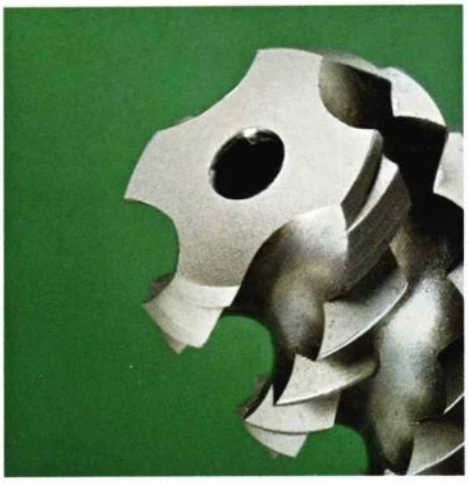
BESLY® TAPS



The world's finest cutting tools since 1875

Form T-110C-1
Revised 2000

Alphabetical Index

TAppAnalyst

IBM COMPATIBLE PROGRAM TO ASSIST YOU IN...

- *Tap trouble shooting guide.*
- *Common tapping problems and solutions.*
- *Cutting characteristics of the material you have selected.*
- *Feed and speed rates for a particular application.*
- *Best drill sizes for a particular application and lists them with decimal equivalents and the percentage of thread.*
- *Lubrication for a particular application and material.*
- *The Besly tap part number, description, catalog number and package quantity are displayed.*
- *The Besly drill part number, description, catalog number and package quantity are displayed.*
- *Gaging limits.*
- *Surface treatment recommendations.*

Numerical Index

UNDER CERTAIN CIRCUMSTANCES ANY CUTTING TOOL MAY BREAK OR SHATTER WHEN USED. PROTECTIVE EYE EQUIPMENT AND OTHER APPROPRIATE SAFEGUARDS SHOULD BE USED AT ALL TIMES IN THE VICINITY OF USE.

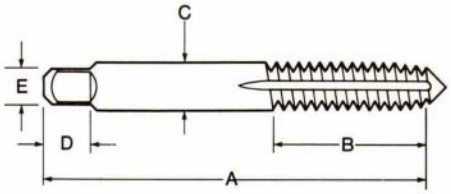
Standard X-Press® Taps

High Speed Steel Ground Thread

No. 2000

Besly X-Press® Taps cold form threads in ductile materials such as brass, copper, aluminum and leaded steels. Since X-Press Taps have no cutting edges, thread size can be maintained closely. Unusually smooth threads can be formed the full depth of the hole. Sizes from No. 8 Machine Screw and larger have two lubrication grooves to carry lubricant to the forming threads. These grooves help prevent seizing or galling in stringy materials, and provide better performance in deep or cored holes.

See pages 60-61 for Drill Selection.



Plug Style

Bottoming Style

Machine Screw Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Lube Grooves	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
0		80	.0519	0	1 5/8	5/16	.141	3/16	.110
1	64	72	.0629 .0640	0	1 1/16	3/8	.141	3/16	.110
2	56	64	.0744 .0759	0	1 3/4	7/16	.141	3/16	.110
3	48	56	.0855 .0874	0	1 13/16	1/2	.141	3/16	.110
4	40	48	.0958 .0985	0	1 7/8	9/16	.141	3/16	.110
5	40	44	.1088 .1102	0	1 15/16	5/8	.141	3/16	.110
6	32	40	.1177 .1218	0	2	11/16	.141	3/16	.110
8	32	36	.1437 .1460	2	2 1/8	3/4	.168	1/4	.131
10	24	32	.1629 .1697	2	2 3/8	7/8	.194	1/4	.152
12	24	28	.1889 .1928	2	2 3/8	15/16	.220	9/32	.165

ORDERING NUMBER (EDP)

Tap Size	Std. Pkg. Quan.	PLUG					BOTTOMING*					
		P3	P4	P5	P6	P10	B2	B3	B4	B5	B6	B10
0–80	12						19291	13571				
1–64	12						13545	13572				
1–72	12						13550	13581				
2–56	12						19297	19298				
2–64	12						19300	13554				
3–48	12						19302	13560				
3–56	12						13561	13562				
4–40	12	19312		19313				19310		13564		
4–48	12	13575		13580				13573		13574		
5–40	12	13585		13590				19318		13584		
5–44	12	13595		13600				13593		13594		
6–32	12	19329		13611		13612		19326		13604		13605
6–40	12	13621		13622				13615		13620		
8–32	12	17756		17716		17717		17755		17714		17715
8–36	12	17759		17760				17757		17758		
10–24	12		17762		17720	17721			17761		17718	17719
10–32	12		17764		17724	17725			17763		17722	17723
12–24	12		17767		17768				17765		17766	
12–28	12		17771		17772				17769		17770	

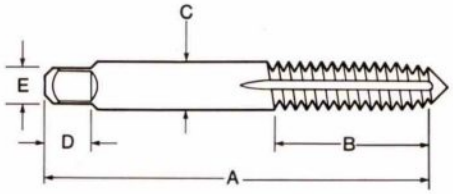
* Male center will be removed on Nos. 0-1-2-3 Bottoming taps upon request.

Standard X-Press® Taps

High Speed Steel
Ground Thread
No. 2000

Plug Style

Bottoming Style



Fractional Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Lube Grooves	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
¼	20	28	.2175 .2268	2	2 ½	1	.255	5/16	.191
5/16	18	24	.2764 .2854	2	2 23/32	1 ⅛	.318	⅜	.238
⅜	16	24	.3344 .3479	2	2 15/16	1 ¼	.381	7/16	.286
7/16	14	20	.3911 .4050	2	3 5/32	1 7/16	.323	13/32	.242
½	13	20	.4500 .4675	2	3 ⅜	1 21/32	.367	7/16	.275
9/16	12	18	.5084 .5264	2	3 19/32	1 21/32	.429	½	.322
⅝	11	18	.5660 .5889	2	3 13/16	1 13/16	.480	9/16	.360
¾	10	16	.6850 .7094	2	4 ¼	2	.590	11/16	.442

ORDERING NUMBER (EDP)

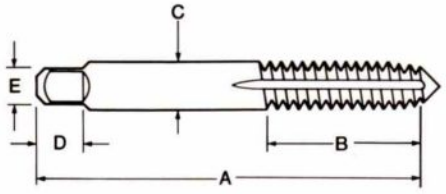
Tap Size	Std. Pkg. Quan.	PLUG						BOTTOMING					
		P4	P5	P6	P7	P8	P10	B4	B5	B6	B7	B8	B10
¼ –20	12	17774		17728			17729	17773		17726			
¼ –28	12	17778		17779				17775		17776			
5/16–18	12		17782		17732				17781		17730		
5/16–24	12		17784		17736				17783		17734		17735
⅜ –16	12		17786		17740		17741		17785		17738		
⅜ –24	12		17788		17744				17787		17742		
7/16–14	12		17791			17792			17789			17790	
7/16–20	12		17794			17747			17793			17746	
½ –13	12		17797			17798			17795			17796	
½ –20	12		17800			17749			17799			17748	
9/16–12	3				17803						17801		17802
9/16–18	3				17807		17808				17805		
⅝ –11	3				17811						17809		17810
⅝ –18	3				17814						17813		
¾ –10	3				17817						17815		
¾ –16	3				17820		17753				17819		17752

Standard X-Press® Taps

High Speed Steel Ground Thread

No. 4004

Besly X-Press® Taps cold form threads in ductile materials such as brass, copper, aluminum and leaded steels. Since X-Press Taps have no cutting edges, thread size can be maintained closely. Unusually smooth threads can be formed the full depth of the hole.
See Page 61 for Drill Selection.



Plug Style

Bottoming Style

Metric Sizes

GENERAL DIMENSIONS

Nominal Size and Pitch	Inch Equivalent	P&B P.D. Limits	No. Lube Grooves	INCHES Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E
M3 x 0.5	.1182 x 50.80	5†	0	1.94	.62	.141	.19	.110
M4 x 0.7	.1575 x 36.29	6†	2	2.38	.88	.194	.25	.152
M5 x 0.8	.1969 x 31.75	7†	2	2.38	.88	.194	.25	.152
M6 x 1	.2363 x 25.40	8†	2	2.50	1.00	.255	.31	.191
M8 x 1.25	.3150 x 20.32	9†	2	2.72	1.12	.318	.38	.238
M10 x 1.5	.3937 x 16.93	10†	2	2.94	1.25	.381	.44	.286
M12 x 1.75	.4725 x 14.51	11†	2	3.38	1.66	.367	.44	.275

†These taps are suitable for both 5H and 6H internal thread limits.

ORDERING NUMBER (EDP)

Nominal Size and Pitch	INTERNAL THREAD — CLASS 6H MILLIMETERS Minor Diameter Min.	Minor Diameter Max.	Pitch Diameter Min.	Pitch Diameter Max.	Major Diam.	INCHES Minor Diameter Min.	Minor Diameter Max.	Pitch Diameter Min.	Pitch Diameter Max.	Major Diam.	Std. Pkg. Quan.	EDP NUMBER Plug	EDP NUMBER Bottoming
M3 x 0.5	2.459	2.599	2.675	2.775	3.000	.0968	.1023	.1053	.1092	.1181	12	18211	18210
M4 x 0.7	3.242	3.422	3.545	3.663	4.000	.1276	.1347	.1396	.1442	.1575	12	18213	18212
M5 x 0.8	4.134	4.334	4.480	4.605	5.000	.1628	.1706	.1764	.1813	.1968	12	18215	18214
M6 x 1	4.917	5.153	5.350	5.500	6.000	.1936	.2029	.2106	.2165	.2362	12	18217	18216
M8 x 1.25	6.647	6.912	7.188	7.348	8.000	.2617	.2721	.2830	.2893	.3150	12	18219	18218
M10 x 1.5	8.376	8.676	9.026	9.206	10.000	.3298	.3416	.3554	.3624	.3937	12	18221	18220
M12 x 1.75	10.106	10.441	10.863	11.063	12.000	.3979	.4111	.4277	.4356	.4724	12	18223	18222

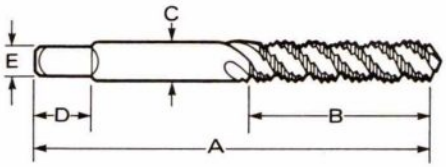
The above thread dimensions are in agreement with ANSI B1.13M-1979 and current ISO standards.

Standard Turbo Cut® Taps Spiral Flute

High Speed Steel Ground Thread

No. 4113-H

Besly Turbo Cut® Taps have a revolutionary fast spiral flute design that does a one-pass job in deep, blind holes and makes tapping cleaner and easier in thru holes. Turbo Cut Taps provide the utmost accuracy in ductile materials, maintain an extremely high rate of production.



Plug Style

Bottoming Style

Machine Screw Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
3	48	56	.0856 .0874	2 2	1 13/16	1/2	.141	3/16	.110
4	40	48	.0958 .0985	2 2	1 7/8	9/16	.141	3/16	.110
5	40	44	.1088 .1102	2 2	1 15/16	5/8	.141	3/16	.110
6	32	40	.1177 .1218	2 2	2	11/16	.141	3/16	.110
8	32	36	.1437 .1460	3 3	2 1/8	3/4	.168	1/4	.131
10	24	32	.1629 .1697	3 3	2 3/8	7/8	.194	1/4	.152
12	24	28	.1889 .1928	3 3	2 3/8	15/16	.220	9/32	.165

ORDERING NUMBER (EDP)

Tap Size	Std. Pkg. Quan.	PLUG			BOTTOMING		
		GH1	GH2	GH3	GH1	GH2	GH3
3–48 3–56	12 12					16884 17007	
4–40 4–48	12 12		10908			11025 17008	
5–40 5–44	12 12		11114			11115 17009	
6–32 6–40	12 12	17010 17014	17012 17016	11215	17011 17015	17013 11295	11220
8–32 8–36	12 12	17018 17022	17020 17024	11364	17019 17023	17021 17025	11365
10–24 10–32	12 12	17026 17030	17028 17032	11511 11605	17027 17031	17029 17033	11512 11610
12–24 12–28	12 12	17034 17036		11660 17038	17035 17037		11661 17039

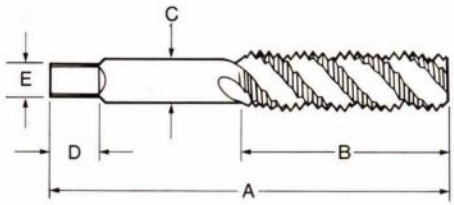
Standard Turbo Cut® Taps Spiral Flute

High Speed Steel
Ground Thread
No. 4113-H

Plug Style

Bottoming Style

Besly Turbo Cut® Taps have a revolutionary fast spiral flute design that does a one-pass job in deep, blind holes and makes tapping cleaner and easier in thru holes. Turbo Cut Taps provide the utmost accuracy in ductile materials, maintain an extremely high rate of production.



Fractional Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
¼	20		.2175	3	2 ½	1	.255	5/16	.191
		28	.2268	3					
5/16	18		.2764	3	2 23/32	1 ⅛	.318	⅜	.238
		24	.2854	3					
⅜	16		.3344	3	2 15/16	1 ¼	.381	7/16	.286
		24	.3479	3					
7/16	14		.3911	3	3 5/32	1 7/16	.323	13/32	.242
		20	.4050	3					
½	13		.4500	3	3 ⅜	1 21/32	.367	7/16	.275
		20	.4675	3					
9/16	12		.5084	4	3 19/32	1 21/32	.429	½	.322
		18	.5264	4					
⅝	11		.5660	4	3 13/16	1 13/16	.480	9/16	.360
		18	.5889	4					
¾	10		.6850	4	4¼	2	.590	1 1/16	.442
		16	.7094	4					

ORDERING NUMBER (EDP)

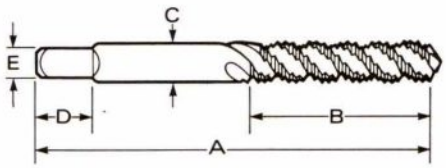
Tap Size	Std. Pkg. Quan.	PLUG					BOTTOMING				
		GH1	GH2	GH3	GH4	GH5	GH1	GH2	GH3	GH4	GH5
¼ –20	12		17040	11793		17042		17041	11794		17043
¼ –28	12	17044		11901	17046		17045		11902	17047	
5/16–18	12		17048	12000		17050		17049	12001		17051
5/16–24	12	17052		12102	17054		17053		12103	17055	
⅜ –16	12		17056	12201		17058		17057	12202		17059
⅜ –24	12	17060		12300	17062		17061		12301	17063	
7/16–14	12		17064	12392		17066		17065	12393		17067
7/16–20	12	17068		12471		17070	17069		12472		17071
½ –13	12		17072	12585		17074		17073	12590		17075
½ –20	12	17076		12682		17078	17077		12683		17079
9/16–12	3		17082	17080		17084		17083	17081		17085
9/16–18	3	17088		17086		17090	17089		17087		17091
⅝ –11	3		17094	17092		17097		17095	17093		17096
⅝ –18	3			17098		17102	17101		17099		17103
¾ –10	3			19684					19685		
¾ –16	3			19682					19683		

Standard Turbo Cut® Taps Spiral Flute

High Speed Steel
Ground Thread
No. 4144

Plug Style

Bottoming Style



Metric Sizes

GENERAL DIMENSIONS

Nominal Size and Pitch	Inch Equiv.	Tap Pitch Diam. Limits	No. Flutes	INCHES Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
M3 x 0.5	.1182 x 50.80	D3	2	1.94	.62	.141	.19	.110
M3.5 x 0.6	.1378 x 42.33	D4	2	2.00	.69	.141	.19	.110
M4 x 0.7	.1575 x 36.29	D4	3	2.12	.75	.168	.25	.131
M4.5 x 0.75	.1772 x 33.87	D4	3	2.38	.88	.194	.25	.152
M5 x 0.8	.1969 x 31.75	D4	3	2.38	.88	.194	.25	.152
M6 x 1	.2363 x 25.40	D5	3	2.50	1.00	.255	.31	.191
M7 x 1	.2756 x 25.40	D5	3	2.72	1.12	.318	.38	.238
M8 x 1.25	.3150 x 20.32	D5	3	2.72	1.12	.318	.38	.238
M8 x 1	.3150 x 25.40	D5	3	2.72	1.12	.318	.38	.238
M10 x 1.5	.3937 x 16.93	D6	3	2.94	1.25	.381	.44	.286
M10 x 1.25	.3937 x 20.32	D5	3	2.94	1.25	.381	.44	.286
M12 x 1.75	.4725 x 14.51	D6	3	3.38	1.66	.367	.44	.275
M12 x 1.25	.4725 x 20.32	D6	3	3.38	1.66	.367	.44	.275

ORDERING NUMBER (EDP)

INTERNAL THREAD — CLASS 6H

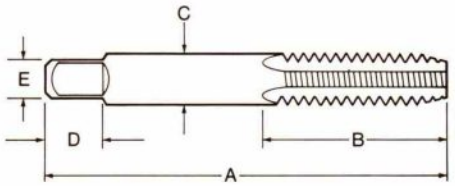
Nominal Size and Pitch	MILLIMETERS Minor Diameter Min.	Minor Diameter Max.	Pitch Diameter Min.	Pitch Diameter Max.	Major Diam.	INCHES Minor Diameter Min.	Minor Diameter Max.	Pitch Diameter Min.	Pitch Diameter Max.	Major Diam.	Std. Pkg. Quan.	EDP NUMBER Plug	EDP NUMBER Bottoming
M3 x 0.5	2.459	2.599	2.675	2.775	3.000	.0968	.1023	.1053	.1092	.1181	12	18172	18173
M3.5 x 0.6	2.850	3.010	3.110	3.222	3.500	.1122	.1185	.1224	.1268	.1378	12	18175	18176
M4 x 0.7	3.242	3.422	3.545	3.663	4.000	.1276	.1347	.1396	.1442	.1575	12	18178	18179
M4.5 x 0.75	3.688	3.878	4.013	4.131	4.500	.1452	.1526	.1580	.1626	.1772	12	18181	18182
M5 x 0.8	4.134	4.334	4.480	4.605	5.000	.1628	.1706	.1764	.1813	.1968	12	18184	18185
M6 x 1	4.917	5.153	5.350	5.500	6.000	.1936	.2029	.2106	.2165	.2362	12	18187	18188
M7 x 1	5.917	6.153	6.350	6.500	7.000	.2330	.2422	.2500	.2559	.2756	12	18190	18191
M8 x 1.25	6.647	6.912	7.188	7.348	8.000	.2617	.2721	.2830	.2893	.3150	12	18196	18197
M8 x 1	6.917	7.153	7.350	7.500	8.000	.2723	.2816	.2894	.2953	.3150	12	18193	18194
M10 x 1.5	8.376	8.676	9.026	9.206	10.000	.3298	.3416	.3554	.3624	.3937	12	18202	18203
M10 x 1.25	8.647	8.912	9.188	9.348	10.000	.3404	.3509	.3617	.3680	.3937	12	18199	18200
M12 x 1.75	10.106	10.441	10.863	11.063	12.000	.3979	.4111	.4277	.4356	.4724	12	18208	18209
M12 x 1.25	10.647	10.912	11.188	11.368	12.000	.4192	.4296	.4405	.4476	.4724	12	18205	18206

The above thread dimensions are in agreement with ANSI B1.13M–1979 and current ISO standards.

Standard Taps
Straight Flute

High Speed Steel
Ground Thread
No. 4115
No. 4115 Sets

For general use in production tapping or hand operations. Taper, plug and bottoming styles provide great versatility in tough materials, blind and thru holes. No. 4115 is available in complete sets of one taper, plug and bottoming tap of the same size.



Machine Screw Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	Std. No. Flutes	Optional No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.
0		80		.0519	2		1 5/8	5/16	.141	3/16	.110	12
1	64			.0629	2		1 11/16	3/8	.141	3/16	.110	12
		72		.0640								
	56			.0744	3							
2				.0744		2	1 3/4	7/16	.141	3/16	.110	12
		64		.0759	3							
	48			.0855	3							
3				.0855		2	1 13/16	1/2	.141	3/16	.110	12
		56		.0874	3							
	40			.0958	3							
4				.0958		2	1 7/8	9/16	.141	3/16	.110	12
		48		.0985								
			36	.0940	3							
	40			.1088	3							
5				.1088		2	1 15/16	5/8	.141	3/16	.110	12
		44		.1102	3							
				.1102		2						
	32			.1177	3							
6				.1177		2	2	11/16	.141	3/16	.110	12
		40		.1218	3							
				.1218		2						
	32			.1437	4							
8				.1437		2	2 1/8	3/4	.168	1/4	.131	12
				.1437		3						
		36		.1460	4							
	24			.1629	4							
				.1629		3						
				.1629		2						
10		32		.1697	4		2 3/8	7/8	.194	1/4	.152	12
				.1697		3						
				.1697		2						
12	24			.1889	4		2 3/8	15/16	.220	9/32	.165	12
		28		.1928								

Standard Taps
Straight Flute

Taper Style
Starts the thread square with the workpiece.

Plug Style
Generally used in thru holes or in blind holes with sufficient clearance.

Bottoming Style
Generates the thread to the bottom of blind holes.

Machine Screw Sizes

ORDERING NUMBER (EDP)

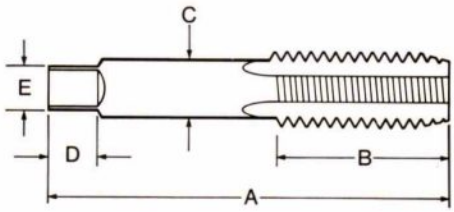
Tap Size	No. Flutes	COMPLETE SETS			TAPER			PLUG			BOTTOMING		
		GH1	GH2	GH3	GH1	GH2	GH3	GH1	GH2	GH3	GH1	GH2	GH3
0–80	2	16784			10773			10774	10781		10775	10782	
1–64	2	16785			10793			10794	10801		10795	10802	
1–72	2	16790			10813			10814	10821		10815	10822	
2–56	3	16791	10853		10843	10850		10844	10851		10845	10852	
	2							10834	10841		10835	10842	
2–64	3		16792			10881			10882			10883	
3–48	3		10931			10924		10922	10925			10930	
	2								10905			10910	
3–56	3		10974			10971			10972			10973	
4–40	3	11036	11042		11032	11035		11033	11040		11034	11041	
	2							11013	11020			11021	
4–48	3		11085			11082			11083			11084	
4–36	3		10995			10992			10993			10994	
5–40	3	11126	11132		11122	11125		11123	11130		11124	11131	
	2								11110			11111	
5–44	3		11175			11172			11173			11174	
	2								11153				
6–32	3	11226	16800	11240	11223	11230	11233	11224	11231	11234	11225	11232	11235
	2							11195	11202	11205		11203	11210
6–40	3		11291			11284			11285			11290	
	2								11273				
8–32	4	11376	16802	11383	11370	11373	11380	11371	11374	11381	11372	11375	11382
	3							11341	11344	11351	11342	11345	11352
	2							11322	11325	11332		11330	11333
8–36	4		11445			11442			11443			11444	
10–24	4		16805	11531		11520	11523	11514	11521	11524	11515	11522	11525
	3							11484	11491	11494			11495
	2								11472	11475		11473	11480
10–32	4	11616	16810	11631	11611	11614	11621	11612	11615	11625	11613	11620	11630
	3								11585	11592		11590	11593
	2							11563	11570	11573	11564	11571	11574
12–24	4			11672			11665			11670			11671
12–28	4			11705			11702			11703			11704

Standard Taps
Straight Flute

High Speed Steel
Ground Thread

No. 4111 Four and Six Flute
No. 4111 Complete Sets

For general use in production tapping or hand operations. Taper, plug and bottoming styles provide great versatility in tough materials, blind and thru holes. No. 4111 is available in complete sets of one taper, plug and bottoming tap of the same size.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER SETS GH1	GH2	GH3	GH4
¼	20	28		.2175 .2268	4 4	2 ½	1	.255	5/16	.191	12	11912	16811 11916	11825 11930	
5/16	18	24		.2764 .2854	4 4	2 23/32	1 ⅛	.318	⅜	.238	12			12032 12132	
⅜	16	24		.3344 .3479	4 4	2 15/16	1 ¼	.381	7/16	.286	12		12219	12231 12324	
7/16	14	20		.3911 .4050	4 4	3 5/32	1 7/16	.323	13/32	.242	12			12421 12500	
½	13	20		.4500 .4675	4 4	3 ⅜	1 21/32	.367	7/16	.275	12			12615 12704	
9/16	12	18		.5084 .5264	4 4	3 19/32	1 21/32	.429	½	.322	3			12765 12805	
⅝	11	18		.5660 .5889	4 4	3 13/16	1 13/16	.480	9/16	.360	3			12884 12941	
11/16			11 16	.6285 .6469	4 4	4 1/32	1 13/16	.542	⅝	.406	3			16825 13001	
¾	10	16		.6850 .7094	4 4	4 ¼	2	.590	11/16	.442	3			13052 13083	
⅞	9	14		.8028 .8286	4 4	4 11/16	2 7/32	.697	¾	.523	3				13155 13184
1	8	12	14	.9188 .9459 .9536	4 4 4	5 ⅛	2 ½	.800	13/16	.600	3				13243 13271 13293
1 ⅛	7	12		1.0322 1.0709	4 4	5 7/16	2 9/16	.896	⅞	.672	1				16830 16831
1 ¼	7	12		1.1572 1.1959	4 6	5 ¾	2 9/16	1.021	1	.766	1				16832 16833
1 ⅜	6	12		1.2667 1.3209	4 6	6 1/16	3	1.108	1 1/16	.831	1				16834 16835
1 ½	6	12		1.3917 1.4459	4 6	6 ⅜	3	1.233	1 ⅛	.925	1				16840 16841

Standard Taps
Straight Flute

Taper Style

Starts the thread square with the workpiece.

Plug Style

Generally used in thru holes or in blind holes with sufficient clearance.

Bottoming Style

Generates the thread to the bottom of blind holes.

Fractional Sizes

ORDERING NUMBER (EDP)

Tap Size	EDP NUMBER														
	TAPER				PLUG						BOTTOMING				
	GH1	GH2	GH3	GH4	GH1	GH2	GH3	GH4	GH5	GH6	GH1	GH2	GH3	GH4	GH5
¼ –20	11810	11813	11820		11811	11814	11821		11831		11812	11815	11822		11832
¼ –28		11915	11922		11913	11920	11923	11932			11914	11921	11925	11933	
5/16–18			12025		12012	12020	12030		12034		12013	12021	12031		12035
5/16–24			12123		12114	12121	12124	12134			12115	12122	12125	12135	
⅜ –16		12215	12222		12213	12220	12223		12233		12214	12221	12224		12234
⅜ –24			12321		12312	12315	12322	12331			12313	12320	12325	12332	
7/16–14			12413		12404	12411	12414		12423		12405	12412	12415		12424
7/16–20			12492		12483	12490	12493		12502		12484	12491	12494		12503
½ –13			12610		12601	12604	12611		12621		12602	12605	12612		12622
½ –20			12700		12691	12694	12701		12710		12692	12695	12702		12711
9/16–12			12760			12754	12761		12771				12762		12772
9/16–18			12801			12795	12802		12811				12803		12812
⅝ –11			12880		12871	12874	12881		12890				12882		12891
⅝ –18			12933			12931	12934		12943				12935		12944
11/16–11			12990				12991						12992		
11/16–16			12994				12995						13000		
¾ –10			13044		13035	13042	13045		13054				13050		13055
¾ –16			13075		13070	13073	13080		13085				13081		13090
⅞ – 9				13151		13145		13152		13161				13153	
⅞ –14				13180		13174		13181		13190				13182	
1 – 8				13235				13240		13245				13241	
1 –12				13264				13265						13270	
1 –14				13285		13283		13290						13291	
1⅛– 7				13334				13335						13340	
1⅛–12				13344				13345						13350	
1¼– 7				13384				13385						13390	
1¼–12				13401				13402						13403	
1⅜– 6				13434				13435						13440	
1⅜–12				13444				13445						13450	
1½– 6				13454				13455						13460	
1½–12				13471				13472						13473	

Standard Taps
Straight Flute

High Speed Steel
Ground Thread

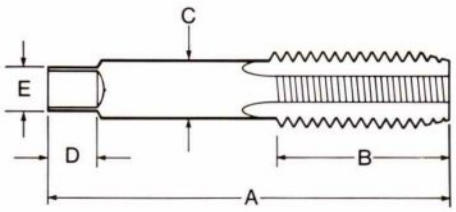
No. 4112 Two and Three Flute

Two Flute

Wider flutes make these taps ideal for horizontal tapping.

Three Flute

These taps are suggested for use in deep, or blind holes in soft, stringy materials. They provide more room in the flutes for chip removal than four flute taps.



Fractional Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
¼	20	28	.2175 .2268	2, 3	2 ½	1	.255	5/16	.191
5/16	18	24	.2764 .2854	2, 3 3	2 23/32	1 ⅛	.318	⅜	.238
⅜	16	24	.3344 .3479	3	2 15/16	1 ¼	.381	7/16	.286
7/16	14	20	.3911 .4050	3	3 5/32	1 7/16	.323	13/32	.242
½	13	20	.4500 .4675	3	3 ⅜	1 21/32	.367	7/16	.275

ORDERING NUMBER (EDP)

Tap Size	Std. Pkg. Quan.	No. 4112 TWO FLUTE		No. 4112 THREE FLUTE					
		PLUG	BOTTOMING	PLUG				BOTTOMING	
		GH3	GH3	GH1	GH2	GH3	GH5	GH3	GH5
¼ –20	12	11771	11772	11775	11781	11783	11785	11784	11790
¼ –28	12	11873	11874			11885		11890	
5/16–18	12	11970	11971	11974	11980	11982	11984	11983	11985
5/16–24	12					12084		12085	
⅜ –16	12			12175		12183	12185	12184	12190
⅜ –24	12					12282		12283	
7/16–14	12					12380		12381	
7/16–20	12					12455			
½ –13	12					12571		12572	
½ –20	12					12670		12671	

Standard Taps
Straight Flute

High Speed Steel
Ground Thread
No. 4124

Standard hand taps in metric sizes. Manufactured by Besly to meet the growing demand for metric sizes.

Plug Style

Generally used in thru holes or in blind holes with sufficient clearance.

Bottoming Style

For threading deep or blind holes to the bottom.

Metric Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Nominal Size and Pitch	Inch Equivalent	Tap Pitch Diam. Limits	No. Flutes	INCHES Overall Length A	Thread Length B	Diam. Shank C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER PLUG	EDP NUMBER BOTT.
M1.6 x 0.35	0.0630 x 72.57	D3	2	1.62	.31	.141	.19	.110	12	17995	17996
M1.8 x 0.35	0.0709 x 72.57	D3	2	1.69	.38	.141	.19	.110	12	17998	17999
M2 x 0.4	0.0788 x 63.50	D3	3	1.75	.44	.141	.19	.110	12	18001	18002
M2.2 x 0.45	0.0867 x 56.44	D3	3	1.75	.44	.141	.19	.110	12	18004	18005
M2.5 x 0.45	0.0985 x 56.44	D3	3	1.81	.50	.141	.19	.110	12	18007	18008
M3 x 0.5	0.1182 x 50.80	D3	3	1.94	.62	.141	.19	.110	12	18010	18011
M3.5 x 0.6	0.1378 x 42.33	D4	3	2.00	.69	.141	.19	.110	12	18013	18014
M4 x 0.7	0.1575 x 36.29	D4	4	2.12	.75	.168	.25	.131	12	18016	18017
M4.5 x 0.75	0.1772 x 33.87	D4	4	2.38	.88	.194	.25	.152	12	18019	18020
M5 x 0.8	0.1969 x 31.75	D4	4	2.38	.88	.194	.25	.152	12	18022	18023
M6 x 1	0.2363 x 25.40	D5	4	2.50	1.00	.255	.31	.191	12	18025	18026
M7 x 1	0.2756 x 25.40	D5	4	2.72	1.12	.318	.38	.238	12	18028	18029
M8 x 1.25	0.3150 x 20.32	D5	4	2.72	1.12	.318	.38	.238	12	18034	18035
M8 x 1	0.3150 x 25.40	D5	4	2.72	1.12	.318	.38	.238	12	18031	18032
M10 x 1.5	0.3937 x 16.93	D6	4	2.94	1.25	.381	.44	.286	12	18040	18041
M10 x 1.25	0.3937 x 20.32	D5	4	2.94	1.25	.381	.44	.286	12	18037	18038
M12 x 1.75	0.4725 x 14.51	D6	4	3.38	1.66	.367	.44	.275	12	18046	18047
M12 x 1.25	0.4725 x 20.32	D5	4	3.38	1.66	.367	.44	.275	12	18043	18044
M14 x 2	0.5512 x 12.70	D7	4	3.59	1.66	.429	.50	.322	3	18052	18053
M14 x 1.5	0.5512 x 16.93	D6	4	3.59	1.66	.429	.50	.322	3	18049	18050
M16 x 2	0.6300 x 12.70	D7	4	3.81	1.81	.480	.56	.360	3	18058	18059
M16 x 1.5	0.6300 x 16.93	D6	4	3.81	1.81	.480	.56	.360	3	18055	18056
M18 x 1.5	0.7087 x 16.93	D6	4	4.03	1.81	.542	.62	.406	3	18061	18062
M18 x 2.5	0.7087 x 10.16	D7	4	4.03	1.81	.542	.62	.406	3	18064	18065
M20 x 2.5	0.7875 x 10.16	D7	4	4.47	2.00	.652	.69	.489	3	18070	18071
M20 x 1.5	0.7875 x 16.93	D6	4	4.47	2.00	.652	.69	.489	3	18067	18068
M22 x 2.5	0.8662 x 10.16	D7	4	4.69	2.22	.697	.75	.523	3	18076	18077
M22 x 1.5	0.8662 x 16.93	D6	4	4.69	2.22	.697	.75	.523	3	18073	18074
M24 x 3	0.9449 x 8.47	D8	4	4.91	2.22	.760	.75	.570	3	18082	18083
M24 x 2	0.9449 x 12.70	D7	4	4.91	2.22	.760	.75	.570	3	18079	18080
M27 x 3	1.0630 x 8.47	D8	4	5.12	2.50	.896	.88	.672	3	18088	18089
M27 x 2	1.0630 x 12.70	D7	4	5.12	2.50	.896	.88	.672	3	18085	18086
M30 x 3.5	1.1812 x 7.26	D9	4	5.44	2.56	1.021	1.00	.766	1	18094	18095
M30 x 2	1.1812 x 12.70	D7	4	5.44	2.56	1.021	1.00	.766	1	18091	18092
M33 x 3.5	1.2993 x 7.26	D9	4	5.75	2.56	1.108	1.06	.831	1	18100	18101
M33 x 2	1.2993 x 12.70	D7	4	5.75	2.56	1.108	1.06	.831	1	18097	18098
M36 x 4	1.4174 x 6.35	D9	4	6.06	3.00	1.233	1.12	.925	1	18106	18107
M36 x 3	1.4174 x 8.47	D8	4	6.06	3.00	1.233	1.12	.925	1	18103	18104
M39 x 4	1.5355 x 6.35	D10	6	6.69	3.19	1.305	1.12	.979	1	18112	18113
M39 x 3	1.5355 x 8.47	D8	6	6.69	3.19	1.305	1.12	.979	1	18109	18110

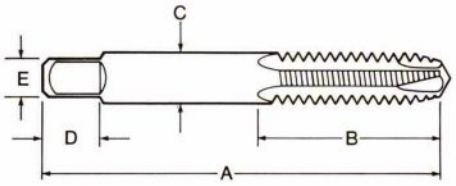
Standard Taps
Spiral Pointed

High Speed Steel
Ground Thread
No. 4125

The angular flutes at the front end of these taps propel the chips ahead of the tap. This feature plus the excellent shearing action of the flute make spiral pointed taps ideal for production tapping thru holes.

Plug Style

Bottoming Style



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Diam. Shank C	Square Length D	Square Size E	EDP NUMBER PLUG GH1	PLUG GH2	PLUG GH3	BOTTOMING GH1	BOTTOMING GH2	BOTTOMING GH3
0		80		.0519	2	1 5/8	5/16	.141	3/16	.110	10763	10765		10764	10770	
1	64	72		.0629 .0640	2 2	1 11/16	3/8	.141	3/16	.110	10783 10803	10785 10805				
2	56	64		.0744 .0759	2 2	1 3/4	7/16	.141	3/16	.110	10823 10854	10825 10860		10824	10830	
3	48	56		.0855 .0874	2 2	1 13/16	1/2	.141	3/16	.110	10891 10934	10893 10940			10894	
4	40	48	36	.0958 .0985 .0940	2 2 2	1 7/8	9/16	.141	3/16	.110	11002 11045	11004 11051 10983		11003	11005 11052	
5	40	44		.1088 .1102	2 2	1 15/16	5/8	.141	3/16	.110	11092	11094 11141		11093	11095	
6	32	40		.1177 .1218	2 2	2	11/16	.141	3/16	.110	11182 11255	11184 11261	11190	11183	11185 11262	11191
8	32	36		.1437 .1460	2 2	2 1/8	3/4	.168	1/4	.131	11305 11395	11311 11401	11313	11310	11312	11314
10	24	32		.1629 .1697	2 2	2 3/8	7/8	.194	1/4	.152	11452 11550	11454 11552	11460 11554	11551	11455 11553	11461 11555
12	24	28		.1889 .1928	2 2	2 3/8	15/16	.220	9/32	.165	11640		11642 11683			11643

Standard Package Quantity: 12

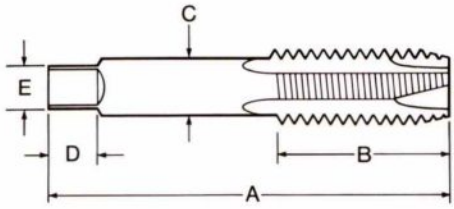
Standard Taps
Spiral Pointed

High Speed Steel
Ground Thread
No. 4120

Use plug chamfer in thru holes and bottoming chamfer for blind holes. The spiral point drives chips ahead of the tap, permitting higher speeds and less driving power than other types of taps.

