STANLEY®
Engineered Fastening

HELI-COIL®
Oversize™ and Twinsert® Inserts

Technical Bulletin 943

HeliCoil®

For Correcting Tapping Errors and Restoring Screw Thread Insert Tapped Holes.

Oversize™ Inserts and Twinserts®

Two methods of Heli-Coil® Thread Repair Inserts are available for correcting tapping errors to STI* and standard tapped holes. Oversize Inserts and Twinserts allow use of the original bolt size after the repair has been made. Each style is described fully on the following pages.

Oversize Inserts are primarily used to correct Heli-Coil® Insert assemblies that gage oversize due to tapping errors. The effective correction is achieved through a larger wire cross section.

Twinserts offer a greater degree of correction to oversize tapping errors because of the larger diameter that results from installing one insert inside another. This larger diameter allows repair of stripped STI holes as well as off-center STI and standard tapped holes. Holes tapped with the incorrect diameter and/or pitch can also be repaired.

For questions on how to use Oversize Insert and Twinsert Inserts, contact the Heli-Coil® Applications Engineering Department in Danbury, CT at (866) 364-2781.

APPROVALS

Heli-Coil® Oversize Inserts and Twinserts have been approved for use by many U.S. Government agencies. U.S. Air Force T.O. 44H1-1-117 prescribes their use in maintenance and salvage operations at major overhaul bases.

Oversize™ Inserts

DESCRIPTION

Oversize Inserts are Heli-Coil® Inserts with a larger wire cross section.

WHEN TO USE

Oversize Inserts are used to correct the tapping errors that cause STI* assemblies to gage oversize. They can also be used to correct conditions of slight taper and bell-mouth in STI tapped holes.

SIZES AVAILABLE

Oversize Inserts and components come in inch sizes UNC and UNF, and Metric sizes as shown in the following tables. When Oversize Inserts are installed, the original internal thread size is re-established allowing installation of the original size bolt. The columns on the right of Tables 1 & 2 indicate the effective correction to the pitch diameter of oversize tapped holes.

HOW TO INSTALL

1. Retap the oversize hole with the special bottoming. No redrilling is necessary. For critical applications, refer to the tapping and gaging procedure listed in the Engineering Data and Trouble Shooting section.
2. Install the insert to the proper depth below the top surface (1/4 to 1/2 pitch for tapped holes without a countersink and 3/4 to 1-1/2 pitch for holes with a countersink). Use the same tool recommended for a standard Heli-Coil Insert of the same size.
3. If the assembly is still oversize, it will be necessary to resort to a Twinsert repair. Note – a standard gage can be used to check an installed free-running Oversize Insert assembly provided the insert is fully seated.
4. When assembly is satisfactory, remove the tang with the tang break-off tool recommended for the original insert.

*Screw Thread Insert

Table 1 – Heli-Coil® Oversize™ Inserts and Tools – INCH

NOMINAL THREAD SIZE*	INSERT PART NUMBER		Nominal Length**		Oversize Bottoming Tap Part No.	Effective Correction to Oversize Hole Pitch Diameter
	Standard Inserts (Free-Running)	Screw-Lock Inserts (Internal-Lock)	1-1/2 Dia.	2 Dia.		
UNIFIED COARSE						
2 (.086)-56	8185-02CN	3885-02CN	.129	.172	56187-02-2	.0026
3 (.099)-48	8185-03CN	3885-03CN	.148	.198	56187-03-2	.0030
4 (.112)-40	8185-04CN	3885-04CN	.168	.224	56187-04-2	.0034
5 (.125)-40	8185-05CN	3885-05CN	.188	.250	56187-05-2	.0034
6 (.138)-32	8185-06CN	3885-06CN	.207	.276	56187-06-2	.0040
8 (.164)-32	8185-2CN	3885-2CN	.246	.328	56187-2-2	.0040
10 (.190)-24	8185-3CN	3885-3CN	.285	.380	56187-3-2	.0050
12 (.216)-24	8185-1CN	3885-1CN	.324	.432	56187-1-2	.0050
1/4 (.2500)-20	8185-4CN	3885-4CN	.375	.500	56187-4-2	.0060
5/16 (.3125)-18	8185-5CN	3885-5CN	.469	.625	56187-5-2	.0060
3/8 (.3750)-16	8185-6CN	3885-6CN	.562	.750	56187-6-2	.0066
7/16 (.4375)-14	8185-7CN	3885-7CN	.656	.875	56187-7-2	.0074
1/2 (.5000)-13	8185-8CN	3885-8CN	.750	1.000	56187-8-2	.0056
UNIFIED FINE						
3 (.099)-56	8191-03CN	3891-03CN	.148	.198	56193-03-2	.0026
4 (.112)-48	8191-04CN	3891-04CN	.168	.224	56193-04-2	.0030
6 (.138)-40	8191-06CN	3891-06CN	.207	.276	56193-06-2	.0034
10 (.190)-32	8191-3CN	3891-3CN	.285	.380	56193-3-2	.0040
1/4 (.2500)-28	8191-4CN	3891-4CN	.375	.500	56193-4-2	.0042
5/16 (.3125)-24	8191-5CN	3891-5CN	.469	.625	56193-5-2	.0050
3/8 (.3750)-24	8191-6CN	3891-6CN	.562	.750	56193-6-2	.0050
7/16 (.4375)-20	8191-7CN	3891-7CN	.656	.875	56193-7-2	.0060
1/2 (.5000)-20	8191-8CN	3891-8CN	.750	1.000	56193-8-2	.0060

