | | | 15184 | | | 15184MA | 1.417 | 36.0 | 12.250 | 22.00 | 36.00 | 33.50 | 47.25 | 44.75 | |
| | 2.5 | 05185 | | | 15185 | | | | 15185MA | 1.772 | 45.0 | 15.625 | | 45.00 | 42.50 | 56.25 | 53.75 |
| | 3 | 05186 | | | 15186 | | | | 15186MA | 2.126 | 54.0 | 19.000 | | 54.00 | 51.50 | 65.25 | 62.75 |

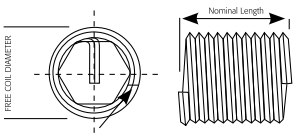
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

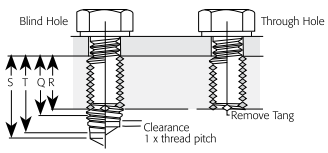


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | MA Spec | | | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 08202 | | 11.25 | 18202 | | | 08202MA | 18202MA | 0.787 | 20.0 | 10.750 | | 20.00 | 18.50 | 26.75 | 25.25 |
| | 1.5 | 08203 | 22.08 | 17.65 | 18203 | AS PER "MA | | 08203MA | 18203MA | 1.181 | 30.0 | 16.875 | 23.15 | 30.00 | 28.50 | 36.75 | 35.25 |
| M20 x 1.5 | 2 | 08204 | 22.50 | 23.95 | 18204 | SPECIFICATION" | | 08204MA | 18204MA | 1.575 | 40.0 | 22.875 | 24.00 | 40.00 | 38.50 | 46.75 | 45.25 |
| | 2.5 | 08205 | | 30.35 | 18205 | | | 08205MA | 18205MA | 1.969 | 50.0 | 28.875 | | 50.00 | 48.50 | 56.75 | 55.25 |
| | 3 | 08206 | | 36.75 | 18206 | | | 08206MA | 18206MA | 2.362 | 60.0 | 35.000 | | 60.00 | 58.50 | 66.75 | 65.25 |
| | 1 | 07202 | | 8.05 | 17202 | | | 07202MA | 17202MA | 0.787 | 20.0 | 7.875 | | 20.00 | 18.00 | 29.00 | 27.00 |
| | 1.5 | 07203 | 22.97 | 12.75 | 17203 | AS PER "MA | | 07203MA | 17203MA | 1.181 | 30.0 | 12.500 | 23.20 | 30.00 | 28.00 | 39.00 | 37.00 |
| M20 x 2 | 2 | 07204 | 23.40 | 17.45 | 17204 | SPECIFICATION" | | 07204MA | 17204MA | 1.575 | 40.0 | 17.250 | 24.05 | 40.00 | 38.00 | 49.00 | 47.00 |
| | 2.5 | 07205 | | 22.25 | 17205 | | | 07205MA | 17205MA | 1.969 | 50.0 | 21.875 | | 50.00 | 48.00 | 59.00 | 57.00 |
| | 3 | 07206 | | 26.95 | 17206 | | | 07206MA | 17206MA | 2.362 | 60.0 | 26.500 | | 60.00 | 58.00 | 69.00 | 67.00 |
| | 1 | | | | 15202 | | | 05202 | 15202MA | 0.787 | 20.0 | 6.125 | | 20.00 | 17.50 | 31.25 | 28.75 |
| | 1.5 | | | | 15203 | AS PER "MA | | 05203 | 15203MA | 1.181 | 30.0 | 9.875 | 23.55 | 30.00 | 27.50 | 41.25 | 38.75 |
| M20 x 2.5 | 2 | | | | 15204 | SPECIFICATION" | | 05204 | 15204MA | 1.575 | 40.0 | 13.625 | 24.40 | 40.00 | 37.50 | 51.25 | 48.75 |
| | 2.5 | | | | 15205 | | | 05205 | 15205MA | 1.969 | 50.0 | 17.375 | | 50.00 | 47.50 | 61.25 | 58.75 |
| | 3 | | | | 15206 | | | 05206 | 15206MA | 2.362 | 60.0 | 21.125 | | 60.00 | 57.50 | 71.25 | 68.75 |
| | 1 | 08222 | | 12.55 | | | | 08222MA | 18222MA | 0.866 | 22.0 | 11.875 | | 22.00 | 20.50 | 28.75 | 27.25 |
| | 1.5 | 08223 | 23.90 | 19.75 | | AS PER "MA | | 08223MA | 18223MA | 1.299 | 33.0 | 18.500 | 25.55 | 33.00 | 31.50 | 39.75 | 38.25 |
| M22 x 1.5 | 2 | 08224 | 24.45 | 26.65 | | SPECIFICATION" | | 08224MA | 18224MA | 1.732 | 44.0 | 25.125 | 26.45 | 44.00 | 42.50 | 50.75 | 49.25 |
| | 2.5 | 08225 | | 33.65 | | | | 08225MA | 18225MA | 2.165 | 55.0 | 31.625 | | 55.00 | 53.50 | 61.75 | 60.25 |
| | 3 | 08226 | | 40.65 | | | | 08226MA | 18226MA | 2.598 | 66.0 | 38.250 | | 66.00 | 64.50 | 72.75 | 71.25 |
| | 1 | 07222 | | 9.05 | 17222 | | | 07222MA | 17222MA | 0.787 | 20.0 | 8.750 | | 22.00 | 20.00 | 31.00 | 29.00 |
| | 1.5 | 07223 | 25.00 | 14.25 | 17223 | AS PER "MA | | 07223MA | 17223MA | 1.181 | 30.0 | 13.750 | 25.60 | 33.00 | 31.00 | 42.00 | 40.00 |
| M22 x 2 | 2 | 07224 | 25.40 | 19.45 | 17224 | SPECIFICATION" | | 07224MA | 17224MA | 1.575 | 40.0 | 18.875 | 26.50 | 44.00 | 42.00 | 53.00 | 51.00 |
| | 2.5 | 07225 | | 24.65 | 17225 | | | 07225MA | 17225MA | 1.969 | 50.0 | 23.875 | | 55.00 | 53.00 | 64.00 | 62.00 |
| | 3 | 07226 | | 30.15 | 17226 | | | 07226MA | 17226MA | 2.362 | 60.0 | 29.000 | | 66.00 | 64.00 | 75.00 | 73.00 |
| | 1 | | | | 15222 | | | 05222 | 15222MA | 0.866 | 22.0 | 6.750 | | 22.00 | 19.50 | 33.25 | 30.75 |
| | 1.5 | | | | 15223 | | | 05223 | 15223MA | 1.299 | 33.0 | 10.875 | 25.90 | 33.00 | 30.50 | 44.25 | 41.75 |
| M22 x 2.5 | 2 | | | | 15224 | | | 05224 | 15224MA | 1.732 | 44.0 | 14.875 | 26.90 | 44.00 | 41.50 | 55.25 | 52.75 |
| | 2.5 | | | | 15225 | | | 05225 | 15225MA | 2.165 | 55.0 | 19.000 | | 55.00 | 52.50 | 66.25 | 63.75 |
| | 3 | | | | 15226 | | | 05226 | 15226MA | 2.598 | 66.0 | 23.125 | | 66.00 | 63.50 | 77.25 | 74.75 |
| | 1 | 08242 | | 13.85 | 18242 | | 13.85 | | | 0.945 | 24.0 | | | 24.00 | 22.50 | 30.75 | 29.25 |
| | 1.5 | 08243 | 26.10 | 21.55 | 18243 | 26.10 | 21.55 | | | 1.417 | 36.0 | | | 36.00 | 34.50 | 42.75 | 41.25 |
| M24 x 1.5 | 2 | 08244 | 26.60 | 29.15 | 18244 | 26.60 | 29.15 | | | 1.89 | 48.0 | | | 48.00 | 46.50 | 54.75 | 53.25 |
| | 2.5 | 08245 | | 36.85 | 18245 | | 36.85 | | | 2.362 | 60.0 | | | 60.00 | 58.50 | 66.75 | 65.25 |
| | 3 | 08246 | | 44.45 | 18246 | | 44.45 | | | 2.835 | 72.0 | | | 72.00 | 70.50 | 78.75 | 77.25 |
| | 1 | 07242 | | 9.95 | 17242 | | | 07242MA | 17242MA | 0.945 | 24.0 | 9.500 | | 24.00 | 22.00 | 33.00 | 31.00 |
| | 1.5 | 07243 | 27.00 | 15.65 | 17243 | AS PER "MA | | 07243MA | 17243MA | 1.417 | 36.0 | 15.000 | 28.10 | 36.00 | 34.00 | 45.00 | 43.00 |
| M24 x 2 | 2 | 07244 | 27.50 | 21.45 | 17244 | SPECIFICATION" | | 07244MA | 17244MA | 1.89 | 48.0 | 20.375 | 29.10 | 48.00 | 46.00 | 57.00 | 55.00 |
| | 2.5 | 07245 | | 27.15 | 17245 | | | 07245MA | 17245MA | 2.362 | 60.0 | 25.875 | | 60.00 | 58.00 | 69.00 | 67.00 |
| | 3 | 07246 | | 32.85 | 17246 | | | 07246MA | 17246MA | 2.835 | 72.0 | 31.250 | | 72.00 | 70.00 | 81.00 | 79.00 |
| | 1 | | | | 15242 | | | 05242 | 15242MA | 0.945 | 24.0 | 6.125 | | 24.00 | 21.00 | 37.50 | 34.50 |
| | 1.5 | | | | 15243 | | | 05243 | 15243MA | 1.417 | 36.0 | 10.000 | 28.00 | 36.00 | 33.00 | 49.50 | 46.50 |
| M24 x 3 | 2 | | | | 15244 | AS PER "MA | | 05244 | 15244MA | 1.89 | 48.0 | 13.750 | 29.00 | 48.00 | 45.00 | 61.50 | 58.50 |
| | 2.5 | | | | 15245 | SPECIFICATION" | | 05245 | 15245MA | 2.362 | 60.0 | 17.500 | | 60.00 | 57.00 | 73.50 | 70.50 |
| | 3 | | | | 15246 | | | 05246 | 15246MA | 2.835 | 72.0 | 21.375 | | 72.00 | 69.00 | 85.50 | 82.50 |

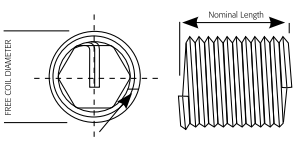
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

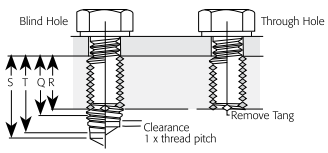


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | | | MA Spec | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 08262 | | 15.15 | | | | | | 1.024 | 26.0 | | | 26.50 | 24.50 | 32.75 | 31.25 |
| | 1.5 | 08263 | 28.10 | 23.45 | | | | | | 1.535 | 39.0 | | | 39.00 | 37.50 | 45.75 | 44.25 |
| M26 x 1.5 | 2 | 08264 | 28.60 | 31.75 | Upon Request | | | | | 2.047 | 52.0 | | | 52.00 | 50.50 | 58.75 | 57.25 |
| | 2.5 | 08265 | | 40.05 | | | | | | 2.559 | 65.0 | | | 65.00 | 63.50 | 71.75 | 70.25 |
| | 3 | 08266 | | 48.35 | | | | | | 3.071 | 78.0 | | | 78.00 | 76.50 | 84.75 | 83.25 |
| | 1 | 08272 | | 15.85 | | | | | | 1.063 | 27.0 | | | | | | |
| | 1.5 | 08273 | 29.10 | 24.45 | | | | | | 1.594 | 40.5 | | | | | | |
| M27 x 1.5 | 2 | 08274 | 29.6 | 33.15 | Upon Request | | | | | 2.126 | 54.0 | | | | | | |
| | 2.5 | 08275 | | 41.8 | | | | | | 2.657 | 67.5 | | | | | | |
| | 3 | 08276 | | 50.45 | | | | | | 3.189 | 81.0 | | | | | | |
| | 1 | 07272 | | 11.08 | 17272 | | | 07272MA | 17272MA | 1.063 | 27.0 | 10.875 | | 27.00 | 25.00 | 36.00 | 34.00 |
| | 1.5 | 07273 | 30.40 | 17.40 | 17273 | AS PER "MA SPECIFICATION" | | 07273MA | 17273MA | 1.594 | 40.5 | 17.000 | 31.30 | 40.50 | 38.50 | 49.50 | 47.50 |
| M27 x 2 | 2 | 07274 | 30.85 | 23.87 | 17274 | | | 07274MA | 17274MA | 2.126 | 54.0 | 23.250 | 32.30 | 54.00 | 52.00 | 63.00 | 61.00 |
| | 2.5 | 07275 | | 30.2 | 17275 | | | 07275MA | 17275MA | 2.657 | 67.5 | 29.375 | | 67.50 | 65.50 | 76.50 | 74.50 |
| | 3 | 07276 | | 36.52 | 17276 | | | 07276MA | 17276MA | 3.189 | 81.0 | 35.500 | | 81.00 | 79.00 | 90.00 | 88.00 |
| | 1 | | | | 15272 | | | 05272 | 15272MA | 1.063 | 27.0 | 7.000 | | 27.00 | 24.00 | 40.50 | 37.50 |
| | 1.5 | | | | 15273 | AS PER "MA SPECIFICATION" | | 05273 | 15273MA | 1.594 | 40.5 | 11.250 | 31.40 | 40.50 | 37.50 | 54.00 | 51.00 |
| M27 x 3 | 2 | | | | 15274 | | | 05274 | 15274MA | 2.126 | 54.0 | 15.500 | 32.40 | 54.00 | 51.00 | 67.50 | 64.50 |
| | 2.5 | | | | 15275 | | | 05275 | 15275MA | 2.657 | 67.5 | 19.750 | | 67.50 | 64.50 | 81.00 | 78.00 |
| | 3 | | | | 15276 | | | 05276 | 15276MA | 3.189 | 81.0 | 24.000 | | 81.00 | 78.00 | 94.50 | 91.50 |
| | 1 | 08302 | | 17.45 | | | | | | 1.181 | 30.0 | | | | | | |
| | 1.5 | 08303 | 32.50 | 26.95 | | | | | | 1.772 | 45.0 | | | | | | |
| M30 x 1.5 | 2 | 08304 | 32.80 | 36.55 | Upon Request | | | | | 2.362 | 60.0 | | | | | | |
| | 2.5 | 08305 | | 46.05 | | | | | | 2.953 | 75.0 | | | | | | |
| | 3 | 08306 | | 55.55 | | | | | | 3.543 | 90.0 | | | | | | |
| | 1 | 07302 | | 12.48 | 17302 | | | 07302MA | 17302MA | 1.181 | 30.0 | 12.250 | | 30.00 | 28.00 | 39.00 | 37.00 |
| | 1.5 | 07303 | 33.55 | 19.58 | 17303 | AS PER "MA SPECIFICATION" | | 07303MA | 17303MA | 1.772 | 45.0 | 19.125 | 34.50 | 45.00 | 43.00 | 54.00 | 52.00 |
| M30 x 2 | 2 | 07304 | 34.00 | 26.54 | 17304 | | | 07304MA | 17304MA | 2.362 | 60.0 | 25.875 | 35.70 | 60.00 | 58.00 | 69.00 | 67.00 |
| | 2.5 | 07305 | | 33.62 | 17305 | | | 07305MA | 17305MA | 2.953 | 75.0 | 32.750 | | 75.00 | 73.00 | 84.00 | 82.00 |
| | 3 | 07306 | | 40.58 | 17306 | | | 07306MA | 17306MA | 3.543 | 90.0 | 39.500 | | 90.00 | 88.00 | 99.00 | 97.00 |
| | 1 | 05302-3 | | | 15302-3 | | | | 15302-3MA | 1.181 | 30.0 | 7.875 | | 30.00 | 27.00 | 43.50 | 40.50 |
| | 1.5 | 05303-3 | AS PER "MA SPECIFICATION" | | 15303-3 | AS PER "MA SPECIFICATION" | | | 15303-3MA | 1.772 | 45.0 | 12.500 | 34.90 | 45.00 | 42.00 | 58.50 | 55.50 |
| M30 x 3 | 2 | 05304-3 | | | 15304-3 | | | | 15304-3MA | 2.362 | 60.0 | 17.125 | 36.10 | 60.00 | 57.00 | 73.50 | 70.50 |
| | 2.5 | 05305-3 | | | 15305-3 | | | | 15305-3MA | 2.953 | 75.0 | 21.875 | | 75.00 | 72.00 | 88.50 | 85.50 |
| | 3 | 05306-3 | | | 15306-3 | | | | 15306-3MA | 3.543 | 90.0 | 26.500 | | 90.00 | 87.00 | 103.50 | 100.50 |
| | 1 | 05302 | | 6.65 | 15302 | | | | | 1.181 | 30.0 | | | 30.00 | 26.50 | 45.75 | 42.25 |
| | 1.5 | 05303 | 34.85 | 10.75 | 15303 | | | | | 1.772 | 45.0 | | | 45.00 | 41.50 | 60.75 | 57.25 |
| M30 x 3.5 | 2 | 05304 | 35.35 | 14.89 | 15304 | | | | | 2.362 | 60.0 | | | 60.00 | 56.50 | 75.75 | 72.25 |
| | 2.5 | 05305 | | 18.95 | 15305 | | | | | 2.953 | 75.0 | | | 75.00 | 71.50 | 90.75 | 87.25 |
| | 3 | 05306 | | 23.13 | 15306 | | | | | 3.543 | 90.0 | | | 90.00 | 86.50 | 105.75 | 102.25 |
| | 1 | 07332 | | 13.93 | 17332 | | | | 17332MA | 1.299 | 33.0 | 13.625 | | 33.00 | 31.00 | 42.00 | 40.00 |
| | 1.5 | 07333 | 36.70 | 21.67 | 17333 | AS PER "MA SPECIFICATION" | | | 17333MA | 1.949 | 49.5 | 21.125 | 37.80 | 49.50 | 47.50 | 58.50 | 56.50 |
| M33 x 2 | 2 | 07334 | 37.15 | 39.42 | 17334 | | | Upon Request | 17334MA | 2.598 | 66.0 | 28.625 | 39.20 | 66.00 | 64.00 | 75.00 | 73.00 |
| | 2.5 | 07335 | | 37.03 | 17335 | | | | 17335MA | 3.248 | 82.5 | 36.000 | | 82.50 | 80.50 | 91.50 | 89.50 |
| | 3 | 07336 | | 44.78 | 17336 | | | | 17336MA | 3.898 | 99.0 | 43.500 | | 99.00 | 97.00 | 108.00 | 106.00 |

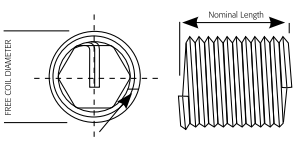
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

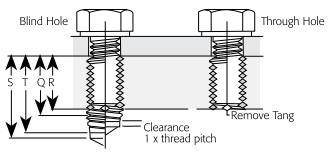


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| Thread Nominal | Nominal Length | Recoil Spec - Free Running Free Part Number | Free Coil Dia Min./Max. | Free Number of Coils | Recoil Spec - Screw Locking Free Part Number | Free Coil Dia Min. /Max. | Free Number of Coils | MA Spec Free Running Part Number | MA Spec Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 07332-3 | | 9.05 | 17332-3MA | | | | | 1.299 | 33.00 | 8.750 | | 33.00 | 30.00 | 46.50 | 43.50 |
| | 1.5 | 07333-3 | 37.65 | 14.25 | 17333-3MA | | | | | 1.949 | 49.50 | 13.875 | 38.10 | 49.50 | 46.50 | 63.00 | 60.00 |
| M33 x 3 | 2 | 07334-3 | 38.00 | | 17334-3MA | | | | | 2.598 | 66.00 | 19.000 | 39.50 | 66.00 | 63.00 | 79.50 | 76.50 |
| | 2.5 | 07335-3 | | | 17335-3MA | | | | | 3.248 | 82.50 | 24.125 | | 82.50 | 79.50 | 96.00 | 93.00 |
| | 3 | 07336-3 | | | 17336-3MA | | | | | 3.898 | 99.00 | 29.250 | | 99.00 | 96.00 | 112.50 | 109.50 |
| | 1 | 05332 | | 7.55 | 15332 | | | | | 1.299 | 33.0 | | | 33.00 | 29.50 | 48.75 | 45.25 |
| | 1.5 | 05333 | 38.20 | 11.95 | 15333 | | | | | 1.949 | 49.5 | | | 49.50 | 46.00 | 65.25 | 61.75 |
| M33 x 3.5 | 2 | 05334 | 38.55 | 16.40 | 15334 | | | | | 2.598 | 66.0 | | | 66.00 | 62.50 | 81.75 | 78.25 |
| | 2.5 | 05335 | | 21.15 | 15335 | | | | | 3.248 | 82.5 | | | 82.50 | 79.00 | 98.25 | 94.75 |
| | 3 | 05336 | | 25.30 | 15336 | | | | | 3.898 | 99.0 | | | 99.00 | 95.50 | 114.75 | 111.25 |
| | 1 | 08362 | | 22.15 | 18362 | | | | | 1.417 | 36.0 | | | 36.00 | 34.50 | 42.75 | 41.25 |
| | 1.5 | 08363 | 38.45 | 33.95 | 18363 | | | | | 2.126 | 54.0 | | | 54.00 | 52.50 | 60.75 | 59.25 |
| M36 x 1.5 | 2 | 08364 | 38.95 | 45.75 | 18364 | | | | | 2.835 | 72.0 | | | 72.00 | 70.50 | 78.75 | 77.25 |
| | 2.5 | 08365 | | 57.65 | 18365 | | | | | 3.543 | 90.0 | | | 90.00 | 88.50 | 96.75 | 95.25 |
| | 3 | 08366 | | 69.45 | 18366 | | | | | 4.252 | 108.0 | | | 108.00 | 106.50 | 114.75 | 113.25 |
| | 1 | 07362-2 | | 16.15 | 17362-2 | | | | 17362-2MA | 1.417 | 36.0 | 15.000 | | 36.00 | 34.00 | 45.00 | 43.00 |
| | 1.5 | 07363-2 | 39.52 | 25.05 | 17363-2 | AS PER "MA SPECIFICATION" | | | 17363-2MA | 2.126 | 54.0 | 23.250 | 41.00 | 54.00 | 52.00 | 63.00 | 61.00 |
| M36 x 2 | 2 | 07364-2 | 40.05 | 33.75 | 17364-2 | | | | 17364-2MA | 2.835 | 72.0 | 31.375 | 42.40 | 72.00 | 70.00 | 81.00 | 79.00 |
| | 2.5 | 07365-2 | | 42.65 | 17365-2 | | | | 17365-2MA | 3.543 | 90.0 | 39.500 | | 90.00 | 88.00 | 99.00 | 97.00 |
| | 3 | 07366-2 | | 51.45 | 17366-2 | | | | 17366-2MA | 4.252 | 108.0 | 47.750 | | 108.00 | 106.00 | 117.00 | 115.00 |
| | 1 | | | | | | | 07362 | | 1.417 | 36.0 | 9.750 | | 36.00 | 33.00 | 49.50 | 46.50 |
| | 1.5 | | | | | | | 07363 | | 2.126 | 54.0 | 15.250 | 41.30 | 54.00 | 51.00 | 67.50 | 64.50 |
| M36 x 3 | 2 | | | | Upon Request | | | 07364 | | 2.835 | 72.0 | 20.875 | 42.70 | 72.00 | 69.00 | 85.50 | 82.50 |
| | 2.5 | | | | | | | 07365 | | 3.543 | 90.0 | 26.500 | | 90.00 | 87.00 | 103.50 | 100.50 |
| | 3 | | | | | | | 07366 | | 4.252 | 108.0 | 32.000 | | 108.00 | 105.00 | 121.50 | 118.50 |
| | 1 | 05362 | | 7.00 | 15362 | | | | | 1.417 | 36.0 | | | 36.00 | 32.00 | 54.00 | 50.00 |
| | 1.5 | 05363 | 41.90 | 11.35 | 15363 | | | | | 2.126 | 54.0 | | | 54.00 | 50.00 | 72.00 | 68.00 |
| M36 x 4.0 | 2 | 05364 | 42.40 | 15.75 | 15364 | | | | | 2.835 | 72.0 | | | 72.00 | 68.00 | 90.00 | 86.00 |
| | 2.5 | 05365 | | 20.05 | 15365 | | | | | 3.543 | 90.0 | | | 90.00 | 86.00 | 108.00 | 104.00 |
| | 3 | 05366 | | 24.35 | 15366 | | | | | 4.252 | 108.0 | | | 108.00 | 104.00 | 126.00 | 122.00 |
| | 1 | 08392 | | 16.95 | 18392 | | | 08392MA | | 1.535 | 39.0 | 16.375 | | 39.00 | 37.00 | 48.00 | 46.00 |
| | 1.5 | 08393 | 42.40 | 26.25 | 18393 | AS PER "MA SPECIFICATION" | | 08393MA | | 2.303 | 58.5 | 25.250 | 44.30 | 58.50 | 56.50 | 67.50 | 65.50 |
| M39 x 2 | 2 | 08394 | 43.05 | 35.55 | 18394 | | | 08394MA | | 3.071 | 78.0 | 34.125 | 45.70 | 78.00 | 76.00 | 87.00 | 85.00 |
| | 2.5 | 08395 | | 44.85 | 18395 | | | 08395MA | | 3.839 | 97.5 | 43.000 | | 97.50 | 95.50 | 106.50 | 104.50 |
| | 3 | 08396 | | 54.15 | 18396 | | | 08396MA | | 4.606 | 117.0 | 51.87 | | 117.00 | 115.00 | 126.00 | 124.00 |
| | 1 | 07392 | | 10.95 | 17392 | | | | 17392MA | 1.535 | 39.0 | 10.750 | | 39.00 | 36.00 | 52.50 | 49.50 |
| | 1.5 | 07393 | 43.87 | 17.15 | 17393 | AS PER "MA SPECIFICATION" | | | 17393MA | 2.303 | 58.5 | 16.750 | 44.40 | 58.50 | 55.50 | 72.00 | 69.00 |
| M39 x 3 | 2 | 07394 | 44.30 | 23.35 | 17394 | | | Upon Request | 17394MA | 3.071 | 78.0 | 22.750 | 45.80 | 78.00 | 75.00 | 91.50 | 88.50 |
| | 2.5 | 07395 | | 29.55 | 17395 | | | | 17395MA | 3.839 | 97.5 | 28.875 | | 97.50 | 94.50 | 111.00 | 108.00 |
| | 3 | 07396 | | 35.75 | 17396 | | | | 17396MA | 4.606 | 117.0 | 34.875 | | 117.00 | 114.00 | 130.50 | 127.50 |
| | 1 | 05392 | | 7.80 | 15392 | | | | | 1.535 | 39.0 | | | 39.00 | 35.00 | 57.00 | 53.00 |
| | 1.5 | 05393 | 45.05 | 12.50 | 15393 | | | | | 2.303 | 58.5 | | | 58.50 | 54.50 | 76.50 | 72.50 |
| M39 x 4 | 2 | 05394 | 45.55 | 17.15 | 15394 | | | | | 3.071 | 78.0 | | | 78.00 | 74.00 | 96.00 | 92.00 |
| | 2.5 | 05395 | | 21.85 | 15395 | | | | | 3.839 | 97.5 | | | 97.50 | 93.50 | 115.50 | 111.50 |
| | 3 | 05396 | | 23.55 | 15396 | | | | | 4.606 | 117.0 | | | 117.00 | 113.00 | 135.00 | 131.00 |

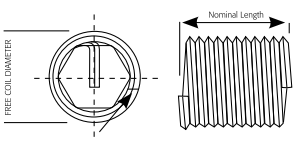
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

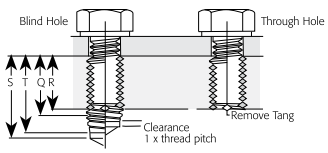


# Recoil Metric Insert Part Number Call-Out and Dimensional Data

| | | Recoil Spec - Free Running Free | | | Recoil Spec - Screw Locking Free | | | | | MA Spec | | | | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thread Nominal | Nominal Length | Part Number | Coil Dia Min./Max. | Number of Coils | Part Number | Coil Dia Min. /Max. | Number of Coils | Free Running Part Number | Screw Locking Part Number | Insert Length inch | Insert Length mm | Number of Coils | Free Coil Dia Min./Max. | Q | R | S | T |
| | 1 | 08422 | | 19.15 | | | | | | 1.654 | 42.0 | | | 42.00 | 40.00 | 51.00 | 49.00 |
| M42 x 2 | 1.5 | 08423 | 44.70 | 29.45 | | | | | | 2.480 | 63.0 | | | 63.00 | 61.00 | 72.00 | 70.00 |
| | 2 | 08424 | 45.50 | 39.85 | Upon Request | | | | | 3.307 | 84.0 | | | 84.00 | 82.00 | 93.00 | 91.00 |
| | 2.5 | 08425 | | 50.15 | | | | | | | | | | 105.00 | 103.00 | 114.00 | 112.00 |
| | 3 | 08426 | | 60.45 | | | | | | | | | | 126.0 | 124.0 | 135.0 | 133.0 |
| | 1 | 07422 | | 11.75 | | | | | | 1.654 | 42.0 | | | 42.00 | 39.00 | 55.50 | 52.50 |
| M42 x 3 | 1.5 | 07423 | 47.20 | 18.45 | | | | | | 2.480 | 63.0 | | | 63.00 | 60.00 | 76.50 | 73.50 |
| | 2 | 07424 | 47.85 | 26.05 | Upon Request | | | | | 3.307 | 84.0 | | | 84.00 | 81.00 | 97.50 | 94.50 |
| | 2.5 | 07425 | | 31.75 | | | | | | | | | | 105.0 | 102.0 | 118.50 | 115.50 |
| | 3 | 07426 | | 38.45 | | | | | | | | | | 126.0 | 123.0 | 139.50 | 136.50 |
| | 1 | 05422 | | 7.35 | | | | | | 1.654 | 42.0 | | | 42.00 | 37.50 | 62.25 | 57.75 |
| M42 x 4.5 | 1.5 | 05423 | 48.5 | 11.85 | | | | | | 2.480 | 63.0 | | | 63.00 | 58.50 | 83.25 | 78.75 |
| | 2 | 05424 | 49.00 | 16.35 | Upon Request | | | | | 3.307 | 84.0 | | | 84.00 | 79.50 | 104.25 | 99.75 |
| | 2.5 | 05425 | | 20.85 | | | | | | | | | | 105.0 | 100.5 | 125.50 | 120.75 |
| | 3 | 05426 | | 25.35 | | | | | | | | | | 126.0 | 121.50 | 146.25 | 141.75 |
| | 1 | 05422-4 | | 8.50 | | | | | | 1.654 | 42.0 | | | 42.00 | 38.00 | 60.00 | 56.00 |
| M42 x 4 | 1.5 | 05423-4 | 48.50 | 13.45 | | | | | | 2.480 | 63.0 | | | 63.00 | 59.00 | 81.00 | 77.00 |
| | 2 | 05424-4 | 49.00 | 18.65 | Upon Request | | | | | 3.307 | 84.0 | | | 84.00 | 80.00 | 102.00 | 98.00 |
| | 2.5 | 05425-4 | | 23.65 | | | | | | | | | | 105.00 | 101.00 | 123.00 | 119.00 |
| | 3 | 05426-4 | | 28.65 | | | | | | | | | | 126.00 | 122.00 | 144.00 | 140.00 |
| | 1 | 07452 | | 12.70 | | | | | | | | | | 45.00 | 42.00 | 58.50 | 55.50 |
| M45 x 3 | 1.5 | 07453 | 50.30 | 19.85 | | | | | | 2.657 | 67.5 | | | 67.50 | 64.50 | 81.00 | 78.00 |
| | 2 | 07454 | 51.00 | 26.95 | Upon Request | | | | | | | | | 90.00 | 87.00 | 103.50 | 100.50 |
| | 2.5 | 07455 | | 34.15 | | | | | | | | | | 112.50 | 109.50 | 126.00 | 123.00 |
| | 3 | 07456 | | 41.25 | | | | | | | | | | 135.00 | 132.00 | 148.50 | 145.50 |
| | 1 | 07482 | | 13.65 | | | | | | | | | | 48.00 | 45.00 | 61.50 | 58.50 |
| M48 x 3 | 1.5 | 07483 | 52.50 | 21.25 | | | | | | 2.835 | 72.0 | | | 72.00 | 69.00 | 85.50 | 82.50 |
| | 2 | 07484 | 53.5 | 28.85 | Upon Request | | | | | | | | | 96.00 | 93.00 | 109.50 | 106.50 |
| | 2.5 | 07485 | | 36.45 | | | | | | | | | | 120.00 | 117.00 | 133.50 | 130.50 |
| | 3 | 07486 | | 44.15 | | | | | | | | | | 144.00 | 141.00 | 157.50 | 154.50 |
| | 1 | 05482 | | | | | | | | | | | | 48.00 | 45.00 | 70.50 | 65.50 |
| M48 x 5 | 1.5 | 05483 | 55.47 | 12.15 | | | | | | 2.835 | 72.0 | | | 72.00 | 67.00 | 94.50 | 89.50 |
| | 2 | 05484 | 56.4 | 17.10 | Upon Request | | | | | | | | | 96.00 | 91.00 | 118.50 | 113.50 |
| | 2.5 | 05485 | | | | | | | | | | | | 120.00 | 115.00 | 142.50 | 137.50 |
| | 3 | 05486 | | | | | | | | | | | | 144.00 | 139.00 | 166.50 | 161.50 |
| M48 x 4 | 1.5 | 05483-4 | 53.80<br>54.30 | 15.56 | Upon Request | | | | | 2.835 | 72.0 | | | 72.00 | 68.00 | 90.00 | 86.00 |
| M52 x 5 | 1.5 | 05523 | 59.53 | 13.45 | Upon Request | | | | | 3.071 | 78.0 | | | 78.00 | 73.00 | 100.50 | 95.50 |
| | 2 | 05524 | 60.25 | 18.00 | | | | | | | | | | 104.0 | 99.00 | 126.50 | 121.50 |
| | 1 | 07522 | 57.37 | 15.00 | Upon Request | | | | | 3.071 | 78.0 | | | | | | |
| M52 x 3 | 1.5 | 07523 | 57.90 | 23.20 | | | | | | | | | | 78.00 | 75.00 | 91.50 | 88.50 |