Plug Style

Bottoming Style



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

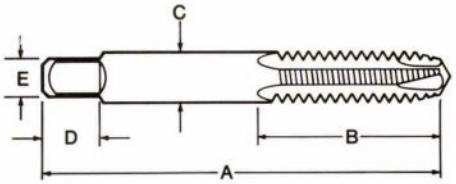
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	EDP NUMBER PLUG GH1	PLUG GH2	PLUG GH3	PLUG GH4	PLUG GH5	BOTT. GH3
¼	20		.2175	2	2 ½	1	.255	5/16	.191	11751	11753	11755		11761	11760
			.2175	3								15975		15985	
		28	.2268	2						11861	11863	11865	11871		11870
			.2268	3							15991		15984		
5/16	18		.2764	2	2 23/32	1 ⅛	.318	⅜	.238	11954	11960	11962		11964	11963
			.2764	3								11972		15983	
		24	.2854	2	2 23/32	1 ⅛	.318	⅜	.238	12060	12062	12064	12070		12065
			.2854	3							15990	12074	15982		
⅜	16		.3344	3	2 15/16	1 ¼	.381	7/16	.286	12163	12165	12171		12173	
		24	.3479	3						12262	12264	12270	12272		
7/16	14		.3911	3	3 5/32	1 7/16	.323	13/32	.242		12362	12364		12370	
		20	.4050	3							12441	12443		12445	
½	13		.4500	3	3 ⅜	1 21/32	.367	7/16	.275	12551	12553	12555		12561	
		20	.4675	3						12650	12652	12654		12660	
⅝	11		.5660	3	3 13/16	1 13/16	.480	9/16	.360			12862		15981	
		18	.5889	3								15641			
¾	10		.6850	3	4 ¼	2	.590	11/16	.442			13025		15980	
		16	.7094	3								15642			

Standard Package Quantity: ¼ thru ½: 12 ⅝ thru ¾: 3

Standard Taps
Spiral Pointed

High Speed Steel
Ground Thread
No. 4134

The angular flutes at the front end of these taps propel the chips ahead of the tap. This feature plus the excellent shearing action of the flute make spiral pointed taps ideal for production tapping thru holes.



Metric Sizes

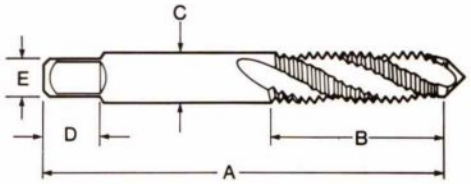
GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Nominal Size and Pitch	Inch Equiv.	Tap Pitch Diam. Limits	No. Flutes	INCHES Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG
M3 x 0.5	0.1182 x 50.80	D3	2	1.94	.62	.141	.19	.110	12	18115
M3.5 x 0.6	0.1378 x 42.33	D4	2	2.00	.69	.141	.19	.110	12	18116
M4 x 0.7	0.1575 x 36.29	D4	2	2.12	.75	.168	.25	.131	12	18117
M4.5 x 0.75	0.1772 x 33.87	D4	2	2.38	.88	.194	.25	.152	12	18118
M5 x 0.8	0.1969 x 31.75	D4	2	2.38	.88	.194	.25	.152	12	18119
M6 x 1	0.2363 x 25.40	D5	2	2.50	1.00	.255	.31	.191	12	18120
M7 x 1	0.2756 x 25.40	D5	2	2.72	1.12	.318	.38	.238	12	18121
M8 x 1.25	0.3150 x 20.32	D5	2	2.72	1.12	.318	.38	.238	12	18123
M8 x 1	0.3150 x 25.40	D5	2	2.72	1.12	.318	.38	.238	12	18122
M10 x 1.5	0.3937 x 16.93	D6	3	2.94	1.25	.381	.44	.286	12	18125
M10 x 1.25	0.3937 x 20.32	D5	3	2.94	1.25	.381	.44	.286	12	18124
M12 x 1.75	0.4725 x 14.51	D6	3	3.38	1.66	.367	.44	.275	12	18127
M12 x 1.25	0.4725 x 20.32	D5	3	3.38	1.66	.367	.44	.275	12	18126
M14 x 2	0.5512 x 12.70	D7	3	3.59	1.66	.429	.50	.322	3	18129
M14 x 1.5	0.5512 x 16.93	D6	3	3.59	1.66	.429	.50	.322	3	18128
M16 x 2	0.6300 x 12.70	D7	3	3.81	1.81	.480	.56	.360	3	18131
M16 x 1.5	0.6300 x 16.93	D6	3	3.81	1.81	.480	.56	.360	3	18130
M18 x 2.5	0.7087 x 10.16	D7	3	4.03	1.81	.542	.62	.406	3	18133
M18 x 1.5	0.7087 x 16.93	D6	3	4.03	1.81	.542	.62	.406	3	18132

Standard Taps
Spiral Flute

High Speed Steel
Ground Thread
No. 4113

For easy removal of chips from blind holes or for tapping holes in which a keyway or opening must be bridged by the tap lands. These taps have 30° spiral flutes.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER PLUG GH2	EDP NUMBER PLUG GH3	EDP NUMBER BOTTOMING GH2	EDP NUMBER BOTTOMING GH3
4	40		.0958	2	1 ⅞	9/16	.141	3/16	.110	12	11030		11031	
5	40		.1088	2	1 15/16	5/8	.141	3/16	.110	12	11120		11121	
6	32		.1177	2	2	11/16	.141	3/16	.110	12		11221		11222
8	32		.1437	2	2 ⅛	¾	.168	¼	.131	12		11334		11335
10	24		.1629	2	2 ⅜	⅞	.194	¼	.152	12		11481		11482
		32	.1697	2								11575		11580

Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

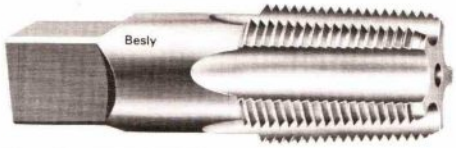
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER PLUG GH3	EDP NUMBER BOTT. GH3
	20		.2175	2							11773	11774
			.2175	3							16875	16880
¼		28	.2268	2	2 ½	1	.255	5/16	.191	12	11875	11880
			.2268	3							16881	16882
5/16	18		.2764	3							11994	11995
		24	.2854	3	2 23/32	1 ⅛	.318	⅜	.238	12	12094	12095
⅜	16		.3344	3							12195	12200
		24	.3479	3	2 15/16	1 ¼	.381	7/16	.286	12	12294	12295
7/16	14		.3911	3							12390	12391
		20	.4050	3	3 5/32	1 7/16	.323	13/32	.242	12	12465	12470
½	13		.4500	3							12583	12584
		20	.4675	3	3 ⅜	1 21/32	.367	7/16	.275	12	12680	12681

Standard Taper Pipe Taps Straight Flute

High Speed Steel Ground Thread

No. 3164 (ANPT)
No. 3165 (NPT)
No. 3165H (NPT-Hi Angle)
No. 3165L (NPT-Lo Angle)
No. 3166 (NPTF-Dryseal)
No. 3166H (NPTF-Dryseal Hi Angle)

See Page 74 for Drill Selection.



No. 3165H (NPT)
No. 3166H (NPTF)

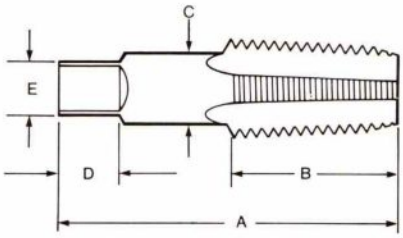
These are Hi Angle Pipe Taps designed with a high rake angle and deep flutes to handle the tough curly chips of low carbon and leaded steels, boiler plate aluminums and die castings. They are available with various surface treatments (see page 85).

No. 3165L (NPT)

These surface treated Lo Angle Pipe Taps have radial cutting faces and heavy lands for excellent tapping in regular cast iron and meehanite.

No. 3164 (ANPT)
No. 3165 (NPT)
No. 3166 (NPTF)

These Medium Angle Taper Pipe Taps may be used in most materials under average conditions.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	Gage Projection Min.	Gage Projection Max.	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	No. Flutes	EDP NUMBER No. 3164	No. 3165	No. 3165H	No. 3165L	No. 3166	No. 3166H
1/16	27	.250	.374	2 1/8	11/16	.3125	3/8	.234	4		13982			13983	
1/8	27	.250	.374	2 1/8	3/4	.3125	3/8	.234	4	16851	14011	14013	14015	14012	14014
1/8*	27	.250	.374	2 1/8	3/4	.4375*	3/8	.328	4	13994	13992	13995	14001	13993	14000
1/4	18	.398	.522	2 7/16	1 1/16	.5625	7/16	.421	4	14031	14025	14032	14034	14030	14033
3/8	18	.392	.516	2 9/16	1 1/16	.7000	1/2	.531	4	14050	14044	14051	14053	14045	14052
1/2	14	.518	.642	3 1/8	1 3/8	.6875	5/8	.515	4	14065	14063	14070	14072	14064	14071
3/4	14	.504	.628	3 1/4	1 3/8	.9063	11/16	.679	5	14084	14082	14085	14091	14083	14090
1	11 1/2	.584	.772	3 3/4	1 3/4	1.1250	13/16	.843	5	16852	14101	14103	14105	14102	14104
1 1/4	11 1/2	.592	.780	4	1 3/4	1.3125	15/16	.984	5	16853	14115	14121	14123	14120	14122
1 1/2	11 1/2	.605	.793	4 1/4	1 3/4	1.5000	1	1.125	7	16854	14131	14133	14135	14132	14134
2	11 1/2	.573	.761	4 1/2	1 3/4	1.8750	1 1/8	1.406	7	16855	14143	14151	14145	14144	14152

* Larger shank furnished unless smaller shank is specified.

Standard Package Quantity: 1/16 thru 1/4: 12; 3/8 thru 3/4: 3; 1" and over: 1.

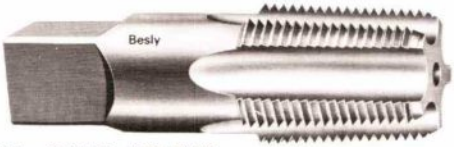
Standard Taper Pipe Taps Straight Flute

High Speed Steel Ground Thread

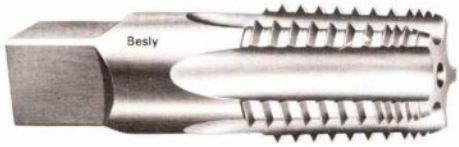
No. 3166L (NPTF-Dryseal Lo Angle)
No. 3167 (NPTF-Dryseal) Interrupted Thread
No. 3168 (NPT) Interrupted Thread
No. 3169 (ANPT) Interrupted Thread
No. 3175 (PTF-Dryseal)**

See Page 74 for Drill Selection.

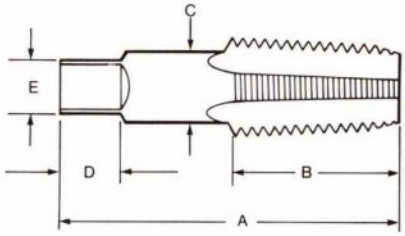
No. 3166L (NPTF)
These surface treated Lo Angle Pipe Taps have radial cutting faces and heavy lands for excellent tapping in regular cast iron and meehanite.



No. 3175 (PTF)**
These Short Dryseal Taper Pipe Taps are manufactured to Automotive standards for taps used to thread shallow holes.



No. 3167 (NPTF)
No. 3168 (NPT)
No. 3169 (ANPT)
These Taper Pipe Taps are made with interrupted threads for use in soft or stringy metals. The removal of every other tooth helps to break the chip and permits a larger supply of lubrication to reach the cutting teeth, thus helping to eliminate torn threads.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	Gage Projection** Min.	Gage Projection** Max.	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	EDP NUMBER No. Flutes	EDP NUMBER No. 3166L	EDP NUMBER No. 3175	EDP NUMBER No. Flutes	EDP NUMBER No. 3167	EDP NUMBER No. 3168	EDP NUMBER No. 3169
1/16	27	.250	.374	2 1/8	11/16	.3125	3/8	.234	4		16902				
1/8	27	.250	.374	2 1/8	3/4	.3125	3/8	.234	4	14020	16903	5	14022	14021	16863
1/8*	27	.250	.374	2 1/8	3/4	.4375*	3/8	.328	4	14002	16904	5	14004	14003	16860
1/4	18	.398	.522	2 7/16	1 1/16	.5625	7/16	.421	4	14035	16905	5	14041	14040	16861
3/8	18	.392	.516	2 9/16	1 1/16	.7000	1/2	.531	4	14054	16910	5	14060	14055	16862
1/2	14	.518	.642	3 1/8	1 3/8	.6875	5/8	.515	4	14073	16911	5	14075	14074	16864
3/4	14	.504	.628	3 1/4	1 3/8	.9063	11/16	.679	5	14092	16912	5	14094	14093	16865
1	11 1/2	.584	.772	3 3/4	1 3/4	1.1250	13/16	.843	5	14110		5	14112	14111	16870
1 1/4	11 1/2	.592	.780	4	1 3/4	1.3125	15/16	.984	5	14124		5	14130	14125	16871
1 1/2	11 1/2	.605	.793	4 1/4	1 3/4	1.5000	1	1.125	7	14140		7	14142	14141	16872
2	11 1/2	.573	.761	4 1/2	1 3/4	1.8750	1 1/8	1.406	7	14150		7	14154	14153	16873

*Larger shank furnished unless smaller shank is specified. Standard Package Quantity: 1/16 thru 1/4: 12; 3/8 thru 3/4: 3; 1" & over: 1.

**Gage Projection — No. 3175 only: 27TPI, Min.-.222, Max.-.259; 18TPI, Min.-.333, Max.-.389; 14TPI, Min.-.429, Max.-.500.

Turbo Cut® Taper Pipe Taps Spiral Flute

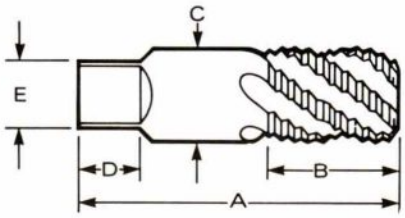
High Speed Steel Ground Thread

No. 3161 (NPT)

No. 3162 (NPTF)

These Turbo Cut® Taper Pipe Taps generate round and smooth threads in pipe connections to prevent leaks. Secondary chip cleaning operations are not needed. For use in most metals, including nonsulfurized steels, stainless steels and diecast metals. These taps have 30° spiral flutes.

See Page 74 for Drill Selection.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	Gage Projection Min.	Gage Projection Max.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	3161 EDP NUMBER	3162 EDP NUMBER
⅛	27	.250	.374	4	2⅛	¾	.3125	⅜	.234	12	10569	10577
⅛*	27	.250	.374	4	2⅛	¾	.4375*	⅜	.328	12	10568	10576
¼	18	.398	.522	4	2 7/16	1 1/16	.5625	7/16	.421	12	10578	10579
⅜	18	.392	.516	4	2 7/16	1 1/16	.7000	½	.531	3	10586	10587

* Larger shank furnished unless smaller shank is specified.

Turbo Cut® Straight Pipe Taps Spiral Flute

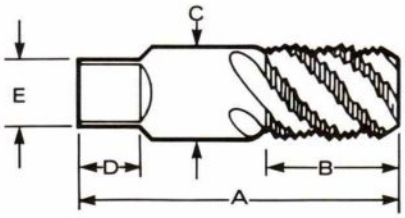
High Speed Steel Ground Thread

No. 3172 (NPS)

No. 3173 (NPSF)

Turbo Cut® Straight Pipe Taps for high production tapping of round smooth threads in diecast metals, nonsulfurized steels and stainless steels. Secondary chip cleaning operations are normally not necessary. These taps have 50° spiral flutes.

See Page 74 for Drill Selection.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	3172 EDP NUMBER	3173 EDP NUMBER
⅛	27	3	2⅛	¾	.3125	⅜	.234	12	10589	10597
⅛*	27	3	2⅛	¾	.4375*	⅜	.328	12	10588	10596
¼	18	4	2 7/16	1 1/16	.5625	7/16	.421	12	10598	10599
⅜	18	4	2 7/16	1 1/16	.7000	½	.531	3	10606	10607

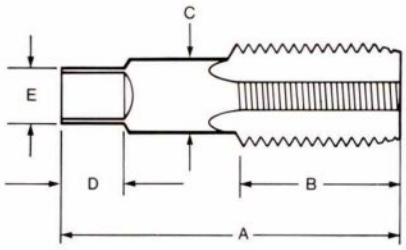
* Larger shank furnished unless smaller shank is specified.

Standard Straight Pipe Taps Straight Flute

High Speed Steel Ground Thread

No. 3170 (NPS, NPSC, NPSM)
No. 3171 (NPSF-Dryseal)

These Straight Pipe Taps are used primarily for tapping internal straight threads in pipe couplings and free-fitting mechanical joints for fixtures.
See Page 74 for Drill Selection.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER	
									No. 3170	No. 3171
1/8	27	4	2 1/8	3/4	.3125	3/8	.234	12	14005	14010
1/8*	27	4	2 1/8	3/4	.4375*	3/8	.328	12	13990	13991
1/4	18	4	2 7/16	1 1/16	.5625	7/16	.421	12	14023	14024
3/8	18	4	2 7/16	1 1/16	.7000	1/2	.531	3	14042	14043
1/2	14	4	3 1/8	1 3/8	.6875	5/8	.515	3	14061	14062
3/4	14	5	3 1/4	1 3/8	.9063	11/16	.679	3	14080	14081
1	11 1/2	5	3 3/4	1 3/4	1.1250	13/16	.843	1	14095	14100

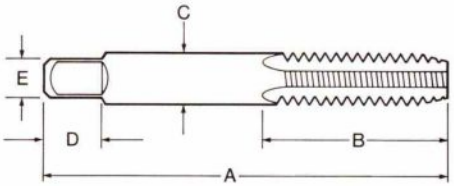
* Larger shank furnished unless smaller shank is specified.

Special Purpose Oversize Taps Straight Flute

High Speed Steel Ground Thread GH7

No. 4117

These taps cut slightly oversize to accommodate platings or to provide greater wear life in abrasive materials.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

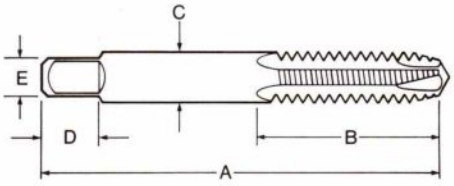
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	Std. No. Flutes	Optional No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG GH7	EDP NUMBER BOTTOMING GH7
6	32		.1177	3		2	11/16	.141	3/16	.110	12	11242	11243
8	32		.1437	4	3	2 1/8	3/4	.168	1/4	.131	12	11354 11385	11355 11390
10	24	32	.1629	4	3	2 3/8	7/8	.194	1/4	.152	12	11501 11533	11502 11534
			.1697	4	3							11595 11623	11600 11624

Special Purpose Oversize Taps Spiral Pointed

High Speed Steel Ground Thread GH7

No. 4127

These taps are slightly oversize for production tapping of through holes which are to be plated.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

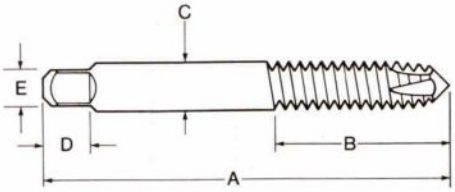
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG GH7	EDP NUMBER BOTTOMING GH7
6	32		.1177	2	2	11/16	.141	3/16	.110	12	11192	11193
8	32		.1437	2	2 1/8	3/4	.168	1/4	.131	12	11315	11320
10	24	32	.1629 .1697	2	2 3/8	7/8	.194	1/4	.152	12	11462 11560	

Special Purpose Fluteless Taps Spiral Pointed

High Speed Steel Ground Thread

No. 4131 Short Flute

For the production tapping of thin sections of steel, brass, copper and aluminum. Spiral points and heavy cross sections provide shearing action and increased rigidity to reduce breakage caused by misalignment.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Size Square **E**	Std. Pkg. Quan.	EDP NUMBER PLUG GH2	EDP NUMBER PLUG GH3
4	40		.0958	2	1 ⅞	9/16	.141	3/16	.110	12	11000	
5	40		.1088	2	1 15/16	⅝	.141	3/16	.110	12	11090	
6	32		.1177	2	2	11/16	.141	3/16	.110	12		11181
8	32		.1437	2	2 ⅛	¾	.168	¼	.131	12		11304
10	24	32	.1629 .1697	2	2 ⅜	⅞	.194	¼	.152	12		11451 11545
12	24		.1889	2	2 ⅜	15/16	.220	9/32	.165	12		11635

Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Size Square **E**	Std. Pkg. Quan.	EDP NO. PLUG GH3
¼	20	.2175	2	2 ½	1	.255	5/16	.191	12	11750
5/16	18	.2764	2	2 23/32	1 ⅛	.318	⅜	.238	12	11953
⅜	16	.3344	3	2 15/16	1 ¼	.381	7/16	.286	12	12162
½	13	.4500	3	3 ⅜	1 21/32	.367	7/16	.275	12	12550

Special Purpose Turbo Cut® STI Taps Spiral Flute

High Speed Steel Ground Thread

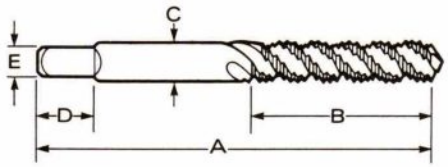
No. 4118 Screw Thread Insert

Ideal for all threading involving helical coil inserts. They should be used in soft, ductile materials. Especially good for deep, blind or long through holes. For high production tapping.

See Page 75 for Drill Selection.

Plug Style

Bottoming Style



Machine Screw Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
4	40		.1283	2	2	11/16	.141	3/16	.110
5	40		.1413	3	2 1/8	3/4	.168	1/4	.131
6	32		.1583	3	2 3/8	7/8	.194	1/4	.152
		40	.1543	3	2 1/8	3/4	.168		.131
8	32		.1843	3	2 3/8	15/16	.220	5/32	.165
10	24		.2170	3	2 1/2	1	.255	5/16	.191
		32	.2103	3					
12	24		.2430	3	2 1/2	1	.286	5/16	.214

ORDERING NUMBER (EDP)

Tap Size	Std. Pkg. Quan.	PLUG			BOTTOMING		
		GH1	GH2	GH3	GH1	GH2	GH3
4–40	12	10668	10676			10677	
5–40	12		10686			10687	
6–32	12		10688	10696		10689	10697
6–40	12	10698	10706		10699	10707	
8–32	12		10708	10716		10709	10717
10–24	12		10718	10726		10719	10727
10–32	12		10728	10736		10729	10737
12–24	12			10746			10747

Special Purpose Turbo Cut® STI Taps Spiral Flute

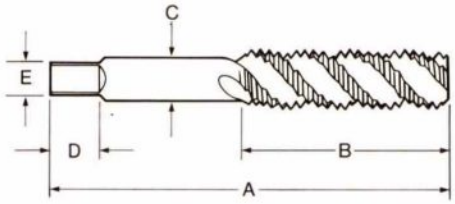
High Speed Steel Ground Thread

No. 4118 Screw Thread Insert

Ideal for all threading involving helical coil inserts. They are ideal for soft, ductile materials. Especially good for deep, blind or long through holes. For high production tapping.
See Page 75 for Drill Selection.

Plug Style

Bottoming Style



Fractional Sizes

GENERAL DIMENSIONS

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**
¼	20		.2825	3	2 23/32	1 ⅛	.318	⅜	.238
		28	.2732	3					
5/16	18		.3486	3	2 15/16	1 ¼	.381	7/16	.286
		24	.3395	3					
⅜	16		.4156	3	3 ⅜	1 21/32	.367	7/16	.275
		24	.4020	3	3 5/32	1 7/16	.323	13/32	.242
7/16	14		.4839	4	3 19/32	1 21/32	.429	½	.322
		20	.4700	3	3 ⅜	1 21/32	.367	7/16	.275
½	13		.5499	4	3 13/16	1 13/16	.480	9/16	.360
		20	.5325	4	3 19/32	1 21/32	.429	½	.322

ORDERING NUMBER (EDP)

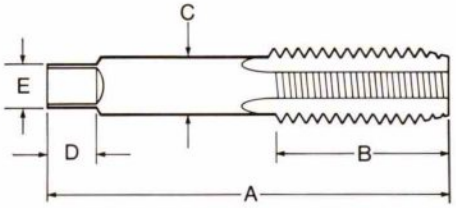
Tap Size	NC UNC	NF UNF	Std. Pkg. Quan.	PLUG			BOTTOMING		
				GH2	GH3	GH4	GH2	GH3	GH4
¼	20		12	10748	10061		10749	10757	
		28	12	10758	10766		10759	10767	
5/16	18		12		10768			10769	
		24	12		10786			10787	
⅜	16		12		10788	10796		10789	10797
		24	12	10798	10806		10799	10807	
7/16	14		12		10808			10809	
		20	12		10818			10819	
½	13		12		10828			10829	
		20	12		10838			10839	

Special Purpose STI Taps Straight Flute

High Speed Steel Ground Thread

No. 4116 Screw Thread Insert

For production tapping of holes which are to accept screw thread inserts.
See Page 75 for Drill Selection.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	EDP NUMBER PLUG GH1	PLUG GH2	PLUG GH3	BOTTOMING GH1	BOTTOMING GH2	BOTTOMING GH3
4	40		.1283	3	2	1 1/16	.141	3/16	.110	15732	15734		15733	15735	
6	32		.1583	3	2 3/8	7/8	.194	1/4	.152		15744	15750		15745	15751
8	32		.1843	3	2 3/8	15/16	.220	9/32	.165		15760	15762		15761	15763
10	24	32	.2170 .2103	3	2 1/2	1	.255	5/16	.191		15764 15772	15770 15774		15765 15773	15771 15775

Standard Package Quantity: 12

Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	EDP NUMBER PLUG GH2	PLUG GH3	BOTTOMING GH2	BOTTOMING GH3
1/4	20	28	.2825 .2732	3 3	2 23/32	1 1/8	.318	3/8	.238	15784 15792	15790 15794	15785 15793	15791 15795
5/16	18	24	.3486 .3395	3 3	2 15/16	1 1/4	.381	7/16	.286	15804	15800 15810	15805	15801 15811
3/8	16	24	.4156 .4020	3 3	3 3/8 3 9/32	1 21/32 1 7/16	.367 .323	7/16 13/32	.275 .242	15820	15812 15822	15821	15813 15823
7/16	14	20	.4839 .4700	4 3	3 19/32 3 3/8	1 21/32	.429 .367	1/2 7/16	.322 .275		15824 15832		15825 15833
1/2	13	20	.5499 .5325	4 4	3 13/16 3 19/32	1 13/16 1 21/32	.480 .429	9/16 1/2	.360 .322		15840 15844		15841 15845

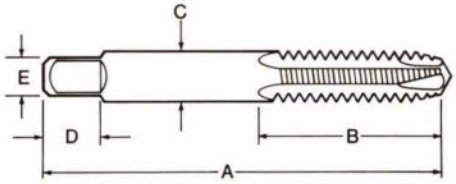
Standard Package Quantity: 12

Special Purpose STI Taps Spiral Pointed

High Speed Steel
Ground Thread

No. 4126 Screw Thread Insert

For high production tapping of through holes to accept screw thread inserts.
See page 75 for Drill Selection.



Machine Screw and Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER PLUG GH2	EDP NUMBER PLUG GH3
4	40		.1283	2	2	1 1/16	.141	3/16	.110	12	15853	
6	32		.1583	2	2 3/8	7/8	.194	1/4	.152	12	15860	15861
8	32		.1843	2	2 3/8	1 5/16	.220	9/32	.165	12	15864	15865
10	24	32	.2170 .2103	2	2 1/2	1	.255	5/16	.191	12	15870 15872	15873
1/4	20	28	.2825 .2732	2	2 23/32	1 1/8	.318	3/8	.238	12	15880 15882	15881 15883

Special Purpose Interrupted Thread Taps

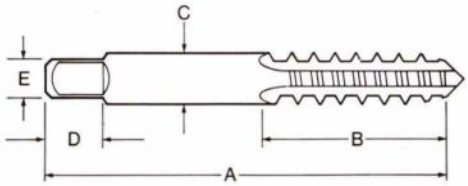
High Speed Steel
Ground Thread

No. 4119 Straight Flute
No. 4129 Spiral Point

For high production tapping of through holes in non ferrous metals and low carbon steel. The interrupted thread design reduces the incidence of torn threads. Can be used in titanium and high hardness alloy steels.

No. 4119

No. 4129



Fractional Sizes

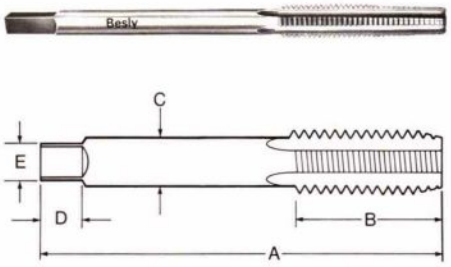
GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	No. 4119 PLUG GH3	No. 4119 BOTT. GH3	No. 4129 PLUG GH3
1/4	20	28	.2175 .2268	3	2 1/2	1	.255	5/16	.191	12	10608 10616	10609 10617	17298 17299
5/16	18	24	.2764 .2854	3	2 23/32	1 1/8	.318	3/8	.238	12	10618 10626	10619 10627	17300 17301
3/8	16	24	.3344 .3479	3	2 15/16	1 1/4	.381	7/16	.286	12	10628 10636	10629 10637	17326 17328

Special Purpose Nut Taps Straight Flute

High Speed Steel
Ground Thread
No. 4130

For small production runs in conventional tapping machines. They have a relatively long shank smaller than the minor diameter to permit the accumulation of several nuts after tapping.



Fractional Sizes

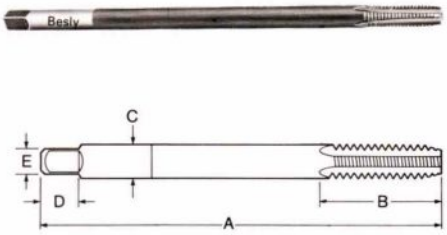
GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NO. TAPER GH3
¼	20	.2175	4	5	1 ⅝	.185	9/16	.139	1	13773
5/16	18	.2764	4	5½	1 13/16	.240	⅝	.180	1	13775
⅜	16	.3344	4	6	2	.294	11/16	.220	1	13781
½	13	.4500	4	7	2 ½	.400	⅞	.300	1	13785

Special Purpose Pulley Taps Straight Flute

High Speed Steel
Ground Thread
No. 4160

These taps have the same major and pitch diameters as standard fractional size taps, but with extended shanks for reaching locations inaccessible to regular hand taps. T310



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	Basic Pitch Diam.	No. Flutes	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	EDP NUMBER GH3 Overall Lengths **A** 6″	8″	10″	12″
¼	20	.2175	4	1	.255	5/16	.191	13864	13865		
5/16	18	.2764	4	1 ⅛	.318	⅜	.238	13872	13873		
⅜	16	.3344	4	1 ¼	.381	7/16	.286	13880	13881	13882	
7/16	14	.3911	4	1 7/16	.444	½	.333	13884	13885		
½	13	.4500	4	1 21/32	.507	9/16	.380	13892	13893	13894	13895
⅝	11	.5660	4	1 13/16	.633	11/16	.475	13900	13901	13902	13903
¾	10	.6850	4	2	.759	¾	.569			13910	13911

Standard Package Quantity: 1

Special Purpose Taps for Cast Iron Straight Flute

EXPANDED OFFERING

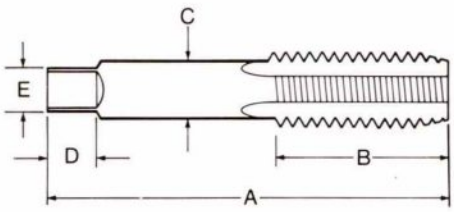
High Speed Steel
Ground Thread

No. 4115C Machine Screw Sizes
No. 4111C Fractional Sizes
No. 4124C Metric Sizes (Bright)

These taps are surface treated to resist the abrasiveness of cast iron, and have controlled straight cutting faces for efficient tapping of true cast iron and other brittle metals.

No. 4115 C

No. 4111 C



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER PLUG GH3	EDP NUMBER BOTT. GH3
6	32		.1177	3	2	11/16	.141	3/16	.110	12	11244	11245
8	32		.1437	4	2 1/8	3/4	.168	1/4	.131	12	11391	11392
10	24	32	.1629 .1697	4	2 3/8	7/8	.194	1/4	.152	12	11535 11632	11540 11633

Fractional Sizes

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	EDP NUMBER PLUG GH3	PLUG GH4	PLUG GH5	BOTTOMING GH3	BOTTOMING GH4	BOTTOMING GH5
1/4	20	28	.2175 .2268	4	2 1/2	1	.255	5/16	.191	11834 11934	11940	11840	11835 11935	11941	11841
5/16	18	24	.2764 .2854	4	2 23/32	1 1/8	.318	3/8	.238	12043 12140	12142	12045	12044 12141	12143	12050
3/8	16	24	.3344 .3479	4	2 15/16	1 1/4	.381	7/16	.286	12245 12333	12335	12251	12250 12334	12340	12252
7/16	14	20	.3911 .4050	4	3 5/32	1 7/16	.323	13/32	.242	12425 12504		12431 12510	12430 12505		12432 12511
1/2	13	20	.4500 .4675	4	3 3/8	1 21/32	.367	7/16	.275	12633 12712		12635 12714	12634 12713		12640 12715
5/8	11	18	.5660 .5889	4	3 13/16	1 13/16	.480	9/16	.360	12895 12945			12900 12950		
3/4	10	16	.6850 .7094	4	4 1/4	2	.590	11/16	.442	13060 13091			13061 13092		

Metric Sizes (Stocked Untreated)

M6 x 1	0.2363 x 25.40	D5	4	2.50	1.00	.255	.31	.191	12	17851	17852
M8 x 1.25	0.3150 x 20.32	D5	4	2.72	1.12	.318	.38	.238	12	17853	17854
M10 x 1.5	0.3937 x 16.93	D6	4	2.94	1.25	.381	.44	.286	12	17855	17856
M12 x 1.75	0.4725 x 14.51	D6	4	3.38	1.66	.367	.44	.275	12	17857	17858

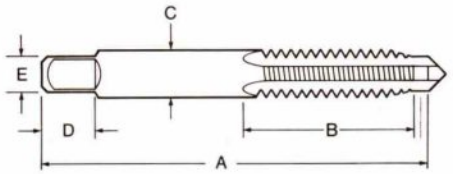
Standard Package Quantity: 1/4 thru 1/2: 12; 5/8 thru 3/4: 3; M6 thru M12: 12

Special Purpose Piloted Taps Straight Flute

High Speed Steel Ground Thread

No. 4115P Machine Screw Sizes
No. 4111P Fractional Sizes

Piloted taps help locate the workpiece for tapping especially when holes enter at an angle. Pilot acts as a locator and guide, eliminates special fixtures, reduces tap breakage. Pilot diameters will fit holes drilled for 75% thread height.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Tap Drill 75% Thread	Std. Pkg. Quan.	EDP No. PLUG GH2
8	32		.1437	4	2 1/8	3/4	.168	1/4	.131	29	12	10558
10	24	32	.1629 .1697	4	2 3/8	7/8	.194	1/4	.152	25 21	12	10559 10566

Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Tap Drill 75% Thread	Std. Pkg. Quan.	EDP No. PLUG GH2
1/4	20		.2175	4	2 1/2	1	.255	5/16	.191	7	12	10436
5/16	18		.2764	4	2 23/32	1 1/8	.318	3/8	.238	F	12	10437
3/8	16		.3344	4	2 15/16	1 1/4	.381	7/16	.286	5/16	12	10438
7/16	14		.3911	4	3 5/32	1 7/16	.323	13/32	.242	U	12	10439
1/2	13	20	.4500 .4675	4	3 3/8	1 21/32	.367	7/16	.275	27/64 29/64	12	10446 10447

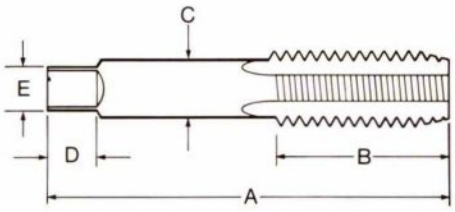
Special Purpose Spark Plug Taps Straight Flute

High Speed Steel Ground Thread No. 4114

As the name indicates, these taps are available for tapping metric size holes for spark plugs in accordance with S.A.E. specifications.

Plug Style

Bottoming Style



Metric Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Size and Pitch	No. Flutes	INCHES					Std. Pkg. Quan.	EDP NUMBER			
		Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**		PLUG		BOTTOMING	
								GH3	GH4	GH3	GH4
10mm x 1.0	4	3.16	1.44	.323	.41	.242	12	18374		18375	
12mm x 1.25	4	3.38	1.66	.367	.44	.275	12	18377		18378	
14mm x 1.25	4	3.59	1.66	.429	.50	.322	3		12855		15570
18mm x 1.5	4	4.03	1.81	.542	.62	.406	3		12860		15571

Size and Pitch	INTERNAL THREAD — INCHES				
	Minor Diameter		Pitch Diameter		Major Diameter
	Min.	Max.	Min.	Max.	
10mm x 1.0	.3482	.3525	.3681	.3719	.3948
12mm x 1.25	.4081	.4157	.4405	.4426	.4699
14mm x 1.25	.4921	.4997	.5192	.5235	.5525
18mm x 1.5	.6404	.6467	.6703	.6753	.7102

General Purpose Taps
Straight Flute

High Speed Steel

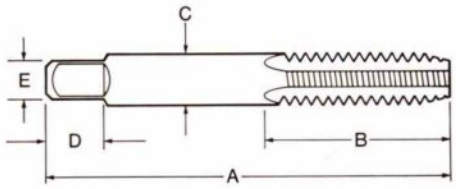
No. 2115
No. 2115 Sets

These general purpose taps in taper, plug and bottoming styles provide the versatility needed by many machine shops for routine tapping jobs. Also available in complete sets of one taper, plug and bottoming tap of the same size.

