

Spirallock Fasteners & Threading Tools

Product Specifications



On the following pages you will find information on Spiralock product selection. If for any reason your required thread size is not listed in this catalog, please contact our offices at (800) 521-2688 or send an email to sinfo@spiralock.com. We are able to supply and/or design nearly any thread size your application may require. For additional information on Spiralock technology, products and applications, please visit our website, www.spiralock.com

Table of Contents

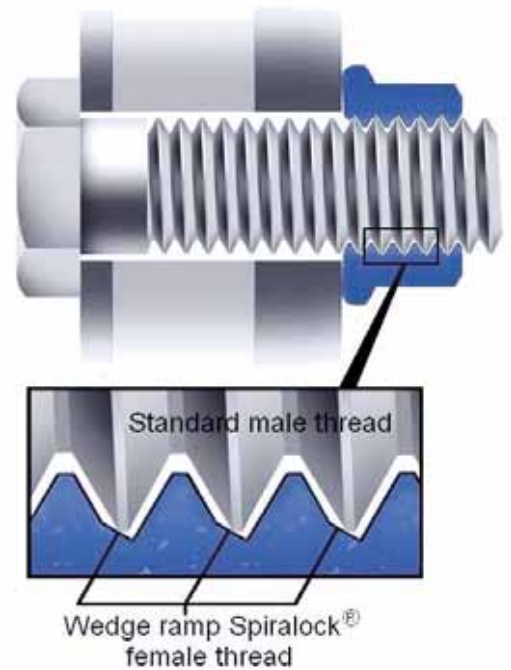
Product Introduction	2
<u>Fastener Product Offering</u>	4
Hex Flange Nuts	5
Stainless Hex Flange Nuts	7
Wire Thread Inserts	9
Key Locking Threaded Inserts	15
Made to Order Fasteners	16
<u>Tooling Product Offering</u>	18
Standard Tap Styles	19
Choosing a Tap	20
Tapping Speeds	21
Hole Sizes for Cut Tapping	23
Hole Sizes for Cold Forming	24
Tap and Gage Part Numbers – English	25
Tap and Gage Part Numbers – Fractional	26
Tap and Gage Part Numbers – Metric	28
<u>Recommended Gaging Practices</u>	31
Thread Milling Cutters	32
Thread Turning – Carbide Inserts	33
Standard Tap Dimensions	35
Tapping Troubleshooting	37
Application Profile	39
About STANLEY Engineered Fastening	40

For more than three decades, industry has turned to Spirallock when it needs to keep critical and demanding threaded joints from coming apart. Spirallock's unique self-locking thread technology adds a locking feature to tapped holes that prevents vibration loosening while still allowing standard external threaded parts to spin freely during assembly.

This achievement is the result of a carefully engineered wedge ramp at the root of the internal thread that only engages when the joint starts to build clamp load during tightening. At that point, the crest of the standard external threads draws tightly against the wedge ramp, eliminating all radial clearance and creating a continuous spiral line of contact between the internal and external threads.

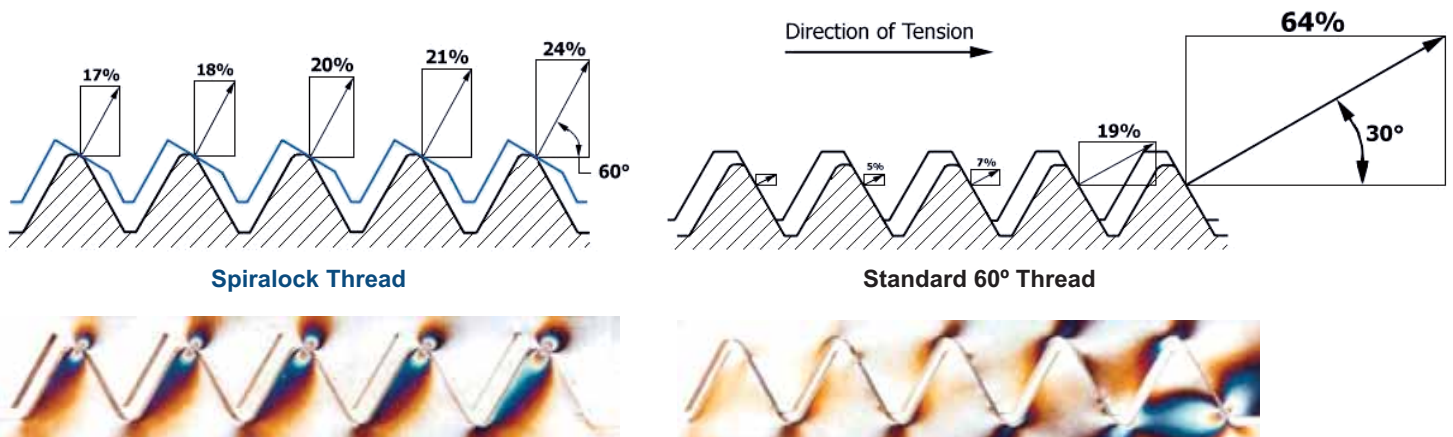
The outcome is a simple yet effective way to transform a traditional threaded joint into a safer and more reliable design element.

Spirallock offers a full line of products to serve a wide range of customer needs, including fasteners, wire inserts, cutting tools, and thread gages. Spirallock products solve fastening issues in a variety of applications across a wide range of industries, including aerospace/defense, electronics, medical, automotive, truck, farm and construction, oil and gas and others.



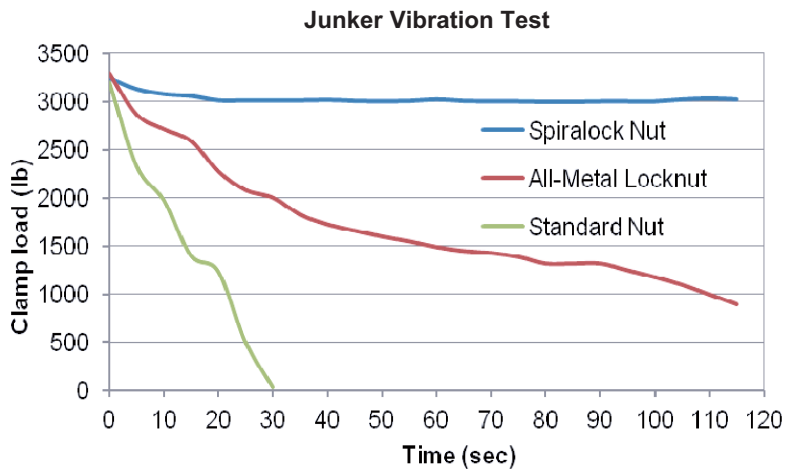
Load Distribution

Research studies performed by Lawrence Livermore National Laboratory, Massachusetts Institute of Technology, and others have confirmed that the load carried by Spirallock threads is much more uniform than it is in standard 60° threads. Additionally, they show that the percentage of load on the first engaged thread produced with a Spirallock tap is significantly lower. The images below show two different ways to visualize the stress carried by the Spirallock threads vs standard 60° threads.



The uniform thread loading reduces the load concentration at the first engaged thread, thereby decreasing joint failures due to shearing and improving product performance. Additionally, the Spirallock thread form distributes the joint load in a radial direction, which prevents the threads from slipping even in extremely high vibration environments.

Vibration Resistance



Test Parameters: 1/4"-28 nuts run @ 20 Hz with ±0.033" amplitude of transverse movement

Extensive testing on Junker's transverse vibration equipment has proven that Spirallock self-locking threads outperform other thread locking devices.

Testing conducted by the Goddard Space Flight Center also determined that the Spirallock thread form was the only product able to withstand the vibrations imposed by the Space Shuttle's solid rocket boosters. Even tests that were ten times the specifications for the Space Shuttle did not loosen the Spirallock fasteners.

Torque/Tension Relationship

The Spirallock thread form design creates a helical line of contact between the crest of the bolt threads and its 30-degree wedge ramp. In order to generate similar joint tension as compared to 60-degree threads, the Spirallock threaded joint generally requires 10% - 20% greater torque due to the redirecting of some assembly forces from an axial direction to a radial direction.

Although higher torque is required in all Spirallock threaded joints, the increase in required torque will vary depending on the types of materials and coatings being used (nut, bolt, joint, etc.). This torque/tension relationship should be evaluated in the actual joint to determine the proper torque required to develop the specified tension.

Testing performed by the Goddard Space Flight Center has shown that Spirallock offers a consistent pattern of friction, especially when the threads are lubricated. Spirallock's more consistent friction factor directly relates to a more consistent joint tension or preload.

Why change to Spirallock threads?

- Exceptionally resistant to vibration loosening
- Eliminates need for other locking devices
- Accepts standard male fasteners
- Improves joint fatigue life
- Consistent reusability
- Eases assembly, reducing assembly time
- Reduces life cycle cost of threaded joints

Where should Spirallock be used?

- Any hard joint
- Thin gasket application

How can a threaded joint be converted to Spirallock?

- Replace standard nut or threading tool with the Spirallock thread form and eliminate the need for other thread locking devices!

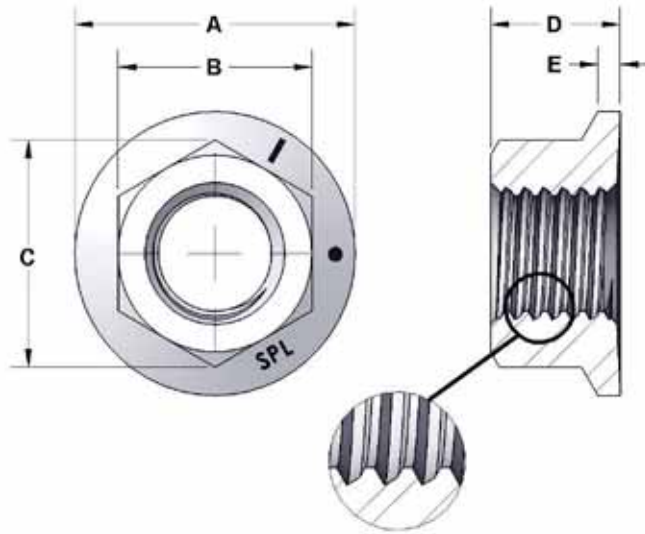




Products	Styles	Sizes*	Options	NAS/MS Part Number Equivalents
Nuts	Hex Hex Flange Weld Spanner T-slot Channel Extension	#2 to 4" M2 to M100	Grade 5 or 8; Property Class 9 or 10 Stainless Steel Small Production Runs Made to standard: SAE/IFI/ASTM Nickel-base alloys Exotic materials Finish/Coating	MS21043, MS21042 (hex flange nuts)
Self-Clinching Nuts	Blind Fasteners Miniature Nuts Computer Board Flush Fasteners Standoffs	#2 to 1/2" M2 to M12	Brass Steel Stainless Steel Pilot length Finish/Coating	
Wire Inserts	Tanged Drive Notch™ (no tang)	#2 to 7/16" M3 to M16	1 to 3 Diameter Lengths Cadmium Silver Dry Film Lube Passivate Installation Accessories	NAS1130, NAS8846
Threaded Inserts	Pre-Molded Post-Molded Ultrasonic Key	#0 to 1/4" M1 to M6	Brass Steel Stainless Steel A286	MS51830, MS51831, MS51832 (key inserts)
Made to Order	Float 12 Point Captive Washer Captive Belleville Washer Potted Inserts	Please contact Spirallock for sizes and material options		MS21060, MS21072 (float nuts) MS3376B (captivity washer nuts) NAS1832-NAS1836 (potted inserts)

* Sizes not listed above are available on made-to-order basis.

Standard Spirallock nuts are SAE Grade 8 equivalent and are compatible with standard 2A, 3A and UNJ class of fit bolts. Spirallock nuts conform dimensionally to IFI standards. The standard plating is clear zinc chromate. Other nut styles, platings, and materials are available upon request.



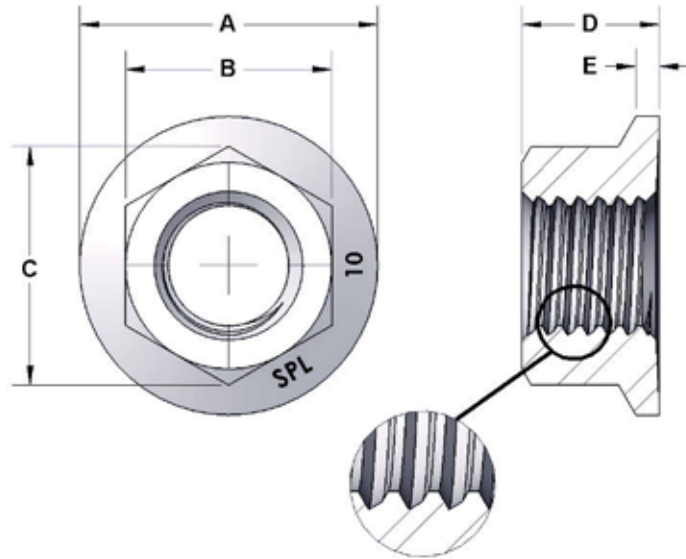
Nominal Nut Size	Part Number		A Flange Diameter	B Across Flats	C Across Corners	D Nut Thickness	E Flange Edge Thickness Min.
1/4-20	F04200M	Max.	0.594	0.438	0.505	0.236	
1/4-28	F04280M	Min.	0.574	0.428	0.488	0.222	0.040
5/16-18	F05180M	Max.	0.680	0.500	0.577	0.283	
5/16-24	F05240M	Min.	0.660	0.489	0.557	0.268	0.040
3/8-16	F06160M	Max.	0.750	0.562	0.650	0.347	
3/8-24	F06240M	Min.	0.728	0.551	0.628	0.330	0.040
7/16-14	F07140M	Max.	0.937	0.688	0.794	0.395	
7/16-20	F07200M	Min.	0.910	0.675	0.768	0.375	0.040
1/2-13	F08130M	Max.	1.031	0.750	0.866	0.458	
1/2-20	F08200M	Min.	1.000	0.736	0.840	0.437	0.050
9/16-12	F09120M	Max.	1.188	0.875	1.010	0.506	
9/16-18	F09180M	Min.	1.155	0.861	0.982	0.483	0.050
5/8-11	F10110M	Max.	1.281	0.938	1.083	0.569	
5/8-18	F10180M	Min.	1.248	0.922	1.051	0.545	0.050
3/4-10	F12100M	Max.	1.500	1.125	1.299	0.675	
3/4-16	F12160M	Min.	1.460	1.088	1.240	0.627	0.060
7/8-9	F14090M	Max.	1.750	1.312	1.515	0.788	
7/8-14	F14140M	Min.	1.706	1.269	1.446	0.735	0.070
1-8	F16080M	Max.	2.000	1.500	1.732	0.900	
1-12	F16120M	Min.	1.950	1.450	1.653	0.850	0.080

Mechanical properties per: SAE J995, Grades 5 and 8

Dimensional properties per: IFI 1986

All dimensions in inches

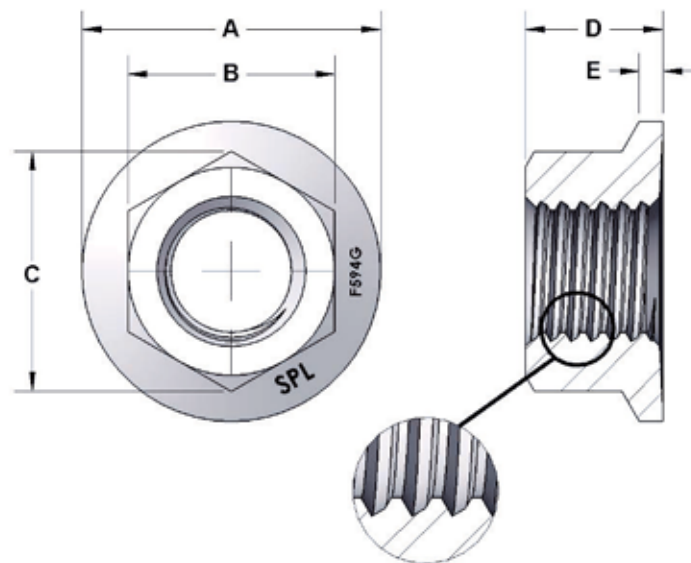
The standard Spiralock flange nuts are Property Class 10 equivalent and are compatible with standard 4g6g, 6g, and MJ class of fit bolts. Spiralock nuts conform dimensionally to IFI standards. The standard plating is clear zinc chromate. Other nut styles, platings, and materials are available upon request.



