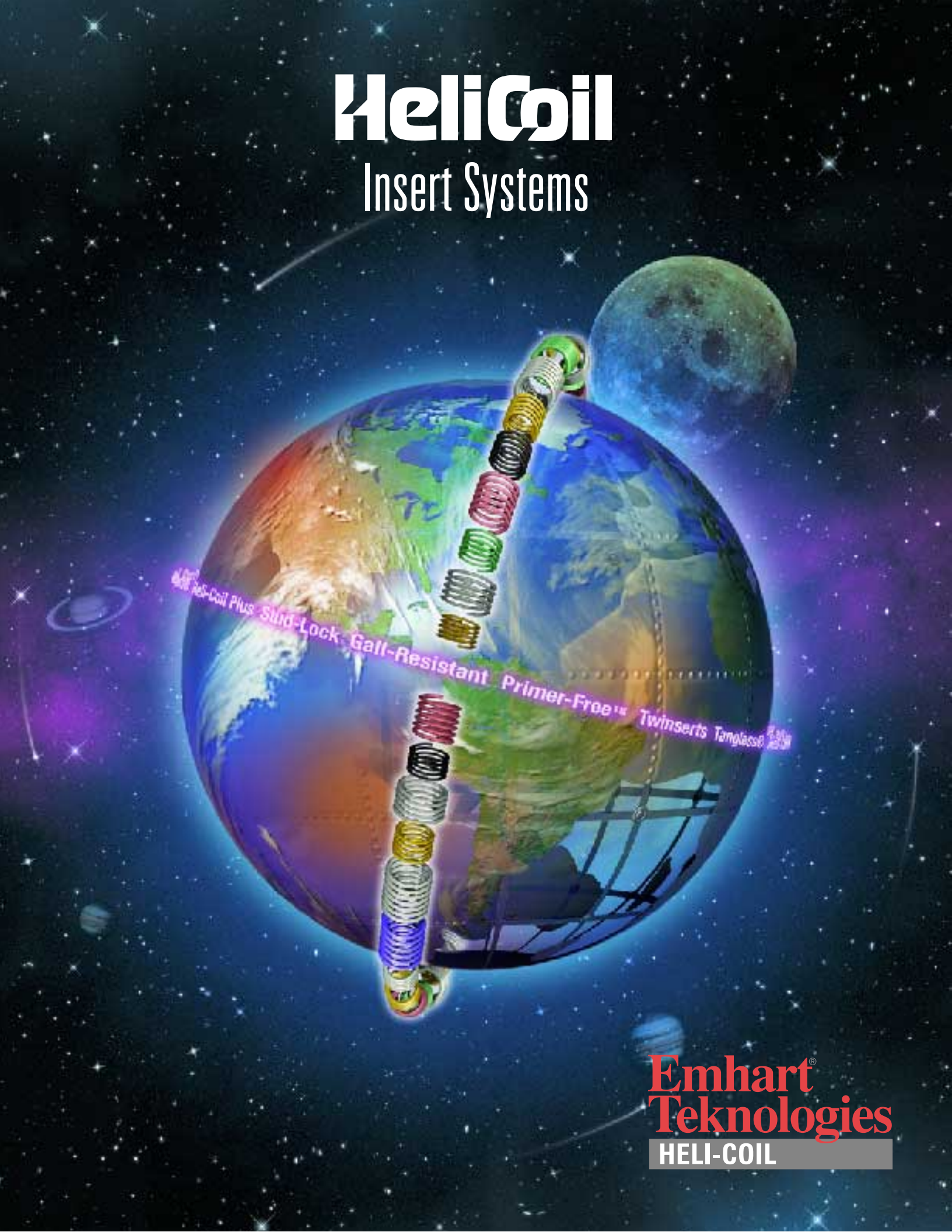
HeliCoil
Insert Systems



Emhart® Teknologies
HELI-COIL

Creating the Future Worldwide.

At Emhart, creating the future is about growth, about change and about taking risks. It is who we are and what we do. Our focus is to reduce the overall product assembly costs of our customers by anticipating needs and meeting those needs with technology and market-driven solutions.

Emhart is a global leader in the design and creation of unique assembly technologies, delivering depth and breadth of service and product through a flexible, cross-functional global organization.

Owning The Customer's Total Experience

We provide every customer with the capability to satisfy every aspect of fastening and assembly technology. From concept through installation, around the corner and around the globe, Emhart develops and delivers solutions for challenging assembly applications.

Technology Optimization

Emhart has the ability to objectively match customer priorities, applications and manufacturing environment with the most appropriate assembly technology and fastening systems. We provide this capability through Application Engineers, and Mobile, Stationary and Virtual Innovation Centers located around the world. Each is electronically linked, capable of sharing application data and new design concepts with each other as well as with our customers.

System Integration

Emhart provides technological solutions in over 100 different countries. For each of these countries and for every application, we deliver innovative, integrated systems solutions from concept and design through system integration, worldwide.

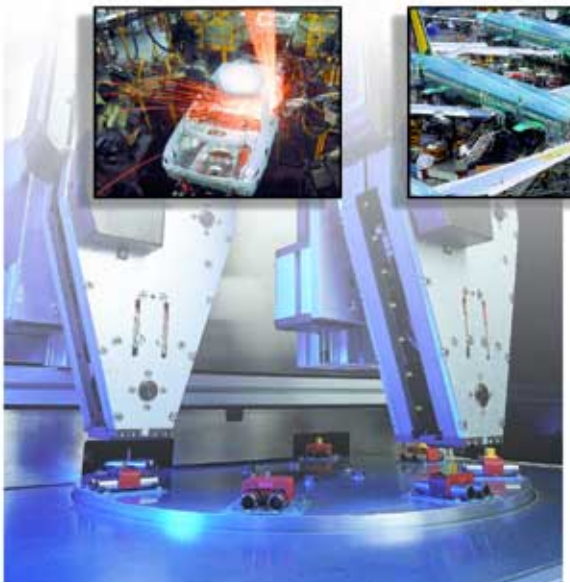
Product Consultancy

Emhart employs Application Analysis and Value Engineering to demonstrate how our technology can enhance the assembly process, and Value Analysis to detail the cost/benefit relationship of applying our technologies.

Innovative Services

Emhart is infused with the spirit and culture of innovation. From our Stationary Innovation Centers to our unique Mobile Innovation Centers, Emhart has built a worldwide service and technology infrastructure to support our customers, 24 hours a day, seven days a week.

DODGE GRIPCO HELI-COIL NPR PARKER-KALON POP TUCKER WARREN



HeliCoil

Wire Inserts

Heli-Coil® precision formed wire inserts are readily recognized and highly regarded products in the industry. Since its inception in 1938, Heli-Coil has been identified as an industry leader offering products with superior performance, reliability and integrity.

Our strict quality programs ensure that we meet the latest industry standards of QS and ISO, as is evident in our track record of consistently passing audits without technical findings. Our SPC and detailed inspection programs elevate our quality levels well above our competitors.

Heli-Coil wire inserts are manufactured with over 60 years of experience. We are dedicated to exceeding our customer's expectations by providing innovative value-added design and engineering services, on-time deliveries and excellent customer service support. Heli-Coil is committed to developing superior products manufactured to only the highest quality standards. We are more than just a supplier, we are a business partner.

Contents

Types of Inserts

There are two designs of Heli-Coil inserts… **STANDARD**, which provides a smooth free-running thread; and, **SCREW-LOCK** which provides self-locking torque on the male member by a series of "chords" on one or more of the insert coils. They are available in inch series coarse and fine and metric series, coarse and fine. Inch series Screw-Lock inserts are dyed red for identification.

Standard Heli-Coil Insert

Screw-Lock Heli-Coil Insert

Heli-Coil inserts are precision formed screw thread coils worked into a diamond shape. The resultant surface finish is a mirror-like 8-16 micro inches. This wire is then wound into a spiral coil which when installed into Heli-Coil tapped holes, provides permanent conventional 60° internal screw threads. This assembled insert accommodates any standard bolt or screw (MIL-S-7742) and MIL-S-8879 (UNJ controlled radius root) male threaded members. (See page 8 for material availability.)

Heli-Coil inserts are larger in diameter before installation than the tapped hole. During installation the inserting tool applies torque to the tang reducing the diameter of the leading coil permitting it to enter the tapped thread. After installation each high tensile stainless steel coil of the insert expands outward with a spring-like action permanently anchoring the insert.

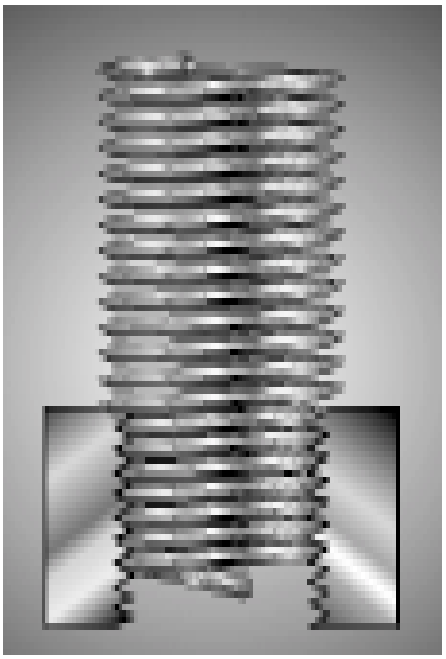


Illustration of the Retention Principle

Size Range:

- UNC #2 through 1-1/2
- UNF #2 through 1-1/2
- Metric Coarse M2 through M39
- Metric Fine M8 through M39

Inserts are also available in UNEF, UNS, 8UN, 12UN, 16UN, Spark Plug and Pipe Thread.

FEATURES & BENEFITS...

Heli-Coil inserts provide a positive means for protecting and strengthening tapped threads in any material. The unique design features of the insert offer many benefits…

- **Stronger Assemblies.** Tapped threads are strengthened because the inherent flexibility of the insert provides a more balanced distribution of dynamic and static loads throughout the length of thread engagement. This flexibility also compensates for variation in lead and angle error allowing each coil to carry its share of the load.
- **No Thread Wear.** Thread life is dramatically increased even after repeated assembly and disassembly, because the insert hardness and surface finish practically eliminate erosion of the thread form due to friction.
- **Corrosion Resistance.** Under normal environmental conditions, Heli-Coil inserts minimize galvanic action within the threaded assembly because of their superior corrosion resistance.
- **Design Flexibility.** Bolt tensile strength can be balanced against parent material shear strength, assuring bolt failure rather than parent material damage. Five insert lengths are available in each thread size.
- **Eliminate Stress.** Virtually no stress is introduced into the parent material because there is no staking, locking, swaging or keying in place — the outward spring-like action of the insert holds it in place.
- **Minimize Space & Weight** Heli-Coil inserts allow use of smaller bosses, flanges and fasteners than any other insert. Heli-Coil inserts can generally be incorporated in existing designs, where no provision has been made for an insert, without increasing boss size.
- **Minimize Total Cost.** Cost savings abound. Lower insert cost, lower installation cost, and Heli-Coil inserts provide design flexibility by allowing a wide choice of parent materials while maintaining maximum threaded assembly strength.
- **True Clamping Torque.** Maximum clamping action and bolt tension are assured with minimum wrench torque, because of the mirror-smooth surface finish of Heli-Coil inserts.
- **Wide Temperature Range.** Heli-Coil stainless steel inserts can be used in temperatures ranging from–320°F to +800°F.
- **Quality & Reliability.** Stringent Quality Assurance and Engineering Standards are rigidly enforced in all phases of the manufacturing process. This assures integrity of your product design.

High Production
Heli-Coil inserts are available mounted on plastic strips and wound onto reels (500 or 1000 inserts per reel). With power installation tooling, use of strip feed inserts will substantially increase installation rates by minimizing handling.

Universal Acceptance
Heli-Coil Standard and Screwlock Inserts are the original — and have an extensive background of tension, torque, shear, vibration and fatigue tests conducted by American industry's leading companies as well as the U.S. Military. Successful applications in the fields of aviation, electronics, industrial, automotive and military equipment provide a wealth of experience and confidence in the performance and reliability of Heli-Coil inserts.

Total Design Service
In addition to the benefits listed above, Heli-Coil provides a wide range of support to solve fastening problems. This manual is one of them — the following pages are presented in a manner to make it easy to "design-in" Heli-Coil inserts to take advantage of the extraordinary benefits they provide.

Additionally, our Sales Engineers, Applications Engineers and Design Engineers are available for consultation of specific designs. When the product gets to the manufacturing phase, our extensive experience in production tooling and installation techniques ensures that you can indeed make your product better with Heli-Coil inserts.

Heli-Coil offers three types of locking inserts for multiple applications…

Screw-Lock Inserts:

- Positive self-locking torque, complying with NASM 8846, MA1565 and MIL-N-25027.
- A resilient locking mechanism (applies to Heli-Coil screw-lock inserts) that grips the bolt and prevents it from loosening under vibration or impact.
- Repeated assembly and disassembly without appreciable loss of self-locking torque.
- Savings in space, weight and money, through the elimination of lock wiring, lock nuts, lock washers, chemical compounds, plastic pellets/patches and other locking mechanisms.

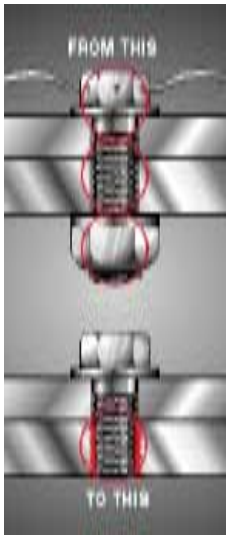
Hi-Torque Inserts:

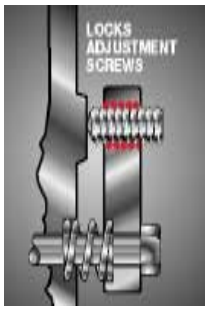
- Similar to Screw-Lock except higher prevailing torque compensates for reduced friction in highly lubricated applications.
- Ideal for higher vibration applications.
- Approximate 40% increase in prevailing torque levels.
- Available in #10 through 3/8" UNF only
- Meets **AS3094, 3095, 3096, 3097**

Stud-Lock Inserts:

- Highest prevailing torque insert available.
- Enables use of threaded rod for space-saving stud applications.
- Allows for any class fit of threaded rod.
- Eliminates inconsistencies caused by interference-fit studs.
- Available for both straight and step studs, #10 through 1/2" UNC and UNF.
- Meets **AS3080, 3081, 3082, 3083**

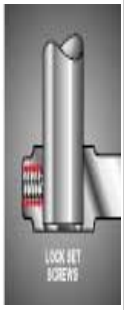
LOCKING FEATURES & BENEFITS...



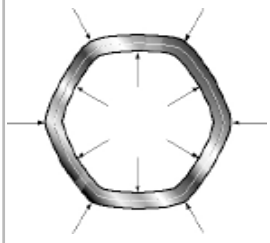


Locks Adjustment Screws. This simple design allows permanent, positive adjustment of screws in any position, secure against vibration or impact.

Inaccessible or Miniaturized Assemblies. Heli-Coil Screw-Lock insert permits the installation of the lock from the front or top. No blind fumbling for assembly of lock washers or lock nuts behind or underneath.



Lock Set Screws. Positively locks assembly against loosening at desired adjustment – protects threads against stripping under high torque – permits use of light housing materials.



The locking action is achieved by one or more of the insert coils having a series of straight segments or **"chords"**. When the bolt enters the **"grip"** coil, these chordal segments flex outward, creating pressure on the bolt. The pressure is exerted between the flanks of the bolt thread to establish an extensive positive and consistent self-locking torque over more cycles than any other prevailing torque mechanism.

Military Standards

Heli-Coil inserts and tooling comply with the following Standards and Specifications:

- **NASM 122076 thru NASM 122275.** Insert, corrosion resistant Helical Coil Coarse Thread (Inch Series)
- **NASM 124651 thru NASM 124850.** Insert, corrosion resistant Helical Coil Fine Thread (Inch Series)
- **NASM 21209**. Insert Screw Thread – Self Locking (Inch Series)
- **NASM 33537.** Insert – Standard Dimensions, Assembly
- **NASM 8846.** Insert, Screw Thread, Helical Coil
- **MA1565.** Insert, Screw Thread, Helical Coil (Metric Series)
- **MA1567.** Insert, Screw Thread, Helical Coil (Metric Series), Standard Dimensions, Assembly
- **MA3279, 3280, 3281.** Insert, Screw Thread, Helical Coil (Metric Series), Screw-Locking
- **A-A-59158.** Tools for inserting and extracting Helical Coil Inserts
- **FED-STD-H28.** Screw Thread Standards for Federal/Services
- **AS3094 thru 3097**
- **AS3080 thru 3083** Special Locking Torque Inserts

Note: Heli-Coil Hi-Torque and Stud-Lock inserts are made to order only. Contact Heli-Coil Applications Engineering at (203) 830-3274 for Hi-Torque and Stud-Lock part numbers and application assistance.

Heli-Coil insert material

Heli-Coil inserts are available in a wide choice of materials to suit specific application needs.
Contact Heli-Coil Applications Engineering to determine the correct material for your specific application.

304 Stainless Steel

- Standard, general purpose material
- Stocked in most sizes
- Ideal for original equipment applications, repair, and overhaul

Material Spec: AS7245
Temperature range: up to 800ºF
Tensile: 200,000 – 250,000 PSI
Hardness: RHc 43-50
Corrosion resistance: Moderate
Magnetic Permeability: 2-10 G/o (depending on wire size)

Inconel X750

- Used in areas exposed to high temperatures
- Typical uses: gas turbine engines, nuclear applications, well drilling
- Non-magnetic

Material Spec: AS7246
Temperature range: up to 1,000ºF
Tensile: 200,000 PSI
Hardness: RHc 43-50
Corrosion resistance: High
Magnetic Permeability: <1 G/o

Phosphor Bronze

- Ideal for salt water applications
- Non-magnetic
- Excellent electrical conductivity

Temperature range: up to 250ºF
Tensile: 140,000
Hardness: HRB 95
Corrosion resistance: High
Magnetic Permeability: <1 G/o

Nitronic 60™

- Superb galling resistance
- Compatible with stainless steel screws
- Ideal for use in vacuum environments
- Requires no additional coatings or plating
- Particle free
- Non-magnetic

Material Spec: UNS S21800
Temperature range: up to 500ºF
Tensile: 200,000 PSI
Hardness: RHc 43-50
Corrosion resistance: Moderate
Magnetic Permeability: <1 G/o

Titanium

- Superior strength-to-weight ratio
- Corrosion resistant
- Excellent low temperature stability

Nitronic 60™ is a trademark of AK Steel

Material Spec: AMS 4957 & AMS 4958A
Temperature range: up to 600ºF
Tensile: 150,000 to 220,000 PSI
Hardness: RHc 35-43
Corrosion resistance: High
Magnetic Permeability: non-magnetic

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Coatings/ Plating	Benefits
Dry Film Lubricant	Provides additional lubrication in high friction applications High temperature resistance (400°F) Highly recommended with Heli-Coil Screw-Lock inserts Mildly corrosion resistant ***Material Spec:*** AS5272 Color: Grey
Cadmium Plating	Provides high corrosion resistance Provides lubrication to prevent galling (Not recommended for new design due to its toxic nature) ***Material Spec: QQ-P-416 Type II*** Color: Iridescent yellow - Free-Running Color: Olive drab - Screw-Lock
Primer-Free™	Prevents galvanic corrosion between insert and parent material Eliminates need for zinc primers Eliminates locking torque issues associated with primers Improves installation productivity Provides additional lubrication facilitating insert installation ***Material Spec: None*** Color: Glossy black
Silver Plating	Recommended to reduce galling of threads at high temperatures For use up to 1200°F ***Material Spec: QQ-S-365*** Color: Silver white
Color Coding	Facilitates verification of insert installation Allows for quick identification of similar size inserts Available in blue, green, red, and black*

** All Heli-Coil Inch Screw-Lock inserts are supplied with a red coloring in accordance with NASM 21209*

Heli-Coil screw lock torque data

Heli-Coil Screw-Lock inserts meet the locking torque value of Tables I and II shown below. The values shown conform to NASM 8846 (inch series) or MA1565 (metric series) requirement.