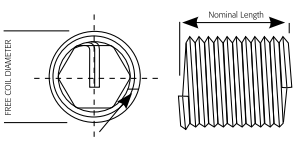
Drill Depth: The minimum drilling depth "S" allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole. "S" minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.



| Thread Nominal | Strip Feed Pt No. Free Running | Strip Feed Pt No. Locking | Strip Feed Pt No. MA Free Running | Strip Feed Pt No. MA Locking | No. of Inserts |
|---|---|---|---|---|---|
| **Magazined on Reels Dia 200** | | | | | |
| M2.2 x 0.45 | 05012SF | 15012SF | 15012MASF | | 1000 |
| | 05013SF | 15013SF | 15013MASF | | 1000 |
| | 05014SF | 15014SF | 15014MASF | | 1000 |
| M2.5 x 0.45 | 05252SF | 15252SF | 15252MASF | | 1000 |
| | 05253SF | 15253SF | 15253MASF | | 1000 |
| | 05254SF | 15254SF | 15254MASF | | 1000 |
| | 05255SF | 15255SF | 15255MASF | | 1000 |
| M2.6 x 0.45 | 05262SF | | | | 1000 |
| | 05263SF | | | | 1000 |
| | 05264SF | | | | 1000 |
| | 05265SF | | | | 1000 |
| M3 x 0.5 | 05032SF | 15032SF | 15032MASF | | 1000 |
| | 05033SF | 15033SF | 15033MASF | | 1000 |
| M3.5 x 0.6 | 05352SF | 15352SF | 15352MASF | | 1000 |
| | 05353SF | 15353SF | 15353MASF | | 1000 |
| | 05354SF | 15354SF | 15354MASF | | 1000 |
| M4 x 0.7 | 05042SF | 15042SF | 15042MASF | | 1000 |
| M6 x 1.0 | 05062SF | 15062SF | 15062MASF | | 500 |
| M12 x 1.25 | Upon Request | Upon Request | Upon Request | Upon Request | |
| M12 x 1.5 | Upon Request | Upon Request | Upon Request | Upon request | |
| M12 x 1.75 | 05122SF | 15122SF | | 15122MASF | 125 |
| | 05123SF | 15123SF | | 15123MASF | 125 |
| | 05124SF | 15124SF | | 15124MASF | 125 |

| Thread Nominal | Strip Feed Pt No. Free Running | Strip Feed Pt No. Locking | Strip Feed Pt No. MA Free Running | Strip Feed Pt No. MA Locking | No. of Inserts |
|---|---|---|---|---|---|
| **Magazined on Reels Dia 290** | | | | | |
| M3 x 0.5 | 05034SF | 15034SF | | 15034MASF | 1000 |
| | 05035SF | 15035SF | | 15035MASF | 1000 |
| M4 x 0.7 | 05043SF | 15043SF | | 15043MASF | 1000 |
| | 05044SF | 15044SF | | 15044MASF | 1000 |
| | 05045SF | 15045SF | | 15045MASF | 500 |
| | 05046SF | 15046SF | | 15046MASF | 500 |
| M5 x 0.8 | 05052SF | 15052SF | | 15052MASF | 1000 |
| | 05053SF | 15053SF | | 15053MASF | 1000 |
| | 05054SF | 15054SF | | 15054MASF | 500 |
| | 05055SF | 15055SF | | 15055MASF | 600 |
| M6 x 1 | 05063SF | 15063SF | | 15064MASF | 500 |
| | 05064SF | 15064SF | | 15063MASF | 500 |
| | 05065SF | 15065SF | | 15065MASF | 500 |
| M8 x 1 | 07082SF | 17082SF | | 17082MASF | 500 |
| | 07083SF | 17083SF | | 17083MASF | 500 |
| | 07084SF | 17084SF | | 17084MASF5 | 500 |

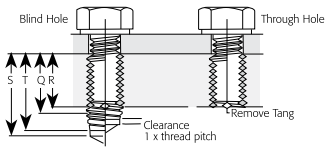
| Thread Nominal | Strip Feed Pt No. Free Running | Strip Feed Pt No. Locking | Strip Feed Pt No. MA Free Running | Strip Feed Pt No. MA Locking | No. of Inserts |
|---|---|---|---|---|---|
| **Magazined on Reels Dia 385** | | | | | |
| M8 x 0.75 | 08082SF | 18082SF | | | 500 |
| | 08083SF | 18083SF | | | 500 |
| M8 x 1.25 | 05083SF | 15083SF | | 15083MASF | 500 |
| | 05084SF | 15084SF | | 15084MASF | 500 |
| M9 x 1 | | Upon Request | | | |
| M9 x 1.25 | | Upon Request | | | |
| M10 x 1 | 08102SF | 18102SF | | 18102MASF | 500 |
| | 08103SF | 18103SF | | 18103MASF | 500 |
| | 08104SF | 18104SF | | 18104MASF | 500 |
| M10 x 1.25 | 07102SF | 17102SF | | 17102MASF | 500 |
| | 07103SF | 17103SF | | 17103MASF | 500 |
| | 07104SF | 17104SF | | 17104MASF | 500 |
| M10 x 1.5 | 05102SF | 15102SF | | 15102MASF | 500 |
| | 05103SF | 15103SF | | 15103MASF | 500 |
| | 05104SF | 15104SF | | 15104MASF | 500 |
| M11 x 1 | | Upon Request | | | |
| M11 x 1.25 | | Upon Request | | | |
| M11 x 1.5 | | Upon Request | | | |

# Recoil Inch Insert Part Number Call-Out and Dimensional Data

| Thread Nominal UNC | Nominal Length Dia | Free Running Part Number | Screw Locking Part Number | Insert Length inches | Insert Length mm | Number of Coils | Free Coil Dia Min. Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 03522 | 13522 | 0.086 | 2.2 | 3.000 | | 0.086 | 0.068 | 0.166 | 0.148 |
| | 1.5D | 03523 | 13523 | 0.129 | 3.3 | 5.250 | .110 | 0.129 | 0.111 | 0.209 | 0.191 |
| #2 - 56 | 2D | 03524 | 13524 | 0.172 | 4.4 | 7.375 | .119 | 0.172 | 0.154 | 0.252 | 0.234 |
| | 2.5D | 03525 | 13525 | 0.215 | 5.5 | 9.625 | | 0.215 | 0.197 | 0.295 | 0.277 |
| | 3D | 03526 | 13526 | 0.258 | 6.6 | 11.875 | | 0.258 | 0.240 | 0.338 | 0.320 |
| | 1D | 03532 | 13532 | 0.099 | 2.5 | 2.875 | | 0.099 | 0.078 | 0.193 | 0.172 |
| | 1.5D | 03533 | 13533 | 0.149 | 3.8 | 5.000 | .128 | 0.148 | 0.127 | 0.242 | 0.221 |
| #3 - 48 | 2D | 03534 | 13534 | 0.198 | 5 | 7.250 | .139 | 0.198 | 0.177 | 0.292 | 0.271 |
| | 2.5D | 03535 | 13535 | 0.248 | 6.3 | 9.375 | | 0.248 | 0.227 | 0.342 | 0.321 |
| | 3D | 03536 | 13536 | 0.297 | 7.5 | 11.500 | | 0.297 | 0.276 | 0.391 | 0.370 |
| | 1D | 03542 | 13542 | 0.112 | 2.8 | 2.750 | | 0.112 | 0.087 | 0.224 | 0.199 |
| | 1.5D | 03543 | 13543 | 0.168 | 4.3 | 4.750 | .144 | 0.168 | 0.143 | 0.28 | 0.255 |
| #4 - 40 | 2D | 03544 | 13544 | 0.224 | 5.7 | 6.750 | .159 | 0.224 | 0.199 | 0.336 | 0.311 |
| | 2.5D | 03545 | 13545 | 0.280 | 7.1 | 8.875 | | 0.280 | 0.255 | 0.392 | 0.367 |
| | 3D | 03546 | 13546 | 0.336 | 8.5 | 10.875 | | 0.336 | 0.311 | 0.448 | 0.423 |
| | 1D | 03552 | 13552 | 0.112 | 2.8 | 3.250 | | 0.125 | 0.100 | 0.237 | 0.212 |
| | 1.5D | 03553 | 13553 | 0.168 | 4.3 | 5.500 | .158 | 0.187 | 0.162 | 0.300 | 0.275 |
| #5 - 40 | 2D | 03554 | 13554 | 0.224 | 5.7 | 7.750 | .173 | 0.250 | 0.225 | 0.362 | 0.337 |
| | 2.5D | 03555 | 13555 | 0.280 | 7.1 | 10.000 | | 0.312 | 0.287 | 0.425 | 0.400 |
| | 3D | 03556 | 13556 | 0.336 | 8.5 | 12.250 | | 0.375 | 0.350 | 0.487 | 0.462 |
| | 1D | 03562 | 13562 | 0.138 | 3.5 | 2.750 | | 0.138 | 0.107 | 0.279 | 0.247 |
| | 1.5D | 03563 | 13563 | 0.207 | 5.3 | 4.750 | .178 | 0.207 | 0.176 | 0.348 | 0.316 |
| #6 - 32 | 2D | 03564 | 13564 | 0.276 | 7 | 6.875 | .193 | 0.276 | 0.245 | 0.417 | 0.385 |
| | 2.5D | 03565 | 13565 | 0.345 | 8.8 | 8.875 | | 0.345 | 0.314 | 0.486 | 0.454 |
| | 3D | 03566 | 13566 | 0.414 | 10.5 | 10.750 | | 0.414 | 0.383 | 0.555 | 0.523 |
| | 1D | 03582 | 13582 | 0.164 | 4.2 | 3.500 | | 0.164 | 0.133 | 0.305 | 0.273 |
| | 1.5D | 03583 | 13583 | 0.246 | 6.2 | 6.000 | .205 | 0.246 | 0.215 | 0.387 | 0.355 |
| #8 - 32 | 2D | 03584 | 13584 | 0.328 | 8.3 | 8.375 | .220 | 0.328 | 0.297 | 0.469 | 0.437 |
| | 2.5D | 03585 | 13585 | 0.410 | 10.4 | 10.750 | | 0.410 | 0.379 | 0.551 | 0.519 |
| | 3D | 03586 | 13586 | 0.492 | 12.5 | 13.250 | | 0.492 | 0.461 | 0.633 | 0.601 |
| | 1D | 03602 | 13602 | 0.190 | 4.8 | 2.875 | | 0.190 | 0.148 | 0.377 | 0.336 |
| | 1.5D | 03603 | 13603 | 0.285 | 7.2 | 5.000 | .244 | 0.285 | 0.243 | 0.472 | 0.431 |
| #10 - 24 | 2D | 03604 | 13604 | 0.380 | 9.7 | 7.125 | .259 | 0.380 | 0.338 | 0.567 | 0.526 |
| | 2.5D | 03605 | 13605 | 0.475 | 12.1 | 9.250 | | 0.475 | 0.433 | 0.662 | 0.621 |
| | 3D | 03606 | 13606 | 0.570 | 14.5 | 11.375 | | 0.570 | 0.528 | 0.757 | 0.716 |
| | 1D | 03622 | 13622 | 0.216 | 5.5 | 3.500 | | 0.216 | 0.174 | 0.404 | 0.362 |
| | 1.5D | 03623 | 13623 | 0.324 | 8.2 | 6.000 | .270 | 0.324 | 0.282 | 0.512 | 0.470 |
| #12 - 24 | 2D | 03624 | 13624 | 0.432 | 11 | 8.375 | .285 | 0.432 | 0.390 | 0.620 | 0.578 |
| | 2.5D | 03625 | 13625 | 0.540 | 13.7 | 10.625 | | 0.540 | 0.498 | 0.727 | 0.686 |
| | 3D | 03626 | 13626 | 0.648 | 16.5 | 13.125 | | 0.648 | 0.606 | 0.836 | 0.794 |
| | 1D | 03042 | 13042 | 0.250 | 6.4 | 3.375 | | 0.250 | 0.200 | 0.475 | 0.425 |
| | 1.5D | 03043 | 13043 | 0.375 | 9.5 | 5.750 | .310 | 0.375 | 0.325 | 0.600 | 0.550 |
| 1/4-20 | 2D | 03044 | 13044 | 0.500 | 12.7 | 8.000 | .330 | 0.500 | 0.450 | 0.725 | 0.675 |
| | 2.5D | 03045 | 13045 | 0.625 | 15.9 | 10.375 | | 0.625 | 0.575 | 0.850 | 0.800 |
| | 3D | 03046 | 13046 | 0.750 | 19.1 | 12.750 | | 0.750 | 0.700 | 0.975 | 0.925 |

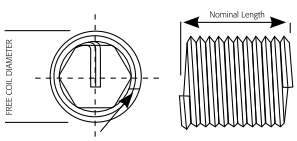
Drill Depth: The minimum drilling depth "S" allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole. "S" minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

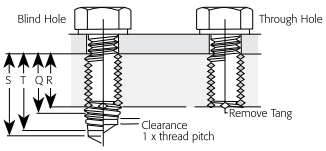


# Recoil Inch Insert Part Number Call-Out and Dimensional Data

| Thread Nominal UNC | Nominal Length Dia | Free Running Part Number | Screw Locking Part Number | Insert Length inches | Insert Length mm | Number of Coils | Free Coil Dia Min. Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 03052 | 13052 | 0.313 | 8 | 4.000 | | 0.312 | 0.257 | 0.562 | 0.507 |
| | 1.5D | 03053 | 13053 | 0.470 | 11.9 | 6.625 | .380 | 0.469 | 0.413 | 0.719 | 0.663 |
| 5/16-18 | 2D | 03054 | 13054 | 0.626 | 15.9 | 9.250 | .400 | 0.625 | 0.569 | 0.875 | 0.819 |
| | 2.5D | 03055 | 13055 | 0.783 | 19.9 | 11.875 | | 0.781 | 0.726 | 1.031 | 0.976 |
| | 3D | 03056 | 13056 | 0.939 | 23.9 | 14.625 | | 0.937 | 0.882 | 1.187 | 1.132 |
| | 1D | 03062 | 13062 | 0.375 | 9.5 | 4.375 | | 0.375 | 0.312 | 0.656 | 0.594 |
| | 1.5D | 03063 | 13063 | 0.563 | 14.3 | 7.250 | .452 | 0.562 | 0.500 | 0.844 | 0.781 |
| 3/8-16 | 2D | 03064 | 13064 | 0.750 | 19.1 | 10.000 | .472 | 0.750 | 0.687 | 1.031 | 0.969 |
| | 2.5D | 03065 | 13065 | 0.938 | 23.8 | 12.875 | | 0.937 | 0.875 | 1.219 | 1.156 |
| | 3D | 03066 | 13066 | 1.125 | 28.6 | 15.750 | | 1.125 | 1.062 | 1.406 | 1.344 |
| | 1D | 03072 | 13072 | 0.438 | 11.1 | 4.500 | | 0.437 | 0.366 | 0.759 | 0.687 |
| | 1.5D | 03073 | 13073 | 0.657 | 16.7 | 7.375 | .526 | 0.656 | 0.585 | 0.978 | 0.906 |
| 7/16-14 | 2D | 03074 | 13074 | 0.876 | 22.3 | 10.250 | .551 | 0.875 | 0.804 | 1.196 | 1.125 |
| | 2.5D | 03075 | 13075 | 1.095 | 27.8 | 13.125 | | 1.094 | 1.022 | 1.415 | 1.343 |
| | 3D | 03076 | 13076 | 1.314 | 33.4 | 16.125 | | 1.312 | 1.241 | 1.634 | 1.562 |
| | 1D | 03082 | 13082 | 0.500 | 12.7 | 4.875 | | 0.500 | 0.423 | 0.846 | 0.769 |
| | 1.5D | 03083 | 13083 | 0.750 | 19.1 | 7.875 | .597 | 0.750 | 0.673 | 1.096 | 1.019 |
| 1/2-13 | 2D | 03084 | 13084 | 1.000 | 25.4 | 11.000 | .622 | 1.000 | 0.923 | 1.346 | 1.269 |
| | 2.5D | 03085 | 13085 | 1.250 | 31.8 | 14.125 | | 1.250 | 1.173 | 1.596 | 1.519 |
| | 3D | 03086 | 13086 | 1.500 | 38.1 | 17.125 | | 1.500 | 1.423 | 1.846 | 1.769 |
| | 1D | 03092 | 13092 | 0.563 | 14.3 | 5.125 | | 0.562 | 0.479 | 0.937 | 0.854 |
| | 1.5D | 03093 | 13093 | 0.845 | 21.5 | 8.250 | .669 | 0.844 | 0.760 | 1.219 | 1.135 |
| 9/16-12 | 2D | 03094 | 13094 | 1.126 | 28.6 | 11.500 | .694 | 1.125 | 1.042 | 1.500 | 1.417 |
| | 2.5D | 03095 | 13095 | 1.408 | 35.8 | 14.750 | | 1.406 | 1.323 | 1.781 | 1.698 |
| | 3D | 03096 | 13096 | 1.689 | 42.9 | 17.125 | | 1.687 | 1.604 | 2.062 | 1.979 |
| | 1D | 03102 | 13102 | 0.625 | 15.9 | 5.250 | | 0.625 | 0.534 | 1.034 | 0.943 |
| | 1.5D | 03103 | 13103 | 0.938 | 23.8 | 8.500 | .742 | 0.937 | 0.846 | 1.347 | 1.256 |
| 5/8-11 | 2D | 03104 | 13104 | 1.250 | 31.8 | 11.750 | .767 | 1.250 | 1.159 | 1.659 | 1.568 |
| | 2.5D | 03105 | 13105 | 1.563 | 39.7 | 15.000 | | 1.562 | 1.471 | 1.972 | 1.881 |
| | 3D | 03106 | 13106 | 1.875 | 47.6 | 18.375 | | 1.875 | 1.784 | 2.284 | 2.193 |
| | 1D | 03112 | Upon Request | 0.688 | 17.5 | 5.75 | | 17.46 | 15.15 | 27.85 | 25.54 |
| | 1.5D | 03113 | Upon Request | 1.032 | 26.2 | 9.80 | .809 | 26.19 | 23.88 | 36.58 | 34.28 |
| 11/16-11 | 2D | 03114 | Upon Request | 1.376 | 35 | 12.95 | .826 | 34.93 | 32.62 | 45.32 | 43.01 |
| | 2.5D | 03115 | Upon Request | 1.720 | 43.7 | 16.55 | | 43.66 | 41.35 | 54.05 | 51.74 |
| | 3D | 03116 | Upon Request | 2.064 | 52.4 | 20.15 | | 52.39 | 50.08 | 62.78 | 60.47 |
| | 1D | 03122 | 13122 | 0.750 | 19.1 | 5.875 | | 0.750 | 0.650 | 1.200 | 1.100 |
| | 1.5D | 03123 | 13123 | 1.125 | 28.6 | 9.375 | .881 | 1.125 | 1.025 | 1.575 | 1.475 |
| 3/4-10 | 2D | 03124 | 13124 | 1.500 | 38.1 | 13.000 | .906 | 1.500 | 1.400 | 1.950 | 1.850 |
| | 2.5D | 03125 | 13125 | 1.875 | 47.6 | 16.500 | | 1.875 | 1.775 | 2.325 | 2.225 |
| | 3D | 03126 | 13126 | 2.250 | 57.2 | 20.125 | | 2.250 | 2.150 | 2.700 | 2.600 |
| | 1D | 03142 | 13142 | 0.875 | 22.2 | 6.250 | | 0.875 | 0.764 | 1.375 | 1.264 |
| | 1.5D | 03143 | 13143 | 1.313 | 33.3 | 10.000 | 1.022 | 1.312 | 1.201 | 1.812 | 1.701 |
| 7/8-9 | 2D | 03144 | 13144 | 1.750 | 44.5 | 13.750 | 1.052 | 1.750 | 1.639 | 2.250 | 2.139 |
| | 2.5D | 03145 | 13145 | 2.188 | 55.6 | 17.500 | | 2.187 | 2.076 | 2.687 | 2.576 |
| | 3D | 03146 | 13146 | 2.625 | 66.7 | 21.250 | | 2.625 | 2.514 | 3.125 | 3.014 |

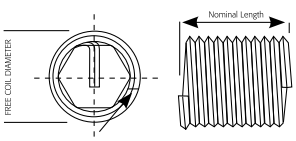
Drill Depth: The minimum drilling depth "S" allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole. "S" minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.



# Recoil Inch Insert Part Number Call-Out and Dimensional Data

| Thread Nominal UNC | Nominal Length Dia | Free Running Part Number | Screw Locking Part Number | Insert Length inches | Insert Length mm | Number of Coils | Free Coil Dia Min. Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 03162 | 13162 | 1.000 | 25.4 | 6.375 | | 1.000 | 0.875 | 1.563 | 1.437 |
| | 1.5D | 03163 | 13163 | 1.500 | 38.1 | 10.125 | 1.166 | 1.500 | 1.375 | 2.062 | 1.937 |
| 1" - 8 | 2D | 03164 | 13164 | 2.000 | 50.8 | 14.000 | 1.196 | 2.000 | 1.875 | 2.562 | 2.437 |
| | 2.5D | 03165 | 13165 | 2.500 | 63.5 | 17.750 | | 2.500 | 2.375 | 3.062 | 2.937 |
| | 3D | 03166 | 13166 | 3.000 | 76.2 | 21.625 | | 3.000 | 2.875 | 3.562 | 3.437 |
| | 1D | 03182 | 13182 | 1.125 | 28.6 | 6.125 | | 1.125 | 0.982 | 1.768 | 1.625 |
| | 1.5D | 03183 | 13183 | 1.688 | 42.9 | 9.875 | 1.315 | 1.687 | 1.545 | 2.330 | 2.187 |
| 1 1/8 - 7 | 2D | 03184 | 13184 | 2.250 | 57.2 | 13.625 | 1.355 | 2.250 | 2.107 | 2.893 | 2.750 |
| | 2.5D | 03185 | 13185 | 2.813 | 71.4 | 17.500 | | 2.812 | 2.670 | 3.455 | 3.312 |
| | 3D | 03186 | 13186 | 3.375 | 85.7 | 21.250 | | 3.375 | 3.232 | 4.018 | 3.875 |
| | 1D | 03202 | 13202 | 1.250 | 31.8 | 7.000 | | 1.250 | 1.107 | 1.893 | 1.750 |
| | 1.5D | 03203 | 13203 | 1.875 | 47.6 | 11.250 | 1.443 | 1.875 | 1.732 | 2.518 | 2.375 |
| 1 1/4 - 7 | 2D | 03204 | 13204 | 2.500 | 63.5 | 15.375 | 1.483 | 2.500 | 2.357 | 3.143 | 3.000 |
| | 2.5D | 03205 | 13205 | 3.125 | 79.4 | 19.500 | | 3.125 | 2.982 | 3.768 | 3.625 |
| | 3D | 03206 | 13206 | 3.750 | 95.3 | 23.750 | | 3.750 | 3.607 | 4.393 | 4.250 |
| | 1D | 03222 | 13222 | 1.375 | 34.9 | 6.500 | | 1.375 | 1.208 | 2.125 | 1.958 |
| | 1.5D | 03223 | 13223 | 2.063 | 52.4 | 10.500 | 1.598 | 2.062 | 1.896 | 2.812 | 2.646 |
| 1 3/8 - 6 | 2D | 03224 | 13224 | 2.750 | 69.9 | 14.375 | 1.643 | 2.750 | 2.583 | 3.500 | 3.333 |
| | 2.5D | 03225 | 13225 | 3.438 | 87.3 | 18.375 | | 3.437 | 3.270 | 4.187 | 4.021 |
| | 3D | 03226 | 13226 | 4.125 | 104.8 | 22.250 | | 4.125 | 3.958 | 4.875 | 4.708 |
| | 1D | 03242 | 13242 | 1.500 | 38.1 | 7.250 | | 1.500 | 1.333 | 2.250 | 1.083 |
| | 1.5D | 03243 | 13243 | 2.250 | 57.2 | 11.500 | 1.727 | 2.250 | 2.083 | 3.000 | 2.833 |
| 1 1/2 - 6 | 2D | 03244 | 13244 | 3.000 | 76.2 | 15.875 | 1.772 | 3.000 | 2.833 | 3.750 | 3.583 |
| | 2.5D | 03245 | 13245 | 3.750 | 95.3 | 20.125 | | 3.750 | 3.583 | 4.500 | 4.333 |
| | 3D | 03246 | 13246 | 4.500 | 114.3 | 24.500 | | 4.500 | 4.333 | 5.250 | 5.083 |

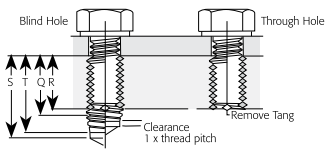
| Thread Nominal UNF | Nominal Length Dia | Recoil Spec Free Running Part Number | Recoil Spec Free Coil Dia Min/Max | Number of coils | MS Spec Free Running Part Number | MS Spec Screw Locking Part Number | Insert Length Inches | Insert Length mm | Number of coils | FreeCoil Dia Min/Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW 'D' Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 04532 | | 3.60 | 04532MS | 14532 | 0.099 | 2.5 | 3.375 | | 0.099 | 0.081 | 0.179 | 0.161 |
| | 1.5D | 04533 | | 6.05 | 04533MS | 14533 | 0.149 | 3.8 | 5.625 | .131 | 0.148 | 0.130 | 0.228 | 0.210 |
| #3 - 56 | 2D | 04534 | 3.15 - 3.25 | 8.65 | 04534MS | 14534 | 0.198 | 5 | 8.000 | .146 | 0.198 | 0.180 | 0.278 | 0.260 |
| | 2.5D | 04535 | | 11.25 | 04535MS | | 0.248 | 6.3 | 10.375 | | 0.248 | 0.230 | 0.328 | 0.310 |
| | 3D | 04536 | | 13.75 | 04536MS | | 0.297 | 7.5 | 12.625 | | 0.297 | 0.279 | 0.377 | 0.359 |
| | 1D | 04542 | | 3.55 | 04542MS | 14542 | 0.112 | 2.8 | 3.375 | | 0.112 | 0.091 | 0.206 | 0.185 |
| | 1.5D | 04543 | | 5.95 | 04543MS | 14543 | 0.168 | 4.3 | 5.625 | .147 | 0.168 | 0.147 | 0.262 | 0.241 |
| #4 - 48 | 2D | 04544 | 3.57 - 3.67 | 8.25 | 04544MS | 14544 | 0.224 | 5.7 | 7.875 | .162 | 0.224 | 0.203 | 0.318 | 0.297 |
| | 2.5D | 04545 | | 10.95 | 04545MS | | 0.280 | 7.1 | 10.250 | | 0.280 | 0.259 | 0.374 | 0.353 |
| | 3D | 04546 | | 13.35 | 04546MS | | 0.336 | 8.5 | 12.500 | | 0.336 | 0.315 | 0.430 | 0.409 |
| | 1D | 04562 | | 3.55 | 04562MS | 14562 | 0.138 | 3.5 | 3.500 | | 0.138 | 0.113 | 0.250 | 0.225 |
| | 1.5D | 04563 | | 6.15 | 04563MS | 14563 | 0.207 | 5.3 | 6.000 | .173 | 0.207 | 0.182 | 0.319 | 0.294 |
| #6 - 40 | 2D | 04564 | 4.38 - 4.50 | 8.65 | 04564MS | 14564 | 0.276 | 7 | 8.375 | .193 | 0.276 | 0.251 | 0.388 | 0.363 |
| | 2.5D | 04565 | | 11.15 | 04565MS | | 0.345 | 8.8 | 10.750 | | 0.345 | 0.320 | 0.457 | 0.432 |
| | 3D | 04566 | | 13.75 | 04566MS | | 0.414 | 10.5 | 13.250 | | 0.414 | 0.389 | 0.526 | 0.501 |

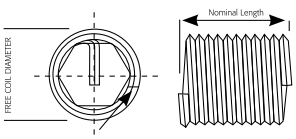
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.



# Recoil Inch Insert Part Number Call-Out and Dimensional Data

| Thread Nominal UNF | Nominal Length Dia | Part Number | Recoil Spec Free Running Free Coil Dia Min/Max | Number of coils | MS spec Free running Part Number | MS spec Screw Locking Part Number | Insert Length Inches | Insert Length mm | Number of coils | FreeCoil Dia Min/Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW 'D' Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 04582 | | 3.85 | 04582MS | 14582 | 0.164 | 4.2 | 3.875 | | 0.164 | 0.136 | 0.289 | 0.261 |
| | 1.5D | 04583 | | 6.85 | 04583MS | 14583 | 0.246 | 6.2 | 6.500 | .204 | 0.246 | 0.218 | 0.371 | 0.343 |
| #8 - 36 | 2D | 04584 | 5.14 - 5.28 | 9.35 | 04584MS | 14584 | 0.328 | 8.3 | 9.125 | .224 | 0.328 | 0.300 | 0.453 | 0.425 |
| | 2.5D | 04585 | | 11.95 | 04585MS | | 0.410 | 10.4 | 11.625 | | 0.410 | 0.382 | 0.535 | 0.507 |
| | 3D | 04586 | | 14.65 | 04586MS | | 0.492 | 12.5 | 14.250 | | 0.492 | 0.464 | 0.617 | 0.589 |
| | 1D | 04602 | | 4.25 | 04602MS | 14602 | 0.190 | 4.8 | 4.125 | | 0.190 | 0.159 | 0.331 | 0.299 |
| | 1.5D | 04603 | | 7.05 | 04603MS | 14603 | 0.285 | 7.2 | 6.875 | .236 | 0.285 | 0.254 | 0.426 | 0.394 |
| #10 - 32 | 2D | 04604 | 5.85 - 6.00 | 9.95 | 04604MS | 14604 | 0.380 | 9.7 | 9.500 | .256 | 0.380 | 0.349 | 0.521 | 0.489 |
| | 2.5D | 04605 | | 12.25 | 04605MS | 14605 | 0.475 | 12.1 | 12.000 | | 0.475 | 0.444 | 0.616 | 0.584 |
| | 3D | 04606 | | 15.65 | 04606MS | 14606 | 0.570 | 14.5 | 14.875 | | 0.570 | 0.539 | 0.711 | 0.679 |
| | 1D | | | | 04622MS | | 0.216 | 5.5 | 4.25 | | 5.49 | 4.58 | 9.57 | 8.66 |
| | 1.5D | | | | 04623MS | | 0.324 | 8.2 | 7.30 | .265 | 8.23 | 7.32 | 12.31 | 11.40 |
| #12 - 28 | 2D | | | | 04624MS | Upon Req. | 0.432 | 11 | 9.85 | .275 | 10.97 | 10.07 | 15.05 | 14.15 |
| | 2.5D | | | | | | 0.540 | 13.7 | | | | | | |
| | 3D | | | | | | 0.648 | 16.5 | | | | | | |
| | 1D | 04042 | | 5.05 | 04042MS | 14042 | 0.250 | 6.4 | 5.000 | | 0.250 | 0.214 | 0.411 | 0.375 |
| | 1.5D | 04043 | | 8.45 | 04043MS | 14043 | 0.375 | 9.5 | 8.250 | .306 | 0.375 | 0.339 | 0.536 | 0.500 |
| 1/4-28 | 2D | 04044 | 7.60-7.80 | 11.65 | 04044MS | 14044 | 0.500 | 12.7 | 11.375 | .326 | 0.500 | 0.464 | 0.661 | 0.625 |
| | 2.5D | 04045 | | 14.95 | 04045MS | 14045 | 0.625 | 15.9 | 14.500 | | 0.625 | 0.589 | 0.786 | 0.750 |
| | 3D | 04046 | | 18.15 | 04046MS | 14046 | 0.750 | 19.1 | 17.625 | | 0.750 | 0.714 | 0.911 | 0.875 |
| | 1D | 04052 | | 5.55 | 04052MS | 14052 | 0.313 | 8 | 5.500 | | 0.312 | 0.271 | 0.500 | 0.458 |
| | 1.5D | 04053 | | 9.05 | 04053MS | 14053 | 0.470 | 11.9 | 8.875 | .380 | 0.469 | 0.428 | 0.656 | 0.615 |
| 5/16-24 | 2D | 04054 | 9.45-9.65 | 12.55 | 04054MS | 14054 | 0.626 | 15.9 | 12.250 | .400 | 0.625 | 0.583 | 0.812 | 0.771 |
| | 2.5D | 04055 | | 16.15 | 04055MS | 14055 | 0.783 | 19.9 | 15.625 | | 0.781 | 0.740 | 0.969 | 0.927 |
| | 3D | 04056 | | 19.65 | 04056MS | 14056 | 0.939 | 23.9 | 19.000 | | 0.937 | 0.896 | 1.125 | 1.083 |
| | 1D | 04062 | | 7.05 | 04062MS | 14062 | 0.375 | 9.5 | 6.875 | | 0.375 | 0.333 | 0.562 | 0.521 |
| | 1.5D | 04063 | | 11.25 | 04063MS | 14063 | 0.563 | 14.3 | 11.000 | .448 | 0.562 | 0.521 | 0.750 | 0.708 |
| 3/8-24 | 2D | 04064 | 11.00-11.20 | 15.45 | 04064MS | 14064 | 0.750 | 19.1 | 15.000 | .468 | 0.750 | 0.708 | 0.937 | 0.896 |
| | 2.5D | 04065 | | 19.75 | 04065MS | 14065 | 0.938 | 23.8 | 19.125 | | 0.937 | 0.896 | 1.125 | 1.083 |
| | 3D | 04066 | | 23.95 | 04066MS | 14066 | 1.125 | 28.6 | 23.125 | | 1.125 | 1.083 | 1.312 | 1.271 |
| | 1D | 04072 | | 6.85 | 04072MS | 14072 | 0.438 | 11.1 | 6.625 | | 0.437 | 0.387 | 0.662 | 0.612 |
| | 1.5D | 04073 | | 11.05 | 04073MS | 14073 | 0.657 | 16.7 | 10.625 | .524 | 0.656 | 0.606 | 0.881 | 0.831 |
| 7/16-20 | 2D | 04074 | 12.96-13.20 | 15.25 | 04074MS | 14074 | 0.876 | 22.3 | 14.625 | .549 | 0.875 | 0.825 | 1.100 | 1.050 |
| | 2.5D | 04075 | | 19.75 | 04075MS | 14075 | 1.095 | 27.8 | 18.500 | | 1.094 | 1.044 | 1.319 | 1.269 |
| | 3D | 04076 | | 23.45 | 04076MS | 14076 | 1.314 | 33.4 | 22.500 | | 1.312 | 1.262 | 1.537 | 1.488 |
| | 1D | 04082 | | 8.05 | 04082MS | 14082 | 0.500 | 12.7 | 7.875 | | 0.500 | 0.450 | 0.725 | 0.675 |
| | 1.5D | 04083 | | 12.75 | 04083MS | 14083 | 0.750 | 19.1 | 12.375 | .592 | 0.750 | 0.700 | 0.975 | 0.925 |
| 1/2-20 | 2D | 04084 | 14.60-14.90 | 17.45 | 04084MS | 14084 | 1.000 | 25.4 | 16.875 | .617 | 1.000 | 0.950 | 1.225 | 1.175 |
| | 2.5D | 04085 | | 22.05 | 04085MS | 14085 | 1.250 | 31.8 | 21.375 | | 1.250 | 1.200 | 1.475 | 1.425 |
| | 3D | 04086 | | 26.75 | 04086MS | 14086 | 1.500 | 38.1 | 25.875 | | 1.500 | 1.450 | 1.725 | 1.675 |
| | 1D | 04092 | | 8.15 | 04092MS | 14092 | 0.563 | 14.3 | 8.000 | | 0.562 | 0.507 | 0.812 | 0.757 |
| | 1.5D | 04093 | | 12.85 | 04093MS | 14093 | 0.845 | 21.5 | 12.500 | .666 | 0.844 | 0.788 | 1.094 | 1.038 |
| 9/16-18 | 2D | 04094 | 16.38-16.68 | 17.65 | 04094MS | 14094 | 1.126 | 28.6 | 17.125 | .691 | 1.125 | 1.068 | 1.375 | 1.319 |
| | 2.5D | 04095 | | 22.45 | 04095MS | 14095 | 1.408 | 35.8 | 21.750 | | 1.406 | 1.351 | 1.656 | 1.601 |
| | 3D | 04096 | | 27.15 | 04096MS | 14096 | 1.689 | 42.9 | 26.250 | | 1.687 | 1.632 | 1.937 | 1.882 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
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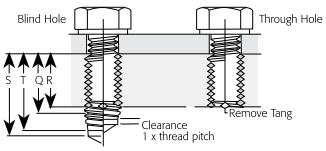


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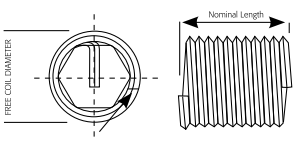
Note: Dimensions shown are for MA parts only.