Nominal Nut Size	Part Number		A Flange Diameter	B Across Flats	C Across Corners	D Nut Thickness	E Flange Edge Thickness Min.
M5 x 0.8	M05080M	Max.	11.81	8.00	9.25	5.00	0.99
		Min.					
M6 x 1.0	M06100M	Max.	14.20	10.00	11.55	6.00	1.10
		Min.					
M8 x 1.00	M08100M	Max.	17.90	13.00	15.01	8.00	1.20
		Min.					
M10 x 1.25	M10125M	Max.	21.80	15.00	17.32	10.00	1.50
		Min.					
M10 x 1.50	M10150M	Max.	26.00	18.00	20.78	12.00	1.80
		Min.					
M12 x 1.25	M12125M	Max.	29.90	21.00	24.25	14.00	2.10
		Min.					
M14 x 1.50	M14150M	Max.	34.50	24.00	27.71	16.00	2.40
		Min.					
M16 x 1.50	M16150M	Max.	42.80	30.00	34.64	20.00	3.00
		Min.					
M20 x 1.50	M20150M	Max.	51.73	36.00	41.57	24.00	3.60
		Min.					
M20 x 2.50	M20250M	Max.	51.73	36.00	41.57	24.00	3.60
		Min.					
M24 x 2.00	M24200M	Max.	51.73	36.00	41.57	24.00	3.60
		Min.					
M24 x 3.00	M24300M	Max.	51.73	36.00	41.57	24.00	3.60
		Min.					

Mechanical properties per: ASTM A563M and ISO 898-2, Classes 9, 10, 12
 Dimensional properties per: ISO 4161 and ANSI B18.2.4.4M
 All dimensions in millimeters

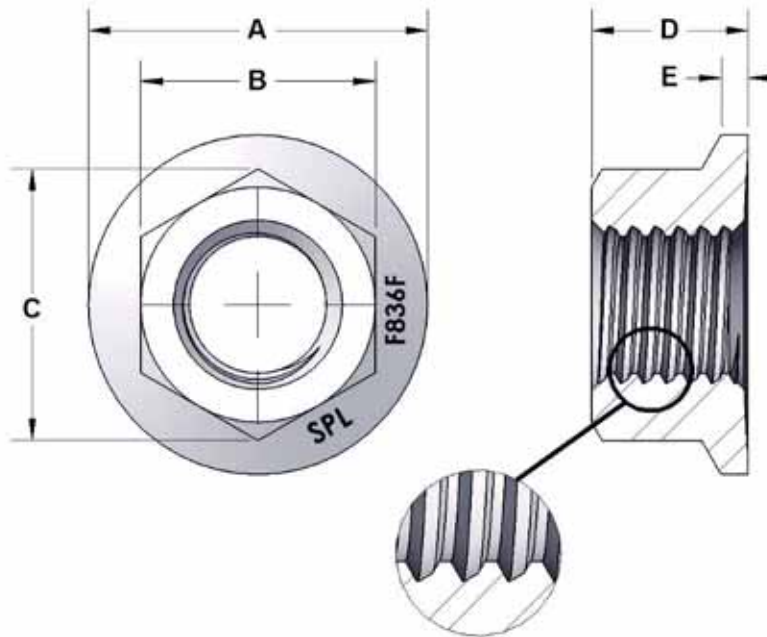
Stainless Steel Spiralock nuts are made of Grade 316 austenitic stainless steel with exceptional corrosion resistance in many aggressive environments. They are compatible with standard 2A, 3A and UNJ class of fit bolts. Spiralock nuts conform dimensionally to IFI standards.



Nominal Nut Size	Part Number		A Flange Diameter	B Across Flats	C Across Corners	D Nut Thickness	E Flange Edge Thickness Min.
1/4-20	F04200MStSi316	Max.	0.594	0.438	0.505	0.236	
1/4-28	F04280MStSi316	Min.	0.574	0.428	0.488	0.222	0.040
5/16-18	F05180MStSi316	Max.	0.680	0.500	0.577	0.283	
5/16-24	F05240MStSi316	Min.	0.660	0.489	0.557	0.268	0.040
3/8-16	F06160MStSi316	Max.	0.750	0.562	0.650	0.347	
3/8-24	F06240MStSi316	Min.	0.728	0.551	0.628	0.330	0.040
7/16-14	F07140MStSi316	Max.	0.937	0.688	0.794	0.395	
7/16-20	F07200MStSi316	Min.	0.910	0.675	0.768	0.375	0.040
1/2-13	F08130MStSi316	Max.	1.031	0.750	0.866	0.458	
1/2-20	F08200MStSi316	Min.	1.000	0.736	0.840	0.437	0.050
9/16-12	F09120MStSi316	Max.	1.188	0.875	1.010	0.506	
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3/4-16	F12160MStSi316	Min.	1.460	1.088	1.240	0.627	0.060
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7/8-14	F14140MStSi316	Min.	1.706	1.269	1.446	0.735	0.070
1-8	F16080MStSi316	Max.	2.000	1.500	1.732	0.900	
1-12	F16120MStSi316	Min.	1.950	1.450	1.653	0.850	0.080

Mechanical properties per: ASTM F594
 Dimensional properties per: IFI 1986
 All dimensions in inches

Stainless Steel Spirallock nuts are made of Grade 316 austenitic stainless steel with exceptional corrosion resistance in many aggressive environments. They are compatible with standard 4g6g, 6g, and MJ class of fit bolts. Spirallock nuts conform dimensionally to ISO and ANSI standards.



Nominal Nut Size	Part Number		A Flange Diameter	B Across Flats	C Across Corners	D Nut Thickness	E Flange Edge Thickness Min.
M5 x 0.8	M05080MStSI316	Max.	11.81	8.00	9.25	5.00	0.99
		Min.					
M6 x 1.0	M06100MStSI316	Max.	14.20	10.00	11.55	6.00	1.10
		Min.					
M8 x 1.00	M08100MStSI316	Max.	17.90	13.00	15.01	8.00	1.20
		Min.					
M10 x 1.25	M10125MStSI316	Max.	21.80	15.00	17.32	10.00	1.50
		Min.					
M12 x 1.25	M12125MStSI316	Max.	26.00	18.00	20.78	12.00	1.80
		Min.					
M14 x 1.50	M14150MStSI316	Max.	29.90	21.00	24.25	14.00	2.10
		Min.					
M16 x 1.50	M16150MStSI316	Max.	34.50	24.00	27.71	16.00	2.40
		Min.					
M20 x 1.50	M20150MStSI316	Max.	42.80	30.00	34.64	20.00	3.00
		Min.					
M24 x 2.00	M24200MStSI316	Max.	51.73	36.00	41.57	24.00	3.60
		Min.					

Mechanical properties per: ASTM F836M
 Dimensional properties per: ISO 4161 and ANSI B18.2.4.4M
 All dimensions in millimeters

Spirallock wire thread inserts are helically-coiled fastening devices that provide permanent, wear resistant screw threads in ductile materials. The inserts are designed to reinforce tapped holes and protect against failures due to stripping, seizing, corrosion, and wear. Spirallock inserts incorporate our 30° wedge ramp thread form, combining the customary advantages of wire thread inserts with the superior vibration resistance and load distribution traits unique to Spirallock.

Features and Benefits of Spirallock Wire Thread Inserts

- Threads into conventional STI (Screw Thread Insert) holes per NASM33537
- Accepts standard 2A/3A bolts (4g6g or 6g metric)
- Complies with wire requirements of NASM8846
- Similar to NASM1130 inserts per fit, form and function
- Replaces wire inserts with prevailing torque
- Reusable



Tanged

Drive Notch™

Spirallock Wire Thread Insert Characteristics

Spirallock inserts are made of cold-rolled Grade 304 stainless steel wire (AS7245), work-hardened to a tensile strength above 200,000 psi, having a hardness of Rockwell C 43-50. The finished surface (8-16 micro inches) is exceedingly smooth, virtually eliminating friction-induced thread erosion.

The resilient characteristics of each coil in the Spirallock insert allows it to adjust independently to secure the maximum surface contact with individual threads in the parent material. As a result, loads are distributed more evenly. During assembly, each coil can flex independently to contact the greatest amount of parent material thread surface. Once installed, the outward spring-like force of the coils holds the insert into place. As a bolt is screwed into the insert and torque is applied, the crests of the bolt push radially outward on the 30° ramp of the insert's Spirallock thread form. The insert then transfers the energy outward into the parent material, thereby locking the insert into the material.

Selecting the proper insert length balances the bolt tensile strength against the shear strength of the parent material. The lengths are multiples of the nominal thread size, or diameter (Dia.), of the insert. Using the specified insert length from the tables below will produce a thread system strong enough to fracture a bolt before it will strip or damage either the parent material or the insert.

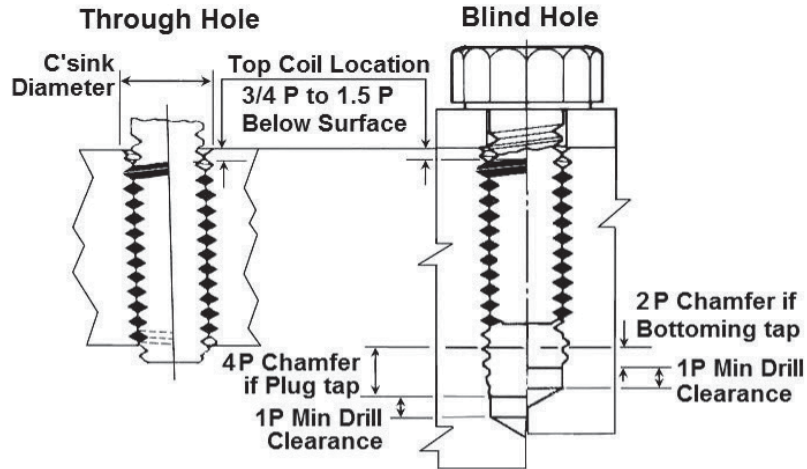
Recommended Insert Lengths, Expressed in Diameters

Unified Sizes

Parent Material: Shear Strength, ksi	Bolt Material: Minimum Ultimate Tensile Strength, ksi								
	54	75	96	108	125	132	160	180	220
10	2	2-1/2	3	-	-	-	-	-	-
15	1-1/2	1-1/2	2	2-1/2	2-1/2	3	3	-	-
20	1	1-1/2	1-1/2	2	2	2	2-1/2	3	3
25	1	1	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2
30	1	1	1	1-1/2	1-1/2	1-1/2	2	2	2-1/2
40	1	1	1	1	1	1-1/2	1-1/2	1-1/2	2
50	1	1	1	1	1	1	1	1-1/2	1-1/2

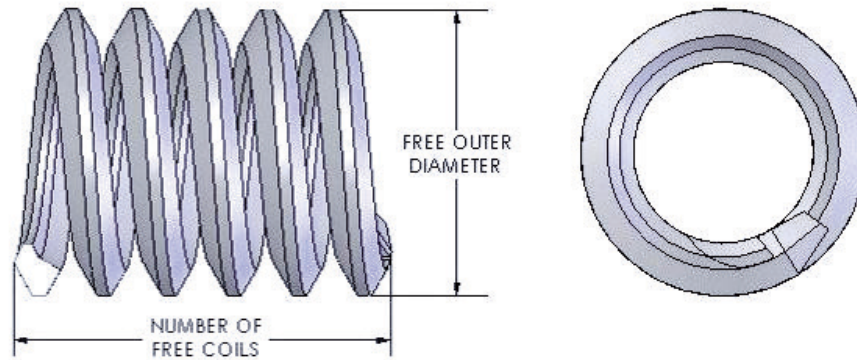
Metric

Parent Material: Shear Strength, MPa	Bolt Material: Minimum Ultimate Tensile Strength, MPa								
	300	400	500	600	800	1000	1200	1400	
70	1-1/2	2	2-1/2	2-1/2	-	-	-	-	
100	1	1-1/2	1-1/2	2	2-1/2	3	-	-	
150	1	1	1-1/2	2	2	2	2-1/2	3	
200	1	1	1	1	1-1/2	1-1/2	2	2-1/2	
250	1	1	1	1	1	1-1/2	1-1/2	2	
300	1	1	1	1	1	1-1/2	1-1/2	1-1/2	
350	1	1	1	1	1	1	1-1/2	1-1/2	