IMPORTANT NOTE: When using heat-treated steel screws or stainless steel screws with a Screw-Lock insert, an anti-seize compound MUST be applied to the screw or insert to minimize galling and maximize cycle life. To improve the wear life of the screws in Screw-Lock insert applications, specify Dry Film Lubricant (Molybdenum Disulfide), cadmium plating or Primer Free coating be applied to the insert.

TABLE I. Heli-Coil Insert Locking Torque – Inch

Thread Size	Max. Locking Torque	Min. Locking Torque 15th Cycle
INCH COARSE		
1 (.073)-64	15 oz-in	2 oz-in
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 (.2500)-20	30 lb-in	4.5 lb-in
5/16 (.3125)-18	60 lb-in	7.5 lb-in
3/8 (.3750)-16	80 lb-in	12.0 lb-in
7/16 (.4375)-14	100 lb-in	16.5 lb-in
1/2 (.5000)-13	150 lb-in	24.0 lb-in
9/16 (.5625)-12	200 lb-in	30.0 lb-in
5/8 (.6250)-11	300 lb-in	40.0 lb-in
3/4 (.7500)-10	400 lb-in	60.0 lb-in
7/8 (.8750)-9	600 lb-in	82.0 lb-in
1 (1.000)-8	800 lb-in	110.0 lb-in
1-1/8 (1.1250)-7	900 lb-in	137.0 lb-in
1-1/4 (1.2500)-7	1000 lb-in	165.0 lb-in
1-3/8 (1.3750)-6	1150 lb-in	185.0 lb-in
1-1/2 (1.5000)-6	1350 lb-in	210.0 lb-in
INCH FINE		
2 (.086)-64	20 oz-in	3 oz-in
3 (.099)-56	32 oz-in	7 oz-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	13 lb-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 (1.000)-14*	800 lb-in	92.0 lb-in
1 (1.000)-12	800 lb-in	90.0 lb-in
1-1/8 (1.1250)-12	900 lb-in	117.0 lb-in
1-1/4 (1.2500)-12	1000 lb-in	143.0 lb-in
1-3/8 (1.3750)-12	1150 lb-in	165.0 lb-in
1-1/2 (1.5000)-12	1350 lb-in	190.0 lb-in

TABLE II. Heli-Coil Insert Locking Torque – Metric

Thread Size	Max. Locking Torque N.m	Min. Locking Torque 15th Cycle N.m
METRIC COARSE		
M2x0.4	0.12	0.003
M2.2x0.45	0.14	0.02
M2.5x0.45	0.23	0.05
M3x0.5	0.45	0.1
M3.5x0.6	0.68	0.12
M4x0.7	0.9	0.15
M5x0.8	1.6	0.3
M6x1	3	0.4
M7x1	4.5	0.6
M8x1.25	6	0.8
M10x1.5	10.5	1.4
M12x1.75	15.5	2.1
M14x2	23.5	3
M16x2	31.5	4.2
M18x2.5	42	5.5
M20x2.5	54	7
M22x2.5	67.5	9
M24x3	80	10.5
M27x3	94	12
M30x3.5	108	14
M33x3.5	122	15.5
M36x4	136	17.5
M39x4	150	19.5
METRIC FINE		
M8x1	6	0.8
M10x1	10.5	1.4
M10x1.25	10.5	1.4
M12x1.25	15.5	2.1
M12x1.5	15.5	2.1
M14x1.5	23.5	3
M16x1.5	31.5	4.2
M18x1.5	42	5.5
M20x1.5	54	7
M22x1.5	67.5	9
M18x2	42	5.5
M20x2	54	7
M22x2	67.5	9
M24x2	80	10.5
M27x2	94	12
M30x2	108	14
M33x2	122	15.5
M36x2	136	17.5
M39x2	150	19.5
M36x3	136	17.5
M39x3	150	19.5

** These sizes are not included in NASM 8846. Torque values shown are interpolated from sizes that are included. All torque data derived for stainless inserts only.*

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Assembly Strength

Heli-Coil offers maximum design flexibility while adhering to conservative engineering practice allowing use of Heli-Coil inserts in virtually any application or material. Five lengths of inserts are available. In this design manual the lengths are listed as multiples of the nominal thread diameter of the screw; 1, 1-1/2, 2, 2-1/2, and 3. This choice of insert length balances the bolt tensile strength against the shear strength of the parent material. This allows for the design of assemblies where the bolt will fail before the parent material. Tables III and IV below show the length of insert to be used with different combinations of bolts and parent materials.

Table III – Inch Bolt & Heli-Coil Insert Selection Guide
Bolt Material Minimum Ultimate Tensile Strength (PSI)

Shear strength of parent material (PSI) (Alum., Mag., Steel)	54,000	75,000	96,000	108,000	125,000	132,000	160,000	180,000	220,000
10.000	2	2-1/2	3	3	–	–	–	–	–
15,000	1-1/2	1-1/2	2	2-1/2	2-1/2	3	3	–	
20,000	1	1-1/2	1-1/2	2	2	2	2-1/2	3	3
25,000	1	1	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2
30,000	1	1	1	1-1/2	1-1/2	1-1/2	2	2	2-1/2
40,000	1	1	1	1	1	1-1/2	1-1/2	1-1/2	2
50,000	1	1	1	1	1	1	1	1-1/2	1-1/2

Table IV – Metric Bolt & Heli-Coil Insert Selection Guide
Bolt Material Minimum Ultimate Tensile Strength MPa (megapascals)

Shear strength of parent material MPa (megapascals) (Alum., Mag., Steel)	300	400	500	600	800	1000	1200	1400
70	1.5	2	2.5	2.5	–	–	–	–
100	1	1.5	1.5	2	2.5	3	–	–
150	1	1	1.5	1.5	2	2	2.5	3
200	1	1	1	1	1.5	1.5	1.5	2.5
250	1	1	1	1	1	1.5	1.5	2
300	1	1	1	1	1	1.5	1.5	1.5
350	1	1	1	1	1	1	1.5	1.5

Type of Conditions & Protective Methods

Parent Material	Normal	Severe	Extremely Severe
Aluminum	None	1 & 2	1 & 2
Magnesium	1	1, & 2 or 3	1, 2 & 3

Corrosion Protection Methods

Method 1 – Parent Material Protection

ALUMINUM: For oxide coating use Alodine, Anodize, Iridite, Hard Coat or similar. Iridite 14 or 14-2 (MIL-C-5541) is recommended for critical parts rather than anodizing (MIL-S-5002).

MAGNESIUM: For oxide coating use Iridite 15 or dichromate surface treatments. For HAE finishes, always plug tapped holes first.

Method 2 – Coat the insert with one of the following:
Cadmium per QQ-P-416, Type II, .0001" thick; or Dry Film Lubricant per AS 5272 (MIL-L 46010) (no graphite).

Method 3 – Utilize Heli-Coil Primer-Free coated inserts or 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 the insert while the primer is still wet.

In addition to the above methods, further corrosion protection can be achieved by:

1. Using blind holes wherever possible.
2. Using a sealing, insulating or step-down (5052 Alum.) washer under the head of the bolt.
3. Using bolts that extend completely through the length of the insert.
4. In critical applications, using a non-hardening sealer or compound on the threaded assembly.

Guidelines for use of table:

1. When the parent material shear strength falls between two listed values, use the lower of the two values.
2. Parent material shear strengths are for room temperature. For applications at elevated temperatures, the shear strength of the material at that temperature must be determined for proper selection of bolt and insert length.
3. Be sure that the engaged thread length of the bolt is at least as long as the full tapped thread depth for the size selected (Dimension "H", Tables VII & VIII, pages 18 & 19).

Assembly strength is a function of shear area and the shear strength of both the bolt and parent material. For detailed charts on specific load values, Heli-Coil Technical Bulletin 68-2 (inch) or Engineering Standard PP15 (metric) covers the complete range of sizes, parent materials and bolt strengths.

Corrosion Protection

The effect of corrosion on threaded assemblies is dependent on many factors — environment, types of metals used, sealing mechanisms and length of service. The following recommendations apply for minimizing the effects of corrosion on Heli-Coil stainless steel insert assemblies at operating temperatures less than 800°F, using carbon steel or alloy steel bolts.

The following definitions apply…

Normal Service – Natural atmosphere environment with the screw always assembled in the insert.

Severe Service – Mildly contaminated atmospheric conditions involving moisture, occasional exposure to salty air or sea spray and the screw may be left out of the insert for extended periods of time.

Extremely Severe Service – Assembly is exposed to salt water, corrosive atmosphere and/or the screw is out of the assembly frequently allowing a blind hole to trap water.

Heli-Coil insert specifications – inch

Nominal Thread Size	Type: Standard Insert No.	Type: Screw-Lock Insert No.	Size Designation	"Q" Nominal Length: 1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	Outside Diameter: Min.	Max.	Number of Coils Nominal Length: 1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.
UNIFIED COARSE															
1 (.073)-64	1185	3585	01CN	0.073	0.110	0.146	0.182	0.219	.095	.103	2-3/4	4-7/8	6-7/8	8-7/8	10-7/8
2 (.086)-56	1185	3585	02CN	0.086	0.129	0.172	0.215	0.258	.110	.119	3	5-1/4	7-3/8	9-5/8	11-7/8
3 (.099)-48	1185	3585	03CN	0.099	0.148	0.198	0.248	0.297	.128	.139	2-7/8	5	7-1/4	9-3/8	11-1/2
4 (.112)-40	1185	3585	04CN	0.112	0.168	0.224	0.280	0.336	.144	.159	2-3/4	4-3/4	6-3/4	8-7/8	10-7/8
5 (.125)-40	1185	3585	05CN	0.125	0.188	0.250	0.312	0.375	.158	.173	3-1/4	5-1/2	7-3/4	10	12-1/4
6 (.138)-32	1185	3585	06CN	0.138	0.207	0.276	0.345	0.414	.178	.193	2-3/4	4-3/4	6-7/8	8-7/8	10-7/8
8 (.164)-32	1185	3585	2CN	0.164	0.246	0.328	0.410	0.492	.205	.220	3-1/2	6	8-3/8	10-3/4	13-1/4
10 (.190)-24	1185	3585	3CN	0.190	0.285	0.380	0.475	0.570	.244	.259	2-7/8	5	7-1/8	9-1/4	11-3/8
12 (.216)-24	1185	3585	1CN	0.216	0.324	0.432	0.540	0.648	.270	.285	3-1/2	6	8-3/8	10-5/8	13-1/8
1/4 (.2500)-20	1185	3585	4CN	0.250	0.375	0.500	0.625	0.750	.310	.330	3-3/8	5-3/4	8	10-3/8	12-3/4
5/16 (.3125)-18	1185	3585	5CN	0.312	0.469	0.625	0.781	0.938	.380	.400	4	6-5/8	9-1/4	11-7/8	14-5/8
3/8 (.3750)-16	1185	3585	6CN	0.375	0.562	0.750	0.938	1.125	.452	.472	4-3/8	7-1/4	10	12-7/8	15-3/4
7/16 (.4375)-14	1185	3585	7CN	0.438	0.656	0.875	1.094	1.312	.526	.551	4-1/2	7-3/8	10-1/4	13-1/8	16-1/8
1/2 (.5000)-13	1185	3585	8CN	0.500	0.750	1.000	1.250	1.500	.597	.622	4-7/8	7-7/8	11	14-1/8	17-1/8
9/16 (.5625)-12	1185	3585	9CN	0.562	0.844	1.125	1.406	1.688	.669	.694	5-1/8	8-1/4	11-1/2	14-3/4	17-7/8
5/8 (.6250)-11	1185	3585	10CN	0.625	0.938	1.250	1.562	1.875	.742	.767	5-1/4	8-1/2	11-3/4	15	18-3/8
3/4 (.7500)-10	1185	3585	12CN	0.750	1.125	1.500	1.875	2.250	.881	.906	5-7/8	9-3/8	13	16-1/2	20-1/8
7/8 (.8750)-9	1185	3585	14CN	0.875	1.312	1.750	2.188	2.625	1.022	1.052	6-1/4	10	13-3/4	17-1/2	21-1/4
1 (1.000)-8	1185	3585	16CN	1.000	1.500	2.000	2.500	3.000	1.166	1.196	6-3/8	10-1/8	14	17-3/4	21-5/8
1-1/8 (1.1250)-7	1185	3585	18CN	1.125	1.688	2.250	2.812	3.375	1.315	1.355	6-1/8	9-7/8	13-5/8	17-1/2	21-1/4
1-1/4 (1.2500)-7	1185	3585	20CN	1.250	1.875	2.500	3.125	3.750	1.443	1.483	7	11-1/4	15-3/8	19-1/2	23-3/4
1-3/8 (1.3750)-6	1185	3585	22CN	1.375	2.062	2.750	3.438	4.125	1.598	1.643	6-1/2	10-1/2	14-3/8	18-3/8	22-1/4
1-1/2 (1.5000)-6	1185	3585	24CN	1.500	2.250	3.000	3.750	4.500	1.727	1.772	7-1/4	11-1/2	15-7/8	20-1/8	24-1/2
UNIFIED FINE															
2 (.086)-64	1191	3591	02CN	0.086	0.129	0.172	0.215	0.258	.110	.119	3-1/2	5-7/8	8-3/8	10-3/4	13-1/8
3 (.099)-56	1191	3591	03CN	0.099	0.148	0.198	0.248	0.297	.131	.146	3-3/8	5-5/8	8	10-3/8	12-5/8
4 (.112)-48	1191	3591	04CN	0.112	0.168	0.224	0.280	0.336	.147	.162	3-3/8	5-5/8	7-7/8	10-1/4	12-1/2
6 (.138)-40	1191	3591	06CN	0.138	0.207	0.276	0.345	0.414	.173	.193	3-1/2	6	8-3/8	10-3/4	13-1/4
8 (.164)-36	1191	3591	2CN	0.164	0.246	0.328	0.410	0.492	.204	.224	3-7/8	6-1/2	9-1/8	11-5/8	14-1/4
10 (.190)-32	1191	3591	3CN	0.190	0.285	0.380	0.475	0.570	.236	.256	4-1/8	6-7/8	9-1/2	12-1/4	14-7/8
1/4 (.2500)-28	1191	3591	4CN	0.250	0.375	0.500	0.625	0.750	.306	.326	5	8-1/4	11-3/8	14-1/2	17-5/8
5/16 (.3125)-24	1191	3591	5CN	0.312	0.469	0.625	0.781	0.938	.380	.400	5-1/2	8-7/8	12-1/4	15-5/8	19
3/8 (.3750)-24	1191	3591	6CN	0.375	0.562	0.750	0.938	1.125	.448	.468	6-7/8	11	15	19-1/8	23-1/8
7/16 (.4375)-20	1191	3591	7CN	0.438	0.656	0.875	1.094	1.312	.524	.549	6-5/8	10-5/8	14-5/8	18-1/2	22-1/2
1/2 (.5000)-20	1191	3591	8CN	0.500	0.750	1.000	1.250	1.500	.592	.617	7-7/8	12-3/8	16-7/8	21-3/8	25-7/8
9/16 (.5625)-18	1191	3591	9CN	0.562	0.844	1.125	1.406	1.688	.666	.691	8	12-1/2	17-1/8	21-3/4	26-1/4
5/8 (.6250)-18	1191	3591	10CN	0.625	0.938	1.250	1.562	1.875	.733	.758	9	14-1/8	19-1/4	24-1/4	29-3/8
3/4 (.7500)-16	1191	3591	12CN	0.750	1.125	1.500	1.875	2.250	.876	.901	9-3/4	15-1/8	20-5/8	26	31-1/2
7/8 (.8750)-14	1191	3591	14CN	0.875	1.312	1.750	2.188	2.625	1.021	1.051	9-7/8	15-1/2	21-1/8	26-5/8	32-1/4
1 (1.000)-14*	1191	3591	16CN	1.000	1.500	2.000	2.500	3.000	1.156	1.186	11-1/2	17-7/8	24-1/4	30-5/8	37
1 (1.000)-12	1191	3591	161CN	1.000	1.500	2.000	2.500	3.000	1.169	1.199	9-5/8	15	20-1/2	26	31-1/2
1-1/8 (1.1250)-12	1191	3591	18CN	1.125	1.688	2.250	2.812	3.375	1.304	1.334	11-1/8	17-1/4	23-3/8	29-1/2	35-3/4
1-1/4 (1.2500)-12	1191	3591	20CN	1.250	1.875	2.500	3.125	3.750	1.439	1.469	12-1/2	19-3/8	26-1/4	33	39-7/8
1-3/8 (1.3750)-12	1191	3591	22CN	1.375	2.062	2.750	3.438	4.125	1.575	1.610	13-3/4	21-3/8	28-7/8	36-1/2	44
1-1/2 (1.5000)-12	1191	3591	24CN	1.500	2.250	3.000	3.750	4.500	1.710	1.745	15-1/4	23-1/2	31-5/8	39-7/8	48-1/8

*Inactive for new design.

1185-4CNY375S

Type	Size	Material	Finish	Length	Packaging
1185 Free Running, Coarse	See Chart	CN – Stainless Steel	Blank – None	See Chart	Blank – Bulk
1191 Free Running, Fine		BN – Phosphor Bronze	Y – Cadmium		S – Strip Feed
3585 Screw-Lock, Coarse		TN – Inconel X	V - Silver		
3591 Screw-Lock, Fine		EN – Nitronic 60	W – Dry Film Lubricant		
		GN – Titanium	HG – Primer Free		

Complete Part No. Example: 1/4-20 x .375 Free Running Insert, Cadmium plated on Strip Feed.

Notes on Insert Specifications:

1. Nominal Length is a computed value and cannot be measured. It is the actual assembled length + 1/2 pitch.
2. The number of coils are counted 90º from the tang.
3. Grip Coil(s) Location: for 1, 1-1/2 and 2 diameter long inserts, Grip Coil Location = 1/2 the number of free coils. For 2-1/2 and 3 diameter long inserts, Grip Coil Location (distance from the tang) is the same as 2 diameter long inserts.