Taper Style

Plug Style

Bottoming Style



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER TAPER	EDP NUMBER PLUG	EDP NUMBER BOTT.	EDP NUMBER SETS
3	48			.0856	3	1 13/16	1/2	.141	3/16	.110	12		10414		
4	40	48	36	.0958 .0985 .0940	3	1 7/8	9/16	.141	3/16	.110	12	10451	10452 10464 10441	10453	10454
5	40	44		.1088 .1102	3	1 15/16	5/8	.141	3/16	.110	12	10474	10475	10480	10481
6	32	40		.1177 .1218	3	2	11/16	.141	3/16	.110	12	10501	10502 10514	10503	10504
8	32	36		.1437 .1460	4	2 1/8	3/4	.168	1/4	.131	12	10531	10532 10551	10533	10534
10	24	32		.1629 .1697	4	2 3/8	7/8	.194	1/4	.152	12	10564 10583	10565 10584	10570 10585	10571 10590
12	24	28		.1889 .1928	4	2 3/8	15/16	.220	9/32	.165	12	10592	10593 10602	10594	10595

General Purpose Taps
Straight Flute

High Speed Steel

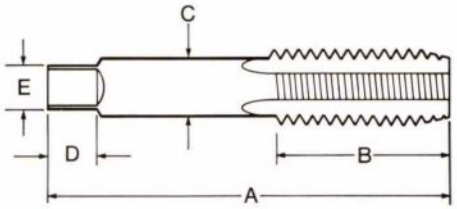
No. 2111
No. 2111 Sets

These general purpose taps in taper, plug and bottoming styles meet the requirements of small machine shops and tool rooms on routine tapping jobs. They are also available in complete sets of one taper, plug and bottoming style tap of the same size.

Taper Style

Plug Style

Bottoming Style



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

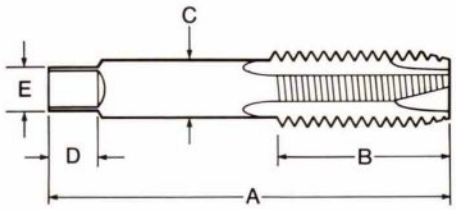
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER TAPER	EDP NUMBER PLUG	EDP NUMBER BOTT.	EDP NUMBER SETS
¼	20		.2175	4	2 ½	1	.255	5/16	.191	12	10612	10613	10614	10615
		28	.2268	4							10621	10622	10623	10624
5/16	18		.2764	4	2 23/32	1 ⅛	.318	⅜	.238	12	10630	10631	10632	10633
		24	.2854	4							10635	10640	10641	10642
⅜	16		.3344	4	2 15/16	1 ¼	.381	7/16	.286	12	10644	10645	10650	10651
		24	.3479	4							10653	10654	10655	10660
7/16	14		.3911	4	3 5/32	1 7/16	.323	13/32	.242	12	10662	10663	10664	10665
		20	.4050	4							10671	10672	10673	10674
½	13		.4500	4	3 ⅜	1 21/32	.367	7/16	.275	12	10680	10681	10682	10683
		20	.4675	4							10685	10690	10691	10692
9/16	12		.5084	4	3 19/32	1 21/32	.429	½	.322	3	10693	10694	10695	10700
		18	.5264	4							10701	10702	10703	10704
⅝	11		.5660	4	3 13/16	1 13/16	.480	9/16	.360	3	10705	10710	10711	10712
		18	.5889	4							10713	10714	10715	10720
¾	10		.6850	4	4 ¼	2	.590	11/16	.442	3	10721	10722	10723	10724
		16	.7094	4							10725	10730	10731	10732
⅞	9		.8028	4	4 11/16	2 7/32	.697	¾	.523	3	10733	10734	10735	10740
		14	.8286	4							10741	10742	10743	10744
1	8		.9188	4	5 ⅛	2 ½	.800	13/16	.600	3	10745	10750	10751	10752

General Purpose Taps
Spiral Pointed

High Speed Steel

No. 2125 Machine Screw
No. 2120 Fractional

These general purpose spiral pointed taps provide excellent service to small shops and tool rooms on routine tapping jobs.



Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG
3	48		.0855	2	1 3/16	1/2	.141	3/16	.110	12	10405
4	40		.0958	2	1 7/8	9/16	.141	3/16	.110	12	10443
5	40		.1088	2	1 15/16	5/8	.141	3/16	.110	12	10470
6	32		.1177	2	2	11/16	.141	3/16	.110	12	10493
8	32		.1437	2	2 1/8	3/4	.168	1/4	.131	12	10520
10	24	32	.1629 .1697	2	2 3/8	7/8	.194	1/4	.152	12	10553 10572
12	24		.1889	2	2 3/8	15/16	.220	9/32	.165	12	10591

Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

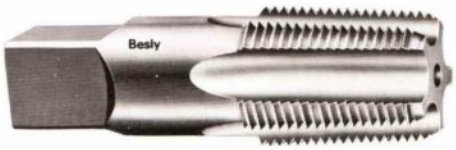
Tap Size	NC UNC	NF UNF	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG
1/4	20	28	.2175 .2268	2	2 1/2	1	.255	5/16	.191	12	10611 10620
5/16	18	24	.2764 .2854	2	2 23/32	1 1/8	.318	3/8	.238	12	10625 10634
3/8	16	24	.3344 .3479	3	2 15/16	1 1/4	.381	7/16	.286	12	10643 10652
7/16	14	20	.3911 .4050	3	3 5/32	1 7/16	.323	13/32	.242	12	10661 10670
1/2	13	20	.4500 .4675	3	3 3/8	1 21/32	.367	7/16	.275	12	10675 10684

General Purpose Taper Pipe Taps Straight Flute

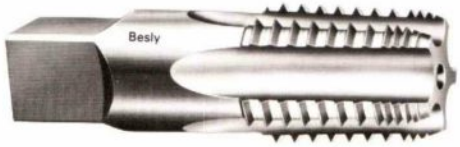
High Speed Steel

No. 2165 (NPT)
No. 2168 (NPT) Interrupted Thread

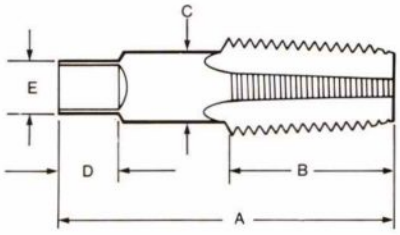
See Page 74 for Drill Selection.



No. 2165 (NPT)
General Purpose Taper Pipe Taps which give a satisfactory performance in routine pipe tapping jobs.



No. 2168 (NPT)
These general purpose Interrupted Thread Taper Pipe Taps are designed for the small shops where a less precise tap is required for routine jobs.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	Gage Measurement —Projection Min.	Gage Measurement —Projection Max.	Overall Length A	Thread Length B	Shank Diam. C	Square Length D	Square Size E	Std. Pkg. Quan.	EDP NUMBER No. Flutes	EDP NUMBER No. 2165	EDP NUMBER No. Flutes	EDP NUMBER No. 2168
1/8	27	.250	.374	2 1/8	3/4	.3125	3/8	.234	12	4	13942	5	13943
1/8*	27	.250	.374	2 1/8	3/4	.4375*	3/8	.328	12	4	13935	5	13940
1/4	18	.398	.522	2 7/16	1 1/16	.5625	7/16	.421	12	4	13945	5	13950
3/8	18	.392	.516	2 7/16	1 1/16	.7000	1/2	.531	3	4	13952	5	13953
1/2	14	.518	.642	3 1/8	1 3/8	.6875	5/8	.515	3	4	13955	5	13960
3/4	14	.504	.628	3 1/4	1 3/8	.9063	11/16	.679	3	5	13962	5	13963
1	11 1/2	.584	.772	3 3/4	1 3/4	1.1250	13/16	.843	1	5	13965	5	13970
1 1/4	11 1/2	.572	.780	4	1 3/4	1.3125	15/16	.984	1	5	13972	5	13973
1 1/2	11 1/2	.605	.793	4 1/4	1 3/4	1.5000	1	1.125	1	7	13974	7	13975
2	11 1/2	.573	.761	4 1/2	1 3/4	1.8750	1 1/8	1.406	1	7	13980	7	13981

* Larger shank furnished unless smaller shank is specified .

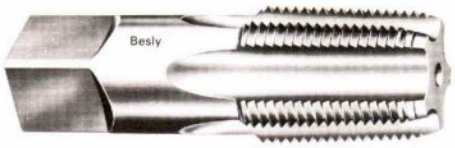
NEW ITEM

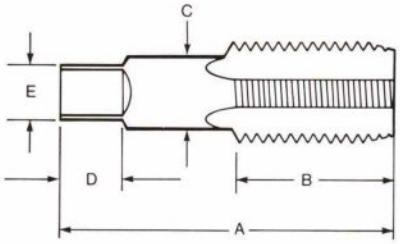
General Purpose Straight Pipe Taps Straight Flute

High Speed Steel

No. 2170 (NPS, NPSC, NPSM)

General purpose Straight Pipe Taps for routine or maintenance jobs.
See Page 74 for Drill Selection.





Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER
⅛	27	4	2⅛	¾	.3125	⅜	.234	12	13941
⅛	27	4	2⅛	¾	.4375*	⅜	.328	12	13934
¼	18	4	2 7/16	1 1/16	.5625	7/16	.421	12	13944
⅜	18	4	2 9/16	1 1/16	.7000	½	.531	3	13951
½	14	4	3⅛	1⅜	.6875	⅝	.515	3	13954
¾	14	5	3¼	1⅜	.9063	11/16	.679	3	13961
1	11½	5	3¾	1¾	1.1250	13/16	.843	1	16874

* Larger shank furnished unless smaller shank is specified.

Tap & Drill Sets

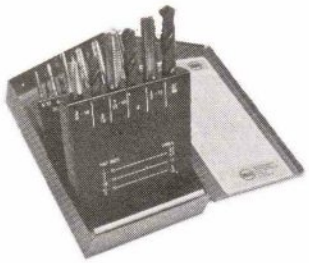
Set #1 NC & Set #2 NF Includes:

HSS Taps (Straight Flute, Plug Chamfer, For Class 2B)
HSS Drills (Jobbers Length, Surface Treated)
Steel Index Case (For Easy Access and Storage)

Set #3 METRIC Includes:

HSS Taps (Straight Flute, Plug Chamfer, For METRIC 6H)
HSS Drills (Jobbers Length, Surface Treated)
Steel Index Case (For Easy Access and Storage)

Set #1 NC EDP 13134
Set #2 NF EDP 13135
Set #3 METRIC EDP 13136



SET #1 NC		SET #2 NF		SET #3 METRIC	
TAP	DRILL	TAP	DRILL	TAP	DRILL
6-32	#36	6-40	#33	M 2.5 x 0.45	2.05mm
8-32	#29	8-36	#29	M 3.0 x 0.50	2.50mm
10-24	#25	10-24	#25	M 3.5 x 0.60	2.90mm
10-32	#21	10-32	#21	M 4.0 x 0.70	3.30mm
1/4-20	#7	1/4-28	#3	M 5.0 x 0.80	4.20mm
5/16-18	"F"	5/16-24	"I"	M 6.0 x 1.00	5.00mm
3/8-16	5/16	3/8-24	"Q"	M 8.0 x 1.25	6.70mm
7/16-14	"U"	7/16-20	25/64	M 10 x 1.50	8.50mm
1/2-13	27/64	1/2-20	29/64	M 12 x 1.75	10.20mm

Standard Carbon Taps Straight Flute

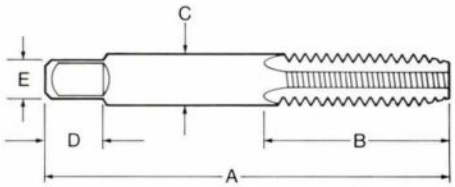
Carbon Steel
Cut Thread
No. 2104

For general hand and limited production tapping. For hand tapping in relatively hard materials or in bottoming holes the use of taper, plug and bottoming taps, in the order named, is suggested. The taper tap is helpful in starting a tapped thread square with the workpiece. The plug tap is, however, the most widely used tap in both hand and production tapping.

Taper Style

Plug Style

Bottoming Style



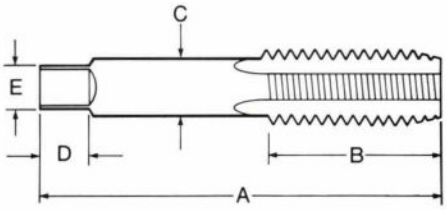
Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER TAPER	PLUG	BOTT.	SETS
0		80		.0519	2	1 5/8	5/16	.141	3/16	.110	12		17295		
1	64	72		.0629 .0640	2	1 11/16	3/8	.141	3/16	.110	12		17303 17307		
2	56	64		.0744 .0759	3	1 3/4	7/16	.141	3/16	.110	12	17310	17311 17315	17312	17313
3	48	56		.0855 .0874	3	1 13/16	1/2	.141	3/16	.110	12		17319 17323		
4	40	48	36	.0958 .0985 .0940	3	1 7/8	9/16	.141	3/16	.110	12	17334	17335 17339 17331	17336	17337
5	40			.1088	3	1 15/16	5/8	.141	3/16	.110	12	17342	17343	17344	17345
6	32	40	36	.1177 .1218 .1200	3	2	11/16	.141	3/16	.110	12	17350	17351 17359 17355	17352	17353
8	32	36	40	.1437 .1460 .1478	4	2 1/8	3/4	.168	1/4	.131	12	17362	17363 17367 17371	17364	17365
10	24	32		.1629 .1697	4	2 3/8	7/8	.194	1/4	.152	12	17374 17382	17375 17383	17376 17384	17377 17385
12	24	28		.1889 .1928	4	2 3/8	15/16	.220	9/32	.165	12	17386	17387 17391	17388	17389

Standard Carbon Taps Straight Flute

Carbon Steel
Cut Thread
No. 2100



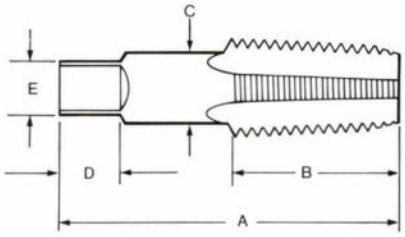
Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	NC UNC	NF UNF	NS	Basic Pitch Diam.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER TAPER	PLUG	BOTT.	SETS
3/16			24 32	.1604 .1672	4	2 3/8	7/8	.194	1/4	.152	12	17125 17129	17126 17130	17127 17131	17128 17132
1/4	20	28		.2175 .2268	4	2 1/2	1	.255	5/16	.191	12	17141 17149	17142 17150	17143 17151	17144 17152
5/16	18	24		.2764 .2854	4	2 23/32	1 1/8	.318	3/8	.238	12	17157 17161	17158 17162	17159 17163	17160 17164
3/8	16	24		.3344 .3479	4	2 15/16	1 1/4	.381	7/16	.286	12	17169 17173	17170 17174	17171 17175	17172 17176
7/16	14	20		.3911 .4050	4	3 5/32	1 7/16	.323	13/32	.242	12	17177 17181	17178 17182	17179 17183	17180 17184
1/2	13	20		.4500 .4675	4	3 3/8	1 21/32	.367	7/16	.275	12	17185 17189	17186 17190	17187 17191	17188 17192
9/16	12	18		.5084 .5264	4	3 19/32	1 21/32	.429	1/2	.322	3	17193 17197	17194 17198	17195 17199	17196 17200
5/8	11	18		.5660 .5889	4	3 13/16	1 13/16	.480	9/16	.360	3	17201 17205	17202 17206	17203 17207	17204 17208
3/4	10	16		.6850 .7094	4	4 1/4	2	.590	11/16	.442	3	17217 17221	17218 17222	17219 17223	17220 17224
7/8	9	14		.8028 .8286	4	4 11/16	2 7/32	.697	3/4	.523	3	17225 17229	17226 17230	17227 17231	17228 17232
1	8	12	14	.9188 .9459 .9536	4	5 1/8	2 1/2	.800	13/16	.600	3	17233 17237 17241	17234 17238 17242	17235 17239 17243	17236 17240 17244

Standard Carbon Taps Taper Pipe Straight Flute

Carbon Steel
Cut Thread
No. 2118



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Tap Size	Threads per Inch	Gage Projection Min.	Gage Projection Max.	No. Flutes	Overall Length **A**	Thread Length **B**	Shank Diam. **C**	Square Length **D**	Square Size **E**	Std. Pkg. Quan.	EDP NUMBER PLUG
1/8	27	.250	.374	4	2 1/8	3/4	.3125	3/8	.234	12	17415
1/8 *	27	.250	.374	4	2 1/8	3/4	.4375	3/8	.328	12	17414
1/4	18	.398	.522	4	2 7/16	1 1/16	.5625	7/16	.421	12	17416
3/8	18	.392	.516	4	2 9/16	1 1/16	.7000	1/2	.531	3	17417
1/2	14	.518	.642	4	3 1/8	1 3/8	.6875	5/8	.515	3	17418
3/4	14	.504	.628	5	3 1/4	1 3/8	.9063	11/16	.679	3	17419
1	11 1/2	.584	.772	5	3 3/4	1 3/4	1.1250	13/16	.843	1	17420
1 1/4	11 1/2	.592	.780	5	4	1 3/4	1.3125	15/16	.984	1	17421
1 1/2	11 1/2	.605	.793	6	4 1/4	1 3/4	1.5000	1	1.125	1	17422
2	11 1/2	.573	.761	7	4 1/2	1 3/4	1.8750	1 1/8	1.406	1	17423
2 1/2	8	.831	1.019	9	5 1/2	2 9/16	2.2500	1 1/4	1.687	1	17424

* Larger shank furnished unless smaller shank is specified.

Dies - HSS Round Split Screw Adjusting

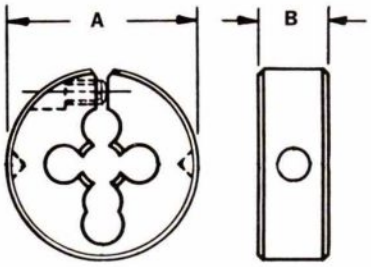
High Speed Steel No. 2901

These dies are used for threading bolts, studs, rods and other pieces requiring external threads. They are round disks of hardened steel which have a slot to allow for limited adjustment in cutting size. This adjustment may be made by a screw in the die itself (screw adjusting).

Machine Screw Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Outside Diameter **A**			13/16	1"
Thickness **B**			1/4	3/8
Size	NC	NF	EDP NUMBER	
5	40	44	70365 70366	
6	32	40	70367 70370	70368
8	32	36	70372 70374	70373
10	24	32	70376 70379	70377 70380
12	24	28	**70381** **70383**	70382



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Outside Diameter **A**			13/16	1"	1 1/2	2"
Thickness **B**			1/4	3/8	1/2	5/8
Size	NC	NF	EDP NUMBER			
1/4	20	28	70333 70336	70334 70337	70335 70338	
5/16	18	24	70339 70342	70340 70343	70341 70344	
3/8	16	24		**70345** **70347**	**70346** **70348**	
7/16	14	20		70349 70351	70350 70352	
1/2	13	20			70353 70354	
9/16	12	18			70355 70356	
5/8	11	18			70357 70359	70358 70360
3/4	10	16				70361 70362
7/8	9	14				70363 70364

Standard Package Quantity: 1

Dies-Carbon Round Split Screw Adjusting

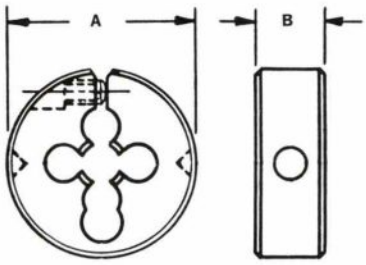
Carbon Steel
No. 2301

Machine Screw

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Outside diameter **A**				13/16	1"
Thickness **B**				1/4	3/8
Size	NC	NF	NS	EDP NUMBER	
0		80		70252	
1	64			70254	
		72		70255	
2	56			70256	
		64		70257	
3	48			70258	
		56		70259	
	40			70262	
4		48		70263	
			36	70261	
5	40			70264	
		44		70265	
6	32			70266	70267
		40		70270	
8	32			70272	70273
		36		70274	
10	24			70278	70279
		32		70282	70283
12	24			70284	70285
		28		70286	

Standard Package Quantity: 1



Fractional Sizes

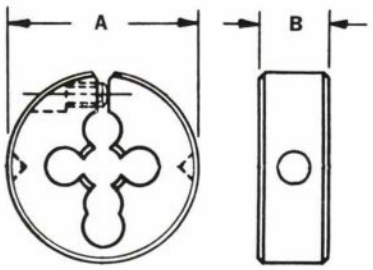
Outside Diameter **A**					13/16	1	1½	2"	2½	3"
Thickness **B**					1/4	3/8	½	5/8	¾	1"
Size	NC	NF	NS	NEF	EDP NUMBER					
3/16			24			70154				
			32			70156				
1/4	20				70161	70162	70163	70164		
		28			70169	70170	70171	70172		
						70166				
			24			70174				
				32						
5/16	18				70177	70178	70179	70180		
		24			70181	70182	70183	70184		
				32		70186				
3/8	16					70189	70190	70191		
		24				70192	70193	70194		
7/16	14					70195	70196	70197		
		20				70198	70199	70200		
½	13					70201	70202	70203		
		20				70205	70206	70207		
9/16	12						70209	70210		
		18					70212	70213		
5/8	11						70215	70216	70217	
		18					70218	70219		
11/16			11					70221		
			16					70223		
¾	10						70225	70226	70227	
		16					70228	70229	70230	
7/8	9							70231	70232	
		14						70233	70234	
1	8							70235	70236	70237
		12						70238	70239	70240
			14					70241	70242	70243
1⅛	7									70244
		12								70245
1¼	7									70246
		12								70247
1⅜	6									70248
		12								70249
1½	6									70250
		12								70251

Standard Package Quantity: 1

Round Split Dies-Carbon Taper Pipe Screw Adjusting

Carbon Steel
No. 2302

The design and method of application of these Taper Pipe Dies is very similar to adjustable Round Split Dies. They are used for repairing or the occasional cutting of taper pipe threads.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

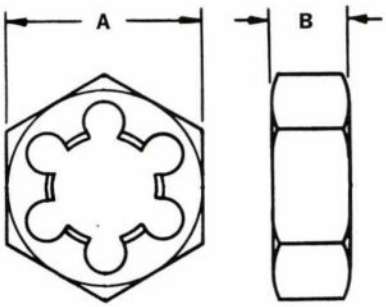
Outside Diameter **A**		1"	1½	2"
Thickness **B**		⅜	½	⅝
Size	NPT	EDP NUMBER		
⅛	27	70294	70295	
¼	18		70296	70297
⅜	18		70298	70299
½	14			70300

Standard Package Quantity: 1

Hexagon Dies-Carbon Rethreading

Carbon Steel
No. 2303

Used only for repair work, for dressing damaged or rusty threads. They are adaptable for use in bit brace sockets, ratchets or adjustable wrenches.



Fractional Sizes

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Size	NC	NF	NS	Across Flat **A**	Thickness **B**	EDP No.
¼	20	28		19/32	¼	70302 70303
5/16	18	24		11/16	5/16	70304 70305
⅜	16	24		25/32	⅜	70306 70307
7/16	14	20		⅞	7/16	70308 70309
½	13	20		1 1/16	½	70310 70311
9/16	12	18		1 1/16	½	70312 70313
⅝	11	18		1 ¼	⅝	70314 70315
11/16			11 16	1 7/16	¾	70316 70317
¾	10	16		1 7/16	¾	70318 70319
⅞	9	14		1 ⅝	⅞	70320 70321
1	8	12	14	1 13/16	1	70322 70323 70324
1⅛	7	12		2	1	70325 70326
1¼	7	12		2 3/16	1	70327 70328
1 ⅜	6	12		2 ⅜	1	70329 70330
1½	6	12		2 5/16	1	70331 70332

Standard Package Quantity: 1

Die Stocks

No. 2313

These die stocks are for use with adjustable round split dies. To insure the cutting of straight accurate threads, the die is held securely by two opposed screws in the stock which locate in two detents in the die. When this is done, the split in the die lines up opposite a third pointed set screw which can be run in to spread the die slightly for minute adjustment. Stocks are made of one piece steel with mottled finish. They are light and carefully balanced.

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

No.	Die Diameter Held	Length	EDP NUMBER
60	13/16	6¼	24619
70	1	9	24626
80	1 ½	14	24627
90	2	23	24629
100	2 ½	26	24637
110	3	40	24638

Standard Package Quantity: 1

Tap Wrenches

No. 2312

STYLE 1 — T-Handle

These tap wrenches are made of high grade steel, strongly constructed and well finished. Special "locking" arrangement for sliding handle permits use in three positions.

STYLE 2 — Movable Jaw

These standard straight tap wrenches are simple to operate. Hardened steel jaws are opened and closed simply by twisting one handle which is knurled for sure gripping. Length and weight are properly balanced to provide easier, more accurate tapping. A hole for hanging while not in use is provided.

Style 1

Style 2

GENERAL DIMENSIONS AND ORDERING NUMBER (EDP)

Wrench Style No.	No.	Capacity Inches: Fractional Taps	Capacity Inches: Machine Screw Taps	EDP NUMBER
1	29	1/16–¼	0–14	24607
1	33	7/32–5/16	12–14	24609
1	34	¼ –½	14	24628
2	30	1/16–¼	0–14	24608
2	35	5/32–½	8–14	24616
2	36	5/32–¾	8–14	24617
2	37	¼ –1⅛		24618

Standard Package Quantity: 1

Tap and Die Kits

Carbon Steel
No. 2315

Model	Cutting Size M.S. No.	Cutting Size Inches	Threads Per Inch NC	Threads Per Inch NF	Threads Per Inch NS	Threads Per Inch Whit.	O.D. Dies	Die Stock No.	Tap Wrench No.	EDP NUMBER
	2		56							
	3		48							
	4		40		36					
Radio	6		32				13/16	60	29	24688
Electricians	8		32							
	10			32						
		¼	20							
		¼	20	28*						
		5/16	18	24*						
50-S		⅜	16	24*						
		7/16	14	20*			1½	80	36	24667
		½	13	20*						
		⅝	11	18*						
50-S NF *		¾	10	16*						24707
	4		40							
	6		32							
M-6	8		32				13/16	60	29	24646
	10		24							
	12		24							
		¼	20							
	4		40							
	6		32							
	8		32							
M-7	10		24	32			13/16	60	29	24647
	12		24							
		¼	20							
	4		40	48						
	6		32	40						
M-10	8		32	36			13/16	60	29	24648
	10		24	32						
	12		24	28						

Standard Package Quantity: 1.

Tap and Die Kits

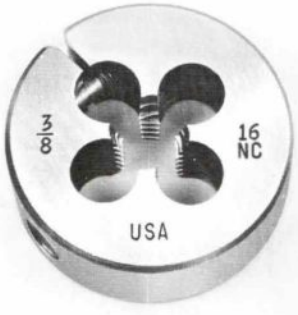
Carbon Steel

No. 2315

Model	Cutting Size	Threads Per Inch NC	NF	NS	NPT	O.D. Dies	Die Stock No.	Tap Wrench No.	EDP NUMBER
F-15	¼ 5/16 ⅜ 7/16 ½	20 18 16 14 13				1	70	35	24657
510	⅛ ¼ 5/16 ⅜ 7/16 ½	20 18 16 14 13	28 24 24 20 20		27	1	70	35	24658
50	¼ 5/16 ⅜	20 18 16				1	70	36	24666
	7/16 ½ ⅝ ¾	14 13 11 10				1½	80		
70	¼ 5/16 ⅜	20 18 16				1	70	35, 37	24668
	7/16 ½ ⅝ ¾	14 13 11 10				1½	80		
	⅞ 1	9 8				2	90		
70NF	¼ 5/16 ⅜		28 24 24			1	70	35, 37	24708
	7/16 ½ ⅝ ¾		20 20 18 16			1½	80		
	⅞ 1		14	14		2	90		
5100	¼ 5/16 ⅜	20 18 16	28 24 24			1	70	35	24669
	7/16 ½	14 13	20 20			1½	80		
5110	⅛ ¼ 5/16 ⅜	20 18 16	28 24 24		27	1	70	36	24676
	7/16 ½ 9/16 ⅝ ¾	14 13 12 11 10	20 20 18 18 16			1½	80		
5120	⅛ ¼ 5/16 ⅜	20 18 16	28 24 24		27	1	70	35, 37	24677
	7/16 ½ 9/16 ⅝ ¾	14 13 12 11 10	20 20 18 18 16			1½	80		
	⅞ 1	9 8	14	14		2	90		

Standard Package Quantity: 1.

Besly Taps & Dies
Technical Data



Tap Nomenclature

ACTUAL SIZE. An actual size is a measured size.

ALLOWANCE. A prescribed difference between the maximum material limits of mating parts. It is the minimum clearance (positive allowance) or maximum interference (negative allowance) between such parts.

ANGLE OF TAPER. The included angle of taper on a taper tap, die or screw thread.

ANGLE OF THREAD. The included angle of a thread (or angle of thread) is the angle between the flanks of the thread measured in an axial plane.

ARBOR HOLE. The central mounting hole in a shell tap.

AXIS. The imaginary straight line which forms the longitudinal centerline of the tool or threaded part. (See Fig. 1)

BACK TAPER. See RELIEF.

BASE OF THREAD. That which coincides with the cylindrical or conical surface from which the thread projects. (See Fig. 2)

BASIC. See SIZE.

BEARING. The actual contact area of the thread form on the land of a tap, die or chaser with the thread form on the product, exclusive of the chamfer cutting edge.

BELL-MOUTH THREAD. An internal thread which is larger in diameter at the start of the thread than at some distance beyond.

BEVEL. See CHAMFER BEVEL.

BLADE. One of a set of flat, threaded chasers attached to, or inserted in, a tap or die body. (See also CHASER)

BODY. (1) The threaded full diameter portion of a solid tap, inclusive of the chamfer. (2) The principal supporting member for a set of chasers, usually including the shank.

BORE. See preferred term ARBOR HOLE.

BOTTOMING TAP. A tap having a chamfer length of approximately 1 to 2 threads.

CENTER RELIEF. See RELIEF.

CHAMFER. The tapering of the threads at the front end of each land or chaser of a tap or die by cutting away and relieving the crest of the first few teeth to distribute the cutting action over several teeth.

CHAMFER ANGLE. The angle formed between the chamfer and the axis of the tap or die, measured in an axial plane at the cutting edge. (See Fig. 1)

CHAMFER BEVEL. An angular surface of revolution (which may or may not be relieved) preceding the point diameter on a tap. (See Fig. 3)

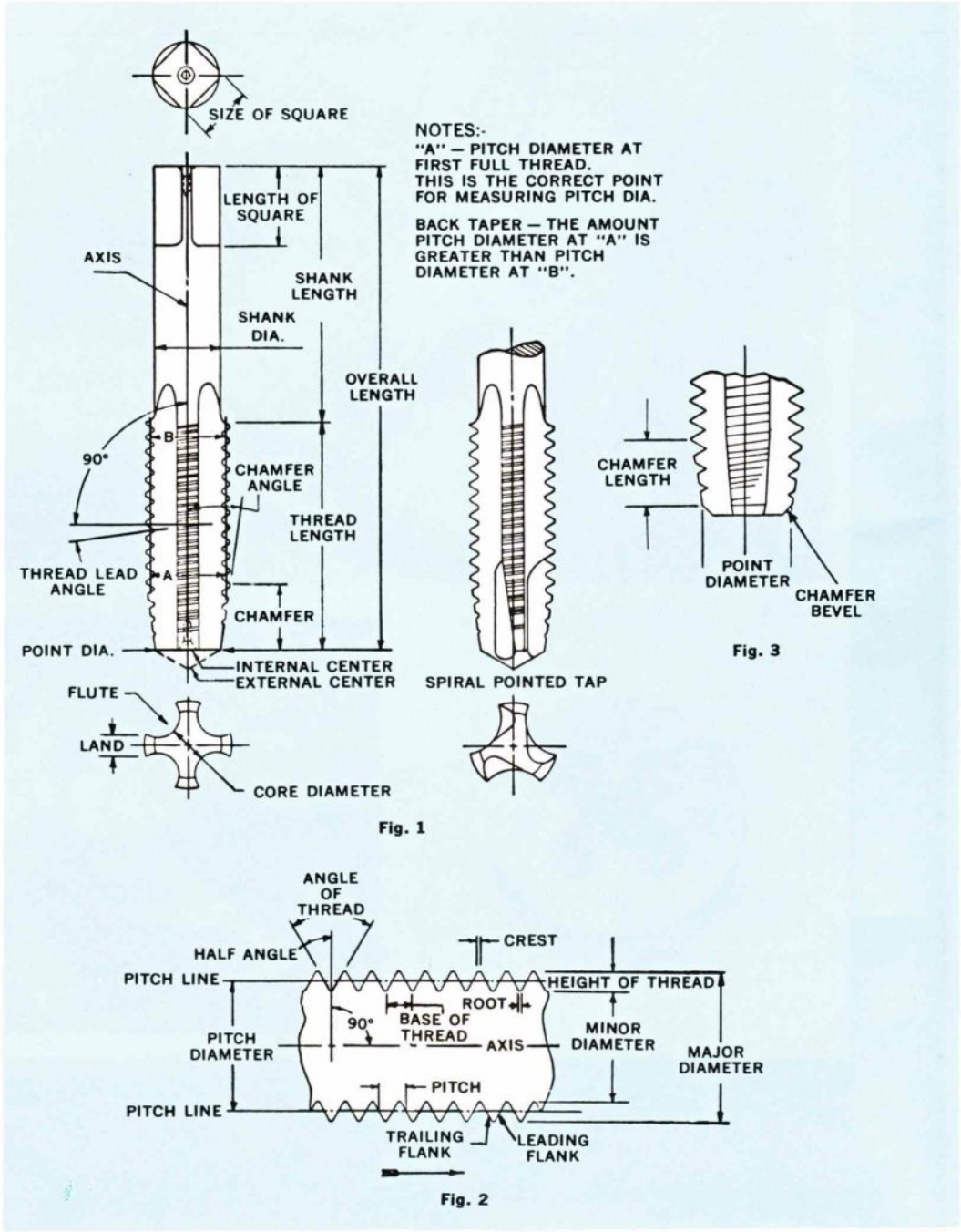
CHAMFER DEPTH. The depth of the cutting edge of the chamfer at the top of a chaser measured from the crest of the thread.

CHAMFER LENGTH. The length of the chamfer measured parallel to the axis at the cutting edge. (See Figs. 1 and 3)

CHAMFER RELIEF. See RELIEF.

CHAMFER RELIEF ANGLE. The complement of the angle formed between a line tangent to the relieved surface at the cutting edge and a radial line to the same point on the cutting edge.

CHASER. One of a set of fixed or movable thread cutting members supported by a tap or die body.



CHIP BREAKERS. Steps or notches formed in the thread crest or cutting face for the purpose of breaking up chips.

CHIP DRIVER POINT. See preferred term SPIRAL POINT.

CHORDAL HOOK. See HOOK.

CLASSES OF THREADS. Classes of threads are distinguished from each other by the amounts of tolerance or tolerances and all allowance specified. It is not applicable to the tools used for threading.

CLEARANCE. Any space provided to prevent undesirable contact of the tool and the workpiece.

CONCENTRIC. Having a common center.

CONCENTRICITY. (See preferred terms TIV and RELATIVE ECCENTRICITY to describe lack of concentricity between two or more tool elements.)

CONCENTRIC MARGIN. A portion of the threaded land, adjacent to the cutting edge, which has concentric threads. (See Fig. 6)

CONCENTRIC THREADS. Threads which are substantially circular for the full land width with a center coincident with the tool axis; that is, having no relief in the thread form except for that slight amount produced by back taper. (See Fig. 6)

CON-ECCENTRIC THREAD. See RELIEF.

CONTROLLED ROOT DIE. A die having specified major diameter limits with or without a specified root shape.

CONTROLLED ROOT TAP. A tap having specified minor diameter limits with or without a specified root shape.

CORE. The central portion of a tap below the flutes which joins the lands.

CORE DIAMETER. The diameter of a circle which is tangent to the bottom of the flutes at a given point on the axis. (See Fig. 1)

CORE TAPER. The taper in the core of a tap.

CREST. That surface of the thread which joins the flanks of the thread and is farthest from the cylinder or cone from which the thread projects. (See Fig. 2)

CREST CLEARANCE. The radial distance between the root of the internal thread and the crest of the external thread of the coaxially assembled design forms of mating threads.

CUTTER SWEEP. The section removed by the milling cutter or grinding wheel in entering or leaving a flute.

