

# STANDARD TAPS SPEED RECOMMENDATIONS

Workpiece Material	Brinell Hardness (BHN)	Surface Speed (SFM)
Low Carbon Steel - 1018, 12L12, 1108, 1213	≤ 120	65
Low & Medium Carbon Steel - 1018, 1551, 11L44	120 - 250	40
Medium Carbon and Alloyed Steel - 1040, 1140, 4340, 8640	≤ 250	40
Tool and Die Steels - P20, A2, D2, H12	≤ 250	20
Tool and Die Steels - P20, A2, D2, H12	250 - 350	15
Free Machining Stainless Steels - 303, 410, 416, 440F	≤ 260	35
Moderate Machining Stainless Steels - 304, 316	≤ 300	25
Difficult Machining Stainless Steels - 17-4PH, 316L, AM350	≤ 300	10
Cast Iron - Soft Gray	≤ 160	70
Cast Iron - Gray	160 - 260	60
Cast Iron - Ductile	250	50
Cast Iron - Malleable	250 - 330	35
Titanium Alloys - Commercially Pure 99.0	110 - 170	20
Titanium Alloys - Ti-6Al-4V, ASTM B367 Grades C-3, C-4	≤ 250	15
High Temperature Alloys - Inconel, Hastelloy, Waspaloy	≤ 150	25
High Temperature Alloys - Inconel, Hastelloy, Waspaloy	150 - 250	10
Aluminum Alloys - 2025, 6061, A140, 514.0	≤ 150	100
Copper Alloys - Brass and Bronze	≤ 200	50
Magnesium Alloys - AZ80A, HM12A, AM60A, ZE41A	50 - 90	70

**SPEEDS** shown are suggested starting points only and may be increased or decreased depending on actual material and machining conditions. Start conservatively and increase until the machining cycle is optimized.

**TAP SPEEDS** may be **increased** for coated taps, spiral point taps, fine pitch taps and when the percentage of thread is decreased.

**TAP SPEEDS** may need to be **decreased** for uncoated taps, spiral flute taps, coarse pitch taps, bottoming taps, difficult materials, longer thread lengths, and when the percentage of thread is increased.

**THREAD FORMING TAPS** generally form threads more efficiently at higher speeds. Suggested speeds are 50% to 100% higher than the suggested speeds for cutting taps in similar applications.

**PIPE TAP SPEEDS** should be between one-half and three-quarters of the speeds of taps of comparable diameter and pitch.

Tool Coatings Also Available

# Tap Drill Sizes

## Cutting Taps & Thread Forming Taps

TAP DRILL SIZES			METRIC TAP DRILL SIZES		
TAP SIZE	Cutting Taps based on approx. 75% thread	Forming Taps based on approx. 65% thread	TAP SIZE	Cutting Taps based on approx. 75% thread	Forming Taps based on approx. 65% thread
	CUTTING TAP DRILL SIZE	FORMING TAP DRILL SIZE		CUTTING TAP DRILL SIZE	FORMING TAP DRILL SIZE
0-80	3/64	No. 54	M1.6 x 0.35	1.25mm	1.45mm
1-64	No. 53	1.65mm	M1.8 x 0.35	1.45mm	1/16
1-72	No. 53	1.7mm	M2 x 0.4	1.60mm	No. 49
2-56	No. 50	5/64	M2.2 x 0.45	1.75mm	No. 42
2-64	No. 50	2.0mm	M2.5 x 0.45	2.05mm	No. 41
3-48	No. 47	No. 43	M3 x 0.5	2.5mm	No. 34
3-56	No. 46	2.3mm	M3.5 x 0.6	2.9mm	3.3mm
4-40	No. 43	No. 39	M4 x 0.7	3.3mm	3.7mm
4-48	No. 42	2.6mm	M4.5 x 0.75	3.75mm	4.2mm
5-40	No. 39	No. 33	M5 x 0.8	No. 19	No. 13
5-44	No. 38	2.9mm	M6 x 1	5mm	No. 2
6-32	No. 36	1/8	M7 x 1	6mm	6.5mm
6-40	No. 33	3.2mm	M8 x 1.25	H	M
8-32	No. 29	No. 25	M8 x 1	J	19/64
8-36	No. 29	No. 24	M10 x 1.5	8.5mm	U
10-24	No. 25	11/64	M10 x 1.25	8.75mm	9.5mm
10-32	No. 21	No. 16	M12 x 1.75	13/32	7/16
12-24	No. 17	5mm	M12 x 1.25	10.75mm	11.5mm
12-28	No. 15	No. 8	M14 x 2	12mm	33/64
1/4-20	No. 7	No. 1	M14 x 1.5	12.5mm	17/32
1/4-28	No. 3	A	M16 x 2	14mm	19/32
5/16-18	F	7.3mm	M16 x 1.5	14.5mm	39/64
5/16-24	I	M	M18 x 2.5	15.5mm	17mm
3/8-16	5/16	S	M18 x 1.5	16.5mm	11/16
3/8-24	Q	T	M20 x 2.5	17.5mm	18.75mm
7/16-14	U	13/32	M20 x 1.5	18.5mm	49/64
7/16-20	W	10.5mm	M22 x 2.5	19.5mm	21mm
1/2-13	27/64	11.8mm	M22 x 1.5	20.5mm	27/32
1/2-20	29/64	12mm	M24 x 3	53/64	57/64
9/16-12	31/64	17/32	M24 x 2	22mm	* Reaming Recommended
9/16-18	33/64	13.5mm	M27 x 3	24mm	
5/8-11	17/32	14.75mm	M27 x 2	63/64	
5/8-18	37/64	15.25mm	M30 x 3.5	1-3/64*	
3/4-10	21/32	45/64	M30 x 2	1-7/64*	
3/4-16	11/16	23/32	M33 x 3.5	1-11/64*	
7/8-9	49/64		M33 x 2	31mm*	
7/8-14	13/16		M36 x 4	32mm*	
1-8	7/8		M36 x 3	33mm*	
1-12	59/64		M39 x 4	35mm*	
1-14	15/16		M39 x 3	36mm*	