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Heli-Coil insert specifications – metric

Nominal Thread Size	Type		Size Design-ation	"Q" Nominal Length					Outside Diameter		Number of Coils Nominal Length				
	Standard Insert No.	Screw-Lock Insert No.		1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	Min.	Max.	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.
METRIC COARSE															
M2x0.4	1084	4184	2CN	2.0	3.0	4.0	5.0	6.0	2.50	2.70	3-1/2	5-1/2	7-3/4	10-1/8	12-3/8
M2.2x0.45	1084	4184	2.2CN	2.2	3.3	4.4	5.5	6.6	2.80	3.00	3-1/8	5-3/8	7-5/8	9-7/8	12-1/8
M2.5x0.45	1084	4184	2.5CN	2.5	3.8	5.0	6.3	7.5	3.20	3.70	3-3/8	5-3/4	8-1/8	10-1/2	12-3/4
M3x0.5	1084	4184	3CN	3.0	4.5	6.0	7.5	9.0	3.80	4.35	3-3/4	6-3/8	8-7/8	11-3/8	13-7/8
M3.5x0.6	1084	4184	3.5CN	3.5	5.3	7.0	8.8	10.5	4.40	4.95	3-3/4	6-3/8	8-3/4	11-3/8	13-3/4
M4x0.7	1084	4184	4CN	4.0	6.0	8.0	10.0	12.0	5.05	5.60	3-5/8	6-1/8	8-5/8	11-1/8	13-5/8
M5x0.8	1084	4184	5CN	5.0	7.5	10.0	12.5	15.0	6.25	6.80	4-1/8	6-7/8	9-5/8	12-3/8	15-1/8
M6x1	1084	4184	6CN	6.0	9.0	12.0	15.0	18.0	7.40	7.95	4	6-3/4	9-1/2	12-1/8	14-7/8
M7x1	1084	4184	7CN	7.0	10.5	14.0	17.5	21.0	8.65	9.20	4-7/8	8	11-1/8	14-1/8	17-1/4
M8x1.25	1084	4184	8CN	8.0	12.0	16.0	20.0	24.0	9.80	10.35	4-1/2	7-3/8	10-1/4	13-1/4	16-1/8
M10x1.5	1084	4184	10CN	10.0	15.0	20.0	25.0	30.0	11.95	12.50	4-7/8	8	11-1/8	14-1/4	17-3/8
M12x1.75	1084	4184	12CN	12.0	18.0	24.0	30.0	36.0	14.30	15.00	5	8-1/4	11-1/2	14-5/8	17-7/8
M14x2	1084	4184	14CN	14.0	21.0	28.0	35.0	42.0	16.65	17.35	5-1/8	8-1/2	11-3/4	15	18-3/8
M16x2	1084	4184	16CN	16.0	24.0	32.0	40.0	48.0	18.90	19.60	6-1/8	9-3/4	13-1/2	17-1/4	21
M18x2.5	1084	4184	18CN	18.0	27.0	36.0	45.0	54.0	21.30	22.0	5-3/8	8-7/8	12-1/4	15-5/8	19
M20x2.5	1084	4184	20CN	20.0	30.0	40.0	50.0	60.0	23.55	24.40	6-1/8	9-7/8	13-5/8	17-3/8	21-1/8
M22x2.5	1084	4184	22CN	22.0	33.0	44.0	55.0	66.0	25.90	26.90	6-3/4	10-7/8	14-7/8	19	23-1/8
M24x3	1084	4184	24CN	24.0	36.0	48.0	60.0	72.0	28.00	29.00	6-1/8	10	13-3/4	17-1/2	21-3/8
M27x3	1084	4184	27CN	27.0	40.5	54.0	67.5	81.0	31.40	32.40	7	11-1/4	15-1/2	19-3/4	24
M30x3.5	1084	4184	30CN	30.0	45.0	60.0	75.0	90.0	34.80	36.00	6-3/4	10-3/4	14-7/8	18-7/8	23
M33x3.5	1084	4184	33CN	33.0	49.5	66.0	82.5	99.0	37.80	39.20	7-1/2	12	16-1/2	21	25-3/8
M36x4	1084	4184	36CN	36.0	54.0	72.0	90.0	108.0	41.50	42.90	7-1/8	11-3/8	15-5/8	19-7/8	24-1/4
M39x4	1084	4184	39CN	39.0	58.5	78.0	97.5	117.0	44.60	46.00	7-7/8	12-1/2	17-1/8	21-3/4	26-3/8
METRIC FINE															
M8x1	4255	5255	8CN	8.0	12.0	16.0	20.0	24.0	9.70	10.25	5-7/8	9-3/8	13	16-1/2	20-1/8
M10x1	4255	5255	10CN	10.0	15.0	20.0	25.0	30.0	11.95	12.50	7-5/8	12	16-1/2	21	25-1/2
M10x1.25	4649	5649	10CN	10.0	15.0	20.0	25.0	30.0	12.10	12.65	5-7/8	9-1/2	13-1/8	16-3/4	20-3/8
M12x1.25	4649	5649	12CN	12.0	18.0	24.0	30.0	36.0	14.30	15.00	7-1/4	11-5/8	15-7/8	20-1/4	24-1/2
M12x1.5	3745	5145	12CN	12.0	18.0	24.0	30.0	36.0	14.25	14.95	6	9-5/8	13-3/8	17	20-3/4
M14x1.5	3745	5145	14CN	14.0	21.0	28.0	35.0	42.0	16.55	17.25	7-1/8	11-3/8	15-5/8	20	24-1/4
M16x1.5	3745	5145	16CN	16.0	24.0	32.0	40.0	48.0	18.90	19.60	8-1/4	13-1/8	18	22-3/4	27-5/8
M18x1.5	3745	5145	18CN	18.0	27.0	36.0	45.0	54.0	21.05	21.75	9-1/2	15	20-3/8	25-7/8	31-3/8
M20x1.5	3745	5145	20CN	20.0	30.0	40.0	50.0	60.0	23.15	24.00	10-3/4	16-7/8	22-7/8	28-7/8	35
M22x1.5	3745	5145	22CN	22.0	33.0	44.0	55.0	66.0	25.55	26.45	11-7/8	18-1/2	25-1/8	31-5/8	38-1/4
M18x2	4266	5266	18CN	18.0	27.0	36.0	45.0	54.0	21.15	21.85	7	11-1/8	15-3/8	19-1/2	23-5/8
M20x2	4266	5266	20CN	20.0	30.0	40.0	50.0	60.0	23.20	24.05	7-7/8	12-1/2	17-1/4	21-7/8	26-1/2
M22x2	4266	5266	22CN	22.0	33.0	44.0	55.0	66.0	25.60	26.50	8-3/4	13-3/4	18-7/8	23-7/8	29
M24x2	4266	5266	24CN	24.0	36.0	48.0	60.0	72.0	28.10	29.10	9-1/2	15	20-3/8	25-7/8	31-1/4
M27x2	4266	5266	27CN	27.0	40.5	54.0	67.5	81.0	31.30	32.30	10-7/8	17	23-1/4	29-3/8	35-1/2
M30x2	4266	5266	30CN	30.0	45.0	60.0	75.0	90.0	34.50	35.70	12-1/4	19-1/8	25-7/8	32-3/4	39-1/2
M33x2	4266	5266	33CN	33.0	49.5	66.0	82.5	99.0	37.80	39.20	13-5/8	21-1/8	28-5/8	36	43-1/2
M36x2	4266	5266	36CN	36.0	54.0	72.0	90.0	108.0	41.00	42.40	15	23-1/4	31-3/8	39-1/2	47-3/4
M39x2	4266	5266	39CN	39.0	58.5	78.0	97.5	117.0	44.30	45.70	16-3/8	25-1/4	34-1/8	43	51-7/8
M36x3	4277	5277	36CN	36.0	54.0	72.0	90.0	108.0	41.30	42.70	9-3/4	15-1/4	20-7/8	26-1/2	32
M39x3	4277	5277	39CN	39.0	58.5	78.0	97.5	117.0	44.40	45.80	10-3/4	16-3/4	22-3/4	28-7/8	34-7/8

1084-4CNY060S

Type	Size	Material	Finish	Length	Packaging
1084 Free Running, Coarse	See Chart	CN – Stainless Steel	Blank – None	See Chart	Blank – Bulk
4255, 4649, 3745, 4266 & 4277 Free Running, Fine		BN – Phosphor Bronze	Y – Cadmium		S – Strip Feed
4184 Screw-Lock, Coarse		TN - Inconel X	V - Silver		
5255, 5649, 5145, 5266 & 5277 Screw-Lock, Fine		EN – Nitronic 60	W – Dry Film Lubricant		
		GN – Titanium	HG – Primer Free		

Complete Part No. Example: M4 x 0.7 Free Running Insert, Cadmium plated on Strip Feed.

Notes on Insert Specifications:

1. Nominal length is a computed value and cannot be measured. It is the actual assembled length + 1/2 pitch.
2. The number of coils are counted from the notch.
3. Phosphor Bronze Inserts – **Not available** in sizes M2, M2.2, M2.5, M3, M3.5 and M4.
4. Inconel X Inserts – 1 diameter long Screw-Lock inserts **not available** in sizes M2, M2.2, M2.5 and M3.

Boss Dimensions

Standard boss configurations may be used with Heli-Coil inserts.

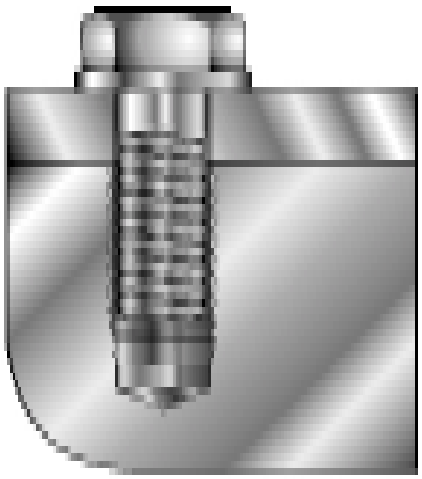
A boss diameter of twice the nominal bolt size is adequate for most load conditions. For critical applications, the boss diameter should be twice the Heli-Coil tap major diameter (Tables VII & VIII, Pages 18 & 19). Boss thickness is a function of the size and length of the insert chosen and the particular requirements of the component being designed. The use of Heli-Coil inserts generally minimizes the size of the boss because their high strength characteristics allow for smaller or fewer fasteners.

Class of Fit

Since Heli-Coil inserts are flexible, the class of fit of the final assembly is a function of the tapped hole. Heli-Coil STI (Screw Thread Insert) taps are available in inch series for both Class 2B and 3B. Metric Classes include 5H and 4H5H. Class 2B tapped holes provide maximum production tolerances while Class 3B or 4H5H holes provide slightly higher and more consistent self-locking torque when Screw-Lock inserts are used.

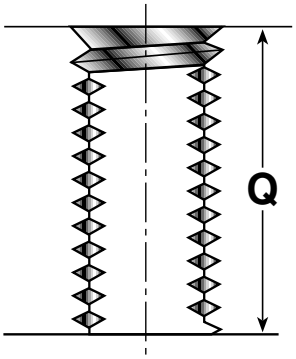
Bolt Projection

The bolt must engage the entire insert to insure maximum strength of a Heli-Coil insert assembly. It is strongly recommended that the tang always be removed and bolt projection be equal to the full tapped thread depth (Dimension H, Tables VII & VIII, Pages 18 & 19). If design limitations prohibit this, contact us to obtain minimum bolt projection data.



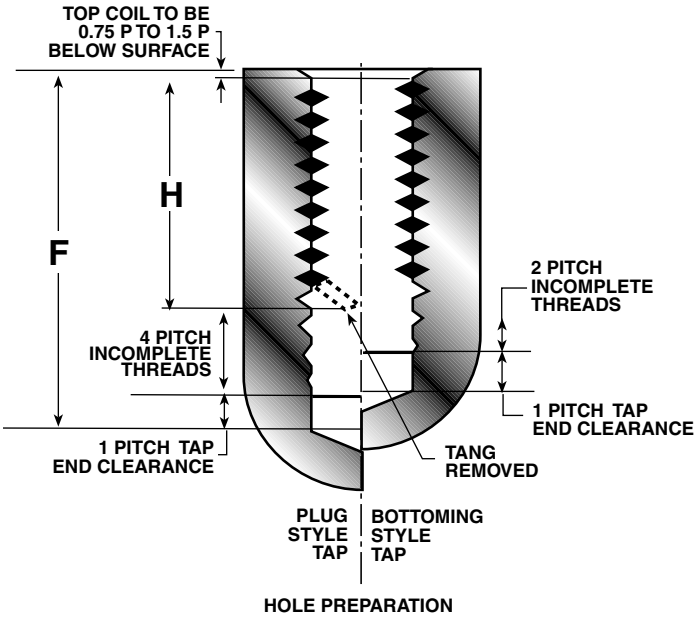
Material Thickness

The **minimum** material thickness for through hole assemblies is equal to the Insert Nominal Length (Dimension Q, Pages 12 &13), without a countersink and the insert installed 1/4-1/2 pitch below the surface. For production, the hole should be countersunk, and the insert installed 3/4–1-1/2 pitch below the surface. In this case the **minimum** material thickness is "Q" + 1 pitch.



Drawing Call Out

Below is a typical drawing call out for a Heli-Coil Insert Assembly. The example used is a 3/8-24 x .562 long Screw-Lock insert in a blind hole, Class 3B fit, tapped with a plug tap.



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Engineering Data

Conventional machining methods are used for Heli-Coil assemblies. The process is simple…

1. **Drill**
2. **Countersink**
3. **Tap**
4. **Gage**

1. Drilling

The suggested drill sizes listed for aluminum in Tables V & VI, pages 16 & 17, are within the minor diameter limits specified in NASM33537 or MA1565. Drill sizes listed for steel, magnesium and plastic are larger (in most cases) allowing for parent material "close-in" in soft materials and increased tap wear life in hard materials.

The drill depths listed in this table allow for tap end clearance, maximum insert "set-down", countersink, and the chamfer on the tap. These drill depths are minimum and should be increased where possible, especially when using Spiral Pointed Taps, to allow for chip clearance. The formula for the drill depth is given on Pages 16 & 17.

2. Countersinking

Countersinking the drilled hole is recommended to prevent a feather edge at the top of the tapped hole and to help guide the insert into the tapped threads. A 120° included angle countersink is necessary to insure that the angle of the tapped thread and the countersink are the same (120° ÷ 2 = 60° tapped thread).

3. Tapping

The dimensions for the depth of the full tapped thread (Dimension H, Tables VII & VIII, Pages 18 & 19) are **MINIMUM** for blind holes with countersinks. For through holes **without** a countersink the minimum full tapped thread depth must be equal to the insert nominal length (Dimension Q, Pages 12 & 13).

Heli-Coil taps for free machining materials are listed in Tables IX & XII, Pages 20 & 22 Class 2B (inch), 5H metric and 3B (inch) or 4H5H (metric) tapped holes. (Class of fit recommendations are given on Page 14). There are four types of taps listed:

- **Straight, Flute, Plug & Bottoming** style which are used for hand and short run production
- **Spiral Point Plug** taps (chips are pushed forward) are used for through holes and blind hole with ample chip clearance at the bottom.
- **High Spiral Flute Bottoming** taps (chips are pulled out of the hole) are used for deep or blind holes in soft stringy materials and holes with minimal chip clearance
- **Roughing** taps (7/16-1") are available for materials difficult to tap to reduce the load and wear on the finishing tap.

If it is necessary to decrease the ***Minimum Depth*** of the drilled and tapped hole, one or more of the following steps may be helpful:

Action	Amount of Reduction
Remove the male center on plug taps 5/16, M8 & under	one half of the bolt diameter
Use a bottoming tap	2 pitches
Eliminate the countersink	1/2 pitch
Reduce insert "set-down" to 1/4-1/2 pitch	up to 1/2 pitch

4. Gaging

Heli-Coil thread plug gages should be used to check, according to sampling plan, the tapped holes before insert installation. See Pages 24 & 25 for gage part numbers and further gaging data.

Preparing Process Sheets

A sample process sheet for preparing a tapped hole for Heli-Coil inserts is shown below. Highlighted are references to the various dimensional data and part number specifications listed in the tables on pages listed. Insert installation and tang break off are covered in subsequent pages.

Hole preparation for 3/8-24, Screw-Lock Heli-Coil Insert, .562 long, Part No. 3591-6CN562
Blind Hole, Class 3B, tapped with a plug tap in aluminum

Oper. No.	Operation Description	Tool or Gage
10	Drill hole .3840/.3910 diameter to minimum depth (Dimension F, Tables V & VI, Pages 16 & 17)	25/64 drill (.3906), Tables V & VI, Pages 16 & 17
20	Countersink 120º±5º to .42/.45 diameter (Dimension M, Tables VII & VIII, Pages 18 & 19)	120º countersink
30	Tap 3/8 (.3750)-24 UNF-3B STI Thread Depth .600 (Dimension H, Tables VII & VIII, Pages 18 & 19)	Heli-Coil tap 6FPB, Tables IX & XI, Pages 20 & 22
40	Remove chips	Air Nozzle
50	Gage according to your sampling plan	Heli-Coil gage 3694-6, Pages 24 & 25
60	Install 3591-6CN562 Heli-Coil insert 3/4 to 1-1/2 pitch below surface	Installation Tool 7552-6, Page 27
70	Break off tang	Heli-Coil tang break-off tool 3692-6, Page 31

Heli-Coil drilling data – inch

The **minimum** drilling depths shown below allow for the following recommended practices:

1. Countersinking the drilled hole to prevent a feather edge at the start of the tapped hole.
2. 3/4 – 1-1/2 pitch of insert "**set-down**" to allow for maximum production tolerance.

Dimensions are shown for both plug and bottoming taps.

(Note: Plug taps 5/16" or M8 and smaller have a male center and the drilled hole depth dimensions allow for this length (one half of the diameter of the bolt). Calculation of dimension "F" is as follows:

TABLE V – INCH DRILLED HOLE DIMENSIONS

Nominal Thread Size	Suggested Drill Size		"F" MINIMUM DRILLING DEPTH FOR EACH INSERT LENGTH									
			Plug Taps					Bottoming Taps				
	Aluminum	Steel, Magnesium, Plastic	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.
UNIFIED COARSE												
1 (.073)-64	#47 (.0785)	#46 (.0810)	.203	.240	.276	.313	.349	.136	.172	.209	.245	.282
2 (.086)-56	3/32 (.0938)	#41 (.0960)	.236	.279	.322	.365	.408	.157	.200	.243	.286	.329
3 (.099)-48	#36 (.1065)	7/64 (.1094)	.273	.323	.372	.422	.471	.182	.232	.281	.331	.380
4 (.112)-40	#31 (.1200)	#31 (.1200)	.318	.374	.430	.486	.542	.212	.268	.324	.380	.436
5 (.125)-40	3.4mm (.1339)	#29 (.1360)	.338	.400	.462	.525	.588	.225	.288	.350	.412	.475
6 (.138)-32	#26 (.1470)	#25 (.1495)	.394	.464	.532	.602	.670	.263	.332	.401	.470	.539
8 (.164)-32	#17 (.1730)	#16 (.1770)	.434	.516	.598	.680	.762	.289	.371	.453	.535	.617
10 (.190)-24	13/64 (.2031)	#5 (.2055)	.535	.630	.725	.820	.915	.357	.452	.547	.642	.737
12 (.216)-24*	#1 (.2280)	#1 (.2280)	.574	.682	.790	.898	1.006	.383	.491	.599	.707	.815
1/4 (.2500)-20	H (.2660)	H (.2660)	.675	.800	.925	1.050	1.175	.450	.575	.700	.825	.950
5/16 (.3125)-18	Q (.3320)	Q (.3320)	.801	.957	1.113	1.269	1.425	.534	.690	.846	1.002	1.158
3/8 (.3750)-16	X (.3970)	X (.3970)	.750	.938	1.125	1.312	1.500	.625	.812	1.000	1.188	1.375
7/16 (.4375)-14	29/64 (.4531)	29/64 (.4531)	.867	1.086	1.305	1.524	1.743	.724	.943	1.162	1.381	1.600
1/2 (.5000)-13*	33/64 (.5156)	17/32 (.5312)	.962	1.212	1.462	1.712	1.962	.808	1.058	1.308	1.558	1.808
9/16 (.5625)-12*	37/64 (.5781)	19/32 (.5938)	1.062	1.343	1.624	1.905	2.186	.895	1.176	1.457	1.738	2.019
5/8 (.6250)-11	21/32 (.6562)	21/32 (.6562)	1.170	1.483	1.795	2.108	2.420	.989	1.301	1.614	1.926	2.239
3/4 (.7500)-10	25/32 (.7812)	25/32 (.7812)	1.350	1.725	2.100	2.475	2.850	1.150	1.525	1.900	2.275	2.650
7/8 (.8750)-9	29/32 (.9062)	29/32 (.9062)	1.542	1.979	2.417	2.854	3.292	1.319	1.757	2.194	2.632	3.069
1 (1.000)-8	1-1/32 (1.0312)	1-1/32 (1.0312)	1.750	2.250	2.750	3.250	3.750	1.500	2.000	2.500	3.000	3.500
1-1/8 (1.1250)-7	1-11/64 (1.1719)	1-11/64 (1.1719)	1.982	2.545	3.107	3.670	4.232	1.696	2.259	2.821	3.384	3.946
1-1/4 (1.2500)-7	1-19/64 (1.2969)	1-19/64 (1.2969)	2.107	2.732	3.357	3.982	4.607	1.821	2.446	3.071	3.696	4.321
1-3/8 (1.3750)-6	1-27/64 (1.4219)	1-27/64 (1.4219)	2.375	3.062	3.750	4.437	5.125	2.042	2.729	3.417	4.104	4.792
1-1/2 (1.5000)-6	1-35/64 (1.5469)	1-35/64 (1.5469)	2.500	3.250	4.000	4.750	5.500	2.167	2.917	3.667	4.417	5.167
UNIFIED FINE												
2 (.086)-64	2.35mm (.0925)	2.35mm (.0925)	.223	.266	.309	.352	.395	.149	.192	.235	.278	.321
3 (.099)-56	#37 (.1040)	#36 (.1065)	.256	.305	.355	.404	.454	.170	.220	.269	.319	.368
4 (.112)-48	3mm (.1181)	#31 (.1200)	.293	.349	.405	.461	.517	.195	.251	.307	.363	.419
6 (.138)-40	#26 (.1470)	#25 (.1495)	.357	.426	.495	.564	.633	.238	.307	.376	.445	.514
8 (.164)-36	#17 (.1730)	#16 (.1770)	.413	.495	.577	.659	.741	.275	.357	.439	.521	.603
10 (.190)-32	#7 (.2010)	13/64 (.2031)	.472	.568	.662	.758	.852	.315	.410	.505	.600	.695
1/4 (.2500)-28	G (.2610)	6.7mm (.2638)	.589	.714	.839	.964	1.089	.393	.518	.643	.768	.893
5/16 (.3125)-24	21/64 (.3281)	21/64 (.3281)	.718	.874	1.030	1.186	1.342	.479	.635	.791	.947	1.103
3/8 (.3750)-24	25/64 (.3906)	25/64 (.3906)	.625	.812	1.000	1.187	1.375	.542	.729	.917	1.104	1.292
7/16 (.4375)-20	29/64 (.4531)	29/64 (.4531)	.738	.957	1.176	1.395	1.614	.638	.857	1.076	1.295	1.514
1/2 (.5000)-20	33/64 (.5156)	33/64 (.5156)	.800	1.050	1.300	1.550	1.800	.700	.950	1.200	1.450	1.700
9/16 (.5625)-18	37/64 (.5781)	37/64 (.5781)	.895	1.176	1.457	1.738	2.019	.784	1.065	1.346	1.627	1.908
5/8 (.6250)-18	41/64 (.6406)	41/64 (.6406)	.958	1.271	1.583	1.896	2.208	.847	1.160	1.472	1.785	2.097
3/4 (.7500)-16	49/64 (.7656)	49/64 (.7656)	1.125	1.500	1.875	2.250	2.625	1.000	1.375	1.750	2.125	2.500
7/8 (.8750)-14	57/64 (.8906)	57/64 (.8906)	1.304	1.741	2.179	2.616	3.054	1.161	1.598	2.036	2.473	2.911
1 (1.000)-14	1-1/64 (1.0156)	1-1/32 (1.0312)	1.429	1.929	2.429	2.929	3.429	1.286	1.786	2.286	2.786	3.286
1 (1.000)-12*	1-1/64 (1.0156)	1-1/32 (1.0312)	1.500	2.000	2.500	3.000	3.500	1.333	1.833	2.333	2.833	3.333
1-1/8 (1.1250)-12*	1-9/64 (1.1406)	1-5/32 (1.1562)	1.625	2.187	2.750	3.312	3.875	1.458	2.021	2.583	3.146	3.708
1-1/4 (1.2500)-12*	1-17/64 (1.2656)	1-9/32 (1.2812)	1.750	2.375	3.000	3.625	4.250	1.583	2.208	2.833	3.458	4.083
1-3/8 (1.3750)-12*	1-25/64 (1.3906)	1-13/32 (1.4062)	1.875	2.562	3.250	3.937	4.625	1.708	2.396	3.083	3.771	4.458
1-1/2 (1.5000)-12*	1-33/64 (1.5156)	1-17/32 (1.5312)	2.000	2.750	3.500	4.250	5.000	1.833	2.583	3.333	4.083	4.833

**Standard size drills are suggested even though in these sizes they vary slightly from minor diameter specifications in NASM33537.*

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For Plug Taps 5/16" or M8 and smaller: F = Insert Nominal Length (Q) + .5 (Bolt Nominal Diameter) + 4P (Tap Chamfer) + 1P (allowance for countersink and maximum insert set-down).

For Plug Taps 3/8" or M10 and larger: F = Insert Nominal Length (Q) + 4P (Tap Chamfer) + 1P (allowance for countersink and maximum insert set-down).

For Bottoming Taps: F = Insert Nominal Length (Q) + 2P (Tap Chamfer) + 1P (allowance for countersink and maximum insert set-down).

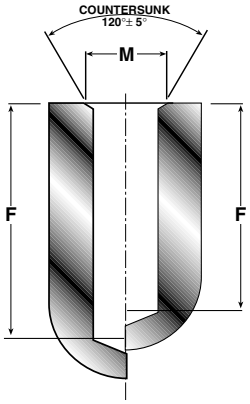

TABLE VI – METRIC DRILLED HOLE DIMENSIONS

Nominal Thread Size	Minor Diameter		Suggested Drill Size		"F" MINIMUM DRILLING DEPTH FOR EACH INSERT LENGTH									
					Plug Taps					Bottoming Taps				
	Min.	Max,	Aluminum	Steel, Magnesium, Plastic	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.
METRIC COARSE														
M2X0.4	2.087	2.170	2.1	2.1	5.40	6.40	7.40	8.40	9.40	3.60	4.60	5.60	6.60	7.60
M2.2x0.45	2.297	2.397	2.3	2.35	6.00	7.10	8.20	9.30	10.40	4.00	5.10	6.20	7.30	8.40
M2.5x0.45	2.597	2.697	2.55	2.65	6.45	7.70	8.95	10.20	11.45	4.30	5.55	6.80	8.05	9.30
M3x0.5	3.108	3.220	3.15	3.2	7.50	9.00	10.50	12.00	13.50	5.00	6.50	8.00	9.50	11.00
M3.5x0.6	3.630	3.755	3.7	3.7	8.85	10.60	12.35	14.10	15.85	5.90	7.65	9.40	11.15	12.90
M4x0.7	4.152	4.292	4.2	4.25	10.20	12.20	14.20	16.20	18.20	6.80	8.80	10.80	12.80	14.80
M5x0.8	5.174	5.334	5.2	5.3	12.30	14.80	17.30	19.80	22.30	8.20	10.70	13.20	15.70	18.20
M6x1	6.217	6.407	6.25	6.3	15.00	18.00	21.00	24.00	27.00	10.00	13.00	16.00	19.00	22.00
M7x1	7.217	7.407	7.25	7.3	16.50	20.00	23.50	27.00	30.50	11.00	14.50	18.00	21.50	25.00
M8x1.25	8.271	8.483	8.3	8.4	19.50	23.50	27.50	31.50	35.50	13.00	17.00	21.00	25.00	29.00
M10x1.5	10.324	10.560	10.5	10.5	19.00	24.00	29.00	34.00	39.00	16.00	21.00	26.00	31.00	36.00
M12x1.75	12.379	12.644	12.5	12.5	22.50	28.50	34.50	40.50	46.50	19.00	25.00	31.00	37.00	43.00
M14x2	14.433	14.733	14.5	14.5	26.00	33.00	40.00	47.00	54.00	22.00	29.00	36.00	43.00	50.00
M16x2	16.433	16.733	16.5	16.5	28.00	36.00	44.00	52.00	60.00	24.00	32.00	40.00	48.00	56.00
M18x2.5	18.541	18.896	18.75	18.75	33.00	42.00	51.00	60.00	69.00	28.00	37.00	46.00	55.00	64.00
M20x2.5	20.541	20.896	20.75	20.75	35.00	45.00	55.00	65.00	75.00	30.00	40.00	50.00	60.00	70.00
M22x2.5	22.541	22.896	22.75	22.75	37.00	48.00	59.00	70.00	81.00	32.00	43.00	54.00	65.00	76.00
M24x3	24.649	25.049	24.75	24.75	42.00	54.00	66.00	78.00	90.00	36.00	48.00	60.00	72.00	84.00
M27x3	27.649	28.049	27.75	27.75	45.00	58.50	72.00	85.50	99.00	39.00	52.50	66.00	79.50	93.00
M30x3.5	30.757	31.207	31	31	51.00	66.00	81.00	96.00	111.00	44.00	59.00	74.00	89.00	104.00
M33x3.5	33.757	34.207	34	34	54.00	70.50	87.00	103.50	120.00	47.00	63.50	80.00	96.50	113.00
M36x4	36.866	37.341	37	37	60.00	78.00	96.00	114.00	132.00	52.00	70.00	88.00	106.00	124.00
M39x4	39.866	40.341	40	40	63.00	82.50	102.00	121.50	141.00	55.00	74.50	94.00	113.50	133.00
METRIC FINE														
M8x1	8.217	8.407	8.25	8.3	18.00	22.00	26.00	30.00	34.00	12.00	16.00	20.00	24.00	28.00
M10x1	10.217	10.407	10.25	10.25	16.00	21.00	26.00	31.00	36.00	14.00	19.00	24.00	29.00	34.00
M10x1.25*	10.271	10.483	10.25	10.25	17.50	22.50	27.50	32.50	37.50	15.00	20.00	25.00	30.00	35.00
M12x1.25*	12.271	12.483	12.25	12.25	19.50	25.50	31.50	37.50	43.50	17.00	23.00	29.00	35.00	41.00
M12x1.5*	12.324	12.560	12.25	12.5	21.00	27.00	33.00	39.00	45.00	18.00	24.00	30.00	36.00	42.00
M14x1.5*	14.324	14.560	14.25	14.5	23.00	30.00	37.00	44.00	51.00	20.00	27.00	34.00	41.00	48.00
M16x1.5*	16.324	16.560	16.25	16.5	25.00	33.00	41.00	49.00	57.00	22.00	30.00	38.00	46.00	54.00
M18x1.5*	18.324	18.560	18.25	18.5	27.00	36.00	45.00	54.00	63.00	24.00	33.00	42.00	51.00	60.00
M20x1.5*	20.324	20.560	20.25	20.5	29.00	39.00	49.00	59.00	69.00	26.00	36.00	46.00	56.00	66.00
M22x1.5*	22.324	22.560	22.25	22.5	31.00	42.00	53.00	64.00	75.00	28.00	39.00	50.00	61.00	72.00
M18x2	18.433	18.733	18.5	18.5	30.00	39.00	48.00	57.00	66.00	26.00	35.00	44.00	53.00	62.00
M20x2	20.433	20.733	20.5	20.5	32.00	42.00	52.00	62.00	72.00	28.00	38.00	48.00	58.00	68.00
M22x2	22.433	22.733	22.5	22.5	34.00	45.00	56.00	67.00	78.00	30.00	41.00	52.00	63.00	74.00
M24x2	24.433	24.733	24.5	24.5	36.00	48.00	60.00	72.00	84.00	32.00	44.00	56.00	68.00	80.00
M27x2	27.433	27.733	27.5	27.5	39.00	52.50	66.00	79.50	93.00	35.00	48.50	62.00	75.50	89.00
M30x2	30.433	30.733	30.5	30.5	42.00	57.00	72.00	87.00	102.00	38.00	53.00	68.00	83.00	98.00
M33x2	33.433	33.733	33.5	33.5	45.00	61.50	78.00	94.50	111.00	41.00	57.50	74.00	90.50	107.00
M36x2	36.433	36.733	36.5	36.5	48.00	66.00	84.00	102.00	120.00	44.00	62.00	80.00	98.00	116.00
M39x2	39.433	39.733	39.5	39.5	51.00	70.50	90.00	109.00	129.00	47.00	66.50	86.00	105.50	125.00
M36x3	36.649	37.049	37	37	54.00	72.00	90.00	108.00	126.00	48.00	66.00	84.00	102.00	120.00
M39x3	39.649	40.049	40	40	57.00	76.50	96.00	115.50	135.00	51.00	70.50	90.00	109.50	129.00

** Standard size drills are suggested even though in these sizes they vary slightly from minor diameter limits.*

Heli-Coil tapping data – inch

The *minimum* tapping depths shown below (Dimension H) is the **MINIMUM** for countersunk holes and an insert set-down of 1 – 1/2 pitch maximum. The calculation for Dimension "H" is:

H = Insert Nominal Length (Q) + 1P

The tapped hole must be held within the stated pitch diameter limits for the required class of fit for the installed Heli-Coil insert.

When anodize, Iridite or other finishes are used, all tapped hole dimensions must be met **after** the finishes are applied.

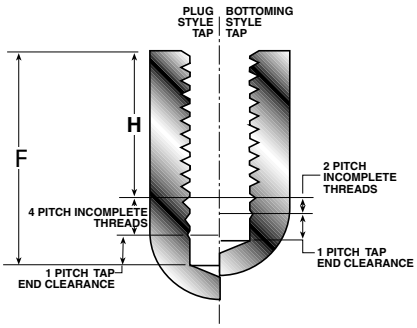

TABLE VII – INCH TAPPED HOLE DIMENSIONS

Nominal Thread Size	Countersink "M" Diameter (120° ±5° included angle)		Pitch Diameter			"H" MINIMUM TAPPING DEPTH					Minor Diameter (after tapping)		Tap Major Dia.. Max.	Thread Pitch P
						INSERT LENGTH								
	Min.	Max.	Min.	3B Max.	2B Max.	1D	1-1/2D	2 D	1-1/2D	3D	Min.	Max.		
UNIFIED COARSE														
1 (.073)-64	.085	.10	.0832	.0843	.0850	.090	.125	.160	.200	.235	.0764	.0823	.0958	.01563
2 (.086)-56	.09	.11	.0976	.0989	.0996	.100	.150	.190	.230	.280	.0899	.0961	.1117	.01786
3 (.099)-48	.11	.14	.1126	.1140	.1148	.120	.170	.220	.270	.320	.1036	.1104	.1289	.02083
4 (.112)-40	.14	.17	.1283	.1299	.1308	.140	.190	.250	.310	.360	.1175	.1252	.1473	.02500
5 (.125)-40	.16	.19	.1413	.1430	.1438	.150	.210	.280	.340	.400	.1305	.1373	.1603	.02500
6 (.138)-32	.18	.21	.1583	.1601	.1611	.170	.240	.310	.380	.450	.1448	.1527	.1817	.03125
8 (.164)-32	.20	.23	.1843	.1862	.1872	.200	.280	.360	.440	.520	.1708	.1781	.2077	.03125
10 (.190)-24	.24	.27	.2170	.2192	.2203	.230	.330	.420	.520	.610	.1990	.2080	.2475	.04167
12 (.216)-24	.26	.29	.2430	.2453	.2464	.260	.370	.470	.580	.690	.2250	.2340	.2735	.04167
1/4 (.2500)-20	.31	.34	.2825	.2851	.2864	.300	.430	.550	.680	.800	.2608	.2704	.3187	.05000
5/16 (.3125)-18	.38	.41	.3486	.3515	.3529	.370	.530	.680	.840	.990	.3245	.3342	.3884	.05556
3/8 (.3750)-16	.45	.48	.4156	.4189	.4203	.440	.630	.810	1.000	1.190	.3885	.3987	.4602	.06250
7/16 (.4375)-14	.52	.55	.4839	.4875	.4890	.510	.730	.950	1.170	1.380	.4530	.4639	.5343	.07143
1/2 (.5000)-13	.59	.62	.5499	.5537	.5554	.580	.830	1.080	1.330	1.580	.5166	.5273	.6042	.07692
9/16 (.5625)-12	.66	.69	.6167	.6208	.6225	.650	.930	1.210	1.490	1.770	.5806	.5918	.6751	.08333
5/8 (.65250)-11	.73	.76	.6841	.6885	.6903	.720	1.030	1.340	1.650	1.970	.6447	.6564	.7477	.09091
3/4 (.7500)-10	.87	.90	.8149	.8196	.8216	.850	1.230	1.600	1.980	2.350	.7716	.7838	.8850	.10000
7/8 (.8750)-9	1.00	1.03	.9471	.9522	.9543	.990	1.420	1.860	2.300	2.740	.8990	.9119	1.0247	.11111
1 (1.000)-8	1.14	1.17	1.0812	1.0868	1.0890	1.130	1.630	2.130	2.630	3.130	1.0271	1.0421	1.1681	.12500
1-1/8 (1.1250)-7	1.29	1.32	1.2178	1.2239	1.2262	1.270	1.830	2.390	2.960	3.520	1.1559	1.1730	1.3171	.14286
1-1/4 (1.2500)-7	1.41	1.44	1.3428	1.3490	1.3514	1.390	2.020	2.640	3.270	3.890	1.2809	1.2980	1.4421	.14286
1-3/8 (1.3750)-6	1.56	1.59	1.4832	1.4900	1.4926	1.540	2.230	2.920	3.600	4.290	1.4110	1.4310	1.5982	.16667
1-1/2 (1.5000)-6	1.69	1.72	1.6082	1.6151	1.6177	1.670	2.420	3.170	3.920	4.670	1.5360	1.5560	1.7232	.16667
UNIFIED FINE														
2 (.086)-64	.09	.11	.0962	.0974	.0981	.100	.145	.190	.230	.275	.0894	.0947	.1088	.01563
3 (.099)-56	.11	.14	.1106	.1119	.1126	.120	.170	.220	.270	.310	.1029	.1086	.1247	.01786
4 (.112)-48	.14	.17	.1256	.1271	.1279	.130	.190	.240	.300	.360	.1166	.1229	.1419	.02083
6 (.138)-40	.17	.20	.1543	.1560	.1569	.160	.230	.300	.370	.440	.1435	.1503	.1733	.02500
8 (.164)-36	.20	.23	.1821	.1840	.1849	.190	.270	.360	.440	.520	.1701	.1771	.2032	.02778
10 (.190)-32	.23	.26	.2103	.2123	.2133	.220	.320	.410	.510	.600	.1968	.2041	.2337	.03125
1/4 (.2500)-28	.29	.32	.2732	.2754	.2765	.290	.410	.540	.660	.790	.2577	.2646	.2995	.03571
5/16 (.3125)-24	.36	.39	.3395	.3421	.3433	.350	.510	.670	.820	.980	.3215	.3288	.3700	.04167
3/8 (.3750)-24	.42	.45	.4020	.4047	.4059	.420	.600	.790	.980	1.170	.3840	.3910	.4325	.04167
7/16 (.4375)-20	.50	.53	.4700	.4731	.4744	.490	.710	.930	1.140	1.360	.4483	.4561	.5062	.05000
1/2 (.5000)-20	.56	.59	.5325	.5357	.5371	.550	.800	1.050	1.300	1.550	.5108	.5186	.5687	.05000
9/16 (.5625)-18	.63	.66	.5986	.6020	.6035	.620	.900	1.180	1.460	1.740	.5745	.5826	.6384	.05556
5/8 (.6250)-18	.69	.72	.6611	.6646	.6661	.680	.990	1.310	1.620	1.930	.6370	.6451	.7009	.05556
3/4 (.7500)-16	.82	.85	.7906	.7945	.7961	.810	1.190	1.560	.1940	2.310	.7635	.7720	.8352	.06250
7/8 (.8750)-14	.96	.99	.9214	.9257	.9274	.950	1.380	1.820	2.260	2.700	.8905	.8994	.9718	.07143
1 (1.000)-14	1.08	1.11	1.0464	1.0508	1.0527	1.070	1.570	2.070	2.570	3.070	1.0155	1.0243	1.0968	.07143
1 (1.000)-12	1.10	1.13	1.0542	1.0589	1.0608	1.080	1.580	2.080	2.580	3.080	1.0181	1.0281	1.1126	.08333
1-1/8 (1.1250)-12	1.22	1.25	1.1792	1.1841	1.1860	1.210	1.770	2.330	2.900	3.460	1.1431	1.1531	1.2376	.08333
1-1/4 (1.2500)-12	1.35	1.38	1.3042	1.3092	1.3112	1.330	1.960	2.580	3.210	3.830	1.2681	1.2781	1.3626	.08333
1-3/8 (1.3750)-12	1.47	1.50	1.4292	1.4343	1.4364	1.460	2.150	2.830	3.520	4.210	1.3931	1.4031	1.4876	.08333
1-1/2 (1.5000)-12	1.60	1.63	1.5542	1.5595	1.5615	1.580	2.330	3.080	3.830	4.580	1.5181	1.5281	1.6126	.08333

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Heli-Coil taps in various types and styles produce holes for Tolerance Classes 4H5H and 5H for use in the general range of aluminums, magnesiums, mild steels, free machining stainless steels and other free machining materials.