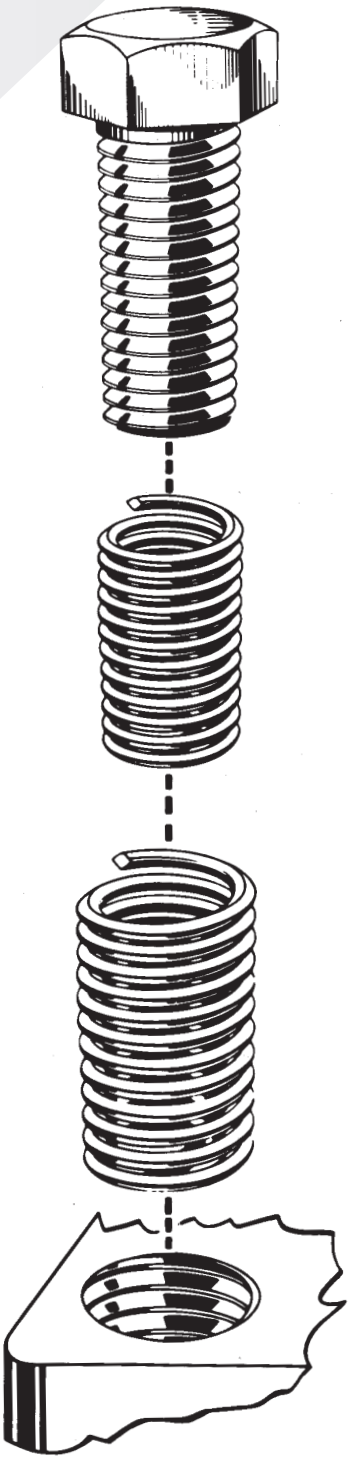
**When ordering, include the length of the insert as a suffix to the part number. Example: 8185-4CN375.
*Other sizes and lengths are available on special order.

Table 2 – Heli-Coil® Oversize™ Inserts and Tools – METRIC

NOMINAL THREAD SIZE*	INSERT PART NUMBER		Nominal Length mm**		Oversize Bottoming Tap Part No.	Effective Correction to Hole Pitch Diameter	
	Standard Inserts (Free-Running)	Screw-Lock Inserts (Internal-Lock)	1-1/2 Dia.	2 Dia.		Inches	mm
COARSE SERIES							
M2.2 x 0.45	8084-2.2CN	4484-2.2CN	3.3	4.4	4893-2.2	.00303	.077
M2.5 x 0.45	8084-2.5CN	4484-2.5CN	3.8	5.0	4893-2.5	.00303	.077
M3 x 0.5	8084-3CN	4484-3CN	4.5	6.0	4893-3	.00303	.077
M3.5 x 0.6	8084-3.5CN	4484-3.5CN	5.3	7.0	4893-3.5	.00354	.090
M4 x 0.7	8084-4CN	4484-4CN	6.0	8.0	4893-4	.00354	.090
M5 x 0.8	8084-5CN	4484-5CN	7.5	10.0	4893-5	.00394	.100
M6 x 1	8084-6CN	4484-6CN	9.0	12.0	4893-6	.00453	.115
M7 x 1	8084-7CN	4484-7CN	10.5	14.0	4893-7	.00453	.115
M8 x 1.25	8084-8CN	4484-8CN	12.0	16.0	4893-8	.00520	.132
M10 x 1.5	8084-10CN	4484-10CN	15.0	20.0	4893-10	.00591	.150
M12 x 1.75	8084-12CN	4484-12CN	18.0	24.0	4893-12	.00661	.168
FINE SERIES							
M8 x 1	4755-8CN	5455-8CN	12.0	16.0	4867-8	.00453	.115
M10 x 1	4755-10CN	5455-10CN	15.0	20.0	4867-10	.00453	.115
M10 x 1.25	5149-10CN	5849-10CN	15.0	20.0	4868-10	.00520	.132
M12 x 1.25	5149-12CN	5849-12CN	18.0	24.0	4868-12	.00520	.132
M12 x 1.5	4745-12CN	5645-12CN	18.0	24.0	4869-12	.00591	.150

**When ordering, include the length of the insert as a suffix to the part number. Example: 8084-4CN060.
*Other sizes and lengths are available on special order.

Twinserts®



DESCRIPTION

Twinsert assemblies, as the name implies consist of two Heli-Coil® Inserts: an Outer Insert, always Free-Running and an Inner Insert which can be either Free-Running or Screw-Lock.

WHEN TO USE

Twinserts are used to correct STI* or standard tapped holes that are stripped, off-center, damaged or beyond the correction range of Oversize Inserts or standard Heli-Coil® Inserts.

SIZES AVAILABLE

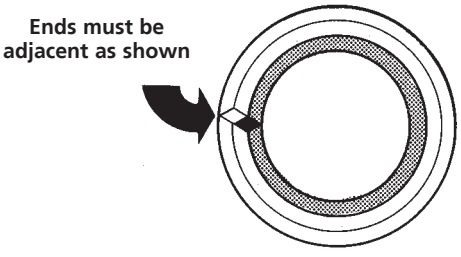
Twinserts and components come in inch sizes UNC and UNF, and Metric sizes as shown in the following tables. When Twinserts are installed, the original internal thread size is re-established allowing installation of the original size bolt. Effective correction for each thread size may be seen on the last page.

HOW TO ORDER

Order by part number from Tables 3 & 4. Assemblies are available with either Free-Running or Screw-Lock Inserts in lengths of either 1-1/2 or 2 diameters.

HOW TO INSTALL

1. Drill hole to the minor diameter specified in Table 5 or 6 using the drill size specified. Drill hole to the original depth.
2. Tap the hole to the original depth using the special bottoming tap.
3. Install outer insert with the tool furnished in the kit 1/4 to 1/2 pitch below the top surface.
4. Break off the driving tang with the tang break-off tool. (Sizes above 7/16" or M10 use long nose pliers, bend tang up and down to snap off at notch.)
5. Install Inner Insert to the position where the end of the last coil is flush with the end of the Outer Insert as shown below. Use the same installation tool as used for the standard Heli-Coil® Insert of the same thread size.
6. Break off the driving tang with the tang break-off tool used for the standard Heli-Coil® Insert of the same thread size. (Sizes above 1/2" or M12 use long nose pliers, bend tang up and down to snap off at notch). The assembled inner insert will provide a Class 2B fit. For additional information on gaging, refer to the Engineering Data and Trouble Shooting section.