PIPE TAP DRILL SIZES				
TAP SIZE	NPT** TAP DRILL SIZE	NPTF** TAP DRILL SIZE	NPS TAP DRILL SIZE	NPSF TAP DRILL SIZE
1/16	D	C	1/4	D
1/8	R	Q	S	R
1/4	7/16	7/16	29/64	7/16
3/8	37/64	9/16	19/32	37/64
1/2	23/32	45/64	47/64	45/64
3/4	59/64	29/32	15/16	59/64
1	1-5/32	1-9/64	1-3/16	1-5/32
1-1/4	1-1/2	1-31/64	1-33/64	**For tapping without reaming
1-1/2	1-47/64	1-23/32	1-3/4	
2	2-7/32	2-3/16	2-7/32	
2-1/2	2-5/8	2-39/64	2-21/32	
3	3-1/4	3-15/64		

# Tap Drill Sizes – STI (Screw Thread Insert) Taps

STI TAP SIZE	ALUMINUM				STEEL, PLASTIC, MAGNESIUM			
	TAP DRILL SIZE	DECIMAL EQUIV. OF TAP DRILL (INCHES)	MINOR DIA. LIMITS (AFTER TAPPING)		TAP DRILL SIZE	DECIMAL EQUIV. OF TAP DRILL (INCHES)	MINOR DIA. LIMITS (AFTER TAPPING)	
			MIN.	MAX.			MIN.	MAX.
4 - 40	#31	.1200	.116	.121	#31	.1200	.119	.124
5 - 40	#30	.1285	.128	.133	#29	.1360	.131	.136
6 - 32	#25	.1495	.144	.150	#25	.1495	.148	.154
6 - 40	#26	.1470	.144	.149	#25	.1495	.148	.153
8 - 32	#17	.1730	.170	.176	#16	.1770	.174	.180
10- 24	1 <sup>3</sup> / <sub>64</sub>	.2031	.199	.205	#5	.2055	.203	.209
10 - 32	#7	.2010	.196	.202	1 <sup>3</sup> / <sub>64</sub>	.2031	.200	.206
12 - 24	#2	.2210	.221	.227	#1	.2280	.225	.231
1/4 - 20	1 <sup>7</sup> / <sub>64</sub>	.2656	.261	.267	1 <sup>7</sup> / <sub>64</sub>	.2656	.265	.271
1/4 - 28	G	.2610	.257	.264	1 <sup>7</sup> / <sub>64</sub>	.2656	.261	.268
5/16 - 18	Q	.3320	.328	.334	Q	.3320	.331	.337
5/16 - 24	2 <sup>1</sup> / <sub>64</sub>	.3281	.323	.330	Q	.3320	.327	.334
3/8 - 16	X	.3970	.390	.398	X	.3970	.396	.402
3/8 - 24	2 <sup>5</sup> / <sub>64</sub>	.3906	.385	.392	2 <sup>5</sup> / <sub>64</sub>	.3906	.389	.396
7/16 - 14	2 <sup>9</sup> / <sub>64</sub>	.4531	.453	.463	1 <sup>5</sup> / <sub>32</sub>	.4687	.461	.471
7/16 - 20	2 <sup>9</sup> / <sub>64</sub>	.4531	.450	.458	2 <sup>9</sup> / <sub>64</sub>	.4531	.453	.461
1/2 - 13	3 <sup>3</sup> / <sub>64</sub>	.5156	.515	.525	1 <sup>7</sup> / <sub>32</sub>	.5312	.523	.533
1/2 - 20	3 <sup>3</sup> / <sub>64</sub>	.5156	.513	.522	3 <sup>3</sup> / <sub>64</sub>	.5156	.515	.524

**NOTE:** Tap Drills listed above should produce holes within the required limits. However, variations in material and equipment may require the use of drills which are larger or smaller than those recommended.

**NOTE:** Minor Diameter Limits for steel, plastic, and magnesium are such as to allow for material contraction and provide maximum tap life.

### Formula for Obtaining Tap Drill Sizes for Cutting Taps:

$$\text{Major Dia. of Thread} - \frac{.01299 \times \text{Amt. of percentage of full thread}}{\text{No. of threads per inch}} = \text{Drilled Hole* Size}$$

Note: Select nearest commercial stock drill.

### Percentage of Full Thread for Other Drill Sizes

$$\text{No. of Threads per Inch} \times \frac{\text{Major Dia. Selected of Thread} - \text{Drill Dia.}}{.01299} = \text{Percentage of Full Thread}$$

### Formula For Obtaining Tap Drill Sizes For Thread Forming Taps:

$$\text{*Drill Hole Size (inches)} = \text{Basic Major Dia. of thread (inches)} - .0068 \times \frac{\text{Percentage of Full Thread}}{\text{No. of Threads per Inch}}$$

$$\text{*Drilled Hole Size (mm)} = \text{Basic Major Dia. of thread (mm)} - \frac{\text{Percentage of Full Thread X mm Pitch}}{147.06}$$

\*Note: Drill size should be smaller than hole size by the probable amount the drill will cut oversize.