Conventional shop practice and production procedures, speeds, feeds and lubricants should be used in combination with proper fixturing and good tapping machines or tapping heads. The tapped hole must be held within the stated pitch diameter limits for the required Tolerance Class of fit for the installed Heli-Coil insert. For Standard (free running inserts), a tolerance class 5H is recommended. For Screw-Lock inserts, a tolerance class 4H5H is recommended in order to develop higher locking torques.

TABLE VIII – METRIC TAPPED HOLE DIMENSIONS

Nominal Thread Size	"M" Countersink Diameter		Pitch Diameter			"H" MINIMUM TAPPING DEPTH					Tap Major Dia. Max.
	Max.	Min.	Min.	4 H Max.	5H Max.	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	
METRIC COARSE											
M2X0.4	2.30	2.70	2.260	2.295	2.310	2.4	3.4	4.4	5.4	6.4	2.581
M2.2x0.45	2.90	2.40	2.492	2.532	2.547	2.7	3.8	4.9	6.0	7.1	2.845
M2.5x0.45	3.40	2.90	2.792	2.832	2.847	3.0	4.2	5.5	6.7	8.0	3.145
M3x0.5	4.00	3.40	3.325	3.367	3.384	3.5	5.0	6.5	8.0	9.5	3.716
M3.5x0.6	4.70	4.10	3.890	3.940	3.959	4.1	5.9	7.6	9.4	11.1	4.354
M4x0.7	5.30	4.70	4.455	4.509	4.529	4.7	6.7	8.7	10.7	12.7	5.007
M5x0.8	6.40	5.80	5.520	5.577	5.597	5.8	8.3	10.8	13.3	15.8	6.145
M6x1	7.70	7.10	6.650	6.719	6.742	7.0	10.0	13.0	16.0	19.0	7.422
M7x1	8.70	8.10	7.650	7.719	7.742	8.0	11.5	15.0	18.5	22.0	8.422
M8x1.25	10.10	9.50	8..812	8.886	8.911	9.3	13.3	17.3	21.3	25.3	9.787
M10x1.5	12.40	11.80	10.974	11.061	11.089	11.5	16.5	21.5	26.5	31.5	12.131
M12x1.75	14.80	14.20	13.137	13.236	13.271	13.8	19.8	25.8	31.8	37.8	14.478
M14x2	17.10	16.50	15.299	15.406	15.444	16.0	23.0	30.0	37.0	44.0	16.822
M16x2	19.10	18.50	17.299	17.406	17.444	18.0	26.0	34.0	42.0	50.0	18.822
M18x2.5	21.80	21.20	19.624	19.738	19.778	20.5	29.5	38.5	47.5	56.5	21.513
M20x2.5	23.80	23.20	21.624	21.738	21.778	22.5	32.5	42.5	52.5	62.5	23.513
M22x2.5	25.50	25.20	23.624	23.738	23.778	24.5	35.5	46.5	57.5	68.5	25.513
M24x3	28.50	27.90	25.948	26.093	26.135	27.0	39.0	51.0	63.0	75.0	28.238
M27x3	31.50	30.90	28.948	29.093	29.135	30.0	43.5	57.0	70.5	84.0	31.238
M30x3.5	35.20	34.60	32.273	32.428	32.472	33.5	48.5	63.5	78.5	93.5	34.925
M33x3.5	38.20	37.60	35.273	35.428	35.472	36.5	53.0	69.5	86.0	102.5	37.925
M36x4	41.90	41.30	38.598	38.763	38.809	40.0	58.0	76.0	94.0	112.0	41.615
M39x4	44.90	44.30	41.598	41.763	41.809	43.0	62.5	82.0	101.5	121.0	44.615
METRIC FINE											
M8x1	9.70	9.10	8.650	8.719	8.742	9.0	13.0	17.0	21.0	25.0	9.422
M10x1	11.70	11.10	10.650	10.719	10.742	11.0	16.0	21.0	26.0	31.0	11.422
M10x1.25	12.10	11.50	10.812	10.886	10.911	11.3	16.3	21.3	26.3	31.3	11.787
M12x1.25	14.10	13.50	12.812	12.898	12.926	13.3	19.3	25.3	31.3	37.3	13.787
M12x1.5	14.40	13.80	12.974	13.067	13.099	13.5	19.5	25.5	31.5	37.5	14.131
M14x1.5	16.40	15.80	14.974	15.067	15.099	15.5	22.5	29.5	36.5	43.5	16.131
M16x1.5	18.40	17.80	16.974	17.067	17.099	17.5	25.5	33.5	41.5	49.5	18.131
M18x1.5	20.40	19.80	18.974	19.067	19.099	19.5	28.5	37.5	46.5	55.5	20.131
M20x1.5	22.40	21.80	20.974	21.067	21.099	21.5	31.5	41.5	51.5	61.5	22.131
M22x1.5	24.40	23.80	22.974	23.067	23.099	23.5	34.5	45.5	56.5	67.5	24.131
M18x2	21.10	20.50	19.299	19.406	19.444	20.0	29.0	38.0	47.0	56.0	20.822
M20x2	23.10	22.50	21.299	21.406	21.444	22.0	32.0	42.0	52.0	62.0	22.822
M22x2	25.10	24.50	23.299	23.406	23.444	24.0	35.0	46.0	57.0	68.0	24.822
M24x2	27.10	26.50	25.299	25.414	25.454	26.0	38.0	50.0	62.0	74.0	26.822
M27x2	30.10	29.50	28.299	28.414	28.454	29.0	42.5	56.0	69.5	83.0	29.822
M30x2	33.10	32.50	31.299	31.414	31.454	32.0	47.0	62.0	77.0	92.0	32.822
M33x2	36.10	35.50	34.299	34.414	34.454	35.0	51.5	68.0	84.5	101.0	35.822
M36x2	39.10	38.50	37.299	37.414	37.454	38.0	56.0	74.0	92.0	110.0	38.822
M39x2	42.10	41.50	40.299	40.414	40.454	41.0	60.5	80.0	99.5	119.0	41.822
M36x3	40.50	39.90	37.948	38.093	38.135	39.0	57.0	75.0	93.0	111.0	40.238
M39x3	43.50	42.90	40.948	41.093	41.135	42.0	61.5	81.0	100.5	120.0	43.238

Heli-Coil STI tap part numbers – inch

STRAIGHT FLUTE TAPS. Widely used for general hand and machine tapping operations. Available in sizes thru 1-1/2".

- **Plug Style – (4 Thread Chamfer).** Used in thru holes and blind holes that allow for ample chip clearance. Easier to start and require less tapping torque than bottoming taps.
- **Bottoming Style – (2 Thread Chamfer).** Used in blind holes drilled to a minimum depth that requires threads be close to the bottom of the hole.

SPIRAL POINTED – PLUG & SPIRAL FLUTE. Used for efficient chip disposal in production tapping operations. Available in sizes thru 1/2".

- **Spiral Pointed - Plug (4 Thread Chamfer).** Incorporates an angular grind at the point end of the tap which shears chips and drives them forward of the tap. Used widely in long thru holes and blind holes with ample chip clearance. They are free cutting and provide increased tap strength. Not recommended for abrasive materials.

TABLE IX – HELI-COIL STI TAP PART NUMBERS

Nominal Thread Size	Straight Flute				Spiral Point		High Spiral Flute		Roughing Tap
	Plug		Bottoming		Plug		Bottoming		
	3B	2B	3B	2B	3B	2B	3B	2B	
UNIFIED COARSE									
1 (.073)-64	01CPB	01CPA	01CBB	01CBA	01CSB	01CSA	5905-01	6905-01	
2 (.086)-56	02CPB	02CPA	02CBB	02CBA	02CSB	02CSA	5905-02	6905-02	
3 (.099)-48	03CPB	03CPA	03CBB	03CBA	03CSB	03CSA	5905-03	6905-03	
4 (.112)-40	04CPB	04CPA	04CBB	04CBA	04CSB	04CSA	5905-04	6905-04	
5 (.125)-40	05CPB	05CPA	05CBB	05CBA	05CSB	05CSA	5905-05	6905-05	
6 (.138)-32	06CPB	06CPA	06CBB	06CBA	06CSB	06CSA	5905-06	6905-06	
8 (.164)-32	2CPB	2CPA	2CBB	2CBA	2CSB	2CSA	5905-2	6905-2	
10 (.190)-24	3CPB	3CPA	3CBB	3CBA	3CSB	3CSA	5905-3	6905-3	
12 (.216)-24	1CPB	1CPA	1CBB	1CBA	1CSB	1CSA	5905-1	6905-1	
1/4 (.2500)-20	4CPB	4CPA	4CBB	4CBA	4CSB	4CSA	5905-4	6905-4	
5/16 (.3125)-18	5CPB	5CPA	5CBB	5CBA	5CSB	5CSA	5905-5	6905-5	
3/8 (.3750)-16	6CPB	6CPA	6CBB	6CBA	6CSB	6CSA	5905-6	6905-6	
7/16 (.4375)-14	7CPB	7CPA	7CBB	7CBA	7CSB	7CSA	5905-7	6905-7	7CRU
1/2 (.5000)-13	8CPB	8CPA	8CBB	8CBA	8CSB	8CSA	5905-8	6905-8	8CRU
9/16 (.5625)-12	187-9	38187-9	4187-9	43187-9					9CRU
5/8 (.6250)-11	8187-10	18187-10	10187-10	20187-10					10CRU
3/4 (.7500)-10	8187-12	18187-12	10187-12	20187-12					12CRU
7/8 (.8750)-9	8187-14	18187-14	10187-14	20187-14					14CRU
1 (1.0000)-8	8187-16	18187-16	10187-16	20187-16					16CRU
1-1/8 (1.1250)-7	8187-18	18187-18	10187-18	20187-18					
1-1/4 (1.2500)-7	8187-20	18187-20	10187-20	20187-20					
1-3/8 (1.3750)-6	8187-22	18187-22	10187-22	20187-22					
1-1/2 (1.5000)-6	8187-24	18187-24	10187-24	20187-24					
UNIFIED FINE									
2 (.086)-64	02FPB	02FPA	02FBB	02FBA	02FSB	02FSA	5906-02	6906-02	
3 (.099)-56	03FPB	03FPA	03FBB	03FBA	03FSB	03FSA	5906-03	6906-03	
4 (.112)-48	04FPB	04FPA	04FBB	04FBA	04FSB	04FSA	5906-04	6906-04	
6 (.138)-40	06FPB	06FPA	06FBB	06FBA	06FSB	06FSA	5906-06	6906-06	
8 (.164)-36	2FPB	2FPA	2FBB	2FBA	2FSB	2FSA	5906-2	6906-2	
10 (.190)-32	3FPB	3FPA	3FBB	3FBA	3FSB	3FSA	5906-3	6906-3	
1/4 (.2500)-28	4FPB	4FPA	4FBB	4FBA	4FSB	4FSA	5906-4	6906-4	
5/16 (.3125)-24	5FPB	5FPA	5FBB	5FBA	5FSB	5FSA	5906-5	6906-5	
3/8 (.3750)-24	6FPB	6FPA	6FBB	6FBA	6FSB	6FSA	5906-6	6906-6	
7/16 (.4375)-20	7FPB	7FPA	7FBB	7FBA	7FSB	7FSA	5906-7	6906-7	7FRU
1/2 (.5000)-20	8FPB	8FPA	8FBB	8FBA	8FSB	8FSA	5906-8	6906-8	8FRU
9/16 (.5625)-18	38193-9	18193-9	43193-9	20193-9					9FRU
5/8 (.6250)-18	8193-10	18193-10	10193-10	20193-10					10FRU
3/4 (.7500)-16	8193-12	18193-12	10193-12	20193-12					12FRU
7/8 (.8750)-14	8193-14	18193-14	10193-14	20193-14					14FRU
1 (1.0000)-14	8193-16	18193-16	10193-16	20193-16					16FRU
1 (1.0000)-12	8193-161	18193-161	10193-161	20193-161					161FRU
1-1/8 (1.1250)-12	8193-18	18193-18	10193-18	20193-18					
1-1/4 (1.2500)-12	8193-20	18193-20	10193-20	20193-20					
1-3/8 (1.3750)-12	8193-22	18193-22	10193-22	20193-22					
1-1/2 (1.5000)-12	8193-24	18193-24	10193-24	20193-24					

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- **High Spiral Flute - Bottoming (2 Thread Chamfer).** Have spiral flute for efficiently pulling stringy chips out of deep or blind holes in soft materials.

ROUGHING TAPS. Are available for difficult tapping operations where it is desirable to reduce the load on the finishing tap. Available in sizes 7/16 – 1".

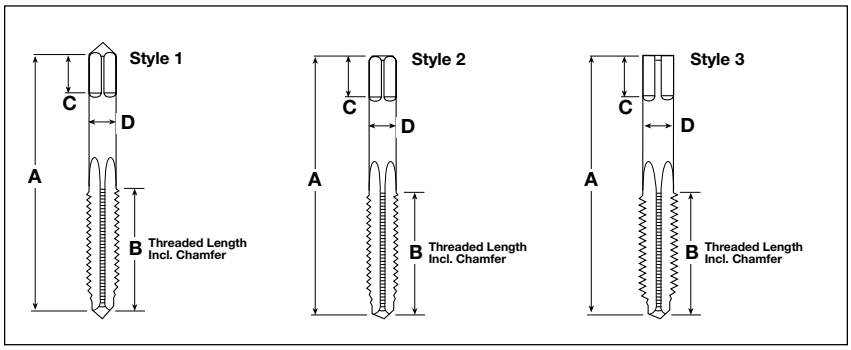

TABLE X – HELI-COIL STI TAP DIMENSIONS

Nominal Thread Size	Tap Dimensions					Number of Flutes			Tap Style*	H Limits	
	Length Overall A	Length Of Thread B	Length Of Square C	Max Dia Of Shank D	Max Size Of Square	Straight Flute	Spiral Point Plug	Spiral Flute Bott.		3B	2B
UNIFIED COARSE											
1 (.073)-64	1-13/16	1/2	3/16	.141	.110	3	2	2	1	H1	H2
2 (.086)-56	1-7/8	9/16	3/16	.141	.110	3	2	2	1	H1	H2
3 (.099)-48	1-15/16	5/8	3/16	.141	.110	3	2	2	1	H1	H2
4 (.112)-40	2	11/16	3/16	.141	.110	3	2	2	1	H1	H2
5 (.125)-40	2-1/8	3/4	1/4	.168	.131	3	2	3	1	H1	H2
6 (.138)-32	2-3/8	7/8	1/4	.194	.152	3	2	3	1	H2	H3
8 (.164)-32	2-3/8	15/16	9/32	.220	.165	3	2	3	1	H2	H3
10 (.190)-24	2-1/2	1	5/16	.255	.191	3	2	3	2	H2	H3
12 (.216)-24	2-23/32	1-1/8	3/8	.318	.238	3	2	3	2	H2	H3
1/4 (.2500)-20	2-23/32	1-1/8	3/8	.318	.238	3	2	3	2	H2	H3
5/16 (.3125)-18	2-15/16	1-1/4	7/16	.381	.286	4	3	3	2	H3	H4
3/8 (.3750)-16	3-3/8	1-21/32	7/16	.367	.275	4	3	3	3	H3	H4
7/16 (.4375)-14	3-19/32	1-21/32	1/2	.429	.322	4	3	4	3	H3	H4
1/2 (.5000)-13	3-13/16	1-13/16	9/16	.480	.360	4	3	4	3	H3	H4
9/16 (.5625)-12	4-1/32	1-13/16	5/8	.542	.406	4	–	–	3	H3	H4
5/8 (.6250)-11	4-1/4	2	11/16	.590	.442	4	–	–	3	H3	H4
3/4 (.7500)-10	4-11/16	2-7/32	3/4	.697	.523	4	–	–	3	H3	H5
7/8 (.8750)-9	5-1/18	2-1/2	13/16	.800	.600	4	–	–	3	H3	H5
1 (1.000)-8	5-3/4	2-9/16	1	1.021	.766	4	–	–	3	H4	H6
1-1/8 (1.1250)-7	6-1/16	3	1-1/16	1.108	.831	4	–	–	3	H4	H6
1-1/4 (1.2500)-7	6-3/8	3	1-1/8	1.233	.925	4	–	–	3	H4	H6
1-3/8 (1.3750)-6	6-11/16	3-3/16	1-1/8	1.305	.979	6	–	–	3	H6	H8
1-1/2 (1.5000)-6	7	3-3/16	1-1/4	1.430	1.072	6	–	–	3	H6	H8
UNIFIED FINE											
2 (.086)-64	1-7/8	9/16	3/16	.141	.110	3	2	2	1	H1	H2
3 (.099)-56	1-15/16	5/8	3/16	.141	.110	3	2	2	1	H1	H2
4 (.112)-48	2	11/16	3/16	.141	.110	3	2	2	1	H1	H2
6 (.138)-40	2-1/8	3/4	1/4	.168	.131	3	2	3	1	H1	H2
8 (.164)-36	2-3/8	15/16	9/32	.220	.165	3	2	3	1	H1	H2
10 (.190)-32	2-1/2	1	5/16	.255	.191	3	2	3	2	H2	H3
1/4 (.2500)-28	2-23/32	1-1/8	3/8	.318	.238	3	2	3	2	H2	H3
5/16 (.3125)-24	2-15/16	1-1/4	7/16	.381	.286	4	3	3	2	H2	H3
3/8 (.3750)-24	3-5/32	1-7/16	13/32	.323	.242	4	3	3	3	H2	H3
7/16 (.4375)-20	3-3/8	1-21/32	7/16	.367	.275	4	3	3	3	H3	H4
1/2 (.5000)-20	3-19/32	1-21/32	1/2	.429	.322	4	3	4	3	H3	H4
9/16 (.5625)-18	3-13/16	1-13/16	9/16	.480	.360	4	–	–	3	H3	H4
5/8 (.6250)-18	4-1/32	1-13/16	5/8	.542	.406	4	–	–	3	H3	H4
3/4 (.7500)-16	4-15/32	2	11/16	.652	.489	4	–	–	3	H3	H4
7/8 (.8750)-14	5-1/8	2-1/2	13/16	.800	.600	4	–	–	3	H3	H4
1 (1.0000)-14	5-7/16	2-9/16	7/8	.896	.672	4	–	–	3	H4	H6
1 (1.0000)-12	5-7/16	2-9/16	7/8	.896	.672	4	–	–	3	H4	H6
1-1/8 (1.1250)-12	5-3/4	2-9/16	1	1.021	.766	6	–	–	3	H4	H6
1-1/4 (1.2500)-12	6-1/16	3	1-1/16	1.108	.831	6	–	–	3	H4	H6
1-3/8 (1.3750)-12	6-3/8	3	1-1/8	1.233	.925	6	–	–	3	H4	H6
1-1/2 (1.5000)-12	6-11/16	3-3/16	1-1/8	1.305	.979	6	–	–	3	H4	H6

** NOTE: All bottoming taps have male center on thread end removed.*

Heli-Coil STI tap part numbers – metric

STRAIGHT FLUTE TAPS. Widely used for general hand and machine tapping operations. Available in sizes thru 39mm.