Nominal Thread Size	Minor Diameter (after tapping)			Suggested Drill Size*		Countersink Diameter		Pitch Diameter		
	Min. All Classes	Max Class 3B	Max Class 2B	Aluminum	Steel, Plastic, Magnesium	Min.	Max.	Min.	3B Max	2B Max
Unified										
#2-56	0.0899	0.0961	0.0961	3/32 (.0938)	#41 (.0960)	0.09	0.11	0.0976	0.0989	0.0996
#4-40	0.1175	0.1252	0.1252	#31 (.1200)	#31 (.1200)	0.14	0.17	0.1283	0.1299	0.1306
#6-32	0.1448	0.1527	0.1527	#26 (.1470)	#25 (.1495)	0.18	0.21	0.1583	0.1601	0.1611
#8-32	0.1708	0.1781	0.1781	#17 (.1730)	#16 (.1770)	0.2	0.23	0.1843	0.1862	0.1872
#10-32	0.1968	0.2041	0.2041	#7 (.2010)	13/64 (.2031)	0.23	0.26	0.2103	0.2123	0.2133
1/4-20	0.2608	0.2704	0.2723	H (.2660)	H (.2660)	0.31	0.34	0.2825	0.2851	0.2863
1/4-28	0.2577	0.2646	0.2661	G (.2610)	6.7mm (.2638)	0.29	0.32	0.2732	0.2754	0.2765
5/16-18	0.3245	0.3342	0.3372	Q (.3320)	Q (.3320)	0.38	0.41	0.3486	0.3515	0.3529
5/16-24	0.3215	0.3288	0.3312	21/64 (.3281)	21/64 (.3281)	0.36	0.39	0.3395	0.3421	0.3433
3/8-16	0.3885	0.3987	0.4026	X (.3970)	X (.3970)	0.45	0.48	0.4156	0.4189	0.4203
3/8-24	0.3840	0.3910	0.3937	25/64 (.3906)	25/64 (.3906)	0.42	0.45	0.4020	0.4047	0.4059
7/16-14	0.4530	0.4639	0.4688	29/64 (.4531)	29/64 (.4531)	0.52	0.55	0.4839	0.4875	0.4890
7/16-20	0.4483	0.4561	0.4593	29/64 (.4531)	29/64 (.4531)	0.05	0.53	0.4700	0.4731	0.4744
Metric										
M3X0.5	3.108	3.22	3.15	3.2	3.4	4	3.325	3.367	3.384	
M4X0.7	4.152	4.292	4.2	4.25	4.7	5.3	4.455	4.509	4.529	
M5X0.8	5.174	5.344	5.2	5.3	5.8	6.4	5.52	5.577	5.597	
M6X1.0	6.217	6.407	6.25	6.35	7.1	7.7	6.65	6.719	6.742	
M8X1.25	8.271	8.483	8.3	8.4	9.5	10.1	8.812	8.886	8.911	
M10X1.5	10.324	10.56	10.5	10.5	11.8	12.4	10.974	11.061	11.089	
M12X1.75	12.379	12.644	12.5	12.5	14.2	14.8	13.137	13.236	13.271	
M16X2.0	16.433	16.733	16.5	16.5	18.5	19.1	17.299	17.406	17.444	

* Standard drill size drills are suggested even though some sizes vary slightly from minor diameter specifications in NASM33537



Nominal Thread Size	Nominal Length*					Number of Free Coils				
	1 Dia.	1.5 Dia.	2 Dia.	2.5 Dia.	3 Dia.	1 Dia.	1.5 Dia.	2 Dia.	2.5 Dia.	3 Dia.
Unified										
#2-56	0.086	0.129	0.172	0.215	0.258	3	5-1/4	7-3/8	9-5/8	11-7/8
#4-40	0.112	0.168	0.224	0.280	0.336	2-3/4	4-3/4	6-3/4	8-7/8	10-7/8
#6-32	0.138	0.207	0.276	0.345	0.414	2-3/4	4-3/4	6-7/8	8-7/8	10-7/8
#8-32	0.164	0.246	0.328	0.410	0.492	3-1/2	6	8-3/8	10-3/4	13-1/4
#10-32	0.190	0.285	0.380	0.475	0.570	4-1/8	6-7/8	9-1/2	12-1/4	14-7/8
1/4-20	0.250	0.375	0.500	0.625	0.750	3-3/8	5-3/4	8	10-3/8	12-3/4
1/4-28	0.250	0.375	0.500	0.625	0.750	5	8-1/4	11-3/8	14-1/2	17-5/8
5/16-18	0.312	0.469	0.625	0.781	0.938	4	6-5/8	9-1/4	11-7/8	14-5/8
5/16-24	0.312	0.469	0.625	0.781	0.938	5-1/2	8-7/8	12-1/4	15-5/8	19
3/8-16	0.375	0.562	0.750	0.938	1.125	4-3/8	7-1/4	10	12-7/8	15-3/4
3/8-24	0.375	0.562	0.750	0.938	1.125	6-7/8	11	15	19-1/8	23-1/8
7/16-14	0.438	0.656	0.875	1.094	1.312	4-1/2	7-3/8	10-1/4	13-1/8	16-1/8
7/16-20	0.438	0.656	0.875	1.094	1.312	6-5/8	10-5/8	14-5/8	18-1/2	22-1/2
Metric										
M3X0.5	3.0	4.5	6.0	7.5	9.0	3-3/4	6-3/8	8-7/8	11-3/8	13-7/8
M4X0.7	4.0	6.0	8.0	10.0	12.0	3-5/8	6-1/8	8-5/8	11-1/8	13-5/8
M5X0.8	5.0	7.5	10.0	12.5	15.0	4-1/8	6-7/8	9-5/8	12-3/8	15-1/8
M6X1.0	6.0	9.0	12.0	15.0	18.0	4	6-3/4	9-1/2	12-1/8	14-7/8
M8X1.25	8.0	12.0	16.0	20.0	24.0	4-1/2	7-3/8	10-1/4	13-1/4	16-1/8
M10X1.5	10.0	15.0	20.0	25.0	30.0	4-7/8	8	11-1/8	14-1/4	17-3/8
M12X1.75	12.0	18.0	24.0	30.0	36.0	5	8-1/4	11-1/2	14-5/8	17-7/8
M16X2.0	16.0	24.0	32.0	40.0	48.0	6-1/8	9-3/4	13-1/2	17-1/4	21

* Nominal length is a calculated number and cannot be measured in the free state. It is the actual installed length plus 1/2 pitch

Step 1: Drill the hole

Select proper drill size from the hole drilling specification chart in the table on page 10. Drill the hole deep enough to allow clearance for installing the insert $\frac{3}{4}$ - $1\frac{1}{2}$ thread pitches below the work surface.

Step 2: Add a Countersink

Before tapping the hole, it is good practice to countersink the hole to the dimension given in the table on page 10. Using a $120^\circ (+/- 5^\circ)$ countersink angle allows for the smoothest and most rapid production installation of the inserts because it matches the angle of the tapped thread, the insert's outer diameter angle, and the inserting tool prewinder tip.

Step 3: Tap the hole

Select the proper STI plug or bottoming tap. The STI tap generates the proper size hole to accommodate the insert. The pitch diameter limits in Table II to conform to NASM33537 specifications and must be met to assure proper post-installation thread fit.

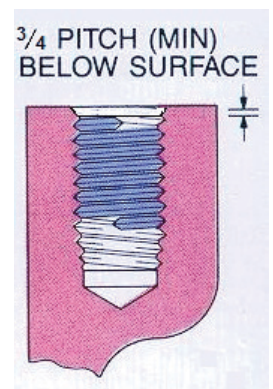
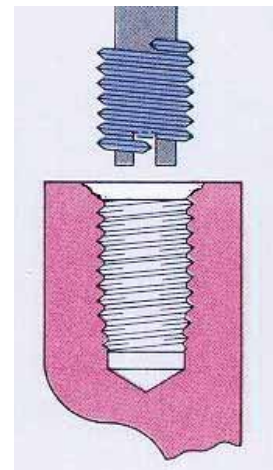
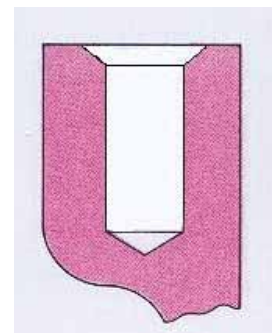
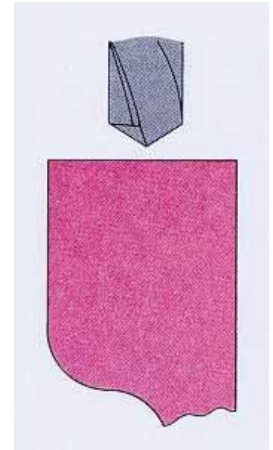
Step 4: Install the Insert

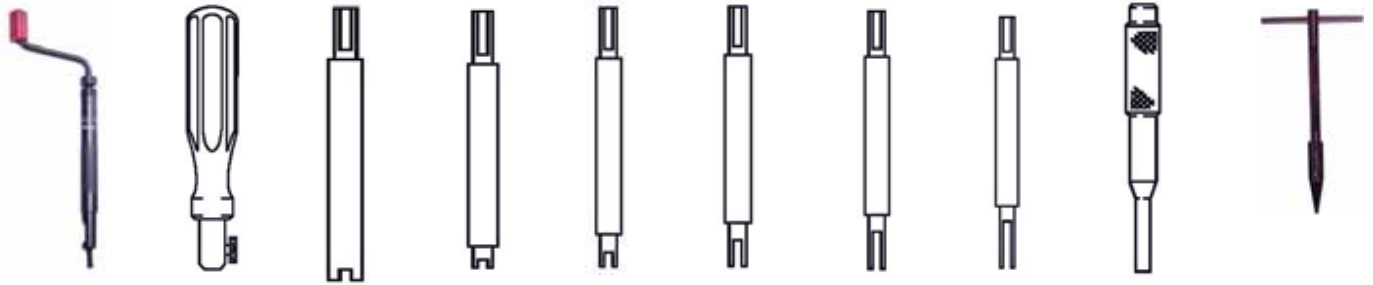
Tanged: Select the appropriate inserting stem. Slide the insert on to the key so that the tang of the insert engages in the driving slot at the forward end. Wind the insert into the tapped hole until the top coil is at least three quarters ($\frac{3}{4}$) of a coil below the top of the tapped hole – make sure to avoid putting any downward load on the tang during installation. Note: When ordering stems for these sizes, the length of the insert should be specified.

Drive Notch: The locking feature in Spirallock Drive Notch (DN) inserts requires proper orientation when installing. The drive notch installation tools work by hooking into the notch and pulling the insert forward into the STI tapped hole. Drive notch inserts are supplied pre-oriented on a plastic strip to save time during assembly.

Step 5. Break off tang (Tanged inserts only)

For insert sizes up to M6 or $\frac{1}{4}$ inch use the punch provided to remove the tang. Locate punch on tang and give a sharp downward blow with a light hammer. For insert sizes above M6 or $\frac{1}{4}$ inch, the insert key may be used to remove the tang. Start by lifting the key off the tang and turning the stem so that it will not engage the tang. Strike the key with a light hammer to break off the tang. Do not attempt to twist the tang off in any manner with the key.





Thread Size	Manual Prewinder*	Inserting Handle	Plain Type	Inserting Stems					Tang Break-off Punch	Extraction tool
				1 Dia.	1.5 Dia.	2 Dia.	2.5 Dia.	3 Dia.		
M3x0.50	SPL9750-MPW	SPL97508	*	SPL97510	SPL97511	SPL97512	SPL97513	SPL97514	SPL97515	SPL97517
M4x0.70	SPL9665-MPW	SPL96758	*	SPL96660	SPL96661	SPL96662	SPL96663	SPL96664	SPL96665	SPL96667
M5x0.80	SPL9670-MPW	SPL96708	SPL96709	SPL96710	SPL96711	SPL96712	SPL96713	SPL96714	SPL96715	SPL96717
M6x1.00	SPL9675-MPW	SPL96708	SPL96759						SPL96765	SPL96717
M8x1.25	SPL9680-MPW	SPL96708	SPL96809						SPL96765	SPL96717
M10x1.50	SPL9685-MPW	SPL96708	SPL96859	* For easy fitting use shouldered type stem on small sizes. Select stems to suit length of insert.					SPL96765	SPL96717
M12x1.75	SPL9690-MPW	SPL96708	SPL96909						SPL96765	SPL96917
M16x2.00	SPL9715-MPW	SPL96708	SPL96959						SPL96765	SPL96917
#2-56	SPL9601-MPW	SPL96758								
#4-40	SPL9602-MPW	SPL96758	*	SPL96030	SPL96031	SPL96032	---	---	SPL96035	SPL96667
#6-32	SPL9607-MPW	SPL96758	*	SPL96080	SPL96081	SPL96082	---	---	SPL96085	SPL96667
#8-32	SPL9600-MPW	SPL96758	SPL96009						SPL96015	SPL96667
#10-24	SPL9605-MPW	SPL96708	SPL96059						SPL96065	SPL96717
#10-32	SPL9610-MPW	SPL96708	SPL96109						SPL96115	SPL96717
1/4-20	SPL9615-MPW	SPL96708	SPL96159						SPL96165	SPL96717
1/4-28	SPL9620-MPW	SPL96708	SPL96209						SPL96215	SPL96717
5/16-18	SPL9625-MPW	SPL96708	SPL96259	*For easy fitting use shouldered type stem on small sizes. Select stems to suit length of insert.					SPL96215	SPL96717
5/16-24	SPL9630-MPW	SPL96708	SPL96309						SPL96215	SPL96717
3/8-16	SPL9635-MPW	SPL96708	SPL96359						SPL96215	SPL96717
3/8-24	SPL9640-MPW	SPL96708	SPL96409						SPL96215	SPL96717
7/16-14	SPL9645-MPW	SPL96708	SPL96459						SPL96215	SPL96917
7/16-20	SPL9650-MPW	SPL96708	SPL96509						SPL96215	SPL96917

*To specify a manual prewinder for Drive Notch inserts, add the suffix 'DN'

MS51831 / NAS1395 Spirallock commercial equivalent



Spirallock Part Number	Spirallock Internal Thread Size*	External Thread Size (Modified)	Material	Coating	MS Series Equivalent
FE06-32-0048	6-32	12-28	SS300	Passivated	MS51830 (Mini)
FE08-32-0025	8-32	1/4-28	SS300	Passivated	MS51830 (Mini)
FE08-32-0049	8-32	5/16-18	SS300	Passivated	MS51831 (HW)
FE10-32-0063	10-32	3/8-16	A286	Dry Film Lube	MS51831 (HW)
FE10-32-0059	10-32	5/16-18	SS300	Passivated	MS51830 (LW)
FE10-32-0067	10-32	5/16-18	SS300	Dry Film Lube	MS51830 (LW)
FE10-32-0071	10-32	3/8-16	SS300	Dry Film Lube	MS51831 (HW)
FE10-32-0072	10-32	7/16-14	SS300	Dry Film Lube	MS51832 (EHW)
FF0250-28-0055	1/4-28	3/8-16	SS300	Passivated	MS51830 (LW)
FF0250-28-0057	1/4-28	3/8-16	A286	Dry Film Lube	MS51830 (LW)
FF0250-28-0058	1/4-28	3/8-16	SS300	Dry Film Lube	MS51830 (LW)
FF0250-28-0059	1/4-28	7/16-14	A286	Dry Film Lube	MS51831 (HW)
FF0250-28-0064	1/4-28	7/16-14	SS300	Dry Film Lube	MS51831 (HW)
FF0250-28-0065	1/4-28	1/3-13	SS300	Dry Film Lube	MS51832 (EHW)
FF0500-20-0025	1/2-20	11/16-11	A286	Passivated	MS51831 (HW)

Mini: Miniature / LW: Lightweight / HW: Heavyweight / EHW: Extra Heavy Weight

* Metric sizes available upon request

Other sizes and materials are also available upon request

Material

- Insert body – Stainless Steel, Grade 303 or alloy A286 (140 ksi min)
- Keys – Stainless Steel, Grade 302

Finish Options

- Coating / Plating – As Required, Passivation
- Lubrication Option – Dry Film Lube, Silver

Added Benefits of Spirallock® combined with the key staking feature

- Free-spinning bolt assembly
- High strength and reliability
- No tang to break off after installation
- Preload locking with the application of torque
- Significantly increases torque-down and load capability in weaker materials
- Keys eliminate rotational movement of insert within parent material
- Hole preparation with standard drill and tap
- Impossible to cross thread during installation
- No special prewinder, free spinning installation