CUTTING EDGE. The leading edge of the land in the direction of rotation for cutting and which does the actual cutting. (See Fig. 6)

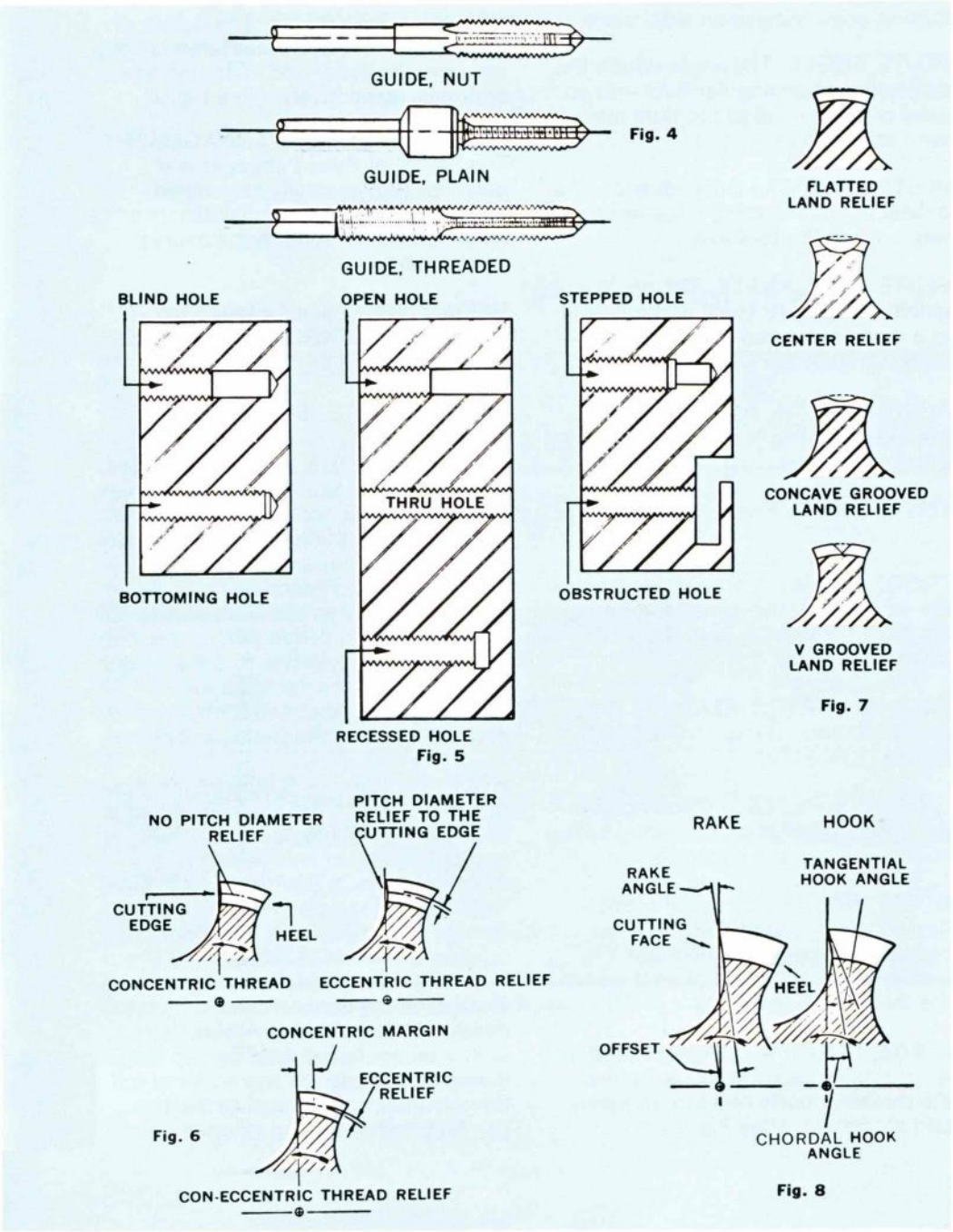
CUTTING FACE. The leading side of the land in the direction of rotation for cutting on which the chip impinges. (See Fig. 8)

ECCENTRIC. Not having a common center.

ECCENTRIC RELIEF. See RELIEF.

ECCENTRICITY. (With respect to the tool axis.) One half the Total Indicator Variation (TIV). See also RELATIVE ECCENTRICITY.

ECCENTRIC THREAD. See RELIEF.



Tap Nomenclature

END CUTTING TAP. A tap with an additional cutting edge below the chamfer.

EXPANDER. The plunger or wedge in a tap body which adjusts the lands of an expansion tap or the blades or chasers of an adjustable or collapsible tap.

EXTERNAL CENTER. The pointed end on a tap. Its included angle varies with manufacturing practice. It must not be confused with a tap chamfer or a chamfer bevel. (See Fig. 1)

FACE. See CUTTING FACE.

FEMALE CENTER. See preferred term INTERNAL CENTER.

FILLET. On a thread profile the radius joining the thread flank with the thread root.

FULL INDICATOR MOVEMENT (FIM). The difference between the maximum and the minimum sweep of the indicator during the checking cycle. Similar to T.I.V.

FIRST FULL THREAD. The first full thread on the cutting edge back of the chamfer. It is at this point that rake, hook and thread elements are measured. (See Fig. 1)

FISHTAIL POINT. A type of point on an end cutting tap having an internal angular relief below the chamfer.

FLANK. The flank of a thread is either surface connecting the crest with the root. The flank surface intersection with an axial plane is theoretically a straight line.

FLANK, CLEARANCE. The clearance flank is that which does not take the externally applied axial load in an assembly.

FLANK, TRAILING. The trailing flank of a thread is the one that is opposite to the leading flank. (See Fig. 2)

FLANK, LEADING. (1) The flank of a thread facing toward the chamfered end of a threading tool. (2) The leading flank of a thread is the one which, when the thread is about to be assembled with a mating thread, faces the mating thread. (See Fig. 2)

FLANK, PRESSURE. The pressure flank is that which takes the externally applied axial load in an assembly. The term is used particularly in relation to buttress and other similar threads.

FLANK ANGLE. See HALF ANGLE.

FLATTED LAND. See RELIEF.

FLUTES. The longitudinal channels formed in a tap to create cutting edges on the thread profile and to provide chip spaces and cutting fluid passages. On a parallel or straight thread tap they may be straight, angular, or helical; on a taper thread tap they may be straight, angular or spiral.

Angular Flute — A flute lying in a plane intersecting the tool axis at an angle.

Helical Flute — A flute with uniform axial lead and constant helix in a helical path around the axis of a cylindrical tap.

Spiral Flute — A flute with uniform axial lead in a spiral path around the axis of a conical tap.

Straight Flute — A flute which forms a cutting edge lying in an axial plane.

FLUTE ANGLE. The angle which the projection of an angular flute into an axial plane parallel to the flute makes with the tap axis.

FLUTE LEAD. The axial advance of a helical or spiral cutting edge in one turn around the tool axis.

FLUTE LEAD ANGLE. The angle which a helical or spiral cutting edge at a given point makes with an axial plane through the same point.

FLUTE LENGTH. As applied to taps, the full axial length of a flute including the cutter sweep.

FLUTE TAPER. See preferred term CORE TAPER.

FRONT TAPER. A gradual increase in the diameter of the thread form on a tap from the leading end of the tool toward the back.

FULL INDICATOR READING. See preferred term TOTAL INDICATOR VARIATION (TIV).

GRINDING RECESS. Clearance for the corner or edge of a grinding wheel at a change in tool diameter.

GUIDE, NUT. A cylindrical section behind the threaded body of a tap of approximately the nut minor diameter to guide the nut as it leaves the threads. (See Fig. 4)

GUIDE, PLAIN. A cylindrical section, with or without oil grooves, behind the threaded body of a tap, to maintain alignment. (See Fig. 4)

GUIDE, THREADED. A threaded section behind the cutting threads on a tap, fitting an internal thread which acts both as a guide and as a means to advance the tap. (See Fig. 4)

GUN POINT. See preferred term SPIRAL POINT.

HALF ANGLE. The flank angle is the angle between the individual flank and the perpendicular to the axis of the thread, measured in an axial plane. A flank angle of a symmetrical thread is commonly termed the half-angle of thread. (See Fig. 2)

HEEL. The edge of the land opposite the cutting edge. (See Fig. 6)

HEIGHT OF THREAD. The height of thread is the distance, measured radially between the major and minor cylinders or cones, respectively. (See Fig. 2)

HEIGHT OF THREAD ENGAGEMENT. The height of thread engagement between two coaxially assembled mating threads is the radial distance by which their thread forms overlap each other.

HELIX ANGLE. See preferred terms FLUTE LEAD ANGLE and THREAD LEAD ANGLE.

HELICAL FLUTE. See FLUTES.

HELIX VARIATION. Helix variation of a thread is an undulate aberration from true helical advancement. The "helical path" includes the helix with its superimposed variation and is measured either as the maximum deviation from the true helix or as the "cumulative pitch". The cumulative pitch is the distance measured parallel to the axis of the thread between corresponding points on any two thread forms whether or not they are in the same axial plane.

HOLE. (1) Blind — A hole which does not pass through the workpiece and is not threaded its full depth. (2) Bottoming — A blind hole which is threaded close to the bottom. (3) Obstructed — A through hole which has some obstruction beyond the hole limiting the travel of the tap. (4) Open — A hole which passes through the workpiece but is not threaded its full depth. (5) Recessed — A blind hole with a recess larger than the tap major diameter and beyond the depth of full thread, limiting the travel of the tap. (6) Stepped — A blind or open hole

with a change in diameter which limits the thread depth. (7) Through — A hole which passes through the workpiece and is threaded its full depth. (See Fig. 5)

HOOK ANGLE. The inclination of a concave cutting face, usually specified either as Chordal Hook or Tangential Hook.

Chordal Hook Angle — The angle between the chord passing through the roof and crest of a thread form at the cutting face, and a radial line through the crest at the cutting edge. (See Fig. 8)

Tangential Hook Angle — The angle between a line tangent to a hook cutting face at the cutting edge and a radial line to the same point. (See Fig. 8)

HOOK FACE. A concave cutting face.

INCLUDED ANGLE. See ANGLE OF THREAD.

INTERNAL CENTER. A 60° countersink with clearance at the bottom, in one or both ends of a tool, which establishes the tool axis. (See Fig. 1)

INTERRUPTED THREAD TAP. A tap having an odd number of lands with alternate teeth in the thread helix removed. In some cases alternate teeth are removed only for a portion of the thread length.

LAND. (1) One of the threaded sections between the flutes of a tap or die. (See Fig. 1) (2) The threaded surface of a tap chaser or die chaser. (See Fig. 1)

LAND WIDTH. The chordal width of the land between the cutting edge and the heel measured normal to the cutting edge. (See Fig. 1)

LEAD DEVIATION. The deviation from the basic (nominal) lead. Progressive Lead Deviation. (1) On a straight thread the deviation from a true helix where the thread helix advances uniformly but with increasing amount. (2) On a taper thread the deviation from a true spiral where the thread spiral advances uniformly but with increasing amount.

LEAD, DRUNKEN. See HELIX VARIATION.

LEAD OF FLUTE. See FLUTE LEAD.

LEAD OF THREAD. The distance a screw thread advances axially in one complete turn. On a single lead screw or tap the lead and pitch are identical. On a double lead screw or tap the lead is twice the pitch, etc.

LEFT HAND CUT. Rotation in a clockwise direction for cutting when viewed from the chamfered end of a tap or die.

LEFT HAND FLUTES. Flutes which, viewed axially, twist in a counterclockwise direction.

LEFT HAND THREADS. A thread is a left hand thread if, when viewed axially, it winds in a counterclockwise and receding direction. All left hand threads are designated LH.

LENGTH. The dimension of a tool element measured parallel to the tool axis.

LENGTH OF ENGAGEMENT. The length of engagement of two mating threads is the axial distance over which two mating threads are designed to contact.

LIMITS. The limits of size are the applicable maximum and minimum sizes.

MAJOR DIAMETER. On a straight thread the major diameter is that of the major cylinder. On a taper thread the major diameter at a given position on the thread axis is that of the major cone at that position. (See Fig. 2)

MALE CENTER. See preferred term EXTERNAL CENTER.

MARGIN. See CONCENTRIC MARGIN.

MINOR DIAMETER. On a straight thread the minor diameter is that of the minor cylinder. On a taper thread the minor diameter at a given position on the thread axis is that of the minor cone at that position. (See Fig. 2)

NECK. A section of reduced diameter between two adjacent portions of a tool.

NOMINAL SIZE. See SIZE.

NON-REVERSING TAP. A tap which passes completely through the part being tapped without reversal of rotation of the tap or the part.

NUMBER OF THREADS. See preferred term THREADS PER INCH.

OFFSET. The distance a straight cutting face is off center or the distance the measuring chord is off center on a hook cutting face. (See Fig. 8)

OIL GROOVES. Longitudinal straight or helical grooves in shank, guide or pilot for lubrication or to carry cutting fluid to the cutting edges.

OIL HOLES. Holes by which a cutting fluid is fed to the cutting edges of a tool.

OVERALL LENGTH. The extreme length of a complete tool from end to end, but not including adjusting screw or external centers when required. (See Fig. 1)

PERCENT OF THREAD. One-half the difference between the basic major diameter and the actual minor diameter of an internal thread, divided by the basic thread height, expressed as a percentage.

PILOT, PLAIN. A cylindrical portion preceding the chamfered end of the tap body to maintain alignment.

PILOT, THREADED. A threaded portion preceding the chamfered end of a tap which facilitates starting the tap in correct relationship to a previously formed internal thread.

PITCH. The pitch of a thread having uniform spacing is the distance, measured parallel to its axis, between corresponding points on adjacent thread forms in the same axial plane and on the same side of the axis. The basic pitch is equal to the lead divided by the number of thread starts. (See Fig. 2)

PITCH DIAMETER. On a straight thread, the pitch diameter is the diameter of the imaginary co-axial cylinder, the surface of which would pass through the thread profiles at such points as to make the width of the groove equal to one-half of the basic pitch. On a perfect thread this occurs at the point where the widths of the thread and groove are equal. On a taper thread, the pitch diameter at a given position on the thread axis is the diameter of the pitch cone at that position. (See Fig. 2)

PITCH ERROR. The deviation from the true basic pitch measured between adjacent teeth on a land.

PITCH LINE. A generator of the imaginary cylinder or cone specified in the definition of Pitch Diameter. (See Fig. 2)

PLUG TAP. A tap with 3 to 5 chamfered threads.

Tap Nomenclature

POINT DIAMETER. The diameter at the cutting edge of the leading end of the chamfered section. (See Figs. 1 and 3)

PROJECTION. The distance the small end of a taper thread projects through a taper thread ring gage.

PULL TAP. A tap which has its shank ahead of the chamfered teeth so that the shank passes through the hole to be tapped before cutting begins.

QUALIFICATION. The axial relation of one thread helix to another, as between a threaded pilot and the cutting threads on a tap or the relation of the thread helix on a tap to some other reference point on the tap.

RAKE. The angular relationship of the straight cutting face of a tooth with respect to a radial line through the crest of the tooth at the cutting edge. Positive rake means that the crest of the cutting face is angularly ahead of the balance of the cutting face of the tooth. Negative rake means that the crest of the cutting face is angularly behind the balance of the cutting face of the tooth. Zero rake means that the cutting face is directly on a radial line. (See Fig. 8)

RELATIVE ECCENTRICITY. The distance between the geometric centerline of one portion of a tool and the geometric centerline of some other portion.

RELIEF. The removal of metal behind the cutting edge to provide clearance between the part being threaded and the threaded land.

Back Taper — A gradual decrease in the diameter of the thread form on a tap (or a gradual increase on a die) from the chamfered end of the land toward the back which creates a slight radial relief in the threads. (See Fig. 1)

Center Relief — Clearance produced on a portion of the tap land by reducing the diameter of the entire thread form between cutting edge and heel. (See Fig. 7)

Chamfer Relief — The gradual decrease in land height from cutting edge to heel on the chamfered portion of the land on a tap or die to provide radial clearance for the cutting edge.

Con-Eccentric Thread Relief — Radial relief in the thread form starting back of a concentric margin. (See Fig. 6)

Double Eccentric Thread Relief — The combination of a slight radial relief in the thread form starting at the cutting edge and continuing for a portion of the land width, and a greater radial relief for the balance of the land.

Eccentric Thread Relief — Radial relief in the thread form starting at the cutting edge and continuing to the heel. (See Fig. 6)

Flatted Land Relief — Clearance produced on a portion of tap land by truncating the thread between cutting edge and heel. (See Fig. 7)

Grooved Land Relief — Clearance produced on a tap land by forming a longitudinal groove in the center of the land. (See Fig. 7)

RELIEVED CREST. See preferred terms under RELIEF.

RIGHT HAND CUT. Rotation in a counterclockwise direction for cutting when viewed from the chamfered end of a tap or die.

RIGHT HAND FLUTES. Flutes which viewed axially, twist in a clockwise direction.

RIGHT HAND THREADS. A thread is a right hand thread if, when viewed axially, it winds in a clockwise and receding direction.

ROOT. The root is that surface of the thread which joins the flanks of adjacent thread forms and is identical with or immediately adjacent to the cylinder or cone from which the thread projects. (See Fig. 2)

RUNOUT. The radial variation from a true circle which lies in a diametral plane and is concentric with the tool axis. See also TOTAL INDICATOR VARIATION (TIV).

SALVAGE HOLE. An internal center in the front end of a tool with sufficient clearance to permit facing back the end of the tool.

SCREW THREAD. A screw thread is a ridge, usually of uniform section and produced by forming a groove in the form of a helix on the external or internal surface of a cylinder, or in the form of a conical spiral on the external or internal surface of a cone or frustum of a cone. A screw thread formed on a cylinder is known as a straight or parallel thread, to distinguish it from a taper screw thread which is formed on a cone or frustum of a cone.

SET. A set of hand taps consists of one each of standard taper, plug and bottoming straight fluted hand taps of the same pitch and major diameter.

SET, SERIAL. Two or more related taps which, used in a specified sequence, progressively cut a thread of full width and height. Taps in a set frequently have a thread form modified from, or entirely different from the basic thread form. They are identified by annular grooves on the shank near the square.

SHANK. The portion of the tool by which it is held and driven.

Square Shank — A cylindrical shank with driving square only.

Plain Round Shank — A cylindrical shank without square or other driving means.

Flatted Round Shank — A cylindrical shank with set screw flat only.

SHAVING. The excessive removal of material from the product thread profile by the tool thread flanks caused by an axial advance per revolution less than or more than the actual lead on the tool. In tapping this results in an increase in product pitch diameter without an increase in product major diameter. In cutting an external thread with a die shaving reduces the product pitch diameter without reducing the product minor diameter.

SIZE. See ACTUAL SIZE.

SIZE — BASIC. Is that size from which the limits of size are derived by the application of allowances and tolerances.

SIZE — FUNCTIONAL. The functional diameter of an external or internal thread is the pitch diameter of the enveloping thread of perfect pitch, lead and flank angles, having full depth of engagement but clear at crests and roots, and of a specified length of engagement. It may be derived by adding to the pitch diameter in the case of an external thread, or subtracting from the pitch diameter in the case of an internal thread, the cumulative effects of deviations from specified profile, including variations in lead and flank angle over a specified length of engagement. The effects of taper, out-of-roundness, and surface defects may be positive or negative on either external or internal threads.

SIZE — NOMINAL. The designation used for the purpose of general identification.

SPIRAL FLUTE. See FLUTES.

SPIRAL POINT. The angular fluting in the cutting face of the land at the chamfered end. It is formed at an angle with respect to the tap axis of opposite hand to that of rotation. Its length is usually greater than the chamfer length and its angle with respect to the tap axis is usually made great enough to direct the chips ahead of the tap. The tap may or may not have longitudinal flutes. (See Fig. 1)

SPIRAL POINT ANGLE. The angle made by the projection of the spiral point flute into an axial plane parallel to the tap axis.

SQUARE. Four driving flats parallel to the axis on a tap shank forming a square or square with round corners. (See Fig. 1)

STRAIGHT FACE. See RAKE.

STRAIGHT FLUTE. See FLUTES.

STRAIGHT THREAD TAP. A tap for producing a straight internal thread.

TANGENTIAL HOOK. See definition under HOOK ANGLE.

TAPER PER INCH. (1) On a taper threaded part, or on a taper shank, the difference in diameter in one inch measured parallel to the axis. (2) On a taper tap or die the difference in diameter in one inch measured parallel to the axis at the cutting face.

TAPER SHANK. A shank made to fit a specified taper socket.

TAPER START. A tapering of the threads, with respect to the axis, which progressively reduces the diameter of the thread form for a short distance toward the entering end of the tap.

TAPER TAP. A tap having a chamfer length of 7 to 10 threads.

TAPER THREAD TAP. A tap for producing a tapered internal thread.

TAPER THREAD. See SCREW THREAD.

THREADS PER INCH (tpi). The reciprocal of the pitch in inches.

THREAD, SINGLE. A thread having a lead equal to the pitch.

THREAD, MULTIPLE. A thread of which the lead is an integral multiple of the pitch. On a double thread, the lead is equal to twice the pitch, on a triple thread the lead is equal to three times the pitch, etc.

THREAD, DRUNKEN. See HELIX VARIATION.

THREAD HELIX ANGLE. See preferred term THREAD LEAD ANGLE.

THREAD LEAD ANGLE. On a straight thread, the lead angle is the angle made by the helix of the thread at the pitch line with a plane perpendicular to the axis. On a taper thread, the lead angle at a given axial position is the angle made by the conical spiral of the thread, with the plane perpendicular to the axis, at the pitch line.

TIV. Total indicator variation.

TOLERANCE. The total permissible variation of a size. The tolerance is the difference between the limits of size.

TOPPING DIE. See CONTROLLED ROOT DIE.

TOPPING TAP. See CONTROLLED ROOT TAP.

TOTAL INDICATOR READING. See preferred term TOTAL INDICATOR VARIATION (TIV).

TOTAL INDICATOR VARIATION (TIV). The difference between maximum and minimum indicator readings obtained during a checking cycle.

TRUNCATION, CREST. The crest truncation of a thread is the radial distance between the sharp crest and the cylinder or cone that would bound the crest.

TRUNCATION, ROOT. The root truncation of a thread is the radial distance between the sharp root and the cylinder or cone that would bound the root.

TURNS PER INCH. The number of turns per inch is the reciprocal of the lead in inches.

UNDERCUT. See preferred term GRINDING RECESS.

WEB. See preferred term CORE.

Taps

Style of Taps

The kind of hole to be tapped has much to do with the style of tap that's best suited. Some holes go all the way through. Others, while not through-holes, still are relatively deep. Some are quite shallow, little deeper than diameter. Each of these three kinds of holes — through, deep-bottoming blind, and shallow bottoming, has a tap or group of taps best suited to requirements.

Taper Taps. This style has a 7 to 10 thread chamfer to distribute cutting action over many teeth and the taper also acts as a guide in starting.

Plug Taps. This style, with a chamfer over four threads, is most widely used in through holes and where there is sufficient room at the bottom in blind holes.

Bottoming Taps. This style of tap is made with just enough chamfer for starting in the hole, only 1 to 2 threads. As the name implies, it is designed to thread blind holes to the bottom.

Tap Sizes have been standardized to conform with those of standard screws, bolts, and studs. Machine Screw tap sizes range from No. 0 through No. 14; No. 0 being .0600" outside diameter; No. 1, .0730"; No. 2, .0860, etc. — all in .0130" increments. Hand Taps, more commonly designated as Fractional Taps and used today on all production machines, are designated in fractional and integral inch sizes from ¼" upwards.

Threads per Inch are shown for various tooth forms: the Unified series adopted by Great Britain and the United States during the war, and the corresponding American National Standard. NC and UNC mean coarse thread. NF and UNF mean fine thread. NS means special thread.

Pitch Diameter is the basic dimension of a screw, threaded hole, or a tap — the diameter of an imaginary cylinder, the surface of which passes through the thread where width of thread and space between threads are identical. This cylinder, of course, would be a cone for tapered taps. It is upon Pitch Diameter that tolerance limits are based to establish Class of Thread.

Class of Thread

There are three established Classes of Thread, designated in the Unified series by adding "A" for screws and "B" for nuts (or other internal threads) to show definite limits and tolerances.

Class 1B Thread is that in which a 1A screw can be run in readily for quick and easy assembly. The hole is classified as 1B. The fit is 1B Thread, and rarely used in modern metalworking.

Class 2B Thread consists of a 2A screw in a 2B hole. This 2B Thread has wide application, accommodates plating, finishes, and coating to a limited extent and, therefore, has fair tolerance allowances.

Class 3B Thread means a 3A Screw in a 3B Nut or threaded hole for applications where tolerance limits are close.

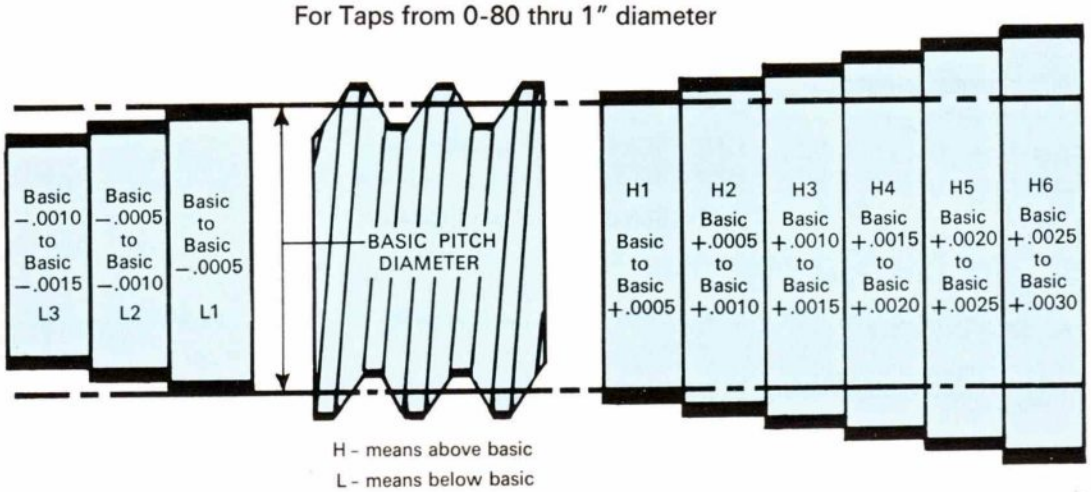
GH Numbers

In the tables that follow, tap selections are shown for the Class of Thread desired and, under the Class of Thread heading, applicable GH Numbers are listed. "G" designates Ground Thread. "H" means that pitch diameter is on the high side of basic. These two letters are followed by a numeral showing the tolerance of pitch diameter oversize as follows:

H1 = Basic to Plus .0005"
H2 = Basic Plus .0005" to Plus .0010"
H3 = Basic Plus .0010" to Plus .0015"
H4 = Basic Plus .0015" to Plus .0020"
H5 = Basic Plus .0020" to Plus .0025"
H6 = Basic Plus .0025" to Plus .0030"
H7 = Basic Plus .0030" to Plus .0035"

The diagram below, exaggerated for clarity, illustrates these several selectives in Pitch Diameter tolerance — including "L" (undersize tolerance), although no "L" taps are shown in this book. Pitch Diameter varies with the number of threads per inch because the number of threads of Pitch of screw determines the height of thread. Since Basic Pitch Diameter is measured from points half the height of the fully formed thread, a hole drilled to provide theoretical 50% thread engagement would be of the same diameter as the pitch diameter of the tap.

For Taps from 0-80 thru 1" diameter



H - means above basic
L - means below basic

The Basic Point in Thread Measurement

All measurements must have a controlling point or base from which to start. In the case of a screw thread, this control point is called the BASIC or theoretically correct size, which is calculated on the basis of a full form thread. Thus, on a given screw thread, we have the Basic Major Diameter, the Basic Pitch Diameter and Basic Minor Diameter.

While it is impossible in practice to form screw threads to their precise theoretical or BASIC Sizes, it is possible and practical to establish limits which the deviation must not exceed. These are called the "Maximum" and "Minimum" Limits. If the product is no smaller than the "Minimum Limit" and no larger than the "Maximum Limit," then it is within the size limits required. This difference between the Maximum and Minimum Limits is the TOLERANCE.

In actual practice the Basic Size is not necessarily between the Maximum and Minimum Limits. In most cases, the Basic Size is one of the Limits. In general, tolerances for internal threads will be above Basic and for external threads, below Basic. See drawing below.

For graphic representation, the Basic Pitch Diameter is commonly designated by a line with variations from it indicated by shorter lines spaced to represent a numerical scale, as shown on the left half of the drawing below.

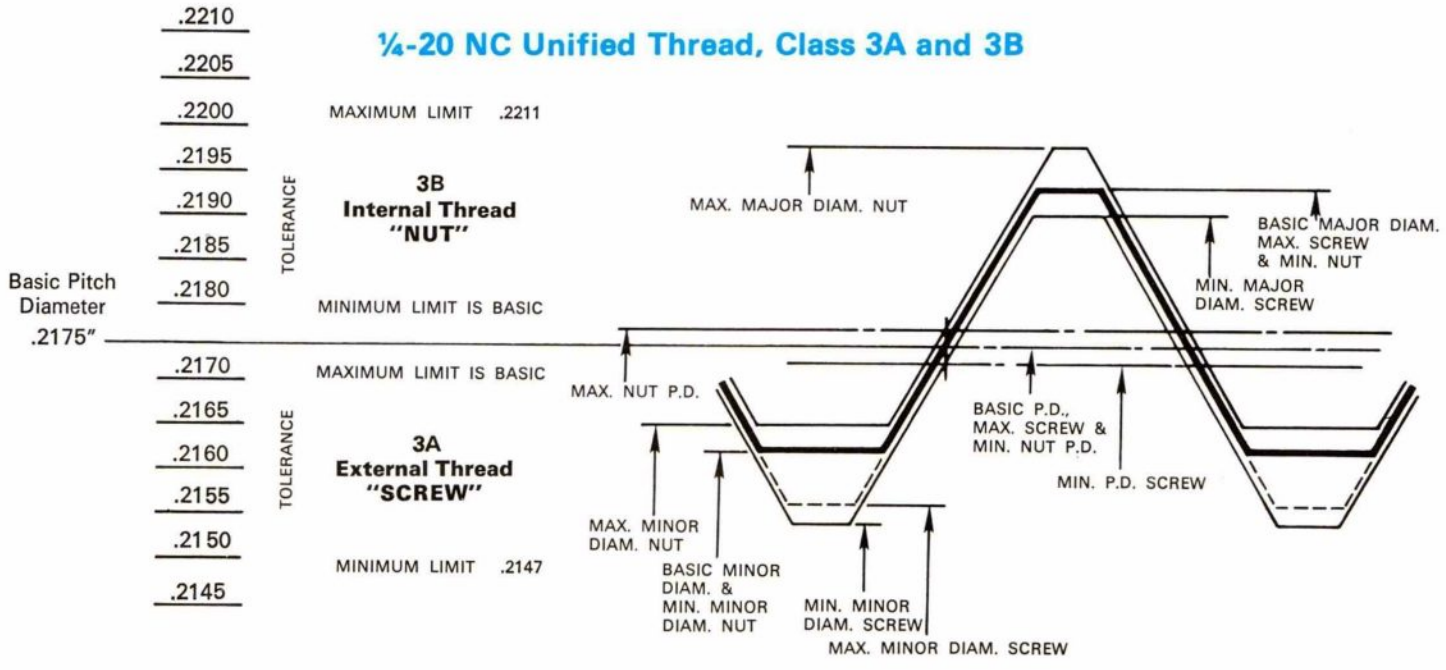
On an actual screw thread, the Basic Dimensions would follow the contour of the theoretically perfect thread, as on the right half of the drawing below.

Constants for Finding Pitch Diameter and Minor Diameter of Screw Threads

To find the basic pitch diameter or basic minor diameter of any screw thread, subtract the constant for the number of threads per inch from the basic major diameter.

Threads per Inch	Pitch in Inches	Constants for Finding Basic Pitch Diameter			Constants for Finding Basic Minor Diameter		
		National Thread	Whitworth Thread	Theoretical V	National Thread	Whitworth Thread	Theoretical V
80	.012500	.00812	.00800	.01083	.01624	.01601	.02165
72	.013888	.00902	.00889	.01203	.01804	.01786	.02406
64	.015625	.01015	.01000	.01353	.02030	.02001	.02706
60	.016666	.01083	.01067	.01443	.02165	.02134	.02887
56	.017857	.01160	.01144	.01546	.02320	.02286	.03093
50	.020000	.01299	.01281	.01732	.02598	.02562	.03464
48	.020833	.01353	.01334	.01804	.02706	.02668	.03608
44	.022727	.01476	.01455	.01968	.02952	.02910	.03936
40	.025000	.01624	.01601	.02165	.03248	.03202	.04330
36	.027777	.01804	.01779	.02406	.03608	.03558	.04811
32	.031250	.02030	.02001	.02706	.04059	.04002	.05413
30	.033333	.02165	.02134	.02887	.04330	.04268	.05773
28	.035714	.02320	.02287	.03093	.04639	.04574	.06186
27	.037037	.02406	.02372	.03208	.04812	.04742	.06416
26	.038461	.02498	.02463	.03331	.04996	.04926	.06662
24	.041666	.02706	.02668	.03608	.05413	.05336	.07217
22	.045454	.02952	.02911	.03936	.05905	.05821	.07873
20	.050000	.03248	.03202	.04330	.06495	.06403	.08660
18	.055555	.03608	.03557	.04811	.07217	.07114	.09623
16	.062500	.04059	.04002	.05413	.08119	.08004	.10825
14	.071428	.04639	.04574	.06186	.09279	.09147	.12372
13	.076923	.04996	.04926	.06662	.09993	.09851	.13323
12	.083333	.05413	.05336	.07217	.10825	.10672	.14434
11½	.086956	.05648	.05568	.07531	.11296	.11132	.15062
11	.090909	.05905	.05821	.07873	.11809	.11642	.15746
10	.100000	.06495	.06403	.08660	.12990	.12806	.17321
9	.111111	.07217	.07115	.09623	.14434	.14230	.19245
8	.125000	.08119	.08004	.10825	.16238	.16008	.21651
7	.142857	.09279	.09148	.12372	.18558	.18295	.24744
6	.166666	.10825	.10672	.14434	.21651	.21344	.28868
5½	.181818	.11809	.11642	.15746	.23619	.23284	.31492
5	.200000	.12990	.12807	.17321	.25981	.25613	.34641
4½	.222222	.14434	.14230	.19245	.28868	.28458	.38490
4	.250000	.16238	.16008	.21651	.32476	.32017	.43301
3½	.285711	.18558	.18295	.24744	.37115	.36590	.49487
3¼	.307692	.19985	.19702	.26647	.39970	.39404	.53294
3	.333333	.21651	.21344	.28868	.43301	.42689	.57733

¼-20 NC Unified Thread, Class 3A and 3B



Taps
Thread Constants for Various Percentages

Formula for Obtaining Tap Drill Sizes

(Select nearest commercial stock drill)

$$\left(\text{Outside Diam. of Thread}\right) - \left(\frac{.01299 \times \text{Amount of percentage of full thread}}{\text{Number of threads per inch}}\right) = \text{Drilled Hole Size}$$

$$\left(\text{No. of Threads per inch}\right) \times \left(\frac{\text{Outside Diam. of thread} - \text{Selected Drill Diam.}}{.01299}\right) = \text{Percentage of Full Thread}$$

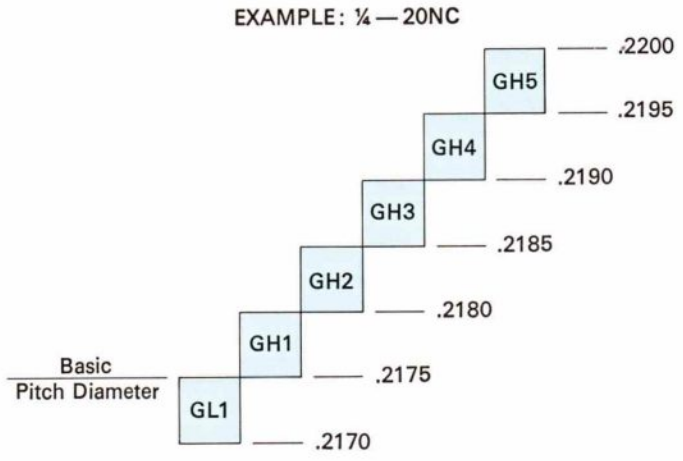
EXAMPLE: To find the hole size for obtaining 75% of thread in a ¼-20 tapped hole, follow first column to 20 threads, then across to 75% of thread. This figure (.0485) when subtracted from the .250 diameter leaves .2015, which is the required diameter of the hole for a ¼-20 thread.

Figures in table show amount to subtract from O.D. of screw to obtain specific percentages of thread.

Threads per Inch	Double Depth	60% Thread	65% Thread	70% Thread	75% Thread	80% Thread	85% Thread
6	.21651	.1300	.1408	.1517	.1625	.1733	.1842
7	.18558	.1114	.1207	.1300	.1393	.1486	.1579
8	.16238	.0975	.1056	.1138	.1219	.1300	.1381
9	.14434	.0866	.0939	.1011	.1083	.1156	.1228
10	.12990	.0779	.0844	.0909	.0974	.1039	.1105
11	.11809	.0708	.0767	.0826	.0885	.0944	.1005
12	.10825	.0649	.0702	.0755	.0808	.0861	.0921
13	.09992	.0599	.0649	.0699	.0749	.0799	.0850
14	.09278	.0556	.0602	.0648	.0694	.0740	.0789
16	.08119	.0486	.0526	.0566	.0606	.0646	.0691
18	.07217	.0431	.0466	.0501	.0536	.0571	.0614
20	.06495	.0389	.0421	.0453	.0485	.0517	.0553
24	.05412	.0326	.0354	.0382	.0410	.0438	.0460
27	.04811	.0288	.0312	.0336	.0360	.0384	.0409
28	.04639	.0276	.0298	.0324	.0347	.0370	.0395
30	.04330	.0260	.0282	.0304	.0326	.0348	.0368
32	.04059	.0243	.0263	.0283	.0303	.0323	.0345
36	.03608	.0216	.0234	.0252	.0270	.0288	.0307
40	.03247	.0194	.0210	.0226	.0242	.0258	.0276
44	.02952	.0177	.0192	.0207	.0222	.0237	.0251
48	.02706	.0161	.0174	.0187	.0200	.0213	.0230
56	.02319	.0138	.0149	.0160	.0171	.0182	.0197
64	.02029	.0121	.0131	.0141	.0151	.0161	.0173
72	.01804	.0107	.0115	.0123	.0131	.0139	.0153
80	.01623	.0097	.0105	.0113	.0121	.0129	.0138

Relation of Tap Pitch Diameter To Basic Pitch Diameter

American tap manufacturers use a series of tap pitch diameter limits. These limits feature a .0005" tolerance in tap sizes #0 through 1", and a .001" or greater tolerance in tap sizes above 1" through 1½" diameter, inclusive. The chart shows the relationship between tap pitch diameter limits and basic (nominal) pitch diameter.