- **Plug Style – (4 Thread Chamfer).** Used in thru holes and in blind holes that allow for ample chip clearance. Easier to start and require less tapping torque than bottoming taps.
- **Bottoming Style – (2 Thread Chamfer).** Used in blind holes drilled to a minimum depth that requires threads be close to the bottom of the hole.

SPIRAL POINTED – PLUG & SPIRAL FLUTE. Used for efficient chip disposal in production tapping operations. Available in sizes thru 12mm.

- **Spiral Pointed - Plug (4 Thread Chamfer).** Incorporates an angular grind at the point end of the tap which shears chips and drives them forward of the tap. Used widely in long thru holes and blind holes with ample chip clearance. They are free cutting and provide increased tap strength. Not recommended for abrasive materials.

TABLE XI – HELI-COIL STI TAP PART NUMBERS

Nominal Thread Size	Straight Flute				Sprial Point		High Spiral Flute		Roughing Tap
	Plug		Bottoming		Plug		Bottoming		
	4H5H	5H	4H5H	5H	4H5H	5H	4H5H	5H	
METRIC COARSE									
M2X0.4	4687-2	2087-2	4693-2	2093-2	4863-2	4763-2	5081-2	4681-2	
M2.2x0.45	4687-2.2	2087-2.2	4693-2.2	2093-2.2	4863-2.2	4763-2.2	5081-2.2	4681-2.2	
M2.5x0.45	4687-2.5	2087-2.5	4693-2.5	2093-2.5	4863-2.5	4763-2.5	5081-2.5	4681-2.5	
M3x0.5	4687-3	2087-3	4693-3	2093-3	4863-3	4763-3	5081-3	4681-3	
M3.5x0.6	4687-3.5	2087-3.5	4693-3.5	2093-3.5	4863-3.5	4763-3.5	5081-3.5	4681-3.5	
M4x0.7	4687-4	2087-4	4693-4	2093-4	4863-4	4763-4	5081-4	4681-4	
M5x0.8	4687-5	2087-5	4693-5	2093-5	4863-5	4763-5	5081-5	4681-5	
M6x1	4687-6	2087-6	4693-6	2093-6	4863-6	4763-6	5081-6	4681-6	
M7x1	4687-7	2087-7	4693-7	2093-7	4863-7	4763-7	5081-7	4681-7	
M8x1.25	4687-8	2087-8	4693-8	2093-8	4863-8	4763-8	5081-8	4681-8	
M10x1.5	4687-10	2087-10	4693-10	2093-10	4863-10	4763-10	5081-10	4681-10	
M12x1.75	4687-12	2087-12	4693-12	2093-12	4863-12	4763-12	5081-12	4681-12	3765-12
M14x2	4687-14	2087-14	4693-14	2093-14					3765-14
M16x2	4687-16	2087-16	4693-16	2093-16					3765-16
M18x2.5	4687-18	2087-18	4693-18	2093-18					3765-18
M20x2.5	4687-20	2087-20	4693-20	2093-20					3765-20
M22x2.5	4687-22	2087-22	4693-22	2093-22					3765-22
M24x3	4687-24	2087-24	4693-24	2093-24					3765-24
M27x3	4687-27	2087-27	4693-27	2093-27					
M30x3.5	4687-30	2087-30	4693-30	2093-30					
M33x3.5	4687-33	2087-33	4693-33	2093-33					
M36x4	4687-36	2087-36	4693-36	2093-36					
M39x4	4687-39	2087-39	4693-39	2093-39					
METRIC FINE									
M8x1	5484-8	4984-8	5486-8	4986-8	4864-8	4764-8	5066-8	4666-8	
M10x1	5484-10	4984-10	5486-10	4986-10	4864-10	4764-10	5066-10	4666-10	
M10x1.25	5444-10	4944-10	5445-10	4945-10	4865-10	4765-10	5067-10	4667-10	
M12x1.25	5444-12	4944-12	5445-12	4945-12	4865-12	4765-12	5067-12	4667-12	3767-12
M12x1.5	5476-12	4976-12	5477-12	4977-12	4866-12	4766-12	5068-12	4668-12	3768-12
M14x1.5	5476-14	4976-14	5477-14	4977-14					3768-14
M16x1.5	5476-16	4976-16	5477-16	4977-16					3768-16
M18x1.5	5476-18	4976-18	5477-18	4977-18					3768-18
M20x1.5	5476-20	4976-20	5477-20	4977-20					3768-20
M22x1.5	5476-22	4976-22	5477-22	4977-22					3768-22
M18x2	5490-18	4990-18	5492-18	4992-18					3769-18
M20x2	5490-20	4990-20	5492-20	4992-20					3769-20
M22x2	5490-22	4990-22	5492-22	4992-22					3769-22
M24x2	5490-24	4990-24	5492-24	4992-24					3769-24
M27x2	5490-27	4990-27	5492-27	4992-27					
M30x2	5490-30	4990-30	5492-30	4992-30					
M33x2	5490-33	4990-33	5492-33	4992-33					
M36x2	5490-36	4990-36	5492-36	4992-36					
M39x2	5490-39	4990-39	5492-39	4992-39					
M36x3	5496-36	4996-36	5497-36	4997-36					
M39x3	5496-39	4996-39	5497-39	4997-39					

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- **High Spiral Flute - Bottoming (2 Thread Chamfer).** Have spiral flute for efficiently pulling stringy chips out of deep or blind holes in soft materials.

ROUGHING TAPS. Are available for difficult tapping operations where it is desirable to reduce the load on the finishing tap. Available in sizes 12mm thru 24mm.

SPECIAL STI TAPS

Taps made to different limits, configurations, or to cut difficult materials, or for very high production are available upon request. The following data should be provided at the time of ordering:

- Thread size
- Class of fit. **Example: 4H5H, 5H, Special Size to Special Tolerance.**
- Material to be cut, and its hardness.
- Hole configuration. **Example: Thru or Blind including length of drilled and tapped hole.**
- Type tap. **Example: Plug or Bottoming Straight Flute, Spiral Point, Spiral Flute.**
- Special features. **Example: Length, Shank Diameter, Chamfer Length, Tap Material.**
- Special coating of tap.

TABLE XII– HELI-COIL STI TAP DIMENSIONS

** Tap dimensions in millimeters.*

Nominal Thread Size	OVERALL LENGTH		THREAD LENGTH		SHANK DIAMETER		SIZE OF SQUARE		SQUARE LENGTH	
	mm	Tolerance ±	mm	Tolerance ±	Max.	Tolerance — only	mm	Tolerance — only	mm	Tolerance ±
METRIC COARSE										
M2x0.4	46.04	0.79	12.70	1.19	.141	0.04	2.80	0.10	4.77	0.79
M2.2X0.45	47.62	0.79	14.29	1.19	3.58	0.04	2.79	0.10	4.76	0.79
M2.5x0.45	49.21	0.79	15.88	1.19	3.58	0.04	2.79	0.10	4.76	0.79
M3x0.5	50.80	0.79	17.46	1.19	3.58	0.04	2.79	0.10	4.76	0.79
M3.5x0.6	53.98	0.79	19.05	1.19	4.27	0.04	3.33	0.10	6.35	0.79
M4x0.7	60.32	0.79	22.22	1.19	4.93	0.04	3.86	0.10	6.35	0.79
M5x0.8	63.50	0.79	25.40	1.59	6.48	0.04	4.85	0.10	7.94	0.79
M6x1	69.06	0.79	28.58	1.59	8.08	0.04	6.04	0.10	9.52	0.79
M7x1	74.61	0.79	31.75	1.59	9.68	0.04	7.26	0.10	11.11	0.79
M8x1.25	74.61	0.79	31.75	1.59	9.68	0.04	7.26	0.10	11.11	0.79
M10x1.5	85.72	0.79	42.07	1.59	9.32	0.04	6.98	0.10	11.11	0.79
M12x1.75	91.28	0.79	42.07	2.38	10.90	0.04	8.18	0.15	12.70	0.79
M14x2	102.39	0.79	46.04	2.38	13.77	0.05	10.31	0.15	15.88	0.79
M16x2	107.95	0.79	50.80	2.38	14.99	0.05	11.23	0.15	17.46	0.79
M18x2.5	119.06	0.79	56.36	2.38	17.70	0.05	13.28	0.15	19.05	0.79
M20x2.5	124.62	0.79	56.36	2.38	19.30	0.05	14.48	0.15	19.05	0.79
M22X2.5	130.18	0.79	63.50	2.38	20.32	0.05	15.24	0.15	20.64	0.79
M24X3	138.11	1.59	65.09	2.38	22.76	0.05	17.07	0.20	22.22	1.59
M27X3	146.05	1.59	65.09	2.38	25.98	0.05	19.46	0.20	25.40	1.59
M30X3.5	153.99	1.59	76.20	2.38	28.14	0.05	21.11	0.20	26.99	1.59
M33X3.5	161.92	1.59	76.20	2.38	31.32	0.05	23.50	0.20	28.58	1.59
M36X4	177.80	1.59	80.96	3.18	36.32	0.08	27.23	0.20	31.75	1.59
M39X4	177.80	1.59	80.96	3.18	36.32	0.08	27.23	0.20	31.75	1.59
METRIC FINE										
M8X1	74.61	0.79	31.75	1.59	9.68	0.04	7.26	0.10	11.11	0.79
M10X1	80.71	0.79	36.51	1.59	8.20	0.04	6.15	0.10	10.32	0.79
M10X1.25	85.72	0.79	42.07	1.59	9.32	0.04	6.98	0.10	11.11	0.79
M12X1.25	91.28	0.79	42.07	2.38	10.90	0.04	8.18	0.15	12.70	0.79
M12X1.5	91.28	0.79	42.07	2.38	10.90	0.04	8.18	0.15	12.70	0.79
M14X1.5	96.84	0.79	46.04	2.38	12.19	0.04	9.14	0.15	14.29	0.79
M16X1.5	107.95	0.79	50.80	2.38	14.99	0.05	11.23	0.15	17.46	0.79
M18X1.5	113.51	0.79	50.80	2.38	16.56	0.05	12.42	0.15	17.46	0.79
M20X1.5	119.06	0.79	56.36	2.38	17.70	0.05	13.28	0.15	19.05	0.79
M22X1.5	130.18	0.79	63.50	2.38	20.32	0.05	15.24	0.15	20.64	0.79
M18X2	113.51	0.79	50.80	2.38	16.56	0.05	12.42	0.15	17.46	0.79
M20X2	124.62	0.79	56.36	2.38	19.30	0.05	14.48	0.15	19.05	0.79
M22X2	130.18	0.79	63.50	2.38	20.32	0.05	15.24	0.15	20.64	0.79
M24X2	130.18	1.59	63.50	2.38	22.76	0.05	17.07	0.20	22.22	1.59
M27X2	138.11	1.59	65.09	2.38	25.93	0.05	19.46	0.20	25.40	1.59
M30X2	146.05	1.59	65.09	2.38	28.14	0.05	21.11	0.20	26.99	1.59
M33X2	153.99	1.59	76.20	2.38	31.32	0.05	23.50	0.20	28.58	1.59
M36X2	169.86	1.59	80.96	3.18	33.15	0.08	24.87	0.20	28.58	1.59
M39X2	177.80	1.59	80.96	3.18	36.32	0.08	27.23	0.20	31.75	1.59
M36X3	169.86	1.59	80.96	3.18	33.15	0.08	24.87	0.20	28.58	1.59
M39X3	177.80	1.59	80.96	3.18	36.32	0.08	27.23	0.20	31.75	1.59

Heli-Coil gages – inch

Accuracy of the finished thread when the insert is installed is dependent upon the accuracy of the tapped hole. If the finished tapped hole gages satisfactorily, the installed insert will be within the thread tolerance. **It is not necessary to gage the installed insert**. After the insert is installed, the GO thread plug gage may not enter freely; however, the insert will always seat itself when the bolt or screw is installed and tightened. *(Reference NASM33537).*

Gage handles and all gage nibs are marked with the extreme product limits for the particular size and class of fit. (See Pages 18 & 19, Tables VII & VIII, Pitch Diameter Limits).

When gaging tapped holes which have been thoroughly cleaned or which have a protective finish applied, the gage should always be lubricated with light oil.

HI nib may enter provided a definite drag results on or before 3rd turn from entry – *Ref. FED-STD-H28, Screw thread Standards for Federal Services.*

Heli-Coil STI Thread Plug Gages for checking the tapped hole are listed in the chart at right.

HELI-COIL STI GAGE WITH GO & HI MEMBERS

Working gages provide a guaranteed minimum wear allowance on the pitch diameter of the GO members of two ten thousandths of an inch (.0002). These gages are recommended for production in sizes 1/2 inch and smaller.

Reference gages have pitch diameters on or close to minimum (basic size). They are essentially laboratory or master gages and should be used in case of conflict between two working gages. Conflict can occur when one of the gages has experienced more use and wear.

Nominal Thread Size	WORKING GAGES Suggested for Longer Wear Life		REFERENCE GAGES Suggested as Master Gages	
	3B	2B	3B	2B
UNIFIED COARSE				
1 (.073)-64	3688-01	1442-01	1688-01	1440-01
2 (.086)-56	3688-02	1442-02	1688-02	1440-02
3 (.099)-48	3688-03	1442-03	1688-03	1440-03
4 (.112)-40	3688-04	1442-04	1688-04	1440-04
5 (.125)-40	3688-05	1442-05	1688-05	1440-05
6 (.138)-32	3688-06	1442-06	1688-06	1440-06
8 (.164)-32	3688-2	1442-2	1688-2	1440-2
10 (.190)-24	3688-3	1442-3	1688-3	1440-3
12 (.216)-24	3688-1	1442-1	1688-1	1440-1
1/4 (.2500)-20	3688-4	1442-4	1688-4	1440-4
5/16 (.3125)-18	3688-5	1442-5	1688-5	1440-5
3/8 (.3750)-16	3688-6	1442-6	1688-6	1440-6
7/16 (.4375)-14	3688-7	1442-7	1688-7	1440-7
1/2 (.5000)-13	3688-8	1442-8	1688-8	1440-8
9/16 (.5625)-12			1688-9	1440-9
5/8 (.6250)-11			1688-10	1440-10
3/4 (.7500)-10			1688-12	1440-12
7/8 (.8750)-9			1688-14	1440-14
1 (1.000)-8			1688-16	1440-16
1-1/8 (1.1250)-7			1688-18	1440-18
1-1/4 (1.2500)-7			1688-20	1440-20
1-3/8 (1.3750)-6			1688-22	1440-22
1-1/2 (1.5000)-6			1688-24	1440-24
UNIFIED FINE				
2 (.086)-64	3694-02	1443-02	1694-02	1441-02
3 (.099)-56	3694-03	1443-03	1694-03	1441-03
4 (.112)-48	3694-04	1443-04	1694-04	1441-04
6 (.138)-40	3694-06	1443-06	1694-06	1441-06
8 (.164)-36	3694-2	1443-2	1694-2	1441-2
10 (.190)-32	3694-3	1443-3	1694-3	1441-3
1/4 (.2500)-28	3694-4	1443-4	1694-4	1441-4
5/16 (.3125)-24	3694-5	1443-5	1694-5	1441-5
3/8 (.3750)-24	3694-6	1443-6	1694-6	1441-6
7/16 (.4375)-20	3694-7	1443-7	1694-7	1441-7
1/2 (.5000)-20	3694-8	1443-8	1694-8	1441-8
9/16 (.5625)-18			1694-9	1441-9
5/8 (.6250)-18			1694-10	1441-10
3/4 (.7500)-16			1694-12	1441-12
7/8 (.8750)-14			1694-14	1441-14
1 (1.0000)-14			1694-16	1441-16
1 (1.0000)-12			1694-161	1441-161
1-1/8 (1.1250)-12			1694-18	1441-18
1-1/4 (1.2500)-12			1694-20	1441-20
1-3/8 (1.3750)-12			1694-22	1441-22
1-1/2 (1.5000)-12			1694-24	1441-24

Heli-Coil STI Thread Plug Gages (metric) for checking the tapped hole are listed below.

The complete gage consists of the **GO** thread plug gage, the **HI** thread plug gage and the appropriately marked gage handle.

Accuracy of the finished thread, when the insert is installed, is dependent upon the accuracy of the tapped hole. If the finished tapped hole gages satisfactorily, the installed insert will be within the thread tolerance. It is, therefore, **not necessary to gage the installed insert**. After the insert is installed, the GO thread plug gage may not enter freely; however, the insert will always seat itself when the bolt or screw is installed and tightened. *(Reference MA1567)*

When gaging tapped holes which have been thoroughly cleaned or which have a protective finish applied, the gage should always be lubricated with light oil.

The HI thread plug gage may enter provided that a definite drag results on or before the second turn of entry. *(Reference ANSI B1.16)*

Nominal Thread Size	Complete Gage	
	4H5H	5H
METRIC COARSE		
M2x0.4	4624-2	1324-2
M2.2X0.45	4624-2.2	1324-2.2
M2.5x0.45	4624-2.5	1324-2.5
M3x0.5	4624-3	1324-3
M3.5x0.6	4624-3.5	1324-3.5
M4x0.7	4624-4	1324-4
M5x0.8	4624-5	1324-5
M6x1	4624-6	1324-6
M7x1	4624-7	1324-7
M8x1.25	4624-8	1324-8
M10x1.5	4624-10	1324-10
M12x1.75	4624-12	1324-12
M14x2	4624-14	1324-14
M16x2	4624-16	1324-16
M18x2.5	4624-18	1324-18
M20x2.5	4624-20	1324-20
M22X2.5	4624-22	1324-22
M24X3	4624-24	1324-24
M27X3	4624-27	1324-27
M30X3.5	4624-30	1324-30
M33X3.5	4624-33	1324-33
M36X4	4624-36	1324-36
M39X4	4624-39	1324-39
METRIC FINE		
M8X1	5416-8	4916-8
M10X1	5416-10	4916-10
M10X1.25	5424-10	4924-10
M12X1.25	5424-12	4924-12
M12X1.5	5480-12	4980-12
M14X1.5	5480-14	4980-14
M16X1.5	5480-16	4980-16
M18X1.5	5480-18	4980-18
M20X1.5	5480-20	4980-20
M22X1.5	5480-22	4980-22
M18X2	5418-18	4918-18
M20X2	5418-20	4918-20
M22X2	5418-22	4918-22
M24X2	5418-24	4918-24
M27X2	5418-27	4918-27
M30X2	5418-30	4918-30
M33X2	5418-33	4918-33
M36X2	5421-36	4921-36
M39X3	5421-39	4921-39

Stock items

Types of Tools

The various tools to install Heli-Coil inserts are presented on the following pages.

For production runs, prototype work, salvage, and repair, hand inserting tools are available. For high volume production, power inserting tools are also available. Both types of tools are dimensioned (pages 27 and 29) to aid determination of accessibility to the tapped hole.

Both hand and power inserting tools feature a threaded mandrel which engages the insert and provides a positive lead to guide the insert into the tapped hole easily and quickly.