Top view of outer and inner inserts

Table 3 – Heli-Coil® Twinserts® and Tools – INCH

NOMINAL THREAD SIZE	Twinsert Outer Insert 1-1/2 Dia. Part No.	Twinsert Inner Insert 1-1/2 Dia.++ Free-Running Part No.	Twinsert Inner Insert 1-1/2 Dia.++ Screw-Lock (Intern. Lock) Part No.	Twinsert Outer Insert 2 Dia. Part No.	Twinsert Inner Insert 2 Dia.++ Free-Running Part No.	Twinsert Inner Insert 2 Dia.++ Screw-Lock (Intern. Lock) Part No.	Bottoming Tap	Outer Insert Installation Tool	Outer Insert Tang Break-Off Tool	Outer Insert Extracting Tool*
UNIFIED COARSE										
2 (.086)-56	2385-02CN129	4485-02CN111	4685-02CN111	2385-02CN172	4485-02CN154	4685-02CN154	3887-02	2698-02	4032-02	1227-06
3 (.099)-48	2385-03CN148	4485-03CN127	4685-03CN127	2385-03CN198	4485-03CN177	4685-03CN177	3887-03	2698-03	4032-04	1227-06
4 (.112)-40	2385-04CN168	4485-04CN143	4685-04CN143	2385-04CN224	4485-04CN199	4685-04CN199	3887-04	2698-04	4032-04	1227-06
5 (.125)-40	2385-05CN188	4485-05CN163	4685-05CN163	2385-05CN250	4485-05CN225	4685-05CN225	3887-05	2698-05	4032-06	1227-06
6 (.138)-32	2385-06CN207	4485-06CN176	4685-06CN176	2385-06CN276	4485-06CN245	4685-06CN245	3887-06	2698-06	4032-06	1227-06
8 (.164)-32	2385-2CN246	4485-2CN215	4685-2CN215	2385-2CN328	4485-2CN297	4685-2CN297	3887-2	2698-2	4032-2	1227-06
10 (.190)-24	2385-3CN285	4485-3CN243	4685-3CN243	2385-3CN380	4485-3CN338	4685-3CN338	3887-3	2698-3	4032-3	1227-6
12 (.216)-24	2385-1CN324	4485-1CN282	4685-1CN282	2385-1CN432	4485-1CN390	4685-1CN390	3887-1	2698-1	4032-1	1227-6
1/4 (.2500)-20	2385-4CN375	4485-4CN325	46854CN325	2385-4CN500	4485-4CN450	4685-4CN450	3987-4	2698-4	4032-4	1227-6
5/16 (.3125)-18	2385-5CN469	4485-5CN413	4685-5CN413	2385-5CN625	4485-5CN569	4685-5CN569	3987-5	2698-5	4032-5	1227-6
3/8 (.3750)-16	2385-6CN562	4485-6CN500	4685-6CN500	2385-6CN750	4485-6CN688	4685-6CN688	3987-6	2698-6	4032-6	1227-16
7/16 (.4375)-14	2385-7CN656	4485-7CN585	4685-7CN585	2385-7CN875	4485-7CN804	4685-7CN804	4087-7	2698-7	4032-7	1227-16
1/2 (.5000)-13	2385-8CN750	4485-8CN673	4685-8CN673	2385-8CN1000	4485-8CN923	4685-8CN923	4087-8	2698-8		1227-16
9/16 (.5625)-12	2385-9CN844	4485-9CN761	4685-9CN761	2385-9CN1125	4485-9CN1042	4685-9CN1042	4087-9	2698-9		1227-16
5/8 (.6250)-11	2385-10CN938	4485-10CN847	4685-10CN847	2385-10CN1250	4485-10CN1159	4685-10CN1159	4087-10	2698-10		1227-16
3/4 (.7500)-10	2385-12CN1125	4485-12CN1025	4685-12CN1025	2385-12CN1500	4485-12CN1400	4685-12CN1400	4087-12	2698-12		1227-16
UNIFIED FINE										
3 (.099)-56	2391-03CN148	4491-03CN130	4691-03CN130	2391-03CN198	4491-03CN180	4691-03CN180	3893-03	2705-03	4032-04	1227-06
4 (.112-)-48	2391-04CN168	4491-04CN147	4691-04CN147	2391-04CN224	4491-04CN203	4691-04CN203	3893-04	2705-04	4032-04	1227-06
6 (.138)-40	2391-06CN207	4491-6CN182	4691-06CN182	2391-06CN276	4491-06CN251	4691-06CN251	3893-06	2705-06	4032-06	1227-06
10 (.190)-32	2391-3CN285	4491-3CN254	4691-3CN254	2391-3CN380	4491-3CN349	4691-3CN349	3893-3	2705-3	4032-3	1227-6
1/4 (.2500)-28	2391-4CN375	4491 4CN339	4691-4CN339	2391-4CN500	4491-4CN464	4691-4CN464	3893-4	2705-4	4032-4	1227-6
5/16 (.3125)-24	2391-5CN469	4491-5CN427	4691-5CN427	2391-5CN625	4491-5CN583	4691-5CN583	3893-5	2705-5	4032-5	1227-6
3/8 (.3750)-24	2391-6CN562	4491-6CN521	4691-6CN521	2391-6CN750	4491-6CN708	4691-6CN708	3993-6	2705-6	4032-6	1227-16
7/16 (.4375)-20	2391-7CN656	4491-7CN606	4691-7CN606	2391-7CN875	4491-7CN825	4691-7CN825	3993-7	2705-7	4032-7	1227-16
1/2 (.5000)-20	2391-8CN750	4491-8CN700	4691-8CN700	2391-8CN1000	4491-8CN950	4691-8CN950	3993-8	2705-8		1227-16
9/16 (.5625)-18	2391-9CN844	4491-9CN788	4691-9CN788	2391-9CN1125	4491-9CN1069	4691-9CN1069	3993-9	2705-9		1227-16
5/8 (.6250)-18	2391-10CN938	4491-10CN882	4691-10C N882	2391-10CN1250	4491-10CN1194	4691-10CN1194	3993-10	2705-10		1227-16
3/4 (.7500)-16	2391-12CN1125	4491-12CN1062	4691-12CN1062	2391-12CN1500	4491-12CN1438	4691-12CN1438	3993-12	2705-12		1227-16

++These inserts are not interchangeable with standard Heli-Coil inserts. The inner insert is 1 coil shorter than the outer insert.