# Standard Taps

## Class of Fit Recommendations

These tap recommendations will produce the specified class of fit in most applications. Threads produced should be checked with thread plug gages to ensure that the threads meet required specifications. Threads that gage loose or tight may require experimentation with taps of lower or higher pitch diameter limit ("H" or "D" number).

Unified and American National Screw Threads							
Nominal Size	Threads Per Inch		Recommended Tap for Class of Thread		Pitch Diameter Limits for Class of Thread		
	UNC	UNF	Class 2B	Class 3B	Minimum (Basic)	Maximum Class 2B	Maximum Class 3B
0	—	80	H2	H1	.0519	.0542	.0536
1	64	—	H2	H1	.0629	.0655	.0648
1	—	72	H2	H1	.0640	.0665	.0659
2	56	—	H2	H1	.0744	.0772	.0765
2	—	64	H2	H1	.0759	.0786	.0779
3	48	—	H2	H1	.0855	.0885	.0877
3	—	56	H2	H1	.0874	.0902	.0895
4	40	—	H2	H2	.0958	.0991	.0982
4	—	48	H2	H1	.0985	.1016	.1008
5	40	—	H2	H2	.1088	.1121	.1113
5	—	44	H2	H1	.1102	.1134	.1126
6	32	—	H3	H2	.1177	.1214	.1204
6	—	40	H2	H2	.1218	.1252	.1243
8	32	—	H3	H2	.1437	.1475	.1465
8	—	36	H2	H2	.1460	.1496	.1487
10	24	—	H3	H3	.1629	.1672	.1661
10	—	32	H3	H2	.1697	.1736	.1726
12	24	—	H3	H3	.1889	.1933	.1922
12	—	28	H3	H3	.1928	.1970	.1959
1/4	20	—	H5	H3	.2175	.2224	.2211
1/4	—	28	H4	H3	.2268	.2311	.2300
5/16	18	—	H5	H3	.2764	.2817	.2803
5/16	—	24	H4	H3	.2854	.2902	.2890
3/8	16	—	H5	H3	.3344	.3401	.3387
3/8	—	24	H4	H3	.3479	.3528	.3516
7/16	14	—	H5	H3	.3911	.3972	.3957
7/16	—	20	H5	H3	.4050	.4104	.4091
1/2	13	—	H5	H3	.4500	.4565	.4548
1/2	—	20	H5	H3	.4675	.4731	.4717
9/16	12	—	H5	H3	.5084	.5152	.5135
9/16	—	18	H5	H3	.5264	.5323	.5308
5/8	11	—	H5	H3	.5660	.5732	.5714
5/8	—	18	H5	H3	.5889	.5949	.5934
3/4	10	—	H5	H3	.6850	.6927	.6907
3/4	—	16	H5	H3	.7094	.7159	.7143
7/8	9	—	H6	H4	.8028	.8110	.8089
7/8	—	14	H6	H4	.8286	.8356	.8339
1	8	—	H6	H4	.9188	.9276	.9254
1	—	12	H6	H4	.9459	.9535	.9516
1	—	14*	H6	H4	.9536	.9609	.9590
1 1/8	7	—	H8	H4	1.0322	1.0416	1.0393
1 1/8	—	12	H6	H4	1.0709	1.0787	1.0768
1 1/4	7	—	H8	H4	1.1572	1.1668	1.1644
1 1/4	—	12	H6	H4	1.1959	1.2039	1.2019
1 3/8	6	—	H8	H4	1.2667	1.2771	1.2745
1 3/8	—	12	H6	H4	1.3209	1.3291	1.3270
1 1/2	6	—	H8	H4	1.3917	1.4022	1.3996
1 1/2	—	12	H6	H4	1.4459	1.4542	1.4522

\*UNS

# Standard Metric Taps

## Class of Fit Recommendations

These tap recommendations will produce the specified class of fit in most applications. Threads produced should be checked with thread plug gages to ensure that the threads meet required specifications. Threads that gage loose or tight may require experimentation with taps of lower or higher pitch diameter limit ("H" or "D" number).