Power inserting tools consist of an air motor, adapter and front end assembly. The front end assembly consists of a prewinder, mandrel and 3 spacers (1 for each length of insert to be installed). The versatility and adaptability of Heli-Coil power inserting tools is shown on page 30. The tool can be hand held, vertically or horizontally mounted, and adapted to both semi-automatic and fully automatic installation stations. Heli-Coil power inserting tools can be adapted to assembly stations, rotary tables, and transfer lines.

Tool Service

All Heli-Coil tooling is backed by our extensive expertise and experience in virtually any application. Of course, all tools are fully warranteed. In addition, our Application Engineering Department is always available to assist in installation techniques, special tooling (longer or shorter length tools, etc.) and tool service. For very high production, Heli-Coil will provide for the successful development of automated installation systems.

All tooling listed in the following pages is available from stock and can be purchased from our extensive network of Industrial Distributors.

Hand Inserting Tools

TYPE I Threaded Mandrel

TYPE II Prewinder

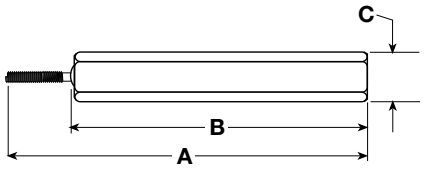
TYPE III Threaded Mandrel

TYPE IV Non-Captive Prewinder

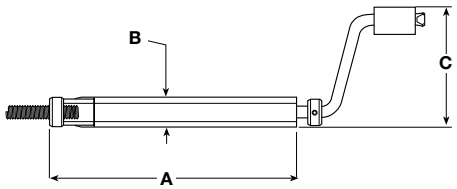
Pictured above are the various designs of Heli-Coil hand inserting tools. Generally, finer pitch inserts are proportionately larger in the free state than coarse pitch inserts and thus have to be “prewound” to a smaller diameter for installation. Large coarse pitch inserts (and 2-56, 3-48 and M2.2 inserts) need only a threaded mandrel tool for installation.

Nominal Thread Size	Hand Inserting Tools 3 Dia. Lengths thru 7/8 2 Dia. Lengths 1" & Up	Tool Type
UNIFIED COARSE		
1 (.073)-64	7551-01	IV
2 (.086)-56	551-02	I
3 (.099)-48	551-03	I
4 (.112)-40*	7551-04	II
5 (.125)-40	7551-05	II
6 (.138)-32	7551-06	II
8 (.164)-32*	7551-2	II
10 (.190)-24*	7551-3	II
12 (.216)-24	7551-1	II
1/4 (.2500)-20	7551-4	II
5/16 (.3125)-18	7551-5	II
3/8 (.3750)-16	7551-6	II
7/16 (.4375)-14	7551-7	II
1/2 (.5000)-13	7551-8	II
9/16 (.5625)-12	3724-9	III
5/8 (.6250)-11	3724-10	III
3/4 (.7500)-10	3724-12	III
7/8 (.8750)-9	3724-14	III
1 (1.0000)-8	3724-16	III
1-1/8 (1.1250)-7	3724-18	III
1-1/4 (1.2500)-7	3724-20	III
1-3/8 (1.3750)-6	3724-22	III
1-1/2 (1.5000)-6	3724-24	III
UNIFIED FINE		
2 (.086)-64	7552-02	IV
3 (.099)-56	7552-03	II
4 (.112)-48	7552-04	II
6 (.138)-40	7552-06	II
8 (.164)-36	7552-2	II
10 (.190)-32	7552-3	II
1/4 (.2500)-28	7552-4	II
5/16 (.3125)-24	7552-5	II
3/8 (.3750)-24	7552-6	II
7/16 (.4375)-20	7552-7	II
1/2 (.5000)-20	7552-8	II
9/16 (.5625)-18	535-9	IV
5/8 (.6250)-18	535-10	IV
3/4 (.7500)-16	535-12	IV
7/8 (.8750)-14	535-14	IV
1 (1.0000)-14	535-16	IV
1 (1.0000)-12	535-161	IV
1-1/8 (1.1250)-12	535-18	IV
1-1/4 (1.2500)-12	535-20	IV
1-3/8 (1.3750)-12	535-22	IV
1-1/2 (1.5000)-12	535-24	IV

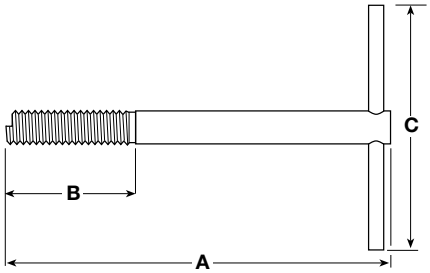
* Special tools required to install Phosphor Bronze and Inconel X-750 inserts in these sizes. To order add "-9" to the part number shown.



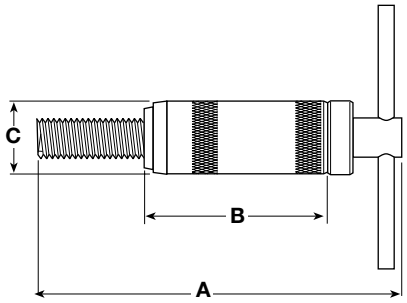
TYPE I Threaded Mandrel



TYPE II Prewinder



TYPE III Threaded Mandrel



TYPE IV Non-Captive Prewinder

Nominal Thread Size	Hand Inserting Tools 3 Dia. Lengths thru M22 2 Dia. Lengths M24 & Up	Tool Type
METRIC COARSE		
M2X0.4	7751-2	IV
M2.2x0.45	7751-2.2	I
M2.5x0.45*	7751-2.5	II
M3x0.5*	7751-3	II
M3.5x0.6	7751-3.5	II
M4x0.7	7751-4	II
M5x0.8*	7751-5	II
M6x1	7751-6	II
M7x1	7751-7	II
M8x1.25	7751-8	II
M10x1.5	7751-10	II
M12x1.75	7751-12	II
M14x2	7751-14	IV
M16x2	7751-16	IV
M18x2.5	7751-18	III
M20x2.5	7751-20	IV
M22X2.5	7751-22	III
M24X3	7751-24	IV
M27X3	7751-27	III
M30X3.5	7751-30	III
M33X3.5	7751-33	III
M36X4	7751-36	III
M39X4	7751-39	III
METRIC FINE		
M8X1	7755-8	II
M10X1	7755-10	II
M10X1.25	7756-10	II
M12X1.25	7756-12	II
M12X1.5	7753-12	II
M14X1.5	7753-14	IV
M16X1.5	7753-16	IV
M18X1.5	7753-18	IV
M20X1.5	7753-20	IV
M22X1.5	7753-22	IV
M18X2	7754-18	IV
M20X2	7754-20	IV
M22X2	7754-22	IV
M24X2	7754-24	IV
M27X2	7754-27	IV
M30X2	7754-30	IV
M33X2	7754-33	IV
M36X2	7754-36	IV
M39X2	7754-39	IV
M36x3	7752-36	IV
M39x3	7752-39	IV

Hand Inserting Tool Dimensions

INCH	METRIC	A	B	C
TYPE I - Coarse & Fine				
2-56	M2.2	2-7/16	2	5/16
3-56	–	6	3	5/8
TYPE II - Coarse & Fine				
No. 4	M2.5	4-5/8	3/8	2-9/32
No. 5	M3	4-5/8	3/8	2-9/32
No. 6	M3.5	4-5/8	3/8	2-9/32
No. 8	M4	4-5/8	3/8	2-9/32
No. 10	M5	4-5/8	15/32	2-9/32
No. 12	–	4-5/8	33/64	2-17/32
1/4"	M6	4-5/8	33/64	2-17/32
5/16"	–	4-5/8	5/8	3-23/32
3/8"	M7 & 8	5	45/64	3-23/32

INCH	METRIC	A	B	C
TYPE II - Coarse & Fine (continued)				
7/16"	M10 & 11	5-1/4	25/32	3-23/32
1/2"	M12	5-1/2	7/8	3-23/32
TYPE III - Coarse				
9/16"	–	4-7/8	1-13/16	4
5/8"	_	4-7/8	2	4
3/4"	M18	4-7/8	2-3/8	4
7/8"	M20	4-7/8	2-3/4	4-1/2
1"	M24	4-7/8	2-1/8	4-1/2
1-1/8"	M30	6-3/4	2-1/2	6
1-1/4"	M33	6-3/4	2-3/4	6
1-3/8"	M36	6-3/4	3	6
1-1/2"	M39	6-3/4	3-1/.4	6

INCH	METRIC	A	B	C
TYPE IV - Coarse & Fine*				
9/16"	M14	5-3/8	2-7/8	1-1/8
5/8"	M16	5-3/8	2-7/8	1-1/8
3/4"	M18	6	2-7/8	1-1/2
7/8"	M20	6-3/8	2-7/8	1-1/2
1-14"	M22	5-7/8	2-7/8	1-5/8
1-12"	M24	5-7/8	2-7/8	1-5/8
1-1/8"	M30	6-5/16	3-1/16	2
1-1/4"	M33	6-13/16	3-5/16	2
1-3/8"	M36	7-5/16	3-9/16	2-1/4
1-1/2"	M39	7-13/16	3-13/16	2-1/4
1-64	M2	2-5/8	3/4	7/16

** M14 & M16 Coarse are Type IV Tools. For metric sizes not shown, see next largest size.*

Heli-Coil inch power inserting tools

Heli-Coil power tools are available in UNC and UNF sizes #2 thru 1/2" for rapid installation of Heli-Coil inserts. Power tools consist of a Front End Assembly, an Adapter and a reversible Air Motor. All three components are ordered separately. A Front End Assembly consists of a prewinder, mandrel and spacers. Select the adapter that corresponds with the insert size being used. Power tools for strip feed inserts are available in sizes #2 through 5/16".

Nominal Thread Size	FRONT END ASSEMBLY		PREWINDERS		MANDRELS	SPACERS		
	P/N for Bulk Inserts (2 dia. max.)	P/N for Strip Feed Inserts	P/N for Bulk Inserts	P/N for Strip Feed Inserts		1 Dia.	1-1/2 Dia.	2 Dia.
INCH COARSE								
2 (.086)-56	–	8551-02-15	–	8557-02-15	8553-02	8559-02	8560-02	8561-02
4 (.112)-40	8551-04	8557-04-15	8557-04	8557-04-15	8553-04	8559-04	8560-04	8561
5 (.125)-40	8551-05	–	8557-05	–	8553-05	8559-05	8560-05	8561
6 (.138)-32	8551-06	8551-06-15	8557-06	8557-06-15	8553-06	8559-06	8560-06	8561
8 (.164)-32	8551-2	8551-2-15	8557-2	8557-2-15	8553-2	8559-2	8560-2	8561
10 (.190)-24	8551-3	8551-3-15	8557-3	8557-3-15	8553-3	8559-3	8560-3	8561
1/4 (.2500)-20	8551-4	8551-4-15	8557-4	8557-4-15	8553-4	8559-4	8560-4	8561
5/16 (.3125)-18	8251-5	8251-5-15	8257-5	8257-5-15	8253-5	8259-5-10	8259-5-15	
3/8 (.3750)-16	8251-6	–	8257-6	–	8253-6	8259-6-10	8259-6-15	NONE
7/16 (.4375)-14	8251-7	–	8257-7	–	8253-7	8259-7-10	8259-7-15	REQ'D
1/2(.5000)-13	8251-8	–	8257-8	–	8253-8	8259-8-10	8259-8-15	
INCH FINE								
6 (.138)-40	8552-06	–	8558-06	–	8554-06	8559-06	8560-06	8561
10 (.190)-32	8552-3	8552-3-15	8558-3	8558-3-15	8554-3	8559-3	8560-3	8561
1/4 (.2500)-28	8552-4	8552-4-15	8558-4	8558-4-15	8554-4	8559-4	8560-4	8561
5/16 (.3125)-24	8252-5	8252-5-15	8258-5	8258-5-15	8254-5	8259-5-10	8259-5-15	
3/8 (.3750)-24	8252-6	–	8358-6	–	8254-6	8259-6-10	8259-6-15	NONE
7/16 (.4375)-20	8252-7	–	8258-7	–	8254-7	8259-7-10	8259-7-15	REQ'D
1/2 (.5000)-20	8252-8	–	8258-8	–	8254-8	8259-8-10	8259-8-15	

Power Tool Holder, **Part No. 13537**, can be used with or without Strip Feed inserts.

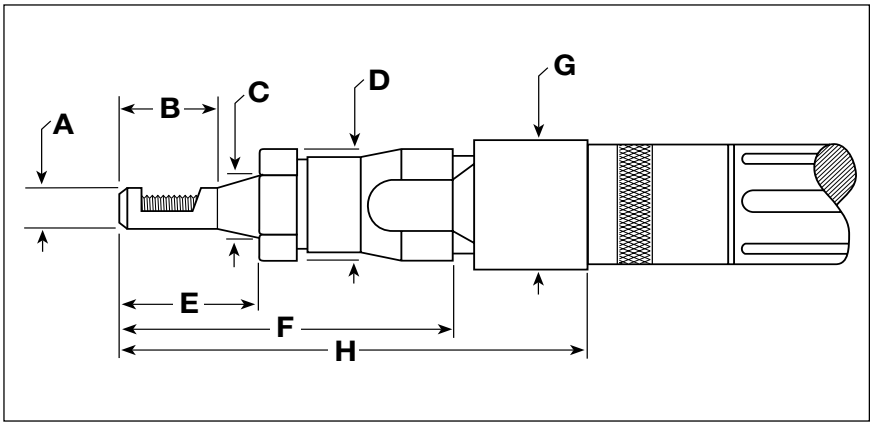
Note: Recommended for use with **2-56" & M2.2x0.45 & M2.5x0.45** power tool.

Heli-Coil metric power inserting tools are available in coarse and fine sizes up thru 12mm* for rapid installation of standard and screw-lock inserts, reducing assembly costs substantially. Strip feed power tools are available in sizes up thru 7mm. They speed up assembly, eliminate waste and permit an accurate count.

Power tools consist of a **Front End Assembly**, an **Adapter** and a reversible **Air Motor.** All three components are ordered individually. A front end assembly consists of a prewinder, mandrel and spacers. Select an Adapter that is compatible with the Air Motor to be used, and for the size range up thru 6mm or the size range 7mm thru 12mm.

Nominal Thread Size	FRONT END ASSEMBLY		PREWINDERS		MANDRELS	SPACERS		
	P/N for Bulk Inserts (2 dia. max.)	P/N for Strip Feed Inserts	P/N for Bulk Inserts	P/N for Strip Feed Inserts		1 Dia.	1-1/2 Dia.	2 Dia.
METRIC COARSE								
M2.2x0.45	–	8751-2.2-15	–	8769-2.2-15	8757-2.2	8775-2.2	8776-2.2	8777-2.2
M2.5x0.45	8751-2.5	8751-2.5-15	8769-2.5	8769-2.5-15	8757-2.5	8775-2.5	8776-2.5	8777
M3x0.5	8751-3	8751-3-15	8769-3	8769-3-15	8757-3	8775-3	8776-3	8777
M3.5x0.6	8751-3.5	8751-3.5-15	8769-3.5	8769-3.5-15	8757-3.5	8775-3.5	8776-3.5	8777
M4x0.7	8751-4	8751-4-15	8769-4	8769-4-15	8757-4	8775-4	8776-4	8777
M5x0.8	8751-5	8751-5-15	8769-5	8769-5-15	8757-5	8775-5	8776-5	8777
M6x1	8751-6	8751-6-15	8769-6	8769-6-15	8757-6	8775-6	8776-6	8777
M7x1	8751-7	8751-7-15	8769-7	8769-7-15	8757-7	8777-7-10	8777-7-15	
M8x1.25	8751-8	–	8769-8	–	8757-8	8777-8-10	8777-8-15	NONE
M10x1.5	8751-10	–	8769-10	–	8757-10	8777-10-10	8777-10-15	REQ'D
M12x1.75	8751-12	–	8769-12	–	8757-12	8777-12-10	8777-12-15	
METRIC FINE								
M8x1	8755-8	–	8770-8	–	8764-8	8777-8-10	8777-8-15	
M10x1	8755-10	–	8770-10	–	8764-10	8777-10-10	8777-10-15	NONE
M10x1.25	8756-10	–	8758-10	–	8759-10	8777-10-10	8777-10-15	REQ'D
M12x1.25	8756-12	–	8758-12	–	8759-12	8777-12-10	8777-12-15	
M12x1.5	8753-12	–	8773-12	–	8774-12	8777-12-10	8777-12-15	

For evaluating space required for installing Heli-Coil inserts with standard manual, pneumatic and electronic inserting tools and tang break-off tools, the diagrams on pages 27 & 29 give dimensions of standard Heli-Coil tooling. For special variations or adaptions, contact the Applications Engineering Department at (203) 830-3274.



Power Inserting Tool Dimensions

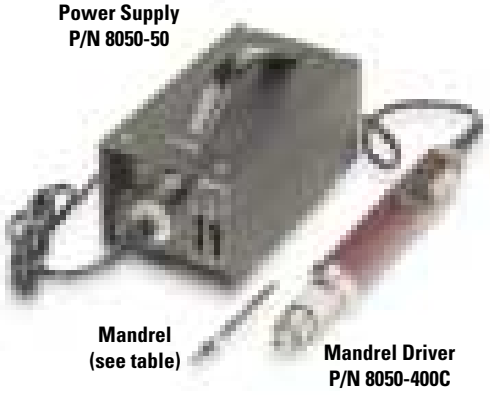
SIZE		A	B	A	B	C	D	E	F	G	H
INCH	METRIC	FOR BULK INSERTS		FOR STRIP FEED INSERTS							
No. 2	M2.2	–	–	5/16	7/16	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
No. 4	M2.5	1/4	9/16	3/8	15/16	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
No. 5	M3	9/32	9/16	3/8	15/16	2332	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
No. 6	M3.5	5/16	9/16	1/2	15/16	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
No. 8	M4	11/32	9/16	1/2	15/16	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
No. 10	M5	3/8	29/32	1/2	15/16	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
1/4"	M6	27/64	29/32	5/8	1-3/8	23/32	1-1/8	1-3/8	3-3/16	1-1/4	4-7/16
5/16"	M7 & M8	9/16	1-1/8	11/16	1-1/8	1"	1-9/16	1-3/8	4-7/16	1-1/4	5-3/4
3/8"	–	11/16	1-11/32	–	–	1"	1-9/16	1-7/8	4-3/4	1-1/4	6-1/32
7/16"	M10	3/4	1-17/32	–	–	1"	1-9/16	2-1/4	5-1/8	1-1/4	6-13/32
1/2"	M12	13/16	1-25/32	–	–	1"	1-9/16	1-1/2	5-13/32	1-1/4	6-11/16

** Tool for larger sizes or special application is available upon request.*

Electronic Power Inserting Tool

Heli-Coil offers an electronic power tool where electric power is preferred over air. The slender configuration of the mandrels allows them to reach into constricted areas. Electric power meets the requirements of clean room operations. Operators prefer electric power because it is quieter. The electronic tool is lighter to minimize operator fatigue. Mandrel assemblies are available to install the sizes of Heli-Coil bulk loaded inserts listed below.

Application Note: Variations in Mandrel Assembly dimensions and threads are available on special order to meet individual applications. For Mandrel Assemblies to meet your special conditions, please contact Heli-Coil Applications Engineering Department at (203) 830-3274



Electronic Tool Mandrel Assembly	
Insert Thread Size (UNC)	**Mandrel Assembly (for bulk inserts)**
2(.086)-56	8051-02
4(.112)-40	8051-04
6(.138)-32	8051-06
8(.164)-32	8051-2

Pneumatic Power Tool Installation Kit

This Heli-Coil power tool installation kit contains an Air Motor 8510-1, adapter, tools, a filter-regulator-lubricator, oil, two quick disconnect fittings, and wrenches. All are packed in a portable molded box with easy-to-follow operating instructions. Front End Assemblies may be ordered separately to fit the sizes of Heli-Coil inserts to be installed.