Table 4 – Heli-Coil® Twinserts® and Tools – METRIC

NOMINAL THREAD SIZE	Twinsert Outer Insert 1-1/2 Dia. Part No.	Twinsert Inner Insert 1-1/2 Dia.++ Free-Running Part No.	Twinsert Inner Insert 1-1/2 Dia.++ Screw-Lock (Intern. Lock) Part No.	Twinsert Outer Insert 2 Dia. Part No.	Twinsert Inner Insert 2 Dia.++ Free-Running Part No.	Twinsert Inner Insert 2 Dia.++ Screw-Lock (Intern. Lock) Part No.	Bottoming Tap	Outer Insert Installation Tool	Outer Insert Tang Break-Off Tool	Outer Insert Extracting Tool*
METRIC COARSE										
M2.2 x 0.45	1884-2.2CN033	4784-2.2CN028	4884-2.2CN028	1884-2.2CN044	4784-2.2CN040	4884-2.2CN040	4673-2.2	1887-2.2	4543-2.2	1227-06
M2.5 x 0.45	1884-2.5CN038	4784-2.5CN034	4884-2.5CN034	1884-2.5CN050	4784-2.5CN046	4884-2.5CN046	4673-2.5	1887-2.5	4543-2.2	1227-06
M3 x 0.5	1884-3CN045	4784-3CN040	4884-3CN040	1884-3CN060	4784-3CN055	4884-3CN055	4673-3	1887-3	4543-3	1227-06
M3.5 x 0.6	1884-3.5CN053	4784-3.5CN047	4884-3.5CN047	1884-3.5CN070	4784-3.5CN064	4884-3.5CN064	4673-3.5	1887-3.5	4543-3.5	1227-6
M4 x 0.7	1884-4CN060	4784-4CN053	4884-4CN053	1884-4CN080	4784-4CN073	4884-4CN073	4673-4	1887-4	4543-4	1227-6
M5 x 0.8	1884-5CN075	4784-5CN067	4884-5CN067	1884-5CN100	4784-5CN092	4884-5CN092	4673-5	1887-5	4543-5	1227-6
M6x 1	1884-6CN090	4784-6CN080	4884-6CN080	1884-6CN120	4784-6CN110	4884-6CN110	4673-6	1887-6	4543-6	1227-6
M7x 1	1884-7CN105	4784-7CN095	4884-7CN095	1884-7CN140	4784-7CN130	4884-7CN130	4673-7	1887-7	4543-7	1227-6
M8 x 1.25	1884-8CN120	4784-8CN108	4884-8CN108	1884-8CN160	4784-8CN148	4884-8CN148	4673-8	1887-8	4543-8	1227-6
M10x 1.5	1884-10CN150	4784-10CN135	4884-10CN135	1884-10CN200	4784-10CN185	4884-10CN185	4673-10	1887-10	4543-10	1227-16
M12 x 1.75	1884-12CN180	4784-12CN163	4884-12CN163	1884-12CN240	4784-12CN223	4884-12CN223	4673-12	1887-12		1227-16
M14 x 2	1884-14CN210	4784-14CN190	4884-14CN190	1884-14CN280	4784-14CN260	4884-14CN260	4673-14	1887-14		1227-16
M16 x 2	1884-16CN240	4784-16CN220	4884-16CN220	1884-16CN320	4784-16CN300	4884-16CN300	4673-16	1887-16		1227-16
M18 x 2.5	1884-18CN270	4784-18CN245	4884-18CN245	1884-18CN360	4784-18CN335	4884-18CN335	4673-18	1887-18		1227-16
M20 x 2.5	1884-20CN300	4784-20CN275	4884-20CN275	1884-20CN400	4784-20CN375	4884-20CN375	4673-20	1887-20		1227-16
METRIC FINE										
M8 x 1	1855-8CN120	3855-8CN110	5755-8CN110	1855-8CN160	3855-8CN150	5755-8CN150	4711-8	1896-8	4543-8	1227-6
M10 x 1	1855-10CN150	3855-10CN140	5755-10CN140	1855-10CN200	3855-10CN190	5755-10CN190	4711-10	1896-10	4543-10	1227-16
M10 x 1.25	1849-10CN150	3849-10CN138	5749-10CN138	1849-10CN200	3849-10CN188	5749-10CN188	4712-10	1897-10	4543-10	1227-16
M12 x 1.25	1849-12CN180	3849-12CN168	5749-12CN168	1849-12CN240	3849-12CN228	5749-12CN228	4712-12	1897-12		1227-16
M12 x 1.5	1845-12CN180	3845-12CN165	5745-12CN165	1845-12CN240	3845-12CN225	5745-12CN225	4713-12	1898-12		1227-16
M14 x 1.5	1845-14CN210	3845-14CN195	5745-14CN195	1845-14CN280	3845-14CN265	5745-14CN265	4713-14	1898-14		1227-16
M16 x 1.5	1845-16CN240	3845-16CN225	5745-16CN225	1845-16CN320	3845-16CN305	5745-16CN305	4713-16	1898-16		1227-16
M18 x 1.5	1845-18CN270	3845-18CN255	5745-18CN255	1845-18CN360	3845-18CN345	5745-18CN345	4713-18	1898-18		1227-16
M20 x 1 .5	1845-20CN300	3845-20CN285	5745-20CN285	1845-20CN400	3845-20CN385	5745-20CN385	4713-20	1898-20		1227-16
M18 x 2	1866-18CN270	3866-18CN250	5766-18CN250	1866-18CN360	3866-18CN340	5766-18CN340	4714-18	1899-18		1227-16
M20 x 2	1866-20CN300	3866-20CN280	5766-20CN280	1866-20CN400	3866-20CN380	5766-20CN380	4714-20	1899-20		1227-16

++These inserts are not interchangeable with standard Heli-Coil inserts. The inner insert is 1 coil shorter than the outer insert.