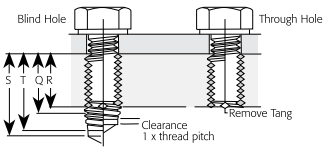


# Recoil Inch Insert Part Number Call-Out and Dimensional Data

| Thread Nominal UNF | Nominal Length Dia | Recoil Spec Free Running Part Number | Free Coil Dia Min/Max | Number of coils | MS spec Free running Part Number | Screw Locking Part Number | Insert Length Inches | Insert Length mm | Number of coils | FreeCoil Dia Min/Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW 'D' Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 04102 | | 9.25 | 04102MS | 14102 | 0.625 | 15.9 | 9.000 | | 0.625 | 0.569 | 0.875 | 0.819 |
| | 1.5D | 04103 | | 14.55 | 04103MS | 14103 | 0.938 | 23.8 | 14.125 | .733 | 0.937 | 0.882 | 1.187 | 1.132 |
| 5/8-18 | 2D | 04104 | 18.00-18.30 | 20.05 | 04104MS | 14104 | 1.250 | 31.8 | 19.250 | .758 | 1.250 | 1.194 | 1.500 | 1.444 |
| | 2.5D | 04105 | | 25.05 | 04105MS | 14105 | 1.563 | 39.7 | 24.250 | | 1.562 | 1.507 | 1.812 | 1.757 |
| | 3D | 04106 | | 30.45 | 04106MS | 14106 | 1.875 | 47.6 | 29.375 | | 1.875 | 1.819 | 2.125 | 2.069 |
| | 1D | 04122 | | 9.95 | 04122MS | 14122 | 0.750 | 19.1 | 9.750 | | 0.750 | 0.687 | 1.031 | 0.969 |
| | 1.5D | 04123 | | 15.55 | 04123MS | 14123 | 1.125 | 28.6 | 15.125 | .876 | 1.125 | 1.062 | 1.406 | 1.344 |
| 3/4-16 | 2D | 04124 | 21.20-21.60 | 21.35 | 04124MS | 14124 | 1.500 | 38.1 | 20.625 | .901 | 1.500 | 1.437 | 1.781 | 1.719 |
| | 2.5D | 04125 | | 26.85 | 04125MS | 14125 | 1.875 | 47.6 | 26.000 | | 1.875 | 1.812 | 2.156 | 2.094 |
| | 3D | 04126 | | 32.65 | 04126MS | 14126 | 2.250 | 57.2 | 31.500 | | 2.250 | 2.187 | 2.531 | 2.469 |
| | 1D | 04142 | | 10.15 | 04142MS | 14142 | 0.875 | 22.2 | 9.875 | | 0.875 | 0.804 | 1.196 | 1.125 |
| | 1.5D | 04143 | | 16.15 | 04143MS | 14143 | 1.313 | 33.3 | 15.500 | 1.021 | 1.312 | 1.241 | 1.634 | 1.562 |
| 7/8-14 | 2D | 04144 | 24.97 - 25.33 | 22.05 | 04144MS | 14144 | 1.750 | 44.5 | 21.125 | 1.051 | 1.750 | 1.679 | 2.071 | 2.000 |
| | 2.5D | 04145 | | 27.85 | 04145MS | 14145 | 2.188 | 55.6 | 26.625 | | 2.187 | 2.116 | 2.509 | 2.437 |
| | 3D | 04146 | | 33.75 | 04146MS | 14146 | 2.625 | 66.7 | 32.250 | | 2.625 | 2.554 | 2.946 | 2.875 |
| | 1D | 04162 | | 9.95 | 04162MS | 14162 | 1.000 | 25.4 | 9.625 | | 1.000 | 0.917 | 1.375 | 1.292 |
| | 1.5D | 04163 | | 15.65 | 04163MS | 14163 | 1.500 | 38.1 | 15.000 | 1.169 | 1.500 | 1.417 | 1.875 | 1.792 |
| 1" - 12 | 2D | 04164 | 28.47 - 28.83 | 21.35 | 04164MS | 14164 | 2.000 | 50.8 | 20.500 | 1.199 | 2.000 | 1.917 | 2.375 | 2.292 |
| | 2.5D | 04165 | | 27.15 | 04165MS | 14165 | 2.500 | 63.5 | 26.000 | | 2.500 | 2.417 | 2.875 | 2.792 |
| | 3D | 04166 | | 32.95 | 04166MS | 14166 | 3.000 | 76.2 | 31.500 | | 3.000 | 2.917 | 3.375 | 3.292 |
| | 1D | 04162-14 | | 11.95 | 04162-14MS | 14162-14 | 8.364 | 25.4 | 11.500 | | 25.40 | 23.59 | 33.56 | 31.75 |
| | 1.5D | 04163-14 | | 18.55 | 04163-14MS | 14163-14 | 9.641 | 38.1 | 17.875 | 1.156 | 38.10 | 36.29 | 46.26 | 44.45 |
| 1" - 14 | 2D | 04164-14 | 28.07 - 28.43 | 25.05 | 04164-14MS | 14164-14 | 11.059 | 50.8 | 24.250 | 1.186 | 50.80 | 48.99 | 58.96 | 57.15 |
| | 2.5D | 04165-14 | | 31.75 | 04165-14MS | 14165-14 | 13.043 | 63.5 | 30.625 | | 63.50 | 61.69 | 71.66 | 69.85 |
| | 3D | 04166-14 | | 38.35 | 04166-14MS | 14166-14 | 14.745 | 76.2 | 37.000 | | 76.20 | 74.39 | 84.36 | 82.55 |
| | 1D | 04182 | | 11.55 | 04182MS | 14182 | 1.125 | 28.6 | 11.125 | | 1.125 | 1.042 | 1.500 | 1.417 |
| | 1.5D | 04183 | | 17.95 | 04183MS | 14183 | 1.688 | 42.9 | 17.250 | 1.304 | 1.687 | 1.604 | 2.062 | 1.979 |
| 1 1/8 - 12 | 2D | 04184 | 31.72 - 32.10 | 24.35 | 04184MS | 14184 | 2.250 | 57.2 | 23.375 | 1.334 | 2.250 | 2.167 | 2.625 | 2.542 |
| | 2.5D | 04185 | | 30.85 | 04185MS | 14185 | 2.813 | 71.4 | 29.500 | | 2.812 | 2.729 | 3.187 | 3.104 |
| | 3D | 04186 | | 37.35 | 04186MS | 14186 | 3.375 | 85.7 | 35.750 | | 3.375 | 3.292 | 3.750 | 3.667 |
| | 1D | 04202 | | 12.95 | 04202MS | 14202 | 1.250 | 31.8 | 12.500 | | 1.250 | 1.167 | 1.625 | 1.542 |
| | 1.5D | 04203 | | 20.15 | 04203MS | 14203 | 1.875 | 47.6 | 19.375 | 1.439 | 1.875 | 1.792 | 2.250 | 2.167 |
| 1 1/4 - 12 | 2D | 04204 | 34.90 - 35.30 | 27.45 | 04204MS | 14204 | 2.500 | 63.5 | 26.250 | 1.469 | 2.500 | 2.417 | 2.875 | 2.792 |
| | 2.5D | 04205 | | 34.55 | 04205MS | 14205 | 3.125 | 79.4 | 33.000 | | 3.125 | 3.042 | 3.500 | 3.417 |
| | 3D | 04206 | | 41.75 | 04206MS | 14206 | 3.750 | 95.3 | 39.875 | | 3.750 | 3.667 | 4.125 | 4.042 |
| | 1D | 04222 | | 14.25 | 04222MS | 14222 | 1.375 | 34.9 | 13.750 | | 1.375 | 1.292 | 1.750 | 1.667 |
| | 1.5D | 04223 | | 22.25 | 04223MS | 14223 | 2.063 | 52.4 | 21.375 | 1.575 | 2.062 | 1.979 | 2.437 | 2.354 |
| 1 3/8 - 12 | 2D | 04224 | 38.22 - 38.52 | 30.15 | 04224MS | 14224 | 2.750 | 69.9 | 28.875 | 1.610 | 2.750 | 2.667 | 3.125 | 3.042 |
| | 2.5D | 04225 | | 38.15 | 04225MS | | 3.438 | 87.3 | 36.500 | | 3.437 | 3.354 | 3.812 | 3.729 |
| | 3D | | | 46.05 | | | | | 44.000 | | 4.125 | 4.042 | 4.500 | 4.417 |
| | 1D | 04242 | | 15.85 | 04242MS | 14242 | 1.500 | 38.1 | 15.250 | | 1.500 | 1.417 | 1.875 | 1.792 |
| | 1.5D | 04243 | | 24.55 | 04243MS | 14243 | 2.250 | 57.2 | 23.500 | 1.710 | 2.250 | 2.167 | 2.625 | 2.542 |
| 1 1/2 - 12 | 2D | 04244 | 41.38 - 41.78 | 33.05 | 04244MS | 14244 | 3.000 | 76.2 | 31.625 | 1.745 | 3.000 | 2.917 | 3.375 | 3.292 |
| | 2.5D | 04245 | | 41.75 | 04245MS | 14245 | 3.750 | 95.3 | 39.875 | | 3.750 | 3.667 | 4.125 | 4.042 |
| | 3D | 04246 | | 50.35 | 04246MS | 14246 | 4.500 | 114.3 | 48.125 | | 4.500 | 4.417 | 4.875 | 4.792 |

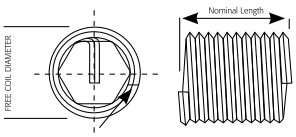
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance.

Fitted Insert:
R = Maximum length of engaged portion of screw when tang is removed.
Q = Minimum full tapped thread length.
T = Minimum tapping depth - including 3 1/2 threads of plug tap.
S = Minimum drill depth - excluding point.




Note: Recoil metric inserts are made to Din locking torque requirements. Military specification MA parts need to be specifically ordered by adding MA to the standard part number above.

Note: Dimensions shown are for MA parts only.



# Recoil Strip Feed Part Number Call-Out and Dimensional Data

| Magazined on Reels Dia 200 | | | | Magazined on Reels Dia 290 | | |
|---|---|---|---|---|---|---|
| Thread Nominal Free Running | Strip Feed Part Number Locking | Strip Feed Part Number | No. of Inserts | Strip Feed Part Number Free Running | Strip Feed Part Number Locking | No. of Inserts |
| | 03522SF | 13522SF | 1000 | | | |
| | 03523SF | 13523SF | 1000 | | | |
| #2-56 | 03524SF | 13524SF | 1000 | | | |
| | | | | 03525SF | 13525SF | 1000 |
| | | | | 03526SF | 13526SF | 1000 |
| | 03532SF | | 1000 | | | |
| | 03533SF | | 1000 | | | |
| #3-56 | 03534SF | | 1000 | | | |
| | | | | 03535SF | 13535SF | 1000 |
| | | | | 03536SF | 13536SF | 1000 |
| | 03542SF | 13542SF | 1000 | | | |
| | 03543SF | 13543SF | 1000 | | | |
| #4-40 | | | | 03544SF | 13544SF | 1000 |
| | | | | 03545SF | 13545SF | 1000 |
| | | | | 03546SF | 13546SF | 1000 |
| | 03552SF | 13552SF | 1000 | | | |
| | 03553SF | 13553SF | 1000 | | | |
| #5-40 | 03554SF | 13554SF | 1000 | | | |
| | | | | 03555SF | 13555SF | 1000 |
| | | | | 03556SF | 13556SF | 1000 |
| | 03562SF | 13562SF | 1000 | | | |
| | | | | 03563SF | 13563SF | 1000 |
| #6-32 | | | | 03564SF | 13564SF | 1000 |
| | | | | 03565SF | 13565SF | 1000 |
| | | | | 03566SF | 13566SF | 1000 |
| | | | | 03582SF | 13582SF | 1000 |
| | | | | 03583SF | 13583SF | 1000 |
| #8-32 | | | | 03584SF | 13584SF | 1000 |
| | | | | 03585SF | 13585SF | 500 |
| | | | | 03586SF | 13586SF | 500 |
| | | | | 03602SF | 13602SF | 1000 |
| | | | | 03603SF | 13603SF | 500 |
| #10-24 | | | | 03604SF | 13604SF | 500 |
| | | | | 03605SF | 13605SF | 500 |
| | | | | 03606SF | 13606SF | 500 |
| | | | | 03622SF | 13622SF | 1000 |
| | | | | 03623SF | 13623SF | 500 |
| #12-24 | | | | 03624SF | 13624SF | 500 |
| | | | | 03625SF | 13625SF | 500 |
| | | | | 03626SF | 13626SF | 500 |
| | | | | 03042SF | 13042SF | 500 |
| | | | | 03043SF | 13043SF | 500 |
| 1/4-20 | | | | 03044SF | 13044SF | 250 |
| | | | | 03045SF | 13045SF | 250 |
| | | | | 03046SF | 13046SF | 250 |
| | | | | 03052SF | 13052SF | 250 |
| 5/16-18 | | | | 03053SF | 13053SF | 250 |
| | | | | 03054SF | 13054SF | 250 |
| | | | | 03062SF | 13062SF | 250 |
| 3/8-16 | | | | 03063SF | 13063SF | 250 |
| | | | | 03064SF | 13064SF | 250 |

# Recoil Strip Feed Part Number Call-Out and Dimensional Data

| Magazined on Reels Dia 200 | | | | Magazined on Reels Dia 290 | | |
|---|---|---|---|---|---|---|
| Thread Nominal Free Running | Strip Feed Part Number Locking | Strip Feed Part Number | No. of Inserts | Strip Feed Part Number Free Running | Strip Feed Part Number Locking | No. of Inserts |
| 7/16-14 | | | | 03072SF | 13062SF | 125 |
| | | | | 03073SF | 13063SF | 125 |
| 1/4-28 | | | | 04042SF | 14042SF | 500 |
| | | | | 04043SF | 14043SF | 500 |
| | | | | 04044SF | 14044SF | 500 |
| | | | | 04045SF | 14045SF | 250 |
| | | | | 04046SF | 14046SF | 250 |
| 5/16-24 | | | | 04052SF | 14052SF | 250 |
| | | | | 04053SF | 14053SF | 250 |
| | | | | 04054SF | 14054SF | 250 |
| | | | | 04055SF | 14055SF | 250 |
| | | | | 04056SF | 14056SF | 250 |
| 3/8-24 | | | | 04062SF | 14062SF | 250 |
| | | | | 04063SF | 14063SF | 250 |
| | | | | 04064SF | 14064SF | 250 |
| | | | | 04065SF | 14065SF | 250 |
| | | | | 04066SF | 14066SF | 250 |
| #10-32 | | | | 04602SF | 14602SF | 1000 |
| | | | | 04603SF | 14603SF | 500 |
| | | | | 04604SF | 14604SF | 500 |
| | | | | 04605SF | 14605SF | 500 |
| | | | | 04606SF | 14606SF | 500 |
| #12-28 | | | | 04622SF | 14622SF | 1000 |
| | | | | 04623SF | 14623SF | 1000 |
| | | | | 04624SF | 14624SF | 1000 |
| | | | | 04625SF | 14625SF | 500 |
| | | | | 04626SF | 14626SF | 500 |
| #3 - 56 | 04532SF | 14532SF | 1000 | 04534SF | 14534SF | 1000 |
| | 04533SF | 14533SF | 1000 | 04535SF | 14535SF | 1000 |
| | | | | 04536SF | 14536SF | 1000 |
| #4 - 48 | 04542SF | 14542SF | 1000 | 04544SF | 14544SF | 1000 |
| | 04543SF | 14543SF | 1000 | 04545SF | 14545SF | 1000 |
| | | | | 04546SF | 04546SF | 1000 |
| #6 - 40 | 04562SF | 14562SF | 1000 | 04564SF | 14564SF | 1000 |
| | 04563SF | 14563SF | 1000 | 04565SF | 14565SF | 1000 |
| | | | | 04566SF | 14566SF | 1000 |
| #8 - 36 | | | | 04582SF | 14582SF | 1000 |
| | | | | 04583SF | 14583SF | 1000 |
| | | | | 04584SF | 14584SF | 500 |
| | | | | 04585SF | 14585SF | 500 |
| | | | | 04586SF | 14586SF | 500 |

# STI Taps

## Recoil Insert Taps

Recoil taps differ from standard taps dimensionally and only Recoil Screw Thread Insert (STI) Taps are suitable for use with Recoil Wire Thread Inserts. Recoil taps are manufactured to precise standards from either High Speed Steel (HSS) with ground threads and are available with taper, intermediate, and bottoming leads. They have a larger diameter but the same pitch as a standard tap in order to accommodate the wire insert. Spiral point and spiral flute machine taps are also available for volume production purposes. For all sparkplug applications, pilot nose taps are recommended and are available for common metric thread sizes. The Recoil thread insert when installed into a correctly tapped hole will provide the applicable internal thread tolerance for the installed bolt.

**Note: Tapped hole size can be significantly affected by variations in drill size, parent material, or lubricant so in close tolerance applications some testing for an optimum combination is recommended.**

## Thread Class

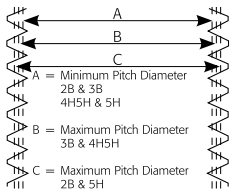
### Unified Thread Class

In the unified thread system, the minimum pitch diameter for a 2B hole (medium fit) or 3B hole (close fit) are the same, while the maximum pitch diameter is greater on the 2B hole (medium fit).Recoil taps for unified threads are made to a 3B hole (close fit) tolerance.

### Metric Thread Class

In the metric thread system the minimum pitch diameter for a 5H hole (medium fit) or 4H5H hole (close fit) are the same, while the maximum pitch diameter is greater on the 5H hole (medium fit).Recoil taps for metric threads are made to 4H5H hole (close fit) tolerance.

| Metric thread tolerance equivalents standards | | |
|---|---|---|
| | Standards | Recoil Standards |
| Medium | Metric 6H | 5H |
| Close | Metric 5H | 4H5H |



Minimum & Maximum pitch diameter

### Taper

Taper (or Roughing Taps) are used for starting precision and difficult holes. This tap has a lead of eight threads, but no size reduction.

### Intermediate

Intermediate (or Plug/Second), used in most general purpose applications to facilitate thread cutting true to the drilled hole. The tap has a lead of four threads, but no size reduction.

### Bottoming

Bottoming Taps are used to ensure the minimum thread run-out when tapping to the bottom of blind holes. The tap has a lead of two threads and would normally be preceded by a taper or an intermediate tap.

### Pilot Nose

Pilot nose taps have been developed for repairing damaged threads without the need for drilling prior to tapping. This style of tap allows the use of the existing thread as a guide in tapping a straight hole. This style of tap is widely used in repairing damaged spark plug threads.

### Spiral Flute

Spiral Flute taps are recommended for machine tapping for all blind hole applications, particularly in soft materials such as copper, magnesium and aluminium which produce long stringy swarf.

### Spiral Point

Spiral Point Taps are recommended for machine tapping through holes. These taps provide for chip clearance within the lead of the tap.

### Thredflo 'Roll Thread' Taps

These taps are designed for machine tapping in ductile materials with higher elasticity e.g. materials with a low silicon content, aliminium & some stainless steels. This tap is designed without flutes or cutting faces, but with special roll forming lobes. It has short tapered leads for through or blind holes and is made from HSS.

# STI Taps

## Tap Type and Applications

The most commonly used type of Recoil taps are defined together with their typical applications. The Taper, Intermediate, and Bottoming are short machine taps (suitable for hand tapping), while the Spiral Point and Spiral Flute are used in production applications.

## Surface Coatings

Recoil taps can be supplied in different surface coatings for special order requirements. Benefits of surface coatings include:

- Longer tool life
- Increased productivity
- Tools can be run at higher feeds and speeds
- Lower maintenance costs

## Titanium Carbonitride - TiCNite (TiCN)

TiCNite coated taps have a very high surface hardness and are generally tougher than other coating materials. It has a high resistance to edge chipping.

## Titanium Nitride - TiNite (TiN)

TiNite coating is a good choice for protecting the tap. It can achieve a longer life than uncoated taps and can be used at higher speeds.

## Chromium Nitride (CrN)

This PVD coating was developed for use in non-ferrous areas where titanium based coatings were not successful. It is recommended for the machining and forming of titanium and copper and is harder than conventional chrome plating. The PVD coating process has no environmental side effects.

## Recoil Tap Part Numbering System

The system of identification used for Recoil taps is categorized into two primary sections: inch threads and metric threads. The tap annotation for both thread designations is very similar and therefore easy to follow.

| Tap Part Number | 4 | 3 | 04 | 5 |
|---|---|---|---|---|
| | Product | Thread Type | Thread Size | Tap Style |
| Inch Series | 4 = Tap | 3 = UNC<br>4 = UNF | Diameter in 1/16″<br>04 = 1/4″ | 4 = taper<br>5 = intermediate<br>6 = bottoming<br>7 = pilot nose<br>8 = spiral point<br>9 = spiral flute<br>0 = roll form |
| Metric Series | | 5 = Coarse<br>7 = Medium<br>8 = Extra Fine | 04 = 4mm | 4 = taper<br>5 = intermediate<br>6 = bottoming<br>7 = pilot nose<br>8 = spiral point<br>9 = spiral flute<br>0 = roll form |

## Screw Pitch Gauge

It is critical that inserts match the tapped hole exactly as some inch and metric are very close but only one is exactly right. A screw pitch gauge is the perfect tool to identify exact TPI or pitch. The bolt diameter should be measured and matched to the closest size over, relating to the TPI or pitch of the thread. In general, major diameter of bolt or male thread will always be slightly less than the exact diameter listed in the thread identification and drill chart.

# Recoil Tap Part Numbers and Dimensional Data Metric Thread Series

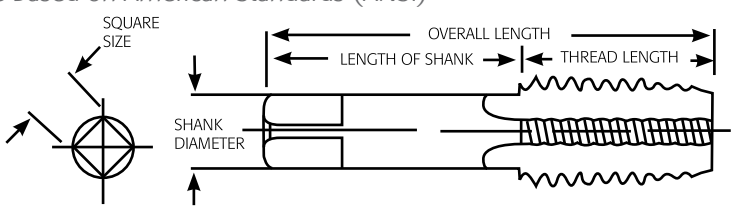
| Thread Size | TAPER | INTERM-EDIATE | BOTTOMING | SPIRAL POINT | SPIRAL FLUTE | OVERALL LENGTH | THREAD LENGTH | SHANK DIAMETER | SQUARE DRIVE |
|---|---|---|---|---|---|---|---|---|---|
| M2 x 0.4 | 45024 | 45025 | 45026 | 45028 | 45029 | 45 | 10 | 2.80 | 2.24 |
| M2.2 x 0.45 | 45014 | 45015 | 45016 | 45018 | 45019 | 48 | 11 | 3.15 | 2.50 |
| M2.5 x 0.45 | 45254 | 45255 | 45256 | 45258 | 45259 | 48 | 11 | 3.15 | 2.50 |
| M3 x 0.5 | 45034 | 45035 | 45036 | 45038 | 45039 | 50 | 13 | 3.55 | 2.80 |
| M3.5 x 0.6 | 45354 | 45355 | 45356 | 45358 | 45359 | 53 | 13 | 4.50 | 3.55 |
| M4 x 0.7 | 45044 | 45045 | 45046 | 45048 | 45049 | 58 | 16 | 5.00 | 4.00 |
| M5 x 0.8 | 45054 | 45055 | 45056 | 45058 | 45059 | 66 | 19 | 6.30 | 5.00 |
| M6 x 1 | 45064 | 45065 | 45066 | 45068 | 45069 | 72 | 22 | 8.00 | 6.30 |
| M7 x1 | 45074 | 45075 | 45076 | - | - | 72 | 22 | 9.00 | 7.10 |
| M8 x 1.25 | 45084 | 45085 | 45086 | 45088 | 45089 | 80 | 24 | 10.00 | 8.00 |
| M9 x 1.25 | 45094 | 45095 | 45096 | - | - | 85 | 25 | 8.00 | 6.30 |
| M10 x 1.5 | 45104 | 45105 | 45106 | 45108 | 45109 | 89 | 29 | 9.00 | 7.10 |
| M11 x 1.5 | 45114 | 45115 | 45116 | - | - | 89 | 29 | 9.00 | 7.10 |
| M12 x 1.75 | 45124 | 45125 | 45126 | 45128 | 45129 | 95 | 30 | 11.20 | 9.00 |
| M14 x 2 | 45144 | 45145 | 45146 | - | - | 102 | 32 | 12.50 | 10.00 |
| M15 x 2 | 45154 | 45155 | 45156 | - | - | 112 | 37 | 14.00 | 11.20 |
| M16 x 2 | 45164 | 45165 | 45166 | 45168 | 45169 | 112 | 37 | 14.00 | 11.20 |
| M18 x 2.5 | 45184 | 45185 | 45186 | - | - | 118 | 38 | 16.00 | 12.50 |
| M20 x 2.5 | 45204 | 45205 | 45206 | - | - | 130 | 45 | 18.00 | 14.00 |
| M22 x 2.5 | 45224 | 45225 | 45226 | - | - | 135 | 48 | 20.00 | 16.00 |
| M24 x 3 | 45244 | 45245 | 45246 | - | - | 135 | 48 | 20.00 | 16.00 |
| M27 x 3 | 45274 | 45275 | 45276 | - | - | 151 | 51 | 22.40 | 18.00 |
| M30 x 3.5 | 45304 | 45305 | 45306 | - | - | 162 | 57 | 25.00 | 20.00 |
| M30 x 3 | 45304-3 | 45305-3 | 45306-3 | - | - | 162 | 57 | 25.00 | 20.00 |
| M33 x 3.5 | 45334 | 45335 | 45336 | - | - | 170 | 60 | 28.00 | 22.40 |
| M36 x 4 | 45364 | 45365 | 45366 | - | - | 170 | 60 | 28.00 | 22.40 |
| M39 x 4 | 45394 | 45395 | 45396 | - | - | 187 | 67 | 31.50 | 25.00 |
| M42 x 4.5 | 45424 | 45425 | 45426 | - | - | 187 | 67 | 31.50 | 25.00 |
| M42 X 4 | 45424-4 | 45425-4 | 45426-4 | - | - | 200 | 70 | 35.50 | 28.00 |
| M52 X 5 | 45524 | 45525 | 45526 | - | - | 221 | 76 | 40.00 | 31.50 |
| METRIC MEDIUM & FINE | | | | | | | | | |
| M8 X 1 | 47084 | 47085 | 47086 | - | - | 80 | 24 | 10.00 | 8.00 |
| M9 X 1 | 47094 | 47095 | 47096 | - | - | 85 | 25 | 8.00 | 6.30 |
| M10 X 1.25 | 47104 | 47105 | 47106 | 47108 | 47109 | 85 | 25 | 9.00 | 7.10 |
| M10 X 1 | 48104 | 48105 | 48106 | 48108 | 48109 | 85 | 25 | 8.00 | 6.30 |
| M11 x 1.25 | 47114 | 47115 | 47116 | - | - | 89 | 29 | 9.00 | 7.10 |
| M11 x 1 | 48114 | 48115 | 48116 | - | - | 89 | 29 | 9.00 | 7.10 |
| M12 x 1.5 | 47124 | 47125 | 47126 | - | - | 95 | 30 | 11.20 | 9.00 |
| M12 x 1.25 | 48124 | 48125 | 48126 | - | - | 95 | 30 | 11.20 | 9.00 |
| M14 x 1.5 | 47144 | 47145 | 47146 | - | - | 102 | 32 | 12.50 | 10.00 |
| M14 x 1.25 | 48144 | 48145 | 48146 | - | - | 102 | 32 | 12.50 | 10.00 |
| M15 x 1.5 | 47154 | 47155 | 47156 | - | - | 112 | 37 | 14.00 | 11.20 |
| M16 x 1.5 | 47164 | 47165 | 47166 | - | - | 112 | 37 | 14.00 | 11.20 |
| M18 x 2 | 47184 | 47185 | 47186 | - | - | 112 | 37 | 14.00 | 11.20 |
| M18 x 1.5 | 48184 | 48185 | 48186 | - | - | 112 | 37 | 14.00 | 11.20 |
| M20 x 2 | 47204 | 47205 | 47206 | - | - | 118 | 38 | 16.00 | 12.50 |
| M20 x 1.5 | 48204 | 48205 | 48206 | - | - | 118 | 38 | 16.00 | 12.50 |
| M22 x 2 | 47224 | 47225 | 47226 | - | - | 130 | 45 | 18.00 | 14.00 |
| M22 x 1.5 | 48224 | 48225 | 48226 | - | - | 130 | 45 | 18.00 | 14.00 |
| M24 x 2 | 47244 | 47245 | 47246 | - | - | 135 | 48 | 20.00 | 16.00 |
| M24 x 1.5 | 48244 | 48245 | 48246 | - | - | 135 | 48 | 20.00 | 16.00 |

Note: The Taps listed above represent the most popular of the Recoil Taps available. Other sizes and types are available including BSF, BSW, NPT, BA, 8UN ETC. Note: Tap dimensions based upon international (ISO) standard