Taps

Tap Limits, Product Limits and Class of Thread

Besly engineers frequently receive a request for a Class 3B (or other class) tap. Many times, too, the customer will ask for a tap to produce a "Class 3B Fit". Ordering taps by these specifications is incorrect, and often impractical. The following information is presented to clarify the difference between the terms Class of Thread, Tap Limits and Product Limits to make ordering taps easier and aid the customer in obtaining the tap best suited for his requirements.

Class of Thread

Class of Thread refers simply to the tolerances that control the closeness of fit between two threaded mating parts. This term should be used only in reference to a threaded assembly, as, for example, a screw and nut.

Product Limits

Product Limits refer to the limits and tolerances of the internal or female thread. The degree of tolerance is expressed by the terms Class 2, 2B, 3 and 3B. Product limits refer to the various limits and tolerances applying to nuts or internal threads and are identified by the terms Class 2, 2B, 3 or 3B.

Tap Limits

Tap Limits refer to the various sizes of taps manufactured to permit selection of a tap which will produce an internal thread within the desired product limit. Tap limits are designated as L-1, H-1, H-2, H-3, etc.

In the chart on this page we have illustrated the difference between tap and product limit, using a ¼-20 tapped hole as the example.

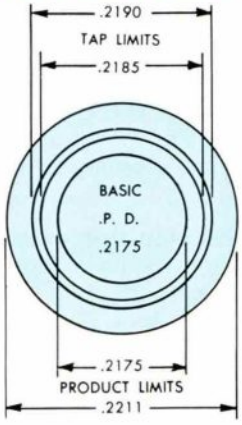
Although ground thread taps are produced to precision tolerances under closely controlled manufacturing processes and are guaranteed for accuracy of individual elements, there is always the possibility of the presence of unknown factors which can be detrimental to good tap performance. The tap manufacturer, therefore, is not able to guarantee the size of the tapped hole.

To summarize, the following points should be remembered:

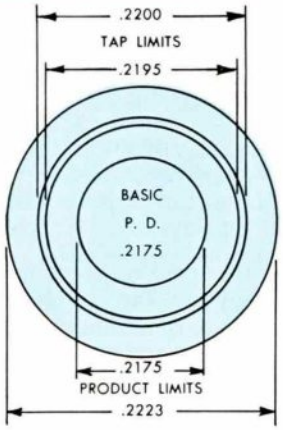
1. A tap cannot produce a Class of Thread. It can produce a tapped hole within specific product limits.
2. Since it is used only in tapping a hole, or producing an internal thread, a tap has no control over the fitting properties of the mating external thread.
3. To produce what is commonly referred to as a "Class of Thread," both the external and internal threads must be within their respective product limits. Only when both members of a threaded assembly fall within the desired class limits can the proper fit be assured.
4. The acceptability of any class of threaded hole is determined only by an accurate "Go" or "Hi" thread plug gage of the corresponding class. Similarly, the acceptability of a male part with an external thread is also determined by a corresponding "Go" or "Lo" thread ring gage.
5. When ordering taps, specify either the tap limit or the class of thread that identifies the limit of the tapped hole.
6. In special applications, supply as much information as possible. The more information our engineers have to work with, the better they can recommend a tap to do the job properly with least expense.
7. Remember, it is not always the most expensive tap which will do the job best. Our files contain many examples of special jobs which were solved with inexpensive standard taps.

¼ - 20 Tapped Hole

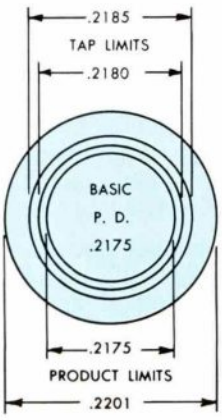
Class 2 Limit GH-3 Tap



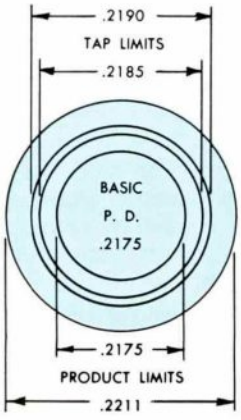
Class 2B Limit GH-5 Tap



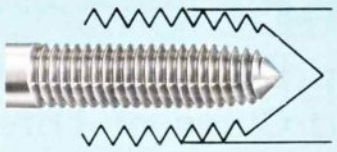
Class 3 Limit GH-2 Tap



Class 3B Limit GH-3 Tap



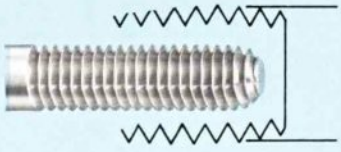
X-Press® Taps



Style P Plug Series

This series is thread relieved, utilizes a 5-thread taper point — 5 threads of taper to the first full form sizing thread. The taper permits easy starting.

Application: Through holes, or blind holes where there is ample clearance.



Style B Bottoming Series

This is the same as Style P Plug Series, except that it has a 2½-thread taper point and has the male center removed on sizes No. 4 and larger. Male center will be removed on Nos. 0-1-2 and 3 upon request.

Application: For use as a bottoming tap.

The X-Press Tap

The X-Press Tap was developed in the Besly engineering laboratories. It is the first major improvement in threading tools in at least a quarter century.

How X-Press Taps Form Internal Threads Without Cutting

The X-Press Tap has neither flutes nor cutting edges. Therefore, it produces no chips, cannot create a chip problem. The X-Press Tap cold forms internal threads in ductile metals such as copper, brass, lead, leaded steels and other metals. The resulting thread is burnished and toughened by this cold working.

The X-Press has far more strength of body than fluted taps, a feature of great importance in the smaller sizes. Tap breakage caused by chip loading is eliminated. There are no cutting edges to become dull and to break down.

Because the X-Press Tap has no cutting edges, pitch diameter can be held close to "No Go" gage limits for added tap life. The continuous thread of the tap assures accurate lead, thus assuring better control of tapped hole sizes.

Because there are no chips to clog or jam, the X-Press Tap can thread easily to the bottom. In addition, there are no chips to contaminate the plating solution in die-casting operations.

Because of longer life, fewer tool changes are required than with cutting type taps. The faster tapping speeds recommended with X-Press Taps reduce the cycle time on automatic tappers and screw machines to produce more tapped pieces per hour.

With X-Press Taps, the cost per threaded hole can be cut to a new low by a substantial reduction in downtime caused by chip problems, tap breakage and frequent tool replacement. The number of holes threaded per tap reaches a new high!

X-Press Tap Application Information

The X-Press Tap is regularly available in Machine Screw Sizes through No. 12, and in Fractional Tap Sizes through ¾ inch size, in Plug and Bottoming styles. Larger sizes are available on request.

X-Press Taps are now being used successfully in many ferrous materials such as Low Carbon Steels, Leaded Steels, Stainless Steels, Alloy Steels, A286 and Annealed Titanium. Consult your Besly representative.

Ductile materials are also adaptable to X-Press tapping. These include Aluminum, Brass, Tellurium, Armco Iron (including Magnetic), Die-Cast Zinc or Zamak, and Tenite.

The application of the X-Press Tap differs in no way from that of conventional cutting taps except for hole size. Since the material in the wall of the hole is not cut away but rather "flows" into the thread depressions of the tap when displaced by the crest, a larger diameter hole is required.

Blind hole tapping possible: Whenever possible in blind holes, drill or core deep enough to permit the use of the P style tool. These tools, with four threads of taper, will require less torque, will produce less burr upon entering the hole, and will give greater life.

Torque: Where the operation calls for 75% of thread or less, the torque required varies with the material from no additional torque to double the amount. On most applications, therefore, conventional single spindle equipment is suitable for driving the X-Press Tap. In multiple spindle applications, the required torque must be carefully evaluated.

No lead screw necessary: The X-Press Tap works equally well when used in a standard tapping head, automatic screw machine, or lead screw tapper. It is not necessary to have lead screw tapping equipment in order to run the X-Press Tap because the tool will pick up its own lead upon entering the hole.

Standard lubrication: In general it is best to use a good cutting oil or lubricant rather than a coolant for X-Press tapping. Sulfur base, and mineral oils, along with most any lubricants recommended for use in cold extrusion or metal drawing have proven best for this work.

Spindle speeds changed for higher production: For most materials spindle speeds may be at least double those recommended for conventional cutting type taps. Generally, the X-Press Tap extrudes with greater efficiency at higher rpm, but it is also possible to run the tap at lower speeds with satisfactory results.

Countersinking or chamfering helpful: Because the X-Press Tap displaces metal, some metal will be displaced above the mouth of the hole during tapping. For this reason, it is best to countersink or chamfer the hole prior to tapping, so that the extrusion will raise within the countersink and not interfere with the mating part.

X-Pressing cored holes possible: Cored holes may be tapped very readily with the X-Press Tap provided that the core pins are first changed to form the proper hole size. Because core pins have a draft or are slightly tapered the theoretical hole size should be at a point on the pin that is one-half the required length of engagement of the thread to be formed. In designing core pins for use with the X-Press Tap a chamfer should be included on the pin to accept the vertical extrusion.

Note

The X-Press Tap has also been proved valuable for burnishing rough threads in reclaiming damaged threads. These applications should, however, be evaluated by the Besly Engineering Department.

X-Press® Taps

Recommendations for Classes 2, 2B, 3B & Oversize Unified and American Screw Threads

MACHINE SCREW SIZES

Machine Screw Size	Basic Pitch Diameter	Tap Recommendations For Class 2 Thread		Tap Recommendations For Class 2B Thread		Tap Recommendations For Class 3B Thread		Oversize X-Press® Taps
		Styles Available	Max. P.D. Limits Thread	Styles Available	Max. P.D. Limits Thread	Styles Available	Max. P.D. Limits Thread	Styles Available
0-80 NF, UNF	.0519	B-2	.0536	B-3	.0542	B-2	.0536	
1-64 NC, UNC	.0629	B-2	.0648	B-3	.0655	B-2	.0648	
1-72 NF, UNF	.0640	B-2	.0658	B-3	.0665	B-2	.0659	
2-56 NC, UNC	.0744	B-2	.0764	B-3	.0772	B-2	.0765	
2-64 NF, UNF	.0759	B-2	.0778	B-3	.0786	B-2	.0779	
3-48 NC, UNC	.0855	B-2	.0877	B-3	.0885	B-2	.0877	
3-56 NF, UNF	.0874	B-2	.0894	B-3	.0902	B-2	.0895	
4-40 NC, UNC	.0958	P-3, B-3	.0982	P-5, B-5	.0991	P-3, B-3	.0982	
4-48 NF, UNF	.0985	P-3, B-3	.1007	P-5, B-5	.1016	P-3, B-3	.1008	
5-40 NC, UNC	.1088	P-3, B-3	.1112	P-5, B-5	.1121	P-3, B-3	.1113	
5-44 NF, UNF	.1102	P-3, B-3	.1125	P-5, B-5	.1134	P-3, B-3	.1126	
6-32 NC, UNC	.1177	P-3, B-3	.1204	P-5, B-5	.1214	P-3, B-3	.1204	P-10, B-10
6-40 NF, UNF	.1218	P-3, B-3	.1242	P-5, B-5	.1252	P-3, B-3	.1243	
8-32 NC, UNC	.1437	P-3, B-3	.1464	P-5, B-5	.1475	P-3, B-3	.1465	P-10, B-10
8-36 NF, UNF	.1460	P-3, B-3	.1485	P-5, B-5	.1496	P-3, B-3	.1487	
10-24 NC, UNC	.1629	P-4, B-4	.1662	P-6, B-6	.1672	P-4, B-4	.1661	P-10, B-10
10-32 NF, UNF	.1697	P-4, B-4	.1724	P-6, B-6	.1736	P-4, B-4	.1726	P-10, B-10
12-24 NC, UNC	.1889	P-4, B-4	.1922	P-6, B-6	.1933	P-4, B-4	.1922	
12-28 NF, UNF	.1928	P-4, B-4	.1959	P-6, B-6	.1970	P-4, B-4	.1959	

FRACTIONAL SIZES

¼-20 NC, UNC	.2175	P-4, B-4	.2211	P-6, B-6	.2223	P-4, B-4	.2211	P-10, B-10
¼-28 NF, UNF	.2268	P-4, B-4	.2299	P-6, B-6	.2311	P-4, B-4	.2300	P-10, B-10
5/16-18 NC, UNC	.2764	P-5, B-5	.2805	P-7, B-7	.2817	P-5, B-5	.2803	P-10, B-10
5/16-24 NF, UNF	.2854	P-5, B-5	.2887	P-7, B-7	.2902	P-5, B-5	.2890	P-10, B-10
⅜-16 NC, UNC	.3344	P-5, B-5	.3389	P-7, B-7	.3401	P-5, B-5	.3387	P-10, B-10
⅜-24 NF, UNF	.3479	P-5, B-5	.3512	P-7, B-7	.3528	P-5, B-5	.3516	P-10, B-10
7/16-14 NC, UNC	.3911	P-5, B-5	.3960	P-8, B-8	.3972	P-5, B-5	.3957	P-10, B-10
7/16-20 NF, UNF	.4050	P-5, B-5	.4086	P-8, B-8	.4104	P-5, B-5	.4091	P-10, B-10
½-13 NC, UNC	.4500	P-5, B-5	.4552	P-8, B-8	.4565	P-5, B-5	.4548	P-10, B-10
½-20 NF, UNF	.4675	P-5, B-5	.4711	P-8, B-8	.4731	P-5, B-5	.4717	P-10, B-10
9/16-12 NC, UNC	.5084	P-7, B-7	.5140	P-10, B-10	.5152	P-7, B-7	.5135	
9/16-18 NF, UNF	.5264	P-7, B-7	.5305	P-10, B-10	.5323	P-7, B-7	.5308	
⅝-11 NC, UNC	.5660	P-7, B-7	.5719	P-10, B-10	.5732	P-7, B-7	.5714	
⅝-18 NF, UNF	.5889	P-7, B-7	.5930	P-10, B-10	.5949	P-7, B-7	.5934	
¾-10 NC, UNC	.6850	P-7, B-7	.6914	P-10, B-10	.6927	P-7, B-7	.6907	
¾-16 NF, UNF	.7094	P-7, B-7	.7139	P-10, B-10	.7159	P-7, B-7	.7143	

The above recommended taps will normally produce the class of thread indicated in most materials. However, if the tap specified does not give a satisfactory gage fit in the work, a choice of some other limit tap will be necessary.

X-Press® Taps

Formula for Obtaining X-Press Tap Drill Sizes

The charts that follow are based upon a formula derived from research statistical data and are designed to reflect the flow characteristics of all ductile materials. Laboratory experiments proved that there are only slight differences in the flow characteristics of the different metals as related to internal threading. It will be necessary to deviate slightly from the recommended hole size when tapping extremely ductile or extra hard metals, or when using an Oversize X-Press Tap.

The formula for these theoretical hole size determinations is as follows

$$\text{(Basic Tap O.D.) minus } \left(\frac{.0068 \times \%\text{ of Thread}}{\text{Threads per Inch}}\right) = \text{Theoretical Hole Size (Core, punch or drill)}$$

EXAMPLE — To determine the proper drill size to form 65% of thread with a ¼-20 X-Press Tap:

$$(.2500) \text{ minus } \left(\frac{.0068 \times 65}{20}\right) = .2280$$

.2280 = Wire Gage Drill #1, the size drill to be used.

MACHINE SCREW SIZES

Machine Screw Size	Tap Drill Size	Decimal Equiv.	Theoretical Hole Core Size	Percentage of Thread
0-80	1.35 mm	.0531	.0536	75
1-64	1.65 mm	.0650	.0650	75
1-72	1.65 mm	.0650	.0659	75
	1.70 mm	.0669	.0669	65
	51	.0670	.0673	60
2-56	1.95 mm	.0768	.0769	75
	5/64	.0781	.0781	65
	47	.0785	.0787	60
2-64	5/64	.0781	.0780	75
	47	.0785	.0785	70
	2.00 mm	.0787	.0791	65
3-48	2.25 mm	.0886	.0884	75
	43	.0890	.0890	70
	2.30 mm	.0906	.0905	60
3-56	43	.0890	.0899	75
	2.30 mm	.0906	.0911	65
4-40	2.50 mm	.0984	.0993	75
	39	.0995	.1000	70
	38	.1015	.1018	60
4-48	38	.1015	.1020	70
	2.60 mm	.1024	.1028	65
5-40	34	.1110	.1123	75
	33	.1130	.1130	70
	2.90 mm	.1142	.1148	60
5-44	33	.1130	.1134	75
	2.90 mm	.1142	.1141	70
6-32	3.10 mm	.1220	.1221	75
	7/64	.1250	.1252	60
6-40	7/64	.1250	.1253	75
	3.20 mm	.1260	.1260	70
8-32	3.75 mm	.1476	.1490	75
	25	.1495	.1502	70
	3.80 mm	.1496	.1503	65
8-36	25	.1495	.1498	75
	3.80 mm	.1496	.1507	70
	24	.1520	.1526	60
10-24	4.25 mm	.1673	.1688	75
	18	.1695	.1700	70
	11/64	.1719	.1717	65
10-32	17	.1730	.1741	75
	16	.1770	.1772	60
12-24	10	.1935	.1948	75
	9	.1960	.1960	70
	5.00 mm	.1968	.1977	65
	8	.1990	.1989	60
12-28	5.00 mm	.1968	.1978	75
	8	.1990	.1989	70
	7	.2010	.2014	60

X-Press® Taps
Drill Selector

FRACTIONAL SIZES

Tap Size	Tap Drill Size	Decimal Equiv.	Theoretical Hole Core Size	Per-centage of Thread
¼-20	5.70 mm	.2244	.2245	75
	1	.2280	.2280	65
¼-28	5.90 mm	.2323	.2329	70
	A	.2340	.2343	65
	15/64	.2344	.2354	60
5/16-18	7.20 mm	.2835	.2842	75
	7.25 mm	.2854	.2861	70
	7.30 mm	.2874	.2879	65
	L	.2900	.2898	60
5/16-24	7.40 mm	.2913	.2912	75
	7.50 mm	.2953	.2955	60
⅜-16	8.75 mm	.3445	.3452	70
	8.80 mm	.3465	.3474	65
⅜-24	9.00 mm	.3543	.3552	70
	T	.3580	.3580	60

Tap Size	Tap Drill Size	Decimal Equiv.	Theoretical Hole Core Size	Per-centage of Thread
7/16-14	Y	.4040	.4059	65
7/16-20	10.50 mm	.4134	.4137	70
½-13	11.80 mm	.4646	.4660	65
½-20	12.00 mm	.4724	.4745	75
9/16-12	13.20 mm	.5197	.5200	75
9/16-18	13.50 mm	.5315	.5342	75
⅝-11	37/64	.5781	.5787	75
	14.75 mm	.5807	.5817	70
⅝-18	19/32	.5937	.5967	75
	15.25 mm	.6004	.6004	65
¾-10	45/64	.7031	.7058	65
¾-16	23/32	.7187	.7202	70

METRIC SIZES

Metric Size and Pitch	Drill Size	Decimal Equivalent	Drilled Hole Size (Prior to Tapping)		Class 6H Minor Diam. (After Tapping)	
			Min.	Max.	Min.	Max.
M3 x 0.5	7/64	.1094	.1070	.1098	.0968	.1023
M3.5 x 0.6	3.20 mm	.1260	.1244	.1277	.1122	.1185
M4 x 0.7	27	.1440	.1419	.1456	.1276	.1347
M4.5 x 0.75	4.10 mm	.1614	.1605	.1643	.1452	.1526
M5 x 0.8	4.60 mm	.1811	.1790	.1831	.1628	.1706
M6 x 1.0	5.50 mm	.2165	.2139	.2187	.1936	.2029
M7 x 1.0	6.50 mm	.2559	.2533	.2581	.2330	.2422
M8 x 1.25	L	.2900	.2871	.2925	.2617	.2721
M8 x 1.00	7.50 mm	.2953	.2927	.2975	.2725	.2816
M10 x 1.5	9.20 mm	.3622	.3603	.3664	.3298	.3416
M10 x 1.25	U	.3680	.3658	.3712	.3404	.3508
M12 x 1.75	7/16	.4375	.4334	.4403	.3979	.4111
M12 x 1.25	.447*		.4445	.4499	.4192	.4296
M14 x 2	13.00 mm	.5118	.5066	.5143	.4659	.4807
M14 x 1.5	13.20 mm	.5197	.5177	.5239	.4872	.4991
M16 x 2	15.00 mm	.5906	.5853	.5930	.5447	.5594
M16 x 1.5	15.25 mm	.6004	.5964	.6026	.5660	.5778
M18 x 2.5	16.75 mm	.6594	.6520	.6622	.6022	.6198
M18 x 1.5	17.25 mm	.6791	.6752	.6814	.6447	.6565
M20 x 2.5	47/64	.7344	.7316	.7408	.6809	.6986
M20 x 1.5	.757*		.7539	.7601	.7235	.7353

ANSI B1.13M specifies a maximum and minimum internal minor diameter for Class 6H threads. In normal applications the above recommended drilled hole sizes will produce internal threads which will meet these minor diameter gaging specifications.

* Standard drills not available. Reaming recommended.

Standard Taps

Recommendations and Gaging Limits for Classes 2, 3, 2B & 3B Unified and American Screw Threads

MACHINE SCREW SIZES

Tap Size	Threads per Inch NC UNC	Threads per Inch NF UNF	Recommended Tap For Class of Thread Class 2	Class 3	Class 2B	Class 3B	Pitch Diameter Gaging Limits For Class of Thread GO All Classes (Basic)	Hi Class 2	Hi Class 3	Hi Class 2B	Hi Class 3B
0		80	G H1	G H1	G H2	G H1	.0519	.0536	.0532	.0542	.0536
1	64		G H1	G H1	G H2	G H1	.0629	.0648	.0643	.0655	.0648
1		72	G H1	G H1	G H2	G H1	.0640	.0658	.0653	.0665	.0659
2	56		G H1	G H1	G H2	G H1	.0744	.0764	.0759	.0772	.0765
2		64	G H1	G H1	G H2	G H1	.0759	.0778	.0773	.0786	.0779
3	48		G H1	G H1	G H2	G H1	.0855	.0877	.0871	.0885	.0877
3		56	G H1	G H1	G H2	G H1	.0874	.0894	.0889	.0902	.0895
4	40		G H2	G H1	G H2	G H2	.0958	.0982	.0975	.0991	.0982
4		48	G H1	G H1	G H2	G H1	.0985	.1007	.1001	.1016	.1008
5	40		G H2	G H1	G H2	G H2	.1088	.1112	.1105	.1121	.1113
5		44	G H1	G H1	G H2	G H1	.1102	.1125	.1118	.1134	.1126
6	32		G H2	G H1	G H3	G H2	.1177	.1204	.1196	.1214	.1204
6		40	G H2	G H1	G H2	G H2	.1218	.1242	.1235	.1252	.1243
8	32		G H2	G H1	G H3	G H2	.1437	.1464	.1456	.1475	.1465
8		36	G H2	G H1	G H2	G H2	.1460	.1485	.1478	.1496	.1487
10	24		G H3	G H1	G H3	G H3	.1629	.1662	.1653	.1672	.1661
10		32	G H2	G H1	G H3	G H2	.1697	.1724	.1716	.1736	.1726
12	24		G H3	G H1	G H3	G H3	.1889	.1922	.1913	.1933	.1922
12		28	G H3	G H1	G H3	G H3	.1928	.1959	.1950	.1970	.1959

FRACTIONAL SIZES

Tap Size	Threads per Inch NC UNC	Threads per Inch NF UNF	Recommended Tap For Class of Thread Class 2	Class 3	Class 2B	Class 3B	Pitch Diameter Gaging Limits For Class of Thread GO All Classes (Basic)	Hi Class 2	Hi Class 3	Hi Class 2B	Hi Class 3B
¼	20		G H3	G H2	G H5	G H3	.2175	.2211	.2201	.2223	.2211
¼		28	G H3	G H1	G H4	G H3	.2268	.2299	.2290	.2311	.2300
5/16	18		G H3	G H2	G H5	G H3	.2764	.2805	.2794	.2817	.2803
5/16		24	G H3	G H1	G H4	G H3	.2854	.2887	.2878	.2902	.2890
⅜	16		G H3	G H2	G H5	G H3	.3344	.3389	.3376	.3401	.3387
⅜		24	G H3	G H1	G H4	G H3	.3479	.3512	.3503	.3528	.3516
7/16	14		G H5	G H3	G H5	G H3	.3911	.3960	.3947	.3972	.3957
7/16		20	G H3	G H1	G H5	G H3	.4050	.4086	.4076	.4104	.4091
½	13		G H5	G H3	G H5	G H3	.4500	.4552	.4537	.4565	.4548
½		20	G H3	G H1	G H5	G H3	.4675	.4711	.4701	.4731	.4717
9/16	12		G H5	G H3	G H5	G H3	.5084	.5140	.5124	.5152	.5135
9/16		18	G H3	G H2	G H5	G H3	.5264	.5305	.5294	.5323	.5308
⅝	11		G H5	G H3	G H5	G H3	.5660	.5719	.5702	.5732	.5714
⅝		18	G H3	G H2	G H5	G H3	.5889	.5930	.5919	.5949	.5934
¾	10		G H5	G H3	G H5	G H5	.6850	.6914	.6895	.6927	.6907
¾		16	G H3	G H2	G H5	G H3	.7094	.7139	.7126	.7159	.7143
⅞	9		G H6	G H4	G H6	G H4	.8028	.8098	.8077	.8110	.8089
⅞		14	G H4	G H2	G H6	G H4	.8286	.8335	.8322	.8356	.8339
1	8		G H6	G H4	G H6	G H4	.9188	.9264	.9242	.9276	.9254
1		12	G H4	G H2	G H6	G H4	.9459	.9515	.9499	.9535	.9516
1	14 NS		G H4	G H2	G H6	G H4	.9536	.9585	.9572	.9609	.9590
1⅛	7		G H8	G H4	G H8	G H4	1.0322	1.0407	1.0381	1.0416	1.0393
1⅛		12	G H4	G H4	G H6	G H4	1.0709	1.0765	1.0749	1.0787	1.0768
1¼	7		G H8	G H4	G H8	G H4	1.1572	1.1657	1.1631	1.1668	1.1644
1¼		12	G H4	G H4	G H6	G H4	1.1959	1.2015	1.1999	1.2039	1.2019
1⅜	6		G H8	G H4	G H8	G H4	1.2667	1.2768	1.2738	1.2771	1.2745
1⅜		12	G H4	G H4	G H6	G H4	1.3209	1.3265	1.3249	1.3291	1.3270
1½	6		G H8	G H4	G H8	G H4	1.3917	1.4018	1.3988	1.4022	1.3996
1½		12	G H4	G H4	G H6	G H4	1.4459	1.4515	1.4499	1.4542	1.4522

The above recommended taps normally produce the Class of Thread indicated in average materials when used with reasonable care. However, if the tap specified does not give a satisfactory gage fit in the work, a choice of some other limit tap will be necessary.

Standard Taps
Ground Thread Limits
Unified and American National Form

MACHINE SCREW SIZES

Tap Size	Threads per Inch NC UNC	NF UNF	NS	Major Diameter* in Inches Basic	Min.	Max.	Basic Pitch Diam.	Pitch Diameter Limits in inches H1 Limit Min.	H1 Limit Max.	H2 Limit Min.	H2 Limit Max.	H3 Limit Min.	H3 Limit Max.	H7 Limit* Min.	H7 Limit* Max.
0		80		.0600	.0605	.0615	.0519	.0519	.0524	.0524	.0529				
1	64			.0730	.0735	.0745	.0629	.0629	.0634	.0634	.0639				
1		72		.0730	.0735	.0745	.0640	.0640	.0645	.0645	.0650				
2	56			.0860	.0865	.0875	.0744	.0744	.0749	.0749	.0754				
2		64		.0860	.0865	.0875	.0759	.0759	.0764	.0764	.0769				
3	48			.0990	.1000	.1010	.0855	.0855	.0860	.0860	.0865				
3		56		.0990	.0995	.1005	.0874	.0874	.0879	.0879	.0884				
4			36	.1120	.1135	.1145	.0940			.0945	.0950				
4	40			.1120	.1135	.1145	.0958	.0958	.0963	.0963	.0968				
4		48		.1120	.1130	.1140	.0985	.0985	.0990	.0990	.0995				
5	40			.1250	.1265	.1275	.1088	.1088	.1093	.1093	.1098				
5		44		.1250	.1260	.1270	.1102	.1102	.1107	.1107	.1112				
6	32			.1380	.1400	.1410	.1177			.1182	.1187	.1187	.1192	.1207	.1212
6		40		.1380	.1395	.1405	.1218	.1218	.1223	.1223	.1228				
8	32			.1640	.1660	.1670	.1437	.1437	.1442	.1442	.1447	.1447	.1452	.1467	.1472
8		36		.1640	.1655	.1665	.1460	.1460	.1465	.1465	.1470				
10	24			.1900	.1930	.1940	.1629	.1629	.1634	.1634	.1639	.1639	.1644	.1659	.1664
10		32		.1900	.1920	.1930	.1697	.1697	.1702	.1702	.1707	.1707	.1712	.1727	.1732
12	24			.2160	.2190	.2200	.1889	.1889	.1894			.1899	.1904		
12		28		.2160	.2185	.2195	.1928	.1928	.1933			.1938	.1943		

FRACTIONAL SIZES

Tap Size	Threads per Inch NC UNC	NF UNF	NS	Major Diameter in Inches Basic	Min.	Max.	Basic Pitch Diam.	Pitch Diameter Limits in Inches H1 Limit Min.	H1 Limit Max.	H2 Limit Min.	H2 Limit Max.	H3 Limit Min.	H3 Limit Max.	H4 Limit Min.	H4 Limit Max.	H5 Limit Min.	H5 Limit Max.	H6 Limit Min.	H6 Limit Max.
¼	20			.2500	.2540	.2550	.2175	.2175	.2180	.2180	.2185	.2185	.2190			.2195	.2200		
¼		28		.2500	.2525	.2535	.2268	.2268	.2273	.2273	.2278	.2278	.2283	.2283	.2288				
5/16	18			.3125	.3170	.3180	.2764	.2764	.2769	.2769	.2774	.2774	.2779			.2784	.2789		
5/16		24		.3125	.3155	.3165	.2854	.2854	.2859	.2859	.2864	.2864	.2869	.2869	.2874				
⅜	16			.3750	.3800	.3810	.3344	.3344	.3349	.3349	.3354	.3354	.3359			.3364	.3369		
⅜		24		.3750	.3780	.3790	.3479	.3479	.3484	.3484	.3489	.3489	.3494	.3494	.3499				
7/16	14			.4375	.4435	.4445	.3911	.3911	.3916	.3916	.3921	.3921	.3926			.3931	.3936		
7/16		20		.4375	.4415	.4425	.4050	.4050	.4055	.4055	.4060	.4060	.4065			.4070	.4075		
½	13			.5000	.5065	.5075	.4500	.4500	.4505	.4505	.4510	.4510	.4515			.4520	.4525		
½		20		.5000	.5040	.5050	.4675	.4675	.4680	.4680	.4685	.4685	.4690			.4695	.4700		
9/16	12			.5625	.5690	.5700	.5084			.5089	.5094	.5094	.5099			.5104	.5109		
9/16		18		.5625	.5670	.5680	.5264			.5269	.5274	.5274	.5279			.5284	.5289		
⅝	11			.6250	.6320	.6330	.5660	.5660	.5665	.5665	.5670	.5670	.5675			.5680	.5685		
⅝		18		.6250	.6295	.6305	.5889	.5889	.5894	.5894	.5899	.5899	.5904			.5909	.5914		
11/16			11	.6875	.6945	.6955	.6285					.6295	.6300						
11/16			16	.6875	.6925	.6935	.6469					.6479	.6484						
¾	10			.7500	.7575	.7590	.6850	.6850	.6855	.6855	.6860	.6860	.6865			.6870	.6875		
¾		16		.7500	.7550	.7560	.7094	.7094	.7099	.7099	.7104	.7104	.7109			.7114	.7119		
⅞	9			.8750	.8835	.8850	.8028			.8033	.8038			.8043	.8048			.8053	.8058
⅞		14		.8750	.8810	.8820	.8286			.8291	.8296			.8301	.8306			.8311	.8316
1	8			1.0000	1.0095	1.0110	.9188			.9193	.9198			.9203	.9208			.9213	.9218
1		12		1.0000	1.0065	1.0075	.9459							.9474	.9479				
1			14	1.0000	1.0060	1.0070	.9536			.9541	.9546			.9551	.9556				
1⅛	7			1.1250	1.1350	1.1370	1.0322							1.0332	1.0342				
1⅛		12		1.1250	1.1315	1.1325	1.0709							1.0719	1.0729				
1¼	7			1.2500	1.2600	1.2620	1.1572							1.1582	1.1592				
1¼		12		1.2500	1.2565	1.2575	1.1959							1.1969	1.1979				
1⅜	6			1.3750	1.3870	1.3890	1.2667							1.2677	1.2687				
1⅜		12		1.3750	1.3815	1.3825	1.3209							1.3219	1.3229				
1½	6			1.5000	1.5120	1.5140	1.3917							1.3927	1.3937				
1½		12		1.5000	1.5065	1.5075	1.4459							1.4469	1.4479				

* Major Diameter for H7 Limit Tap is .002" larger than values shown in column 6 and 7.