Table 5 – Heli-Coil® Twinsert® Tapped Hole Dimentions – INCH

COARSE SERIES CLASS 2B

NOMINAL THREAD SIZE	MINOR DIAMETER AFTER TAPPING		SUGGESTED DRILL SIZE		TAP MAJOR DIAMETER	PITCH DIAMETER	
	MIN.	MAX.	ALUM.	STEEL	MAX.	MIN.	MAX.
2 (.086)-56	.1131	.1184	32 (.1160)	32 (.1160)	.1349	.1208	.1220
3 (.099)-48	.1306	.1362	30 (.1285)	29 (.1360)	.1559	.1396	.1410
4 (.112)-40	.1500	.1568	24 (.1520)	23 (.1540)	.1798	.1608	.1625
5 (.125)-40	.1630	.1692	19 (.1660)	18 (.1695)	.1928	.1738	.1755
6 (.138)-32	.1854	.1927	12 (.1890)	11 (.1910)	.2223	.1989	.2008
8 (.164)-32	.2114	.2181	3 (.2130)	7/32 (.2188)	.2483	.2249	.2269
10 (.190)-24	.2531	.2611	"F" (.2570)	"G" (.2610)	.3016	.2711	.2734
12 (.216)-24	.2791	.2871	9/32 (.2812)	9/32 (.2812)	.3276	.2971	.2995
1/4 (.2500)-20	.3258	.3346	21/64 (.3281)	"Q" (.3320)	.3836	.3474	.3502
5/16 (.3125)-18	.3966	.4057	"X" (.3970)	"Y" (.4040)	.4605	.4207	.4240
3/8 (.3750)-16	.4697	.4789	15/32 (.4688)	15/32 (.4688)	.5414	.4968	.5005
7/16 (.4375)-14	.5458	.5558	35/64 (.5469)	9/16 (.5625)	.6271	.5767	.5808
1/2 (.5000)-13	.6165	.6265	5/8 (.6250)	5/8 (.6250)	.7041	.6498	.6543
9/16 (.5625)-12	.6888	.6997	11/16 (.6875)	45/64 (.7031)	.7833	.7249	.7297
5/8 (.6250)-11	.7628	.7728	49/64 (.7656)	49/64 (.7656)	.8658	.8022	.8074
3/4 (.7500)-10	.9015	.9135	29/32 (.9062)	29/32 (.9062)	1.0149	.9448	.9505

FINE SERIES CLASS 2B

NOMINAL THREAD SIZE	MINOR DIAMETER AFTER TAPPING		SUGGESTED DRILL SIZE		TAP MAJOR DIAMETER	PITCH DIAMETER	
	MIN.	MAX.	ALUM.	STEEL	MAX.	MIN.	MAX.
3 (.099)-56	.1266	.1319	30 (.1285)	30 (.1285)	.1479	.1338	.1350
4 (.112)-48	.1436	.1492	26 (.1470)	26 (.1470)	.1689	.1526	.1541
6 (.138)-40	.1760	.1822	15 (.1800)	14 (.1820)	.2058	.1868	.1886
10 (.190)-32	.2374	.2441	"C" (.2420)	"D" (.2460)	.2743	.2509	.2530
1/4 (.2500)-28	.3041	.3110	5/16 (.3125)	5/16 (.3125)	.3459	.3196	.3219
5/16 (.3125)-24	.3756	.3826	"V" (.3770)	"V" (.3770)	.4241	.3936	.3964
3/8 (.3750)-24	.4381	.4451	7/16 (.4375)	7/16 (.4375)	.4866	.4561	.4590
7/16 (.4375)-20	.5132	.5210	33/64 (.5156)	33/64 (.5156)	.5711	.5349	.5383
1/2 (.5000)-20	.5758	.5836	37/64 (.5781)	37/64 (.5781)	.6336	.5974	.6010
9/16 (.5625)-18	.6466	.6547	41/64 (.6406)	21/32 (.6562)	.7105	.6707	.6746
5/8 (.6250)-18	.7092	.7173	45/64 (.7031)	23/32 (.7188)	.7730	.7332	.7372
3/4 (.7500)-16	.8447	.8532	27/32 (.8438)	55/64 (.8594)	.9164	.8718	.8763

Table 6 – Heli-Coil® Twinsert® Tapped Hole Dimentions – METRIC

COARSE SERIES

NOMINAL THREAD SIZE	MINOR DIAMETER AFTER TAPPING		SUGGESTED DRILL SIZE		TAP MAJOR DIAMETER	PITCH DIAMETER	
	MIN.	MAX.	ALUM.	STEEL	MAX.	MIN.	MAX.
M2.2 x 0.45	2.881	2.981	2.9	2.9	3.379	3.076	3.111
M2.5 x 0.45	3.181	3.281	3.2	3.2	3.678	3.376	3.411
M3 x 0.5	3.758	3.870	3.8	3.8	4.308	3.975	4.013
M3.5 x 0.6	4.410	4.535	4.5	4.5	5.065	4.670	4.718
M4 x 0.7	5.062	5.202	5.1	5.1	5.830	5.365	5.418
M5 x 0.8	6.214	6.374	6.3	6.3	7.077	6.560	6.614
M6 x 1	7.517	7.707	7.6	7.6	8.586	7.950	8.016
M7 x 1	8.517	8.707	8.6	8.6	9.586	8.950	9.016
M8 x 1.25	9.895	10.107	10.0	10.0	11.227	10.436	10.509
*M10 x 1.5	12.272	12.508	12.5	12.5	13.860	12.922	13.012
*M12 x 1.75	14.653	14.918	14.5	15.0	16.493	15.411	15.519
*M14 x 2	17.031	17.331	17.0	17.5	19.122	17.897	18.017
*M16 x 2	19.031	19.331	19.0	19.5	21.122	19.897	20.017
M18 x 2.5	21.789	22.144	22.0	22.0	24.362	22.872	23.000
M20 x 2.5	23.789	24.144	24.0	24.0	26.362	24.872	25.000