# Recoil Tap Part Numbers and Dimensional Data UNC, UNF

| Thread Size UNC | TAPER | INTERM-EDIATE | BOTTOMING | SPIRAL POINT | SPIRAL FLUTE | OVERALL LENGTH | THREAD LENGTH | SHANK DIAMETER | SQUARE DRIVE |
|---|---|---|---|---|---|---|---|---|---|
| 2-56 | 43524 | 43525 | 43526 | 43528 | 43529 | 1.875 | 0.562 | 0.141 | 0.110 |
| 3-48 | 43534 | 43535 | 43536 | 43538 | 43539 | 1.937 | 0.625 | 0.141 | 0.110 |
| 4-40 | 43544 | 43545 | 43546 | 43548 | 43549 | 2.000 | 0.687 | 0.141 | 0.110 |
| 5-40 | 43554 | 43555 | 43556 | 43558 | 43559 | 2.125 | 0.750 | 0.168 | 0.131 |
| 6-32 | 43564 | 43565 | 43566 | 43568 | 43569 | 2.375 | 0.875 | 0.194 | 0.152 |
| 8-32 | 43584 | 43585 | 43586 | 43588 | 43589 | 2.375 | 0.937 | 0.220 | 0.165 |
| 10-24 | 43604 | 43605 | 43606 | 43608 | 43609 | 2.500 | 1.000 | 0.255 | 0.191 |
| 12-24 | 43624 | 43625 | 43626 | 43628 | 43629 | 2.718 | 1.125 | 0.318 | 0.238 |
| 1/4-20 | 43044 | 43045 | 43046 | 43048 | 43049 | 2.718 | 1.125 | 0.318 | 0.238 |
| 5/16-18 | 43054 | 43055 | 43056 | 43058 | 43059 | 2.937 | 1.250 | 0.381 | 0.286 |
| 3/8-16 | 43064 | 43065 | 43066 | 43068 | 43069 | 3.375 | 1.656 | 0.367 | 0.275 |
| 7/16-14 | 43074 | 43075 | 43076 | 43078 | 43079 | 3.593 | 1.656 | 0.429 | 0.322 |
| 1/2-13 | 43084 | 43085 | 43086 | 43088 | 43089 | 3.812 | 1.812 | 0.480 | 0.360 |
| 9/16-12 | 43094 | 43095 | 43096 | 43098 | 43099 | 4.031 | 1.812 | 0.542 | 0.406 |
| 5/8-11 | 43104 | 43105 | 43106 | 43108 | 43109 | 4.250 | 2.000 | 0.590 | 0.442 |
| 3/4-10 | 43124 | 43125 | 43126 | 43128 | 43129 | 4.687 | 2.218 | 0.697 | 0.523 |
| 7/8-9 | 43144 | 43145 | 43146 | 43148 | 43149 | 5.125 | 2.500 | 0.800 | 0.600 |
| 1-8 | 43164 | 43165 | 43166 | 43168 | 43169 | 5.750 | 2.562 | 1.021 | 0.766 |
| 11/8-7 | 43184 | 43185 | 43186 | - | - | - | - | - | - |
| 11/4-7 | 43204 | 43205 | 43206 | - | - | - | - | - | - |
| 13/8-6 | 43224 | 43225 | 43226 | - | - | - | - | - | - |
| 11/2-6 | 43244 | 43245 | 43246 | - | - | - | - | - | - |
| | | | | | | | | | |
| UNF | | | | | | | | | |
| 3-56 | 44534 | 44535 | 44536 | 44538 | 44539 | 1.937 | 0.625 | 0.141 | 0.110 |
| 4-48 | 44544 | 44545 | 44546 | 44548 | 44549 | 2.000 | 0.687 | 0.141 | 0.110 |
| 6-40 | 44564 | 44565 | 44566 | 44568 | 44569 | 2.125 | 0.750 | 0.168 | 0.131 |
| 8-36 | 44584 | 44585 | 44586 | 44588 | 44589 | 2.375 | 0.937 | 0.220 | 0.165 |
| 10-32 | 44604 | 44605 | 44606 | 44608 | 44609 | 2.500 | 1.000 | 0.255 | 0.191 |
| 12-28 | 44624 | 44625 | 44626 | - | - | 2.718 | 1.125 | 0.318 | 0.238 |
| 1/4-28 | 44044 | 44045 | 44046 | 44048 | 44049 | 2.718 | 1.125 | 0.318 | 0.238 |
| 5/16-24 | 44054 | 44055 | 44056 | 44058 | 44059 | 2.937 | 1.250 | 0.381 | 0.286 |
| 3/8-24 | 44064 | 44065 | 44066 | 44068 | 44069 | 3.156 | 1.438 | 0.323 | 0.242 |
| 7/16-20 | 44074 | 44075 | 44076 | 44078 | 44079 | 3.375 | 1.656 | 0.367 | 0.275 |
| 1/2-20 | 44084 | 44085 | 44086 | 44088 | 44089 | 3.593 | 1.656 | 0.429 | 0.322 |
| 9/16-18 | 44094 | 44095 | 44096 | 44098 | 44099 | 3.812 | 1.812 | 0.480 | 0.360 |
| 5/8-18 | 44104 | 44105 | 44106 | 44108 | 44109 | 4.031 | 1.812 | 0.542 | 0.406 |
| 3/4-16 | 44124 | 44125 | 44126 | 44128 | 44129 | 4.468 | 2.000 | 0.652 | 0.489 |
| 7/8-14 | 44144 | 44145 | 44146 | 44148 | 44149 | 5.125 | 2.500 | 0.800 | 0.600 |
| 1-12 | 44164 | 44165 | 44166 | 44168 | 44169 | 5.437 | 2.562 | 0.896 | 0.672 |
| 1-14 | 44164-14 | 44165-14 | 44166-14 | 44168-14 | 44169-14 | 5.437 | 2.562 | 0.896 | 0.672 |
| 11/8-12 | 44184 | 44185 | 44186 | - | - | - | - | - | - |
| 11/4-12 | 44204 | 44205 | 44206 | - | - | - | - | - | - |
| 13/8-12 | 44224 | 44225 | 44226 | - | - | - | - | - | - |
| 11/2-12 | 44244 | 44245 | 44246 | - | - | - | - | - | - |

Note: Tap dimensional data are based on American Standards (ANSI)



# Recoil Tap Part Numbers and Dimensional Data BA, BSC, BSF, BSW

| | TAPER | INTERM-EDIATE | BOTTOMING | SPIRAL POINT | SPIRAL FLUTE | OVERALL LENGTH | THREAD LENGTH | SHANK DIAMETER | SQUARE DRIVE |
|---|---|---|---|---|---|---|---|---|---|
| **BA** | | | | | | | | | |
| 0 BA | 40504 | 40505 | 40506 | - | - | 72.00 | 22.00 | 8.00 | 6.30 |
| 1BA | 40514 | 40515 | 40516 | - | - | 66.00 | 19.00 | 6.30 | 5.00 |
| 2 BA | 40524 | 40525 | 40526 | - | - | 66.00 | 19.00 | 6.30 | 5.00 |
| 4 BA | 40544 | 40545 | 40546 | - | - | 53.00 | 13.00 | 4.50 | 3.55 |
| 6 BA | 40564 | 40565 | 40566 | - | - | 50.00 | 13.00 | 3.55 | 2.80 |
| **BSC** | | | | | | | | | |
| 5/16 - 26 | 46504 | 46505 | 46506 | - | - | 73.000 | 22.000 | 9.000 | 7.100 |
| 3/8 - 26 | 46604 | 46605 | 46606 | - | - | 85.000 | 25.000 | 8.000 | 6.300 |
| 7/16 - 26 | 46704 | 46705 | 46706 | - | - | 89.000 | 29.000 | 9.000 | 7.100 |
| 1/2 - 26 | 46804 | 46805 | 46806 | - | - | 95.000 | 30.000 | 11.200 | 9.000 |
| **BSF** | | | | | | | | | |
| 3/16 - 32 | 40034 | 40035 | 40036 | - | - | 67.00 | 19.00 | 6.30 | 5.00 |
| 1/4 - 26 | 40044 | 40045 | 40056 | - | - | 72.00 | 22.00 | 8.00 | 6.30 |
| 5/16 - 22 | 40054 | 40055 | 40056 | - | - | 80.00 | 24.00 | 8.00 | 6.30 |
| 3/8 - 20 | 40064 | 40065 | 40066 | - | - | 85.00 | 25.00 | 8.00 | 6.30 |
| 7/16 - 18 | 40074 | 40075 | 40076 | - | - | 89.00 | 29.00 | 9.00 | 7.10 |
| 1/2 - 16 | 40084 | 40085 | 40086 | - | - | 95.00 | 30.00 | 11.20 | 9.00 |
| 9/16 - 16 | 40094 | 40095 | 40096 | - | - | 102.00 | 32.00 | 12.50 | 10.00 |
| 5/8 - 14 | 40104 | 40105 | 40106 | - | - | 112.00 | 37.00 | 14.00 | 11.20 |
| 3/4 - 12 | 40124 | 40125 | 40126 | - | - | 118.00 | 38.00 | 16.00 | 12.50 |
| 7/8 - 11 | 40144 | 40145 | 40146 | - | - | 135.00 | 48.00 | 20.00 | 16.00 |
| 1 - 10 | 40164 | 40165 | 40166 | - | - | 135.00 | 48.00 | 20.00 | 16.00 |
| 1 1/4 - 9 | 40184 | 40185 | 40186 | - | - | 151.00 | 51.00 | 22.40 | 18.00 |
| **BSP** | | | | | | | | | |
| 1/8 - 28 | 41024 | 41025 | 41026 | - | - | 85.00 | 25.00 | 8.00 | 6.30 |
| 1/4 - 19 | 41044 | 41045 | 41046 | - | - | 95.00 | 30.00 | 11.20 | 9.00 |
| 3/8 - 19 | 41064 | 41065 | 41066 | - | - | 112.00 | 37.00 | 14.00 | 11.20 |
| 1/2 - 14 | 41084 | 41085 | 41086 | - | - | 130.00 | 45.00 | 18.00 | 14.00 |
| 5/8 - 14 | 41104 | 41105 | 41106 | - | - | 130.00 | 42.00 | 18.00 | 14.00 |
| 3/4 - 14 | 41124 | 41125 | 41126 | - | - | 135.00 | 48.00 | 20.00 | 16.00 |
| 1 - 11 | 41164 | 41165 | 41166 | - | - | 162.00 | 57.00 | 25.00 | 20.00 |
| **BSW** | | | | | | | | | |
| 1/8 - 40 | 42024 | 42025 | 42026 | | | 53.00 | 13.00 | 4.00 | 3.15 |
| 3/16-24 | 42034 | 42035 | 42036 | 42038 | 42039 | 67.00 | 19.00 | 6.30 | 5.00 |
| 1/4 - 20 | 42044 | 42045 | 42046 | 42048 | 42049 | 72.00 | 22.00 | 8.00 | 6.30 |
| 5/16-18 | 42054 | 42055 | 42056 | 42058 | 42059 | 80.00 | 24.00 | 10.00 | 8.00 |
| 3/8 - 16 | 42064 | 42065 | 42066 | 42068 | 42069 | 85.00 | 25.00 | 8.00 | 6.30 |
| 7/16-14 | 42074 | 42075 | 42076 | - | - | 95.00 | 30.00 | 11.20 | 9.00 |
| 1/2 - 12 | 42084 | 42085 | 42086 | - | - | 95.00 | 30.00 | 11.20 | 9.00 |
| 9/16-12 | 42094 | 42095 | 42096 | - | - | 102.00 | 32.00 | 12.50 | 10.00 |
| 5/8 - 11 | 42104 | 42105 | 42106 | - | - | 112.00 | 37.00 | 14.00 | 11.20 |
| 3/4 - 10 | 42124 | 42125 | 42126 | - | - | 118.00 | 38.00 | 16.00 | 12.50 |
| 7/8 - 9 | 42144 | 42145 | 42146 | - | - | 135.00 | 48.00 | 20.00 | 16.00 |
| 1 - 8 | 42164 | 42165 | 42166 | - | - | 135.00 | 48.00 | 20.00 | 16.00 |
| 1 1/8 - 7 | 42184 | 42185 | 42186 | - | - | 151.00 | 51.00 | 22.40 | 18.00 |
| 1 1/4 - 7 | 42204 | 42205 | 42206 | - | - | 162.00 | 57.00 | 25.00 | 20.00 |
| 1 3/8 - 6 | 42224 | 42225 | 42226 | - | - | 170.00 | 60.00 | 28.00 | 22.40 |
| 1 1/2 - 6 | 42244 | 42245 | 42246 | - | - | 187.00 | 67.00 | 31.50 | 25.00 |

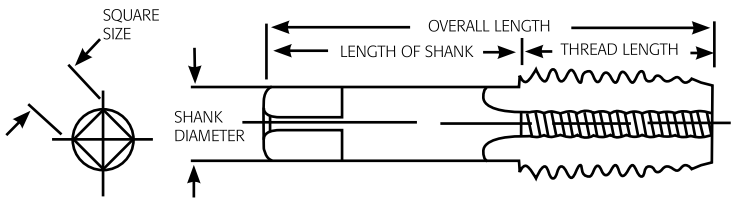
# Recoil Tap Part Numbers and Dimensional Data Unified Thread Series

| NPT | TAPER | INTERM-EDIATE | BOTTOMING | SPIRAL POINT | SPIRAL FLUTE | OVERALL LENGTH | THREAD LENGTH | SHANK DIAMETER | SQUARE DRIVE |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 - 27 | 46025 | 46026 | - | - | - | 2 1/8 | 3/4 | 0.438 | 0.328 |
| 1/4 - 18 | 46045 | 46046 | - | - | - | 2 7/16 | 1 1/16 | 0.563 | 0.420 |
| 3/8 - 18 | 46065 | 46066 | - | - | - | 2 9/16 | 1 1/6 | 0.700 | 0.531 |
| 1/2 - 14 | 46085 | 46086 | - | - | - | 3 5/32 | 1 3/8 | 0.687 | 0 515 |
| 3/4 - 14 | 46125 | 46126 | - | - | - | 3 9/32 | 1 3/8 | 0.906 | 0.679 |
| 1 - 11 1/2 | 46165 | 46166 | - | - | - | 3 3/4 | 4 3/4 | 1.125 | 0.893 |
| **8 TPI UN** | | | | | | | | | |
| 1 1/8 - 8 | 46184 | 46185 | 46186 | — | — | 5.945 | 2.007 | 0.881 | 0.708 |
| 1 1/4 - 8 | 46204 | 46205 | 46206 | — | — | 6.378 | 2.244 | 0.984 | 0.787 |
| 1 3/8 - 8 | 46224 | 46225 | 46226 | — | — | 6.692 | 2.362 | 1.102 | 0.881 |
| 1 1/2 - 8 | 46244 | 46245 | 46246 | — | — | 6.692 | 2.362 | 1.102 | 0.881 |
| 1 5/8 - 8 | 46264 | 46265 | 46266 | — | — | 7.362 | 2.637 | 1.240 | 0.984 |
| 1 3/4 - 8 | 46284 | 46285 | 46286 | — | — | 7.362 | 2.637 | 1.240 | 0.984 |
| 1 7/8 - 8 | 46304 | 46305 | 46306 | — | — | 7.874 | 2.755 | 1.397 | 1.102 |
| 2 - 8 | 46324 | 46325 | 46326 | — | — | 7.874 | 2.755 | 1.397 | 1.102 |

| SPECIAL SIZES | Taper | Intermediate | Bottoming |
|---|---|---|---|
| UNEF 1/4 - 32 | 44044-32 | 44045-32 | 44046-32 |
| HARLEY 1/4 - 24 | 44044-24 | 44045-24 | 44046-24 |
| HARLEY 7/16 - 16 | 44074-16 | 44075-16 | 44076-16 |
| CARB. 7/8 - 20 | 44144-20 | 44145-20 | 44146-20 |
| CARB. 1 - 20 | 44164-20 | 44165-20 | 44166-20 |
| CUMMINS 11/16 - 16 | 44114-16 | 44115-16 | 44116-16 |

| LEFT HAND THREADS Metric | Intermediate |
|---|---|
| M6 -1 | 45065LH |
| M8 - 1.25 | 45085LH |
| M10 - 1.5 | 45105LH |
| M12 - 1.75 | 45125LH |

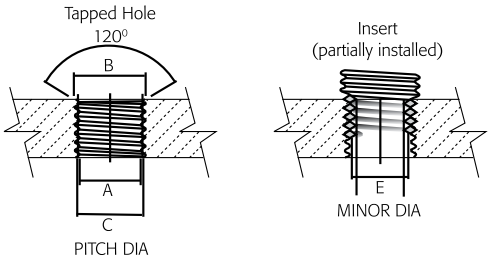
| LEFT HAND THREADS UNC | Intermediate |
|---|---|
| 1/4-20 | 43045LH |
| 5/16-18 | 43055LH |
| 3/8-16 | 43065LH |
| 7/16-14 | 43075LH |
| 1/2-13 | 43085LH |



# Recoil Tapped Hole and Fitted Size Data - Metric

| METRIC (ISO) THREAD SIZE | DRILL SIZE | A MINOR DIA | | B MAJ DIA | PITCH DIA C CLASS 5H | | C CLASS 6H | | E INSERTS FITTED |
|---|---|---|---|---|---|---|---|---|---|
| | | MAX | MIN | | MAX | MIN | MAX | MIN | |
| M2 X 0.4 | 2.10 | 2.177 | 2.087 | 2.520 | 2.295 | 2.260 | 2.310 | 2.260 | 1.567 |
| M2.2 X 0.45 | 2.30 | 2.397 | 2.297 | 2.785 | 2.532 | 2.492 | 2.547 | 2.492 | 1.713 |
| M2.5 X 0.45 | 2.60 | 2.697 | 2.597 | 3.085 | 2.832 | 2.792 | 2.847 | 2.792 | 2.013 |
| M3 X 0.5 | 3.10 | 3.220 | 3.108 | 3.650 | 3.367 | 3.325 | 3.384 | 3.325 | 2.459 |
| M3.5 X 0.6 | 3.60 | 3.755 | 3.630 | 4.279 | 3.940 | 3.890 | 3.959 | 3.890 | 2.850 |
| M4 X 0.7 | 4.10 | 4.292 | 4.152 | 4.909 | 4.509 | 4.455 | 4.529 | 4.455 | 3.242 |
| M5 X 0.8 | 5.20 | 5.333 | 5.173 | 6.039 | 5.577 | 5.520 | 5.597 | 5.520 | 4.134 |
| M6 X 1.0 | 6.20 | 6.406 | 6.216 | 7.299 | 6.719 | 6.650 | 6.742 | 6.650 | 4.917 |
| M7 X 1.0 | 7.20 | 7.406 | 7.216 | 8.299 | 7.719 | 7.650 | 7.742 | 7.650 | 5.917 |
| M8 X 1.0 | 8.20 | 8.406 | 8.216 | 9.299 | 8.719 | 8.650 | 8.742 | 8.650 | 6.917 |
| M8 X 1.25 | 8.30 | 8.483 | 8.271 | 9.624 | 8.886 | 8.812 | 8.912 | 8.812 | 6.647 |
| M9 X 1.25 | 9.30 | 9.483 | 9.271 | 10.624 | 9.886 | 9.812 | 9.912 | 9.812 | 7.647 |
| M10 X 1.25 | 10.30 | 10.483 | 10.271 | 11.624 | 10.886 | 10.812 | 10.912 | 10.812 | 8.647 |
| M10 X 1.5 | 10.30 | 10.561 | 10.325 | 11.949 | 11.061 | 10.974 | 11.089 | 10.974 | 8.376 |
| M11 X 1.5 | 11.30 | 11.561 | 11.325 | 12.949 | 12.061 | 11.974 | 12.089 | 11.974 | 9.376 |
| M12 X 1.25 | 12.30 | 12.483 | 12.271 | 13.624 | 12.898 | 12.812 | 12.926 | 12.812 | 10.647 |
| M12 X 1.5 | 12.5 | 12.56 | 13.324 | 14.131 | 12.974 | 13.067 | 12.974 | 13.099 | 10.376 |
| M12 X 1.75 | 12.40 | 12.644 | 12.379 | 14.273 | 13.236 | 13.137 | 13.271 | 13.137 | 10.106 |
| M14 X 1.5 | 14.30 | 14.561 | 14.325 | 15.949 | 15.067 | 14.974 | 15.099 | 14.974 | 12.376 |
| M14 X 2.0 | 14.40 | 14.733 | 14.433 | 16.598 | 15.406 | 15.299 | 15.444 | 15.299 | 11.835 |
| M16 X 1.5 | 16.25 | 16.561 | 16.325 | 17.949 | 17.067 | 16.974 | 17.099 | 16.974 | 14.376 |
| M16 X 2.0 | 16.50 | 16.733 | 16.433 | 18.598 | 17.406 | 17.299 | 17.444 | 17.299 | 13.835 |
| M18 X 1.5 | 18.25 | 18.561 | 18.325 | 19.949 | 19.067 | 18.974 | 19.099 | 18.974 | 16.376 |
| M18 X 2.0 | 18.50 | 18.733 | 18.433 | 20.598 | 19.406 | 19.299 | 19.444 | 19.299 | 15.835 |
| M18 X 2.5 | 18.50 | 18.896 | 18.541 | 21.248 | 19.738 | 19.624 | 19.778 | 19.624 | 15.294 |
| M20 X 1.5 | 20.25 | 20.561 | 20.325 | 21.949 | 21.067 | 20.974 | 21.099 | 20.974 | 18.376 |
| M20 X 2.0 | 20.50 | 20.733 | 20.433 | 22.598 | 21.406 | 21.299 | 21.444 | 21.299 | 17.835 |
| M20 X 2.5 | 20.50 | 20.896 | 20.541 | 23.248 | 21.738 | 21.624 | 21.778 | 21.624 | 17.294 |
| M22 X 1.5 | 22.50 | 22.561 | 22.325 | 23.949 | 23.067 | 22.974 | 23.099 | 22.974 | 20.376 |
| M22 X 2.0 | 22.50 | 22.733 | 22.433 | 24.598 | 23.406 | 23.299 | 23.444 | 23.299 | 19.835 |
| M22 X 2.5 | 22.50 | 22.896 | 22.541 | 25.248 | 23.738 | 23.624 | 23.778 | 23.624 | 19.294 |
| M24 X 2.0 | 24.25 | 24.733 | 24.433 | 26.598 | 25.414 | 25.299 | 25.454 | 25.299 | 21.835 |
| M24 X 3.0 | 24.75 | 25.050 | 24.650 | 27.897 | 26.093 | 25.949 | 26.135 | 25.949 | 20.752 |
| M27 X 3.0 | 27.50 | 28.050 | 27.650 | 30.897 | 29.093 | 28.949 | 29.135 | 28.949 | 23.752 |
| M30 X 3.5 | 30.50 | 31.208 | 30.758 | 34.547 | 32.428 | 32.273 | 32.472 | 32.273 | 26.211 |
| M33 X 3.5 | 33.50 | 34.208 | 33.758 | 37.547 | 35.428 | 35.273 | 35.472 | 35.273 | 29.211 |
| M36 X 4.0 | 36.50 | 37.341 | 36.866 | 41.196 | 38.763 | 38.598 | 38.809 | 38.598 | 31.670 |
| M39 X 4.0 | 39.50 | 40.341 | 39.866 | 44.196 | 41.763 | 41.598 | 41.809 | 41.598 | 34.670 |

Standard size drills are suggested even though in these sizes they vary slightly from minor diameter limits. Drill sizes are recommended only and test should be carried out to select the one suitable for the material involved. Countersinking: It is recommended that a 120° countersink is provided before tapping to prevent a feather edge at the start of the lead thread. When design prevents the use of a countersink, any feather edges or deformed material at the thread lead should be removed before tapping.This will facilitate insert installation and reduce the effects of removing the countersinking operation.

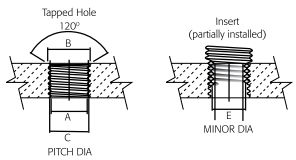


# Recoil Tapped Hole and Fitted Size Data - Unified

| UNC | | DRILL SIZE UNC | | TAPPED HOLE | | | PITCH DIA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | | B | C | | C | | E |
| SIZE | T.P.I. | MM | INCH | MI DIA MIN | | MAJ DIA | CLASS 2B | | CLASS 3B | | INSERTS FITTED |
| | | | | | | | MAX | MIN | MAX | MIN | |
| No.2 | 56 | 2.3 | 3/32 | 0.094 | 0.090 | 0.1092 | 0.0996 | 0.0976 | 0.989 | 0.0976 | 0.0667 |
| No.3 | 48 | 2.7 | No.36 | 0.108 | 0.104 | 0.1261 | 0.1147 | 0.1125 | 0.1139 | 0.1125 | 0.0764 |
| No.4 | 40 | 3 | No.31 | 0.122 | 0.118 | 0.1445 | 0.1307 | 0.1282 | 0.1298 | 0.1282 | 0.0849 |
| No.5 | 40 | 3.4 | No.29 | 0.135 | 0.131 | 0.1575 | 0.1437 | 0.1412 | 0.1429 | 0.1412 | 0.0979 |
| No.6 | 32 | 3.7 | No.25 | 0.150 | 0.145 | 0.1786 | 0.1611 | 0.1583 | 0.1601 | 0.1583 | 0.1042 |
| No.8 | 32 | 4.4 | 11/64 | 0.175 | 0.171 | 0.2046 | 0.1872 | 0.1843 | 0.1862 | 0.1843 | 0.1302 |
| No.10 | 24 | 5.0 | 13/64 | 0.205 | 0.199 | 0.2441 | 0.2204 | 0.2171 | 0.2193 | 0.2171 | 0.1449 |
| No.12 | 24 | 5.8 | 15/64 | 0.230 | 0.225 | 0.2701 | 0.2465 | 0.2431 | 0.2454 | 0.2431 | 0.1709 |
| 1/4 | 20 | 6.7 | 17/64 | 0.270 | 0.261 | 0.3150 | 0.2863 | 0.2825 | 0.2851 | 0.2825 | 0.1959 |
| 5/16 | 18 | 8.3 | 21/64 | 0.334 | 0.325 | 0.3847 | 0.3529 | 0.3486 | 0.3515 | 0.3486 | 0.2524 |
| 3/8 | 16 | 9.9 | 25/64 | 0.398 | 0.389 | 0.4562 | 0.4203 | 0.4156 | 0.4189 | 0.4156 | 0.3073 |
| 7/16 | 14 | 11.5 | 29/64 | 0.463 | 0.453 | 0.5303 | 0.4890 | 0.4839 | 0.4875 | 0.4839 | 0.3602 |
| 1/2 | 13 | 13.0 | 17/32 | 0.527 | 0.517 | 0.5999 | 0.5554 | 0.5499 | 0.5537 | 0.5499 | 0.4167 |
| 9/16 | 12 | 14.5 | 19/32 | 0.591 | 0.581 | 0.6708 | 0.6225 | 0.6167 | 0.6208 | 0.6167 | 0.4723 |
| 5/8 | 11 | 16.5 | 21/32 | 0.656 | 0.645 | 0.7431 | 0.6903 | 0.6841 | 0.6885 | 0.6841 | 0.5266 |
| 3/4 | 10 | 19.75 | 25/32 | 0.783 | 0.772 | 0.8799 | 0.8216 | 0.8149 | 0.8196 | 0.8149 | 0.6417 |
| 7/8 | 9 | 23.0 | 29/32 | 0.912 | 0.899 | 1.0193 | 0.9543 | 0.9471 | 0.9522 | 0.9471 | 0.7547 |
| 1 | 8 | 26.0 | 11/32 | 1.042 | 1.027 | 1.1624 | 1.0890 | 1.0812 | 1.0868 | 1.0812 | 0.8647 |
| 11/8 | 7 | 29.5 | 15/32 | 1.170 | 1.156 | 1.3106 | 1.2262 | 1.2178 | 1.2239 | 1.2178 | 0.9704 |
| 11/4 | 7 | 33.0 | 19/32 | 1.295 | 1.281 | 1.4356 | 1.3514 | 1.3428 | 1.3490 | 1.3428 | 1.0954 |
| 13/8 | 6 | 36.0 | 113/32 | 1.431 | 1.411 | 1.5914 | 1.4926 | 1.4832 | 1.4900 | 1.4832 | 1.1946 |
| 11/2 | 6 | 39.0 | 117/32 | 1.556 | 1.536 | 1.7164 | 1.6177 | 1.6082 | 1.6151 | 1.6082 | 1.3196 |

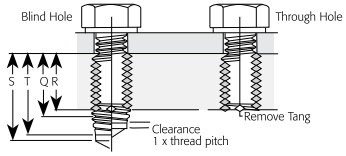
| UNF | | DRILL SIZE UNC | | TAPPED HOLE | | | PITCH DIA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | | B | C | | C | | E |
| SIZE | T.P.I. | MM | INCH | MI DIA MIN | | MAJ DIA | CLASS 2B | | CLASS 3B | | INSERTS FITTED |
| | | | | | | | MAX | MIN | MAX | MIN | |
| No.3 | 56 | 2.65 | - | 0.106 | 0.103 | 0.1222 | 0.1126 | 0.1106 | 0.1119 | 0.1106 | 0.0797 |
| No.4 | 48 | 3.0 | No.31 | 0.120 | 0.117 | 0.1391 | 0.1278 | 0.1255 | 0.1270 | 0.1255 | 0.0894 |
| No.5 | 44 | 3.3 | - | 0.134 | 0.130 | 0.1545 | 0.1422 | 0.1398 | 0.1414 | 0.1398 | 0.1004 |
| No.6 | 40 | 3.7 | No.26 | 0.148 | 0.144 | 0.1705 | 0.1568 | 0.1542 | 0.1559 | 0.1542 | 0.1109 |
| No.8 | 36 | 4.4 | 11/64 | 0.174 | 0.170 | 0.2001 | 0.1848 | 0.1820 | 0.1839 | 0.1820 | 0.1339 |
| No.10 | 32 | 5.1 | 13/64 | 0.201 | 0.197 | 0.2306 | 0.2133 | 0.2103 | 0.2123 | 0.2103 | 0.1562 |
| 1/4 | 28 | 6.6 | 17/64 | 0.264 | 0.258 | 0.2964 | 0.2765 | 0.2732 | 0.2754 | 0.2732 | 0.2113 |
| 5/16 | 24 | 8.2 | 21/64 | 0.328 | 0.322 | 0.3666 | 0.3433 | 0.3395 | 0.3421 | 0.3395 | 0.2674 |
| 3/8 | 24 | 9.8 | 25/64 | 0.390 | 0.384 | 0.4291 | 0.4059 | 0.4020 | 0.4047 | 0.4020 | 0.3299 |
| 7/16 | 20 | 11.5 | 29/64 | 0.456 | 0.449 | 0.5025 | 0.4744 | 0.4700 | 0.4731 | 0.4700 | 0.3834 |
| 1/2 | 20 | 13.0 | 33/64 | 0.518 | 0.511 | 0.5650 | 0.5371 | 0.5325 | 0.5357 | 0.5325 | 0.4459 |
| 9/16 | 18 | 14.5 | 37/64 | 0.582 | 0.575 | 0.6347 | 0.6035 | 0.5986 | 0.6020 | 0.5986 | 0.5024 |
| 5/8 | 18 | 16.25 | 41/64 | 0.644 | 0.637 | 0.6972 | 0.6661 | 0.6611 | 0.6646 | 0.6611 | 0.5649 |
| 3/4 | 16 | 19.5 | 49/64 | 0.771 | 0.764 | 0.8312 | 0.7961 | 0.7906 | 0.7945 | 0.7906 | 0.6823 |
| 7/8 | 14 | 22.5 | 57/64 | 0.899 | 0.891 | 0.9678 | 0.9274 | 0.9214 | 0.9257 | 0.9214 | 0.7977 |
| 1 | 12 | 26.0 | 11/54 | 1.028 | 1.018 | 1.1083 | 1.0608 | 1.0542 | 1.0589 | 1.0542 | 0.9098 |
| 1 1/8 | 12 | 29.5 | 15/32 | 1.153 | 1.143 | 1.2333 | 1.1860 | 1.1792 | 1.1841 | 1.1792 | 1.0348 |
| 1 1/4 | 12 | 32.5 | 19/32 | 1.278 | 1.268 | 1.3583 | 1.3112 | 1.3042 | 1.3092 | 1.3042 | 1.1598 |
| 1 3/8 | 12 | 36.0 | 113/32 | 1.403 | 1.393 | 1.4833 | 1.4364 | 1.4292 | 1.4343 | 1.4292 | 1.2848 |
| 1 1/2 | 12 | 39.0 | 117/32 | 1.528 | 1.518 | 1.6083 | 1.5615 | 1.5542 | 1.5595 | 1.5542 | 1.4098 |

Standard size drills are suggested even though in these sizes they vary slightly from minor diameter limits. Drill sizes are recommended only and test should be carried out to select the one suitable for the material involved. Countersinking: It is recommended that a 120° countersink is provided before tapping to prevent a feather edge at the start of the lead thread. When design prevents the use of a countersink, any feather edges or deformed material at the thread lead should be removed before tapping.This will facilitate insert installation and reduce the effects of removing the countersinking operation.