Metric Threads						
Size mm	Pitch mm	Recommended Tap for Class of Thread		Pitch Diameter Limits for Class of Thread		
		Class 4H	Class 6H	Minimum (Basic)	Maximum Class 4H	Maximum Class 6H
M1.6	0.35	D1	D3	1.373	1.426	1.458
M1.8	0.35	D1	D3	1.573	1.626	1.658
M2	0.4	D1	D3	1.740	1.796	1.830
M2.2	0.45	D1	D3	1.908	1.968	2.003
M2.5	0.45	D1	D3	2.208	2.268	2.303
M2.6	0.45	D1	D2	2.308	2.368	2.403
M3	0.5	D1	D3	2.675	2.738	2.775
M3.5	0.6	D1	D4	3.110	3.181	3.222
M4	0.75	D2	D3	3.513	3.588	3.631
M4	0.7	D2	D4	3.545	3.620	3.663
M4.5	0.75	D2	D4	4.013	4.088	4.131
M5	0.9	D2	D3	4.415	4.501	4.549
M5	0.8	D2	D4	4.480	4.560	4.605
M5.5	0.9	D2	D3	4.915	5.002	5.050
M6	1	D3	D5	5.350	5.445	5.500
M6	0.75	D3	D4	5.513	5.598	5.645
M7	1	D3	D5	6.350	6.445	6.500
M8	1.25	D3	D5	7.188	7.288	7.348
M8	1	D3	D5	7.350	7.445	7.500
M9	1.25	D3	D5	8.188	8.288	8.348
M9	1	D3	D5	8.350	8.445	8.500
M10	1.5	D3	D6	9.026	9.138	9.206
M10	1.25	D3	D5	9.188	9.288	9.348
M10	1	D3	D5	9.350	9.445	9.500
M11	1.5	D3	D5	10.026	10.138	10.206
M12	1.75	D3	D6	10.863	10.988	11.063
M12	1.5	D3	D5	11.026	11.144	11.216
M12	1.25	D3	D5	11.188	11.300	11.368
M14	2	D3	D7	12.701	12.833	12.913
M14	1.5	D3	D6	13.026	13.144	13.216
M14	1.25	D3	D5	13.188	13.300	13.368
M16	2	D4	D7	14.701	14.833	14.913
M16	1.5	D3	D6	15.026	15.144	15.216
M18	2.5	D4	D7	16.376	16.516	16.600
M18	1.5	D3	D6	17.026	17.144	17.216
M20	2.5	D4	D7	18.376	18.516	18.600
M20	1.5	D3	D6	19.026	19.144	19.216
M22	2.5	D4	D7	20.376	20.516	20.600
M22	1.5	D3	D6	21.026	21.144	21.216
M24	3	D4	D8	22.051	22.221	22.316
M24	2	D4	D7	22.701	22.841	22.925
M24	1.5	D3	D5	23.026	23.151	23.226
M25	1.5	D3	D5	24.026	24.151	24.226
M27	3	D5	D8	25.051	25.221	25.316
M27	2	D5	D7	25.701	25.841	25.925
M30	3.5	D5	D9	27.727	27.907	28.007
M30	2	D5	D7	28.701	28.841	28.925
M32	2	D5	D7	30.701	30.841	30.925
M33	3.5	D5	D9	30.727	30.907	31.007
M33	2	D5	D7	31.701	31.841	31.925
M36	4	D5	D9	33.402	33.592	33.702
M36	3	D5	D8	34.051	34.221	34.316
M36	2	D5	D7	34.701	34.841	34.925
M39	4	D6	D9	36.402	36.592	36.702
M39	3	D6	D8	37.051	37.221	37.316

# Fluteless Thread Forming Taps

## Class of Fit Recommendations

These tap recommendations will produce the specified class of fit in most applications. Threads produced should be checked with thread plug gages to ensure that the threads meet required specifications. Threads that gage loose or tight may require experimentation with taps of lower or higher pitch diameter limit ("H" or "D" number).