FINE SERIES

NOMINAL THREAD SIZE	MINOR DIAMETER AFTER TAPPING		SUGGESTED DRILL SIZE		TAP MAJOR DIAMETER	PITCH DIAMETER	
	MIN.	MAX.	ALUM.	STEEL	MAX.	MIN.	MAX.
M8 x 1	9.517	9.707	9.6	9.6	10.586	9.950	10.016
*M10 x 1	11.517	11.707	11.5	11.8	12.586	11.950	12.016
M10 x 1.25	11.895	12.107	12.0	12.0	13.227	12.436	12.509
M12 x 1.25	13.895	14.107	14.0	14.0	15.243	14.436	14.524
M12 x 1.5	14.272	14.508	14.25	14.5	15.870	14.922	15.022
M14 x 1.5	16.272	16.508	16.25	16.5	17.870	16.922	17.022
M16 x 1.5	18.272	18.508	18.5	18.5	19.870	18.922	19.022
M18 x 1.5	20.272	20.508	20.5	20.5	21.870	20.922	21.022
M20 x 1.5	22.272	22.508	22.5	22.5	23.870	22.922	23.022
*M18 x 2	21.031	21.331	21.0	21.5	23.122	21.897	22.017
*M20 x 2	23.031	23.331	23.0	23.5	25.122	23.897	24.017

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

Engineering Data and Trouble Shooting Guide

OVERSIZE™ TAPPING

Heli-Coil® STI tapped holes may become oversize for any one, or combination of the same factors that cause standard tapped holes to be oversize. Heli-Coil provides two insert systems to correct oversize STI tapped holes. (The Heli-Coil® Insert, itself, is the first choice method of correcting standard holes that are oversize.)

OVERSIZE™ INSERTS

A tapped hole is considered oversize if the Hl (No Go) gage enters more than 3 turns (2 turns for Metric threads). If this Hl gage enters more than 3 turns, the amount of oversize is not known except by an educated guess based on the degree of wobble of the gage.

This oversize condition of an STI tapped hole can be corrected by an Oversize Insert if the actual pitch diameter of the hole is within Heli-Coil® oversize limits, or if it can be retapped with an Oversize STI Tap to within Heli-Coil® oversize limits.

For critical applications, Class 2B or 3B Oversize Gages can be ordered for gaging the oversize tapped hole. This enables determination of the actual class of fit. These are listed in Table 7.

When it has been determined that a tapped hole is oversize, it must next be determined if retapping with the Oversize Tap is necessary. If the Oversize GO Gage will pass through the full length of the hole, it is already large enough to accommodate the oversize insert. The Hl gage can be used to determine if it is a Class 3B or a Class 2B hole.

If the Oversize GO Gage does not enter, it is necessary to retap with the Oversize STI Tap. All proper tapping procedures should be followed to minimize the possibility of the Oversize Tap itself cutting oversize.

The Oversize Tap may remove, approximately, from one ten thousandth of material up to several thousandths. In removing very small amounts of material, a tap may simply burnish and not cut. In order to minimize this problem, Heli-Coil® Oversize Taps have been made to a slightly larger pitch diameter than if they were cutting an untapped hole. As a result, a Class 3B hole may not be attainable. Also, a Class 2B hole is not always absolutely assured, depending on the condition of the original oversize hole.

If it is determined that the oversize tapped hole is so large that it is beyond the correction range of Oversize Inserts, a Twinsert® assembly can be used.

TWINSERT®

Twinsert tapped holes are prepared by standard machining practices. The drill size for the special bottoming taps are listed in Tables 5 and 6. The tap major diameter maximum is shown to allow determination of wall thickness or clearances.

A Class 3B fit cannot be guaranteed with Twinserts because of the accumulation of tolerances of the tapped hole and inner and outer inserts. However, a Class 2B fit can be achieved if proper tapping and installation procedures are followed.

For critical applications, Class 2B Twinsert Gages can be ordered for gaging the Twinsert tapped hole. These are listed in Table 8.

Table 7 – Heli-Coil® Oversize™ Thread Plug Gages*

INCH			METRIC		
NOMINAL THREAD SIZE	3B	2B	NOMINAL THREAD SIZE	4H5H	5H
UNIFIED COARSE			**METRIC COARSE**		
2 (.086)-56	4026-02-2	4033-02-2	M2.2 x 0.45	5346-2.2	4895-2.2
3 (.099)-48	4026-03-2	4033-03-2	M2.5 x 0.45	5346-2.5	4895-2.5
4 (.112)-40	4026-04-2	4033-04-2	M3 x 0.5	5346-3	4895-3
5 (.125)-40	4026-05-2	4033-05-2	M3.5 x 0.6	5346-3.5	4895-3.5
6 (.138)-32	4026-06-2	4033-06-2	M4 x 0.7	5346-4	4895-4
8 (.164)-32	4026-2-2	4033-2-2	M5 x 0.8	5346-5	4895-5
10 (.190)-24	4026-3-2	4033-3-2	M6 x 1	5346-6	4895-6
12 (.216)-24	4026-1-2	4033-1-2	M7 x 1	5346-7	4895-7
1/4 (.2500)-20	4026-4-2	4033-4-2	M8 x 1.25	5346-8	4895-8
5/16 (.3125)-18	4026-5-2	4033-5-2	M10 x 1.5	5346-10	4895-10
3/8 (.3750)-16	4026-6-2	4033-6-2	M12 x 1.75	5346-12	4895-12
7/16 (.4375)-14	4026-7-2	4033-7-2			
1/2 (.5000)-13	4026-8-2	4033-8-2			
UNIFIED FINE			**METRIC FINE**		
3 (.099)-56	4027-03-2	4034-03-2	M8 x 1	5374-8	5347-8
4 (.112)-48	4027-04-2	4034-04 -2	M10 x 1	5374-10	5347-10
6 (.138)-40	4027-06-2	4034-06-2	M10 x 1.25	5375-10	5348-10
10 (.190)-32	4027-3-2	4034-3-2	M12 x 1.25	5375-12	5348-12
1 /4 (.2500)-28	4027-4-2	4034-4-2	M12 x 1.5	5376-12	5349-12
5/16 (.3125)-24	4027-5-2	4034-5-2			
3/8 (.3750)-24	4027-6-2	4034-6-2			
7/16 (.4375)-20	4027-7-2	4034-7-2			
1/2 (.5000)-20	4027-8-2	4034-8-2			