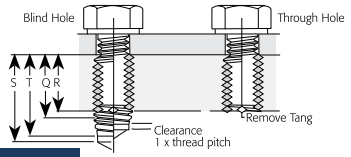
| Thread Nominal | Recoil Spec Nominal Length Dia | Part # | Free Run Free Min-Max | Dia of Coils | Drill Size mm | Drill Size inch | A Minor Dia min | A Minor Dia max | B Major Dia min | C Class 2B min | C Class 2B max | C Class 3B min | C Class 3B max | E inserts fitted | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 00502 | | 4.15 | | | | | | | | | | | 0.236 | 0.197 | 0.413 | 0.374 |
| | 1.5 | 00503 | | 7.00 | | | | | | | | | | | 0.354 | 0.315 | 0.531 | 0.492 |
| 0 | 2 | 00504 | 7.40 - 7.50 | 9.85 | 6.20 | - | 0.2410 | 0.2460 | 0.2805 | 0.2598 | 0.2645 | - | - | 0.1890 | 0.472 | 0.433 | 0.649 | 0.610 |
| | 2.5 | 00505 | | 12.80 | | | | | | | | | | | 0.591 | 0.552 | 0.768 | 0.729 |
| | 3 | 00506 | | | | | | | | | | | | | 0.709 | 0.670 | 0.886 | 0.847 |
| | 1 | 00522 | | 4.25 | | | | | | | | | | | 0.185 | 0.153 | 0.329 | 0.297 |
| | 1.5 | 00523 | | 7.05 | | | | | | | | | | | 0.278 | 0.246 | 0.422 | 0.390 |
| 2 | 2 | 00524 | 5.70 - 5.85 | 9.85 | 4.90 | - | 0.1910 | 0.1960 | 0.2208 | 0.2042 | 0.2079 | - | - | 0.1468 | 0.370 | 0.338 | 0.514 | 0.482 |
| | 2.5 | 00525 | | 12.75 | | | | | | | | | | | 0.463 | 0.431 | 0.607 | 0.575 |
| | 3 | 00526 | | 15.55 | | | | | | | | | | | 0.555 | 0.523 | 0.699 | 0.667 |
| | 1 | 00542 | | 3.85 | | | | | | | | | | | 0.142 | 0.116 | 0.259 | 0.233 |
| | 1.5 | 00543 | | 6.45 | | | | | | | | | | | 0.213 | 0.187 | 0.330 | 0.304 |
| 4 | 2 | 00544 | 4.40 - 4.55 | 9.05 | 3.80 | - | 0.1470 | 0.1520 | 0.1711 | 0.1574 | 0.1605 | - | - | 0.1106 | 0.283 | 0.257 | 0.400 | 0.374 |
| | 2.5 | 00545 | | 11.65 | | | | | | | | | | | 0.354 | 0.328 | 0.471 | 0.445 |
| | 3 | 00546 | | 14.35 | | | | | | | | | | | 0.425 | 0.399 | 0.542 | 0.516 |
| | 1 | 00562 | | 3.45 | | | | | | | | | | | 0.110 | 0.089 | 0.204 | 0.183 |
| | 1.5 | 00563 | | 6.00 | | | | | | | | | | | 0.165 | 0.144 | 0.259 | 0.238 |
| 6 | 2 | 00564 | 3.55 - 3.60 | 8.50 | 2.90 | - | 0.1130 | 0.1160 | 0.1339 | 0.1226 | 0.1252 | - | - | 0.0850 | 0.220 | 0.199 | 0.314 | 0.293 |
| | 2.5 | 00565 | | | | | | | | | | | | | 0.276 | 0.255 | 0.370 | 0.349 |
| | 3 | 00566 | | 13.50 | | | | | | | | | | | 0.331 | 0.310 | 0.425 | 0.404 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



| Thread Nominal | Recoil Spec Nominal Length Dia | Part # | Free Run Free Min-Max | Dia of Coils | Drill Size mm | Drill Size inch | A Minor Dia min | A Minor Dia max | B Major Dia min | C Class 2B min | C Class 2B max | C Class 3B min | C Class 3B max | E inserts fitted | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BSF** | | | | | | | | | | | | | | | | | | |
| | 1 | 00032 | | 4.40 | | | | | | | | | 0.187 | 0.156 | 0.327 | 0.296 | | |
| | 1.5 | 00033 | | 7.25 | | | | | | | | | | 0.281 | 0.250 | 0.421 | 0.390 | |
| 3/16-32 | 2 | 00034 | 5.80 - 6.00 | 10.15 | 5.00 | 13/64 | 0.192 | 0.198 | 0.2247 | .2075* | .2098* | not recommended | | 0.1475 | 0.375 | 0.344 | 0.515 | 0.484 |
| | 2.5 | 00035 | | 13.05 | | | | | | | | | | 0.468 | 0.437 | 0.608 | 0.577 | |
| | 3 | 00036 | | 15.95 | | | | | | | | | | 0.562 | 0.531 | 0.702 | 0.671 | |
| | 1 | 00042 | | 4.85 | | | | | | | | | | 0.250 | 0.212 | 0.423 | 0.385 | |
| | 1.5 | 00043 | | 7.95 | | | | | | | | | | 0.375 | 0.337 | 0.548 | 0.510 | |
| 1/4-26 | 2 | 00044 | 7.65 - 7.90 | 11.15 | 6.60 | 17/64 | 0.257 | 0.264 | 0.2957 | .2747* | .2774* | not recommended | | 0.2008 | 0.500 | 0.462 | 0.673 | 0.635 |
| | 2.5 | 00045 | | 14.25 | | | | | | | | | | 0.625 | 0.587 | 0.798 | 0.760 | |
| | 3 | 00046 | | 17.45 | | | | | | | | | | 0.750 | 0.712 | 0.923 | 0.0885 | |
| | 1 | 00052 | | 5.15 | | | | | | | | | | 0.312 | 0.267 | 0.516 | 0.471 | |
| | 1.5 | 00053 | | 8.55 | | | | | | | | | | 0.469 | 0.424 | 0.673 | 0.628 | |
| 5/16-22 | 2 | 00054 | 9.65 - 9.90 | 11.85 | 8.20 | 21/64 | 0.323 | 0.33 | 0.3662 | .3416* | .3447* | not recommended | | 0.2543 | 0.625 | 0.580 | 0.829 | 0.784 |
| | 2.5 | 00055 | | 15.15 | | | | | | | | | | 0.781 | 0.736 | 0.985 | 0.940 | |
| | 3 | 00056 | | 18.55 | | | | | | | | | | 0.937 | 0.982 | 1.141 | 1.096 | |
| | 1 | 00062 | | 5.75 | | | | | | | | | | 0.375 | 0.325 | 0.600 | 0.550 | |
| | 1.5 | 00063 | | 9.45 | | | | | | | | | | 0.562 | 0.512 | 0.787 | 0.737 | |
| 3/8-20 | 2 | 00064 | 11.20 - 11.50 | 13.05 | 9.80 | 25/64 | 0.385 | 0.392 | 0.434 | .4070* | .4104* | not recommended | | 0.311 | 0.750 | 0.700 | 0.975 | 0.925 |
| | 2.5 | 00065 | | 16.75 | | | | | | | | | | 0.937 | 0.887 | 1.162 | 1.112 | |
| | 3 | 00066 | | 20.35 | | | | | | | | | | 1.125 | 1.075 | 1.350 | 1.300 | |
| | 1 | 00072 | | 6.15 | | | | | | | | | | 0.437 | 0.381 | 0.687 | 0.631 | |
| | 1.5 | 00073 | | 9.95 | | | | | | | | | | 0.656 | 0.600 | 0.906 | 0.850 | |
| 7/16-18 | 2 | 00074 | 13.00 - 13.35 | 13.75 | 11.50 | 29/64 | 0.45 | 0.458 | 0.503 | 0.473 | 0.4767 | .4730* | 0.4751* | 0.3663 | 0.875 | 0.819 | 1.125 | 1.069 |
| | 2.5 | 00075 | | 17.65 | | | | | | | | | | 1.093 | 1.037 | 1.343 | 1.287 | |
| | 3 | 00076 | | 21.45 | | | | | | | | | | 1.312 | 1.256 | 1.562 | 1.506 | |
| | 1 | 00082 | | 6.25 | | | | | | | | | | 0.500 | 0.737 | 0.781 | 0.719 | |
| | 1.5 | 00083 | | 10.15 | | | | | | | | | | 0.750 | 0.688 | 1.031 | 0.969 | |
| 1/2-16 | 2 | 00084 | 14.85 - 15.25 | 14.05 | 13.00 | 33/64 | 0.513 | 0.522 | 0.5736 | 0.54 | 0.544 | .5400* | 0.5423* | 0.42 | 1.000 | 0.938 | 1.281 | 1.219 |
| | 2.5 | 00085 | | 17.95 | | | | | | | | | | 1.250 | 1.180 | 1.531 | 1.469 | |
| | 3 | 00086 | | 21.75 | | | | | | | | | | 1.500 | 1.438 | 1.781 | 1.719 | |
| | 1 | 00092 | | 7.25 | | | | | | | | | | 0.562 | 0.500 | 0.843 | 0.781 | |
| | 1.5 | 00093 | | 11.65 | | | | | | | | | | 0.844 | 0.782 | 1.125 | 1.063 | |
| 9/16-16 | 2 | 00094 | 16.50 - 16.85 | 15.95 | 14.50 | 37/64 | 0.577 | 0.586 | 0.6362 | 0.6025 | 0.6067 | 0.6025* | 0.6049* | 0.4825 | 1.125 | 1.062 | 1.406 | 1.344 |
| | 2.5 | 00095 | | 20.35 | | | | | | | | | | 1.406 | 1.344 | 1.687 | 1.625 | |
| | 3 | 00096 | | 24.75 | | | | | | | | | | 1.687 | 1.625 | 1.968 | 1.906 | |
| | 1 | 00102 | | 7.05 | | | | | | | | | | 0.625 | 0.554 | 0.946 | 0.875 | |
| | 1.5 | 00103 | | 11.25 | | | | | | | | | | 0.937 | 0.866 | 1.258 | 1.187 | |
| 5/8-14 | 2 | 00104 | 18.40 - 18.75 | 15.45 | 16.20 | 41/64 | 0.64 | 0.649 | 0.7091 | 0.6708 | 0.6752 | 0.6708 | 0.6734* | 0.5336 | 1.250 | 1.179 | 1.571 | 1.500 |
| | 2.5 | 00105 | | 19.75 | | | | | | | | | | | 1.562 | 1.491 | 1.883 | 1.812 |
| | 3 | 00106 | | 23.95 | | | | | | | | | | | 1.875 | 1.804 | 2.196 | 2.125 |

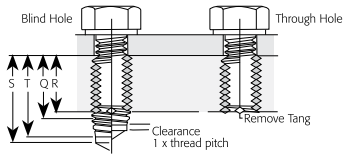
Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



# Recoil Tapped Hole and Fitted Size Data - BSF (con't)

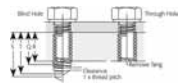
| Thread Nominal | Recoil Spec Nominal Length Dia | Part # | Free Run Free Min-Max | Dia of Coils | Drill Size mm | Drill Size inch | A Minor Dia min | A Minor Dia max | B Major Dia min | C Class 2B min | C Class 2B max | C Class 3B min | C Class 3B max | E inserts fitted | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 00122 | | 7.25 | | | | | | | | | | | 0.750 | 0.667 | 1.125 | 1.042 |
| | 1.5 | 00123 | | 11.65 | | | | | | | | | | | 1.125 | 1.042 | 1.500 | 1.417 |
| 3/4-12 | 2 | 00124 | 22.30 - 22.70 | 15.95 | 19.50 | 49/64 | 0.765 | 0.775 | 0.8478 | 0.8033 | 0.8082 | 0.8033* | 0.8062* | 0.6432 | 1.500 | 1.417 | 1.875 | 1.792 |
| | 2.5 | 00125 | | 20.35 | | | | | | | | | | | 1.875 | 1.792 | 2.250 | 2.167 |
| | 3 | 00126 | | 24.75 | | | | | | | | | | | 2.250 | 2.167 | 2.625 | 2.542 |
| | 1 | 00142 | | 7.85 | | | | | | | | | | | 0.875 | 0.784 | 1.284 | 1.193 |
| | 1.5 | 00143 | | 12.55 | | | | | | | | | | | 1.312 | 1.221 | 1.721 | 1.630 |
| 7/8-11 | 2 | 00144 | 25.50 - 25.90 | 17.15 | 22.50 | 57/64 | 0.89 | 0.9 | 0.9817 | 0.9332 | 0.9384 | 0.9332* | 0.9364* | 0.7586 | 1.750 | 1.659 | 2.159 | 2.068 |
| | 2.5 | 00145 | | 21.85 | | | | | | | | | | | 2.187 | 2.096 | 2.596 | 2.505 |
| | 3 | 00146 | | 26.55 | | | | | | | | | | | 2.625 | 2.534 | 3.034 | 2.943 |
| | 1 | 00162 | | 8.25 | | | | | | | | | | | 1.000 | 0.900 | 1.450 | 1.350 |
| | 1.5 | 00163 | | 13.05 | | | | | | | | | | | 1.500 | 1.400 | 1.950 | 1.850 |
| 1-10 | 2 | 00164 | 29.35 - 29.80 | 17.95 | 26.00 | 1 1/32 | 1.031 | 1.044 | 1.1173 | 1.0641 | 1.0697 | 1.0641* | 1.0675* | 0.872 | 2.000 | 1.900 | 2.450 | 2.350 |
| | 2.5 | 00165 | | 22.75 | | | | | | | | | | | 2.500 | 2.400 | 2.950 | 2.850 |
| | 3 | 00166 | | 27.65 | | | | | | | | | | | 3.000 | 2.900 | 3.450 | 3.350 |
| | 1 | 00202 | | 9.45 | | | | | | | | | | | 1.250 | 1.139 | 1.750 | 1.639 |
| | 1.5 | 00203 | | 14.85 | | | | | | | | | | | 1.875 | 1.764 | 2.375 | 2.264 |
| 1-1/4-9 | 2 | 00204 | 35.90 - 36.35 | 20.35 | 32.50 | 1 9/32 | 1.281 | 1.295 | 1.3803 | 1.3212 | 1.3274 | 1.3212* | 1.3250* | 1.1078 | 2.500 | 2.389 | 3.000 | 2.889 |
| | 2.5 | 00205 | | 25.75 | | | | | | | | | | | 3.125 | 3.014 | 3.625 | 3.514 |
| | 3 | 00206 | | 31.25 | | | | | | | | | | | 3.750 | 3.639 | 4.250 | 4.139 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



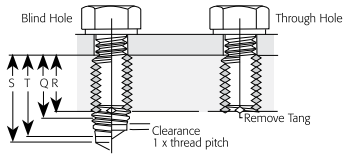
| Thread Nominal | Recoil Spec Nominal Length Dia | Part # | Free Run Free Min-Max | Dia of Coils | Drill Size mm | Drill Size inch | A Minor Dia min | A Minor Dia max | B Major Dia min | C Class 2B min | C Class 2B max | C Class 3B min | C Class 3B max | E inserts fitted | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BSP** | | | | | | | | | | | | | | | | | | |
| | 1 | 01022 | | 3.10 | | | | | | | | | | | 0.125 | 0.089 | 0.287 | 0.251 |
| | 1.5 | 01023 | | 4.75 | | | | | | | | | | | 0.187 | 0.151 | 0.349 | 0.313 |
| 1/8-28 | 2 | 01024 | 11.0 - 11.35 | 6.35 | 9.900 | 3/8 | 0.3900 | 0.4000 | 0.4258 | 0.4058 | 0.409 | not recommended | | 0.3372 | 0.250 | 0.214 | 0.412 | 0.376 |
| | 2.5 | 01025 | | 7.95 | | | | | | | | | | | 0.312 | 0.276 | 0.474 | 0.438 |
| | 3 | 01026 | | 9.60 | | | | | | | | | | | 0.375 | 0.339 | 0.537 | 0.501 |
| | 1 | 01042 | | 3.05 | | | | | | | | | | | 0.250 | 0.197 | 0.488 | 0.435 |
| | 1.5 | 01043 | | 5.35 | | | | | | | | | | | 0.375 | 0.322 | 0.613 | 0.560 |
| 1/4-19 | 2 | 01044 | 15.0 - 15.35 | 7.35 | 13.500 | 33/64 | 0.5300 | 0.5400 | 0.5803 | 0.5517 | 0.5556 | not recommended | | 0.4506 | 0.500 | 0.447 | 0.738 | 0.685 |
| | 2.5 | 01045 | | 9.85 | | | | | | | | | | | 0.625 | 0.572 | 0.863 | 0.810 |
| | 3 | 01046 | | 12.15 | | | | | | | | | | | 0.750 | 0.697 | 0.988 | 0.935 |
| | 1 | 01062 | | 5.85 | | | | | | | | | | | 0.375 | 0.322 | 0.613 | 0.560 |
| | 1.5 | 01063 | | 9.35 | | | | | | | | | | | 0.562 | 0.509 | 0.800 | 0.747 |
| 3/8-19 | 2 | 01064 | 18.6 - 18.85 | 12.95 | 17.000 | 21/32 | 0.6700 | 0.6800 | 0.7184 | 0.6897 | 1.6937 | not recommended | | 0.5886 | 0.750 | 0.697 | 0.988 | 0.935 |
| | 2.5 | 01065 | | 15.75 | | | | | | | | | | | 0.937 | 0.884 | 1.175 | 1.122 |
| | 3 | 01066 | | 19.25 | | | | | | | | | | | 1.125 | 1.072 | 1.363 | 1.310 |
| | 1 | 01082 | | 5.25 | | | | | | | | | | | 0.500 | 0.429 | 0.820 | 0.749 |
| | 1.5 | 01083 | | 8.60 | | | | | | | | | | | 0.750 | 0.679 | 1.070 | 0.999 |
| 1/2-14 | 2 | 01084 | 23.6 - 24.0 | 11.95 | 21.500 | 13/16 | 0.8400 | 0.8500 | 0.9092 | 0.8708 | 0.8754 | not recommended | | 0.7336 | 1.000 | 0.929 | 1.320 | 1.249 |
| | 2.5 | 01085 | | 15.25 | | | | | | | | | | | 1.250 | 1.179 | 1.570 | 1.499 |
| | 3 | 01086 | | 18.60 | | | | | | | | | | | 1.500 | 1.429 | 1.820 | 1.749 |
| | 1 | 01102 | | 6.95 | | | | | | | | | | | 0.625 | 0.554 | 0.945 | 0.874 |
| | 1.5 | 01103 | | 11.25 | | | | | | | | | | | 0.937 | 0.866 | 1.257 | 1.186 |
| 5/8-14 | 2 | 01104 | 25.4 - 26 | 15.45 | 23.500 | 59/64 | 0.9150 | 0.9270 | 0.9863 | 0.9478 | 0.9524 | 0.9478 | 0.9506 | 0.8106 | 1.250 | 1.179 | 1.570 | 1.499 |
| | 2.5 | 01105 | | 20.35 | | | | | | | | | | | 1.562 | 1.491 | 1.882 | 1.811 |
| | 3 | 01106 | | 23.95 | | | | | | | | | | | 1.875 | 1.804 | 2.195 | 2.124 |
| | 1 | 01122 | | 8.65 | | | | | | | | | | | 0.750 | 0.679 | 1.070 | 0.999 |
| | 1.5 | 01123 | | 13.75 | | | | | | | | | | | 1.125 | 1.054 | 1.445 | 1.374 |
| 3/4-14 | 2 | 01124 | 29.3 - 29.8 | 18.85 | 27.000 | 1 1/64 | 1.0530 | 1.0660 | 1.1255 | 1.0868 | 1.0918 | 1.0868 | 1.0898 | 0.9496 | 1.500 | 1.429 | 1.820 | 1.749 |
| | 2.5 | 01125 | | 24.05 | | | | | | | | | | | 1.875 | 1.804 | 2.195 | 2.124 |
| | 3 | 01126 | | 29.10 | | | | | | | | | | | 2.250 | 2.179 | 2.570 | 2.499 |
| | 1 | 01162 | | 9.15 | | | | | | | | | | | 1.000 | 0.909 | 1.410 | 1.319 |
| | 1.5 | 01163 | | 14.55 | | | | | | | | | | | 1.500 | 1.409 | 1.910 | 1.819 |
| 1"-11 | 2 | 01164 | 36.85 - 37.30 | | 33.500 | 1 9/32 | 1.3200 | 1.3350 | 1.4158 | 1.3673 | 1.3727 | 1.3673 | 1.3705 | 1.1926 | 2.000 | 1.909 | 2.410 | 2.319 |
| | 2.5 | 01165 | | 25.25 | | | | | | | | | | | 2.500 | 2.409 | 2.910 | 2.819 |
| | 3 | 01166 | | 30.55 | | | | | | | | | | | 3.000 | 2.909 | 3.410 | 3.319 |
| | 1 | 01202 | | 11.50 | | | | | | | | | | | 1.250 | 1.159 | 1.660 | 1.569 |
| | 1.5 | 01203 | | 18.00 | | | | | | | | | | | 1.875 | 1.784 | 2.285 | 2.194 |
| 1 1/4-11 | 2 | 01204 | 46.60 - 47.10 | 24.60 | | 1 43/64 | 1.6650 | 1.6800 | 1.7571 | 1.7083 | 1.7141 | 1.7083 | 1.7118 | 1.5336 | 2.500 | 2.409 | 2.910 | 2.819 |
| | 2.5 | 01205 | | | | | | | | | | | | | 3.125 | 3.034 | 3.535 | 3.440 |
| | 3 | 01206 | | | | | | | | | | | | | 3.750 | 3.659 | 4.160 | 4.069 |
| | 1 | 01242 | | 18.15 | | | | | | | | | | | 1.500 | 1.409 | 1.910 | 1.819 |
| | 1.5 | 01243 | | 27.95 | | | | | | | | | | | 2.250 | 2.159 | 2.660 | 2.569 |
| 1 1/2-11 | 2 | 01244 | 52.70 - 53.25 | 37.85 | | 1 29/32 | 1.9060 | 1.9210 | 1.9893 | 1.9403 | 1.9464 | 1.9403 | 1.944 | 1.7656 | 3.000 | 2.909 | 3.410 | 3.319 |
| | 2.5 | 01245 | | | | | | | | | | | | | 3.750 | 3.659 | 4.160 | 4.069 |
| | 3 | 01246 | | | | | | | | | | | | | 4.500 | 4.409 | 4.910 | 4.819 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink.Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



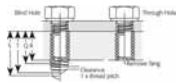
| Thread Nominal | Recoil Spec Nominal Length Dia | Part # | Free Run Free Min-Max | Dia of Coils | Drill Size mm | Drill Size inch | A Minor Dia min | A Minor Dia max | B Major Dia min | C Class 2B min | C Class 2B max | C Class 3B min | C Class 3B max | E inserts fitted | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BSW** | | | | | | | | | | | | | | | | | | |
| | 1 | 02032 | | 3.00 | | | | | | | | | | | 0.187 | 0.146 | 0.375 | 0.332 |
| | 1.5 | 02033 | | 4.90 | | | | | | | | | | | 0.281 | 0.24 | 0.468 | 0.426 |
| 3/16-24 | 2 | 02034 | 6.00 - 6.30 | 7.00 | 5 | 13/64 | 0.196 | 0.202 | 0.2365 | 0.2141* | 0.2166* | not recommended | | 0.1341 | 0.375 | 0.334 | 0.562 | 0.52 |
| | 2.5 | 02035 | | 9.30 | | | | | | | | | | | 0.468 | 0.427 | 0.656 | 0.612 |
| | 3 | 02036 | | 11.40 | | | | | | | | | | | 0.562 | 0.521 | 0.750 | 0.708 |
| | 1 | 02042 | | 3.375 | | | | | | | | | | | 0.250 | 0.200 | 0.475 | 0.425 |
| | 1.5 | 02043 | | 5.750 | | | | | | | | | | | 0.375 | 0.325 | 0.600 | 0.550 |
| 1/4-20 | 2 | 02044 | 8.10 - 8.35 | 8.000 | 6.7 | 17/64 | 0.261 | 0.267 | 0.3087 | 0.2820* | 0.2849* | not recommended | | 0.1860 | 0.500 | 0.450 | 0.725 | 0.675 |
| | 2.5 | 02045 | | 10.375 | | | | | | | | | | | 0.625 | 0.575 | 0.850 | 0.800 |
| | 3 | 02046 | | 12.750 | | | | | | | | | | | 0.750 | 0.700 | 0.975 | 0.925 |
| | 1 | 02052 | | 4.00 | | | | | | | | | | | 0.312 | 0.257 | 0.562 | 0.507 |
| | 1.5 | 02053 | | 6.60 | | | | | | | | | | | 0.469 | 0.413 | 0.719 | 0.663 |
| 5/16-18 | 2 | 02054 | 9.85 - 10.05 | 9.25 | 8.3 | 21/64 | 0.328 | 0.334 | 0.3777 | 0.3480* | 0.3512* | not recommended | | 0.2413 | 0.625 | 0.569 | 0.875 | 0.819 |
| | 2.5 | 02055 | | 11.85 | | | | | | | | | | | 0.781 | 0.726 | 1.031 | 0.976 |
| | 3 | 02056 | | 14.60 | | | | | | | | | | | 0.937 | 0.882 | 1.187 | 1.132 |
| | 1 | 02062 | | 4.375 | | | | | | | | | | | 0.375 | 0.312 | 0.656 | 0.594 |
| | 1.5 | 02063 | | 7.250 | | | | | | | | | | | 0.562 | 0.500 | 0.844 | 0.781 |
| 3/8-16 | 2 | 02064 | 11.50 - 11.85 | 10.000 | 9.9 | 25/64 | 0.39 | 0.398 | 0.4483 | 0.4150 | 0.4185 | 0.4150* | 0.4170* | 0.2950 | 0.750 | 0.687 | 1.031 | 0.969 |
| | 2.5 | 02065 | | 12.875 | | | | | | | | | | | 0.937 | 0.875 | 1.219 | 1.156 |
| | 3 | 02066 | | 15.750 | | | | | | | | | | | 1.125 | 1.062 | 1.406 | 1.344 |
| | 1 | 02072 | | 4.500 | | | | | | | | | | | 0.437 | 0.366 | 0.759 | 0.687 |
| | 1.5 | 02073 | | 7.375 | | | | | | | | | | | 0.656 | 0.585 | 0.978 | 0.906 |
| 7/16-14 | 2 | 02074 | 13.35 - 14.00 | 10.250 | 11.5 | 29/64 | 0.453 | 0.463 | 0.5212 | 0.4833 | 0.4871 | 0.4833* | 0.4855* | 0.3461 | 0.875 | 0.804 | 1.196 | 1.125 |
| | 2.5 | 02075 | | 13.125 | | | | | | | | | | | 1.093 | 1.022 | 1.415 | 1.343 |
| | 3 | 02076 | | 16.125 | | | | | | | | | | | 1.312 | 1.241 | 1.634 | 1.562 |
| | 1 | 02082 | | 4.25 | | | | | | | | | | | 0.500 | 0.417 | 0.888 | 0.792 |
| | 1.5 | 02083 | | 7.05 | | | | | | | | | | | 0.750 | 0.667 | 1.125 | 1.042 |
| 1/2-12 | 2 | 02084 | 15.15 - 15.60 | 9.85 | 13 | 17/32 | 0.515 | 0.525 | 0.5973 | 0.5333 | 0.5575 | 0.5533* | 0.5557* | 0.3932 | 1.000 | 0.917 | 1.375 | 1.292 |
| | 2.5 | 02085 | | 12.45 | | | | | | | | | | | 1.250 | 1.167 | 1.625 | 1.542 |
| | 3 | 02086 | | 15.45 | | | | | | | | | | | 1.500 | 1.417 | 1.875 | 1.792 |
| | 1 | 02092 | | 5.125 | | | | | | | | | | | 0.562 | 0.479 | 0.937 | 0.854 |
| | 1.5 | 02093 | | 8.250 | | | | | | | | | | | 0.844 | 0.76 | 1.219 | 1.135 |
| 9/16-12 | 2 | 02094 | 16.99 - 17.70 | 11.500 | 15 | 19/32 | 0.578 | 0.588 | 0.6600 | 0.6158 | 0.6201 | 0.6158* | 0.6184* | 0.4557 | 1.125 | 1.042 | 1.500 | 1.417 |
| | 2.5 | 02095 | | 14.750 | | | | | | | | | | | 1.406 | 1.323 | 1.781 | 1.698 |
| | 3 | 02096 | | 17.125 | | | | | | | | | | | 1.687 | 1.604 | 2.062 | 1.979 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



| Thread Nominal | Nominal Length Dia | Part # | Recoil Spec Free Running Free Coil Dia. Min-Max | No. of Coils | Screw Locking Part # | DRILLED HOLE DIA** Min | DRILLED HOLE DIA** Max | PITCH DIAMETER Min | PITCH DIAMETER Max | TAP MAJOR DIAMETER Max | ASSEMBLED INSERT PITCH DIAMETER Min | ASSEMBLED INSERT PITCH DIAMETER Max | BASIC LENGTH OF INSERT NOMINAL DIAMETER OF SCREW "D" Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8UN** | | | | | | | | | | | | | | | | |
| | 1 | 06182 | | 6.95 | 16182 | | | | | | | | 28.575 | 25.400 | 42.863 | 39.688 |
| | 1.5 | 06183 | | 11.25 | 16183 | | | | | | | | 42.863 | 39.688 | 57.150 | 53.975 |
| 1 1/8-8 | 2 | 06184 | 32.00 - 32.90 | 13.45 | 16184 | 1.130 | 1.1550 | 1.1688 | 1.1757 | 1.261 | 1.0438 | 1.0528 | 57.150 | 53.975 | 71.438 | 68.263 |
| | 2.5 | 06185 | | 19.75 | 16185 | | | | | | | | 71.438 | 68.263 | 85.725 | 82.550 |
| | 3 | 06186 | | 23.95 | 16186 | | | | | | | | 85.725 | 82.550 | 100.013 | 96.838 |
| | 1 | 06202 | | 7.85 | 16202 | | | | | | | | 31.750 | 28.575 | 46.038 | 42.863 |
| | 1.5 | 06203 | | 12.75 | 16203 | | | | | | | | 47.625 | 44.450 | 61.913 | 58.738 |
| 1 1/4-8 | 2 | 06204 | 35.00 - 36.00 | 17.35 | 16204 | 1.255 | 1.2800 | 1.2938 | 1.3008 | 1.386 | 1.1688 | 1.178 | 63.500 | 60.325 | 77.788 | 74.613 |
| | 2.5 | 06205 | | 22.15 | 16205 | | | | | | | | 79.375 | 76.200 | 93.663 | 90.488 |
| | 3 | 06206 | | 26.85 | 16206 | | | | | | | | 95.250 | 92.075 | 109.538 | 106.363 |
| | 1 | 06222 | | 8.85 | 16222 | | | | | | | | 34.925 | 31.750 | 49.213 | 46.038 |
| | 1.5 | 06223 | | 14.15 | 16223 | | | | | | | | 52.388 | 49.213 | 66.675 | 63.500 |
| 1 3/8-8 | 2 | 06224 | 38.50 - 39.50 | 19.35 | 16224 | 1.380 | 1.4050 | 1.4188 | 1.4259 | 1.511 | 1.2938 | 1.3031 | 69.850 | 66.675 | 84.138 | 80.963 |
| | 2.5 | 06225 | | 24.65 | 16225 | | | | | | | | 87.313 | 84.138 | 101.600 | 98.425 |
| | 3 | 06226 | | 29.95 | 16226 | | | | | | | | 104.775 | 101.600 | 119.063 | 115.888 |
| | 1 | 06242 | | 9.85 | 16242 | | | | | | | | 38.100 | 34.925 | 52.388 | 49.213 |
| | 1.5 | 06243 | | 15.45 | 16243 | | | | | | | | 57.150 | 53.975 | 71.438 | 68.263 |
| 1 1/2-8 | 2 | 06244 | 41.60 - 42.60 | 21.25 | 16244 | 1.505 | 1.5300 | 1.5438 | 1.551 | 1.636 | 1.4188 | 1.4283 | 76.200 | 73.025 | 90.488 | 87.313 |
| | 2.5 | 06245 | | 26.95 | 16245 | | | | | | | | 95.250 | 92.075 | 109.538 | 106.363 |
| | 3 | 06246 | | 32.65 | 16246 | | | | | | | | 114.300 | 111.125 | 128.588 | 125.413 |
| | 1 | 06262 | | 10.95 | 16262 | | | | | | | | 41.275 | 38.100 | 55.563 | 52.388 |
| | 1.5 | 06263 | | 17.15 | 16263 | | | | | | | | 61.913 | 58.738 | 76.200 | 73.025 |
| 1 5/8-8 | 2 | 06264 | 47.00 - 48.00 | 23.35 | 16264 | 1.630 | 1.6550 | 1.6688 | 1.6762 | 1.761 | 1.5438 | 1.5535 | 82.550 | 79.375 | 96.838 | 93.663 |
| | 2.5 | 06265 | | 29.55 | 16265 | | | | | | | | 103.188 | 100.013 | 117.475 | 114.300 |
| | 3 | 06266 | | 35.75 | 16266 | | | | | | | | 123.825 | 120.650 | 138.113 | 134.938 |
| | 1 | 06282 | | 11.85 | 16282 | | | | | | | | 44.450 | 41.275 | 58.738 | 55.563 |
| | 1.5 | 06283 | | 18.55 | 16283 | | | | | | | | 66.675 | 63.500 | 80.963 | 77.788 |
| 1 3/4-8 | 2 | 06284 | 50.30 - 51.40 | 25.25 | 16284 | 1.755 | 1.7800 | 1.7938 | 1.8013 | 1.886 | 1.6688 | 1.686 | 88.900 | 85.725 | 103.188 | 100.013 |
| | 2.5 | 06285 | | 31.85 | 16285 | | | | | | | | 111.125 | 107.950 | 125.413 | 122.238 |
| | 3 | 06286 | | 38.55 | 16286 | | | | | | | | 133.350 | 130.175 | 147.638 | 144.463 |
| | 1 | 06302 | | 12.85 | 16302 | | | | | | | | 47.625 | 44.450 | 61.913 | 58.738 |
| | 1.5 | 06303 | | 19.95 | 16303 | | | | | | | | 71.438 | 68.263 | 85.725 | 82.550 |
| 1 7/8-8 | 2 | 06304 | 53.00 - 54.00 | 27.15 | 16304 | 1.880 | 1.9050 | 1.9188 | 1.9264 | 2.011 | 1.7938 | 1.8038 | 95.250 | 92.075 | 109.538 | 106.363 |
| | 2.5 | 06305 | | 34.25 | 16305 | | | | | | | | 119.063 | 115.888 | 133.350 | 130.175 |
| | 3 | 06306 | | 41.45 | 16306 | | | | | | | | 142.875 | 139.700 | 157.163 | 153.988 |
| | 1 | 06322 | | 13.75 | 16322 | | | | | | | | 50.800 | 47.630 | 65.090 | 61.910 |
| | 1.5 | 06323 | | 21.45 | 16323 | | | | | | | | 76.200 | 73.030 | 90.490 | 87.310 |
| 2-8 | 2 | 06324 | 56.5 - 57.40 | 27.95 | 16324 | 2.030 | 2.0438 | 2.0515 | 2.136 | 1.9188 | 1.9289 | 2.005 | 101.600 | 98.430 | 115.890 | 112.710 |
| | 2.5 | 06325 | | 36.65 | 16325 | | | | | | | | 127.000 | 123.830 | 141.290 | 138.110 |
| | 3 | 06326 | | 44.25 | 16326 | | | | | | | | 152.400 | 149.230 | 166.690 | 163.510 |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S"minimum allows for tap clearance, the maximum amount of insert set-down and the countersink.Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



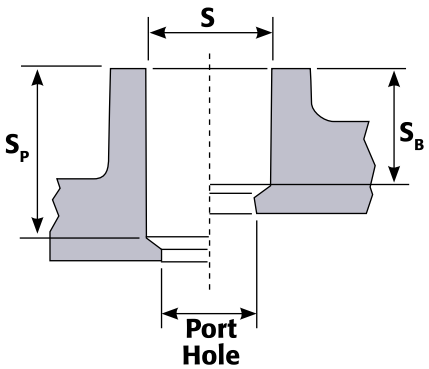
# Design and Installation Data - NPT

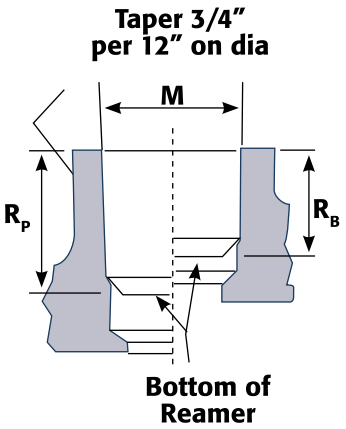
Drilled Hole

| Nominal Thread Size | S Diameter Reaming (Anpt) | No Reaming (NPT) | Min Depth Plug Tap $S_P$ | Bottom Tap $S_B$ |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 1/8-27 | U (.3680) | W (.3860) | 0.592 | 0.466 |
| 1/4-18 | 31/64 (.4844) | 33/64 (.5156) | 0.833 | 0.606 |
| 3/8-18 | 5/8 (.6250) | 21/32 (.6562) | 0.840 | 0.619 |
| 1/2-14 | 25/32 (.7812) | 1 1/64 (1.0156) | 1/074 | 0.794 |
| 3/4 - 14 | 63/64 (.9844) | 1 1/64 (1.0156) | 1.074 | 0.794 |
| 1-11 1/2 | 1 1/4 (1.2500) | 1 9/32 (1.2812) | 1.302 | 0.972 |

Reamed Hole

| M Diameter Min | Max | Min Depth* Plug Top $R_P$ | Bottom Top $R_B$ |
|---|---|---|---|
| 5 | 6 | 7 | 8 |
| 0.3963 | 0.4047 | 0.519 | 0.447 |
| 0.5265 | 0.5386 | 0.676 | 0.578 |
| 0.6619 | 0.6740 | 0.684 | 0.590 |
| 0.8247 | 0.8390 | 0.841 | 0.726 |
| 1.0351 | 1.0494 | 0.846 | 0.745 |
| 1.2058 | 1.3125 | 1.005 | 0.892 |



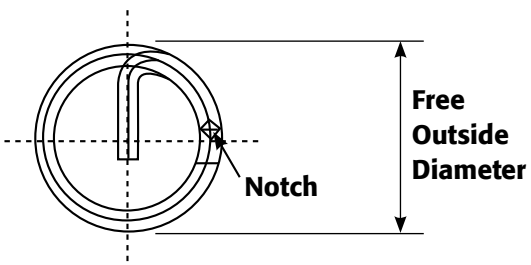

Tool Part Numbers

| Nominal Thread Size | Plug | Tap+ Bottom | Gages Plain Taper Plug | $L_1$ Thread Plug | $L_3$ Thread Plug | Inserting Tool | Extracting Tool |
|---|---|---|---|---|---|---|---|
| 1/8-27 | 46025 | 46026 | 66023P | 66023L1 | 66023L3 | 50313 | 50003 |
| 1/4-18 | 46045 | 46046 | 66043P | 66043L1 | 66043L3 | 50438 | 50003 |
| 3/8-18 | 46065 | 46066 | 66063P | 66063L1 | 66063L3 | 50500 | 50003 |
| 1/2-14 | 46085 | 46086 | 66083P | 66083L1 | 66083L3 | 50688 | 50003 |
| 3/4-14 | 46125 | 46126 | 66126P | 66123L1 | 66123L3 | 50875 | 50004 |
| 1-11 1/2 | 46165 | 46166 | 66166P | 66123L1 | 66163L3 | 51125 | 50004 |

May also be used in aluminium, cast iron, mild steel, and brass for limited production. Production taps for these and other materials are available on special order.