Double-hex (12-Point) Nuts



Spiralock Thread Size*	Width Across Flats	Nut Height Max	Flange Diameter Max.	Perpendicularity**
1/4-28	0.376 - 0.367	0.300	0.460	0.003
5/16-24	0.439 - 0.430	0.363	0.560	0.004
3/8-24	0.502 - 0.492	0.425	0.670	0.005
7/16-20	0.564 - 0.553	0.488	0.770	0.006
1/2-20	0.627 - 0.616	0.550	0.870	0.007

Material: Alloy steel, 48 HRC Max.; other materials available upon request
Coating / Plating: Per customer requirements

* Sizes #8 through 1" are available on made-to-order basis
 ** Thread pitch diameter to bearing surface

Captive Washer Nuts



Spiralock Thread Size*	Width Across Flats	Nut Height Max.	Flange Diameter Max.
#8-36	0.220	0.170	0.340
#10-32	0.250	0.188	0.380
1/4-28	0.312	0.219	0.460
5/16-24	0.375	0.266	0.560
3/8-24	0.437	0.282	0.660
7/16-20	0.500	0.328	0.760
1/2-20	0.562	0.480	0.860
9/16-18	0.687	0.540	1.000
5/8-18	0.750	0.600	1.100
3/4-16	0.875	0.720	1.310
7/8-14	1.000	0.800	1.480
1-12	1.125	0.960	1.690

Materials:
Nut: Alloy Steel with Cadmium Plate
Washer: Carbon Steel with Dry Film Lube

Metric sizes and other materials are also available

Captive Belleville Washer Nuts



Size	Width Across Flats	Nut Height **	Flange Diameter Max.	Minimum Spring Load	Maximum Spring Load
1/4 - 28	.312	.22 - .37	.68	200	1200
5/16 - 24	.375	.30 - .41	.80	250	1600
3/8 - 24	.438	.32 - .43	.87	250	2000
7/16 - 20	.500	.36 - .47	.93	TBD	TBD

Materials:
Nut: 17-4 PH, Condition H1025
Washer: 17-7 PH, Condition H1050
Coating / Plating: As required

**Overall height will vary as spring is compressed
 Metric sizes and other materials are also available

MS21042 and MS21043 Equivalent Nuts



This nut is equivalent to MS21042 and MS21043 except for the prevailing torque feature that is replaced by the Spirallock locking thread technology.

- Nut characteristics:
- Thin-walled (reduced hex for thread size)
 - High strength
 - Precision

Spirallock Thread Size	Width Across Flats	Nut Height Max.	Flange Diameter Max.	Perpendicularity
#2-56	0.125	0.100	0.167	0.0025
#4-40	0.156	0.125	0.206	0.003
#6-32	0.187	0.141	0.244	0.003
#8- 32	0.218	0.188	0.290	0.003
#10-32	0.250	0.188	0.330	0.003
1/4-28	0.312	0.219	0.420	0.003
5/16-24	0.375	0.266	0.520	0.004
3/8- 24	0.437	0.282	0.620	0.004

Material:
Carbon Steel; 18-8 Stainless Steel; Alloy A286

Coating / Plating:

- Cadmium plate per QQ-P-416, Type II, Class 2 and Dry Film Lube per MIL-PRF-46010
- Silver plate per AMS 2410 and wax

NEW! Micro Threaded Inserts for Compact Electronics

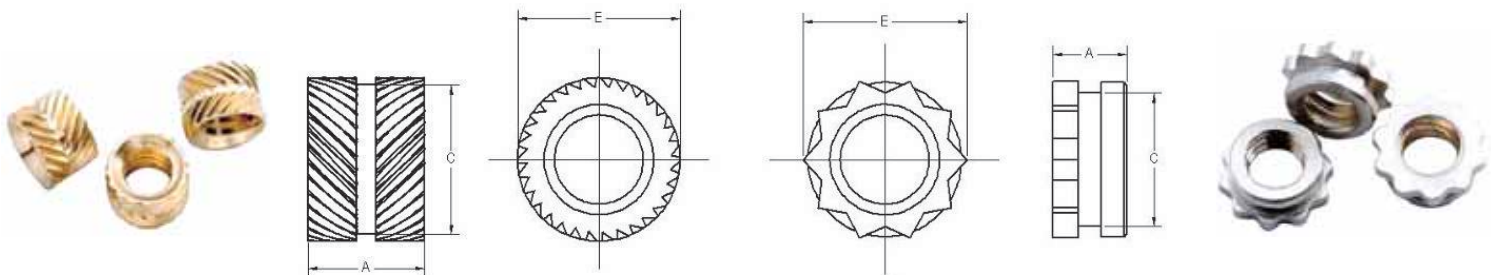
Spirallock Brass Ultrasonic Insert	A (mm)	C (mm)	E (mm)
M1.6x0.35	1.75 +/- 0.05	2.30 +/- 0.05	2.50-2.43

Spirallock Steel Pressed-in Insert	A (mm)	C (mm)	E (mm)
M1.6x0.35	1.15 +/- 0.05	2.05 +/-0.05	2.76 +/- 0.04

Material: Brass 360, no coating

Material: Carbon Steel 1214, electroless Nickel coating

Other sizes and configurations can be provided. Please contact Spirallock sales and engineering for details.



New Spirallock® micro threaded inserts for plastics introduce ideal fastener solutions to attach components in compact electronic assemblies. Installation is achieved by pressing the insert into a mounting hole using either ultrasonic insertion equipment or a thermal press. When installed ultrasonically, the frictional heat caused by the vibration then melts the plastic surrounding the insert and, when the vibration ceases, the plastic solidifies to lock the insert into place. Use of a thermal press will melt the plastic surrounding the insert to result in permanent installation.



Available Products	Styles	Sizes*	Options	Accessories
Taps	Multi Purpose T-10 Cold Forming High Performance	#0-80 to 1"-14 M1.6 X 0.35 to M24 X 3.00	Carbide R/L Hand "TT" Direction	
Threading Inserts	Single Point Multi-Tooth End Mount Face Mount Triangular Square	80 – 4 TPI 0.5 – 4.00 mm pitch		Threading Bars
Thread Gages	Standard Plug Depth Control Location	#0 – 80 to 1" -14 M1.6 x 0.35 to M24 x 3.0		Leitech® Depth Gage Extension Handles
Thread Milling Cutters	Shank Type Single Thread	80 – 4 TPI 0.5" – 2" Dia. 0.5 – 4.0 mm pitch 12 – 50 mm Dia.	M42 Steel T15 Steel Carbide	

The purchaser of Spirallock® tools shall have the right to use Spirallock® tools to thread blind and through holes in all elements other than "Fasteners", which are defined to mean discrete male and female threaded elements, the primary purpose of which is to engage or accept a complementary threaded element. If your application requires a Spirallock® Fastener, Spirallock Corporation offers a full line of Spirallock fasteners to meet your needs.



Multi-Purpose

- High speed steel
- TiN coating
- Replaces General Purpose taps; can be used for hand tapping
- Plug chamfer uses spiral point design
- Bottom chamfer uses a spiral flute design (sizes larger than #3 or M2.5)

Designed for a wide variety of low-hardness materials that generate long chips. The spiral point pushes chips ahead of the tap in a through hole, while the spiral flute design provides good chip removal from a blind hole. Necked blanks allow better access for lubrication. These taps can be used for hand tapping.



T-10 Straight Flute

- High speed steel
- TiN coating
- Minimal contact with workpiece
- Available with plug or bottom chamfer

Specialized geometry for short-chipping materials such as cast iron and hardened alloy steels. The straight flutes do not provide chip transport, so these taps should not be used on deep blind holes unless tap is extracted mid-way to evacuate chips. TiN coating adds durability and lubricity. The T-10 tap range is intended for use on CNC machining centers.



Cold Forming

- Powdered metallurgy grade of high speed steel
- Material flows without generating chips and makes threads stronger
- Lower risk of breakage, particularly in small diameters
- Plug and bottom chamfer

Cold forming taps produce a thread by deforming material instead of removing it. The starting minor diameter is larger and must be held to a tighter tolerance than with standard taps to ensure the threads fill out properly. Forming taps are suitable for all ductile materials with an elongation value above 10%, such as aluminum, brass, copper, and mild steels. Lubrication with cutting oil is preferred.



High Performance

- Specially adjusted geometry reduces friction between the tool and workpiece
- Intended for abrasive and high tensile strength materials
- Powdered metallurgy grade of high speed steel
- Dual layer PVD coating
- Spiral point with plug chamfer, or spiral flute with bottom chamfer (sizes larger than #3 or M2.5)

An innovative line of cutting taps with cutting geometry tailored for cutting threads in traditionally difficult materials, including high nickel alloys and alloys of titanium. Every aspect of the tool is designed to provide good chip flow and to keep cutting edges sharp. Use of cutting oil for lubrication is essential.



Spirallock taps are furnished with ramp angles as shown here. This is referred to as style "BT" for bottom tapping. When tapping from the opposite end of a through hole, you must specify Spirallock style "TT" (top tapping), which has the ramp angle facing the opposite direction.

How to order: All Spirallock taps are identified by a 6-digit catalog code. This code and the quantity are all you need when ordering.

Tap Recommendations

Category	Examples	1st Choice	2nd choice	3rd choice
Carbon & alloy steels, normalized (< Rc30)	1010, 1045, 12L14, 4340, 8640	Multi-Purpose	Cold Forming	
Carbon & alloy steels, hardened (≥ Rc30)	4140PH, Stressproof	T-10	High Performance	Multi-Purpose
Stainless steels	304, 316, 410	Multi-Purpose	Cold Forming	
Precipitation Hardened Stainless Steels	17-4PH, 15-5PH, 17-7PH	High Performance	T-10	
Cast Iron, gray	Class G20 - G50	T-10		
Cast iron, ductile 'SG'	ASTM A536	Multi-Purpose	Cold Forming	
Aluminum, wrought	6061-T6, 2024, 7075	Cold Forming	Multi-Purpose	T-10
Aluminum, cast	A360, A380	Multi-Purpose	T-10	
Copper, brass, bronze, zinc, magnesium	360 brass, Beryllium Copper	Multi-Purpose	Cold Forming (excl. Zn, Mg)	
Titanium, wrought/cast	6Al-4V	High Performance	T-10	
Nickel alloys and superalloys	Inconel, A286, Nimonic, P550	High Performance	T-10	Cold Forming (1st choice P550)

Cold Forming Taps

Forming taps and cutting taps produce threads that gage identically and are interchangeable, but they produce these threads in a different manner. Forming taps push and displace material instead of removing material like a cutting tap. Thread forming offers several advantages over cut tapping:

- Doesn't generate chips *Material is displaced, not cut, eliminating chips and swarf – perfect for blind holes*
- Makes stronger threads *The material grain aligns to the thread contour, increasing thread strength*
- Improves thread gaging *The possibility of producing oversized threads is greatly reduced*
- Taps are stronger *Forming taps don't need flutes to evacuate chips, so the core diameter is larger*
- Taps last longer *Without cutting edges to dull, forming taps can last 3 to 20x longer than cutting taps*
- Works with non-lead screw tappers *Forming taps generate their own lead*

Recommended Applications

In general, materials that produce a stringy chip are good candidates for cold forming. Common materials are aluminum, brass, copper, lead, diecast zinc, low carbon steel, 300/400 series stainless steels, and nickel alloys.

Pre-Tap Hole Size

Thread forming taps require a larger pre-tap hole size than cutting taps because they do not produce a chip during tapping. The hole tolerance must be tightly controlled to prevent after-tap minor diameter problems. All formed threads contain a cup or "U" in the crest due to the nature of the forming process. Tapping with too small of a hole size results in excessive tapping torque, tap wear, and possible tap breakage.

Lubrication and Tapping Speeds

The quality and type of lubrication becomes more important to tap life and thread quality as speed increases. Cutting oils are generally preferred for lubrication because of their lubricity compared to that of water soluble coolants. For non-ferrous materials, water soluble may be used at increased concentrations. Water soluble coolants can also work in softer steels and stainless steels when the tap is coated with TiN. A high sulfur/high chlorine tapping oil with a fat additive is recommended when thread forming in steels and stainless steels. In general, the suggested cold-form tapping speed is the same as that of cutting taps. In soft and fine pitch applications (20+ TPI), tapping speeds of 1.5 to 2 times higher may be achievable.

Tapping speeds for the Spirallock thread form depend on many factors, including the machine, the material being tapped, the design of the hole, the lubricant, and the style of tap used. No exact rules can be given that take in account all of these variables, but the information on these pages can be used as a guide in determining a starting point and course to follow for obtaining maximum performance.

Material Being Tapped	Peripheral Speed of Tap, SFM (surface feet per minute)	Peripheral Speed of Tap, m/min (meters per minute)
Aluminum and Magnesium	90-110	30-40
Brass - soft	140-200	45-65
Brass - hard	80-130	25-45
Bronze - soft	60-100	20-35
Bronze - hard	30-40	10-15
Malleable Iron	35-60	10-20
Cast Iron - soft	90-110	30-40
Cast Iron -medium	75-95	25-30
Cast Iron - hard	65-85	20-30
Cast Steel	20-35	5-10
Copper - soft	50-80	15-25
Copper - hard, Beryllium	30-50	10-15
Nickel Alloys	10-15	3-5
Steel Forgings	50-65	15-20
Steel - 200 Brinell	70-90	20-30
Steel - 300 Brinell	40-65	10-20
Steel - 400 Brinell	15-25	5-8
Steel - 500 Brinell	5-15	2-5
Stainless Steel	10-35	3-10
300 Series Stainless Steel	20-30	5-10
400 Series Stainless Steel	15-20	5-8
Titanium Alloys	10-15	3-5
Tool Steel	25-40	8-15
Zinc Die Castings	90-110	30-40

These speeds should be used for coarse and fine threads. Coarse thread taps should be run near the low end of the range while fine threads can be run at the upper end of the range. These values should also be modified according to the following suggestions:

- Deep blind holes (> 2.5 dia.) -20%
- Multiple threads -50%
- Very coarse threads -50%
- Cold Form taps +50%
- TiN or other PVD coated taps +50%
- Carbide taps +100%

Except in a few isolated cases, the use of lower speeds is not detrimental except as it affects production. In fact, limitations of equipment often make it necessary to use considerably reduced speeds. This is especially true with the smaller sizes of machine taps where limitations of spindle design make it impossible to obtain the recommended speeds.