*Non-stock item

Table 8 – Heli-Coil® Twinsert® Thread Plug Gages*

INCH		METRIC	
NOMINAL THREAD SIZE	PART NO.	NOMINAL THREAD SIZE	PART NO.
UNIFIED COARSE		**METRIC COARSE**	
2 (.086)-56	1926-02	M2.2 x 0.45	1894-2.2
3 (.099)-48	1926-03	M2.5 x 0.45	1894-2.5
4 (.112)-40	1926-04	M3 x 0.5	1894-3
5 (.125)-40	1926-05	M3.5 x 0.6	1894-3 5
6 (.138)-32	1926-06	M4 x 0.7	1894-4
8 (.164)-32	1926-2	M5 x 0.8	1894-5
10 (.190)-24	1926-3	M6 x 1	1894-6
12 (.216)-24	1926-1	M7 x 1	1894-7
1/4 (.2500)-20	1926-4	M8 x 1.25	1894-8
5/16 (.3125)-18	1926-5	M10 x 1.5	1894-10
3/8 (.3750)-16	1926-6	M12 x 1.75	1894-12
7/16 (.4375)-14	1926-7	M14 x 2	1894-14
1/2 (.5000)-13	1926-8	M16 x 2	1894-16
9/16 (.5625)-12	1926-9	M18 x 2.5	1894-18
5/8 (.6250)-11	1926-10	M20 x 2.5	1894-20
3/4 (.7500)-10	1926-12		
UNIFIED FINE		**METRIC FINE**	
3 (.099)-56	1927-03	M8 x 1	5377-8
4 (.112)-48	1927-04	M10 x 1	5377-10
6 (.138)-40	1927-06	M10 x 1.25	5378-10
10 (.190)-32	1927-3	M12 x 1.25	5378-12
1/4 (.2500)-28	1927-4	M12 x 1.5	5379-12
5/16 (.3125)-24	1927-5	M14 x 1.5	5379-14
3/8 (.3750)-24	1927-6	M16 x 1.5	5379-16
7/16 (.4375)20	1927-7	M18 x 1.5	5379-18
1/2 (.5000)-20	1927-8	M20 x 1.5	5379-20
9/16 (.5625)-18	1927-9	M18 x 2	5380-18
5/8 (.6250)-18	1927-10	M20 x 2	5380-20
3/4 (.7500)-16	1927-12		

*Non-stock item

Table 9 – Relocating Off Center Standard Tapped Holes By Use Of Heli-Coil® Inserts Or Twinserts®

Select type of repair (Heli-Coil® Insert or Twinsert), using desired final thread size and amount hole is off center. If the amount the hole is off center exceeds the figure stated under "Heli-Coil® Insert", then repair by the "Twinsert" is necessary. If the amount the hole is off center exceeds the figure stated under "Twinsert", repair is not feasible by this method.

INCH SERIES

Desired Final H-C Thread Size	Max. Amount Existing Tapped Hole May Be Off Center With Same Nominal Diameter Thread And:			
	*Same Thread Pitch		Different Thread Pitch	
	H-C Insert	Twinsert	H-C Insert	Twinsert
UNIFIED COARSE				
2-56	.012	.023	.004	.015
3-48	.014	.027	.004	.017
4-40	.016	.032	.005	.021
5-40	.016	.032	.004	.021
6-32	.020	.041	.005	.026
8-32	.020	.041	.005	.025
10-24	.027	.054	.007	.034
12-24	.027	.054	.007	.034
1/4-20	.032	.065	.008	.040
5/16-18	.036	.072	.008	.044
3/8-16	.041	.081	.009	.050
7/16-14	.046	.093	.010	.057
1/2-13	.050	.100	.011	.061
9/16-12	.054	.108	.012	.066
5/8-11	.059	.118	.013	.071
3/4-10	.065	.130	.014	.079
UNIFIED FINE				
3-56	.012	.023	.003	.015
4-48	.014	.027	.004	.017
6-40	.016	.032	.004	.021
8-36	.018	.036	.005	.023
10-32	.020	.041	.005	.025
1/4-28	.023	.046	.006	.029
5/16-24	.027	.054	.006	.033
3/8-24	.027	.054	.006	.033
7/16-20	.032	.065	.007	.040
1/2-20	.032	.065	.007	.040
9/16-18	.036	.072	.008	.044
5/8-18	.036	.072	.008	.044
3/4-16	.041	.081	.009	.049

*Note: Assuming same lead is picked up during tapping.