Insert Identification

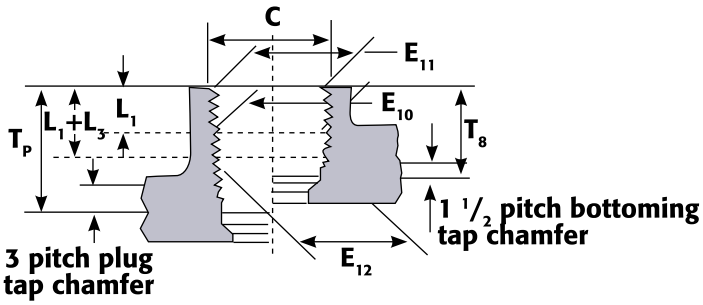
| Nominal Thread Size | Part No. | Free No. Length | Free Outside Diameter (Counted from Notch) | Max |
|---|---|---|---|---|
| 1/8-27 | 66023 | 0.273 | 5.15 | 0.511 |
| 1/4-18 | 66043 | 0.394 | 4.95 | 0.680 |
| 3/8-18 | 66063 | 0.407 | 5.35 | 0.828 |
| 1/2-14 | 66083 | 0.534 | 5.45 | 1.035 |
| 3/4-14 | 66123 | 0.553 | 5.8 | 1.262 |
| 1-11 1/2 | 66163 | 0.661 | 5.65 | 1.575 |



# Design and Installation Data - NPT

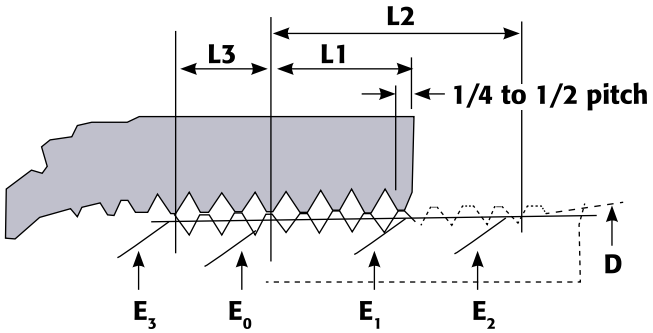
## Tapped Hole

| Pitch Diameters $E_{10}$ | Pitch Diameters $E_{11}$ | $E_{13}$ | Major Dia Max Plug Tap ($T_P$) | Major Dia Max Bottom Tap ($T_8$) | Min Depth |
|---|---|---|---|---|---|
| 10 | 11 | 12 | 13 | 14 | 15 |
| 0.41761 | 0.42770 | 0.41066 | 0.459 | 0.536 | 0.409 |
| 0.55967 | 0.57391 | 0.54925 | 0.621 | 0.749 | 0.568 |
| 0.69429 | 0.70929 | 0.68388 | 0.757 | 0.756 | 0.580 |
| 0.86579 | 0.88579 | 0.85240 | 0.947 | 0.962 | 0.740 |
| 1.07504 | 1.09623 | 1.06165 | 1.157 | 0.966 | 0.759 |
| 1.34531 | 1.37031 | 1.32901 | 1.445 | 1.172 | 0.929 |




## Assembled Insert Specifications

| Basic Lengths $L_1$ | $L_2$ | $L_1+L_3$ | Basic Pitch Diameters $E_0$ | $E_1$ | $E_2$ | $E_3$ | D |
|---|---|---|---|---|---|---|---|
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 0.1615 | 0.26385 | .27261 | 0.36351 | 0.37351 | 0.38000 | 0.35656 | 0.405 |
| 0.2278 | 0.40178 | 0.39447 | 0.47739 | 0.49163 | 0.5250 | 0.46697 | 0.540 |
| 0.240 | 0.40778 | 0.40667 | 0.61201 | 0.62701 | 0.63750 | 0.60160 | 0.675 |
| 0.320 | 0.53371 | 0.53429 | 0.75843 | 0.77843 | 0.79179 | 0.74504 | 0.840 |
| 0.399 | 0.68278 | 0.55329 | 0.96768 | 0.98887 | 1.00179 | 0.95429 | 1.050 |
| 0.400 | 0.68278 | 0.66087 | 1.21363 | 1.238631 | 1.25630 | 1.19733 | 1.315 |




### Notes:

Depths of reaming and tapping are reference dimensions only. Actual hole depths are governed by use of pipe thread gauges.

D = Outside diameter of pipe – major diameter of pipe thread at L2 from end of pipe

$E_0$ = Basic pitch diameter of thread at end of pipe
= D – (0.05D + 1.1) P

$E_1$ = Basic pitch diameter of thread at end of coupling
= E0 + 0.0625L1

$E_2$ = Basic pitch diameter of thread at L2 from end of pipe
= EO + 0.0625L2

$E_3$ = Basic pitch diameter of thread at L3 from end of pipe
= EO – 0.1875P

$L_1$ = Normal engagement by hand between external and internal threads

$L_2$ = Effective length of external thread
= P(0.8D + 6.8

$L_3$ = Normal wrench take-up

$L_1$ + $L_3$ = Effective length of internal threads.
Nominal insert length.
Minimum full thread in blind holes.
Minimum boss thickness for through holes.

### How to use inserts

Recoil Pipe Thread Insets are simply installed following the steps below described in the process sheet.

DRILL using a standard drill (and ream for AMPT)

TAP with a Recoil Tap

GAUGE the hole to recommended tolerance when required

INSTALL the inserts with Recoil tool

BREAK OFF THE TANG*

Important Note:
Spiral Leakage could occur due to extremes of truncation and pitch diameter tolerances can create crest and root (major and minor diameter) clearances that might allow a void. The normal practice of using sealing compounds should be followed when producing Recoil Pipe Thread Insert assemblies.

# Process Sheet - NPT

| Operation | ANPT | NPT | Procedure |
|---|---|---|---|
| Drilling | Col. 1 | Col. 2 | Normal drilling methods should be followed. Drill sizes are recommended only and test should be carried out to select the one suitable for the material and process involved. Drill to depth given in col. 3 or 4 |
| Taper reaming | | | Check hole with plain taper plug gauge (part number shown in Col. 27). Ream to depth shown in Col. 7 or 8 and diameter as shown in Col. 5 and 6 |
| Tapping | Col. 25 or 26 | | Normal tapping methods should be followed. Recoil pipe thread taps are wrapped with a strand of copper wire to indicate approximate tapping depth. Actual depth and size must be controlled by gauging. Tap to given depth in Col. 14 or 15 |
| Gauging | Col. 27 | | Plain taper plug: Used to check taper, roundness, and diameter at the crest of thread |
| | Col. 28 | | $L_1$ thread plug: used to check diameter, lead, form, and taper of that portion of thread which will be engaged when the male thread part is screwed in by hand. This is the only gauge used when working to NPT. Tapped hole must be within MIN and MAX steps on $L_1$ gauge.<br><br>$L_3$ thread plug: Used to check diameter, lead, form, and taper of thread at lower portion of hole – those threads that will be engaged by wrench pressure.<br><br>ANPT GAUGING PROCEDURE ANPT gauging requires the use of $L_1$, $L_3$ and plain taper gauges. $L_1$ and $L_3$ gauges have notches denoting Maximum (MX), Basic (B), and Minimum (MN). The plain taper plug gauge has three additional notches which indicate truncation tolerances: Maximum Tolerance (MXt), Basic Tolerances (Bt), and Minimum Tolerance (MNt). The use of these three gauges establishes an acceptable threaded hole as Maximum, Basic or Minimum.<br><br>First, gauge the hole with the $L_1$ gauge, noting the actual position of the steps in relation to the hole. If the Minimum step reaches the edge of the hole, the hole is classified Minimum. If $L_1$ stops at Basic or Maximum, the hole is classified either Basic or Maximum.<br><br>Now gauge the hole with the $L_3$ gauge, checking that the proper step comes into the same relative position with the edge of the hole that the $L_1$ did. The $L_3$ gauge must not vary more than ½ turn from the position established by the L1 gauge.<br><br>Finally, check the hole with the plain taper gauge. The edge of the hole must come between the Minimum (MN) and Minimum Tolerance (MNt) steps if Minimum is what the $L_1$ gauge showed the hole to be. (If the $L_1$ gauge showed the hole to be Basic, the plain plug would have to be between B and Bt; if $L_1$ were Maximum, the plain plug would have to be between MX and MXt)<br><br>Gauging of the assembled insert is not necessary if this procedure has been followed. |
| Inserts | Page 4 | | The same Recoil inserts are used for both ANPT and NPT. |
| Installation | Col. 30 | | Wind the insert in with light pressure until ¼ to ½ below the surface, driving tang towards the bottom of the hole. |

# Design and Installation Data - NPT

**Tang Removal**

Remove tool and sit back on top of tang. Tap down sharply. Do not twist tang off. Or with long nosed pliers pull the tang out.

**Assembly**

We recommend that a suitable non hardening paste type sealing compound be used with ANPT and NPT pipe threads. Application factors such as machining accuracy, type of fluid gas flowing through the connection, pressures, temperature and pipe material will determine the type of sealant best suited for the individual application. The following typical compounds are suggested for the conditions listed:

| | |
|---|---|
| Petroleum oils<br>Water, Steam | Antiseize compound per MIL-A-907<br>(Led-Plate 250, product of Armite Laboratories) |
| Oxygen system | Thread compound per MIL-T-5542<br>(Rectorseal-15, product of Rector Well Equipment Company) |

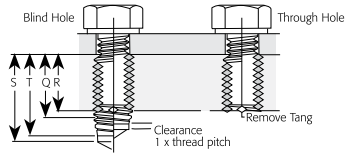
**Torque**

After applying thread compound to male thread, assemble male thread into installed insert using the following tightening torques per MIL-T-542

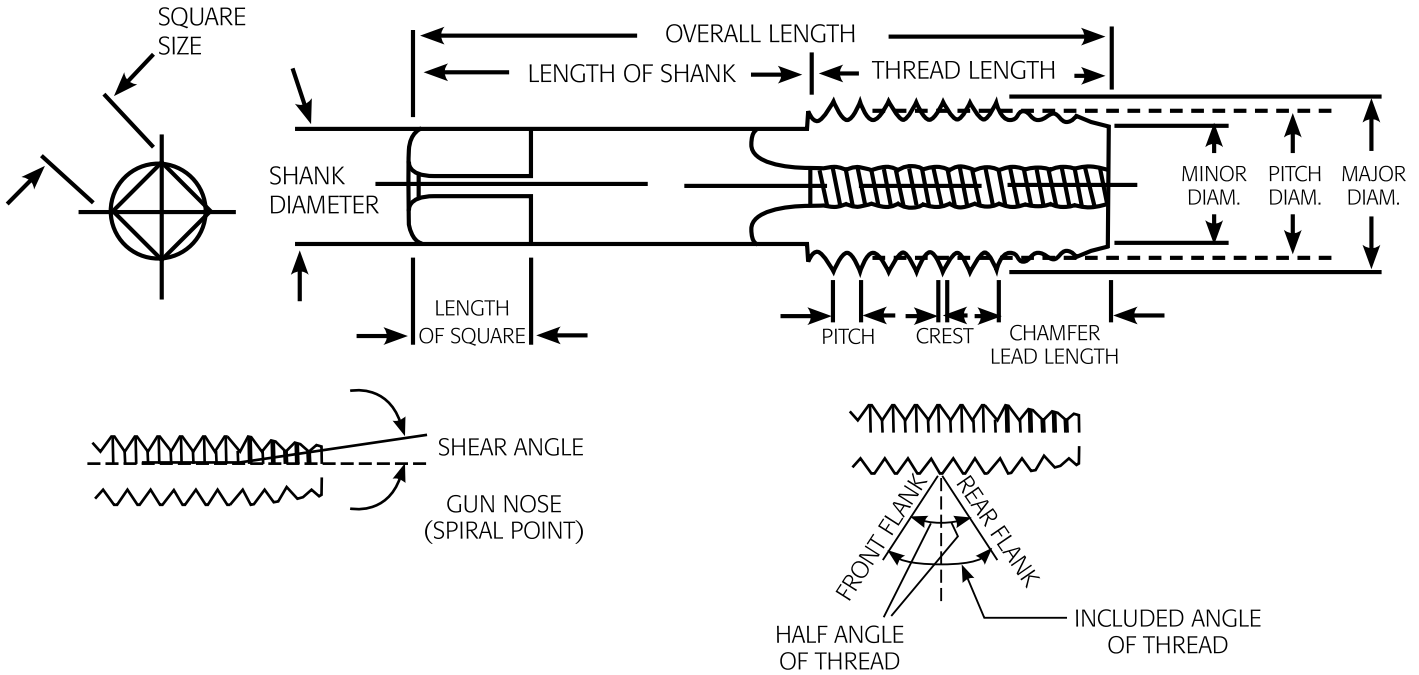
| | |
|---|---|
| ¾-14 | 950 inch pounds |
| 1/8 – 27 | 150 inch pounds |
| 1-11 ½ | 1800 inch pounds |
| ¼ - 18 | 250 inch pounds |
| 3/8 – 18 | 450 inch pounds |
| ½ - 14 | 600 inch pounds |

| NOMINAL THREAD SIZE **8UN** | MIN DRILL DEPTH DIAMETER | INSERT LENGTH | BOLT PROJECTION MINIMUM AND MAXIMUM INTERMEDIATE TAP | BOTTOMING TAP | N NOMINAL LENGTH 1 DIA | 1.5 DIA | 2 DIA | K NOMINAL LENGTH 1 DIA | 1.5 DIA | 2 DIA |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1D | 1.125 | 1.813 | 1.438 | | | | | | |
| 1 1/8-8 | 1.5D | 1.688 | 2.376 | 2.001 | 0.96 | 1.24 | 1.52 | 1.06 | 1.63 | 2.19 |
| | 2D | 2.250 | 2.938 | 2.563 | | | | | | |
| | 1D | 1.250 | 1.938 | 1.563 | | | | | | |
| 1 1/4-8 | 1.5D | 1.875 | 2.563 | 2.188 | 1.02 | 1.34 | 1.65 | 1.19 | 1.81 | 2.44 |
| | 2D | 2.500 | 3.188 | 2.813 | | | | | | |
| | 1D | 1.375 | 2.063 | 1.688 | | | | | | |
| 1 3/8-8 | 1.5D | 2.062 | 2.750 | 2.375 | 1.09 | 1.43 | 1.77 | 1.31 | 2.00 | 2.69 |
| | 2D | 2.750 | 3.438 | 3.063 | | | | | | |
| | 1D | 1.500 | 2.188 | 1.813 | | | | | | |
| 1 1/2-8 | 1.5D | 2.250 | 2.938 | 2.563 | 1.15 | 1.52 | 1.90 | 1.44 | 2.19 | 2.94 |
| | 2D | 3.000 | 3.688 | 3.313 | | | | | | |
| | 1D | 1.625 | 2.313 | 1.938 | | | | | | |
| 1 5/8-8 | 1.5D | 2.438 | 3.126 | 2.751 | 1.27 | 1.68 | 2.09 | 1.56 | 2.38 | 3.19 |
| | 2D | 3.250 | 3.938 | 3.563 | | | | | | |
| | 1D | 1.750 | 2.438 | 2.063 | | | | | | |
| 1 3/4-8 | 1.5D | 2.625 | 3.313 | 2.938 | 1.52 | 1.96 | 2.40 | 1.69 | 2.65 | 3.44 |
| | 2D | 3.500 | 4.188 | 3.813 | | | | | | |
| | 1D | 1.875 | 2.563 | 2.188 | | | | | | |
| 1 7/8-8 | 1.5D | 2.812 | 3.500 | 3.125 | 1.59 | 2.05 | 2.52 | 1.81 | 2.75 | 3.69 |
| | 2D | 3.750 | 4.438 | 4.063 | | | | | | |
| | 1D | 2.000 | 2.688 | 2.313 | | | | | | |
| 2-8 | 1.5D | 3.000 | 3.688 | 3.313 | 1.65 | 2.15 | 2.65 | 1.94 | 2.94 | 3.94 |
| | 2D | 4.000 | 4.688 | 4.313 | | | | | | |

Drill Depth: The minimum drilling depth "S"allows for one pitch chip clearance between the tip of the tap and the bottom of the drilled hole."S" minimum allows for tap clearance, the maximum amount of insert set-down and the countersink. Where a spiral pointed tap is used, the drill depths shown should be increased to allow for chip clearance. Fitted Insert: R = Maximum length of engaged portion of screw when tang is removed. Q = Minimum full tapped thread length. T = Minimum tapping depth - including 3 1/2 threads of plug tap. S = Minimum drill depth - excluding point.



# Tap Terminology




### Actual Size
An actual size is a measured size

### Allowance
An allowance is the prescribed difference between the design (maximum material) size and the basic size. It is numerically equal to the absolute value of the ISO term fundamental deviation.

### Angle of Thread
The included angle between the flanks of a thread measured in an axial plane

### Back Taper
A slight taper on the threaded portion of the tap making the pitch diameter near the shank smaller than that at the centre

### Basic
The theoretical or nominal standards size from which all variations are made

### Chamfer
The tapered and relieved cutting teeth at the front end of the threaded section. Common types of chamfer are taper, intermediate or bottoming

### Crest
The top joining the two sides or flanks of a thread

### Crest Clearance
The space between the crest of a thread and the root of its component

### Cutting Face
The leading face of the land

### Flank
The surface of the thread, sometimes referred to as the side of the thread which connects the crest with the root

### Flute
The longitudinal channels formed om a tap to create cutting edges on the thread profile

### Hand of Threads
- A Right Hand Thread is advanced by turning it to the right or clockwise
- A Left Hand Thread is advanced by turning it to the left or antic lock wise
- All left handed threads are designated LH

### Heel
The following side of the land

### Height of the Thread
In profile, the distance between the crest and bottom section of the thread measured normal to the axis

### Helix Angle - Flute
Flutes of taps are sometimes cut helically instead of straight. This helix angle is the angle made by the flute with the axis of the tap. (Helical Flutes are commonly r eferred to as spiral flutes.)

# Tooling

## Recoil Tools

AFS supplies a range of associated Recoil tooling to facilitate Recoil insert installation. The advantage of the Recoil tooling system is its simplicity, versatility, and ease of use. The hand installation tooling range includes the manual installation tool, the semi production "Prewinder" type, as well as manual and spring operated tang break off tools.

### Trade Series Kit

Recoil's innovative and cost-effective thread repair kits are utilized worldwide in industrial and automotive maintenance situations. Each kit contains:

1 New combo tap and installation tool
- tap wrench no longer required

2 Magnetic Tang Break Tool - for easy tang removal in blind holes

3 H.S.S. Drill

### Spark Plug Kit

Spark plug kits have pilot nose taps for accurate self alignment eliminating the need for drilling. The table below denotes the Recoil Insert Kit part numbers for each available thread size together with details of insert quantities included with each thread repair kit.

### Manual Installation Tool

The standard Recoil insert installation tool is the most practical and simple to use for general applications. This tool may be used to install 1D through to 3D length inserts, but care must be taken to ensure that the adjustable collar is correctly set to suit the particular type and length of the Recoil insert. If the collar is incorrectly set, the insert will not drive properly and the tool may slip off the tang as the insert enters the hole. For general use, the collar should be adjusted such that the insert tang is positioned mid-way along the slot with the insert coils compressed. This will allow the insert free movement to suit the parent material thread pitch during installation.

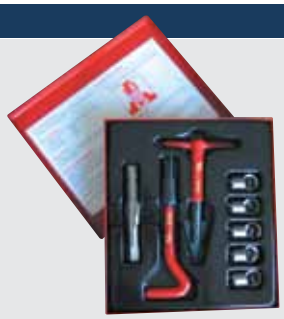
If the installation tool is used to break off the tang, then it must be lifted clear of the insert following installation and replaced into the insert at 90 degrees to its drive position. This ensures that the tool is correctly placed on the insert tang. Tap the tool sharply downward to produce a clean tang break.

**Note: The manual installation tool is not recommended for the installation of locking inserts.**

**Note: Recoil manual tools are not recommended for use with other brands of wire thread inserts.**

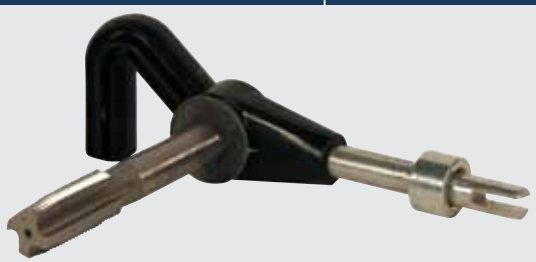
Trade Series Kit/Pro XL

Spark Plug Kit



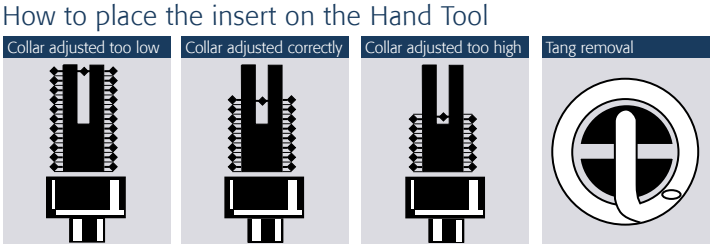
Manual Installation Tool

Square Drive Installation Tool with tap



* Tap Square is only suitable for non-ferrous alloys. Tap drive, tang break and drill only up to 1/2"

### How to place the insert on the Hand Tool



# Tooling

## Pre-Winder Installation Tools

This type of tool is ideal for installing inserts in small production runs or in areas where compressed air or electricity are not available and offers a quicker alternative to the simple hand installation tool. The tool is suitable for use when installing free running and locking inserts.

The mandrel is wound into the insert which is then installed into the tapped hole. During installation the insert diameter is reduced when passing through the bottom of the prewinder tool chamber making it easier to install. The mandrel is removed by turning the crank in a counter clockwise direction, leaving the insert in place.

## Threaded Mandrel Type

The threaded mandrel type is suitable for the installation of free running and locking inserts. The mandrel is wound into the insert which is then wound into the tapped hole. The mandrel is removed by turning the crank in a counter clockwise direction, leaving the insert in place.

**Note: The threaded mandrel type installation tool is recommended for installing locking inserts.**

**Note: Non Captive Prewinder – Installation toll with Pre-pressing cartridge Only for special utilisation and fine thread pitches.**

'Prewinder' Non Captive Type Installation Tool

Semi Production 'Pre-Winder' Type Installation Tool - **Metal Body**

Semi Production 'Pre-Winder' Lightweight Type Installation Tool - **Plastic Body**

## Recoil Tang Break Off Tools

Tang break off tools are available in hand, semi automatic spring type and pneumatic..The spring loaded and pneumatic tang break tools are recommended for removal of tangs in production applications. For large diameter fine thread inserts, e.g. M18-1.5 and above, 3/4- 16 and above, the use of long nose pliers is an alternative method to break the tang.

## Manual Tang Break Tool

The simple Recoil manual magnetic tang removal tool is suitable for low volume tang removal and is used for insert sizes up to 1/2" or M12. The magnet allows for easy retrieval of the tang.

On larger sizes the multipurpose Recoil installation and tang break tool should be used. For tang removal, the tool is simply lifted and turned 90°, which will put the slot at right angles to the tang, then pushed downward with a sharp blow.

Magnetic Tang Break Tool

## Spring Loaded Tang Break Tool

Spring loaded tang break tools offer effective removal of insert tangs and are suited from medium to large insert usage. Being spring loaded this tool requires no external power source and is suitable for tang removal on insert sizes up to 1/2" or M12.This tool is a spring loaded punch and when the tool is pushed down, the pin punches downward breaking off the tang.

Spring Loaded Tang Break Tool

# Tooling

## Pneumatic Tang Break Tool

The pneumatic tang break tool is designed for high volume applications where rapid, effortless tang removal is required on insert sizes up to 3/4" or M20.This tool works on the same basis as the spring loaded tool, except the pin punches downward when an air cylinder is actuated by the valve.

Pneumatic Tang Break Tool

| INSERT PART | MANUAL TANG BREAK | SPRING (ATBO) TYPE | PNEUMATIC TYPE |
|---|---|---|---|
| 2-56, M2, M2.2 | 59060M | 59061 | 59062 |
| 3-48, 3-56, M2.5 | 59070M | 59071 | 59072 |
| 4-40, 4-48 | 59080M | 59081 | 59082 |
| 5-40, M3 | 59090M | 59091 | 59092 |
| 6-32, 6-40, M3.5 | 59100M | 59101 | 59102 |
| 8-32, 8-36, M4 | 59130M | 59121 | 59132 |
| 10-24, 12-24 | 59140M | 59141 | 59142 |
| 10-32, M5 | 59160M | 59141 | 59142 |
| 1/4-20, 1/4-28,M6 | 59190M | 59181 | 59192 |
| 5/16-18 | 59220M | 59241 | 59252 |
| 5/16-24, M8 | 59250M | 59241 | 59252 |
| 3/8-16, M10-1.5 | 59280M | 59291 | 59252 |
| 3/8-24, M10-1.25 | 59310M | 59291 | 59252 |
| 7/16-14, 7/16-20, M11-1.25 | 59340M | | |
| 1/2-12, 1/2-13, M12-1.75 | 59380M | | 59332 |
| M14-1.5 | | | 59462 |

Refer to page 58 for Production Installation Tooling

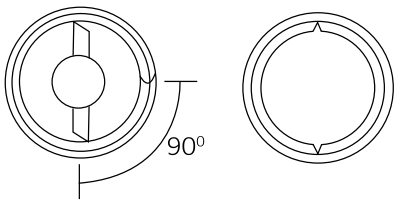
# Tooling

## Extraction Tool

Should inserts need to be removed, the use of the Recoil extraction tool is recommended. Extraction tools are simple and easy to use. As correct positioning will make the extraction easier, the tool should be turned 90° from the start of the coil allowing easy winding out of the insert. If the extraction tool is not gripping the insert, the edges can be resharpened.

Extraction Tool

| Size of extraction tool and related size inserts | | | |
|---|---|---|---|
| Size | Inch | Metric | Part No. |
| No.2 | 4-40 - 3/8 | M3 - M10 | 50002 |
| No.3 | 6-32 - 1 | M4 - M24 | 50003 |
| No.4 | 1 1/8 - 1/2 | M27 - M39 | 50004 |
| No.5 | 1 1/2 - 2 1/2 | M8 - M65 | 50005 |




Should the extracting tool not grip the insert, file a small notch in the insert for the tool to bite into.

## Recoil Thread Gauges

Thread gauging is recommended wherever precision threads are required.The quality of the tapped hole which accommodates the insert determines the finished size and hole quality after the insert has been installed. If the finished tapped hole gauges satisfactorily, the installed insert will be within the thread tolerance.

Thread Pitch Gaiuge

## Technical Information

Recoil gauges 1/2" M12 and below have at least a .0002" or 5um wear allowance on the Go nib.Gauge handle and all gauge nibs are marked with the extreme product limits for particular size and class of fit. Where precision is required, 3B gauges should be used. When using locking inserts, 3B gauges should be used as close precision is required.

| THREAD / TOLERANCE | CLOSE | MEDIUM |
|---|---|---|
| Metric | 4H5H | 5H |
| UN | 3B | 2B |
| Imperial | CLOSE | MEDIUM |

## Fits and Tolerances

Recoil gauges are supplied for two different classes of fit (tolerances).These are close and medium tolerance. Gauges are used to check the pitch diameter of the tapped hole; the "NoGo" end of the gauge checks the pitch diameter is not too large and the "Go" end checks the pitch diameter is not too small.