Standard Taps

Cut and General Purpose Thread-Unified and American National Form

MACHINE SCREW SIZES

FRACTIONAL SIZES

Tap Size	Threads per Inch NC UNC	NF UNF	NEF UNEF	NS or UNS	Major Diameter in Inches Basic	Minimum	Maximum	Pitch Diameter in Inches Basic	Minimum	Maximum
0		80			.0600	.0609	.0624	.0519	.0521	.0531
1	64				.0730	.0740	.0755	.0629	.0631	.0641
1		72			.0730	.0740	.0755	.0640	.0642	.0652
2	56				.0860	.0872	.0887	.0744	.0746	.0756
2		64			.0860	.0870	.0885	.0759	.0761	.0771
3	48				.0990	.1003	.1018	.0855	.0857	.0867
3		56			.0990	.1002	.1017	.0874	.0876	.0886
4				36	.1120	.1137	.1157	.0940	.0942	.0957
4	40				.1120	.1136	.1156	.0958	.0960	.0975
4		48			.1120	.1133	.1153	.0985	.0987	.1002
5	40				.1250	.1266	.1286	.1088	.1090	.1105
6	32				.1380	.1402	.1422	.1177	.1182	.1197
6				36	.1380	.1397	.1417	.1200	.1202	.1217
6		40			.1380	.1396	.1416	.1218	.1220	.1235
8	32				.1640	.1662	.1682	.1437	.1442	.1457
8		36			.1640	.1657	.1677	.1460	.1462	.1477
8				40	.1640	.1656	.1676	.1478	.1480	.1495
10	24				.1900	.1928	.1948	.1629	.1634	.1649
10				28	.1900	.1924	.1944	.1668	.1673	.1688
10		32			.1900	.1922	.1942	.1697	.1702	.1717
12	24				.2160	.2188	.2208	.1889	.1894	.1909
12		28			.2160	.2184	.2204	.1928	.1933	.1948
14				24	.2420	.2448	.2473	.2149	.2154	.2174
1/16				64	.0625	.0635	.0650	.0524	.0526	.0536
3/32				48	.0938	.0951	.0966	.0803	.0805	.0815
1/8				40	.1250	.1266	.1286	.1088	.1090	.1105
5/32				32	.1563	.1585	.1605	.1360	.1365	.1380
5/32				36	.1563	.1580	.1600	.1382	.1384	.1399
3/16				24	.1875	.1903	.1923	.1604	.1609	.1624
3/16				32	.1875	.1897	.1917	.1672	.1677	.1692
7/32				24	.2188	.2216	.2236	.1917	.1922	.1937
7/32				32	.2188	.2210	.2230	.1985	.1990	.2005
1/4	20				.2500	.2532	.2557	.2175	.2180	.2200
1/4				24	.2500	.2528	.2553	.2229	.2234	.2254
1/4		28			.2500	.2524	.2549	.2268	.2273	.2288
1/4			32		.2500	.2522	.2547	.2297	.2302	.2317
5/16	18				.3125	.3160	.3185	.2764	.2769	.2789
5/16				20	.3125	.3157	.3182	.2800	.2805	.2825
5/16		24			.3125	.3153	.3178	.2854	.2859	.2874
5/16			32		.3125	.3147	.3172	.2922	.2927	.2942
3/8	16				.3750	.3789	.3814	.3344	.3349	.3369
3/8				20	.3750	.3782	.3807	.3425	.3430	.3450
3/8		24			.3750	.3778	.3803	.3479	.3484	.3499
7/16	14				.4375	.4419	.4449	.3911	.3916	.3941
7/16		20			.4375	.4407	.4437	.4050	.4055	.4075
7/16				24	.4375	.4403	.4433	.4104	.4109	.4129
1/2				12	.5000	.5050	.5080	.4459	.4464	.4489
1/2	13				.5000	.5047	.5077	.4500	.4505	.4530
1/2		20			.5000	.5032	.5062	.4675	.4680	.4700
1/2				24	.5000	.5028	.5058	.4729	.4734	.4754
9/16	12				.5625	.5675	.5705	.5084	.5089	.5114
9/16		18			.5625	.5660	.5690	.5264	.5269	.5289
5/8	11				.6250	.6304	.6334	.5660	.5665	.5690
5/8				12	.6250	.6300	.6330	.5709	.5714	.5739
5/8		18			.6250	.6285	.6315	.5889	.5894	.5914
11/16				11	.6875	.6929	.6969	.6285	.6290	.6320
11/16				16	.6875	.6914	.6954	.6469	.6474	.6499
3/4	10				.7500	.7559	.7599	.6850	.6855	.6885
3/4				12	.7500	.7550	.7590	.6959	.6964	.6994
3/4		16			.7500	.7539	.7579	.7094	.7099	.7124
7/8	9				.8750	.8820	.8860	.8028	.8038	.8068
7/8				12	.8750	.8805	.8845	.8209	.8219	.8249
7/8		14			.8750	.8799	.8839	.8286	.8296	.8321
7/8				18	.8750	.8790	.8830	.8389	.8399	.8424
1	8				1.0000	1.0078	1.0118	.9188	.9198	.9228
1		12			1.0000	1.0055	1.0095	.9459	.9469	.9499
1				14	1.0000	1.0049	1.0089	.9536	.9546	.9571

Standard Cutting Taps

Drill Selector

MACHINE SCREW SIZES

Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical % of Thread	Prob-able Oversize (Mean)	Prob-able Hole Size	Percentage of Thread
0-80	56	.0465	83	.0015	.0480	74
	3/64	.0469	81	.0015	.0484	71
1-64	54	.0550	89	.0015	.0565	81
1-72	53	.0595	75	.0015	.0610	67
2-56	51	.0670	82	.0017	.0687	74
	50	.0700	69	.0017	.0717	62
2-64	50	.0700	79	.0017	.0717	70
3-48	48	.0760	85	.0019	.0779	78
	5/64	.0781	77	.0019	.0800	70
	47	.0785	76	.0019	.0804	69
	46	.0810	67	.0019	.0829	60
3-56	46	.0810	78	.0019	.0829	69
	45	.0820	73	.0019	.0839	65
4-40	44	.0860	80	.0020	.0880	74
	43	.0890	71	.0020	.0910	65
4-48	42	.0935	68	.0020	.0955	61
	3/32	.0938	68	.0020	.0958	60
5-40	40	.0980	83	.0023	.1003	76
	39	.0995	79	.0023	.1018	71
	38	.1015	72	.0023	.1038	65
5-44	38	.1015	79	.0023	.1038	72
	37	.1040	71	.0023	.1063	63
6-32	37	.1040	84	.0023	.1063	78
	36	.1065	78	.0026	.1091	71
	7/64	.1094	70	.0026	.1120	64
	35	.1100	69	.0026	.1126	63
	34	.1110	67	.0026	.1136	60
6-40	34	.1110	83	.0026	.1136	75
	33	.1130	77	.0026	.1156	69
	32	.1160	68	.0026	.1186	60
8-32	29	.1360	69	.0029	.1389	62
8-36	29	.1360	78	.0029	.1389	70
10-24	27	.1440	85	.0032	.1472	79
	26	.1470	79	.0032	.1502	74
	25	.1495	75	.0032	.1527	69
	24	.1520	70	.0032	.1552	64
	23	.1540	67	.0032	.1572	61
10-32	5/32	.1563	83	.0032	.1595	75
	22	.1570	81	.0032	.1602	73
	21	.1590	76	.0032	.1622	68
	20	.1610	71	.0032	.1642	64
12-24	11/64	.1719	82	.0035	.1754	75
	17	.1730	79	.0035	.1765	73
	16	.1770	72	.0035	.1805	66
	15	.1800	67	.0035	.1835	60
12-28	16	.1770	84	.0035	.1805	77
	15	.1800	78	.0035	.1835	70
	14	.1820	73	.0035	.1855	66

These tables show both the theoretical percentage of thread represented by the drill size and the percentage that would normally be obtained in drilling.

FRACTIONAL SIZES

Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theoretical % of Thread	Prob-able Oversize (Mean)	Prob-able Hole Size	Percentage of Thread
1/4-20	9	.1960	83	.0038	.1998	77
	8	.1990	79	.0038	.2028	73
	7	.2010	75	.0038	.2048	70
	13/64	.2031	72	.0038	.2069	66
	6	.2040	71	.0038	.2078	65
	5	.2055	69	.0038	.2093	63
	4	.2090	63	.0038	.2128	57
1/4-28	3	.2130	80	.0038	.2168	72
5/16-18	F	.2570	77	.0038	.2608	72
	G	.2610	71	.0041	.2651	66
5/16-24	H	.2660	86	.0041	.2701	78
	I	.2720	75	.0041	.2761	67
3/8-16	5/16	.3125	77	.0044	.3169	72
	O	.3160	73	.0044	.3204	68
3/8-24	21/64	.3281	87	.0044	.3325	79
	Q	.3320	79	.0044	.3364	71
7/16-14	T	.3580	86	.0046	.3626	81
	23/64	.3594	84	.0046	.3640	79
	U	.3680	75	.0046	.3726	70
	3/8	.3750	67	.0046	.3796	62
	V	.3770	65	.0046	.3816	60
7/16-20	W	.3860	79	.0046	.3906	72
	25/64	.3906	72	.0046	.3952	65
1/2-13	27/64	.4219	78	.0047	.4266	73
1/2-20	29/64	.4531	72	.0047	.4578	65
9/16-12	15/32	.4688	87	.0048	.4736	82
	31/64	.4844	72	.0048	.4892	68
9/16-18	1/2	.5000	87	.0048	.5048	80
5/8-11	17/32	.5313	79	.0049	.5362	75
	35/64	.5469	66	.0049	.5518	62
5/8-18	9/16	.5625	87	.0049	.5674	80
3/4-10	41/64	.6406	84	.0050	.6456	80
	21/32	.6563	72	.0050	.6613	68
3/4-16	11/16	.6875	77	.0050	.6925	71
7/8-9	49/64	.7656	76	.0052	.7708	72
	25/32	.7812	65	.0052	.7864	61
7/8-14	51/64	.7969	84	.0052	.8021	79
	13/16	.8125	67	.0052	.8177	62
1"- 8	55/64	.8594	87	.0059	.8653	83
	7/8	.8750	77	.0059	.8809	73
	57/64	.8906	67	.0059	.8965	64
1"-12	23/32	.9063	87	.0060	.9122	81
	59/64	.9219	72	.0060	.9279	67
1"-14	59/64	.9219	84	.0060	.9279	78
	15/16	.9375	67	.0060	.9435	61
1 1/8- 7	31/32	.9688	84	.0062	.9750	81
	63/64	.9844	76	.0067	.9911	72
	1"	1.0000	67	.0070	1.0070	64
1 1/8-12	1 1/32	1.0313	87	.0071	1.0384	80
	1 3/64	1.0469	72	.0072	1.0541	66
1 1/4- 7	1 3/32	1.0938	84	Reaming Recommended		
	1 7/64	1.1094	76			
	1 1/8	1.1250	67			
1 1/4-12	1 5/32	1.1563	87			
	1 11/64	1.1719	72			
1 3/8- 6	1 3/16	1.1875	87			
	1 13/64	1.2031	79			
	1 7/32	1.2188	72			
	1 15/64	1.2344	65			
1 3/8-12	1 9/32	1.2813	87			
	1 19/64	1.2969	72			
1 1/2- 6	1 5/16	1.3125	87			
	1 21/64	1.3281	79			
	1 11/32	1.3438	72			
	1 23/64	1.3594	65			
1 1/2-12	1 13/32	1.4063	87			
	1 27/64	1.4219	72			

Acme and Related Thread Taps

An ever increasing demand for special thread taps such as acme, stub acme, modified square, buttress and others is being shown in the metalworking industry. Acme threads are used chiefly for the purpose of producing traversing motions on machines, tools, valves, and in a variety of other ways.

The three classes of general purpose threads have clearances on all diameters for free movement and may be used in assemblies with the internal thread rigidly fixed and movement of the external thread in a direction perpendicular to its axis limited by its bearing or bearings. The five classes of centralizing threads have a limited clearance at the major diameters of the external and internal threads, thereby maintaining close alignment of the thread axis and preventing wedging on the flanks of the thread. The stub acme thread generally applies where a coarse pitch thread or shallow depth is required due to mechanical or metallurgical considerations. When backlash or end play is objectionable, some mechanical means should be provided to eliminate the condition.

Acme and related thread taps have usually been furnished in sets of a single or series of roughing taps and a finishing tap. Continued experience and careful engineering have made it possible to reduce the number of taps needed for given jobs. Most Besly taps for Acme and related thread applications can now be engineered for the job in a single pass tap or one roughing and a finishing tap. Occasionally a series of roughing taps is still needed.

Since Acme and related thread taps are of a special design, each tapping job is engineered individually. Inquiries and orders should furnish complete information on both nut and screw. Blueprints of the part, sketches or samples of the mating screw are valuable in the development of the correct tap for the job. When these are not available, the following information should be provided:

Basic Major Diameter _____

Pitch _____

Lead _____

Right or Left Hand _____

Thread Form _____

Class of Fit _____

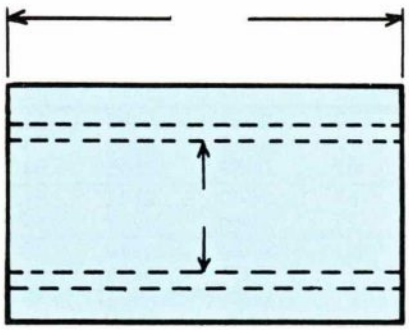
Taps will be operated Vertically. Horizontally.

If horizontally operated: Taps Nut will be revolved.

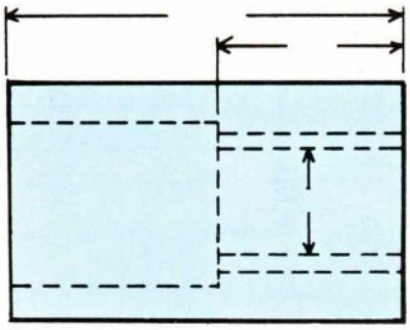
Will taps be backed out of nut? ____

Material to be tapped? _____

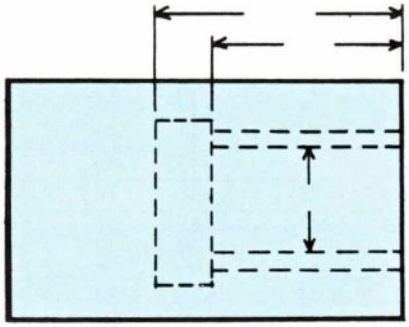
Identify as closely as possible.



No. 1
With Thru Hole



No. 2
With Counterbored Hole
From which end will tap enter?



No. 3
With Blind Hole

Dimension sketch that applies.
Is this a production job or a small quantity run ?_____

_____

Hole will be drilled or bored to_____

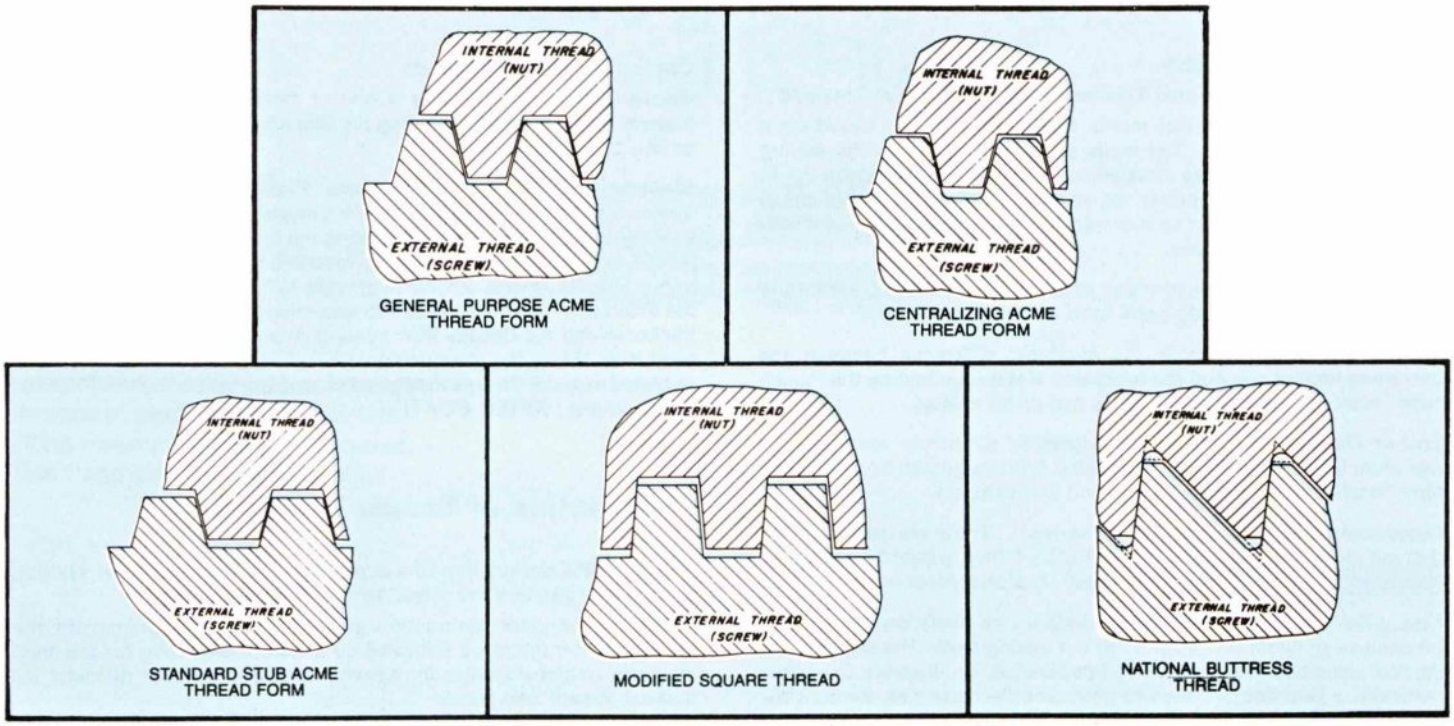
_____Diameter before tapping.

Where finishing tap only is desired:

We should be provided with the roughing tap which precedes it for measuring purposes.

If the nut is to be rough threaded in a lathe we should be given details as to how much stock will be left on each side and/or on the top of the thread for the finishing tap to remove.

Where the thread form is special we should be supplied with a sample screw unless full details are given on the print.



GENERAL PURPOSE SERIES

These Acme thread sizes have been adopted both as an ANSI standard and as a standard for Federal Services. Complete specifications are given in FED-STD-H28/12.

Dimensions for Stub Acme Threads are given in ASME/ANSI B1.8. Information on 10° Modified Square Threads and 60° stub threads can be found in H28/19. National Buttress threads are covered in ASME/ANSI B1.9.

Multiple threads are recommended when faster leads than standard are required, rather than the use of coarser pitch single threads.

		Major Diam.		Minor Diam.		Pitch Diam.								
		Screw		Nut		Screw							Nut	
							Class 2G			Class 3G			Class 2G	Class 3G
Nominal Size	Threads per Inch	Min.	Max. (Basic)	Min. (Basic)	Max.	Basic	Min.	Max.	Allowance	Min.	Max.	Allowance	Min. is Basic Max.	Min. is Basic Max.
¼	16	.2469	.2500	.1875	.1925	.2188	.2043	.2148	.0040	.2109	.2158	.0030	.2293	.2237
5/16	14	.3089	.3125	.2411	.2461	.2768	.2614	.2728	.0040	.2685	.2738	.0030	.2882	.2821
⅜	12	.3708	.3750	.2917	.2967	.3333	.3161	.3284	.0049	.3238	.3296	.0037	.3456	.3391
7/16	12	.4333	.4375	.3542	.3592	.3958	.3783	.3909	.0049	.3862	.3921	.0037	.4084	.4017
½	10	.4950	.5000	.4000	.4050	.4500	.4306	.4443	.0057	.4394	.4458	.0042	.4637	.4564
⅝	8	.6188	.6250	.5000	.5062	.5625	.5408	.5562	.0063	.5506	.5578	.0047	.5779	.5697
¾	6	.7417	.7500	.5833	.5916	.6667	.6424	.6598	.0069	.6534	.6615	.0052	.6841	.6748
⅞	6	.8667	.8750	.7083	.7166	.7917	.7663	.7842	.0075	.7778	.7861	.0056	.8096	.8000
1	5	.9900	1.0000	.8000	.8100	.9000	.8726	.8920	.0080	.8949	.8940	.0060	.9194	.9091
1⅛	5	1.1150	1.1250	.9250	.9350	1.0250	.9967	1.0165	.0085	1.0094	1.0186	.0064	1.0448	1.0342
1¼	5	1.2400	1.2500	1.0500	1.0600	1.1500	1.1210	1.1411	.0089	1.1339	1.1433	.0067	1.1701	1.1594
1⅜	4	1.3625	1.3750	1.1250	1.1375	1.2500	1.2186	1.2406	.0094	1.2327	1.2430	.0070	1.2720	1.2603
1½	4	1.4875	1.5000	1.2500	1.2625	1.3750	1.3429	1.3652	.0098	1.3573	1.3677	.0073	1.3973	1.3854
1¾	4	1.7375	1.7500	1.5000	1.5125	1.6250	1.5916	1.6145	.0105	1.6064	1.6171	.0079	1.6479	1.6357
2	4	1.9875	2.0000	1.7500	1.7625	1.8750	1.8402	1.8637	.0113	1.8555	1.8665	.0085	1.8985	1.8360
2¼	3	2.2333	2.2500	1.9167	1.9334	2.0833	2.0450	2.0713	.0120	2.0620	2.0743	.0090	1.2096	2.0956
2½	3	2.4833	2.5000	2.1667	2.1834	2.3333	2.2939	2.3207	.0126	2.3113	2.3238	.0095	2.3601	2.3458
2¾	3	2.7333	2.7500	2.4167	2.4334	2.5833	2.5427	2.5700	.0133	2.5607	2.5734	.0099	2.6106	2.5960
3	2	2.9750	3.0000	2.5000	2.5250	2.7500	2.7044	2.7360	.0140	2.7248	2.7395	.0105	2.7816	2.7647
4	2	3.9750	4.0000	3.5000	3.5250	3.7500	3.7008	3.7340	.0160	3.7225	3.7380	.0120	3.7832	3.7655
5	2	4.9750	5.0000	4.5000	4.5250	4.7500	4.6973	4.7319	.0181	4.7202	4.7364	.0136	4.7846	4.7662

Metric Screw Threads – M Profile

ANSI B1.13M – 1995

Tolerance System

ISO System of Limits and Fits as applied to Screw Threads

General. The international metric tolerance system is based on a system of limits and fits. The limits of the tolerances on the mating parts and their allowances (fundamental deviations) determine the fit of the assembly. For simplicity the system is described for cylindrical parts. Holes are equivalent to internally threaded surfaces and shafts to externally threaded surfaces.

Basic Size. This is the zero line or surface at assembly, where the interface of the two mating parts have a common reference.

Upper Deviation. This is the algebraic difference between the maximum limit of size and the basic size. It is designated by the French term "ecart superieur" (*ES* for holes and *es* for shafts).

Lower Deviation. This is the algebraic difference between the minimum limit of size and the basic size. It is designated by the French term "ecart inferieur" (*EI* for holes and *ei* for shafts).

Fundamental Deviations (Allowances). These are the deviations that are closest to the basic size. In Figure 1 they would be *EI* and *es*. Fundamental deviations are designated by alphabetical letters.

Fits. Fits are determined by the fundamental deviation, which may be positive or negative, assigned to the mating parts. The selected fits can be clearance, transition, and interference. To illustrate fits schematically, a zero line is drawn to represent the basic size. By convention, the shaft always lies below the zero line and the hole lies above the zero line (except for interference fits). This makes the fundamental deviation negative for the shaft and equal to its upper deviation (*es*). The fundamental deviation is positive for the hole and equal to its lower deviation (*EI*). See Figure 1.

Tolerance. Defined by a series of numerical grades, each grade provides numerical values for nominal sizes corresponding to the standard tolerance.

The Tolerance Grade

This is indicated by a number. The system provides for a series of tolerance grades for each of the four screw thread parameters:

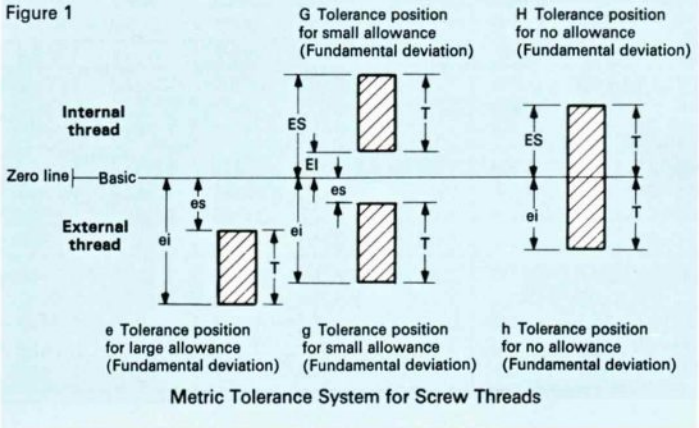
	Tolerance Grade
D_1 Minor diameter of internal threads	4, 5, 6, 7, 8
d Major diameter of external threads	4, 6, 8
D_2 Pitch diameter of internal threads	4, 5, 6, 7, 8
d_2 Pitch diameter of external threads	3, 4, 5, 6, 7, 8, 9

The Tolerance Position

This is indicated by a letter. This position is the allowance (fundamental deviation). A capital letter is used for internal threads and a lower case letter for external threads. The system provides a series of tolerance positions for internal and external threads. These tolerance positions are as follows:

Internal Threads	G, H
External Threads	e, g, h

Figure 1



Metric Tolerance System for Screw Threads

Coated or Plated Threads

Coated Threads. Coating is one or more applications of additive material to the threads, including dry film lubricants, but excluding soft or liquid lubricants.

Material Limits for Coated and Plated Threads. The pitch diameter on tolerance position *H/h* threads shall be within adjusted limits before coating, and after coating the threads shall not exceed the tabulated maximum material limits specified herein. On tolerance position *g* threads, unless otherwise specified, the tolerance position *g* on the external thread may be used to accommodate the coating or plating thickness and the threads after coating or plating shall not exceed the basic size. When the tolerance position *g* must be retained on coated or plated external threads the thread class designation shall be followed by the words: AFTER COATING or AFTER PLATING.

Designation of Screw Threads

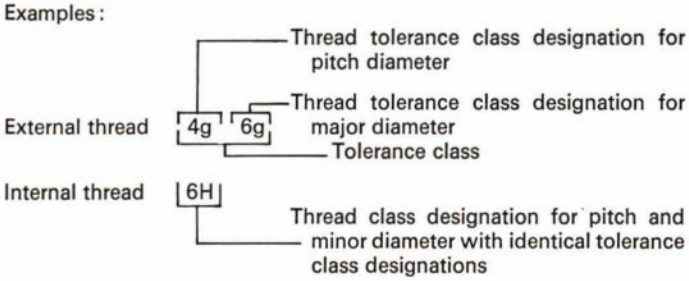
General

The complete designation of a screw thread gives the thread symbol, the nominal size and the thread tolerance class.

The tolerance class designation gives the class designation for the pitch diameter tolerance followed by a class designation for the crest diameter (major diameter for external thread and minor diameter for internal thread) tolerances.

The class designation consists of a number indicating the tolerance grade followed by a letter indicating the tolerance position.

Examples:



Designation of Standard Screw Threads

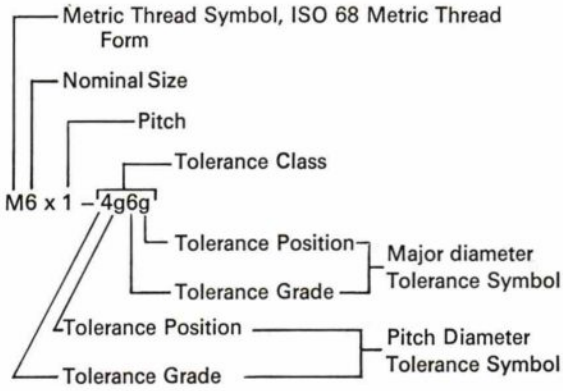
Metric screw threads are identified by letter (M) for the thread form profile, followed by the nominal diameter size and the pitch expressed in millimeters, separated by the sign (x) and followed by the tolerance class separated by a dash (–) from the pitch.

The simplified international practice for designating coarse pitch M profile screw threads is to leave off the pitch. Thus a M14 x 12 thread is designated just M14. To prevent misunderstanding, it is mandatory to use the value for pitch in all other designations.

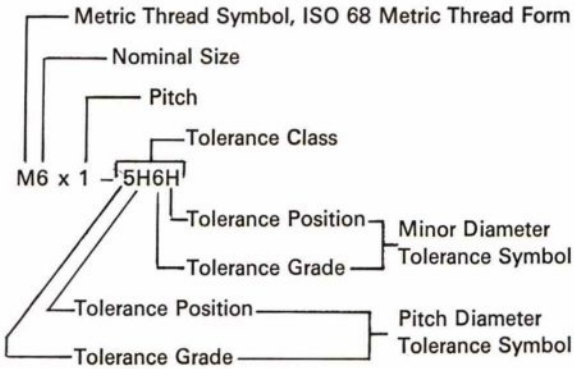
Unless otherwise specified in the designation, the screw thread helix is right hand.

Example:

External Thread M Profile, Right Hand:



Internal Thread M Profile, Right Hand:



Designation of Left Hand Thread. When left hand thread is specified, the tolerance class designation is followed by a space and LH.

Example:

M6 x 1–5H6H–LH

Designation for Equal Tolerance Classes. If the two tolerance class designations for a thread are identical, it is not necessary to repeat the symbols.

Example:

M6 x 1–6H

Designations Using All Capital Letters. When computer and teletype thread designations use all capital letters, the external or internal thread may need further identification. Thus the tolerance class identification is followed by the abbreviations EXT or INT in capital letters.

Examples:

M6 x 1–4G6G EXT
M6 x 1–6H INT

Designation for Thread Fit

A fit between mating threads is indicated by the internal thread tolerance class followed by the external thread tolerance class separated by a slash.

Examples:

M6 x 1–6H/6g
M6 x 1–6H/4g6g

Designation for Rounded Root External Thread

Modified ISO 68 Thread with Radius Root Rmin = 0.125P. For the mandatory condition external fasteners of property class 8.8 and stronger no special designation is required. Other parts requiring a 0.125P root radius must specify that radius.

Designation for Special Rounded Root Thread

When a special rounded root thread is required its external thread designation is suffixed by the minimum root radius value in millimeters and the letter R.

Example:

M42 x 4.5–6g–0.63R — Minimum Root Radius

Designation of Threads Having Modified Crests

Where the limits of size of the major diameter of an external thread or the minor diameter of an internal thread are modified, the thread designation is suffixed by the letters MOD followed by the modified diameter limits.

Example: External thread M profile, major diam. reduced 0.075 mm.
M6 x 1–4h6h MOD
Major dia. = 5.745 – 5.925 MOD

Example: Internal thread M profile, minor diam. increased 0.075 mm.
M6 x 1–4H5H MOD
Minor dia. = 5.101 – 5.291 MOD

Designation of Special Threads

Special diameter-pitch threads, developed in accordance with this standard, shall be identified by the letters SPL following the tolerance class. Below the designation shall be specified the limits of size for major diameter, pitch diameter and minor diameter.

Example: External thread
M6.5 x 1–4h6h–SPL
Major dia. = 6.320 – 6.500
Pitch dia. = 5.779 – 5.850
Minor dia. = 5.163 – 5.386

Example: Internal thread
M6.5 x 1–4H5H–SPL
Major dia. = 6.500 min
Pitch dia. = 5.850 – 5.945
Minor dia. = 5.417 – 5.607

Designation of Multiple Start Threads

When a thread is required with a multiple start, it is designated by specifying sequentially M for metric thread, nominal diameter size, x L for lead, lead value, dash, P for pitch, pitch value, dash, tolerance class, parenthesis, script number of starts, and the word starts, close parenthesis.

Examples: M16 x L4–P2–4h6h (TWO STARTS)
M14 x L6–P2–6H (THREE STARTS)

Designation of Coated or Plated M Threads

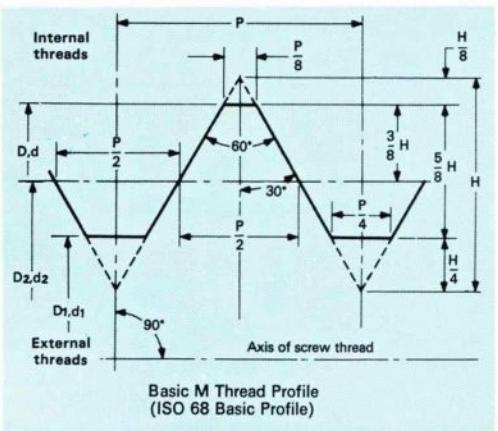
Specify if the tolerance class is after coating or after plating. If no designation of after coating or after plating is specified, the tolerance class applies before coating or plating in accordance with ISO practice. After plating the thread profile shall not transgress the maximum material limits for the tolerance position H/h.

Examples:

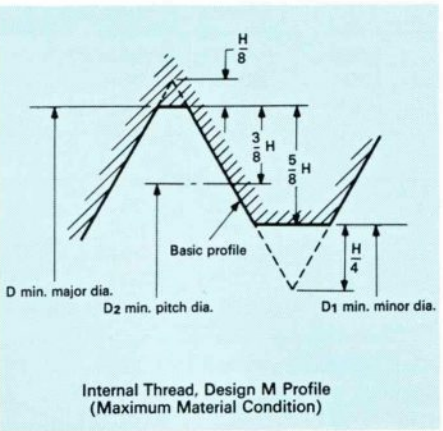
M6 x 1–6h AFTER COATING or AFTER PLATING
M6 x 1–6g AFTER COATING or AFTER PLATING

Where the tolerance position G/g is insufficient relief for the application to hold the threads within product limits, the coating or plating allowance may be specified as the maximum and minimum limits of size for minor and pitch diameter of internal threads or major and pitch diameter of external threads before coating or plating.

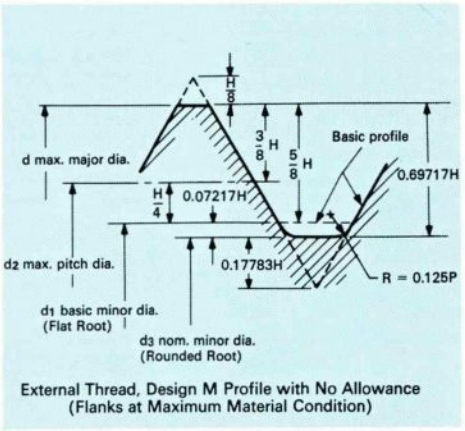
Example: Allowance on external thread M profile based on 0.010mm min coating thickness
M6 x 1–4h6h AFTER COATING
BEFORE COATING
Major dia. = 5.780 – 5.940
Pitch dia. = 5.239 – 5.290



Basic M Thread Profile
(ISO 68 Basic Profile)



Internal Thread, Design M Profile
(Maximum Material Condition)



External Thread, Design M Profile with No Allowance
(Flanks at Maximum Material Condition)

The preceding information has been excerpted from ANSI B1.13M-1979 with the permission of the publisher, The American Society of Mechanical Engineers.

Metric Taps

Thread Limits and Tolerances

General

The following tables and formulae are used in determining the limits and tolerances for ground thread metric taps unless otherwise specified. They apply only to metric threads having a 60° form with a P/8 flat at the major diameter of the basic thread form.

Lead Tolerance

A maximum lead error of plus or minus 0.013mm within any two threads not farther apart than 25mm is permitted.

Angle Tolerance

Pitch (mm)	Deviation in Half Angle
Over 0.25 to 2.5 Incl.	30′ Plus or Minus
Over 2.5 to 4 Incl.	25′ Plus or Minus
Over 4 to 6 Incl.	20′ Plus or Minus

Formulae

Min. Major Dia. = Basic plus W
Max. Major Dia. = Min. plus X
Max. Pitch Dia. = Basic plus Y
Min. Pitch Dia. = Max. minus Z

W = Constant to add to Basic Major Diameter*
X = Major Diameter Tolerance
Y = Amount over Basic for Maximum Pitch Diameter
Z = Pitch Diameter Tolerance

*W = .080P converted to inches

Note: When the tap major diameter must be determined from a specified tap pitch diameter, the minimum major diameter equals the maximum specified tap pitch diameter minus constant Y, plus 0.64952 P, plus constant W.

VALUES FOR W, X, Y, AND Z (IN INCHES)

P Pitch				Y				Z			
mm	Inch Equiv.	W	X	Over M1.6 to M6.3 Incl.	Over M6.3 to M25 Incl.	Over M25 to M90 Incl.	Over M90	Over M1.6 to M6.3 Incl.	Over M6.3 to M25 Incl.	Over M25 to M90 Incl.	Over M90
0.3	.01181	.0009	.0010	.0015	.0015	.0020	.0020	.0006	.0006	.0008	.0008
0.35	.01378	.0011	.0010	.0015	.0015	.0020	.0020	.0006	.0006	.0008	.0008
0.4	.01575	.0013	.0010	.0015	.0020	.0020	.0020	.0006	.0006	.0008	.0010
0.45	.01772	.0014	.0010	.0015	.0020	.0020	.0020	.0006	.0008	.0008	.0010
0.5	.01068	.0016	.0010	.0015	.0020	.0020	.0025	.0006	.0008	.0010	.0010
0.6	.02362	.0019	.0010	.0020	.0020	.0025	.0025	.0008	.0008	.0010	.0010
0.7	.02756	.0022	.0016	.0020	.0020	.0025	.0025	.0008	.0008	.0010	.0010
0.75	.02953	.0024	.0016	.0020	.0025	.0025	.0030	.0008	.0010	.0010	.0012
0.8	.03150	.0025	.0016	.0020	.0025	.0025	.0030	.0008	.0010	.0010	.0012
0.9	.03543	.0028	.0016	.0020	.0025	.0025	.0030	.0008	.0010	.0010	.0012
1	.03937	.0032	.0016	.0025	.0025	.0030	.0030	.0010	.0010	.0012	.0012
1.25	.04921	.0039	.0025	.0025	.0025	.0030	.0035	.0010	.0012	.0012	.0016
1.5	.05906	.0047	.0025	.0025	.0030	.0030	.0035	.0010	.0012	.0012	.0016
1.75	.06890	.0055	.0025		.0030	.0035	.0040		.0012	.0016	.0016
2	.07874	.0063	.0025		.0035	.0035	.0040		.0016	.0016	.0016
2.5	.09843	.0079	.0025		.0035	.0040	.0045		.0016	.0016	.0020
3	.11811	.0095	.0039		.0040	.0040	.0050		.0016	.0020	.0020
3.5	.13780	.0110	.0039		.0040	.0045	.0050		.0016	.0020	.0020
4	.15748	.0126	.0039		.0040	.0045	.0055		.0020	.0020	.0025
4.5	.17717	.0142	.0039			.0050	.0055		.0020	.0020	.0025
5	.19685	.0158	.0039			.0050	.0060			.0025	.0025
5.5	.21654	.0173	.0039			.0055	.0060			.0025	.0025
6	.23622	.0189	.0039			.0055	.0060			.0025	.0025

Metric Cutting Taps

Drill Selector

Metric Tap Size	Basic Major Dia. (Ins.)	Tap Drill Size	Decimal Equiv. of Tap Drill (Ins.)	Theoretical Percent of Thread	Prob-able Mean Over-Size (Ins.)	Prob-able Hole Size (Ins.)	Probable Percent of Thread
M1.6 x 0.35	.0630	1.25 mm	.0492	77	.0015	.0507	69
M1.8 x 0.35	.0709	1.45 mm	.0571	77	.0015	.0586	69
M2 x 0.4	.0787	1/16"	.0625	79	.0015	.0640	72
		1.60 mm	.0630	77	.0017	.0647	69
		#52	.0635	74	.0017	.0652	66
M2.2 x 0.45	.0866	1.75 mm	.0689	77	.0017	.0706	70
M2.5 x 0.45	.0984	2.05 mm	.0807	77	.0019	.0826	69
		#46	.0810	76	.0019	.0829	67
		#45	.0820	71	.0019	.0839	63
M3 x 0.5	.1181	#40	.0980	79	.0023	.1003	70
		2.5 mm	.0984	77	.0023	.1007	68
		#39	.0995	73	.0023	.1018	64
M3.5 x 0.6	.1378	#33	.1130	81	.0026	.1156	72
		2.9 mm	.1142	77	.0026	.1168	68
		#32	.1160	71	.0026	.1186	63
M4 x 0.7	.1575	*3.25 mm	.1280	82	.0029	.1309	74
		#30	.1285	81	.0029	.1314	73
		3.3 mm	.1299	77	.0029	.1328	69
M4.5 x 0.75	.1772	3.7 mm	.1457	82	.0032	.1489	74
		#26	.1470	79	.0032	.1502	70
		*3.75 mm	.1476	77	.0032	.1508	69
		#25	.1495	72	.0032	.1527	64
M5 x 0.8	.1968	4.2 mm	.1654	77	.0032	.1686	69
		#19	.1660	75	.0032	.1692	68
M6 x 1	.2362	#10	.1935	84	.0038	.1973	76
		#9	.1960	79	.0038	.1998	71
		5 mm	.1968	77	.0038	.2006	70
		#8	.1990	73	.0038	.2028	65
M7 x 1	.2756	"A"	.2340	81	.0038	.2378	74
		15/64"	.2344	81	.0038	.2382	73
		6 mm	.2362	77	.0038	.2400	70
		"B"	.2380	74	.0038	.2418	66
M8 x 1.25	.3150	6.7 mm	.2638	80	.0041	.2679	74
		17/64"	.2656	77	.0041	.2697	71
		*6.75 mm	.2657	77	.0041	.2698	71
		"H"	.2660	77	.0041	.2701	70
		6.8 mm	.2677	74	.0041	.2718	68
M8 x 1	.3150	7 mm	.2756	77	.0041	.2797	69
		"J"	.2770	74	.0041	.2811	66
M10 x 1.5	.3937	8.4 mm	.3307	82	.0044	.3351	76
		"Q"	.3320	80	.0044	.3364	75
		8.5 mm	.3346	77	.0044	.3390	71
M10 x 1.25	.3937	8.7 mm	.3425	80	.0046	.3471	73
		11/32"	.3438	78	.0046	.3483	71
		*8.75 mm	.3445	77	.0046	.3491	70
M12 x 1.75	.4724	10.2 mm	.4016	79	.0047	.4063	74
		"Y"	.4040	76	.0047	.4087	71
		13/32"	.4062	74	.0047	.4109	69
M12 x 1.25	.4724	27/64"	.4219	79	.0047	.4266	72
		10.8 mm	.4252	74	.0047	.4299	66
M14 x 2	.5512	15/32"	.4688	81	.0048	.4736	76
		12 mm	.4724	77	.0048	.4772	72
M14 x 1.5	.5512	12.5 mm	.4921	77	.0048	.4969	71
M16 x 2	.6299	35/64"	.5469	81	.0049	.5518	76
		14 mm	.5512	77	.0049	.5561	72
M16 x 1.5	.6299	14.5 mm	.5709	77	.0049	.5758	71
M18 x 2.5	.7087	39/64"	.6094	78	.0050	.6144	74
		15.5 mm	.6102	77	.0050	.6152	73
M18 x 1.5	.7087	41/64"	.6406	89	.0050	.6456	82
		16.5 mm	.6496	77	.0050	.6546	70
		21/32"	.6562	68	.0050	.6612	62
M20 x 2.5	.7874	11/16"	.6875	78	.0050	.6925	74
		17.5 mm	.6890	77	.0052	.6942	73
M20 x 1.5	.7874	18.5 mm	.7283	77	.0052	.7335	70
M22 x 2.5	.8661	49/64"	.7656	79	.0052	.7708	75
		19.5 mm	.7677	77	.0052	.7729	73
M22 x 1.5	.8661	20.5 mm	.8071	77	.0052	.8123	70
M24 x 3	.9449	21 mm	.8268	77	.0059	.8327	73
		53/64"	.8281	76	.0059	.8340	72
M24 x 2	.9449	22 mm	.8661	77	.0059	.8720	71
M27 x 3	1.0630	15/16"	.9375	82	.0060	.9435	78
		24 mm	.9449	77	.0062	.9511	73
M27 x 2	1.0630	25 mm	.9843	77	.0070	.9913	70
		63/64"	.9844	77	.0070	.9914	70
M30 x 3.5	1.1811	26.5 mm	1.0433	77	REAMING RECOMMENDED		
		1 3/64"	1.0469	75			
M30 x 2	1.1811	28 mm	1.1024	77			
		1 7/64"	1.1094	70			
M33 x 3.5	1.2992	1 5/32"	1.1562	80			
		29.5 mm	1.1614	77			
		1 11/64"	1.1719	71			
M33 x 2	1.2992	1 1/32"	1.2188	79			
		31 mm	1.2205	77			
M36 x 4	1.4173	1 1/4"	1.2500	82			
		32 mm	1.2598	77			
M36 x 3	1.4173	1 19/64"	1.2969	78			
		33 mm	1.2992	77			
M39 x 4	1.5354	1 3/8"	1.3750	78			
		35 mm	1.3780	77			
M39 x 3	1.5354	36 mm	1.4173	77			
		1 27/64"	1.4219	74			

Note: Sizes with an asterisk (*) are not standard drills.