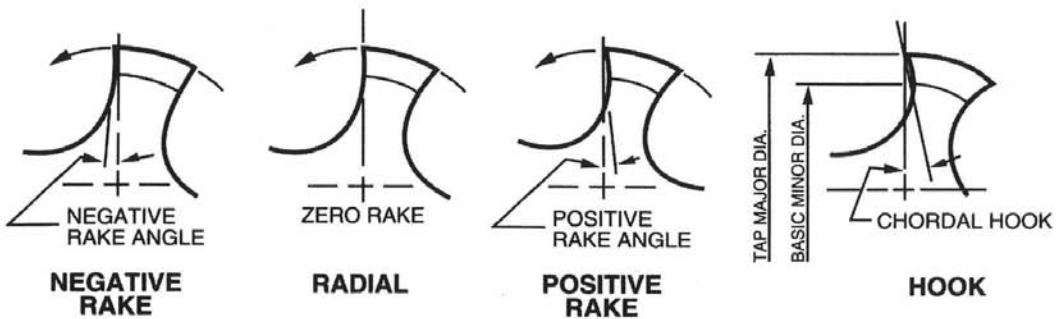
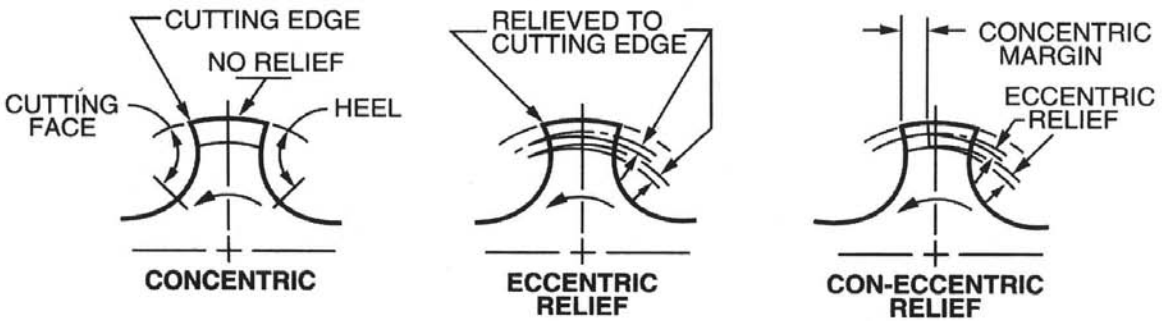
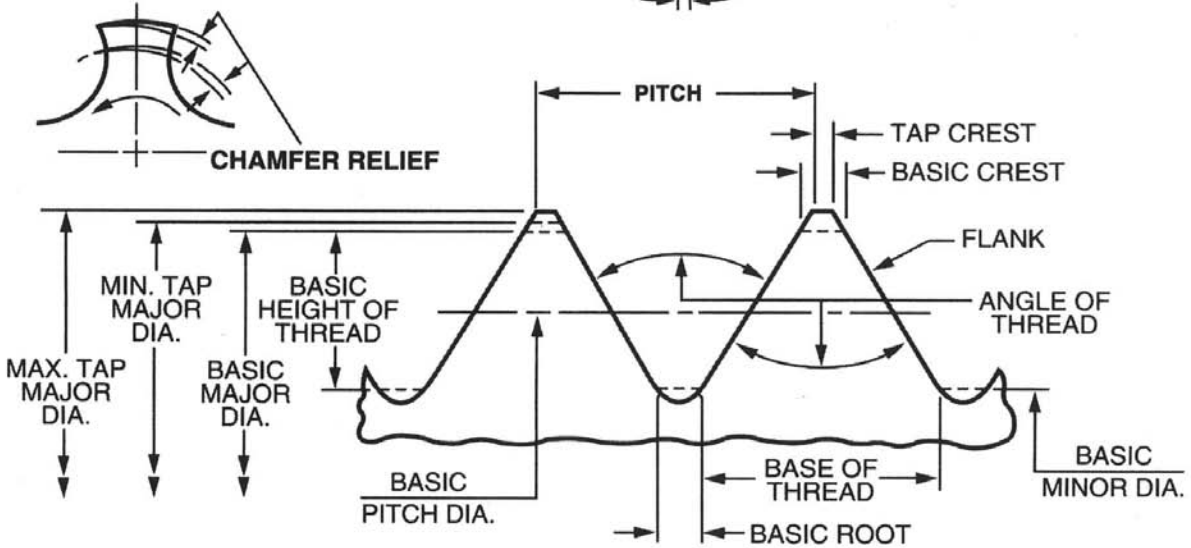
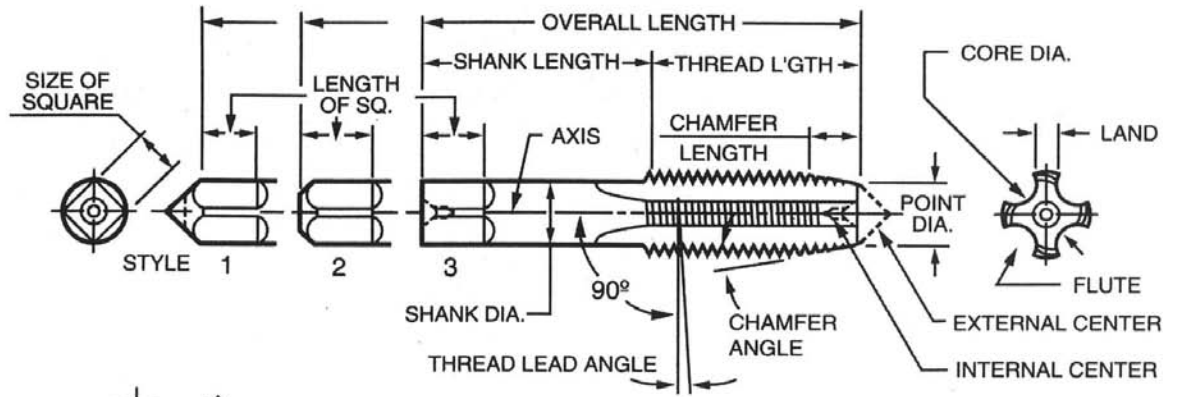
### Machine Screw & Fractional

SIZE	THREADS PER INCH		"H" LIMIT for CLASS of FIT		
	UNC	UNF	2	2B	3B
0	80	—	H2	H3	H2
1	64	—	H2	H3	H2
	—	72	H2	H3	H2
2	56	—	H2	H3	H2
	—	64	H2	H3	H2
3	48	—	H2	H3	H2
	—	56	H2	H3	H2
4	40	—	H3	H5	H3
	—	48	H3	H5	H3
5	40	—	H3	H5	H3
	—	44	H3	H5	H3
6	32	—	H3	H5	H3
	—	40	H3	H5	H3
8	32	—	H3	H5	H3
	—	36	H3	H5	H3
10	24	—	H4	H6	H4
	—	32	H4	H6	H4
12	24	—	H4	H6	H4
	—	28	H4	H6	H4
1/4	20	—	H4	H6	H4
	—	28	H4	H6	H4
5/16	18	—	H5	H7	H5
	—	24	H5	H7	H5
3/8	16	—	H5	H7	H5
	—	24	H5	H7	H5
7/16	14	—	H5	H8	H5
	—	20	H5	H8	H5
1/2	13	—	H5	H8	H5
	—	20	H5	H8	H5
9/16	12	—	H7	H10	H7
	—	18	H7	H10	H7
5/8	11	—	H7	H10	H7
	—	18	H7	H10	H7
3/4	10	—	H7	H10	H7
	—	16	H7	H10	H7