Periph. Speed,SFM	Tap size – English & Fractional																		
	0	1	2	3	4	5	6	8	10	12	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
20	1273	1046	888	772	682	611	554	466	402	354	306	244	204	175	153	122	102	87	76
25	1592	1308	1110	965	853	764	692	582	503	442	382	306	255	218	191	153	127	109	95
30	1910	1570	1332	1157	1023	917	830	699	603	531	458	367	306	262	229	183	153	131	115
35	2228	1831	1555	1350	1194	1070	969	815	704	619	535	428	357	306	267	214	178	153	134
40	2546	2093	1777	1543	1364	1222	1107	932	804	707	611	489	407	349	306	244	204	175	153
45	2865	2355	1999	1736	1535	1375	1246	1048	905	736	688	550	458	393	344	275	229	196	172
50	3183	2616	2221	1929	1705	1528	1384	1165	1005	884	764	611	509	437	382	306	255	218	191
55	3501	2879	2443	2122	1876	1681	1522	1281	1106	973	841	673	560	480	420	336	280	240	210
60	3820	3139	2665	2315	2046	1833	1661	1397	1206	1061	917	733	611	524	458	367	306	262	229
65	4138	3401	2887	2508	2217	1986	1799	1514	1307	1149	993	795	662	568	497	397	331	284	248
70	4456	3663	3109	2701	2387	2139	1938	1630	1407	1238	1070	856	713	611	535	428	357	306	267
75	4775	3924	3331	2894	2558	2292	2076	1747	1508	1326	1146	917	764	655	573	458	382	327	286
80	5093	4186	3553	3086	2728	2445	2214	1863	1608	1415	1222	978	815	698	611	489	407	349	306
85	5411	4448	3775	3280	2899	2597	2353	1980	1709	1503	1299	1038	866	742	649	519	433	371	325
90	5730	4709	3997	3472	3069	2750	2491	2096	1809	1592	1375	1100	917	786	688	550	458	393	344
95	6048	4971	4219	3665	3240	2903	2630	2213	1910	1680	1451	1160	968	829	726	581	484	415	363
100	6366	5232	4442	3858	3410	3056	2768	2329	2010	1768	1528	1222	1019	873	764	611	509	437	382
110	7003	5756	4886	4244	3751	3361	3045	2562	2211	1945	1681	1345	1120	960	840	672	560	480	420
120	7639	6279	5330	4630	4093	3667	3321	2795	2412	2122	1833	1467	1222	1048	917	733	611	524	458
130	8276	6802	5774	5016	4434	3973	3598	3028	2613	2299	1986	1589	1324	1135	993	794	662	567	497
140	8913	7325	6218	5402	4775	4278	3875	3261	2815	2476	2139	1711	1426	1222	1070	856	713	611	535
150	9549	7849	6662	5787	5116	4584	4151	3494	3016	2653	2292	1833	1528	1310	1146	917	764	655	573

Peripheral speed,m/min	Tap size (mm)													
	3	3.5	4	4.5	5	6	7	8	9	10	11	12	14	16
3	318	273	239	212	191	159	136	119	106	95	87	80	68	60
4	424	364	318	283	255	212	182	159	141	127	116	106	91	80
5	531	455	398	354	318	265	227	199	177	159	145	133	114	99
6	637	546	477	424	382	318	273	239	212	191	174	159	136	119
7	743	637	557	495	446	371	318	279	248	223	203	186	159	139
8	849	728	637	566	509	424	364	318	283	255	232	212	182	159
9	955	819	716	637	573	477	409	358	318	286	260	239	205	179
10	1061	909	796	707	637	531	455	398	354	318	289	265	227	199
12	1273	1091	955	849	764	637	546	477	424	382	347	318	273	239
14	1485	1273	1114	990	891	743	637	557	495	446	405	371	318	279
16	1698	1455	1273	1132	1019	849	728	637	566	509	463	424	364	318
18	1910	1637	1432	1273	1146	955	819	716	637	573	521	477	409	358
20	2122	1819	1592	1415	1273	1061	909	796	707	637	579	531	455	398
25	2653	2274	1989	1768	1592	1326	1137	995	884	796	723	663	568	497
30	3183	2728	2387	2122	1910	1592	1364	1194	1061	955	868	796	682	597
35	3714	3183	2785	2476	2228	1857	1592	1393	1238	1114	1013	928	796	696
40	4244	3638	3183	2830	2547	2122	1819	1592	1415	1273	1158	1061	909	796
45	4775	4093	3581	3183	2865	2387	2046	1791	1592	1432	1302	1194	1023	895
50	5305	4547	3979	3537	3183	2653	2274	1989	1768	1592	1447	1326	1137	995

These charts are supplied as a recommendation only. Actual sizes may vary depending on application and the material being tapped.

Other thread and hole sizes are available upon request or on our website drill size calculator at www.spiralock.com

- For aluminum or other soft materials a hole minor diameter on the low side of the suggested range is recommended. For harder materials, a hole minor diameter near the high end of the suggested range is recommended
- Spiralock threaded holes require the use a larger minor diameter than conventional threads

English/ Fractional Thread Size	Hole Minor Diameter Min. (in)	Hole Minor Diameter Max. (in)	Suggested Drill Size*
0 – 80	0.052	0.054	#55
1 – 64	0.063	0.065	#52
1 – 72	0.064	0.066	#52
2 – 56	0.074	0.077	#48
2 – 64	0.076	0.078	1.95mm
3 – 48	0.086	0.088	#44
3 – 56	0.087	0.090	#43
4 – 40	0.096	0.099	#41
4 – 48	0.099	0.101	#40
5 – 40	0.109	0.112	7/64
5 – 44	0.110	0.113	#35
6 – 32	0.112	0.118	#33
6 – 40	0.122	0.125	1/8"
8 – 32	0.138	0.144	#28
8 – 36	0.146	0.150	#26
10 – 24	0.155	0.163	#21
10 – 32	0.164	0.170	#19
12 – 24	0.181	0.189	#13
12 – 28	0.186	0.193	#12
1/4 – 20	0.208	0.218	#4
1/4 – 28	0.220	0.227	#2
5/16 – 18	0.266	0.276	H
5/16 – 24	0.277	0.285	J
3/8 – 16	0.322	0.334	P
3/8 – 24	0.340	0.348	11/32
7/16 – 14	0.377	0.391	V
7/16 – 20	0.395	0.405	X
1/2 – 13	0.435	0.450	7/16
1/2 – 20	0.458	0.468	11.75mm
9/16 – 12	0.492	0.508	1/2
9/16 – 18	0.516	0.526	33/64
5/8 – 11	0.548	0.566	14 mm
5/8 – 18	0.578	0.589	37/64
3/4 – 10	0.666	0.685	43/64
3/4 – 16	0.697	0.709	45/64
7/8 – 9	0.781	0.803	25/32
7/8 – 14	0.815	0.829	21 mm
1" – 8	0.895	0.919	29/32
1" – 12	0.930	0.946	15/16
1" – 14	0.940	0.954	24 mm

Metric Thread Size	Hole Minor Diameter Min. (mm)	Hole Minor Diameter Max. (mm)	Suggested Drill Size*
M1.6 x 0.35	1.37	1.42	#54
M2.0 x 0.40	1.74	1.79	#50
M2.5 x 0.45	2.21	2.27	#43
M3.0 x 0.50	2.68	2.74	#36
M3.5 x 0.60	3.11	3.19	1/8
M4.0 x 0.70	3.55	3.64	#28
M4.5 x 0.75	4.01	4.11	#21
M5.0 x 0.80	4.32	4.48	11/64
M6.0 x 1.00	5.16	5.35	#5
M7.0 x 1.00	6.16	6.35	C
M8.0 x 1.00	7.16	7.35	9/32
M8.0 x 1.25	6.94	7.19	J
M9.0 x 1.25	7.94	8.19	8 mm
M10 x 1.25	8.94	9.19	T
M10 x 1.50	8.73	9.03	S
M11 x 1.50	9.73	10.03	W
M12 x 1.25	10.94	11.19	11 mm
M12 x 1.75	10.52	10.86	27/64
M14 x 1.25	12.94	13.19	33/64
M14 x 1.50	12.73	13.03	13 mm
M14 x 2.00	12.31	12.7	31/64
M16 x 1.50	14.73	15.03	15 mm
M16 x 2.00	14.31	14.7	9/16
M18 x 1.50	16.73	17.03	17 mm
M18 x 2.50	15.89	16.38	5/8
M20 x 1.50	18.73	19.03	19 mm
M20 x 2.50	17.89	18.38	23/32
M22 x 1.50	20.73	21.03	21 mm
M22 x 2.50	19.89	20.38	20 mm
M24 x 3.00	21.47	22.05	55/64

*Drill size callouts were determined to best fit the hole minor diameter range

These charts are supplied as a recommendation only. Finding the correct drill size for a Spirallock tap may be a “Cut and Try” process:

- Not all drills are alike - to get good results, verify the actual hole size being produced by the drill
- Thin wall parts may expand during tapping and produce oversize after-tap minor diameters

After tapping, the hole size should fall within the Spirallock recommended minor diameter range for cut threads

- If the final minor diameter is below the range for a cut thread, use a larger drill. Do the opposite for a final minor diameter that is larger than the recommended range for cut taps.

Fractional Thread Size	Minor Dia. Min. (in)	Minor Dia. Max. (in)
0 – 80	0.0559	0.0567
1 – 64	0.0678	0.0688
1 – 72	0.0684	0.0693
2 – 56	0.0801	0.0812
2 – 64	0.0808	0.0818
3 – 48	0.0921	0.0933
3 – 56	0.0931	0.0942
4 – 40	0.1038	0.1050
4 – 48	0.1051	0.1063
5 – 40	0.1168	0.1180
5 – 44	0.1175	0.1187
6 – 32	0.1248	0.1279
6 – 40	0.1298	0.1311
8 – 32	0.1508	0.1539
8 – 36	0.1548	0.1562
10 – 24	0.1724	0.1765
10 – 32	0.1768	0.1799
12 – 24	0.1984	0.2025
12 – 28	0.2009	0.2044
1/4 – 20	0.2289	0.2338
1/4 – 28	0.2349	0.2384
5/16 – 18	0.2890	0.2945
5/16 – 24	0.2949	0.2990
3/8 – 16	0.3486	0.3547
3/8 – 24	0.3574	0.3615
7/16 – 14	0.4073	0.4143
7/16 – 20	0.4164	0.4213
1/2 – 13	0.4675	0.4750
1/2 – 20	0.4789	0.4838
9/16 – 12	0.5273	0.5354
9/16 – 18	0.5390	0.5445
5/8 – 11	0.5866	0.5955
5/8 – 18	0.6015	0.6070
3/4 – 10	0.7078	0.7175
3/4 – 16	0.7236	0.7297
7/8 – 9	0.8281	0.8389
7/8 – 14	0.8448	0.8518
1” – 8	0.9472	0.9594
1” – 12	0.9648	0.9729
1” – 14	0.9698	0.9768

Metric Thread Size	Minor Dia. Min. (mm)	Minor Dia. Min. (mm)
M1.6 x 0.35	1.483	1.506
M2.0 x 0.40	1.867	1.892
M2.5 x 0.45	2.352	2.380
M3.0 x 0.50	2.835	2.865
M3.5 x 0.60	3.302	3.335
M4.0 x 0.70	3.769	3.805
M4.5 x 0.75	4.257	4.308
M5.0 x 0.80	4.658	4.735
M6.0 x 1.00	5.578	5.679
M7.0 x 1.00	6.574	6.675
M8.0 x 1.00	7.582	7.671
M8.0 x 1.25	7.468	7.595
M9.0 x 1.25	8.478	8.590
M10 x 1.25	9.472	9.599
M10 x 1.50	9.370	9.510
M11 x 1.50	10.363	10.516
M12 x 1.25	11.474	11.588
M12 x 1.75	11.257	11.435
M14 x 1.25	13.477	13.592
M14 x 1.50	13.363	13.515
M14 x 2.00	13.160	13.350
M16 x 1.50	15.367	15.519
M16 x 2.00	15.151	15.354
M18 x 1.50	17.369	17.508
M18 x 2.50	16.937	17.191
M20 x 1.50	19.373	19.512
M20 x 2.50	18.857	18.908
M22 x 1.50	21.364	21.516
M22 x 2.50	20.945	21.186
M24 x 3.00	22.731	23.023



Forming tap with oil grooves

Cutting tap

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Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
#0-80	Plug	SPL56436A	SPL56430A	SPL56438A	SPL22003A	SPL56348
	Bottom	SPL56422A	SPL56432A	SPL56439A	SPL22000A	
Gage Members		GO Plug: SPL56340	Handle: SPL56341	HI Ramp: SPL56342		
#1-64	Plug	SPL56456A	SPL56450A	SPL56458A	SPL22013A	SPL56358
	Bottom	SPL56442A	SPL56452A	SPL56459A	SPL22010A	
Gage Members		GO Plug: SPL56350	Handle: SPL56351	HI Ramp: SPL56352		
#1-72	Plug	SPL56476A	SPL56470A	SPL56478A	SPL22018A	SPL56368
	Bottom	SPL56462A	SPL56472A	SPL56479A	SPL22015A	
Gage Members		GO Plug: SPL56360	Handle: SPL56361	HI Ramp: SPL56362		
#2-56	Plug	SPL56515A	SPL56510A	SPL56518A	SPL22023A	SPL56708
	Bottom	SPL56507A	SPL56512A	SPL56519A	SPL22020A	
Gage Members		GO Plug: SPL56700	Handle: SPL56701	HI Ramp: SPL56702		
#2-64	Plug	SPL56495A	SPL56490A	SPL56498A	SPL22028A	SPL56378
	Bottom	SPL56487A	SPL56492A	SPL56499A	SPL22025A	
Gage Members		GO Plug: SPL56370	Handle: SPL56371	HI Ramp: SPL56372		
#3-48	Plug	SPL56535A	SPL56530A	SPL56538A	SPL22033A	SPL56718
	Bottom	SPL56534A	SPL56532A	SPL56539A	SPL22030A	
Gage Members		GO Plug: SPL56710	Handle: SPL56711	HI Ramp: SPL56712		
#3-56	Plug	SPL56555A	SPL56550A	SPL56558A	SPL22038A	SPL56728
	Bottom	SPL56554A	SPL56552A	SPL56559A	SPL22035A	
Gage Members		GO Plug: SPL56720	Handle: SPL56721	HI Ramp: SPL56722		
#4-40	Plug	SPL56575A	SPL56570A	SPL56578A	SPL22043A	SPL56738
	Bottom	SPL56574A	SPL56572A	SPL56579A	SPL22040A	
Gage Members		GO Plug: SPL56730	Handle: SPL56731	HI Ramp: SPL56732		
#4-48	Plug	SPL56595A	SPL56590A	SPL56598A	SPL22048A	SPL56748
	Bottom	SPL56594A	SPL56592A	SPL56599A	SPL22045A	
Gage Members		GO Plug: SPL56740	Handle: SPL56741	HI Ramp: SPL56742		
#5-40	Plug	SPL56615A	SPL56610A	SPL56618A	SPL22053A	SPL56758
	Bottom	SPL56614A	SPL56612A	SPL56619A	SPL22050A	
Gage Members		GO Plug: SPL56750	Handle: SPL56751	HI Ramp: SPL56752		
#5-44	Plug	SPL56635A	SPL56630A	SPL56638A	SPL22058A	SPL56768
	Bottom	SPL56634A	SPL56632A	SPL56639A	SPL22055A	
Gage Members		GO Plug: SPL56760	Handle: SPL56761	HI Ramp: SPL56762		
#6-32	Plug	SPL17035A	SPL17030A	SPL17043A	SPL22063A	SPL49508
	Bottom	SPL17041A	SPL17032A	SPL17044A	SPL22060A	
Gage Members		GO Plug: SPL49500	GO Handle: SPL49501	HI P.D.: SPL49502	HI Ramp: SPL49503	HI Handle: SPL49504
#6-40	Plug	SPL56655A	SPL56650A	SPL56668A	SPL22068A	SPL56778
	Bottom	SPL56663A	SPL56652A	SPL56669A	SPL22065A	
Gage Members		GO Plug: SPL56770	Handle: SPL56771	HI Ramp: SPL56772		
#8-32	Plug	SPL17075A	SPL17070A	SPL17083A	SPL22073A	SPL49518
	Bottom	SPL17081A	SPL17072A	SPL17084A	SPL22070A	
Gage Members		GO Plug: SPL49510	GO Handle: SPL49511	HI P.D.: SPL49512	HI Ramp: SPL49513	HI Handle: SPL49514