METRIC SERIES

Desired Final H-C Thread Size	Max. Amount Existing Tapped Hole May Be Off Center With Same Nominal Diameter Thread And:							
	*Same Thread Pitch				Different Thread Pitch			
	H-C Insert		Twinsert		H-C Insert		Twinsert	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch
METRIC COARSE								
M2.2 x 0.45	0.24	.010	0.54	.021	0.05	.002	0.34	.013
M2.5 x 0.45	0.24	.010	0.54	.021	0.05	.002	0.34	.013
M3 x 0.5	0.28	.011	0.60	.024	0.05	.002	0.38	.015
M3.5 x 0.6	0.33	.013	0.72	.029	0.07	.003	0.46	.018
M4 x 0.7	0.40	.016	0.85	.033	0.08	.003	0.53	.021
M5 x 0.8	0.46	.018	0.98	.038	0.09	.003	0.61	.024
M6 x 1	0.58	.023	1.23	.048	0.11	.004	0.76	.030
M7 x 1	0.58	.023	1.23	.048	0.11	.004	0.76	.030
M8 x 1.25	0.73	.029	1.54	.061	0.14	.005	0.95	.037
M10 x 1.5	0.88	.035	1.86	.073	0.16	.006	1.14	.045
M12 x 1.75	1.04	.041	2.17	.086	0.19	.007	1.33	.052
M14 x 2	1.19	.047	2.49	.098	0.22	.009	1.52	.060
M16 x 2	1.19	.047	2.49	.098	0.22	.009	1.52	.060
M18 x 2.5	1.51	.060	3.14	.123	0.27	.011	1.89	.075
M20 x 2.5	1.51	.060	3.14	.123	0.27	.011	1.89	.075
METRIC FINE								
M8 x 1	0.58	.023	1.23	.048	O.11	.004	0.76	.030
M10 x 1	0.58	.023	1.23	.048	0.11	.004	0.76	.030
M10 x 1.25	0.73	.029	1.54	.061	0.14	.005	0.95	.037
M12 x 1.25	0.72	.028	1.53	.060	0.14	.005	0.95	.037
M12 x 1.5	0.88	.035	1.85	.073	0.16	.006	1.14	.045
M14 x 1.5	0.88	.035	1.85	.073	0.16	.006	1.14	.045
M16 x 1.5	0.88	.035	1.85	.073	0.16	.006	1.14	.045
M18 x 1.5	0.88	.035	1.85	.073	0.16	.006	1.14	.045
M20 x 1.5	0.88	.035	1.85	.073	0.16	.006	1.14	.045
M18 x 2	1.19	.047	2.49	.098	0.22	.009	1.52	.060
M20 x 2	1.19	.047	2.49	.098	0.22	.009	1.52	.060

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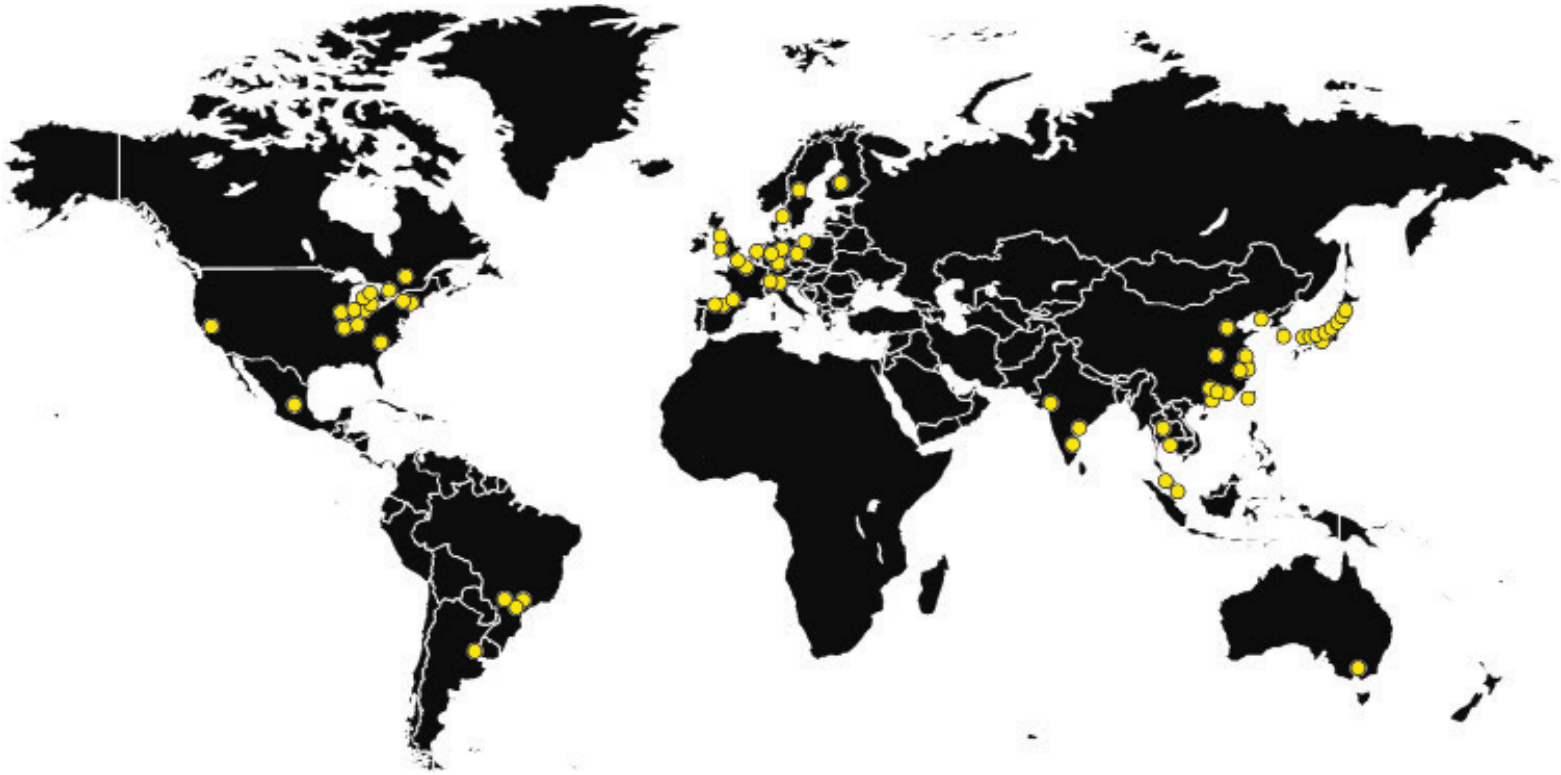

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