

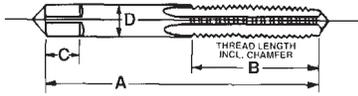


TAP DRILL SIZES AND PERCENTAGE OF THREADS

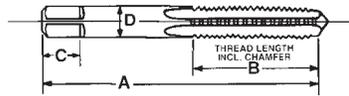
TAP		TAP DRILL	DECIM. EQUIV.	THEOR. % OF THREAD	TAP		TAP DRILL	DECIM. EQUIV.	THEOR. % OF THREAD	TAP		TAP DRILL	DECIM. EQUIV.	THEOR. % OF THREAD		
NOM. SIZE	TPI				NOM. SIZE	TPI				NOM. SIZE	TPI					
0	80	#56 3/64	.0465 .0469	83 81	1/4	20	13/64 #6	.2031 .2040	72 71	5/8	18	9/16 0.5687	.5625 .5687	87 78		
1	64	#54 #53	.0550 .0595	89 67	1/4	28	#5 7/32	.2055 .2188	69 67	5/8	20	37/64 37/64	.5781 .5781	72 87		
1	72	#53 1/16	.0595 .0625	75 58	1/4	32	7/32 #2	.2188 .2210	80 71	5/8	24	0.5828 19/32	.5828 .5938	78 67		
2	56	#51 #50 #49	.0670 .0700 .0730	82 69 56	1/4	36	#2 #2	.2210 .2210	80 80	5/8	28	19/32 19/32	.5938 .5938	77 87		
2	64	#50 #49	.0700 .0730	79 64	5/16	18	F G	.2570 .2610	77 71	11/16	12	19/32 39/64	.5938 .6094	87 72		
3	48	#48 5/64 #47 #46 #45	.0760 .0781 .0785 .0810 .0820	85 77 76 67 63	5/16	20	F G H H	.2570 .2610 .2660 .2660	75 79 72 86	11/16	16	5/8	.6250	77		
		#48 #45 #44	.0810 .0820 .0860	78 73 56			I J	.2720 .2770	75 66			11/16	20	41/64 41/64	.6406 .6406	72 87
		#44 #43 #42 3/32	.0860 .0890 .0935 .0938	80 71 57 56			K K 9/32	.2810 .2812 .2812	68 67 77			11/16	24	21/32 21/32	.6562 .6562	67 77
		#43 #42 3/32	.0890 .0935 .0938	85 68 67			7.25mm 5/16 O	.2854 .3125 .3160	75 77 73			11/16	28	23/32 23/32	.7188 .7188	67 77
4	40	#41 #40 #39 #38 #37	.0960 .0980 .0995 .1015 .1040	59 83 79 72 65	3/8	20	P Q Q R	.3230 .3320 .3320 .3390	80 66 79 67	13/16	12	47/64 3/4	.7344 .7500	72 77		
		#38 #37 #36	.1015 .1040 .1065	80 71 63			R 11/32 S	.3390 .3438 .3480	78 67 67			13/16	16	49/64 49/64	.7656 .7656	72 67
		#37 #36 7/64 #35 #34 #33	.1040 .1065 .1094 .1100 .1110 .1130	84 78 70 69 67 62			11/32 S T 23/64	.3480 .3580 .3594 .3750	67 86 84 77			7/8	9	25/32 51/64 51/64	.7812 .7969 .7969	77 84 78
		#34 #33 #32	.1110 .1130 .1160	83 77 68			3/8 36	.3480 .3480	75 75			7/8	14	13/16 0.8024 13/16	.8125 .8024 .8125	67 78 67
6	40	#34 #33 #32	.1110 .1130 .1160	83 77 68	7/16	20	W 25/64	.3860 .3906	79 72	7/8	28	27/32 27/32	.8438 .8438	67 77		
		#29 #29 #28 9/64	.1360 .1360 .1405 .1406	69 78 65 65			Y Y 13/32 Z	.4040 .4040 .4062 .4130	72 83 77 80			7/8	32	27/32 55/64 7/8	.8438 .8594 .8750	87 72 77