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
#8-36	Plug	SPL56685A	SPL56680A	SPL56698A	SPL22078A	SPL56788
	Bottom	SPL56693A	SPL56682A	SPL56699A	SPL22075A	
Gage Members		GO Plug: SPL56780	Handle: SPL56781	HI Ramp: SPL56782		
#10-24	Plug	SPL17115A	SPL17110A	SPL17123A	SPL22083A	SPL49528
	Bottom	SPL17121A	SPL17112A	SPL17124A	SPL22080A	
Gage Members		GO Plug: SPL49520	GO Handle: SPL49521	HI P.D.: SPL49522	HI Ramp: SPL49523	HI Handle: SPL49524
#10-32	Plug	SPL17155A	SPL17150A	SPL17163A	SPL22088A	SPL49538
	Bottom	SPL17161A	SPL17152A	SPL17164A	SPL22085A	
Gage Members		GO Plug: SPL49530	GO Handle: SPL49531	HI P.D.: SPL49532	HI Ramp: SPL49533	HI Handle: SPL49534
#12-24	Plug	SPL17185A	SPL17200A	SPL17203A	SPL22093A	SPL49548
	Bottom	SPL17191A	SPL17202A	SPL17204A	SPL22090A	
Gage Members		GO Plug: SPL49540	GO Handle: SPL49541	HI P.D.: SPL49542	HI Ramp: SPL49543	HI Handle: SPL49544
#12-28	Plug	SPL17236A	SPL17230A	SPL17243A	SPL22098A	SPL49558
	Bottom	SPL17241A	SPL17232A	SPL17244A	SPL22095A	
Gage Members		GO Plug: SPL49550	GO Handle: SPL49551	HI P.D.: SPL49552	HI Ramp: SPL49553	HI Handle: SPL49554

Tap and Gage Part Numbers – Fractional

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
1/4-20	Plug	SPL17270A	SPL17260A	SPL17283A	SPL22103A	SPL49568
	Bottom	SPL17281A	SPL17262A	SPL17284A	SPL22100A	
Gage Members		GO Plug: SPL49560	GO Handle: SPL49561	HI P.D.: SPL49562	HI Ramp: SPL49563	HI Handle: SPL49564
1/4-28	Plug	SPL17310A	SPL17300A	SPL17323A	SPL22108A	SPL49578
	Bottom	SPL17321A	SPL17302A	SPL17324A	SPL22105A	
Gage Members		GO Plug: SPL49570	GO Handle: SPL49571	HI P.D.: SPL49572	HI Ramp: SPL49573	HI Handle: SPL49574
5/16-18	Plug	SPL17350A	SPL17340A	SPL17363A	SPL22113A	SPL49588
	Bottom	SPL17361A	SPL17342A	SPL17364A	SPL22110A	
Gage Members		GO Plug: SPL49580	GO Handle: SPL49581	HI P.D.: SPL49582	HI Ramp: SPL49583	HI Handle: SPL49584
5/16-24	Plug	SPL17380A	SPL17396A	SPL17403A	SPL22118A	SPL49598
	Bottom	SPL17391A	SPL17398A	SPL17404A	SPL22115A	
Gage Members		GO Plug: SPL49590	GO Handle: SPL49591	HI P.D.: SPL49592	HI Ramp: SPL49593	HI Handle: SPL49594
3/8-16	Plug	SPL17430A	SPL17420A	SPL17443A	SPL22123A	SPL49608
	Bottom	SPL17438A	SPL17422A	SPL17444A	SPL22120A	
Gage Members		GO Plug: SPL49600	GO Handle: SPL49601	HI P.D.: SPL49602	HI Ramp: SPL49603	HI Handle: SPL49604
3/8-24	Plug	SPL17470A	SPL17455A	SPL17483A	SPL22128A	SPL49618
	Bottom	SPL17478A	SPL17457A	SPL17484A	SPL22125A	
Gage Members		GO Plug: SPL49610	GO Handle: SPL49611	HI P.D.: SPL49612	HI Ramp: SPL49613	HI Handle: SPL49614
7/16-14	Plug	SPL17510A	SPL17495A	SPL17523A	SPL22133A	SPL49628
	Bottom	SPL17518A	SPL17497A	SPL17524A	SPL22130A	
Gage Members		GO Plug: SPL49620	GO Handle: SPL49621	HI P.D.: SPL49622	HI Ramp: SPL49623	HI Handle: SPL49624

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
7/16-20	Plug	SPL17550A	SPL17535A	SPL17563A	SPL22138A	SPL49638
	Bottom	SPL17558A	SPL17537A	SPL17564A	SPL22135A	
Gage Members	GO Plug: SPL49630 GO Handle: SPL49631 HI P.D.: SPL49632 HI Ramp: SPL49633 HI Handle: SPL49634					
1/2-13	Plug	SPL17590A	SPL17575A	SPL17603A	SPL22143A	SPL49648
	Bottom	SPL17598A	SPL17577A	SPL17604A	SPL22140A	
Gage Members	GO Plug: SPL49640 GO Handle: SPL49641 HI P.D.: SPL49642 HI Ramp: SPL49643 HI Handle: SPL49644					
1/2-20	Plug	SPL17630A	SPL17615A	SPL17643A	SPL22148A	SPL49658
	Bottom	SPL17638A	SPL17617A	SPL17644A	SPL22145A	
Gage Members	GO Plug: SPL49650 GO Handle: SPL49651 HI P.D.: SPL49652 HI Ramp: SPL49653 HI Handle: SPL49654					
9/16-12	Plug	SPL17665A	SPL17655A	SPL17673A	SPL22153A	SPL49668
	Bottom	SPL17670A	SPL17657A	SPL17674A	SPL22150A	
Gage Members	GO Plug: SPL49660 GO Handle: SPL49661 HI P.D.: SPL49662 HI Ramp: SPL49663 HI Handle: SPL49664					
9/16-18	Plug	SPL17695A	SPL17685A	SPL17703A	SPL22158A	SPL49678
	Bottom	SPL17700A	SPL17687A	SPL17704A	SPL22155A	
Gage Members	GO Plug: SPL49670 GO Handle: SPL49671 HI P.D.: SPL49672 HI Ramp: SPL49673 HI Handle: SPL49674					
5/8-11	Plug	SPL17725A	SPL17715A	SPL17733A	SPL22163A	SPL49688
	Bottom	SPL17730A	SPL17717A	SPL17734A	SPL22160A	
Gage Members	GO Plug: SPL49680 GO Handle: SPL49681 HI P.D.: SPL49682 HI Ramp: SPL49683 HI Handle: SPL49684					
5/8-18	Plug	SPL17755A	SPL17745A	SPL17763A	SPL22168A	SPL49698
	Bottom	SPL17760A	SPL17747A	SPL17764A	SPL22165A	
Gage Members	GO Plug: SPL49690 GO Handle: SPL49691 HI P.D.: SPL49692 HI Ramp: SPL49693 HI Handle: SPL49694					
3/4-10	Plug	SPL17785A	SPL17775A	SPL17793A	SPL22173A	SPL49708
	Bottom	SPL17790A	SPL17777A	SPL17794A	SPL22170A	
Gage Members	GO Plug: SPL49700 GO Handle: SPL49701 HI P.D.: SPL49702 HI Ramp: SPL49703 HI Handle: SPL49704					
3/4-16	Plug	SPL17815A	SPL17805A	SPL17823A	SPL22178A	SPL49718
	Bottom	SPL17820A	SPL17807A	SPL17824A	SPL22175A	
Gage Members	GO Plug: SPL49710 GO Handle: SPL49711 HI P.D.: SPL49712 HI Ramp: SPL49713 HI Handle: SPL49714					
7/8-9	Plug	SPL17825A	SPL17835A	SPL17853A	SPL22183A	SPL49728
	Bottom	SPL17827A	SPL17837A	SPL17854A	SPL22180A	
Gage Members	GO Plug: SPL49720 GO Handle: SPL49721 HI P.D.: SPL49722 HI Ramp: SPL49723 HI Handle: SPL49724					
7/8-14	Plug	SPL17855A	SPL17865A	SPL17883A	SPL22188A	SPL49738
	Bottom	SPL17857A	SPL17867A	SPL17884A	SPL22185A	
Gage Members	GO Plug: SPL49730 GO Handle: SPL49731 HI P.D.: SPL49732 HI Ramp: SPL49733 HI Handle: SPL49734					
1-8	Plug	SPL17885A		SPL17893A	SPL22193A	SPL49748
	Bottom	SPL17887A		SPL17894A	SPL22190A	
Gage Members	GO Plug: SPL49740 GO Handle: SPL49741 HI P.D.: SPL49742 HI Ramp: SPL49743 HI Handle: SPL49744					
1-12	Plug	SPL17895A		SPL17903A	SPL22198A	SPL49758
	Bottom	SPL17897A		SPL17904A	SPL22195A	
Gage Members	GO Plug: SPL49750 GO Handle: SPL49751 HI P.D.: SPL49752 HI Ramp: SPL49753 HI Handle: SPL49754					
1-14	Plug	SPL17905A		SPL17913A	SPL22203A	SPL49768
	Bottom	SPL17907A		SPL17914A	SPL22200A	
Gage Members	GO Plug: SPL49760 GO Handle: SPL49761 HI P.D.: SPL49762 HI Ramp: SPL49763 HI Handle: SPL49764					

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
M1.6x0.35	Plug	SPL56981D	SPL56975D	SPL56983D	SPL23003D	SPL59418
	Bottom	SPL56967D	SPL56977D	SPL56984D	SPL23000D	
Gage Members		GO Plug: SPL59410	Handle: SPL59411	HI Ramp: SPL59412		
M1.8x0.35	Plug	SPL57001D	SPL56995D	SPL57003D	SPL23013D	SPL59428
	Bottom	SPL56987D	SPL56997D	SPL57004D	SPL23010D	
Gage Members		GO Plug: SPL59420	Handle: SPL59421	HI Ramp: SPL59422		
M2.0x0.40	Plug	SPL57021D	SPL57015D	SPL57023D	SPL23018D	SPL59438
	Bottom	SPL57007D	SPL57017D	SPL57024D	SPL23015D	
Gage Members		GO Plug: SPL59430	Handle: SPL59431	HI Ramp: SPL59432		
M2.2x0.45	Plug	SPL57041D	SPL57035D	SPL57043D	SPL23023D	SPL59448
	Bottom	SPL57027D	SPL57037D	SPL57044D	SPL23020D	
Gage Members		GO Plug: SPL59440	Handle: SPL59441	HI Ramp: SPL59442		
M2.5x0.45	Plug	SPL56815D	SPL56810D	SPL56818D	SPL23028D	SPL59458
	Bottom	SPL56807D	SPL56812D	SPL56819D	SPL23025D	
Gage Members		GO Plug: SPL59450	Handle: SPL59451	HI Ramp: SPL59452		
M3.0x0.50	Plug	SPL56835D	SPL56830D	SPL56838D	SPL23033D	SPL59468
	Bottom	SPL56827D	SPL56832D	SPL56839D	SPL23030D	
Gage Members		GO Plug: SPL59460	Handle: SPL59461	HI Ramp: SPL59462		
M3.5x0.60	Plug	SPL56855D	SPL56850D	SPL56863D	SPL23038D	SPL59478
	Bottom	SPL56861D	SPL56852D	SPL56864D	SPL23035D	
Gage Members		GO Plug: SPL59470	Handle: SPL59471	HI Ramp: SPL59472		
M4.0x0.70	Plug	SPL56895D	SPL56890D	SPL56903D	SPL23043D	SPL59488
	Bottom	SPL56901D	SPL56892D	SPL56904D	SPL23040D	
Gage Members		GO Plug: SPL59480	Handle: SPL59481	HI Ramp: SPL59482		
M4.5x0.75	Plug	SPL57075D	SPL57070D	SPL57083D	SPL23048D	SPL59498
	Bottom	SPL57081D	SPL57072D	SPL57084D	SPL23045D	
Gage Members		GO Plug: SPL59490	Handle: SPL59491	HI Ramp: SPL59492		
M5.0x0.80	Plug	SPL57115D	SPL57110D	SPL57123D	SPL23053D	SPL59528
	Bottom	SPL57121D	SPL57112D	SPL57124D	SPL23050D	
Gage Members		GO Plug: SPL59520	GO Handle: SPL59521	HI P.D.: SPL59522	HI Ramp: SPL59523	HI Handle: SPL59524
M6x1.00	Plug	SPL57150D	SPL57140D	SPL57163D	SPL23058D	SPL59538
	Bottom	SPL57161D	SPL57142D	SPL57164D	SPL23055D	
Gage Members		GO Plug: SPL59530	GO Handle: SPL59531	HI P.D.: SPL59532	HI Ramp: SPL59533	HI Handle: SPL59534
M7x1.00	Plug	SPL57190D	SPL57176D	SPL57203D	SPL23063D	SPL59548
	Bottom	SPL57201D	SPL57178D	SPL57204D	SPL23060D	
Gage Members		GO Plug: SPL59540	GO Handle: SPL59541	HI P.D.: SPL59542	HI Ramp: SPL59543	HI Handle: SPL59544
M8x1.00	Plug	SPL57230D	SPL57220D	SPL57243D	SPL23068D	SPL59558
	Bottom	SPL57241D	SPL57222D	SPL57244D	SPL23065D	
Gage Members		GO Plug: SPL59550	GO Handle: SPL59551	HI P.D.: SPL59552	HI Ramp: SPL59553	HI Handle: SPL59554
M8x1.25	Plug	SPL57270D	SPL57260D	SPL57283D	SPL23073D	SPL59568
	Bottom	SPL57281D	SPL57262D	SPL57284D	SPL23070D	
Gage Members		GO Plug: SPL59560	GO Handle: SPL59561	HI P.D.: SPL59562	HI Ramp: SPL59563	HI Handle: SPL59564