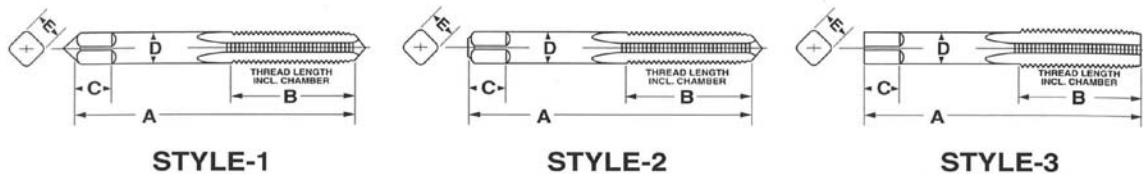
### Metric

SIZE	PITCH	"D" LIMIT for CLASS of FIT	
		4H	6H
M3	0.5	D3	D5
M4	0.7	D4	D6
M5	0.8	D4	D7
M6	1	D5	D8
M8	1.25	D5	D9
M10	1.5	D6	D10
M12	1.75	D6	D11
M14	2	D7	D11
M16	2	D7	D12
M20	2.5	D7	D12

# Tap Terminology



# Table 302 — Hand Taps



## General Dimensions

NOMINAL DIA. RANGE-INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER (INCHES)	NOMINAL METRIC DIAMETER (MM)	STYLE	TAP DIMENSIONS — INCHES				
						LENGTH OVERALL A	THREAD LENGTH B	SQUARE LENGTH C	SHANK DIAMETER D	SIZE OF SQUARE E
OVER	TO (Incl.)									
.052	.065	0	1/16	M1.6	1	1 5/8	5/16	3/16	.141	.110
.065	.078	1	—	M1.8	1	1 11/16	3/8	3/16	.141	.110
.078	.091	2	—	M2, M2.2	1	1 3/4	7/16	3/16	.141	.110
.091	.104	3	3/32	M2.5	1	1 13/16	1/2	3/16	.141	.110
.104	.117	4	—	—	1	1 7/8	9/16	3/16	.141	.110
.117	.130	5	1/8	M3, M3.15	1	1 15/16	5/8	3/16	.141	.110
.130	.145	6	—	M3.5	1	2	1 1/16	3/16	.141	.110
.145	.171	8	5/32	M4	1	2 1/8	3/4	1/4	.168	.131
.171	.197	10	3/16	M4.5, M5	1	2 3/8	7/8	1/4	.194	.152
.197	.223	12	7/32	—	1	2 3/8	1 5/16	9/32	.220	.165
.223	.260	14	1/4	M6, M6.3	2	2 1/2	1	5/16	.255	.191
.260	.323		5/16	M7, M8	2	2 23/32	1 1/8	3/8	.318	.238
.323	.395		3/8	M10	2	2 15/16	1 1/4	7/16	.381	.286
.395	.448		7/16	—	3	3 5/32	1 7/16	13/32	.323	.242
.448	.510		1/2	M12, M12.5	3	3 3/8	1 21/32	7/16	.367	.275
.510	.573		9/16	M14	3	3 19/32	1 21/32	1/2	.429	.322
.573	.635		5/8	M16	3	3 13/16	1 13/16	9/16	.480	.360
.635	.709		1 1/16	M18	3	4 1/32	1 13/16	5/8	.542	.406
.709	.760		3/4	—	3	4 1/4	2	1 1/16	.590	.442
.760	.823		13/16	M20	3	4 15/32	2	1 1/16	.652	.489
.823	.885		7/8	M22	3	4 1 1/16	2 7/32	3/4	.697	.523
.885	.948		15/16	M24	3	4 29/32	2 7/32	3/4	.760	.570
.948	1.010		1	M25	3	5 1/8	2 1/2	13/16	.800	.600
1.010	1.073		1 1/16	M27	3	5 1/8	2 1/2	7/8	.896	.672
1.073	1.135		1 1/8	—	3	5 7/16	2 9/16	7/8	.896	.672
1.135	1.198		1 3/16	M30	3	5 7/16	2 9/16	1	1.021	.766
1.198	1.260		1 1/4	—	3	5 3/4	2 9/16	1	1.021	.766
1.260	1.323		1 5/16	M33	3	5 3/4	2 9/16	1 1/16	1.108	.831
1.323	1.385		1 3/8	—	3	6 1/16	3	1 1/16	1.108	.831
1.385	1.448		1 7/16	M36	3	6 1/16	3	1 1/8	1.233	.925
1.448	1.510		1 1/2	—	3	6 3/8	3	1 1/8	1.233	.925
1.510	1.635		1 5/8	M39	3	6 1 1/16	3 3/16	1 1/8	1.305	.979
1.635	1.760		1 3/4	M42	3	7	3 3/16	1 1/4	1.430	1.072
1.760	1.885		1 7/8	—	3	7 5/16	3 3/16	1 1/4	1.519	1.139
1.885	2.010		2	M48	3	7 5/8	3 3/16	1 3/8	1.644	1.233
2.010	2.135		2 1/8	—	3	8	3 3/16	1 3/8	1.769	1.327
2.135	2.260		2 1/4	M56	3	8 1/4	3 3/16	1 7/16	1.894	1.420
2.260	2.385		2 3/8	—	3	8 1/2	4	1 7/16	2.019	1.514
2.385	2.510		2 1/2	—	3	8 3/4	4	1 1/2	2.100	1.575
2.510	2.635		2 5/8	M64	3	8 3/4	4	1 1/2	2.225	1.669
2.635	2.760		2 3/4	—	3	9 1/4	4	1 9/16	2.350	1.762
2.760	2.885		2 7/8	M72	3	9 1/4	4	1 9/16	2.475	1.856

(continued)