		#27 #26 #25 #24 #23	.1440 .1470 .1495 .1520 .1540	85 79 75 70 66			27/64 27/64 7/16 29/64	.4219 .4219 .4375 .4531	72 78 77 72			15/16	12	27/32 55/64 7/8	.8438 .8594 .8750	87 72 77
		#29 #28 9/64	.1360 .1405 .1406	78 65 65			Y 13/32 Z	.4040 .4062 .4130	83 77 80			15/16	16	27/32 55/64 7/8	.8438 .8594 .8750	87 72 77
10	24	#27 #26 #25 #24 #23	.1440 .1470 .1495 .1520 .1540	85 79 75 70 66	1/2	12	27/64 27/64 7/16 29/64	.4219 .4219 .4375 .4531	72 78 77 72	15/16	20	57/64 29/32 29/32	.8906 .9062 .9062	72 67 77		
		#29 #28 9/64	.1360 .1405 .1406	78 65 65			Y 13/32 Z	.4040 .4062 .4130	83 77 80			15/16	16	27/32 55/64 7/8	.8438 .8594 .8750	87 72 77
		#27 #26 #25 #24 #23	.1440 .1470 .1495 .1520 .1540	85 79 75 70 66			27/64 27/64 7/16 29/64	.4219 .4219 .4375 .4531	72 78 77 72			15/16	28	29/32 29/32	.9062 .9062	67 77
		#29 #28 9/64	.1360 .1405 .1406	78 65 65			Y 13/32 Z	.4040 .4062 .4130	83 77 80			15/16	32	27/32 55/64 7/8	.8438 .8594 .8750	87 72 77
10	32	5/32 #22 #21 #20	.1562 .1570 .1590 .1610	83 81 76 71	9/16	12	15/32 15/32 31/64	.4688 .4688 .4844	77 87 72	1	12	29/32 59/64 59/64	.9062 .9219 .9219	87 72 84		
		11/64 #17 #16 #15	.1719 .1730 .1770 .1800	82 79 72 67			1/2 0.5062 1/2	.5000 .5062 .5062	77 69 87			1	14	0.9274 15/16 15/16	.9274 .9375 .9375	78 77 72
		#16 #15 #14 #13	.1770 .1800 .1820 .1850	84 78 73 67			9/16 33/64 33/64	.5156 .5156 .5156	72 87 87			1	16	61/64 31/32 31/32	.9531 .9688 .9688	72 67 77
		#16 #15 #14 #13	.1770 .1800 .1820 .1850	84 78 73 67			9/16 33/64 0.5203	.5156 .5156 .5203	72 87 78			1	20	31/32 31/32	.9688 .9688	67 77
12	28	#16 #15 #14 #13	.1770 .1800 .1820 .1850	84 78 73 67	9/16	24	17/32 17/32 0.5203	.5312 .5312 .5203	67 77 78	1 1/16	8	59/64 0.9274 15/16	.9219 .9274 .9375	87 83 77		
		#14 #13 3/16 #12	.1820 .1850 .1875 .1890	84 76 70 67			17/32 17/32 17/32	.5312 .5312 .5312	67 77 79			1 1/16	12	31/32 63/64	.9688 .9844	87 72
		#14 #13 3/16 #12	.1820 .1850 .1875 .1890	84 76 70 67			17/32 17/32 17/32	.5312 .5312 .5312	67 77 79			1 1/16	16	1 1	1.0000 1.0000	77 87
		#9 #8 #7	.1960 .1990 .2010	83 79 75			5/8 9/16 0.5687	.5469 .5625 .5687	72 77 69			1 1/16	18	1 11/64	1.0000 1.0156	77 87 72