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
M9x1.25	Plug	SPL57310D	SPL57300D	SPL57323D	SPL23078D	SPL59578
	Bottom	SPL57321D	SPL57302D	SPL57324D	SPL23075D	
Gage Members	GO Plug: SPL59570 GO Handle: SPL59571 HI P.D.: SPL59572 HI Ramp: SPL59573 HI Handle: SPL59574					
M10x1.25	Plug	SPL57350D	SPL57335D	SPL57363D	SPL23083D	SPL59588
	Bottom	SPL57361D	SPL57337D	SPL57364D	SPL23080D	
Gage Members	GO Plug: SPL59580 GO Handle: SPL59581 HI P.D.: SPL59582 HI Ramp: SPL59583 HI Handle: SPL59584					
M10x1.50	Plug	SPL57380D	SPL57375D	SPL57403D	SPL23088D	SPL59598
	Bottom	SPL57401D	SPL57377D	SPL57404D	SPL23085D	
Gage Members	GO Plug: SPL59590 GO Handle: SPL59591 HI P.D.: SPL59592 HI Ramp: SPL59593 HI Handle: SPL59594					
M11x1.50	Plug	SPL57430D	SPL57415D	SPL57443D	SPL23093D	SPL59608
	Bottom	SPL57438D	SPL57417D	SPL57444D	SPL23090D	
Gage Members	GO Plug: SPL59600 GO Handle: SPL59601 HI P.D.: SPL59602 HI Ramp: SPL59603 HI Handle: SPL59604					
M12x1.25	Plug	SPL57470D	SPL57455D	SPL57483D	SPL23098D	SPL59618
	Bottom	SPL57478D	SPL57457D	SPL57484D	SPL23095D	
Gage Members	GO Plug: SPL59610 GO Handle: SPL59611 HI P.D.: SPL59612 HI Ramp: SPL59613 HI Handle: SPL59614					
M12x1.75	Plug	SPL57510D	SPL57495D	SPL57523D	SPL23103D	SPL59628
	Bottom	SPL57518D	SPL57497D	SPL57524D	SPL23100D	
Gage Members	GO Plug: SPL59620 GO Handle: SPL59621 HI P.D.: SPL59622 HI Ramp: SPL59623 HI Handle: SPL59624					
M14x1.25	Plug	SPL57550D	SPL57535D	SPL57563D	SPL23108D	SPL59638
	Bottom	SPL57558D	SPL57537D	SPL57564D	SPL23105D	
Gage Members	GO Plug: SPL59630 GO Handle: SPL59631 HI P.D.: SPL59632 HI Ramp: SPL59633 HI Handle: SPL59634					
M14x1.5	Plug	SPL57590D	SPL57575D	SPL57603D	SPL23113D	SPL59648
	Bottom	SPL57598D	SPL57577D	SPL57604D	SPL23110D	
Gage Members	GO Plug: SPL59640 GO Handle: SPL59641 HI P.D.: SPL59642 HI Ramp: SPL59643 HI Handle: SPL59644					
M14x2.0	Plug	SPL57630D	SPL57615D	SPL57643D	SPL23118D	SPL59658
	Bottom	SPL57638D	SPL57617D	SPL57644D	SPL23115D	
Gage Members	GO Plug: SPL59650 GO Handle: SPL59651 HI P.D.: SPL59652 HI Ramp: SPL59653 HI Handle: SPL59654					
M16x1.5	Plug	SPL57665D	SPL57655D	SPL57673D	SPL23123D	SPL59668
	Bottom	SPL57670D	SPL57657D	SPL57674D	SPL23120D	
Gage Members	GO Plug: SPL59660 GO Handle: SPL59661 HI P.D.: SPL59662 HI Ramp: SPL59663 HI Handle: SPL59664					
M16x2.0	Plug	SPL57695D	SPL57685D	SPL57703D	SPL23128D	SPL59678
	Bottom	SPL57700D	SPL57687D	SPL57704D	SPL23125D	
Gage Members	GO Plug: SPL59670 GO Handle: SPL59671 HI P.D.: SPL59672 HI Ramp: SPL59673 HI Handle: SPL59674					
M18x1.5	Plug	SPL57725D	SPL57715D	SPL57733D	SPL23133D	SPL59688
	Bottom	SPL57730D	SPL57717D	SPL57734D	SPL23130D	
Gage Members	GO Plug: SPL59680 GO Handle: SPL59681 HI P.D.: SPL59682 HI Ramp: SPL59683 HI Handle: SPL59684					
M18x2.5	Plug	SPL57755D	SPL57745D	SPL57763D	SPL23138D	SPL59698
	Bottom	SPL57760D	SPL57747D	SPL57764D	SPL23135D	
Gage Members	GO Plug: SPL59690 GO Handle: SPL59691 HI P.D.: SPL59692 HI Ramp: SPL59693 HI Handle: SPL59694					

Thread Size	Chamfer	Multi- Purpose	T-10 Straight Flute	Cold Forming	High Performance	Gage Set
M20x1.5	Plug	SPL57785D	SPL57775D	SPL57793D	SPL23143D	SPL59708
	Bottom	SPL57790D	SPL57777D	SPL57794D	SPL23140D	
Gage Members	GO Plug: SPL59700 GO Handle: SPL59701 HI P.D.: SPL59702 HI Ramp: SPL59703 HI Handle: SPL59704					
M20x2.5	Plug	SPL57815D	SPL57805D	SPL57823D	SPL23148D	SPL59718
	Bottom	SPL57820D	SPL57807D	SPL57824D	SPL23145D	
Gage Members	GO Plug: SPL59710 GO Handle: SPL59711 HI P.D.: SPL59712 HI Ramp: SPL59713 HI Handle: SPL59714					
M22x1.5	Plug	SPL57825D	SPL57835D	SPL57843D	SPL23153D	SPL59728
	Bottom	SPL57827D	SPL57837D	SPL57844D	SPL23150D	
Gage Members	GO Plug: SPL59720 GO Handle: SPL59721 HI P.D.: SPL59722 HI Ramp: SPL59723 HI Handle: SPL59724					
M22x2.5	Plug	SPL57845D	SPL57855D	SPL57863D	SPL23158D	SPL59738
	Bottom	SPL57847D	SPL57857D	SPL57864D	SPL23155D	
Gage Members	GO Plug: SPL59730 GO Handle: SPL59731 HI P.D.: SPL59732 HI Ramp: SPL59733 HI Handle: SPL59734					
M24x3.0	Plug	SPL57865D	SPL57875D	SPL57883D	SPL23163D	SPL59748
	Bottom	SPL57867D	SPL57877D	SPL57884D	SPL23160D	
Gage Members	GO Plug: SPL59740 GO Handle: SPL59741 HI P.D.: SPL59742 HI Ramp: SPL59743 HI Handle: SPL59744					

Gaging Spirallock threads requires the use of special gages to ensure proper function of the thread. Only genuine Spirallock gages can determine the functionality of Spirallock threads.

Gage Utilization

Gages are to be installed in the same direction as the external (male) thread will be assembled into the hole.

The GO member checks for minimum thread profile and should enter the threads hole for the full length of thread engagement. The gage member should spin freely to minimize wear with a slight drag allowable.

The NO-GO gage members check for maximum thread profile and are designed not to enter the threaded hole. However, the thread is acceptable if the gage enters the thread up to a maximum of three (3) revolutions. This allows for any errors in starting the threading process.

When gaging Spirallock threads that will be heat treated, all gage members (GO & NO-GO) must function properly both before and after heat treating.

Spirallock GO and NO-GO gages should be utilized before plating to determine acceptability. If the thread gages successfully before plating, the Spirallock thread form will function properly.

Gage Illustrations

Conventional Spirallock Thread Gages:

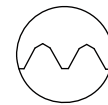
This three part gaging system is used with all Spirallock cutting tools making equal to or coarser than 32 TPI (0.80 mm)



GO - Pitch Diameter and Ramp



NO-GO Pitch Diameter



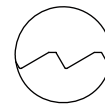
NO-GO Ramp

Spirallock Sawtooth Thread Gages:

Two gage system for use with all Spirallock cutting tools making finer than a 32 TPI (0.80 mm).



GO Pitch Diameter



NO-GO Ramp Gage

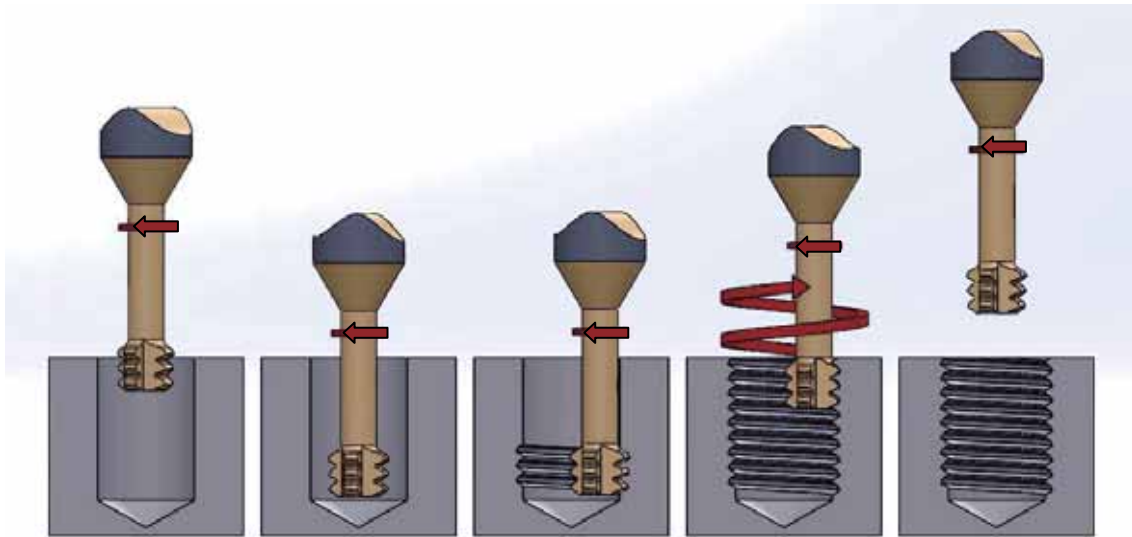
A unique serial number is assigned to each gage member for traceability at the time of manufacture, and a long form certification is supplied for each gage member. Gage re-certification is performed exclusively through Spirallock Corporation and should be based on the number of uses of a gage (rather than a fixed time period) to ensure that used gages remain within specification.

This gaging practice is based on FED-STD-H28, Section 6.3, Gaging and Gaging Procedures.

Tapping may be the most common method for putting threads into a hole, but it is not always the best method. Difficult to cut materials, small hole sizes, or threading close to the bottom of a blind hole can push the limits of tap capabilities. An alternative way to create threads and overcome these hurdles is through the use of a thread milling cutter. Spirallock all-carbide thread milling cutters can be made to suit specific customer applications by adjusting the cutter diameter, neck length, and number of threads.

Advantages of Thread Milling

- Ability to adjust amount of material being removed by changing depth of cut
- Continuous spindle rotation – no need to stop and reverse the spindle when coming out of the hole
- Easy machining of difficult materials that produces short, controllable chips
- One cutter can produce varying diameters with a common thread pitch
- One tool for both right and left-hand threads, as well as through or blind holes
- Partial thread removal at start of thread for cleaner assembly
- Full bottom threading with precise thread depth control
- Less cutting pressure for thin-walled workpieces
- Better thread surface finish quality and lower spindle torque
- Tool breakage does not necessarily result in workpiece rejection



How Thread Milling Works

In thread milling, the workpiece remains stationary while the thread mill rotates at high speed and moves along a helical path. The tool is moved into position above the hole and then lowered into the hole before beginning the cut. The tool then moves out radially to touch the wall of the workpiece and begins its helical climb back out of the hole, controlled by a CNC program. Chip load and wear on the tool can be controlled by making several passes to generate the full thread profile. Thread milling speeds and feeds are dependent upon material tensile strength, hardness and elongation characteristics. Spirallock can assist customers in choosing a thread mill and recommending speeds, feeds, and number of passes.



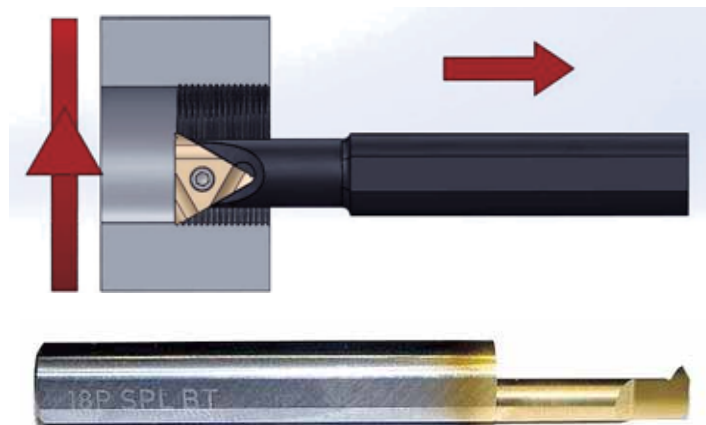
Note: Spirallock Thread Milling Cutters are made to order.

Thread turning is another option for making internal threads when tapping conditionals are not optimal, such as parts with large diameters or in difficult to cut materials. Thread turning is most often performed on a lathe with a cylindrical workpiece, and uses an indexable carbide insert with a boring bar. When boring bars are too large for the size of hole, a solid carbide threading bar can be used. In thread turning, the workpiece rotates as the cutting tool moves axially to create a continuous thread path. Like thread milling, it normally takes multiple passes to generate a full thread profile. Unlike a thread milling cutter, all the material removal is accomplished with only one cutting edge engaged. Removing only a fraction of the thread depth in each pass keeps the cutting edge from being overloaded.