# Table 302 — Hand Taps (continued)

## General Dimensions

NOMINAL DIA. RANGE-INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER (INCHES)	NOMINAL METRIC DIAMETER (MM)	STYLE	TAP DIMENSIONS —INCHES				
						LENGTH OVERALL A	THREAD LENGTH B	SQUARE LENGTH C	SHANK DIAMETER D	SIZE OF SQUARE E
2.885	3.010		3	—	3	9 <sup>3</sup> / <sub>4</sub>	4 <sup>9</sup> / <sub>16</sub>	1 <sup>5</sup> / <sub>8</sub>	2.543	1.907
3.010	3.135		3 <sup>1</sup> / <sub>8</sub>	—	3	9 <sup>3</sup> / <sub>4</sub>	4 <sup>9</sup> / <sub>16</sub>	1 <sup>5</sup> / <sub>8</sub>	2.668	2.001
3.135	3.260		3 <sup>1</sup> / <sub>4</sub>	M80	3	10	4 <sup>9</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>4</sub>	2.793	2.095
3.260	3.385		3 <sup>3</sup> / <sub>8</sub>	—	3	10	4 <sup>9</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>4</sub>	2.883	2.162
3.385	3.510		3 <sup>1</sup> / <sub>2</sub>	—	3	10 <sup>1</sup> / <sub>4</sub>	4 <sup>15</sup> / <sub>16</sub>	2	3.008	2.256
3.510	3.635		3 <sup>5</sup> / <sub>8</sub>	M90	3	10 <sup>1</sup> / <sub>4</sub>	4 <sup>15</sup> / <sub>16</sub>	2	3.133	2.350
3.635	3.760		3 <sup>3</sup> / <sub>4</sub>	—	3	10 <sup>1</sup> / <sub>2</sub>	5 <sup>5</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>8</sub>	3.217	2.413
3.760	3.885		3 <sup>7</sup> / <sub>8</sub>	—	3	10 <sup>1</sup> / <sub>2</sub>	5 <sup>5</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>8</sub>	3.342	2.506
3.885	4.010		4	M100	3	10 <sup>3</sup> / <sub>4</sub>	5 <sup>5</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>4</sub>	3.467	2.600

## Tolerances

ELEMENT	NOMINAL DIAMETER RANGE —INCHES		DIRECTION	TOLERANCE — INCHES
	OVER	TO (Incl.)		
Length Overall — A	.052	1.010	Plus or Minus	1/32
	1.010	4.010	Plus or Minus	1/16
Length of Thread — B	.052	.223	Plus or Minus	3/64
	.223	.510	Plus or Minus	1/16
	.510	1.510	Plus or Minus	3/32
	1.510	4.010	Plus or Minus	1/8
Length of Square — C	.052	1.010	Plus or Minus	1/32
	1.010	4.010	Plus or Minus	1/16
Diameter of Shank — D	.052	.223	Minus	.0015
	.223	.635	Minus	.0015
	.635	1.010	Minus	.002
	1.010	1.510	Minus	.002
	1.510	2.010	Minus	.003
	2.010	4.010	Minus	.003
Size of Square — E	.052	.510	Minus	.004
	.510	1.010	Minus	.006
	1.010	2.010	Minus	.008
	2.010	4.010	Minus	.010

### Special Taps

Unless otherwise specified: Special taps over 1.010" to 1.510" diameter inclusive, having 14 or more threads per inch or 1.75 millimeter pitch and finer, and sizes over 1.510" diameter with 10 or more threads per inch or 2.5 millimeter pitch and finer, are made to general dimensions shown in Table 303.

Special ground thread taps are made to limits shown in Table 331 for Unified Inch Screw Threads and Table 341 for Metric M-Profile Screw Threads.

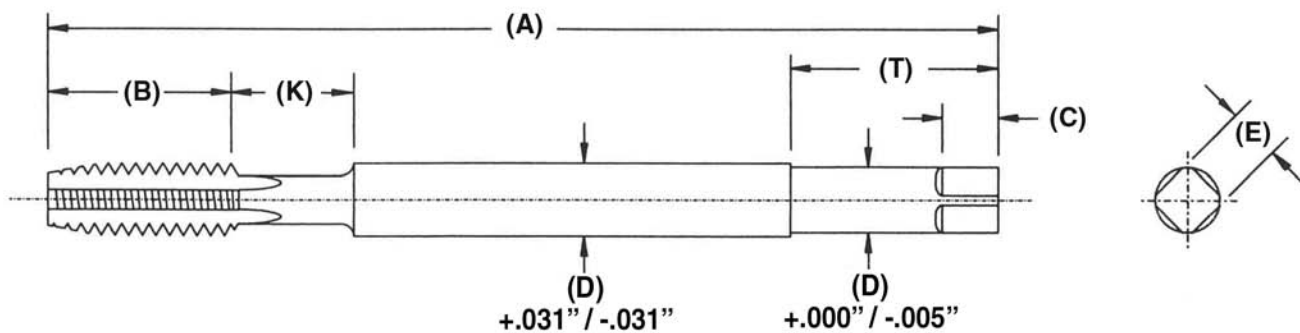
### Notes

Ground thread taps, sizes .395" and smaller, have external center on thread end (may be removed on bottoming taps). Sizes .223" and smaller have external center on shank end; sizes .224" thru .395" have truncated partial cone centers on shank end (length of cone approximately 1/4 of diameter shank). Sizes over .395" have internal center in thread and shank ends.