# Recoil Kits/Tools Metric

| Thread Size/Pitch | Kits | Installation Tools | Production Insertion Tools | | | Electric Mandrels | Tangbreak Tools | Extraction Tool | Gauges | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-Winder | Light - Winder | Non - Captive | | | | 4H5H Tol. | 5H MED |
| *M2 - 0.4 | 35028 | 50061-20 | | | | 55027B | 59060M | 50002 | 65024 | 65025 |
| *M2.2 - 0.45 | 35018 | 50061-21 | 55011 | | | | 59060M | 50002 | 65014 | 65015 |
| *M2.5 - 0.45 | 35258 | 50069-17 | 55251 | | | 55257B | 59070M | 50002 | 65254 | 65255 |
| *M3 - 0.5 | 35038 | 50089-17 | 55031 | 55032U | | 55037B | 59090M | 50002 | 65034 | 65035 |
| *M3.5 - 0.6 | 35358 | 50095-15 | 55351 | | | | 59100M | 50002 | 65354 | 65355 |
| *M4 - 0.7 | 35048 | 50125-13 | 55041 | 55042U | | 55047B | 59130M | 50003 | 65044 | 65045 |
| *M5 - 0.8 | 35058 | 50156-9 | 55051 | 55052U | | 55057B | 59160M | 50003 | 65054 | 65055 |
| *M6 - 1 | 35068 | 50188-5 | 55061 | 55062U | | 55067B | 59190M | 50003 | 65064 | 65065 |
| *M7 - 1 | 35078 | 50219-4 | 55071 | | | | 59220M | 50003 | 65074 | 65075 |
| M8 - 0.75 | N/A | 50250-0 | | | | | | 50003 | | |
| *M8 - 1 | 37088 | 50250-7 | 57081 | | | | 59250M | 50003 | 67084 | 67085 |
| *M8 - 1.25 | 35088 | 50250-7 | 55081 | 55082U | | 55087B | 59250M | 50003 | 65084 | 65085 |
| *M9 - 1 | 37098 | 50281-5 | | | | | 59280M | 50003 | 67094 | 67095 |
| *M9 - 1.25 | 35098 | 50281-5 | | | | | 59280M | 50003 | 65094 | 65095 |
| *M10 - 1 | 38108 | 50313-12 | 58101 | | | 58107B | 59310M | 50003 | | |
| *M10 - 1.25 | 37108 | 50281-4 | 57101 | 57102U | | | 59310M | 50003 | 67104 | 67105 |
| *M10 - 1.5 | 35108 | 50281-4 | 55101 | 55102U | | 55107B | 59280M | 50003 | 65104 | 65105 |
| *M11 - 1 | 38118 | 50344-4 | | | | | 59340M | 50003 | 68114 | 68115 |
| *M11 - 1.25 | 37118 | 50344-4 | | | | | 59340M | 50003 | 67114 | 67115 |
| *M11 - 1.5 | 35118 | 50344-4 | | | | | 59340M | 50003 | 65114 | 65115 |
| *M12 - 1 | N/A | 50375-0 | | | | | | | | |
| *M12 - 1.25 | 38128 | 50375-1 | 58121 | | | | 59380M | 50003 | | |
| *M12 - 1.5 | 37128 | 50375-1 | 57121 | 57122U | | 57127B | 59380M | 50003 | 67124 | 67125 |
| *M12 - 1.75 | 35128 | 50375-1 | 55121 | 55122U | | 55127B | 59380M | 50003 | 65124 | 65125 |
| M13 - 1.25 | 38138 | 50375-0 | | | | | | 50003 | 68134 | 68135 |
| M13 - 1.5 | 37138 | 50375-0 | | | | | | 50003 | 67134 | 67135 |
| M13 - 1.75 | 35138 | 50375-0 | | | | | | 50003 | 65134 | 65135 |
| M14 - 1.25 | 38148-1 | 50468-0 | | | | | | 50003 | | |
| M14 - 1.5 | 37148 | 50438-0 | 57141 | | | | | 50003 | 67144 | 67145 |
| M14 - 2 | 35148 | 50438-0 | 55146 | | | | | 50003 | 65144 | 65145 |
| M15 - 1.5 | 37150 | 50438-0 | | | | | | 50003 | 67154 | 67155 |
| M15 - 2 | 35158 | 50438-0 | | | | | | 50003 | 65154 | 65155 |
| M16 - 1.5 | 37168 | 50500-0 | | | 57161 | | | 50003 | 67164 | 67165 |
| M16 - 2 | 35168 | 50500-0 | 55166 | | 55161 | | | 50003 | 65164 | 65165 |
| M18 - 1.5 | 38188-1 | 50591-0 | 57181 | | | | | 50003 | | |
| M18 - 2 | 37188 | 50591-0 | | | | | | 50003 | 67184 | 67185 |
| M18 - 2.5 | 35188 | 50591-0 | 55186 | | | | | 50003 | 65184 | 65185 |
| M20 - 1.5 | 38200 | 50591-0 | | | 58201 | | | 50004 | 68204 | 68205 |
| M20 - 2 | 37208 | 50591-0 | | | | | | 50004 | 67204 | 67205 |
| M20 - 2.5 | 35208 | 50591-0 | | | | | | 50004 | 65204 | 65205 |
| M22 - 1.5 | 38220 | 50688 | | | | | | 50004 | 68224 | 68225 |
| M22 - 2 | 37220 | 50688 | | | | | | 50004 | 67224 | 67225 |
| M22 - 2.5 | 35220 | 50688 | | | | | | 50004 | 65224 | 65225 |
| M24 - 1.5 | 38240 | 50750 | | | | | | 50004 | 68244 | 68245 |
| M24 - 2 | 37240 | 50750 | | | | | | 50004 | 67244 | 67245 |
| M24 - 3 | 35240 | 50750 | | | | | | 50004 | 65244 | 65245 |
| M26 - 1.5 | 38260 | 50875 | | | | | | 50004 | 68264 | 68265 |
| M27 - 1.5 | 38270 | 50875 | | | | | | 50004 | 68274 | 68275 |
| M27 - 2 | 37270 | 50875 | | | 57271 | | | | 67274 | 67305 |
| M27 - 3 | 35270 | 50875 | | | | | | | 65274 | 65275 |
| M30 - 1.5 | 38300 | 51000 | | | | | | | 68304 | 68305 |
| M30 - 2 | 37300 | 51000 | | | | | | | 67304 | 67305 |
| M30 - 3 | 35300-3 | 51000 | | | | | | | 65304-3 | 65305-3 |
| M30 - 3.5 | 35300 | 51000 | | | | | | | 65304 | 65305 |
| M33 - 2 | 37330 | 51063 | | | | | | | | |
| M33 - 3.5 | 35330 | 51063 | | | | | | | | |
| M36 - 1.5 | 38360 | 51125 | | | | | | | 68364 | 68365 |

* Drill and magnetic tangbreak tool included

# Recoil Kits/Tools Metric

| Thread Size/Pitch | Kits | Installation Tools | Production Insertion Tools | | | Electric Mandrels | Tangbreak Tools | Extraction Tool | Gauges | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-Winder | Light - Winder | Non - Captive | | | | 4H5H Tol. | 5H MED |
| M36 - 3 | 37360 | 51125 | | | 57361 | | | | | |
| M36 - 4 | 35360 | 51125 | | | | | | | 65364 | 65365 |
| M39 - 2 | 38390 | 51250 | | | | | | | 68394 | 68395 |
| M39 - 3 | 37390 | 51250 | | | | | | | 67394 | 67395 |
| M39 - 4 | 35390 | 51250 | | | | | | | 65394 | 65395 |
| M42 - 2 | 38420 | 51250 | | | | | | | 68424 | 68425 |
| M42 - 3 | 37420 | 51250 | | | 57421 | | | | 67424 | 67425 |
| M42 - 4 | 35420-4 | 51250 | | | | | | | 65424-4 | 65425-4 |
| M42 - 4.5 | 35420 | 51250 | | | 55421 | | | | | |
| M45 - 3 | N/A | 51250 | | | | | | | | |
| M45 - 4.5 | 35450 | 51250 | | | | | | | 65424 | 65425 |
| M48 - 3 | N/A | 51500 | | | | | | | | |
| M48 - 4 | N/A | 51500 | | | | | | | | |
| M48 - 5 | N/A | 51500 | | | | | | | | |
| M52 - 3 | N/A | 51500 | | | 57421 | | | | | |
| M52 - 5 | N/A | 51500 | | | 55521 | | | | | |

# Recoil Kits/Tools Unified

| Thread Size/Pitch UNC | Kits | Installation Tools | Production Insertion Tools | | | | Electric Mandrels | Tangbreak Tools | Extraction Tool | Gauges | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-Winder | Mandrel | Light - Weight | Non - Captive | | | | 3BCLOSE | 2BMED |
| *#2 - 56 | 33528 | 50061-17 | 53521 | | 53522U | | 53527B | 59060M | | 63523 | 63522 |
| *#3 - 48 | 33538 | 50069-17 | 53531 | 53536 | 53532U | | | 59070M | | 63533 | 63532 |
| *#4 - 40 | 33548 | 50077-17 | 53541 | | 53542U | | 53547B | 59100M | 50002 | 63543 | 63542 |
| *#5 - 40 | 33558 | 50089-18 | 53551 | | 53542U | | | 59090M | 50002 | 63553 | 63552 |
| *#6 - 32 | 33568 | 50095-16 | 53561 | | 53562U | | 53576B | 59100M | 50002 | 63563 | 63562 |
| *#8 - 32 | 33588 | 50125-14 | 53581 | | 53582U | | 53587B | 59130M | 50002 | 63583 | 63582 |
| *#10 - 24 | 33608 | 50140-11 | 53601 | | 53602U | | 53607B | 59140M | 50002 | 63603 | 63602 |
| *#12 - 24 | 33628 | 50156-10 | 53621 | | 53622U | | | 59160M | 50002 | 63623 | 63622 |
| *1/4 - 20 | 33048 | 50188-10 | 53041 | | 53042U | | 53047B | 59190M | 50002 | 63043 | 63042 |
| *5/16 - 18 | 33058 | 50219-8 | 53051 | | 53052U | | 53057B | 59220M | 50002 | 63053 | 63052 |
| *3/8 - 16 | 33068 | 50281-4 | 53061 | | 53062U | | 53067B | 59280M | 50002 | 63063 | 63062 |
| *7/16 - 14 | 33078 | 50344-3 | 53071 | | 53072U | | 53077B | 59310M | 50003 | 63073 | 63072 |
| *1/2 - 13 | 33088 | 50375-2 | 53081 | | 53082U | | 53087B | 59380M | 50003 | 63083 | 63082 |
| 9/16 - 12 | 33098 | 50438-0 | 53091 | 53096 | | | | | 50003 | 63093 | 63092 |
| 5/8 - 11 | 33108 | 50500-0 | | 53106 | | 53101 | | | 50003 | 63103 | 63102 |
| 11/16 - 11 | 33110 | 50500-0 | | | | 53111 | | | 50003 | 63113 | 63112 |
| 3/4 - 10 | 33128 | 50591-0 | | 53126 | | 53121 | | | 50003 | 63123 | 63122 |
| 7/8 - 9 | 33140 | 50688 | | 53146 | | 53141 | | | 50003 | 63143 | 63142 |
| 1″ - 8 | 33160 | 50750 | | 53166 | | 53161 | | | 50003 | 63163 | 63162 |
| 1 1/8 - 7 | 33180 | 50875 | | 53186 | | | | | 50004 | 63183 | 63182 |
| 1 1/4 - 7 | 33200 | 51000 | | 53206 | | | | | 50004 | 63203 | 63202 |
| 1 3/8 - 6 | 33220 | 51063 | | 53226 | | | | | 50004 | 63223 | 63222 |
| 1 1/2 - 6 | 33240 | 51125 | | 53246 | | | | | 50004 | 63243 | 63242 |

* Drill and magnetic tangbreak tool included

# Recoil Kits/Tools Unified

| Thread Size/Pitch | Kits | Installation Tools | Production Insertion Tools | | | | Electric Mandrels | Tangbreak Tools | Extraction Tool | Gauges | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pre-Winder | Mandrel | Light - Weight | Non - Captive | | | | 3BCLOSE | 2BMED |
| UNF | | | | | | | | | | | |
| *#3 - 56 | 34538 | 50069-17 | 54531 | | | | | 59070M | 50002 | 64533 | 64532 |
| *#4 - 48 | 34548 | 50077-17 | 54541 | | 54542U | | | 59080M | 50002 | 64543 | 64542 |
| *#6 - 40 | 34568 | 50095-17 | 54561 | | 54562U | | | 59100M | 50002 | 64563 | 64562 |
| *#8 - 36 | 34588 | 50125-14 | 54581 | | 54582U | | | 59130M | 50002 | 64583 | 64582 |
| *#10 - 32 | 34608 | 50156-11 | 54601 | | 54602U | | 54607B | 59160M | 50002 | 64603 | 64602 |
| *#12 - 28 | 34628 | 50156-10 | | | | | | 59160M | 50002 | | |
| *1/4 - 28 | 34048 | 50188-10 | 54041 | | 54042U | | 54047B | 59190M | 50002 | 64043 | 64042 |
| *5/16 - 24 | 34058 | 50250-8 | 54051 | | 54052U | | 54057B | 59250M | 50002 | 64053 | 64052 |
| *3/8 - 24 | 34068 | 50313-6 | 54061 | | 54062U | | 54067B | 59280M | 50002 | 64063 | 64062 |
| *7/16 - 20 | 34078 | 50344-4 | 54071 | | 54072U | | 54077B | 59310M | 50003 | 64073 | 64072 |
| *1/2 - 20 | 34088 | 50375-3 | 54081 | | 54082U | | 54087B | 59380M | 50003 | 64083 | 64082 |
| 9/16 - 18 | 34098 | 50438-0 | | | | 54091 | | | 50003 | 64093 | 64092 |
| 5/8 - 18 | 34108 | 50500-0 | | | | 54101 | | | 50003 | 64103 | 64102 |
| 3/4 - 16 | 34128 | 50591-0 | | | | 54121 | | | 50003 | 64123 | 64122 |
| 7/8 - 14 | 34140 | 50688 | | | | 54141 | | | 50003 | 64143 | 64142 |
| 1" - 12 | 34160 | 50750 | | | | 54161 | | | 50003 | 64163 | 64162 |
| 1" - 14 | 34160-14 | 50750 | | | | 54171 | | | 50003 | 64163-14 | 64162-14 |
| 1 1/8 - 12 | 34180 | 51000 | | | | 54181 | | | 50004 | 64183 | 64182 |
| 1 1/4 - 12 | 34200 | 51063 | | | | | | | 50004 | 64203 | 64202 |
| 1 3/8 - 12 | 34220 | 51125 | | | | | | | 50004 | 64223 | 64222 |
| 1 1/2 - 12 | 34240 | 51250 | | | | | | | 50004 | 64243 | 64242 |

| BA | Kits | Tools | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *0BA | 30508 | 50188-5 | | | | | | 59190M | 50002 | | 60502 |
| *2BA | 30528 | 50140-9 | | | | | | 59140M | 50002 | | 60522 |
| *4BA | 30548 | 50095-15 | | | | | | 59100M | 50002 | | 60542 |
| *6BA | 30568 | 50077-17 | | | | | | 59070M | 50002 | | 60562 |

| BSC | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *5/16 - 26 | 36508 | 50250-4 | | | | | | 59250M | 50002 | | 66502 |
| *3/8 - 26 | 36608 | 50313-5 | | | | | | 59310M | 50002 | | 66602 |
| *7/16 - 26 | 36708 | 50344-4 | | | | | | 59340M | 50003 | | 66702 |
| *1/2 - 26 | 36808 | 50375-1 | | | | | | 59380M | 50003 | | 66802 |

| BSF | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *3/16 - 32 | 30038 | 50156-9 | | | | | | 59160M | 50002 | | 60032 |
| *1/4 - 26 | 30048 | 50188-5 | | | | | | 59190M | 50002 | | 60042 |
| *5/16 - 22 | 30058 | 50250-5 | | | | | | 59250M | 50002 | | 60052 |
| *3/8 - 20 | 30068 | 50281-5 | | | | | | 59280M | 50002 | | 60062 |
| *7/16 - 18 | 30078 | 50344-4 | | | | | | 59340M | 50003 | | 60072 |
| *1/2 - 16 | 30088 | 50375-1 | | | | | | 59380M | 50003 | | 60082 |
| 9/16 - 16 | 30098 | 50438-0 | | | | | | | 50003 | | 60092 |
| 5/8 - 14 | 30108 | 50500-0 | | | | | | | 50003 | | 60102 |
| 3/4 - 12 | 30128 | 50591-0 | | | | | | | 50003 | | 60122 |
| 7/8 - 11 | 30140 | 50688 | | | | | | | 50003 | | 60142 |
| 1" - 10 | 30160 | 50750 | | | | | | | 50003 | | 60162 |
| 1 1/4 - 9 | 30200* | 51000 | | | | | | | | | 60202 |

* Drill and magnetic tangbreak tool included

# Recoil Kits/Tools Unified

| Thread Size/Pitch | Kits | Installation Tools | Production Insertion Tools: Pre-Winder | Mandrel: Light - Weight | Mandrel: Non - Captive | Electric Mandrels | Tangbreak Tools | Extraction Tool | Gauges: 3BCLOSE | Gauges: 2BMED |
|---|---|---|---|---|---|---|---|---|---|---|
| BSP | | | | | | | | | | |
| *1/8 - 28 | 31028 | 50313-5 | | | | | 59310M | 50002 | | 61022 |
| 1/4 - 19 | 31048 | 50438-0 | | | | | | 50002 | | 61042 |
| 3/8 - 19 | 31068 | 50500-0 | | | | | | 50002 | | 61062 |
| 1/2 - 14 | 31080 | 50688 | | | | | | 50003 | | 64082 |
| 5/8 - 14 | 31100 | 50875 | | | | | | 50003 | | 61102 |
| 3/4 - 14 | 31120 | 51125 | | | | | | 50003 | | 61122 |
| 1″ - 11 | 31160 | | | | | | | 50003 | | 61162 |
| BSW | | | | | | | | | | |
| *1/8 - 40 | 32028 | 50089-19 | | | | | 59090M | 50002 | | 62022 |
| *3/16 - 24 | 32038 | 50140-9 | | | | | 59140M | 50002 | | 62032 |
| *1/4 - 20 | 32048 | 50188-5 | | | | | 59190M | 50002 | | 62042 |
| *5/16 - 18 | 32058 | 50219-8 | | | | | 59200M | 50002 | | 62052 |
| *3/8 - 16 | 32068 | 50281-4 | | | | | 59280M | 50002 | | 62062 |
| *7/16 - 14 | 32078 | 50344-1 | | | | | 59340M | 50003 | | 62072 |
| *1/2 - 12 | 32088 | 50375-1 | | | | | 59380M | 50003 | | 62082 |
| 9/16 - 12 | 32098 | 50438-0 | | | | | | 50003 | | 62092 |
| 5/8 - 11 | 32108 | 50500-0 | | | | | | 50003 | | 62102 |
| 3/4 - 10 | 32128 | 50591-0 | | | | | | 50003 | | 62122 |
| 7/8 - 9 | 32140 | 50688 | | | | | | 50003 | | 62142 |
| 1″ - 8 | 32160 | 50750 | | | | | | 50003 | | 62162 |
| 1 1/8 - 7 | 32180 | 50875 | | | | | | 50004 | | 62182 |
| 1 1/4 - 7 | 32200 | 51000 | | | | | | 50004 | | 62202 |
| 1 3/8 - 6 | 32220 | 50875 | | | | | | 50004 | | 62222 |
| 1 1/2 - 6 | 32240 | 51125 | | | | | | 50004 | | 62242 |
| NPT | | | | | | | | | | |
| *1/8 - 27 | 36028 | 50313-1 | | | | | 59310M | 50002 | | |
| 1/4 - 18 | 36048 | 50438-0 | | | | | | 50003 | | |
| 3/8 - 18 | 36068 | 50500-0 | | | | | | 50003 | | |
| 1/2 - 14 | 36080 | 50688 | | | | | | 50004 | | |
| 3/4 - 14 | 36120 | 50875 | | | | | | 50004 | | |
| 1 - 11 1/2 | 36160 | 51125 | | | | | | 50004 | | |
| 8 TPI UN | | | | | | | | | | |
| 1 1/8 - 8 | 36180 | 50875 | | | | | | 50004 | 66183 | 66182 |
| 1 1/4 - 8 | 36200 | 51000 | | | 56201 | | | 50004 | 66204 | 66202 |
| 1 3/8 - 8 | 36220 | 51063 | | | 56226 | | | 50004 | 66223 | 66222 |
| 1 1/2 - 8 | 36240 | 51125 | | | 56241 | | | 50004 | 66243 | 66242 |
| 1 5/8 - 8 | 36260 | 51250 | | | 56261 | | | 50005 | 66263 | 66262 |
| 1 3/4 - 8 | 36280 | 51250 | | | 56281 | | | 50005 | 66283 | 66282 |
| 1 7/8 - 8 | 36300 | 51500 | | | | | | 50005 | 66303 | 66302 |
| 2″ - 8 | 36320 | 51500 | | | 56321 | | | 50005 | 66323 | 66322 |
| 2 1/8 - 8 | N/A | | | | 56341 | | | 50005 | | |
| 2 1/4 - 8 | N/A | | | | 56361 | | | 50005 | | |
| 2 1/2 - 8 | N/A | 52125 | | | 56401 | | | 50005 | | |
| 2 3/4 - 8 | N/A | | | | 56441 | | | 50005 | | |
| 3″ - 8 | N/A | 52500 | | | 56481 | | | 50005 | | |

| Spark Plug Sizes | Kits | |
|---|---|---|
| M10 -1 SPK | 38108-2 | |
| M12 - 1.25 SPK | 38120-2 | |
| M14 - 1.25 | 38140 | |
| M14 - 1.25 SPK | 38148-2 | Contains 5 each x 3/4″ and 3/8″ spark plug inserts |
| M18 - 1.5 | 38188 | |

| Plugsaver Sizes | |
|---|---|
| M14 - 1.25 SPK | 38148 |

| Exhaust Analysis Size | |
|---|---|
| M18 - 1.5 | 38188-X |

* Drill and magnetic tangbreak tool included

# Production Installation Tooling

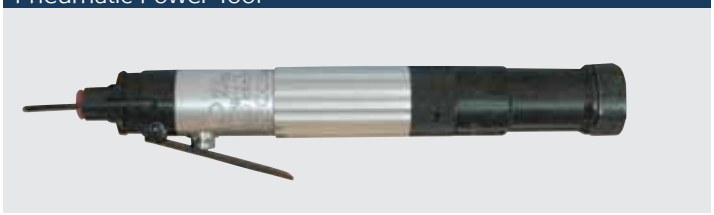
## Power Tools

The Recoil range of power tooling ensures consistent high volume thread insert installation for a variety of applications. Recoil powered installation tools may be supplied for use with either a compressed air supply or via a stabilized low voltage power supply to suit your particular requirements. Both equipment types offer significant productivity gains for high volume insert use.

## Pneumatic Power Tooling

- Wide thread size range #2-56 through 3/4",or M2.5 through M16, coarse and fine
- Rugged and versatile air motor
- May be used with captive strip feed or bulk insert insertion
- Standard speed 1500 rpm
- Auto reverse on release of trigger The complete pneumatic insert installation tool comprises three components:
- Air motor with single lever control to install and retract
- Adaptor - connect the motor to the insert drive nozzle - small and large types
- Front end assembly nozzle to suit the particular insert thread size

Pneumatic Power Tool



Front End Assembly

## Electric Power Tooling

- Size range #2-56 through 1/4", M2 through M10
- Auto reverse on installation
- Clean, lightweight, quiet
- Suitable for bulk insert only
- Easy Adjust Depth Control Collar
- Suitable for use with torque control
- Hardened Steel Hex Drive Mandrel screwdrivers
- alpha - 5000
- SB7 - 50

Electric Power Tool with Mandrel

## Compressed Air Supply for Pneumatic Installation Tools chart

| PRESSURE RECOMMENDATIONS FOR INSERT SIZES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Inch | #2 #4 | #5 | #6 | #8 #10 | 1/4" | 5/16" | 3/8" | 7/16" | 1/2" | |
| Metric | M2 - 2.5, M2.5 | M3 | M3.5 | M4, M5 | M6, M7 | M8 | M10 | - | M12 | |
| RECOMMENDED PRESSURE | | | | | | | | | | |
| psi | 25 | 20-30 | 25-30 | 40 | 45 | 50-60 | 60 | 70 | 70-80 | 90 |
| bar | 1.70 | 1.3-2.0 | 1.7-2.0 | 2.72 | 3.06 | 3.4-4.0 | 4.0 | 4.76 | 4.7-5.4 | 6.0 |
| MPa | 0.172 | 0.138-0.206 | 0.172-0.206 | 0.275 | 0.310 | .344-0.413 | 0.413 | 0.482 | 0.482-0.551 | 0.620 |

If difficulty is encountered within the above settings, reduce the pressure until the optimum setting is found. It is imperative that a regulated moisture-free and filtered air supply is used with all Recoil pneumatic tooling. Reliability will be affected if an adequate and regulated air supply is not used with these tools. Guidelines for typical Recoil insert tool pressure requirements are shown above.

## Strip-Feed Inserts

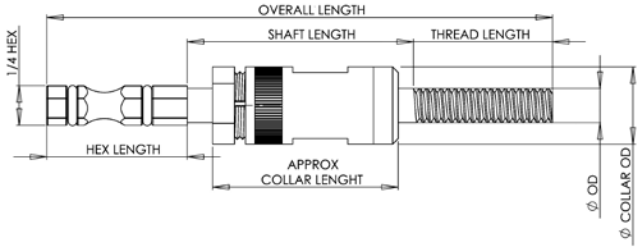
To complete the Recoil power installation tools, Recoil has inserts available on strip (M2.5-M12, #2-5/16) to optimize production with increased installation cycles and reduced operator fatigue. Recoil strip feed inserts provide many advantages such as minimized handling costs, faster, more economical assembly and positive inventory control. When used in combination with Recoil pneumatic installation tooling, each insert is retained in plastic strip which is passed through a slot in the front end assembly nozzle, indexing the insert to the installation mandrel. Recoil Strip-Feed inserts are available in most common thread diameters and lengths in addition to the various surface finishes which are available on standard Recoil bulk inserts. The table shows some commonly supplied Recoil Strip-Feed inserts and defines the typical quantity of inserts supplied per reel for each given thread size. Additional insert diameters and lengths may be available to special order.

| Electric Mandrel Metric Size | Part No. | OD (mm) | OD (inch) | Thread Length (mm) | Thread Length (inch) | Collar OD (mm) | Collar OD (inch) | Approx Collar Length (mm) | Approx Collar Length (inch) | Shaft Length (mm) | Shaft Length (inch) | Hex Length (mm) | Hex Length (inch) | Hex Drive | Overall Length (mm) | Overall Length (inch) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M2 x 0.4 | 55027B | 2.05 | 0.080 | 13 | 0.512 | 6 | 0.236 | 25.5 | 1.004 | 35 | 1.378 | 25.6 | 1.008 | 1/4″ | 73.5 | 2.894 |
| M2 x 0.45 | 55257B | 2.5 | 0.098 | 13 | 0.512 | 6 | 0.236 | 25.5 | 1.004 | 35 | 1.378 | 25.6 | 1.008 | 1/4″ | 73.5 | 2.894 |
| M3 x 0.5 | 55037B | 2.85 | 0.112 | 13 | 0.512 | 6 | 0.236 | 25.5 | 1.004 | 35 | 1.378 | 25.6 | 1.008 | 1/4″ | 73.5 | 2.894 |
| M4 x 0.7 | 55047B | 3.7 | 0.145 | 15 | 0.591 | 10 | 0.394 | 25 | 0.984 | 45 | 1.772 | 25.6 | 1.008 | 1/4″ | 85.5 | 3.366 |
| M5 x 0.8 | 55057B | 4.7 | 0.185 | 25 | 0.984 | 10 | 0.394 | 33 | 1.299 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 94 | 3.701 |
| M6 x 1.0 | 55067B | 5.75 | 0.226 | 25 | 0.984 | 10 | 0.394 | 33 | 1.299 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 94 | 3.701 |
| M8 x 1.25 | 55087B | 7.2 | 0.283 | 25 | 0.984 | 14 | 0.551 | 35 | 1.378 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 94 | 3.701 |
| M10 x 1.0 | 58107B | 9.75 | 0.383 | 35 | 1.378 | 16 | 0.630 | 37 | 1.457 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4″ | 101 | 3.976 |
| M10 x 1.25 | 57107B | 9.75 | 0.383 | 35 | 1.378 | 16 | 0.630 | 37 | 1.457 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4″ | 101 | 3.976 |
| M10 x 1.5 | 55107B | 9.35 | 0.368 | 35 | 1.378 | 16 | 0.630 | 37 | 1.457 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4″ | 101 | 3.976 |
| M12 x 1.5 | 57127B | 11.55 | 0.454 | 40 | 1.575 | 18 | 0.709 | 45 | 1.772 | 45.5 | 1.791 | 25.6 | 1.008 | 1/4″ | 111 | 4.370 |
| M12 x 1.75 | 55127B | 11.6 | 0.456 | 40 | 1.575 | 18 | 0.709 | 45 | 1.772 | 45.5 | 1.791 | 25.6 | 1.008 | 1/4″ | 111 | 4.370 |

| Electric Mandrel UNC Size | Part No. | OD (mm) | OD (inch) | Thread Length (mm) | Thread Length (inch) | Collar OD (mm) | Collar OD (inch) | Approx Collar Length (mm) | Approx Collar Length (inch) | Shaft Length (mm) | Shaft Length (inch) | Hex Length (mm) | Hex Length (inch) | Hex Drive | Overall Length (mm) | Overall Length (inch) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNC #2-56 | 53527B | 2.15 | 0.085″ | 15 | 0.591 | 6 | 0.236 | 25.5 | 1.004 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 84 | 3.307 |
| UNC #4-40 | 53547B | 2.7 | 0.106″ | 15 | 0.591 | 6 | 0.236 | 24.5 | 0.965 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 84 | 3.307 |
| UNC #6-32 | 53567B | 3.2 | 0.128″ | 16 | 0.630 | 6 | 0.236 | 25.6 | 1.008 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 85 | 3.346 |
| UNC #8-32 | 53587B | 3.9 | 0.154″ | 18 | 0.709 | 10 | 0.394 | 30 | 1.181 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 87 | 3.425 |
| UNC #10-24 | 53607B | 4.5 | 0.177″ | 18 | 0.709 | 10 | 0.394 | 30 | 1.181 | 43.5 | 1.713 | 25.6 | 1.008 | 1/4″ | 87 | 3.425 |
| UNC 1/4-20 | 53047B | 6.2 | 0.244″ | 26 | 1.024 | 14 | 0.551 | 35 | 1.378 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4″ | 92 | 3.622 |
| UNC 5/16-18 | 53057B | 7.3 | 0.287″ | 25 | 0.984 | 14 | 0.551 | 35 | 1.378 | 36.5 | 1.437 | 25.6 | 1.008 | 1/4″ | 87 | 3.429 |
| UNC 3/8-16 | 53067B | 9.1 | 0.358″ | 35 | 1.378 | 16 | 0.630 | 41 | 1.614 | 45.5 | 1.791 | 25.6 | 1.008 | 1/4″ | 106 | 4.177 |
| UNC 7/16-20 | 53077B | 10.5 | 0.413″ | 38 | 1.496 | 16 | 0.630 | 43 | 1.693 | 42.5 | 1.673 | 25.6 | 1.008 | 1/4″ | 106 | 4.177 |
| UNC 1/2-13 | 53087B | 12.1 | 0.476″ | 45 | 1.772 | 18 | 0.709 | 45 | 1.772 | 45.5 | 1.791 | 25.6 | 1.008 | 1/4″ | 116 | 4.571 |

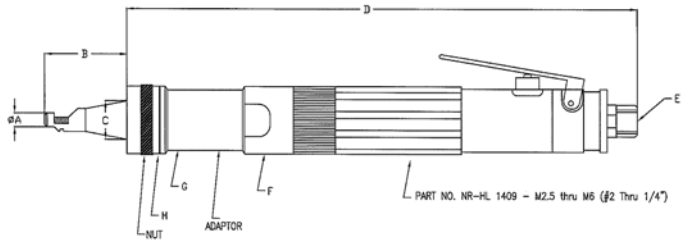
Dimensions are reference only

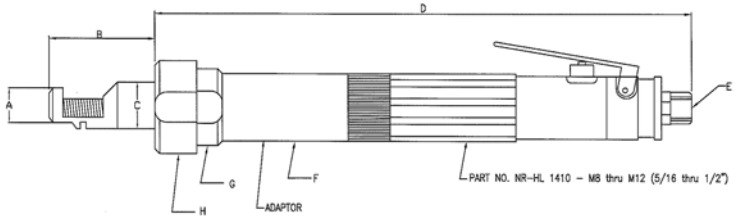
| Electric Mandrel UNF Size | Part No. | OD (mm) | OD (inch) | Thread Length (mm) | Thread Length (inch) | Collar OD (mm) | Collar OD (inch) | Approx Collar Length (mm) | Approx Collar Length (inch) | Shaft Length (mm) | Shaft Length (inch) | Hex Length (mm) | Hex Length (inch) | Hex Drive | Overall Length (mm) | Overall Length (inch) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNC #10-32 | 54607B | 4.5 | 0.177 | 21 | 0.827 | 10 | 0.394 | 35 | 1.378 | 35 | 1.378 | 25.6 | 1.008 | 1/4" | 81.5 | 3.209 |
| UNC 1/4-28 | 54047B | 6.3 | 0.248 | 25 | 0.984 | 14 | 0.551 | 37 | 1.457 | 36.5 | 1.437 | 25.6 | 1.008 | 1/4" | 87 | 3.425 |
| UNC 5/16-24 | 54057B | 7.4 | 0.291 | 25 | 0.984 | 14 | 0.551 | 35 | 1.378 | 40 | 1.575 | 25.6 | 1.008 | 1/4" | 90.5 | 3.563 |
| UNC 3/8-24 | 54067B | 8.9 | 0.350 | 35 | 1.378 | 16 | 0.630 | 41 | 1.614 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4" | 101.5 | 3.996 |
| UNC 7/16-20 | 54077B | 10.9 | 0.429 | 41 | 1.614 | 18 | 0.709 | 43 | 1.693 | 42 | 1.654 | 25.6 | 1.008 | 1/4" | 108.5 | 4.272 |
| UNC 1/2-20 | 54087B | 12.3 | 0.484 | 45 | 1.772 | 18 | 0.709 | 45 | 1.772 | 40.5 | 1.594 | 25.6 | 1.008 | 1/4" | 111 | 4.370 |




| Part No. NR-HL 1409 Size | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1/4-28 | Ø11 | 41.5 | Ø16 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| 10-32 | Ø9.5 | 41.5 | Ø18.5 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| 1/4-20 | Ø11 | 41.5 | Ø16 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| #10-24 | Ø9.5 | 41.5 | Ø18.5 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| #8-32 | Ø8 | 41.5 | Ø18.5 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| #6-32 | Ø8 | 41.5 | Ø18 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| #4-40 | Ø6 | 41.5 | Ø16 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| M6x1 | Ø11 | 41.5 | Ø16 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| M5x0.8 | Ø10 | 41.5 | Ø18.5 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| M4x0.7 | Ø8 | 41.5 | Ø18.5 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |
| M30.5 | Ø6 | 41.5 | Ø16 | 217mm | BSP 1/8-28 | Ø28 | Ø26 | Ø29.5 |

| Part No. NR-HL 1410 Size | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1/2-20 | Ø20 | 71 | Ø25 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 1/2-13 | Ø20 | 71 | Ø25 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 7/16-20 | Ø20 | 65 | Ø25 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 7/16-14 | Ø20 | 65 | Ø25 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 3/8-24 | Ø17.5 | 55 | Ø22.5 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 3/8-16 | Ø17.5 | 55 | Ø22.5 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 5/16-24 | Ø15 | 50 | Ø20 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| 5/16-18 | Ø15 | 50 | Ø20 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| M12x1.75 | Ø20 | 71 | Ø25 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| M10x1.5 | Ø17.5 | 55 | Ø22.5 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |
| M8x1.25 | Ø15 | 50 | Ø20 | 230mm | BSP 1/8-28 | Ø29 | Ø33 | Ø40 |



# Pneumatic Installation Tooling

The following table denotes the part numbers of all pneumatic installation tooling for the most popular thread size ranges.