METRIC THREAD FORMULAE

$$\text{Basic major dia. (mm)} - \frac{\text{\% thread} \times \text{mm pitch}}{76.980} = \text{Drilled hole size (mm)}$$

$$\frac{76.980}{\text{mm pitch}} \times \left[\text{Basic major dia. (mm)} - \text{Drilled hole size (mm)}\right] = \text{\% of thread}$$

Straight Pipe Taps

Ground Thread Limits

American National Standard Straight Pipe Thread Form (NPS) (NPSC) (NPSM)

Nominal Size in Inches	Threads per Inch	Major Diameter in Inches			Pitch Diameter in Inches		
		Plug at Gaging Notch	Minimum **G**	Maximum **H**	Plug at Gaging Notch **E**	Minimum **K**	Maximum **L**
⅛	27	.3983	.4022	.4032	.3736	.3746	.3751
¼	18	.5286	.5347	.5357	.4916	.4933	.4938
⅜	18	.6640	.6701	.6711	.6270	.6287	.6292
½	14	.8260	.8374	.8357	.7784	.7806	.7811
¾	14	1.0364	1.0447	1.0457	.9889	.9906	.9916
1	11½	1.2966	1.3062	1.3077	1.2386	1.2402	1.2412
1¼	11½	1.6413	1.6507	1.6522	1.5834	1.5847	1.5862
1½	11½	1.8803	1.8897	1.8912	1.8223	1.8237	1.8252
2	11½	2.3542	2.3639	2.3654	2.2963	2.2979	2.2994
2½	8	2.8454	2.8604	2.8619	2.7622	2.7640	2.7660
3	8	3.4718	3.4868	3.4883	3.3885	3.3904	3.3924
3½	8	3.9721	3.9872	3.9887	3.8888	3.8908	3.8928
4	8	4.4704	4.4855	4.4870	4.3871	4.3891	4.3911

Lead Tolerance

A maximum lead deviation of plus or minus .0005" within any two threads not farther apart than 1" is permitted.

Angle Tolerance

Threads per Inch	Deviation in Half Angle
8	25' Plus or Minus
11½ to 27 Inclusive	30' Plus or Minus

Dryseal American National Standard Straight Pipe Thread Form (NPSF)

Nominal Size M Inches	Threads per Inch	Major Diameter		Pitch Diameter			
		Minimum **G**	Maximum **H**	Plug at Gaging Notch **E**	Minimum **K**	Maximum **L**	Minor* Diam. Flat Max.
1/16	27	.3008	.3018	.2812	.2772	.2777	.004
⅛	27	.3932	.3942	.3736	.3696	.3701	.004
¼	18	.5239	.5249	.4916	.4859	.4864	.005
⅜	18	.6593	.6603	.6270	.6213	.6218	.005
½	14	.8230	.8240	.7784	.7712	.7717	.005
¾	14	1.0335	1.0345	.9889	.9817	.9822	.005
1	11½	1.2933	1.2943	1.2386	1.2295	1.2305	.006

* As specified or sharper.

Lead Tolerance

A maximum lead deviation of plus or minus .0005" within any two threads not farther apart than 1" is permitted.

Angle Tolerance

Threads per Inch	Deviation in Half Angle
11½ to 27 inclusive	30' Plus or Minus

Taper Pipe Taps
Ground & Cut Thread Limits

American National Standard Taper Pipe Thread Form (NPT)

Aeronautical National Form Taper Pipe Thread (ANPT)

Dryseal American National Standard Taper Pipe Thread Form (NPTF)

Nominal Size in Inches	Threads per Inch	**Gage Measurement in Inches			Taper per Foot in Inches			
			Tolerance Plus or Minus		Cut Thread*		Ground Thread	
		Projection	Cut Thread*	Ground Thread	Minimum	Maximum	Minimum	Maximum
1/16	27	.312	1/16	1/16	23/32	27/32	23/32	25/32
1/8	27	.312	1/16	1/16	23/32	27/32	23/32	25/32
1/4	18	.459	1/16	1/16	23/32	27/32	23/32	25/32
3/8	18	.454	1/16	1/16	23/32	27/32	23/32	25/32
1/2	14	.579	1/16	1/16	23/32	13/16	23/32	25/32
3/4	14	.565	1/16	1/16	23/32	13/16	23/32	25/32
1	11 1/2	.678	3/32	3/32	23/32	13/16	23/32	25/32
1 1/4	11 1/2	.686	3/32	3/32	23/32	13/16	23/32	25/32
1 1/2	11 1/2	.699	3/32	3/32	23/32	13/16	23/32	25/32
2	11 1/2	.667	3/32	3/32	23/32	13/16	23/32	25/32
2 1/2	8	.925	3/32	3/32	47/64	51/64	47/64	25/32
3	8	.925	3/32	3/32	47/64	51/64	47/64	25/32
3 1/2	8	.938	1/8	1/8	47/64	51/64	47/64	25/32
4	8	.950	1/8	1/8	47/64	51/64	47/64	25/32

** Distance small end of tap projects through Taper Thread Ring Gage L1.

Lead Tolerance

Cut Thread* = A maximum lead deviation of plus or minus .003" within any two threads not farther apart than 1" is permitted.

Ground Thread = A maximum lead deviation of plus or minus .0005" within any two threads not farther apart than 1" is permitted.

Angle Tolerance

Threads per Inch	Tolerance		
	Half Angle		Full Angle
	Cut Thread*	Ground Thread	Cut Thread*
8	40' Plus or Minus	25' Plus or Minus	60'
11 1/2 to 27 Inclusive	45' Plus or Minus	30' Plus or Minus	68'

* Cut thread tolerances apply only to NPT taps.

Widths of Flats at Tap Crests and Roots

Threads Per Inch	Tap Flat Width at	Column I NPT – Cut & Ground Thread ANPT – Ground Thread		Column II NPTF – Ground Thread	
		Minimum	Maximum	Minimum	Maximum
27	Major Dia.	.0014	.0041	.0040	.0055
	Minor Dia.		.0041		.0040
18	Major Dia.	.0021	.0057	.0050	.0065
	Minor Dia.		.0057		.0050
14	Major Dia.	.0027	.0064	.0050	.0065
	Minor Dia.		.0064		.0050
11 1/2	Major Dia.	.0033	.0073	.0060	.0083
	Minor Dia.		.0073		.0060
8	Major Dia.	.0048	.0090	.0080	.0103
	Minor Dia.		.0090		.0080

Minimum minor diameter flats are not specified. May be as sharp as practicable.

Note: Cut thread taps made to Column I are marked NPT but are not recommended for ANPT application. Ground thread taps made to Column I may be used for NPT and ANPT applications and are so marked. Ground thread taps made to Column II are marked NPTF and used for Dryseal application.

Pipe Taps
Drill Selector (NPS) (NPT) (NPSF) (NPTF)

Straight and Taper Pipe Taps

The drill diameters listed for NPT (not reamed) are the diameters of standard drills which are the closest to minor diameters at small end of the pipe.

They represent the diameters of the holes which would be cut with a twist drill correctly ground when drilling a material without tearing or flow of metal. This is approximately the condition that exists when a correctly sharpened twist drill is cutting a hole in a homogeneous block of cast iron.

When nonferrous metals and other similar materials are to be drilled and tapped, it may be found necessary to use a drill of slightly larger or smaller diameter to produce a hole of a size that will make it possible for the tap to cut an acceptable pipe thread with the required thread height.

It should be understood that this table of twist drill diameters is intended to help only the occasional user of drills in the application of this standard.

When internal pipe threads are produced in larger quantities in a particular type of material and with specially designed machinery it may be found to be more advantageous to use a drill size not given in the table, even one having a non-standard diameter.

	Straight Pipe (NPS)		Taper Pipe (NPT)			
Nominal Pipe Size	Tap Drill Size	Decimal Equivalent	Tap Drill Size With Reamer	Decimal Equivalent	Tap Drill Size Without Reamer	Decimal Equivalent
1/16–27	1/4	0.250	6.1 mm	0.240	"D"	0.246
1/8 –27	11/32	0.344	21/64	0.328	"Q"	0.332
1/4 –18	7/16	0.438	27/64	0.422	7/16	0.438
3/8 –18	37/64	0.578	9/16	0.562	9/16	0.562
1/2 –14	23/32	0.719	11/16	0.688	45/64	0.703
3/4 –14	59/64	0.922	57/64	0.891	29/32	0.906
1 –11 1/2	1 5/32	1.156	1 1/8	1.125	1 9/64	1.141
1 1/4 –11 1/2	1 1/2	1.500	1 15/32	1.469	1 31/64	1.484
1 1/2 –11 1/2	1 3/4	1.750	1 23/32	1.719	1 47/64	1.734
2 –11 1/2	2 7/32	2.219	2 3/16	2.188	2 13/64	2.203
2 1/2 – 8	2 21/32	2.656	2 19/32	2.594	2 5/8	2.625

Straight and Taper Pipe Taps—Dryseal

The drill diameters given are for taper and straight internal pipe threads and will usually permit the tapping of acceptable threads in free-machining brass or steel provided the drill is correctly sharpened. When hard metals or other similar materials are to be drilled and tapped, it may be necessary to use a drill of slightly larger diameter whereas some soft materials may require a smaller size.

Taper pipe threads of improved quality are obtained when the holes are taper reamed after drilling and before tapping. Standard taper pipe reamers are used and, as in drilling, the actual size of the hole depends upon the material and is best determined by trial.

	Straight Pipe (NPSF)		Taper Pipe (NPTF)			
Nominal Pipe Size	Tap Drill Size	Decimal Equivalent	Tap Drill Size With Reamer	Decimal Equivalent	Tap Drill Size Without Reamer	Decimal Equivalent
1/16–27	D	.246	A	.234	C	.242
1/8 –27	R	.339	21/64	.328	Q	.332
1/4 –18	7/16	.438	27/64	.422	7/16	.438
3/8 –18	37/64	.578	9/16	.563	9/16	.562
1/2 –14	23/32	.719	11/16	.688	45/64	.703
3/4 –14	59/64	.922	57/64	.891	29/32	.906
1 –11 1/2	1 5/32	1.156	1 1/8	1.125	1 9/64	1.141
1 1/4–11 1/2			1 15/32	1.469	1 31/64	1.484
1 1/2 –11 1/2			1 45/64	1.703	1 23/32	1.719
2 –11 1/2			2 11/64	2.172	2 3/16	2.188
2 1/2 – 8			2 37/64	2.578	2 39/64	2.609
3 – 8			3 13/64	3.203	3 15/64	3.234

STI Taps

For Helical Coil Wire Screw Thread Inserts
Ground Thread Limits

*These taps are oversize to the extent that the internal thread which they produce will accommodate a helical coil wire screw thread insert, which at final assembly will accept a screw thread of the nominal size and pitch.

Nominal Size STI	Threads per Inch		Major Diameter		Pitch Diameter Limits					
					H1 Limit		H2 Limit		H3 Limit	
	NC UNC	NF UNF	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
4	40		.1463	.1473	.1283	.1288	.1288	.1293		
5	40		.1593	.1603			.1418	.1423		
6	32		.1807	.1817			.1588	.1593	.1593	.1598
6		40	.1723	.1733			.1548	.1553		
8	32		.2067	.2077			.1848	.1853	.1853	.1858
10	24		.2465	.2475			.2175	.2180	.2180	.2185
10		32	.2327	.2337			.2108	.2113	.2113	.2118
12	24		.2725	.2735			.2435	.2440	.2440	.2445
1/4	20		.3177	.3187			.2830	.2835	.2835	.2840
1/4		28	.2985	.2995			.2737	.2742	.2742	.2747
5/16	18		.3874	.3884					.3496	.3501
5/16		24	.3690	.3700			.3400	.3405	.3405	.3410
3/8	16		.4592	.4602					.4166	.4171
3/8		24	.4315	.4325			.4025	.4030	.4030	.4035
7/16	14		.5333	.5343					.4849	.4854
7/16		20	.5052	.5062					.4710	.4715
1/2	13		.6032	.6042					.5509	.5514
1/2		20	.5677	.5687					.5335	.5340

STI basic thread dimensions are determined by adding twice the National single thread height (2 x .649519P.) to the basic dimensions of the nominal screw size.

Drill Selector

Nom. Size STI	UNC NC	UNF NF	Major Diam. of Tap	Aluminum Tap Drill Size	Aluminum Decimal Equiv.	Plastic, Steel Magnesium Tap Drill Size	Plastic, Steel Magnesium Decimal Equiv.	Aluminum Minor Diameter Limits STI Tapped Hole Min.	Aluminum Minor Diameter Limits STI Tapped Hole Max.	Plastic, Steel Magnesium Minor Diameter Limits STI Tapped Hole Min.	Plastic, Steel Magnesium Minor Diameter Limits STI Tapped Hole Max.
4	40		.1473	#31	.1200	#31	.1200	.116	.121	.119	.124
5	40		.1603	#30	.1285	#29	.1360	.128	.133	.131	.136
6	32		.1817	#25	.1495	#25	.1495	.144	.150	.148	.154
		40	.1733	#26	.1470	#25	.1495	.144	.149	.148	.153
8	32		.2077	#17	.1730	#16	.1770	.170	.176	.174	.180
10	24		.2475	13/64	.2031	#5	.2055	.199	.205	.203	.209
		32	.2337	#7	.2010	13/64	.2031	.196	.202	.200	.206
12	24		.2735	#2	.2210	#1	.2280	.221	.227	.225	.231
1/4	20		.3187	17/64	.2656	17/64	.2656	.261	.267	.265	.271
		28	.2995	G	.2610	17/64	.2656	.257	.264	.261	.268
5/16	18		.3884	Q	.3320	Q	.3320	.328	.334	.331	.337
		24	.3700	21/64	.3281	Q	.3320	.323	.330	.327	.334
3/8	16		.4602	X	.3970	X	.3970	.390	.398	.396	.402
		24	.4325	25/64	.3906	25/64	.3906	.385	.392	.389	.396
7/16	14		.5343	29/64	.4531	15/32	.4687	.453	.463	.461	.471
		20	.5062	29/64	.4531	29/64	.4531	.450	.458	.453	.461
1/2	13		.6042	33/64	.5156	17/32	.5312	.515	.525	.523	.533
		20	.5687	33/64	.5156	33/64	.5156	.513	.522	.515	.524

Table of Speeds

MACHINE SCREW SIZE TAPS

Feet per Min.	REVOLUTIONS PER MINUTE										
Machine Screw Size	0	1	2	3	4	5	6	8	10	12	14
Decimal Size	.060	.073	.086	.099	.112	.125	.138	.164	.190	.216	.242
20	1273	1046	888	772	682	611	554	466	402	354	316
25	1592	1308	1110	965	853	764	692	582	503	442	395
30	1910	1570	1332	1157	1023	917	830	699	603	531	474
35	2228	1831	1555	1350	1194	1070	969	815	704	619	552
40	2546	2093	1777	1543	1364	1222	1107	932	804	707	631
45	2865	2355	1999	1736	1535	1375	1246	1048	905	736	710
50	3183	2616	2221	1929	1705	1528	1384	1165	1005	884	789
55	3501	2879	2443	2122	1876	1681	1522	1281	1106	973	868
60	3820	3139	2665	2315	2046	1833	1661	1397	1206	1061	947
65	4138	3401	2887	2508	2217	1986	1799	1514	1307	1149	1026
70	4456	3663	3109	2701	2387	2139	1938	1630	1407	1238	1105
75	4775	3924	3331	2894	2558	2292	2076	1747	1508	1326	1184
80	5093	4186	3553	3086	2728	2445	2214	1863	1608	1415	1263
85	5411	4448	3775	3280	2899	2597	2353	1980	1709	1503	1342
90	5730	4709	3997	3472	3069	2750	2491	2096	1809	1592	1421
95	6048	4971	4219	3665	3240	2903	2630	2213	1910	1680	1499
100	6366	5232	4442	3858	3410	3056	2768	2329	2010	1768	1578
110	7003	5756	4886	4244	3751	3361	3045	2562	2211	1945	1736
120	7639	6279	5330	4630	4093	3667	3321	2795	2412	2122	1894
130	8276	6802	5774	5016	4434	3973	3598	3028	2613	2299	2052
140	8913	7325	6218	5402	4775	4278	3875	3261	2815	2476	2210
150	9549	7849	6662	5787	5116	4584	4151	3494	3016	2653	2368

FRACTIONAL SIZE TAPS

Fractional Size	¼	5/16	⅜	7/16	½	9/16	¾	⅞	1	1⅛	1¼	1⅜	1½
20	306	245	204	175	153	122	102	88	77	68	61	56	51
25	383	306	255	219	191	153	128	109	96	85	77	69	64
30	458	367	306	262	229	183	153	131	115	102	92	83	76
35	535	428	357	306	268	214	179	153	134	119	107	97	89
40	611	489	407	349	306	244	203	175	153	136	122	111	102
50	764	611	509	437	382	306	255	218	191	170	153	139	127
55	841	673	560	480	420	336	280	240	210	187	168	153	140
60	917	733	611	524	458	367	306	262	229	204	183	167	153
65	993	795	662	568	497	397	331	284	249	221	199	181	166
70	1070	856	713	611	535	428	357	306	267	238	214	194	178
80	1222	978	815	698	611	489	407	349	306	272	244	222	204
90	1375	1100	917	786	688	550	458	393	344	306	275	250	229
100	1528	1222	1019	873	764	611	509	436	382	340	306	278	255
110	1681	1345	1120	960	840	672	560	480	420	373	336	306	280
120	1833	1467	1222	1048	917	733	611	524	458	407	367	333	306
130	1986	1589	1324	1135	993	794	662	568	497	441	397	361	331
140	2139	1711	1426	1222	1070	856	713	611	535	475	428	389	357
150	2292	1833	1528	1310	1146	917	764	655	573	509	458	417	382

Quick Tap Selector

Refer to Besly "Modern Application Taps" Catalog MA-110C For Difficult To Machine Alloys

+ Best Tap to use in this Material
= Usable Tap in this Material
– Possible to use in this Material
* If there is sufficient clearance at bottom or if chip removal is unnecessary
C Tap for threading Cast Iron

MATERIAL	to be tapped	Straight Fluted Taps		Spiral Pointed Taps		Turbo-Cut Taps	X-Press Taps		Special Taps	
		Thru Hole	Blind Hole	Thru Hole	Blind Hole	Blind Hole	Thru Hole	Blind Hole	Thru Hole	Blind Hole
STEEL	Low Carbon	=	–	=	=*	+	+	+		
	High Carbon	+	+			–	–	–		
	Chromium	+	+							
	Tool Steel	+	+				–	–		
	Cast Steel		=	+	+*	–				
	Leaded Steel			=	=*	+	+	+		
IRON	True Cast Iron	C	C							
	Nodular	+	+			–				
	Malleable	+	+			+	–	–		
	Ingot Iron			+	+*	–	+	+		
	Semi-Steel	+	+	=	=*	=	–	–		
STAINLESS STEEL	301-347	–	–	=	=*	=	+	+		
	403-440		–	+	+*					
ALLOYS	Hastelloy	+ Modified +								
	Monel	+ Modified +								
	Inconel	+ Modified +								
	Incoloy	+ Modified +								
	Titanium			=	=*				+	+
	Zirconium	+ Modified +								
ALUMINUM	Die Cast			=	=*	+	+	+		
	Soft			=	=*	=	+	+		
	Alloys (2024T4 & harder)	=	=	+	+*	–	–	–		
	(2024T4 & softer)			=	=*	+	+	+		
ZINC	Die Cast			=	=*	+	+	+		
MAGNESIUM		+	+	=	=*	–				
COPPER				=	=*	=	+	+		
BRASS	Yellow	C	C				+	+		
	Cast	C	C			=	+	+		
	Red	+	+			–	+	+		
BRONZE	Aluminum	+ Modified +								
	Ampco	+ Modified +								
	Phosphor	+ Modified +								
	Silicon	+ Modified +								
PLASTIC	Bakelite	–	–						+	+
	Lucite	–	–						+	+
	Nylon	–	–						+	+
	Phenolic	–	–						+	+
	Styrene	–	–						+	+
	Polyvinyl Chloride								+	+

Tap Users' Guide

Refer to Besly "Modern Application Taps" Catalog MA-110C For Difficult To Machine Alloys

MATERIAL	CUTTING CHARACTERISTICS	BEST TAP	USABLE TAP	POSSIBLE TAP	LUBRICATION	PROBLEMS	SOLUTION
LOW CARBON STEEL	Soft, gummy material produces stringy chip which does not break up easily.	X-Press Tap	Spiral Pointed Tap in thru hole—drives chip forward. Turbo-Cut Tap in blind hole—lifts chips upward.	Straight Fluted Tap. Where chip clearance is lacking, use 3-flute tap for max. chip room in flute.	Use good grade sulphur base cutting oil.	Galling Loading Rough thread	Check tap sharpness and proper lubrication. Secondary heat treatment generally required.
HIGH CARBON STEEL	Tough material. Chips usually break up.	Straight Fluted Tap. Use greatest number of flutes possible.			Use good grade sulphur base cutting oil.	Work hardening Chipping	Check tap sharpness and proper lubrication. Secondary heat treatment generally required. Also, be sure sharp drills are used.
LEADED STEEL	Soft, gummy material.	X-Press Tap. Forms internal threads. Eliminates chip problem.	Spiral Pointed Tap for thru holes. Turbo-Cut tap for blind holes.		Use good grade sulphur base cutting oil.	Loading Rough thread Chipping	Check tap sharpness and proper lubrication. Secondary heat treatment generally required.
TOOL STEEL	Hard, tough, close-grained material.	Straight Fluted Tap. Permits better alignment in hand tapping.			Use good grade cutting oil.	Short tool life. Chipping	Check lubrication, alignment, hole size (do not exceed 60% of thread). Specify secondary heat treatment.
CAST STEEL	Produces wiry, hard chip.	Spiral Pointed Tap. For better chip control.	Straight Fluted Tap. For better size control.		Use good grade sulphur base cutting oil.	Oversize Hard spots Breakage Loading Galling	Selection of proper size tap is very important. Keep tap sharp. Check proper lubrication and alignment. Secondary heat treatment generally required.
TRUE CAST IRON	Produces fine, powdery chip.	Straight Fluted Cast Iron Tap. To reduce chipping and flank wear.			Dry	Breakage Chipping Short tool life	Use proper tap design with secondary heat treatment to counteract dullness which causes wear, breakage and chipping. Bottoming chamfer is generally recommended.
SEMI-STEEL CAST IRON	Chip varies in size in direct relation to steel content—the larger the chip, the higher percentage of steel.	Straight Fluted Tap is generally recommended where steel content is relatively low.	Spiral Pointed Tap or Turbo-Cut is generally recommended where steel content is relatively high.		Sulphur oil or dry.	Breakage Chipping Short tool life	Use proper tap design. Semi-steel produces chip similar to steel. Use Spiral Point to shear metal and drive chips forward. Semi-steel Cast Iron is similar to true cast iron but contains some steel so chips break up easily. Use straight flute.
STAINLESS STEEL 300 SERIES	Long hard chip.	Use X-Press Tap where chipping and breakage is a problem with fluted taps.	Spiral Pointed Tap in thru hole—drives chip forward. Turbo-Cut Tap in blind hole—lifts chips upward.	Straight Fluted Tap.		Breakage Loading Chipping Low tool life	Check lubrication and hole size. Slower speed generally recommended. Drill must be kept sharp and not allowed to dwell while drilling.
DIE CAST ALUMINUM	A soft flaky chip.	X-Press Tap. No chip problem and assures greater tool life.	Spiral Pointed Tap for thru holes. Turbo-Cut tap for blind holes.		Mineral oil or Lard oil.	Short tool life Loading Breakage due to chipping	X-Press Tap. Use secondary heat treatment where silica content is high and short tool life is encountered. Check for correct hole size.
SILICON ALUMINUM	A hard stringy chip.	Straight Fluted Cast Iron Tap.			Mineral oil or Lard oil.	Short tool life Loading Breakage due to chipping	Proper design tap with secondary heat treatment.
ZINC DIE CASTING	Soft gummy chip.	X-Press Tap. Material extrudes well and is somewhat self-lubricating.	Spiral Pointed Tap for thru holes. Turbo-Cut tap for blind holes.		Mineral oil or Lard oil.	Short tool life Loading Breakage due to chipping	X-Press Tap. Check cored hole size.
COPPER	A hard stringy chip, very hard to break.	X-Press Tap. No chip problem, assures more accurate size.	Spiral Pointed Tap for thru holes. Turbo-Cut tap for blind holes.		Good non-sulphur cutting oil.	Undersize Breakage Chipping	X-Press Tap.
BRASS	Small flaky chip.	X-Press Tap.	Straight Fluted Cast Iron Tap.		Mineral oil or dry.	Undersize Loading Short tool life	X-Press Tap.
CAST BRASS	Small flaky chip.	Straight Fluted Tap. Use greatest number of flutes available.			Mineral oil or dry.	Short tool life	Proper design tap with secondary heat treatment.

Tap Trouble Shooting

Problems encountered in tapping are often the fault of the tapping machine, tap holding devices and conditions of the hole to be tapped. The tapping machine should be checked for spindle, fixture and work alignment; for slipping belts, wear and power. The tap holding device should be checked as to correct type, for wear and alignment with the hole. The drilled hole should be checked for diameter and trueness in round and axis to assure correct percentage of thread engagement. Blind holes must have sufficient chip room at the bottom.

General Suggestions

1. If holes are undersize or oversize check against the setup instructions. Check the tap for correct pitch diameter limit for desired class of thread, and the drill for correct size.
2. If the tap is producing rough thread it generally means that the tap is pushing or tearing the metal instead of cutting it. The tap may be dull, have galled threads or may be running at too slow a speed. If none of these, increase the hook angle of the cutting face.
3. If the tap is loading (metal clinging to the tap) or galling, check the lubrication. Here, too, the tap may be dull, or it may be producing too high a percentage of thread. Shift to a surface-treated tap.
4. If tap breakage is encountered the tap may be cutting too high a percentage of thread, be insufficiently lubricated or have too little clearance for chips at the bottom of a blind hole. If none of these conditions exist, increase the speed, except in hard or tough materials. In these materials, lower the speed.

Trouble	Cause
Tap Breakage	1. Wrong type of tap. 2. Dull tap. 3. Tap incorrectly ground. 4. Tap drill too small. 5. Drilled hole too shallow. 6. Misalignment of tap and hole. 7. Wrong machine. 8. Incorrect fixture or holding device. 9. Work hardened material. 10. Lack of lubricant, or use of wrong type.
Tap Failure on Reversal	1. Tap cutting too tightly. Cutting face angle should be increased. 2. Tap galling. Face angle on back of land should be increased. 3. Chips wedged between flutes. (See the following).
Chips Clogging Flutes	1. Wrong type of tap. 2. Insufficient chamfer. 3. Incorrect cutting face angle. 4. Rough flutes. 5. Flutes improperly reground. 6. Lack of lubrication, or use of wrong type.
Stripped or Chipped Tap Threads	1. Misalignment. 2. Careless handling. 3. Dull tap. 4. Tap too hard. 5. Wrong application of surface treated taps. 6. Improper sharpening of tap.
Torn Threads in Tapped Part	1. Incorrect cutting face angle (usually too small). 2. Tap drill too small. 3. Chips clogging flutes. 4. Broken threads on taps. 5. Improper resharpening of tap. 6. Lack of lubricant, or use of wrong type.
Tap Sticking or Binding	1. Tap drill too small. 2. Tap lands too wide. 3. Incorrect cutting face angle. 4. Lack of lubricant, or use of wrong type. 5. Surface treatment (lubricant) required.
Excessive Tap Wear	1. Material is abrasive, or inclusions present. Surface treated tap required. 2. Misalignment.
Cutting Face Breakdown	1. Incorrect cutting face angle. 2. Surface treatment required.
Overheating of Tap	1. Excessive land width. 2. Lack of lubricant, or use of wrong type. 3. Dull tap. 4. Excessive flank contact, pitch diameter relief required. 5. Excessive tapping speeds.
Poor Finish on Thread in Tapped Part	1. Pitch diameter relief required. 2. Incorrect cutting face angle, usually too small. 3. Tap drill too small. 4. Insufficient number of chamfered threads. 5. Dull tap. 6. Lack of lubricant, or use of wrong type.
Excessive Frictional Drag and Power Requirement	1. Pitch diameter relief required. 2. Point size on tap too large. 3. Dull tap. 4. Incorrect cutting face angle. 5. Incorrect tapping speed. 6. Lack of lubricant, or use of wrong type. 7. Incorrect or inadequate equipment. 8. Misalignment.

Resharpening Taps

When a tap becomes dull, it is apt to chip, break, produce rough or poor threads, or cut oversize. Dull taps also consume excessive power because they cut with difficulty, slowing down the tapping machine. It becomes necessary, then, to replace the tap with a new one, or resharpen the old one.

If the tap is to be resharpened, usually only the chamfer or point will require grinding, since this is the cutting portion of the tap. If this is to be done, a new tap should be used for reference. The same number of threads should be chamfered as in the new one. The angle of the chamfer should be identical, and all lands should be ground equally and relieved alike.

If the cutting faces are to be touched up or their angle altered, a machine that can be accurately indexed, such as a cutter grinder, should be used. Ideally, all tap grinding should be done on a tap grinding machine. The operator must understand that he is working on a precision cutting tool that has been ground originally to very close limits.

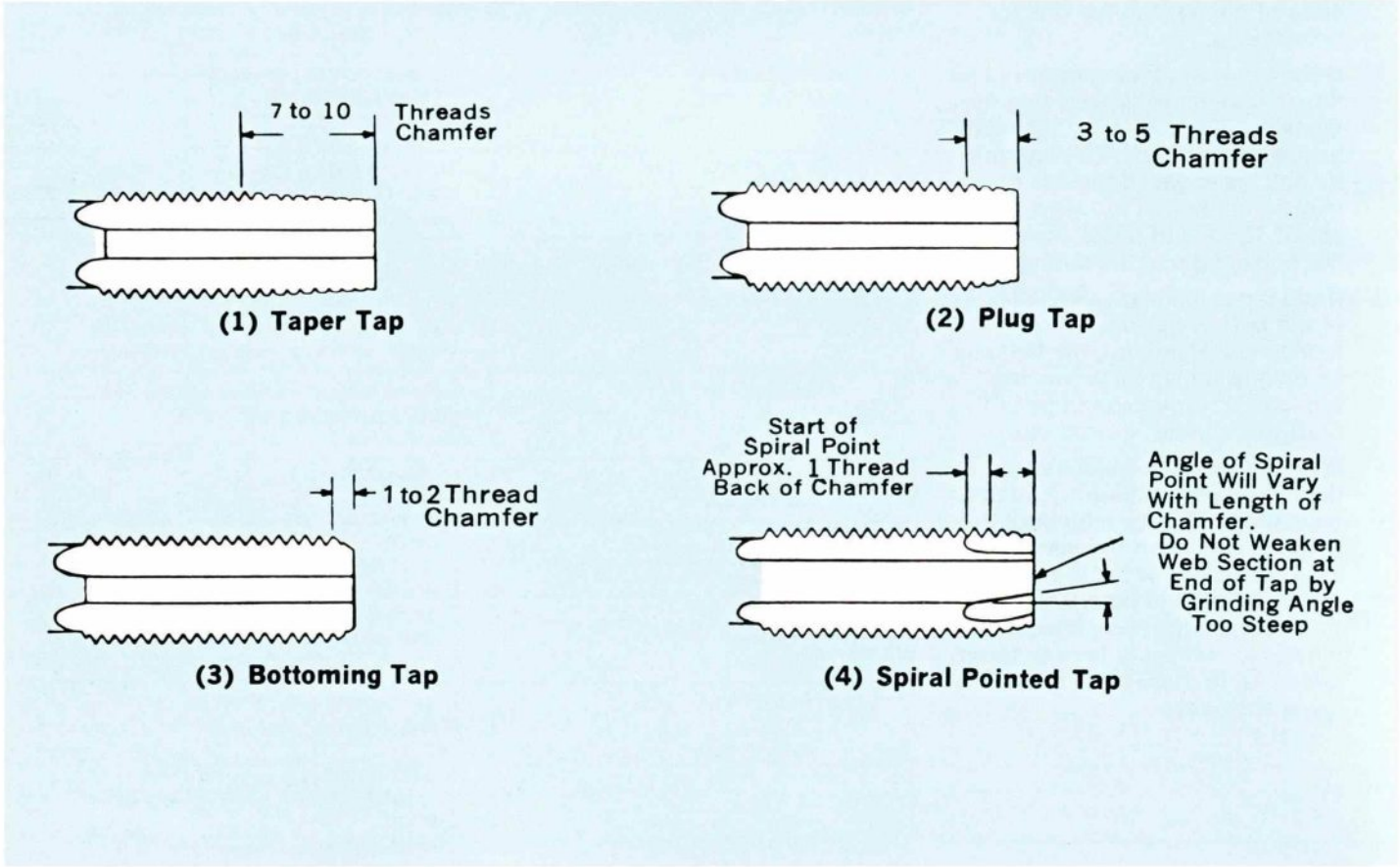
In touching up a rake angle, a Saucer-type grinding wheel is used. It should be dressed to present a flat surface to the tap cutting face. The indexing angle must be carefully maintained and duplicated on each tooth.

In touching up a hook angle, a straight grinding wheel is required, with its periphery dressed round to match the contour of the flutes in the tap and indexed to conform to the arc of the hook in the cutting faces.

Start spiral point about 1 thread behind end of chamfer.