For standard thread limits and tolerances for Unified Inch Screw Threads see Table 327 and for Metric Threads see Table 337.

For eccentricity tolerances of tap elements see Table 317.

# Table 310 — Pulley Taps



## General Dimensions

DIAMETER OF TAP INCHES	DIMENSIONS - INCHES						
	LENGTH OVERALL A	LENGTH OF THREAD B	LENGTH OF SQUARE C	DIA. OF SHANK D	LENGTH OF CLOSE TOLERANCE T*	SIZE OF SQUARE E	LENGTH OF NECK K**
1/4	6, 8	1	5/16	.255	1 1/2	.191	3/8
5/16	6, 8	1 1/8	3/8	.318	1 9/16	.238	3/8
3/8	6, 8, 10	1 1/4	7/16	.381	1 5/8	.286	3/8
7/16	6, 8	1 7/16	1/2	.444	1 11/16	.333	7/16
1/2	6, 8, 10, 12	1 21/32	9/16	.507	1 11/16	.380	1/2
5/8	6, 8, 10, 12	1 13/16	1 1/16	.633	2	.475	5/8
3/4	10, 12	2	3/4	.759	2 1/4	.569	3/4

## Tolerances

ELEMENT	RANGE	DIRECTION	TOLERANCE
Length Overall — A	1/4" to 3/4" incl.	Plus or Minus	1/16"
Length of Thread — B	1/4" to 3/4" incl.	Plus or Minus	1/16"
Length of Square — C	1/4" to 3/4" incl.	Plus or Minus	1/32"
Diameter of Shank — D	1/4" to 3/4" incl.	Minus	.005"
Size of Square — E	1/4" to 1/2" incl. 5/8" to 3/4" incl.	Minus Minus	.004" .006"

### Formulae (Approximate)

Diameter of Shank "D" = Maximum Major Diameter.

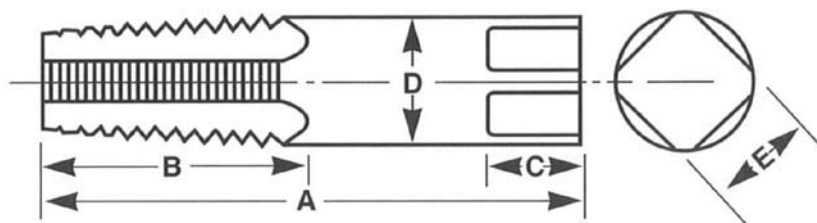
Size of Square = Diameter of Shank "D" x .75 to nearest .001"

### Notes

\*T is minimum length of shank which is held to eccentricity tolerances.

\*\*K (neck and its length) is optional with manufacturer.

# Table 311 — Pipe Taps



## General Dimensions

NOMINAL SIZE INCHES	DIMENSIONS - INCHES				
	LENGTH OVERALL A	LENGTH OF THREAD B	LENGTH OF SQUARE C	DIA. OF SHANK D	SIZE OF SQUARE E
1/16	2 1/8	1 1/16	3/8	.3125	.234
1/8	2 1/8	3/4	3/8	.3125	.234
1/8	2 1/8	3/4	3/8	.4375	.328
1/4	2 7/16	1 1/16	7/16	.5625	.421
3/8	2 9/16	1 1/16	1/2	.7000	.531
1/2	3 1/8	1 3/8	5/8	.6875	.515
3/4	3 1/4	1 3/8	1 1/16	.9063	.679
1	3 3/4	1 3/4	1 3/16	1.1250	.843
1 1/4	4	1 3/4	1 5/16	1.3125	.984
1 1/2	4 1/4	1 3/4	1	1.5000	1.125
2	4 1/2	1 3/4	1 1/8	1.8750	1.406
2 1/2	5 1/2	2 9/16	1 1/4	2.2500	1.687
3	6	2 5/8	1 3/8	2.6250	1.968
3 1/2	6 1/2	2 11/16	1 1/2	2.8125	2.108
4	6 3/4	2 3/4	1 5/8	3.0000	2.250

## Tolerances

ELEMENT	RANGE	DIRECTION	TOLERANCE
Length Overall — A	1/16" to 3/4" incl.	Plus or Minus	1/32"
	1" to 4" incl.	Plus or Minus	1/16"
Length of Thread — B	1/16" to 3/4" incl.	Plus or Minus	1/16"
	1" to 1 1/4" incl.	Plus or Minus	3/32"
	1 1/2" to 4" incl.	Plus or Minus	1/8"
Length of Square — C	1/16" to 3/4" incl.	Plus or Minus	1/32"
	1" to 4" incl.	Plus or Minus	1/16"
Diameter of Shank — D	1/16" to 1/8" incl.	Minus	.0015"
	1/4" to 1/2" incl.	Minus	.0020"
	3/4" to 1" incl.	Minus	.0020"
	1 1/4" to 4" incl.	Minus	.0030"
Size of Square — E	1/16" to 1/8" incl.	Minus	.0040"
	1/4" to 3/4" incl.	Minus	.0060"
	1" to 4" incl.	Minus	.0080"

### USEFUL FORMULAS

Surface Feet Per Minute = SFM  
 Revolutions Per Minute = RPM  
 Threads Per Inch = TPI  
 Pitch = P  
 Inches Per Minute = IPM

When TPI is known  
 $P = 1 \div TPI$

When SFM and DIA are known:  
 $RPM = 3.82 \times SFM \div DIA$

When RPM and P are known:  
 $IPM = RPM \times P$