STANDARD TAP DIMENSIONS, GROUND THREAD

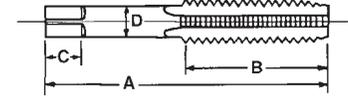
General Dimensions



STYLE 1



STYLE 2



STYLE 3

NOMINAL DIAMETER RANGE - INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER INCHES	NOMINAL METRIC DIAMETER MILLIMETER	STYLE*	TAP DIMENSIONS - INCHES				
						O/A LENGTH A	THD. LGTH. B	SQ. LGTH. C	SHANK DIA. D	SIZE OF SQ. 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	11/16	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	15/16	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		11/16	M18	3	4 1/32	1 13/16	5/8	.542	.406
.709	.760		3/4		3	4 1/4	2	11/16	.590	.442
.760	.823		13/16	M20	3	4 15/32	2	11/16	.652	.489
.823	.885		7/8	M22	3	4 11/16	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 11/16	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 9/16	1 1/4	1.519	1.139
1.885	2.010		2	M48	3	7 5/8	3 9/16	1 3/8	1.644	1.233
2.010	2.135		2 1/8		3	8	3 9/16	1 3/8	1.769	1.327
2.135	2.260		2 1/4	M56	3	8 1/4	3 9/16	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
2.885	3.010		3		3	9 3/4	4 9/16	1 5/8	2.543	1.907
3.010	3.135		3 1/8		3	9 3/4	4 9/16	1 5/8	2.668	2.001
3.135	3.260		3 1/4	M80	3	10	4 9/16	1 3/4	2.793	2.095

*Styles shown are for Ground Thread Taps.

TAPPING SPEED GUIDE

MATERIALS		SPEED FEET PER MINUTE	MATERIALS		SPEED FEET PER MINUTE
Aluminum Alloys		90-100	(Steel, Cont.) Carbon Steel, Plain	Annealed	40-80
Brass		60-100		Tempered	15-40
Bronze		40-60	Cast, Carbon	Annealed	40-50
Copper		40-60		Tempered	30
High Temperature Alloys	Cobalt Base	5-10	Cast, Corrosion Resistant, Heat Resistant, Low Alloy	Annealed	20-30
	Iron Base	10-15		as Cast	20-25
	Nickel Base	5-10		Annealed	30-45
Iron	Ductile	Annealed	Precipitation Hardening, Stainless	Tempered	15-25
		as Cast		Treated	10-15
		Tempered		Annealed	15-45
Gray,	Annealed	80	Free Machining, Tool Steels, High Speed	Tempered	15-25
	As Cast	35-60		Annealed	45-75
Malleable	Heat Treated	25-50	Water Hardening	Annealed	50
		Annealed		175	Annealed
Magnesium Alloys		20	Ultra High Strength Steels	Normalized	20
Manganese		50		Tempered	3-7
Molybdenum Alloys	Stress Relieved	50	Maraging Steels	Annealed	20-15
Monel	Annealed	20		Maraged	5-10
Nickel Alloys	Annealed	25		Tantalum Alloys, Stress Relieved	
Plastics,	Reinforced	25	Titanium Alloys, Commercial Pure,	Annealed	40-60
	Thermoplastics	50	Alpha & Alpha Beta Alloys,	Annealed	10-25
	Thermosetting Plastics	50		Tungsten Alloys, Pressed & Sintered	
Steels,	Alloys, Annealed or Cold Drawn	40-60	Zinc Alloys	Die Cast	150
	Quenched & Tempered	15-35			
Armor Plate		10			