Insert Selection Process:

1. Determine thread size and minimum minor diameter
2. Determine minimum bore size smaller than the minor diameter from the chart below
3. Select appropriate insert blank size for minimum bore
4. Select Spiralock part number for corresponding insert blank and pitch size using chart on the following page

Min. Bore	Insert Size	Pitch Range	Boring Bar (example)
0.240	06	20-32 TPI (1.00-0.45 mm)	SIR 0205 H06
0.310	08	16-32 TPI (1.50-0.45 mm)	SIR 0265 K08
0.350	08		SIR 0310 K08
0.470	11	14-32 TPI (1.75-0.45 mm)	SIR 0375 H11
0.470	11		SIR 0375 K11
0.470	11		SIR 0375 M11 C
0.580	11		SIR 0500 L11
0.580	11		SIR 0500 P11 C
0.640	16	7-32 TPI (3.50-0.45 mm)	SIR 0500 M16
0.750	16		SIR 0625 P16
0.750	16		SIR 0625 R16 C
0.900	16		SIR 0750 P16
1.160	16		SIR 1000 R16
1.400	16		SIR 1250 S16
1.650	16		SIR 1500 T16
0.900	22	6 TPI (5.00-0.45 mm)	SIR 0750 P22
1.160	22		SIR 1000 R22
1.500	22		SIR 1250 S22



Ordering Code: SPL part number + Modifiers

No suffix for Right Hand threads or BT thread direction

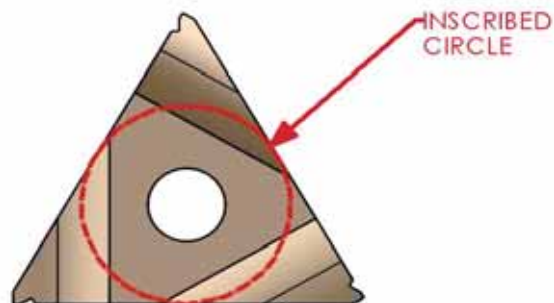
Add 'LH' for Left Hand threads

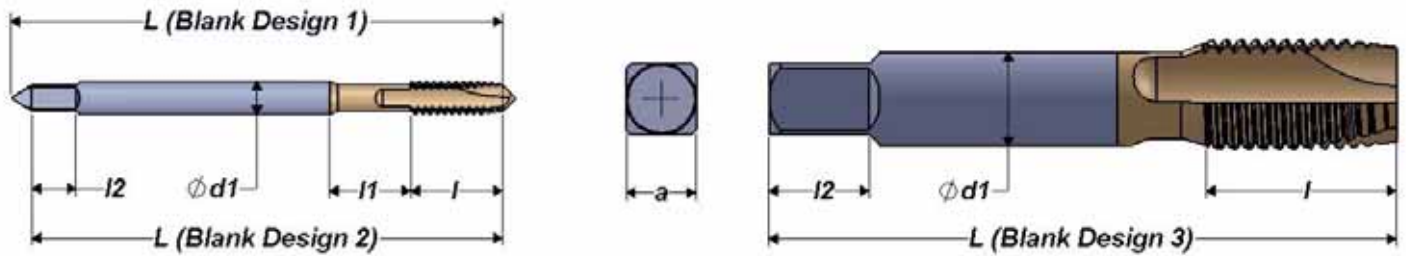
Add 'TT' when cutting from opposite end of a through hole

Example: **SPL90154LH** is an 18 pitch insert for cutting left hand Spirallock threads, and is made from an ISO size 16 blank

Part Number	Pitch	ISO Blank Size/ Inscribed Circle
SPL90324	32	
SPL90326	28	
SPL90328	24	06 (5/32")
SPL90330	20	
SPL90332	18	
SPL90334	32	
SPL90336	28	
SPL90338	24	08 (3/16")
SPL90340	20	
SPL90342	18	
SPL90344	16	
SPL90114	32	
SPL90116	28	
SPL90118	27	
SPL90120	24	11 (1/4")
SPL90122	20	
SPL90124	18	
SPL90126	16	
SPL90128	14	
SPL90144	32	
SPL90146	28	
SPL90148	27	
SPL90150	24	
SPL90152	20	
SPL90154	18	
SPL90156	16	
SPL90158	14	16 (3/8")
SPL90160	13	
SPL90162	12	
SPL90164	11.5	
SPL90166	11	
SPL90168	10	
SPL90170	9	
SPL90172	8	
SPL90174	7	22 (1/2")
SPL90176	6	

Part Number	Pitch	ISO Blank Size/ Inscribed Circle
SPL90300	0.50	
SPL90302	0.75	06 (5/32")
SPL90304	1.00	
SPL90308	0.50	
SPL90310	0.75	
SPL90312	1.00	08 (3/16")
SPL90314	1.25	
SPL90316	1.50	
SPL90014	0.80	
SPL90016	1.00	
SPL90018	1.25	11 (1/4")
SPL90020	1.50	
SPL90022	1.75	
SPL90038	0.80	
SPL90040	1.00	
SPL90042	1.25	
SPL90044	1.50	16 (3/8")
SPL90046	1.75	
SPL90048	2.00	
SPL90050	2.50	
SPL90052	3.00	
SPL90054	3.50	
SPL90056	4.00	22 (1/2")
SPL90058	4.50	
SPL90060	5.00	
SPL90062	5.50	27 (5/8")
SPL90064	6.00	



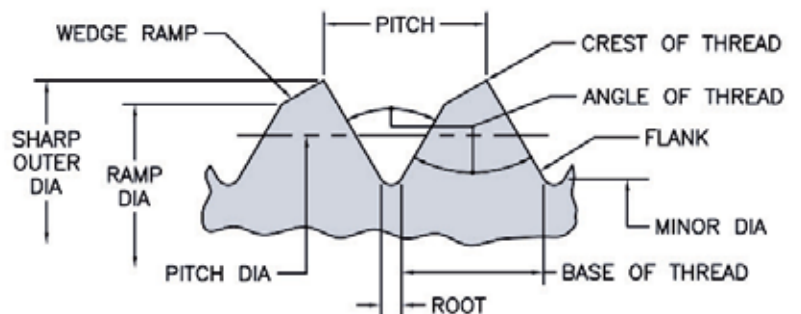
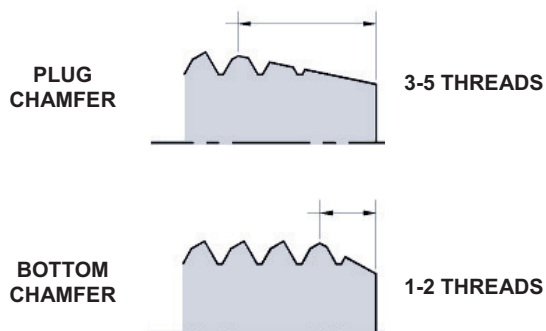


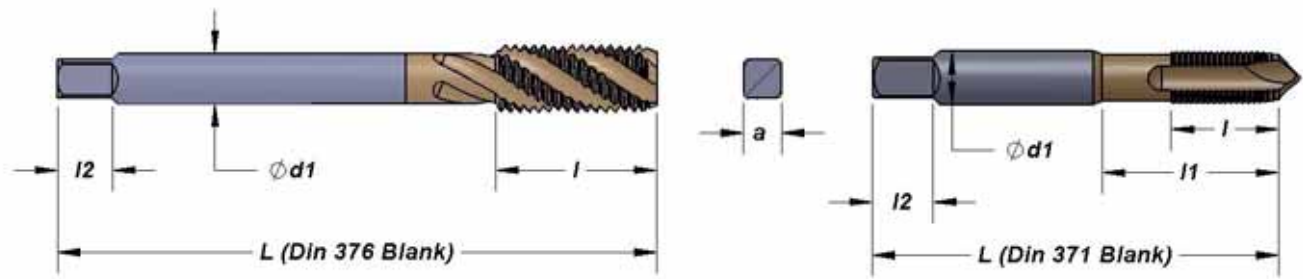
English and Fractional Sizes

English Screw Size	Nominal Diameter	Blank Design No.	L Overall Length	l Thread Length	l1 Neck Length	l2 Square Length	d1 Shank Diameter	a Size of Square
0	.060	1	1.63	.31		.19	.1410	.110
1	.073	1	1.69	.38		.19	.1410	.110
2	.086	1	1.75	.44		.19	.1410	.110
3	.099	1	1.81	.50		.19	.1410	.110
4	.112	1	1.88	.31	.25	.19	.1410	.110
5	.125	1	1.94	.31	.31	.19	.1410	.110
6	.138	1	2.00	.38	.31	.19	.1410	.110
8	.164	1	2.13	.38	.38	.25	.1680	.131
10	.190	1	2.38	.50	.38	.25	.1940	.152
12	.216	1	2.38	.50	.44	.28	.2200	.165
	1/4	2	2.5	.63	.38	.31	.2550	.191
	5/16	2	2.72	.69	.44	.38	.3180	.238
	3/8	2	2.94	.75	.50	.44	.3810	.286
	7/16	3	3.16	.88		.41	.3230	.242
	1/2	3	3.38	.94		.44	.3670	.275
	9/16	3	3.59	1.00		.50	.4290	.322
	5/8	3	3.81	1.09		.56	.4800	.360
	3/4	3	4.25	1.22		.69	.5900	.442
	7/8	3	4.69	1.34		.75	.6970	.523
	1"	3	5.13	1.50		.81	.8000	.600

All dimensions in inches

Tap Terminology





Metric Sizes

Nominal Thread Diameter	Blank Style	L Overall Length	l Thread Length	l1 Length with Neck	l2 Square Length	d1 Shank Diameter	a Size of Square
M1.4	DIN 371	40	7		5	2.5	2.1
M1.6	DIN 371	40	8		5	2.5	2.1
M1.7	DIN 371	40	8		5	2.5	2.1
M1.8	DIN 371	40	8		5	2.5	2.1
M2	DIN 371	45	8		5	2.8	2.1
M2.2	DIN 371	45	9		5	2.8	2.1
M2.5	DIN 371	50	9		5	2.8	2.1
M3	DIN 371	56	11	18	6	3.5	2.7
M3.5	DIN 371	63	12	20	6	4	3
M4	DIN 371	63	13	21	6	4.5	3.4
M4.5	DIN 371	70	16	25	8	6	4.9
M5	DIN 371	70	16	25	8	6	4.9
M6	DIN 371	80	19	30	8	6	4.9
M7	DIN 371	80	19	30	8	7	5.5
M8	DIN 371	90	22	35	9	8	6.2
M9	DIN 371	90	22	35	10	9	7
M10	DIN 371	100	24	39	11	10	8
M11	DIN 376	100	24		9	8	6.2
M12	DIN 376	110	28		10	9	7
M14	DIN 376	110	30		12	11	9
M16	DIN 376	110	32		12	12	9
M18	DIN 376	125	34		14	14	11
M20	DIN 376	140	34		15	16	12
M22	DIN 376	140	34		17	18	14.5
M24	DIN 376	160	38		17	18	14.5

*Coarse pitch shown – dimensions also apply to fine pitches
All dimensions in millimeters

GO Gage Problems: GO gage will not enter the hole or will not go all the way into the hole

Possible Cause	Solution
Tap worn on cutting edge	Regrind or replace tap
Tap worn on major diameter	Replace tap
Burrs on entry or exit side of hole	Remove burrs from thread, increase coolant concentration
Minor diameter is too small	Select proper size from Spiralock Drill Chart
Tapered thread	Tap not aligned with hole. Check alignment with dial indicator
Fixture clamping distorts part during tapping	Change clamp points to remove stress from tapped hole
Damaged thread(s)	Use proper reversing speed when exiting hole and clear tool completely from hole when finished tapping
Re-sharpened tap not within specifications	Discard tap and use a new tap
Material closing in on tapped hole	Common occurrence in thin-walled tubing or elastic materials. Increase tapping speed and feed. Reduce jaw pressure on workpiece
Debris on gage	Thoroughly clean gage and tapped hole

NO-GO Gage Problems: Gaging oversize – either “NO-GO” gage enters the hole more than 3 full turns

Possible Cause	Solution
Poor spindle alignment	Realign/rebuild spindle assembly to achieve accuracy required
Tapered or bell-mouthed hole	1. Check that part is fixtured properly and movement of part does not occur during tapping operation 2. Re-align tap to drilled hole
Tap holder not concentric with spindle	Change to a rigid tool holder
Too much feed/pullout force	Decrease feed pressure, allowing tap to freely cut its own lead
Loading on tap teeth (metal welds on tap)	Increase coolant concentration, direct coolant to end of tap, or change tap lubricant
Chips packed in flutes of tap	Use spiral flute tap, or peck tap to rinse chips from tap and hole
Incorrect flute hook for material being tapped	Consult Spiralock sales or engineering for correct style tap
Gage worn undersize	Return to Spiralock for recertification or purchase new gage

Rough Threads: Poor surface finish found on minor diameter and/or in thread flanks

Possible Cause	Solution
Incorrect flute hook for material being tapped	Consult Spiralock sales or engineering for correct style of tap
Incorrect lead chamfer	Change to tap with increased chamfer
Improper thread relief	Consult Spiralock sales or engineering for correct style of tap
Wrong or insufficient lubricant	Consult lube specialist for proper cutting oils
Loading on tap teeth (metal welds to tap)	Increase coolant concentration; change to cutting oil
Tap drill too small	Select proper size from Spiralock Drill Chart
Chips packed in tap flutes	Increase amount of coolant; direct coolant to end of tap
Chipped teeth on tap	Replace tap
Tap worn on cutting edge	Regrind or replace tap

Taps are Breaking:

Possible Cause	Solution
Taps are dull	Re-sharpen taps or replace with new taps
Material too hard	Switch to a tap designed for harder materials
Incorrect lubrication	Consult lubrication specialist for proper cutting oils
Misalignment of tap with drilled hole	Check accuracy of axis in machinery and alignment to drilled hole
Minor diameter too small	Select proper size from Spirallock Drill Chart
Not enough chip clearance	Clean out chips before tapping or drill minor diameter deeper to provide more area for chips
Tap not cutting freely	Modify feeds to improve cutting ability of taps
Tap bottoming in blind holes	Clean out chips before tapping or drill minor diameter deeper to provide more area for chips
Loose or poor fixturing of part	Check that part is fixtured correctly and movement of part does not occur during tapping operation
Poor lubrication	Increase amount of coolant; peck tap to re-wet deep holes
Not enough thread relief	Switch to style of tap with greater thread relief
Improper tap coating	Consult Spirallock engineers for change in tap surface coating specification
Hand tapping in work hardening materials	Machine tap in one pass; if not possible, contact Spirallock for custom solution

Poor Tool Life:

Possible Cause	Solution
Misalignment	Check accuracy of axis in machinery or realign/rebuild spindle
Tap run out in holder	Change to a rigid tool holder
Wrong or insufficient lubricant	Consult lubrication specialist for proper cutting oils
Minor diameter too small	Select proper size from Spirallock Drill Chart
Minor diameter work hardened during drilling	Use a carbide drill bit or ream the minor diameter after drilling
Hard spots in material	Anneal material if possible
Chips packed in flute	Clean out chips before tapping or drill minor diameter deeper to provide more area for chips
Incorrect flute hook for material being tapped	Obtain material specifications and consult Spirallock sales for correct style tap
Incorrect lead chamfer	Change to tap with increased chamfer. This may require drilling deeper for blind holes
Tap requires a special surface treatment	Obtain material specifications and consult Spirallock sales for correct surface treatment
Tap teeth are chipping	Verify that tap is not cutting into an angled or contoured surface
Tap over-cutting or under-cutting its lead	Change to a rigid tool holder. Verify gaging is correct
Loading on tap teeth	Increase amount of coolant, direct coolant to end of tap
Tap worn on cutting edge	Regrind or replace tap
Excessive tapping torque	Increase tapping speed or change tap style

Questions to consider while evaluating the Spirallock solution:

Application description:

Current problem with application:

Reason for interest in Spirallock?

Type of test/definition of success:

Application time line – prototype:

Application time line – pre-production:

Application time line – production

Application life cycle?

Customer application prints available?

Application samples needed?

Material /hardness?

Thread size:

Is this a hard joint?

Is there a gasket in the joint?

Peak temperature at bolt/stud:

Peak temperature at nut:

Competitive fastening method in use:

Male thread material type:

Male thread grade/class:

Other components being used in joint:

Plating type on male and female thread:

Torque-current levels in use:

Specific clamp load required:

Any other special requirements?

Mil. Spec. compliance required?

Quality compliance required?

Material being tapped?

Machine cutting fluid?

Machine type & model?

Hole type:

Hole depth being tapped?

Current tool life performance?

Components per year x holes per?

Est. annual tooling usage?

Thread mill style:

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