Cordless Electric Tool

The Heli-Coil Cordless Tool is a complete kit that includes a driver, 2 batteries, 15 minute charger and mandrels all in a durable metal box. The cordless tool is portable, lightweight, has adjustable torque and uses standard Heli-Coil electronic tool installation mandrels for quick setup.

Power Tool Holder

The Power Tool Holder 13537 is mounted on a bench and the appropriate air motor is attached to a spring loaded air tube at the end of a movable arm. A mounting arm is also provided for attaching reels of strip-feed inserts.

This power tool holder configuration ensures accurate vertical (square to work surface) installations of Heli-Coil inserts in relatively large parts. The tool holder is capable of installing inserts within a radius of 23.5 inches as well as on planes differing by 3.5 inches. Example: Box shape configurations.

NOTE: This tool holder is recommended for use with the **2-56, M2.2x0.45** and **M2.5x0.45** air tools. The tool holder also may be used with the Heli-Coil Electronic Inserting Tool, with the addition of an electronic tool adapter.

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Mexico Tel 52-5-326-7100 • Fax 52-5-326-7141

Heli-Coil Tang Break-Off Tools

The driving tangs of Heli-Coil inserts must be removed to eliminate their interference with the end of the assembled bolt. Heli-Coil tang break-off tools are available for use with inserts through 1/2 inch and 12mm metric nominal diameter. Their operation is automatic, having a spring loaded, easily triggered punch that strikes a sharp, uniform blow against the tang of the installed insert. The tool can be operated with one hand.

Nominal Thread Size	Tool Part No.	Replacement Punch Part No.
UNIFIED FINE		
1 (.073)-64	3695-01	3697-01
2 (.086)-56	3695-02	3697-02
3 (.099)-48	3695-02	3697-02
4 (.112)-40	3695-04	3697-04
5 (.125)-40	3695-04	3697-04
6 (.138)-32	3695-06	3697-06
8 (.164)-32	3695-2	3697-2
10 (.190)-24	3695-3	3697-3
12 (.216)-24	3695-3	3697-3
1/4 (.2500)-20	3695-4	3697-4
5/16 (.3125)-18	3695-5	3643-5
3/8 (.3750)-16	3695-6	3643-6
7/16 (.4375)-14	3695-7	3643-7
1/2 (.5000)-13	3695-8	3643-8
UNIFIED FINE		
2 (.086)-64	3695-02	3697-02
3 (.099)-56	3695-02	3697-02
4 (.112)-48	3695-04	3697-04
6 (.138)-40	3695-06	3697-06
8 (.164)-36	3695-2	3697-2
10 (.190)-32	3695-3	3697-3
1/4 (.2500)-28	3695-4	3697-4
5/16 (.3125)-24	3692-5	3645-5
3/8 (.3750)-24	3692-6	3645-6
7/16 (.4375)-20	3692-7	3645-7
1/2 (.5000)-20	3692-8	3645-8

Nominal Thread Size	Tool Part No.	Replacement Punch Part No.
METRIC COARSE		
M2x0.4	4238-2	3697-01
M2.2x0 45	4238-2.2	3697-02
M2.5x0.45	4238-2.2	3697-02
M3x0.5	4238-3	3697-04
M3.5x0.6	4238-3	3697-04
M4x0.7	4238-4	3697-2
M5x0.8	4238-5	3697-3
M6x1	4238-6	3697-4
M7x1	4238-7	4436-7
M8x1.25	4238-8	3643-5
M10x1.25	4238-10	4436-10
M12x1.75	4238-12	4436-12
METRIC FINE		
M8x1	4238-8	3643-5
M10x1	4238-10	4436-10
M10x1.25	4238-10	4436-10
M12x1.25	4238-12	4436-12
M12x1.5	4238-12	4436-12

Note: Tang break-off tools will break-off tangs thru 2 diameter lengths.

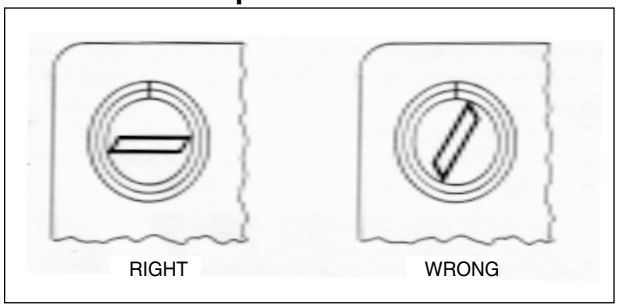
For sizes larger than 1/2" or 12mm, use long nose pliers. Bend tang up and down to snap off at notch.

Heli-Coil Extracting Tools

Occasionally Heli-Coil inserts must be removed. Inserts may be removed manually with little effort. This is done by inserting the blade of the extracting tool into the Heli-Coil insert so that a flat side of the blade is toward the top end of the insert. Strike the head of the tool with a light blow. Maintaining a steady pressure of blade against insert, turn the extracting tool counterclockwise until the insert is removed.

Nominal Thread Size		Extracting Tool
Inch	Metric	Part No.
#1	M2	1227-01
#2	M2.2	1227-02
#3 thru #8	M2.5 thru M4	1227-06
#10 thru 3/8"	M5 thru M10	1227-6
7/16" thru 1"	M11 thru M24	1227-16
1-1/8" thru 1-1/2"	M27 thru M39	1227-24

Top View Shown



Right & wrong blade positions of insert extracting tool.

Heli-Coil Tangless® Inserts

Heli-Coil Tangless® Inserts eliminate tang break-off and retrieval and are easily adjusted or removed after installation.

- **BI-DIRECTIONAL DESIGN** Installs quickly and easily from either end.
- **STRONGER ASSEMBLIES** Tapped threads are strengthened because the inherent flexibility of the insert provides a more balanced distribution of static and dynamic loads throughout the engagement length.
- **ELIMINATE STRESS**. Virtually no stress is induced into the parent material as no staking, swaging or keying in place is required.
- **POSITIVE SELF-LOCKING TORQUE.** Heli-Coil Tangless® screw-lock inserts provide a positive, self-locking torque complying with the requirements of NASM8846.
- **MINIMIZE SPACE AND WEIGHT.** Requires smaller boss than solid inserts; minimize total in-place cost.
- **CONFORM TO NAS1130**

Selecting a Heli-Coil Tangless® Insert

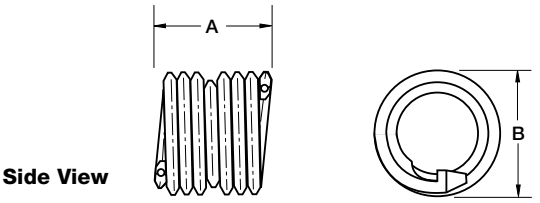
Heli-Coil Tangless® inserts are made from 304 Stainless Steel per AS7245 (see chart below for thread size designation), and are available in three lengths: **1**, **1-1/2** and **2** diameters.

Tangless® inserts can be ordered with a Cadmium Plate finish **(Y)**, Dry Lube finish **(W)**, or no finish. The following is an example of how to order the Heli-Coil Tangless® insert:

T3585-04CW112S

TYPE	SIZE	MATERIAL	*FINISH	LENGTH	PACKAGING
T1185 Free Running, UNC **T1191** Free Running, UNF **T3585** Screw-Lock, UNC **T3591** Screw-Lock, UNF	See Chart See Chart (Size Designation)	**C** - Stainless Steel	**Y** - Cadmium **W** - Dry Film Lube **Blank** - No Finish	See Chart	**Blank** - Bulk **S** - Strip Feed

Complete Part Number Example – 4-40 x .112 Screw-Lock Insert, Dry Film Lube, on Strip Feed.



Nominal Thread Size	Type: Free Running	Type: Screw-Lock	Size Designation	"A" Normal Length: 1 Dia.	"A" Normal Length: 1 1/2 Dia.	"A" Normal Length: 2 Dia.	"B" Free Outer Dia.: Min.	"B" Free Outer Dia.: Max.	Number of Coils Nominal Length: 1 Dia.	Number of Coils Nominal Length: 1 1/2 Dia.	Number of Coils Nominal Length: 2 Dia.
Unified Coarse Thread (UNC)											
2 (.086)-56	T1185	T3585	02C*	.086	.129	.172	.110	.119	3	5-1/4	7-3/8
4 (.112)-40	T1185	T3585	04C*	.112	.168	.224	.144	.159	2-3/4	4-3/4	6-3/4
6 (.138)-32	T1185	T3585	06C*	.138	.207	.276	.178	.193	2-3/4	4-3/4	6-7/8
8 (.164)-32	T1185	T3585	2C*	.164	.246	.328	.205	.220	3-1/2	6	8-3/8
10 (.190)-24	T1185	T3585	3C*	.190	.285	.380	.244	.259	2-7/8	5	7-1/8
1/4(.250)-20	T1185	T3585	4C*	.250	.375	.500	.310	.330	3-3/8	5-3/4	8
Unified Fine Thread (UNF)											
10(.190) 32	T1191	T3591	3C*	.190	.285	.380	.236	.256	4-1/8	6-7/8	9-1/2

Note: Contact your local distributor for specific product availability

Tangless® is a registered trademark of Advanex Inc.

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Installation and Removal Tools

Tangless® inserts may be installed by hand or power tooling with the same mandrel assembly.

- Tooling utilizes a "blade" that applies torque to a notch in the end of the coil for installation.
- Installation depth can be adjusted easily for virtually any application.
- Driving blades are replaceable- and increase the overall life of the tool.

Electronic tool & power supply

Strip-feed reels, available in all sizes

Hand installation tool

Heli-Coil Tangless® Insert Tooling

Nominal Thread Size	Hand Installation Tool	Replacement Installation Blade Kit**	Removal Tool (with handles)	Electronic Driver*
2-56	7571-02	7571-02-5	7570-02	8050-400C
4-40	7571-04	7571-04-5	7570-04	8050-400C
6-32	7571-06	7571-06-5	7570-06	8050-400C
8-32	7571-2	7571-2-5	7570-2	8050-400C
10-24	7571-3	7571-3-5	7570-3	8050-650C
10-32	7572-3	7572-3-5	7570-3	8050-650C
1/4-20	7571-4	7571-4-5	7570-4	8050-650C

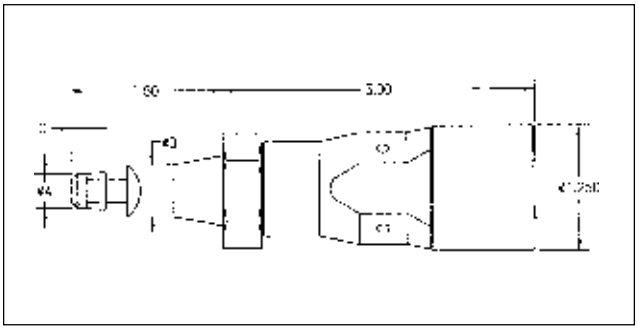
** An electronic driver requires a power supply, part number 8050-50.*

** *Includes blade, spring and pin.*

Heli-Coil Tangless® Power Tooling***

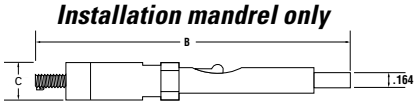
Nominal Thread Size	Front End Assembly	Replacement Mandrel Assembly	Replacement Blade
2-56	18551-02-15	18551-02-30	18551-02-2
4-40	18551-04-15	18551-04-30	18551-04-2
6-32	18551-06-15	18551-06-30	18551-06-2
8-32	18551-2-15	18551-2-30	18551-2-2
10-24	18551-3-15	18551-3-30	18551-3-2
10-32	18552-3-15	18552-3-30	18552-3-2
1/4-20	18551-4-15	18551-4-30	18551-4-2
1/4-28	18552-4-15	18552-4-30	18552-4-2

****For use with Heli-Coil Pneumatic Installation Tools & Adapters*

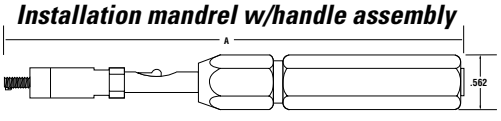


Front End Assembly Dimensions			
Nominal	A Nose Diameter	B Body Diameter	C Prewinder Tip Length
2-56	.32	.32	.09
4-40	.25	.40	.13
6-32	.32	.50	.14
8-32	.35	.51	.15
10-24	.38	.51	.19
10-32	.38	.51	.15
1/4-20	.42	.63	.22

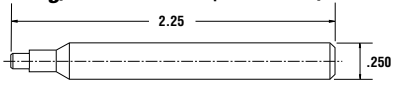
Installation mandrel only



Installation mandrel w/handle assembly



Adjusting/removal tool (shown w/o handle)



Note: Installation mandrel and adjusting/removal tool designed for use with both handle and electronic tool.

Installation Tool Dimensions

Nominal Thread Size	"A" Overall Length (reference)	"B" Mandrel Length	"C" Spinner Diameter
2-56	5.33	2.80	.240
4-40	5.43	2.90	.240
6-32	5.53	3.00	.360
8-32	5.68	3.15	.360
10-24	5.53	3.00	.370
10-32	5.53	3.00	.370
1/4-20	5.53	3.00	.370

Thread repair kits & master sets

Heli-Coil inserts are available in thread repair kits and sets for repairing tapped holes which have been stripped or damaged due to wear, corrosion and over-torque. They are available in inch, metric, spark plug and pipe thread series. All kits have a quantity of inserts, the proper size drill, high speed steel Heli-Coil tap and an installation tool. The Professional Kits* (shown in bold type) also includes a tang removal tool and quantities of three lengths of inserts.

Thread Size	Kit P/N	Inserts per Kit
Inch Coarse		
4-40	**5401-04**	36*
5-40	**5401-05**	36*
6-32	**5401-06**	36*
8-32	**5401-2**	36*
10-24	**5401-3**	36*
12-24	**5401-1**	36*
1/4-20	**5401-4**	36*
5/16-18	**5401-5**	36*
3/8-16	**5401-6**	18*
7/16-14	**5401-7**	18*
1/2-13	**5401-8**	18*
9/16-12	5401-9	6
5/8-11	5401-10	6
3/4-10	5401-12	4
7/8-9	5521-14	6
1-8	5521-16	6
1–1/8-7	5521-18	5
1–1/4-7	5521-20	4
1–3/8-6	5521-22	4
1–1/2-6	5521-24	4
Inch Fine		
6-40	**5402-06**	36*
8-36	**5402-2**	36*
10-32	**5402-3**	36*
1/4-28	**5402-4**	36*
5/16-24	**5402-5**	36*
3/8-24	**5402-6**	18*
7/17-20	**5402-7**	18*
1/2-20	**5402-8**	18*
9/16-18	5402-9	6
5/8-18	5402-10	6
3/4-16	5402-12	4
7/8-14	5528-14	6
1-14	5528-16	6
1-12	5528-161	6
1–1/8-12	5528-18	5
1–1/4-12	5528-20	4
1–3/8-12	5528-22	4
1–1/2-12	5528-24	4

**** The total quantity of inserts in the Professional Kits represents 3 lengths.***

Thread Size	Kit P/N	Inserts per Kit
Metric Coarse		
M3x0.5	**5403-3**	36*
M3.5x0.6	**5403-3.5**	36*
M4x0.7	**5403-4**	18*
M5x0.8	**5403-5**	18*
M6x1	**5403-6**	18*
M7x1	**5403-7**	18*
M8x1.25	**5403-8**	18*
M9x1.25	**5403-9**	12
M10x1.5	5403-10	18*
M11x1.5	5403-11	6
M12x1.75	**5403-12**	18*
M14x2	5403-14	12
M16x2	5403-16	6
M18x2.5	5403-18	6
M20x2.5	5403-20	4
Metric Fine		
M8x1	**5404-8**	18*
M10x1	**5404-10**	18*
M10x1.25	**5405-10**	18*
M12x1.25	**5405-12**	18*
M12x1.5	**5406-12**	18*
M14x1.5	5406-14	6
M16x1.5	5406-16	6
M18x1.5	5406-18	6

**** The total quantity of inserts in the Professional Kits represents 3 lengths.***

SPARK PLUG SERIES

Thread Size	Part No.	Reach	Inserts Per Kit
10-1.0mm	5523-10	1/2	24
12-1.25mm	5523-12	1/2	12
		3/4	12
14-1.25mm	5523-14	3/8	6
		7/16	6
		1/2	6
		3/4	6
		.472	6
18-1.50mm	5523-18	1/2	24
7/8-18	550	1/2-5/8	10
M14x1.25	5408-14	Short	6
		Normal	6
		Long	6

PIPE THREAD SERIES

Thread Size	Part No.	Inserts Per Kit
1/8-27	5407-2	12
1/4-18	5407-4	12
3/8-18	5407-6	10
1/2-14	5407-8	10
3/4-14	5407-12	10
1-11-1/2	5407-16	6

MASTER THREAD REPAIR SETS

Type	Part No.	Insert sizes included in set
Inch Coarse	4934	1/4-20, 5/16-18, 3/8-16, 7/16-14, 1/2-13, 5/8-11
Inch Fine	4936	10-32, 1/4-28, 5/16-24, 3/8-24, 7/16-20, 1/2-20
Metric	4937-125	M5x0.8, M6x1, M8x1.25, M10x1.25
Metric	4937-150	M5x0.8, M6x1, M8x1.25, M10x1.5

All sets contain a drill, tap, tool and inserts for each size listed above. See Heli-Coil Bulletin 998 for a complete listing of all Heli-Coil thread repair products.

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Emhart Teknologies

Product Portfolio

Emhart applies unconventional thinking and innovation, routinely combining multiple technologies in new ways to create cost-effective assembly systems. Focused on intimate customer relationships in every phase of the manufacturing process, Emhart provides assembly solutions through computer-based modeling and value analysis from mobile and stationary innovation centers located around the Globe and online at www.emhart.com.

Dodge Threaded Inserts for plastics are designed to provide strong metal threads in soft materials. Dodge inserts are installed in a variety of ways including semi- and full automation using ultrasonic welding, hot or cold press-in, mold-in and self-threading.

- Application and Product Development
- Pre-production Prototyping and Sampling
- Extensive Product Range
- Installation Equipment Coordination

Parker-Kalon specialty threaded fasteners set the industry standard for quality and consistency, providing high performance assembly for metal, plastic and masonry applications.

- Value-added design and engineering services
- QS and ISO certified
- Thread rolling, thread forming and self-drilling screws
- Assembled screws
- Weld screws and weld pins

POP Blind Riveting Systems offer an extensive range of blind rivets, hand-powered and automated-setting systems for every blind rivet application. POP's extensive experience and commitment to product breakthroughs provide both on- and off-the-shelf products and systems.

- Lightweight, Vibration-proof Assembly
- High Grip and Pull-up Strengths
- Exceptional Versatility and Design Flexibility
- Extensive Installation and Processing Equipment

Tucker Assembly Systems from fully automated drawn ARC stud, Nut (Nut-fast) and bracket (Weldfast) welding to automatic plastic clip assembly and self-piercing riveting; Tucker supplies the most innovative and cost-effective assembly systems in the world.

- Application-Based Product Design
- Full System Approach
- Performance Monitoring, Self-Compensation and Diagnostics
- Production Line Integration

Warren Metal and Plastic Clips The no-hole, fastening system combines plastic clips, studs and TUCKER welding equipment to retain insulation, route wire or ground electrical systems. Warren metal clips fasten plastic moldings and decorative parts.

- Design Flexibility
- Snap-on, Serviceable and Reusable
- Designed For Specific Applications
- Part of an Integrated System

Gripco Prevailing torque nuts and assemblies are an integral part of OEM assembly operations, providing exceptional performance and simplification of the assembly process.

- Application and Standards Engineering
- Extensive Product Selection
- Cold and Hot Forming
- Heat Treating and Plating

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