CONVERSION TABLE, SURFACE FEET PER MINUTE TO REVOLUTIONS PER MINUTE

SPEED FEET PER MINUTE	20	25	30	40	50	60	70	80	90	100	110	120	130	140	150
TAP SIZE	REVOLUTIONS PER MINUTE														
0	1273	1592	1910	2546	3183	3820	4456	5093	5730	6366	7003	7639	8276	8913	9549
1	1047	1308	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6808	7326	7849
2	888	1110	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
3	772	964	1157	1543	1929	2315	2701	3086	3472	3858	4244	4629	5015	5401	5787
4	682	853	1023	1364	1705	2046	2387	2728	3069	3411	3751	4092	4434	4775	5116
5	611	764	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
6	553	691	829	1106	1382	1658	1934	2211	2487	2764	3040	3316	3592	3869	4145
8	466	583	699	932	1165	1398	1631	1864	2097	2330	2563	2796	3029	3262	3495
10	401	502	603	804	1005	1205	1406	1607	1808	2009	2210	2411	2612	2813	3014
12	354	442	531	707	884	1061	1238	1415	1592	1769	1945	2122	2300	2476	2653
1/4	306	382	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	245	306	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	204	255	306	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	175	219	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	153	191	229	306	382	458	535	611	688	764	840	917	993	1070	1146
9/16	137	172	206	275	344	412	481	550	619	687	756	825	893	963	1031
5/8	122	153	183	244	306	367	428	489	550	611	672	733	794	856	917
3/4	102	128	153	203	255	306	357	407	458	509	560	611	662	713	764
7/8	87	109	131	175	218	262	306	350	392	437	480	524	568	611	655
1	76	96	115	153	191	230	268	306	344	382	420	458	497	535	573



METRIC TAP DRILL SIZES AND PERCENTAGES OF THREADS

TAP SIZE	TAP DRILL	DECIMAL EQUIV.	THEOR. % OF THREAD	TAP SIZE	TAP DRILL	DECIMAL EQUIV.	THEOR. % OF THREAD	TAP SIZE	TAP DRILL	DECIMAL EQUIV.	THEOR. % OF THREAD
M1.6X3.5	1.25mm	.0492	77	M8X1.25	I	.2720	67	M22X1.5	20.5mm	.8071	77
	1.3mm	.0512	66	M8X1	7mm	.2756	77	M24X3	13/16	.8125	70
	#55	.0520	61		J	.2770	74		21mm	.8268	77
M1.8X.35	1.45mm	.0571	77	M10X1.5	8.5mm	.3346	77	M24X2	27/32	.8438	66
	1.5mm	.0591	66	M10X1.25	R	.3390	71		22mm	.8661	77
	#53	.0595	64		8.75mm	.3445	77	7/8	.8750	68	
M2X.4	1.6mm	.0630	77	M12X1.75	S	.3480	71	M27X3	24mm	.9449	77
	#52	.0635	74		13/32	.4062	74	61/64	.9531	72	
M2.2X.45	1.75mm	.0689	77	M12X1.25	Z	.4130	66	M27X2	25mm	.9843	77
	#50	.0700	72		27/64	.4219	79	63/64	.9844	77	
M2.5X.45	2.05mm	.0807	77	M14X2	11mm	.4331	62	M30X3.5	26.5mm	1.0433	77
	#45	.0820	71		12mm	.4724	77		1 1/16	1.0625	66
M3X.5	2.5mm	.0984	77	M14X1.5	31/64	.4844	65	M30X2	28mm	1.1024	77
	#39	.0995	73		12.5mm	.4921	77		1 7/64	1.1094	70
M3.5X.6	2.9mm	.1142	77	M16X2	1/2	.5000	67	M33X3.5	29.5mm	1.1614	77
	#32	.1160	71		14mm	.5512	77		1 11/64	1.1719	71
M4X.7	3.3mm	.1299	77	M16X1.5	9/16	.5625	66	M33X2	31mm	1.2205	77
	3.4mm	.1339	66		14.5mm	.5709	77		1 15/64	1.2344	63
	#29	.1360	60		37/64	.5781	68		32mm	1.2598	77
M4.5X.75	3.75mm	.1476	77	M18X2.5	15.5mm	.6102	77	M36X4	1 17/64	1.2656	74
	#25	.1495	72		5/8	.6250	65		1 19/64	1.2969	78
M5X.8	4.2mm	.1654	77	M18X1.5	16.5mm	.6496	77	M36X3	33mm	1.2992	77
	#18	.1695	67		21/32	.6562	68		1 5/16	1.3125	68
M6X1	5mm	.1969	77	M20X2.5	17.5mm	.6890	77	M39X4	1 3/8	1.3750	78
	#8	.1990	73		45/64	.7031	66		35mm	1.3780	77
M7X1	6mm	.2362	77	M20X1.5	18.5mm	.7283	77	M39X3	1 25/64	1.3906	71
	B	.2380	74		47/64	.7344	69		36mm	1.4173	77
M8X1.25	6.75mm	.2657	77	M22X2.5	19.5mm	.7677	77	1 27/64	1.4219	74	
	6.8mm	.2677	74		25/32	.7812	66				