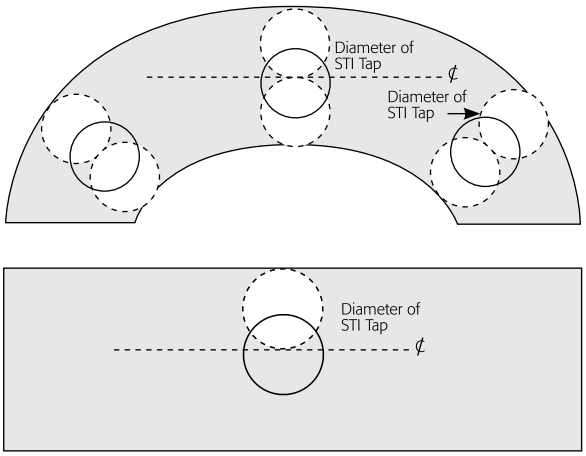
| SUIT ARO & NR SERIES FRONT END ASSEMBLY | | SPARES FOR FRONT END ASSEMBLY | | | |
|---|---|---|---|---|---|
| | | NR MOTOR & ADAPTOR | | FRONT END ASSEMBLY | |
| SIZE | PART NO. | PART NO. | SIZE | NOZZLE | MANDREL |
| METRIC COARSE | | | METRIC COARSE | | |
| M2.2 x .45 | 55250 | NR-HL 1409 | M2.2 x 0.45 | 55258 | 55259 |
| M2.5 x .45 | 55250 | NR-HL 1409 | M2.5 x 0.45 | 55258 | 55259 |
| M3 x 0 .5 | M8751-3-15 | NR-HL 1409 | M3 x 0.5 | M8769-3-15 | M8757-3 |
| M3.5 x 0 .6 | M8751-3.5-15 | NR-HL 1409 | M3.5 x 0.6 | M8769-3.5-15 | M8757-3.5 |
| M4 x 0.7 | M8751-4-15 | NR-HL 1409 | M4 x 0.7 | M8769-4-15 | M8757-4 |
| M5 x 0.8 | M8751-5-15 | NR-HL 1409 | M5 x 0.8 | M8769-5-15 | M8757-5 |
| M6 x 1 | M8751-6-15 | NR-HL 1409 | M6 x 1 | M8769-6-15 | M8757-6 |
| M7 x 1 | 55070 | NR-HL 1410 | M7 x 1 | 55078 | 55079 |
| M8 x 1.25 | M8751-8-15 | NR-HL 1410 | M8 x 1.25 | M8769-8-15 | M8757-8 |
| M10 x 1.5 | M8751-10-15 | NR-HL 1410 | M10 x 1.5 | M8769-10-15 | M8757-10 |
| M12 x 1.75 | M8751-12-15 | NR-HL 1410 | M12 x 1.75 | M8769-12-15 | M8757-12 |
| M16 x 2 | 55160 | NR-HL 1410 | M16 x 2 | 55168 | 55169 |
| METRIC FINE | | | METRIC FINE | | |
| M8 x 1 | 57080 | NR-HL 1410 | M8 x 1 | 57088 | 57089 |
| M10 x 1 | 58100 | NR-HL 1410 | M10 x 1 | 58108 | 58109 |
| M10 x 1.25 | 57100 | NR-HL 1410 | M10 x 1.25 | 57108 | 57109 |
| M12 x 1.25 | 58120 | NR-HL 1410 | M12 x 1.25 | 58128 | 58129 |
| M12 x 1.5 | 57120 | NR-HL 1410 | M12 x 1.5 | 57128 | 57129 |
| M14 x 1.5 | M8753-14 | NR-HL 1410 | M14 x 1.5 | M8773-14 | M8774-14 |
| UNC | | | UNC | | |
| 2 - 56 | 53520 | NR-HL 1409 | 2 - 56 | 53528 | 53529 |
| 4 - 40 | M8551-04-15 | NR-HL 1409 | 4 - 40 | M8557-04-15 | M8553-04 |
| 5 - 40 | M8851-05-15 | NR-HL 1409 | 5 - 40 | M8557-05-15 | M8553-05 |
| 6 - 32 | M8551-06-15 | NR-HL 1409 | 6 - 32 | M8557-06-15 | M8553-06 |
| 8 - 32 | M8551-2-15 | NR-HL 1409 | 8 - 32 | M8557-2-15 | M8553-2 |
| 10 - 24 | M8551-3-15 | NR-HL 1409 | 10 - 24 | M8557-3-15 | M8553-3 |
| 1/4 - 20 | M8551-4-15 | NR-HL 1409 | 1/4 - 20 | M8557-4-15 | M8553-4 |
| 5/16-18 | M8251-5-15 | NR-HL 1410 | 5/16 - 18 | M8257-5-15 | M8253-5 |
| 3/8 - 16 | M8251-6-16 | NR-HL 1410 | 3/8 - 16 | M8257-6-15 | M8253-6 |
| 7/16 - 14 | M8251-7-15 | NR-HL 1410 | 7/16 - 14 | M8257-7-15 | M8253-7 |
| 1/2 - 13 | M8251-8-15 | NR-HL 1410 | 1/2 - 13 | M8257-8-15 | M8253-8 |
| 5/8 - 11 | 53100 | NR-HL 1410 | 5/8 - 11 | 53108 | 53109 |
| 3/4 - 10 | 53120 | NR-HL 1410 | 3/4 - 10 | 53128 | 53129 |
| UNF | | | UNF | | |
| 6 - 40 | 54560 | NR-HL 1409 | 6 - 40 | 54568 | 54569 |
| 10 - 32 | M8552-3-15 | NR-HL 1409 | 10 - 32 | M8558-3-15 | M8554-3 |
| 1/4 - 28 | M8552-4-15 | NR-HL 1409 | 1/4- 28 | M8558-4-15 | M8554-4 |
| 5/16 - 24 | M8252-5-15 | NR-HL 1410 | 5/16 - 24 | M8258-5-15 | M8254-5 |
| 3/8 - 24 | 54060 | NR-HL 1410 | 3/8 - 24 | 54068 | 54069 |
| 7/16 - 20 | M8252-7-15 | NR-HL 1410 | 7/16 - 20 | M8258-7-15 | M8254-7 |
| 1/2 - 20 | M8252-8-15 | NR-HL 1410 | 1/2 - 20 | M8258-8-15 | M8254-8 |
| 5/8 - 18 | M8252-9 | NR-HL 1410 | 5/8 - 18 | M8258-9 | M8254-9 |
| 3/4 - 16 | 54120 | NR-HL 1410 | 3/4 - 16 | 54128 | 54129 |

# Design Considerations

The following design considerations should be evaluated to maximize the security and safety of the fastening assembly using Recoil wire inserts.

## Boss Dimensions

Boss thickness is a function of size and strength requirements and also design of components. For optimum strength, the minimum wall thickness should be twice the maximum diameter of the STI Recoil Tap. For minimum requirements, a wall thickness of twice the bolt diameter to center line may be adequate.




## Edge Dimensions

The minimum edge distance recommended is the maximum diameter of the STI tap measured from the edge of the material to the center-line of the hole.

## Minimum Material Thickness

The recommended minimum material thickness for through-hole applications is equal to the nominal length of the insert plus one pitch. This allows for proper countersinking and installation of the insert at 3/4 to 1-1/2 pitches below the surface of the component. In design critical applications, the minimum thickness may be reduced by eliminating the countersink and installing the insert to 1/4 to 1/2 pitch below the surface.

## Class of Thread Fit

All Recoil inserts are produced to exacting tolerances where installation into the tapped hole will conform exactly to the parent material thread characteristics. It is therefore important that the tapped hole tolerances of either 2B or 3B (unified threads), or the applicable 4H5H and 5H (metric threads) combinations must be carefully controlled by precise tapping and gauging operations.

## Gauging

Recoil inserts, when installed correctly in tapped and gauged holes, will conform with the tapped hole dimensions once the insert has been seated. Gauging of the tapped hole with the appropriate gauges prior to installing Recoil inserts is therefore highly recommended.

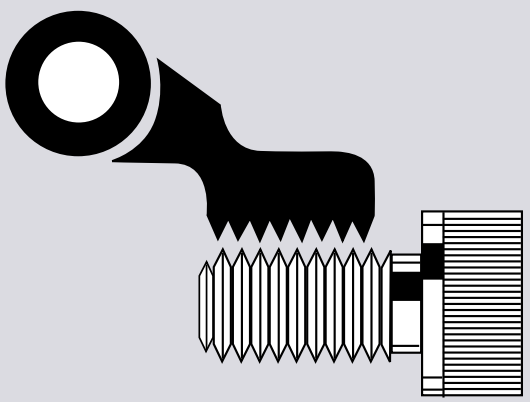
## Bolt Engagement

Maximum strength of the bolted insert assembly will be achieved if the bolt or screw engages the full length of the insert. Ideally, the minimum bolt projection for safe engagement should be at least two pitches beyond the last coil of the insert.

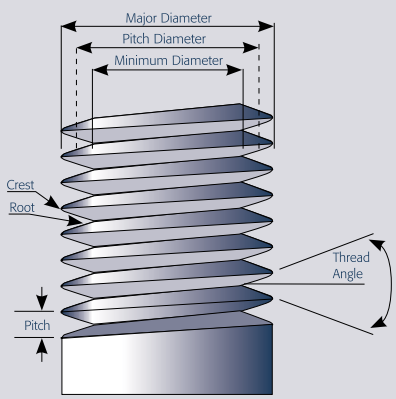
## Tang Removal

To achieve the optimum bolt engagement and hence maximum strength, the tang should be removed from the insert. Exceptions to this recommendation may be necessary in certain blind-hole applications involving light tensile bolt loading.

## Thread Pitch/T.P.I.



## Thread Identification



# Assembly Design

## Design Method

The ultimate consideration is to design an assembly that balances the tensile strength of the bolt material against the shear strength of the parent material. With insert lengths available in 1, 1-1/2, 2, 2-1/2, and 3 times the nominal thread diameters, there are engagement lengths available to produce an assembly thread system where the bolt will fail without damage to the parent material or thread. The bolt must be fully engaged along the entire length of the insert to obtain this position.

Selection of the correct length insert can be determined from Table 1 referring to values for bolt ultimate strengths and parent material shear strengths. For intermediate strength value, use the next higher bolt tensile value or the next lower parent material shear strength.

Assembly strength is a function of shear area and the shear strength of the parent material, tensile strength and cross sectional area of the bolt. Table 1 provides a recommendation of the nominal length of insert which should be selected for a parent material of a certain shear strength, so that when a bolt is used with defined tensile properties, tensile failure of the bolt should occur before the insert is stripped away from the material in which it was inserted.

| | TENSILE STRENGTH OF BOLT SELECTED (Ultimate Tensile Strength) | | | | | | |
|---|---|---|---|---|---|---|---|
| SHAEAR STRENGTH PARENT MATERIAL | 400 (MPa) 58,000 (psi) | 500 (MPa) 72,000 (psi) | 600 (MPa) 87,000 (psi) | 800 (MPa) 116,000 (psi) | 1000 (MPa) 145,000 (psi) | 1200 (MPa) 174,000 (psi) | 1400 (MPa) 203,000 (psi) |
| 70 to 99 MPa (10.0 to 14.4 Ksi) | 2.0D | 2.5D | 2.5D | - | - | - | - |
| 100 to 149 MPa (14.5 to 21.5 Ksi) | 1.5D | 1.5D | 2.0D | 3.0D | - | - | - |
| 150 to 199 MPa (21.7 to 28.9 Ksi) | 1.0D | 1.5D | 1.5D | 2.0D | 2.5D | 3.0D | - |
| 200 to 249 MPa (29.0 to 36.1 Ksi) | 1.0D | 1.0D | 1.0D | 1.5D | 2.0D | 2.0D | 2.5D |
| 250 to 299 MPa (36.2 to 43.3 Ksi) | 1.0D | 1.0D | 1.0D | 1.5D | 1.5D | 2.0D | 2.0D |
| 300 to 349 MPa (43.5 to 50.6 Ksi) | 1.0D | 1.0D | 1.0D | 1.0D | 1.5D | 1.5D | 2.0D |
| > 350 MPa (50.7 Ksi) | 1.0D | 1.0D | 1.0D | 1.0D | 1.0D | 1.5D | 1.5D |

Note: Inserts are available in different lengths which are measured by the diameter of the thread. For example the length of a 3D insert would be three times the diameter. Note: Table 1 is for guidance only. It remains the responsibility of the user to ensure that the insert nominal length chosen is suitable for the particular application concerned.

## Design Method

The following procedure can be used to verify a joint design incorporating a wire thread insert:

1. Select size and strength of bolt to be used (refer to table 2).
2. Determine tensile failure load of the selected bolt.
3. Determine shear strength of parent material for the installation of the insert (refer to table 3).
4. Determine length of insert based on the shear strength capability of parent material.

Note: Information in referring to joint strength is intended as a guide only. Professional engineering advice must be sought when exact design calculations are required.

| Design Example (Metric) Units<br>Step One: Select size and strength of bolt to be used | | Design Example (Inch) Units | |
|---|---|---|---|
| Type | M16 x 2.0, SAE Grade 8 | Type | 1/2-13 UNC Socket Head Cap Screw |
| Nominal Diameter | 16.0 mm | Nominal Diameter | 0.500 " |
| Pitch | 2.0 mm | TPI | 13 |
| Shear Strength | 1034 MPa (refer table 2) | Tensile Strength | 181,000psi (refer table 2) |

# Assembly Design

Table 2 Strength, Bolt (Metric)

| BOLT GRADE (minimum) | Tensile Strength Mpa |
|---|---|
| SAE Grade 1 | |
| 1/4 to 1" | 413 |
| SAE Grade 5 | |
| 1/4 to 1 1/2" | 827 |
| SAE Grade 7 | |
| 1/4 to 1 1/2" | 917 |
| SAE Grade 8 | |
| 1/4 to 1 1/2" | 1034 |
| ASTM A354 | |
| BC 1/4 to 2 1/2" | 862 |
| BD 1/4 to 2 1/2" | 1034 |
| Socket head screw products | 1250 |

Table 2 Strength, Bolt (Metric)

| BOLT GRADE | Tensile Strength Mpa (minimum) |
|---|---|
| SAE Grade 1 | |
| 1/4 to 1" " | 60,000 |
| SAE Grade 5 | |
| 1/4 to 1 1/2" " | 120,000 |
| SAE Grade 7 | |
| 1/4 to 1 1/2" " | 133,000 |
| SAE Grade 8 | |
| 1/4 to 1 1/2" " | 150,000 |
| ASTM A354 | |
| BC 1/4 to 2 1/2" " | 125,000 |
| BD 1/4 to 2 1/2" " | 150,000 |
| Socket head screw products | 181,000 |

Step Two: Determine tensile failure load of selected bolt

| | |
|---|---|
| Min Thread Diameter | 13.797mm (handbook) |
| Shear Area | 149.5mm2 (calculated)* |
| Tensile Failure Load | 154.59kN (calculated)# |

***Area based on minor thread diameter.**
**#Parent material shear strength must exceed this.**

| | |
|---|---|
| Min Thread Diameter | 0.407" (handbook) |
| Shear Area | 0.130" (calculated)* |
| Tensile Failure Load | 23,550 Pounds Force (lbf) (calculated)# |

***Area based on minor thread diameter.**
**#Parent material shear strength must exceed this.**

Step Three: Determine shear strength of parent material for the installation of the insert (refer table 3)

| | |
|---|---|
| Type | 2024 Wrought Aluminum, T62 temper |
| Shear Strength | 283 MPa (refer table 3) |

| | |
|---|---|
| Type | 5083 Wrought Aluminum, annealed Condition |
| Shear Strength | 25,000 psi (refer table 3) |

Table 3 Shear Strength, Parent Material (Metric)

| ALLOY | TEMPER | SHEAR STRENGTH PMa (typical) |
|---|---|---|
| **SHEET & PLATE** | | |
| 1200 | 0 | 62 |
| 2024 | T62 | 283 |
| 5005 | H34 | 97 |
| 5251 | H34 | 138 |
| 5083 | 0 | 172 |
| 5083 | H321 | 179 |
| 7075 | T6 | 331 |
| **EXTRUSIONS (including machine rod)** | | |
| 1350 | H112 | 55 |
| 2011 | T3 | 221 |
| 2011 | T6 | 234 |
| 2014 | T6 | 290 |
| 6060 | T5 | 117 |
| 6061 | T6 | 207 |
| **CASTINGS (Properties refer to test bars only)** | | |
| CA401 {LM6+ A413#} | F1-Sand | 125 |
| **Heat Treating Alloy** | | |
| AC601 {LM25+ A356#} | T6-Sand | 125 |
| AC601 {LM25+ A356#} | T5-Sand | 180 |
| AC601 {LM25+ A356#} | T6-Perm | 190 |

Table 3 Shear Strength, Parent Material (Inch)

| ALLOY | TEMPER | SHEAR STRENGTH PMa (typical) |
|---|---|---|
| **SHEET & PLATE** | | |
| 1200 | 0 | 9,000 |
| 2024 | T62 | 41,000 |
| 5005 | H34 | 14,000 |
| 5251 | H34 | 20,000 |
| 5083 | 0 | 25,000 |
| 5083 | H321 | 26,000 |
| 7075 | T6 | 48,000 |
| **EXTRUSIONS (including machine rod)** | | |
| 1350 | H112 | 8,000 |
| 2011 | T3 | 32,000 |
| 2011 | T6 | 34,000 |
| 2014 | T6 | 42,000 |
| 6060 | T5 | 17,000 |
| 6061 | T6 | 30,000 |
| **CASTINGS (Properties refer to test bars only)** | | |
| CA401 {LM6+ A413#} | F1-Sand | 18,000 |
| **Heat Treating Alloy** | | |
| AC601 {LM25+ A356#} | T6-Sand | 18,000 |
| AC601 {LM25+ A356#} | T5-Sand | 26,000 |
| AC601 {LM25+ A356#} | T6-Perm | 27,000 |

Shear strength of standard parent materials, (indication only refer supplier for specific properties)
+Nearest British Equivalent
#Nearest US Equivalent

# Assembly Design

## Step Four, Determine the length of insert based on shear strength of parent material

Nominal Diameter 16.0 mm (selected bolt)
Pitch 2.0 mm
Pitch Diameter (min) 17.299mm
(refer taped hole data)

$$L = \frac{\text{Tensile Strength of Bolt}}{\text{Shear Circumference Strength of Hole x Arbitrary Constant}}$$

**L = Required length of fitted insert**
**Arbitrary Constant = 0.5**
**(0.5 Based on shearing of the parent material occurring along the pitch diameter of the tapped hole)**

$$L = \frac{1034 \text{ X } (13.797^2 \text{ X } \varpi/4)}{283 \text{ X } 17.299 \ \varpi \text{ X } 0.5}$$

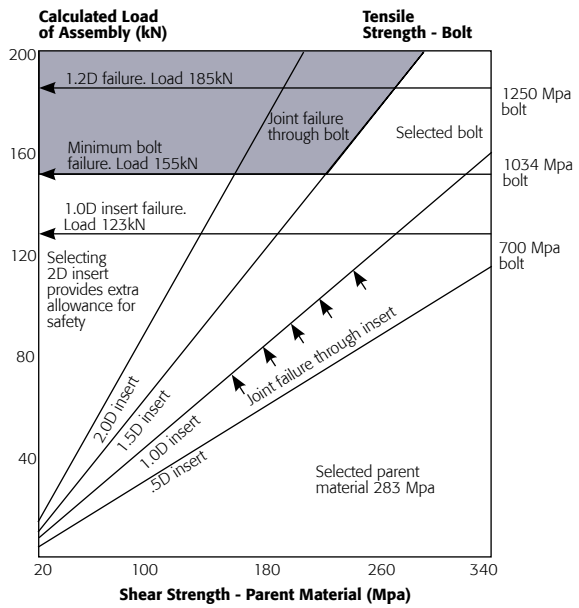
**L = 20.1mm**

### Conclusion:

For this application a 16mm diameter bolt has been selected. Insert engagement of 20.1mm was calculated. The suitable diameter of the insert can be determined by dividing the length of the insert by the diameter of the bolt.

**For example:**

L/dia = 20.1mm/16mm
= 1.26 select next highest size
Therefore use a 1.5D insert




The shaded area in the graph indicates the region in which bolt failure will occur.

Nominal Diameter 0.500" (selected bolt)
TPI 13
Pitch Diameter (min) 0.550"
(refer taped hole data)

$$L = \frac{\text{Tensile Strength of Bolt}}{\text{Shear Circumference Strength of Hole x Arbitrary Constant}}$$

**L = Required length of fitted insert**
**Arbitrary Constant = 0.5**
**(0.5 Based on shearing of the parent material occurring along the pitch diameter of the tapped hole)**

$$L = \frac{181{,}000 \text{ X } (0.4072 \text{ X } \varpi/4)}{25{,}000 \text{ X } 0.550 \ \varpi \text{ X } 0.5}$$

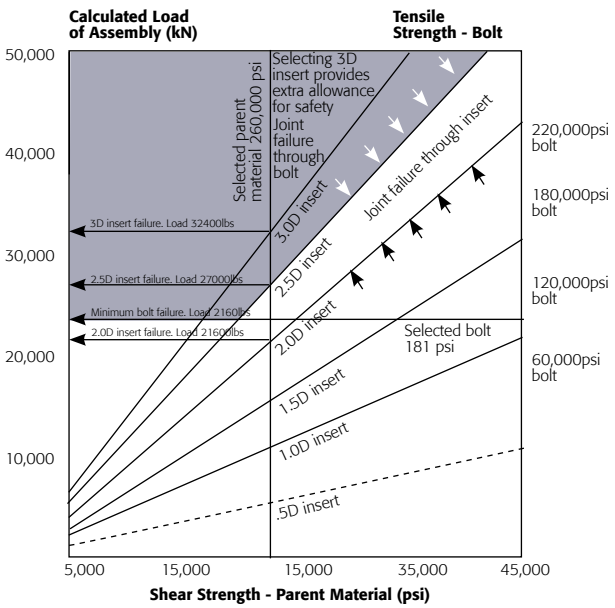
**L = 1.09"**

### Conclusion:

For this application a 1/2" diameter bolt has been selected. Insert engagement of 1.09" was calculated. The suitable diameter of the insert can be determined by dividing the length of the insert by the diameter of the bolt.

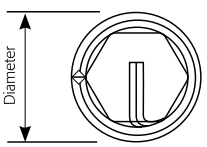
**For example:**

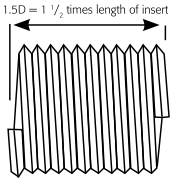
L/dia = 1.09"/0.5"
= 2.2 select next highest size
Therefore use a 2.5D insert




The shaded area in the graph indicates the region in which bolt failure will occur.

Note: Inserts are available in standard lengths which are multiples of the diameter. For example an insert with a length of 1.5D will measure one and a half times as long as the diameter when installed. Note: The example above is an indication only. Professional engineering advice must be sought when exact design calculations are required.



# Thread Idenficiation and Drill Chart

Metric

| DIA IN INCHES | THREAD SIZE | ISO COARSE | | | | ISO FINE | | | BA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DRILL SIZE | DRILL SIZE | DIAMETER | | | | | | | | | |
| | MM | PITCH | INCH | MM | OTHER | PITCH | INCH | MM | SIZE | MM | IMCH | PITCH | DRILL |
| .079 | 2 | .4 | | 2.1 | | | | | 0 | 6.0 | 0.236 | 1 | 6.2 |
| .087 | 2.2 | .45 | No. 42 | 2.3 | | | | | 2 | 4.7 | 0.185 | 0.8 | 4.9 |
| .098 | 2.5 | .45 | No. 37 | 2.6 | | | | | 4 | 3.6 | 0.142 | 0.66 | 3.8 |
| .118 | 3 | .5 | 1/8 | 3.2 | | | | | 6 | 2.8 | 0.11 | 0.53 | 2.9 |
| .138 | 3.5 | 0.6 | No. 27 | 3.7 | | | | | 8 | 2.2 | 0.86 | 0.43 | 2.3 |
| .157 | 4 | .7 | 11/64 | 4.2 | | | | | 10 | 1.7 | 0.67 | 0.35 | 1.7 |
| .197 | 5 | .8 1 | 3/64 | 5.2 | | | | | | | | | |
| .236 | 6 | 1 | 1/4 | 6.3 | | | | | | | | | |
| .276 | 7 | 1 | 9/32 | 7.3 | | | | | | | | | |
| .315 | 8 | 1.25 | 21/64 | 8.3 | | 1 | 21/64 | 8.3 | | | | | |
| .354 | 9 | 1.25 | | 9.4 | | 1 | | 9.3 | | | | | |
| .394 | 10 | 1.5 | 13/32 | 10.4 | 1* | 1.25 | 13/32 | 10.25 | | | | | |
| .433 | 11 | 1.5 | | 11.5 | 1 | 1.25 | | 11.25 | | | | | |
| .472 | 12 | 1.75 | 31/64 | 12.5 | 1.25 | 1.5 | 31/64 | 12.25 | | | | | |
| .512 | 13 | | | 13.5 | | 1.5 | | 13.25 | | | | | |
| .551 | 14 | 2 | 37/64 | 14.5 | 1.25* | 1.5 | 9/16 | 14.25 | | | | | |
| .630 | 16 | 2 | 21/32 | 16.5 | | 1.5 | 21/32 | 16.5 | | | | | |
| .709 | 18 | 2.5 | 47/64 | 18.75 | 1.5* | 2 | 23/32 | 18.5 | | | | | |
| .787 | 20 | 2.5 | 13/16 | 20.75 | 1.5 | 2 1 | 3/16 | 20.5 | | | | | |
| .866 | 22 | 2.5 | | 22.75 | 1.5 | 2 | | 22.5 | | | | | |
| .945 | 24 | 3 | | 24.75 | 1.5 | 2 | | 24.5 | | | | | |

*M10 X 1, M12 X 1.25, M14 X 1.25, M18 X 1.5 - popular spark plug sizes sizes above M24 available on request.

INCH

| DIAMETER INCHES | MM SIZE | THREADS PER INCH THREAD | UNC | BSW (SAE) | UNF | DRILL SIZE BSF | BSF* | NPT INCH | UNC MM | BSW INCH | UNF, SAE, BSF MM | UNF, SAE, BSF INCH | BSP MM | NPT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .86 | 2.18 | #2 | 56 | 40 | 64 | | | | 3/32 | 2.3 | No. 37 | 2.3 | | |
| .990 | 2.51 | #3 | 48 | | 56 | | | | No.36 | 2.7 | | 2.7 | | |
| .112 | 2.84 | #4 | 40 | | 48 | | | | No.31 | 3.0 | No.31 | 3.0 | | |
| .125 | 3.17 | #5 (1/8) | 40 | | 44 | | 28 | 27 | N0.29 | 3.4 | | 3.3 | 3/8 | 9.9 |
| .138 | 3.50 | #6 | 32 | | 40 | | | | N0.25 | 3.7 | N0.26 | 3.7 | | |
| .164 | 4.16 | #8 | 32 | | 36 | | | | 11/64 | 4.4 | 11/64 | 4.4 | | |
| .190 | 4.82 | #10 (3/16) | | 24 | | 32 | | | | 13/64 | 5.1 | 13/64 | 5.1 | |
| .187 | 4.76 | 3/16 | | 24 | 32 | | | | 13/64 | 5.0 | 13/64 | 5.0 | | |
| .216 | 5.49 | #12 (7/32) | | 24 | 24 | | | | | 15/64 | 5.6 | | | |
| .250 | 6.35 | 1/4 | 20 | 20 | 28 | 26 | 19 | 18 | 17/64 | 6.7 | 17/64 | 6.6 | 33/64 | 13.5 |
| .312 | 7.93 | 5/16 | 18 | 18 | 24 | 22 | | | 21/64 | 8.3 | 21/64 | 8.2 | | |
| .375 | 9.52 | 3/8 | 16 | 16 | 24 | 20 | 19 | 18 | 25/64 | 9.9 | 25/64 | 9.8 | 21/32 | 17.0 |
| .437 | 11.11 | 7/16 | 14 | 14 | 20 | 18 | | | 29/64 | 11.5 | 29/64 | 11.5 | | |
| .500 | 12.70 | 1/2 | 13 | 12 | 20 | 16 | 14 | 14 | 17/32 | 13.0 | 33/64 | 13.0 | 13/16 | 21.5 |
| .562 | 14.28 | 9/16 | 12 | 12 | 18 | 16 | | | 19/32 | 14.5 | 37/64 | 14.5 | | |
| .625 | 15.87 | 5/8 | 11 | 11 | 18 | 14 | | | 21/32 | 16.5 | 41/64 | 16.25 | | |
| .750 | 19.05 | 3/4 | 10 | 10 | 16 | 12 | 14 | 14 | 25/32 | 19.75 | 49/64 | 19.5 | 1 1/64 | 27.0 |
| .875 | 22.22 | 7/8 | 9 | 9 | 14 | 11 | | | 29/32 | 23.0 | 57/64 | 22.5 | | |
| 1.000 | 25.40 | 1″ | 8 | 8 | 12 (14) | 10 | 11 | 11 1/2 | 1 1/32 | 26.0 | 1 1/64 | 26.0 | 1 9/32 | 33.5 |
| 1.125 | 28.57 | 11/8″ | 7 | 7 | 12 | 9 | 11 | | 1 5/32 | 29.5 | 1 5/32 | 29.5 | | |
| 1.250 | 31.75 | 11/4″ | 7 | 7 | 12 | 9 | 11 | | 1 9/32 | 33.0 | 1 9/32 | 32.5 | | |
| 1.375 | 34.92 | 13/8″ | 6 | 6 | 12 | 8 | 11 | | 1 13/32 | 36.0 | 1 13/32 | 36.0 | | |
| 1.500 | 38.10 | 11/2″ | 6 | 6 | 12 | 8 | 11 | | 1 17/32 | 39.0 | 1 17/32 | 39.0 | | |

*Nominal diameters for BSP and NPT are not thread diameters but relate to the inside diameter of the pipe.

# General Information

## SI Units & Conversions for Characteristics of Mechanical Fasteners

| PROPERTY | UNIT | SYMBOL | CONVERSION FROM | CONVERSION TO | MULTIPLY BY | APPROXIMATE / EQUIV |
|---|---|---|---|---|---|---|
| Length | metre | m | inch | mm | 25.4 | 25mm = 1 in |
| | centimeter | cm | inch | cm | 2.54 | 300mm-1 ft |
| Mass | millimeter | mm | foot | mm | 304.8 | 1m = 39.37 |
| | kilogram | kg | ounce | g | 28.35 | 28g = 1oz |
| | gram | g | pound | kg | .4536 | 1kg = 2.2lb = 35oz |
| Density | tonne (megagram) | t | ton (224lb) | kg | 984.2 | 1t = 2206lbs |
| | kilogram per | kg/m3 | pounds per cu. ft | kg/m3 | 16.02 | 16kg/m3 = 1lb/ft3 |
| Temperature | deg. Celsius | °C | deg. Fahr | °C | (°F-32)x5/9 | 0°C = 32 °F |
| Area | square metre | m2 | sq. inch | mm2 | 645.2 | 645mm2 = 1 in2 |
| | squaremillimetre | mm2 | sq. ft | m2 | .0929 | 1m2 = 11 ft2 |
| Volume | cub. metre | m3 | cu. In | mm3 | 16387 | 16400mm3 = 1 in3 |
| | cubic centimeter | cm3 | cu. Ft | m3 | .02832 | 1m3 = 35ft3 |
| | cubic millimeter | mm3 | cu. Yd | m3 | .7645 | 1m3 = 1.3yd |
| Force | newton | N | ounce(Force) | N | .278 | 1N = 3.6 ozf |
| | kilonewton | kN | pound(Force) | kN | .00445 | 4.4N = 1 lbf |
| | meganewton | MN | kip | MN | .00445 | 1kN = 225 lbf |
| Pressure | bar | MPa | bar | .1 | 1MPa = 1bar | |
| | megapascal | MPa | pound/in2(psi) | MPa | .0069 | 1MPa = 145 psi |
| | newton/sqmm | N/m2 | Kip/in2(ksi) | MPa | 6.895 | 7MPa = 1ksi |
| Torque | newton-meters | N-m | inch-ounce | N-m | .00706 | 1N-m = 140 in.oz |
| | | | inch-pound | N-m | .113 | 1N-m = 9 in. ib |
| | | | foot-pound | N-m | 1.356 | 1N-m.75 ft lb |
| | | | | | | 1.4N-m = 1 ft.lb |

## Hardness Comparison Table

| Brinell 10m/m Ball 3000kg load. | Firth or Vickers 120kg | Rockwell C. Scale1200 Cone 150kg load. | Rockwell B. Scale1/16" Ball 100kg load | Brinell 10m/m Ball 3000kg load. | Firth or Vickers 120kg | Rockwell C.Scale 1200 Cone 150kg load. | Rockwell B.Scale 1/16" 100kg load. |
|---|---|---|---|---|---|---|---|
| 800 | - | 72 | - | 276 | 278 | 30 | 105 |
| 780 | 1220 | 71 | - | 269 | 272 | 29 | 104 |
| 760 | 1170 | 70 | - | 261 | 261 | 28 | 103 |
| 745 | 1114 | 68 | - | 258 | 258 | 27 | 102 |
| 725 | 1060 | 67 | - | 255 | 255 | 26 | 102 |
| 712 | 1021 | 66 | - | 249 | 250 | 25 | 101 |
| 682 | 940 | 65 | - | 245 | 246 | 24 | 100 |
| 688 | 905 | 64 | - | 240 | 240 | 23 | 99 |
| 652 | 867 | 63 | - | 237 | 235 | 22 | 99 |
| 262 | 803 | 62 | - | 229 | 226 | 21 | 98 |
| 614 | 775 | 61 | - | 224 | 221 | 20 | 97 |
| 601 | 746 | 60 | - | 217 | 127 | 19 | 96 |
| 590 | 727 | 59 | - | 211 | 213 | 18 | 95 |
| 576 | 694 | 57 | - | 206 | 209 | 17 | 94 |
| 552 | 649 | 56 | - | 203 | 201 | 16 | 94 |
| 545 | 639 | 55 | - | 200 | 199 | 15 | 93 |
| 529 | 606 | 54 | - | 196 | 197 | 14 | 92 |
| 514 | 587 | 53 | 120 | 191 | 190 | 13 | 92 |
| 502 | 565 | 52 | 119 | 187 | 186 | 12 | 91 |
| 495 | 551 | 51 | 119 | 185 | 184 | 11 | 91 |
| 477 | 534 | 49 | 118 | 183 | 183 | 10 | 90 |
| 461 | 489 | 47 | 117 | 175 | 174 | 7 | 88 |
| 444 | 474 | 46 | 116 | 170 | 171 | 6 | 87 |
| 427 | 460 | 45 | 115 | 167 | 168 | 5 | 87 |
| 415 | 435 | 44 | 115 | 165 | 165 | 4 | 86 |
| 401 | 413 | 43 | 114 | 163 | 162 | 3 | 85 |
| 388 | 401 | 42 | 114 | 160 | 159 | 2 | 84 |
| 374 | 390 | 41 | 113 | 156 | 154 | 1 | 83 |
| 370 | 385 | 40 | 112 | 154 | 152 | | -82 |
| 362 | 280 | 39 | 111 | 152 | 150 | | -82 |
| 351 | 361 | 38 | 111 | 147 | 147 | | -80 |
| 346 | 352 | 37 | 110 | 147 | 147 | | -79 |
| 331 | 335 | 36 | 109 | 143 | 144 | | -79 |
| 323 | 320 | 35 | 109 | 141 | 142 | | -77 |
| 311 | 312 | 34 | 108 | 140 | 135 | | -75 |
| 301 | 305 | 33 | 107 | 135 | 135 | | -75 |
| 293 | 291 | 32 | 106 | 130 | 130 | | -72 |
| 285 | 285 | 31 | 105 | - | - | - | - |

# Recoil.® Bringing versatility to a range of applications.

The range of wire thread inserts by Recoil are designed to enable you to produce strong threads in softer materials or more evenly distributed thread loads in harder materials. Thread strengthening needs to be fast, reliable and cost effective - decades of engineering experience means Recoil products carry a global reputation for delivering these OEM essentials.

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Alcoa Fastening Systems' (AFS) Recoil manufacturing operations are located in Australia, with sales and warehouse facilities strategically placed in North America, Asia and Europe. The European distribution centre is based in Telford, UK.

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