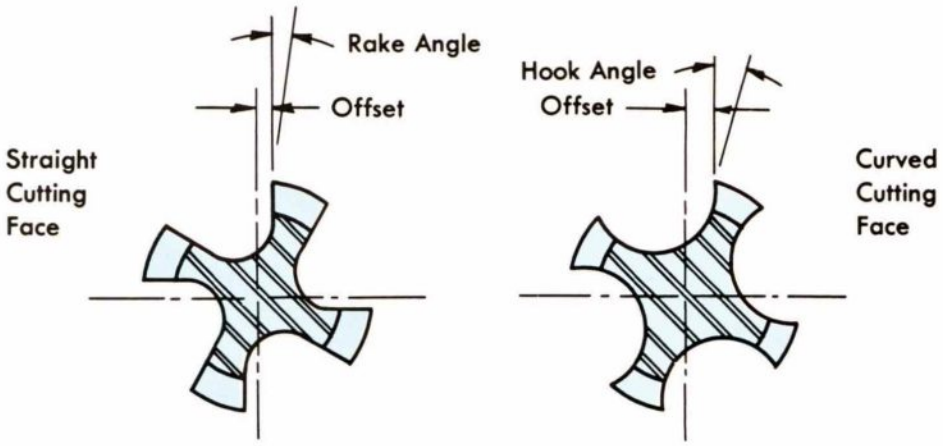
Don't make the angle of spiral point too sharp or it will weaken tap web.

When ends of lands become thin, grind end of tap straight back until lands are normal thickness, then regrind flutes and cutting edges.



Offset for Grinding Tap Flutes

A hook or rake is the angle between the chord passing through the root and crest of a thread form, and a radial line through the crest at the cutting edge.



Tap Size	ANGLE OF RAKE OR HOOK														
	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	12°	14°	16°	18°	20°
	OFFSET FROM CENTERLINE OF TAP														
# 6	.001	.002	.004	.005	.006	.007	.009	.010	.011	.012	.015	.018	.020	.023	.026
# 8	.001	.003	.004	.006	.007	.009	.010	.012	.013	.015	.018	.021	.024	.027	.030
#10	.002	.003	.005	.007	.008	.010	.012	.014	.015	.017	.020	.024	.028	.031	.035
#12	.002	.004	.006	.008	.010	.012	.014	.015	.017	.020	.023	.028	.032	.036	.040
¼	.002	.004	.007	.009	.011	.013	.016	.018	.020	.022	.027	.032	.037	.041	.046
5/16	.003	.006	.008	.011	.014	.017	.020	.022	.025	.028	.034	.040	.046	.052	.058
⅜	.003	.007	.010	.013	.017	.020	.023	.027	.030	.033	.040	.047	.055	.062	.069
7/16	.004	.008	.012	.016	.019	.023	.027	.031	.035	.039	.047	.055	.064	.070	.081
½	.004	.009	.013	.018	.022	.027	.031	.035	.040	.045	.054	.063	.073	.082	.092
9/16	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.061	.071	.082	.093	.104
⅝	.006	.011	.017	.022	.028	.033	.039	.044	.050	.056	.067	.079	.091	.103	.115
¾	.007	.013	.020	.027	.033	.040	.047	.053	.060	.067	.081	.095	.109	.123	.138
⅞	.008	.015	.023	.031	.039	.046	.054	.062	.070	.078	.094	.110	.127	.144	.161
1	.009	.018	.026	.035	.044	.053	.062	.071	.080	.089	.107	.126	.144	.164	.184
1⅛	.010	.020	.030	.040	.050	.060	.070	.080	.090	.100	.121	.142	.163	.185	.207
1¼	.011	.022	.033	.044	.055	.066	.077	.089	.100	.111	.134	.157	.181	.205	.230
1⅜	.012	.024	.036	.049	.061	.073	.085	.098	.110	.122	.147	.173	.199	.225	.252
1½	.013	.026	.040	.053	.066	.080	.093	.106	.120	.133	.161	.189	.217	.246	.276
⅛ Pipe	.003	.007	.010	.013	.017	.020	.023	.027	.030	.033	.040	.047	.054	.061	.069
¼ Pipe	.005	.009	.014	.019	.023	.028	.033	.038	.042	.047	.057	.067	.077	.087	.097
⅜ Pipe	.006	.012	.018	.024	.029	.035	.041	.047	.053	.059	.071	.084	.096	.109	.122
½ Pipe	.007	.015	.022	.029	.037	.044	.051	.059	.066	.074	.089	.104	.120	.136	.152
¾ Pipe	.009	.018	.027	.037	.046	.055	.064	.074	.083	.092	.111	.130	.150	.170	.190
1 Pipe	.011	.023	.034	.046	.057	.069	.080	.092	.103	.115	.139	.163	.188	.212	.238
1¼ Pipe	.015	.029	.043	.058	.072	.087	.101	.116	.131	.146	.176	.206	.237	.269	.302
1½ Pipe	.017	.033	.050	.066	.083	.100	.116	.133	.150	.167	.202	.236	.272	.308	.345

Cutting Face Angles, Speed and Lubricants

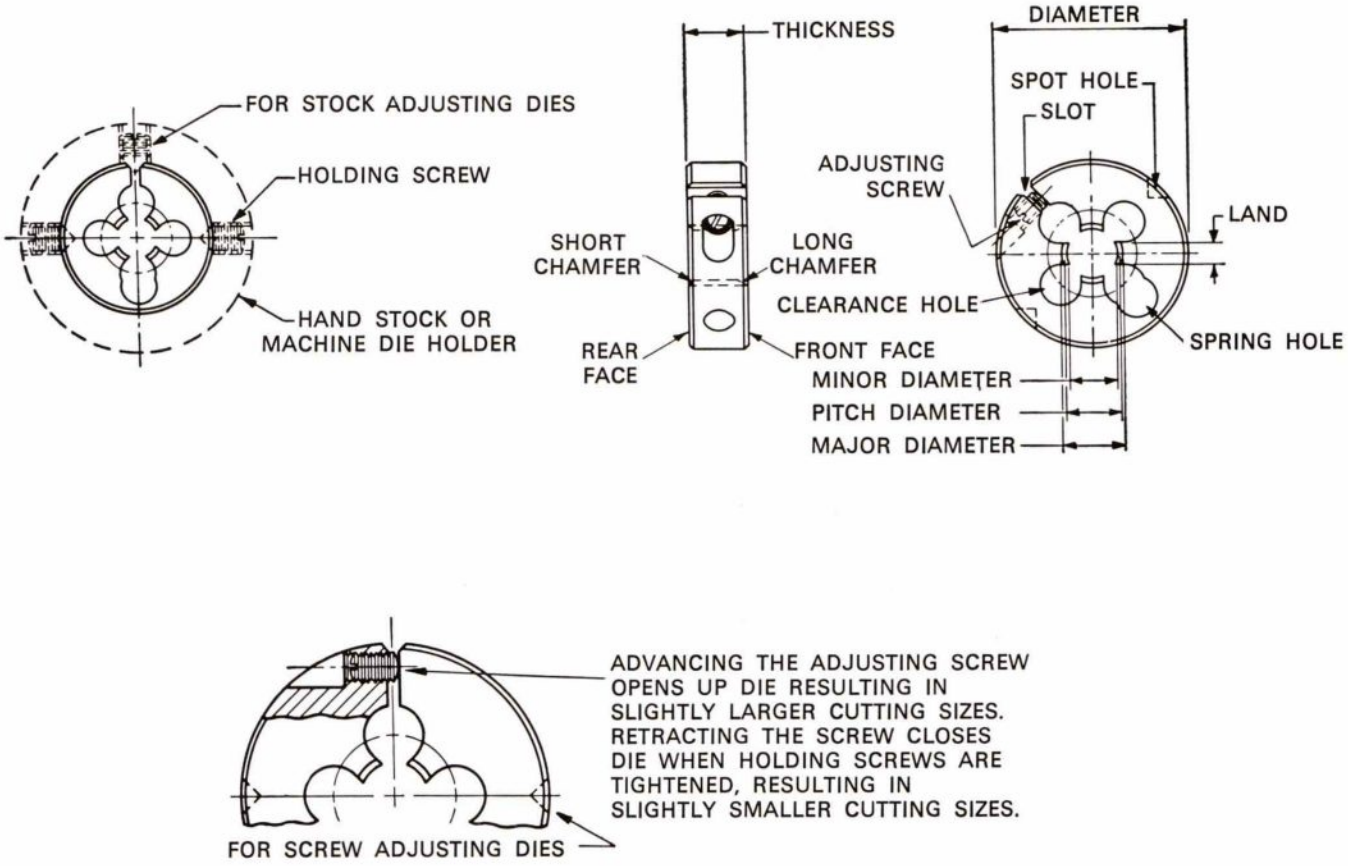
for Tapping Various Materials

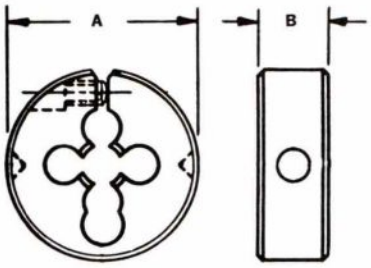
Materials	*Angle of Cutting Face	Speed: FPM	Lubricant or Coolant
Aluminum:			
Cast	High	90 - 110	Water soluble oil or oil especially for Alum. and Magnesium
Wrought	High	100 - 125	Water soluble oil or oil especially for Alum. and Magnesium
Ampco Metals	Low	10 - 60	Soluble oil
Armco Iron	Medium	30 - 50	Soluble oil, light duty oil
Bakelite	Low	50 - 70	Dry
Brass, Yellow	Low	75 - 100	Soluble oil, light duty oil
Bronze:			
Aluminum	Low	40 - 50	Soluble oil
Leaded	Medium	70 - 85	Soluble or light base oil
Silicon	Low	60 - 75	Soluble oil
Phosphor	Low	45 - 60	Light base oil
Cast Iron:			
Regular	Low	70 - 100	Dry or soluble oil
Ductile	Medium	30 - 50	Soluble oil or chemical type coolant
Malleable	Medium	25 - 50	Soluble oil or chemical type coolant
Pearlitic	Medium	25 - 50	Soluble oil or chemical type coolant
Copper	High	25 - 40	Light base oil
Beryllium	Medium	25 - 40	Light base oil
Magnesium Alloys	High	100 - 160	Oil especially recom. for magnesium
Plastic:			
Thermo	Medium	50 - 80	Dry, air jet
Thermosetting	Low	50 - 80	Dry, air jet
Steel:			
Carbon (Low)	High	40 - 60	Sulfo or chlorinated oil — light duty
Carbon (High)	Medium	25 - 35	Sulfo or chlorinated oil — light duty
Cast	Medium	20 - 45	Sulfo or chlorinated oil — heavy duty
Chromium	Medium	10 - 45	Sulfo or chlorinated oil — heavy duty
Cobalt	Medium	10 - 45	Sulfo or chlorinated oil — heavy duty
Free Cutting	High	50 - 80	Soluble oil or heavy duty oil
Hardened R/C 28-32 BHN 270-310	Medium	10 - 25	Sulfo or chlorinated — heavy duty
Leaded	High	45 - 60	Sulfo or chlorinated — heavy duty
Manganese	Medium	10 - 35	Sulfo or chlorinated — heavy duty
Molybdenum	Medium	10 - 35	Sulfo or chlorinated — heavy duty
Nickel	Medium	10 - 35	Sulfo or chlorinated — heavy duty
Tool	Medium	10 - 25	Sulfo or chlorinated — heavy duty
Vanadium	Medium	10 - 35	Sulfo or chlorinated — heavy duty
Stainless	High	10 - 35	Sulfo or chlorinated — heavy duty
Prec. Hardening	High	10 - 25	Sulfo or chlorinated — heavy duty
Sintered Metal	Low	50 - 70	Soluble or light base oil
High Temp. Alloys:			
Titanium	High	10 - 40	Sulfurized oil — heavy duty
Inconel	Medium	5 - 15	Sulfo-chlorinated — heavy duty
Hastalloy	Medium	5 - 15	Sulfo-chlorinated — heavy duty
Rene 41	Medium	5 - 15	Sulfo-chlorinated — heavy duty
Waspaloy	Medium	5 - 15	Sulfo-chlorinated — heavy duty
Zinc Die Cast	High	100 - 150	Soluble oil

* High = 10 - 20° Medium = 5 - 10° Low = 0 - 5°

Dies
Round Split
Screw Adjusting

ILLUSTRATION OF TERMS



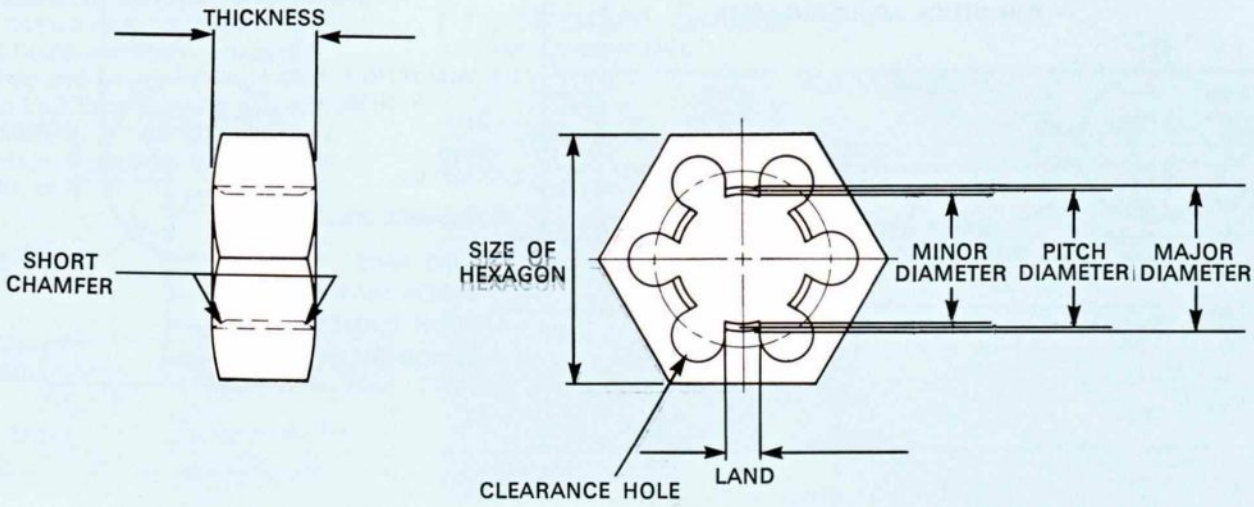


TOLERANCES

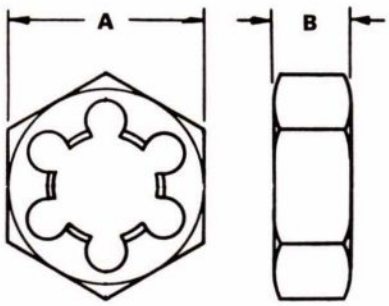
Dimensions in Inches		Tolerances in Inches	
Outside Diameter **A**	Thickness **B**	Outside Diameter **A**	Thickness **B**
⅝	¼		+.005
13/16	¼		−.005
1	⅜		
		+.000	
1 5/16	7/16	−.008	
1½	½		+.010
2	⅝		−.010
2½	¾	+.000	
3	1	−.010	

Dies
Hexagon
Rethreading

ILLUSTRATION OF TERMS



NON-ADJUSTABLE TYPE, FOR HAND USE WITH OPEN END, SOCKET, OR BOX TYPE WRENCHES.



TOLERANCES

Cutting Size Range	Dimensions in Inches		Tolerances in Inches	
	Across Flats **A**	Thickness **B**	Across Flats **A**	Thickness **B**
¼ 5/16 ⅜ 7/16 ½, 9/16	19/32 11/16 25/32 ⅞ 1 1/16	¼ 5/16 ⅜ 7/16 ½	+.005 −.010	+.010 −.010
⅝ 11/16, ¾ ⅞ 1	1 ¼ 1 7/16 1 ⅝ 1 13/16	⅝ ¾ ⅞ 1	+.008 −.010	+.010 −.010
1⅛ 1¼ 1⅜ 1½	2 2 3/16 2 ⅜ 2 9/16	1 1 1 1	+.010 −.015	+.010 −.010

Surface Treatment of Besly Taps

The taps in this catalog are all made by Besly of the finest high speed steel available. They are heat treated under controlled conditions and with the latest techniques. The result is the finest line of ground thread taps to be found on the market. And every tap has a built in resistance to heat and abrasion.

On occasion, however, some of our customers have an unusual application which requires a special surface treatment of the tap. To give our customers the kind of service they have come to expect, Besly can provide a variety of surface treatments. Listed are the surface treatments currently available.

No.	Description	Purpose	Application
	NITRIDED		
14 24 34 48	Light Nitride Medium Nitride Heavy Nitride Double Nitride	To resist abrasion with a hardened surface case.	For tapping aluminums, die castings, abrasive stringy metals and free machining copper alloys.
	OXIDED		
33	Steam Oxide	To counteract galling or loading. Lubricate tap surfaces.	For tapping low carbon, leaded steel, stainless and gummy material.
44	Nitride and Oxide in air	For stress relief and light oxide coating.	Copper alloys of medium machinability.
52	Nitride plus Steam Oxide	To add wear life and reduce loading.	High speed production tapping. Poor lubrication.
55	Steam Oxide plus Nitride	To add wear life, provide self lubrication.	For use in cast iron.
81	Heavy Nitride plus Steam Oxide	To add wear life in hard and dense metals.	For tapping hard steel alloys, titanium, exotic metals and hard copper alloys.
	CHROME PLATED AND/OR VAPOR BLAST*		
CP-75	Hard Flash Chrome	To reduce friction and prevent galling.	For copper and mild ferrous alloys.
NP-75	Nitride plus Flash Chrome	To increase wear life.	Use in ductile and abrasive materials.
66	Chrome Plate, Oil Bath and Vapor Blast	To prevent galling.	For gummy materials or when lubricant is inadequate.
BP-75	Chrome, Oxide in Air, Oil Impregnation	Additional Lubrication Wear resistance	Gummy steel
	PHYSICAL VAPOR DEPOSITION (PVD)		
TiN	Titanium Nitride	To resist abrasion and chip welding.	Most potentials are in ferrous materials below Rc40.
TiCN	Titanium Carbonitride	Wear Resistance	Most potentials are in ferrous materials below Rc40.
TiAlN	Titanium Aluminum Nitride	Heat Protection	Most potentials are in ferrous materials below Rc40.
CrN	Chromium Nitride	Wear Resistance	Most potentials are in ferrous materials below Rc40.

Conversion Table

Decimal, Fractional, Wire Gage, Letter, Millimeter Sizes

Dec.	Inch	Wire	mm.
.0059		97	
.0063		96	
.0067		95	
.0071		94	
.0075		93	
.0079		92	
.0083		91	
.0087		90	
.0091		89	
.0095		88	
.0100		87	
.0105		86	
.0110		85	
.0115		84	
.0120		83	
.0125		82	
.0130		81	
.0135		80	
.0138			.35
.0145		79	
.0156	1/64		
.0158			.40
.0160		78	
.0177			.45
.0180		77	
.0197			.50
.0200		76	
.0210		75	
.0217			.55
.0225		74	
.0236			.60
.0240		73	
.0250		72	
.0256			.65
.0260		71	
.0276			.70
.0280		70	
.0292		69	
.0295			.75
.0310		68	
.0312	1/32		
.0315			.80
.0320		67	
.0330		66	
.0335			.85
.0350		65	
.0354			.90
.0360		64	
.0370		63	
.0374			.95
.0380		62	
.0390		61	
.0394			1.00
.0400		60	
.0410		59	
.0413			1.05
.0420		58	
.0430		57	
.0433			1.10
.0453			1.15
.0465		56	
.0469	3/64		
.0472			1.20
.0492			1.25
.0512			1.30
.0520		55	
.0531			1.35

Dec.	Inch	Wire	mm.
.0550		54	
.0551			1.40
.0571			1.45
.0591			1.50
.0595		53	
.0610			1.55
.0625	1/16		
.0630			1.60
.0635		52	
.0650			1.65
.0669			1.70
.0670		51	
.0689			1.75
.0700		50	
.0709			1.80
.0728			1.85
.0730		49	
.0748			1.90
.0760		48	
.0768			1.95
.0781	5/64		
.0785		47	
.0787			2.00
.0807			2.05
.0810		46	
.0820		45	
.0827			2.10
.0846			2.15
.0860		44	
.0866			2.20
.0886			2.25
.0890		43	
.0906			2.30
.0925			2.35
.0935		42	
.0938	3/32		
.0945			2.40
.0960		41	
.0965			2.45
.0980		40	
.0984			2.50
.0995		39	
.1015		38	
.1024			2.60
.1040		37	
.1063			2.70
.1065		36	
.1083			2.75
.1094	7/64		
.1100		35	
.1102			2.80
.1110		34	
.1130		33	
.1142			2.90
.1160		32	
.1181			3.00
.1200		31	
.1220			3.10
.1250	1/8		
.1260			3.20
.1280			3.25
.1285		30	
.1299			3.30
.1339			3.40
.1360		29	
.1378			3.50
.1405		28	

Dec.	Inch	Wire	mm.
.1406	9/64		
.1417			3.60
.1440		27	
.1457			3.70
.1470		26	
.1476			3.75
.1495		25	
.1496			3.80
.1520		24	
.1535			3.90
.1540		23	
.1562	5/32		
.1570		22	
.1575			4.00
.1590		21	
.1610		20	
.1614			4.10
.1654			4.20
.1660		19	
.1673			4.25
.1693			4.30
.1695		18	
.1719	11/64		
.1730		17	
.1732			4.40
.1770		16	
.1772			4.50
.1800		15	
.1811			4.60
.1820		14	
.1850		13	4.70
.1870			4.75
.1875	3/16		
.1890		12	4.80
.1910		11	
.1929			4.90
.1935		10	
.1960		9	
.1968			5.00
.1990		8	
.2008			5.10
.2010		7	
.2031	13/64		
.2040		6	
.2047			5.20
.2055		5	
.2067			5.25
.2087			5.30
.2090		4	
.2126			5.40
.2130		3	
.2165			5.50
.2188	7/32		
.2205			5.60
.2210		2	
.2244			5.70
.2264			5.75
.2280		1	
.2283			5.80
.2323			5.90

Dec.	Inch	Letter	mm.
.2340		A	
.2344	15/64		
.2362			6.00
.2380		B	
.2402			6.10

Dec.	Inch	Letter	mm.
.2420		C	
.2441			6.20
.2460		D	
.2461			6.25
.2480			6.30
.2500	1/4	E	
.2520			6.40
.2559			6.50
.2570		F	
.2598			6.60
.2610		G	
.2638			6.70
.2656	17/64		
.2657			6.75
.2660		H	
.2677			6.80
.2717			6.90
.2720		I	
.2756			7.00
.2770		J	
.2795			7.10
.2810		K	
.2812	9/32		
.2835			7.20
.2854			7.25
.2874			7.30
.2900		L	
.2913			7.40
.2950		M	
.2953			7.50
.2969	19/64		
.2992			7.60
.3020		N	
.3031			7.70
.3051			7.75
.3071			7.80
.3110			7.90
.3125	5/16		
.3150			8.00
.3160		O	
.3189			8.10
.3228			8.20
.3230		P	
.3248			8.25
.3268			8.30
.3281	21/64		
.3307			8.40
.3320		Q	
.3346			8.50
.3386			8.60
.3390		R	
.3425			8.70
.3438	11/32		
.3445			8.75
.3465			8.80
.3480		S	
.3504			8.90
.3543			9.00
.3580		T	
.3583			9.10
.3594	23/64		
.3622			9.20
.3642			9.25
.3661			9.30
.3680		U	
.3701			9.40
.3740			9.50

Dec.	Inch	Letter	mm.
.3750	3/8		
.3770		V	
.3780			9.60
.3819			9.70
.3839			9.75
.3858			9.80
.3860		W	
.3898			9.90
.3906	25/64		
.3937			10.00
.3970		X	
.4040		Y	
.4062	13/32		
.4130		Z	

Dec.	Inch	mm.
.4134		10.50
.4219	27/64	
.4331		11.00
.4375	7/16	
.4528		11.50
.4531	29/64	
.4688	15/32	
.4724		12.00
.4844	31/64	
.4921		12.50
.5000	1/2	
.5118		13.00
.5156	33/64	
.5312	17/32	
.5315		13.50
.5469	35/64	
.5512		14.00
.5625	9/16	
.5709		14.50
.5781	37/64	
.5906		15.00
.5938	19/32	
.6094	39/64	
.6102		15.50
.6250	5/8	
.6299		16.00
.6406	41/64	
.6496		16.50
.6562	21/32	
.6693		17.00
.6719	43/64	
.6875	11/16	
.6890		17.50
.7031	45/64	
.7087		18.00
.7188	23/32	
.7283		18.50
.7344	47/64	
.7480		19.00
.7500	3/4	
.7656	49/64	
.7677		19.50
.7812	25/32	
.7874		20.00
.7969	51/64	
.8071		20.50
.8125	13/16	
.8268		21.00
.8281	53/64	
.8438	27/32	
.8465		21.50

Conversion Table

Decimal, Fractional, Wire Gage, Letter, Millimeter Sizes

Dec.	Inch	mm.
.8594	55/64	
.8661		22.00
.8750	7/8	
.8858		22.50
.8906	57/64	
.9055		23.00
.9062	29/32	
.9219	59/64	
.9252		23.50
.9375	15/16	
.9449		24.00
.9531	61/64	
.9646		24.50
.9688	31/32	
.9843		25.00
.9844	63/64	
1.0000	1	
1.0039		25.50
1.0156	1 1/64	
1.0236		26.00
1.0312	1 1/32	
1.0433		26.50
1.0469	1 3/64	
1.0625	1 1/16	
1.0630		27.00
1.0781	1 5/64	
1.0827		27.50
1.0938	1 3/32	
1.1024		28.00
1.1094	1 7/64	
1.1220		28.50
1.1250	1 1/8	
1.1406	1 9/64	
1.1417		29.00
1.1562	1 5/32	
1.1614		29.50
1.1719	1 11/64	
1.1811		30.00
1.1875	1 3/16	
1.2008		30.50
1.2031	1 13/64	
1.2188	1 7/32	
1.2205		31.00
1.2344	1 15/64	
1.2402		31.50
1.2500	1 1/4	
1.2598		32.00
1.2656	1 17/64	
1.2795		32.50
1.2812	1 9/32	
1.2969	1 19/64	
1.2992		33.00
1.3125	1 5/16	
1.3189		33.50
1.3281	1 21/64	
1.3386		34.00
1.3438	1 11/32	
1.3583		34.50
1.3594	1 23/64	
1.3750	1 3/8	
1.3780		35.00
1.3906	1 25/64	
1.3976		35.50
1.4062	1 13/32	
1.4173		36.00
1.4219	1 27/64	
1.4370		36.50
1.4375	1 7/16	
1.4531	1 29/64	
1.4567		37.00
1.4688	1 15/32	
1.4764		37.50
1.4844	1 31/64	
1.4961		38.00
1.5000	1 1/2	
1.5156	1 33/64	
1.5157		38.50
1.5312	1 17/32	
1.5354		39.00
1.5469	1 35/64	
1.5551		39.50
1.5625	1 9/16	
1.5748		40.00
1.5781	1 37/64	
1.5938	1 19/32	
1.5945		40.50
1.6094	1 39/64	
1.6142		41.00
1.6250	1 5/8	
1.6339		41.50
1.6406	1 41/64	
1.6535		42.00
1.6562	1 21/32	
1.6719	1 43/64	
1.6732		42.50
1.6875	1 11/16	
1.6929		43.00
1.7031	1 45/64	
1.7126		43.50
1.7188	1 23/32	
1.7323		44.00
1.7344	1 47/64	
1.7500	1 3/4	
1.7520		44.50
1.7656	1 49/64	
1.7717		45.00
1.7812	1 25/32	
1.7913		45.50
1.7969	1 51/64	
1.8110		46.00
1.8125	1 13/16	
1.8281	1 53/64	
1.8307		46.50
1.8438	1 27/32	
1.8504		47.00
1.8594	1 55/64	
1.8701		47.50
1.8750	1 7/8	
1.8898		48.00
1.8906	1 57/64	
1.9062	1 29/32	
1.9094		48.50
1.9219	1 59/64	
1.9291		49.00
1.9375	1 15/16	
1.9488		49.50
1.9531	1 61/64	
1.9685		50.00
1.9688	1 31/32	
1.9844	1 63/64	
1.9882		50.50
2.0000	2	
2.0079		51.00
2.0156	2 1/64	
2.0276		51.50
2.0312	2 1/32	
2.0469	2 3/64	
2.0472		52.00
2.0625	2 1/16	
2.0669		52.50
2.0781	2 5/64	
2.0866		53.00
2.0938	2 3/32	
2.1063		53.50
2.1094	2 7/64	
2.1250	2 1/8	
2.1260		54.00
2.1406	2 9/64	
2.1457		54.50
2.1562	2 5/32	
2.1654		55.00
2.1719	2 11/64	
2.1850		55.50
2.1875	2 3/16	
2.2031	2 13/64	
2.2047		56.00
2.2188	2 7/32	
2.2244		56.50
2.2344	2 15/64	
2.2441		57.00
2.2500	2 1/4	
2.2638		57.50
2.2656	2 17/64	
2.2812	2 9/32	
2.2835		58.00
2.2969	2 19/64	
2.3031		58.50
2.3125	2 5/16	
2.3228		59.00
2.3281	2 21/64	
2.3425		59.50
2.3438	2 11/32	
2.3594	2 23/64	
2.3622		60.00
2.3750	2 3/8	
2.3819		60.50
2.3906	2 25/64	
2.4016		61.00
2.4062	2 13/32	
2.4213		61.50
2.4219	2 27/64	
2.4375	2 7/16	
2.4409		62.00
2.4531	2 29/64	
2.4606		62.50
2.4688	2 15/32	
2.4803		63.00
2.4844	2 31/64	
2.5000	2 1/2	63.50
2.5156	2 33/64	
2.5197		64.00
2.5312	2 17/32	
2.5394		64.50
2.5469	2 35/64	
2.5591		65.00
2.5625	2 9/16	
2.5781	2 37/64	
2.5787		65.50
2.5938	2 19/32	
2.5984		66.00
2.6094	2 39/64	
2.6181		66.50
2.6250	2 5/8	
2.6378		67.00
2.6406	2 41/64	
2.6562	2 21/32	
2.6575		67.50
2.6719	2 43/64	
2.6772		68.00
2.6875	2 11/16	
2.6968		68.50
2.7031	2 45/64	
2.7165		69.00
2.7188	2 23/32	
2.7344	2 47/64	
2.7362		69.50
2.7500	2 3/4	
2.7559		70.00
2.7656	2 49/64	
2.7756		70.50
2.7812	2 25/32	
2.7953		71.00
2.7969	2 51/64	
2.8125	2 13/16	
2.8150		71.50
2.8281	2 53/64	
2.8346		72.00
2.8438	2 27/32	
2.8543		72.50
2.8594	2 55/64	
2.8740		73.00
2.8750	2 7/8	
2.8906	2 57/64	
2.8937		73.50
2.9062	2 29/32	
2.9134		74.00
2.9219	2 59/64	
2.9331		74.50
2.9375	2 15/16	
2.9528		75.00
2.9531	2 61/64	
2.9688	2 31/32	
2.9724		75.50
2.9844	2 63/64	
2.9921		76.00
3.0000	3	
3.0118		76.50
3.0156	3 1/64	
3.0312	3 1/32	
3.0315		77.00
3.0469	3 3/64	
3.0512		77.50
3.0625	3 1/16	
3.0709		78.00
3.0781	3 5/64	
3.0905		78.50
3.0938	3 3/32	
3.1094	3 7/64	
3.1102		79.00
3.1250	3 1/8	
3.1299		79.50
3.1406	3 9/64	
3.1496		80.00
3.1562	3 5/32	
3.1693		80.50
3.1719	3 11/64	
3.1875	3 3/16	
3.1890		81.00
3.2031	3 13/64	
3.2087		81.50
3.2188	3 7/32	
3.2283		82.00
3.2344	3 15/16	
3.2480		82.50
3.2500	3 1/4	
3.2656	3 17/64	
3.2677		83.00
3.2812	3 9/32	
3.2874		83.50
3.2969	3 19/64	
3.3071		84.00
3.3125	3 5/16	
3.3268		84.50
3.3281	3 21/64	
3.3438	3 11/32	
3.3465		85.00
3.3594	3 23/64	
3.3661		85.50
3.3750	3 3/8	
3.3858		86.00
3.3906	3 25/64	
3.4055		86.50
3.4062	3 13/32	
3.4219	3 27/64	
3.4252		87.00
3.4375	3 7/16	
3.4449		87.50
3.4531	3 29/64	
3.4646		88.00
3.4688	3 15/32	
3.4842		88.50
3.4844	3 31/64	
3.5000	3 1/2	
3.5039		89.00
3.5236		89.50
3.5433		90.00
3.5630		90.50
3.5827		91.00
3.6024		91.50
3.6220		92.00
3.6417		92.50
3.6614		93.00
3.6811		93.50
3.7008		94.00
3.7205		94.50
3.7402		95.00
3.7598		95.50
3.7795		96.00
3.7992		96.50
3.8189		97.00
3.8386		97.50
3.8583		98.00
3.8779		98.50
3.8974		99.00
3.9173		99 50
3.9370		100.00
4.0000		101.60

Besly Special Taps

Besly encourages its customers to consult with our Authorized Distributors and our Engineering Department when a special tapping problem arises. Often they can recommend a standard tap as a solution. After all, Besly has a complete line of taps, and styles which are exclusively our own.

However, when the occasion arises where only a special tap will do, we stand ready to design and produce special taps to customer specifications. Our Engineering and Production staff has a wealth of tap experience and technology. They, for example, developed the X-Press Tap.

Practically any special purpose tap can be produced promptly, including those with special shanks, squares and fittings. Types from Acme, Stub Acme, Buttress, Modified Whitworth, British Association Standard to French and ISO metric sizes.

Single Pass Taps or Series Taps, for the progressive generation of Acme threads can be produced quickly and efficiently. Whatever the need, call on Besly first.

Besly Tap Blitz is the quick tap service tailored to fit **your** needs. There is no 12 piece limit on taps ordered for quick service. Just call our toll free number and tell us how many taps you need and in what time. We'll discuss it . . . and agree together, on a solution for your special tap problem.

See Special Taps Catalog no. ST-1103 for details.

Turboflute Drills are not just for deep hole drilling

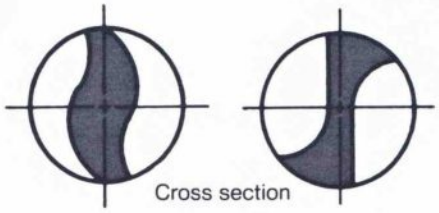
Many manufacturers are reaping the many other benefits of Besly Turboflute Drills

One thing has made the Turboflute drill as successful as it is. It can drill deep holes. Up to 16 or more times its own diameter in one pass. Quite remarkable isn't it.

Equally remarkable, is the fact that most people think the Turboflute drill can be used only in deep hole drilling applications. The very design features that make the Turboflute drill an ideal deep hole drill allow it to be used most successfully in other drilling operations.

2x the normal feed rate.
The Turboflute drill operates at penetration rates 2x that of conventional drills. You are in and out of the hole faster. You get two hours of drilling work from a machine you used to get one hour. In many screw machine applications you could eliminate a secondary machining operation. Due to the increased feed rate you may free up a spindle for additional machining. Simply stated, you increase your productivity.

Parabolic flute design makes the difference.
The Turboflute parabolic flute design breaks the chips up into smaller pieces and allows them to escape out of the hole more freely. There is no chip packing in the hole.



The increased feed rate which is allowed by the parabolic flute design, allows for a more efficient chip flow and eliminates withdrawal of the drill to clear the chips. Again, productivity is increased.

Center drilling can be eliminated.
In many cases, the center drilling operation is eliminated because the special split point design of the turboflute drill centers and seats itself. Productivity is increased.

Turboflute split point design

Drill life extended up to seven times average drills.
The parabolic flute design results in an unusually thick web that provides stability and extends life between sharpenings up to seven times average drills. That means you have less down time to change and sharpen drills. Production continues with fewer interruptions and greater productivity.

Strength and rigidity eliminates bushings and fixtures.
Costly bushings and fixtures can be eliminated because the Turboflute drill seats itself and does not have a tendency to "walk". You get a true, straight hole.

Productivity increased ... add it up.

- **2x feed rate**
- **fewer withdrawals**
- **center drilling operation eliminated**
- **7x drill life — less down time to change drills**
- **bushings and fixtures eliminated**

The Turboflute drill is available in almost any length and diameter to suit your needs. Whether it's for deep hole drills or high production screw machine operations, Besly has a Turboflute drill to fit your particular operation. Contact your Besly Representative for technical assistance for your specific drilling operation.

Distributed by:

Your Besly Industrial Supply Distributor is ready, willing and able to give you the finest service and the finest cutting tools available. Besly Distributors are cutting tool experts and back their expertise with stocks to meet your requirements. They are supported by our own Factory Trained Field Sales Engineers, our Product Engineering Group, our Research and Development Lab and our inventories.

In this catalog you'll find taps designed specifically for tapping some of the most difficult materials in use today. Tougher applications may require a modification of some features of these taps. Your Besly Technical Support Team can assist you in achieving the best tap design for your situation.

Informative literature is available on the complete line of Besly fine quality cutting tools. Ask your Besly distributor listed or contact Besly directly. For your convenience, toll free telephone lines are available.

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Besly Cutting Tools, Inc.
16200 Woodmint Lane
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815-389-2231 • FAX: 815-389-1339
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