PIPE TAP DRILL SIZES

TAP SIZE	*NPT		*NPTF		STRAIGHT	
	TAP DRILL	DECIMAL EQUIV.	TAP DRILL	DECIMAL EQUIV.	TAP DRILL	DECIMAL EQUIV.
1/16	D	.2460	D	.2460	1/4	.2500
1/8	Q	.3320	R	.3390	11/32	.3438
1/4	7/16	.4375	7/16	.4375	7/16	.4375
3/8	9/16	.5625	37/64	.5781	37/64	.5781
1/2	45/64	.7031	45/64	.7031	23/32	.7188
3/4	29/32	.9062	59/64	.9219	59/64	.9219
1	1 9/64	1.1406	1 5/32	1.1562	1 5/32	1.1562
1 1/4	1 31/64	1.4844	1 1/2	1.5000	1 1/2	1.5000
1 1/2	1 47/64	1.7344	1 47/64	1.7344	1 3/4	1.7500
2	2 13/64	2.2031	2 7/32	2.2188	2 7/32	2.2188
2 1/2	2 5/8	2.6250	2 41/64	2.6406	2 21/32	2.6562
3			3 17/64	3.2656		

*For tapping without reaming.

STANDARD PIPE TAP DIMENSIONS, STRAIGHT AND TAPER, GROUND THREAD



DIMENSIONS IN INCHES

NOMINAL SIZE INCHES	DIMENSIONS IN INCHES				
	LENGTH OVERALL A	LENGTH OF THREAD B	LENGTH OF SQUARE C	DIAMETER OF SHANK D	SIZE OF SQUARE E
1/16	2 1/8	11/16	3/8	.3125	.234
1/8 Small Shank	2 1/8	3/4	3/8	.3125	.234
1/8 Large Shank	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	11/16	.9063	.679
1	3 3/4	1 3/4	13/16	1.1250	.843
1 1/4	4	1 3/4	15/16	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

TAPER PIPE TAPS THREAD LIMITS

NOMINAL SIZE INCHES	THREADS PER INCH	STANDARD PROJECTION NPT & NPTF			PTF SAE SHORT PROJECTION		
		PROJECTION THROUGH L1 RING GAGE	THICKNESS OF L1 RING GAGE	RUN OF THREAD	PROJECTION THROUGH L1 RING GAGE	THICKNESS OF L1 RING GAGE	RUN OF THREAD
1/16	27	.312	.160	.472	.2405±.019	.160	.4005
1/8	27	.312	.1615	.4735	.2405±.019	.1615	.4020
1/4	18	.459	.2278	.6868	.3610±.028	.2278	.5888
3/8	18	.454	.240	.694	.3610±.028	.240	.6010
1/2	14	.579	.320	.899	.4645±.036	.320	.7845
3/4	14	.565	.339	.904	.4645±.036	.339	.8035
1	11 1/2	.678	.400	1.078	.5652±.044	.400	.9652
1 1/4	11 1/2	.686	.420	1.106	.5652±.044	.420	.9852
1 1/2	11 1/2	.699	.420	1.119	.5652±.044	.420	.9852
2	11 1/2	.667	.436	1.103	.5652±.044	.436	1.0012
2 1/2	8	.925	.682	1.607	.8125±.062	.682	1.4945
3	8	.925	.766	1.691	.8125±.062	.766	1.5785
3 1/2	8	.938	.821	1.759			
4	8	.950	.844	1.794			

Projection & Thickness L1 Ring Gage = Run Gage Measurement in Inches