

TABLE 1 TAP DRILL SIZES AND INFORMATION

SIZE	OUTSIDE DIAMETER	THREAD DEPTH	TAP DRILL	CLEARANCE DRILL
0000-160	.0210	.0041	#78	#73
000-120	.0340	.0054	#71	#63
00-112	.0470	.0058	#61	#56
00-96	.0470	.0068	#62	#56
00-90	.0470	.0072	#62	#56
0-80	.0600	.0081	#55	#52
1-64	.0730	.0101	#53	#48
1-72	.0730	.0090	#53	#48
2-56	.0860	.0116	#50	#43
2-64	.0860	.0101	#49	#43

TABLE 2 TAPABLE MATERIALS, TAPS, THREAD PERCENTAGES, and LUBRICANTS

MATERIAL	TAP	THREAD % TO 1-1/2 D.	LUBRICANT
Aluminum	CS 2 Flute (Gun)	65	Kerosene
Brass	CS 3 Flute	65	Soluble or Light Base Oil
Bronze	CS 3 Flute	65	Soluble or Light Base Oil
Copper	CS 3 Flute	65	Soluble or Light Base Oil
Die Cast	CS 2 Flute (Gun)	70	Light Base Oil
Nickel Silver	CS or HSS 2 or 3 Flute	60	Sulfur Base Oil
Steel, Free Mach.	CS or HSS 2 or 3 Flute	65	Sulfur Base Oil
Stainless Steel and Alloys	HSS 2 and 3 Flute or 2 Flute (Gun)	50-55	Sulfur Base Oil

DEFINITIONS

CLEARANCE DRILL: Drill used to provide hole large enough for screw to pass easily through material.

PIN VISE: A handle or holder used to grip small drills and taps for hand drilling and tapping procedures.

TAP: Tool for cutting an internal thread in a tap drill hole.

TAP DRILL: Drill used to provide sufficient thread material when tapped.



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TAP and DRILL

INSTRUCTIONS

WARNING: Cutting tools may shatter when broken. An approved form of eye protection is strongly recommended.

DRILLING

Drilling the hole is the first step of most tapping jobs. First, determine what tap you need, (this is decided by the size of the screw to be used) then refer to Table 1 under the Tap Drill Column and select the proper size drill for that tap. Do not substitute drill sizes since a slight difference in diameter may cause trouble and produce unsatisfactory results.

Next, locate the position for the hole and mark it with a center punch. If possible, secure the part in a vise to hold it while drilling. Most often you will be drilling by hand with a pin vise, however using a drill press is basically the same. In any case, care must be taken not to break these tiny drills or taps. If you are drilling metal, apply a drop of cutting fluid (See Table 2) to the point where hole is to be made and start drilling with gentle pressure. As you start, watch the point of the drill to make sure it does not jump off center. Also, make sure you are holding the drill at a right angle to the part. An inaccurately held drill or part will cause the drill to cut at an angle. If using a drill press, release the pressure on the drill frequently to avoid overheating and apply more oil as needed. When the hole is complete, clean away the burrs.

TAPPING

Place the tap in Kadee® #240 pin vise (do not use drill press), leaving about one-half its length projecting. Dip the tip of the tap in oil (for metal only) and tap the hole by turning clockwise. Hold the tap in a straight line with the hole at all times. Reverse the tap a half turn at frequent intervals to break the chips loose (metal). Remove the tap after five or six complete turns, wipe off any chips and apply more oil.

HELPFUL HINTS

If you countersink the hole slightly before tapping, it makes it easier to start the threads. Avoid forcing the tap. If it won't turn, back it out and see why. When two parts are to be held together with screws, drill the part that goes next to the head of the screw with a clearance drill and tap the other piece. This allows the screw to pass through the first part without engaging any threads and lets you tighten one part against the other. Do not over tighten any screw, especially in plastic.

DECIMAL EQUIVALENT OF NUMBERED, LETTERED, AND METRIC DRILLS

Decimal Inch	Wire	mm	Decimal Inch	Wire	mm	Decimal Inch	Wire	mm	Decimal Inch	Wire	mm	Decimal Inch	Wire	mm	Decimal Inch	Wire	mm
.0135	80		.0469	3/64		.0965		2.45	.1610	20		.2323		5.90	.3150		8.00
.0138		.35	.0472		1.20	.0980	40		.1614	4.10		.2340	A		.3160	O	
.0145	79		.0492		1.25	.0984		2.50	.1654	4.20		.2344	15/64		.3189		8.10
.0156	1/64		.0512		1.30	.0995	39		.1660	19		.2362		6.00	.3228		8.20
.0158		.40	.0520	55		.1015	38		.1673	4.25		.2380	B		.3230	P	
.0160		.78	.0531		1.35	.1024		2.60	.1693	4.30		.2402		6.10	.3248		8.25
.0177		.45	.0550	54		.1040	37		.1695	18		.2420	C		.3268		8.30
.0180		.77	.0551		1.40	.1063		2.70	.1719	11/64		.2441		6.20	.3281	21/64	
.0197		.50	.0571		1.45	.1065	36		.1730	17		.2460	D		.3307		8.40
.0200		.76	.0591		1.50	.1083		2.75	.1732		4.40	.2461		6.25	.3320	Q	
.0210		.75	.0595	53		.1094	7/64		.1770	16		.2480		6.30	.3346		8.50
.0217		.55	.0610		1.55	.1100	35		.1772		4.50	.2500	1/4	E	.3386		8.60
.0225	74		.0625	1/16		.1102		2.80	.1800	15		.2520		6.40	.3390	R	
.0236		.60	.0630		1.60	.1110	34		.1811		4.60	.2559		6.50	.3425		8.70
.0240		.73	.0635	52		.1130	33		.1820	14		.2570	F		.3438	11/32	
.0250		.72	.0650		1.65	.1142		2.90	.1850	13	4.70	.2598		6.60	.3445		8.75
.0256		.65	.0669		1.70	.1160	32		.1870		4.75	.2610	G		.3465		8.80
.0260		.71	.0670	51		.1181		3.00	.1875	3/16		.2638		6.70	.3480	S	
.0276		.70	.0689		1.75	.1200	31		.1890	12	4.80	.2656	17/64		.3504		8.90
.0280		.70	.0700	50		.1220		3.10	.1910	11		.2657		6.75	.3543		9.00
.0292		.69	.0709		1.80	.1250	1/8		.1929		4.90	.2660	H		.3580	T	
.0295		.75	.0728		1.85	.1260		3.20	.1935	10		.2677		6.80	.3583		9.10
.0310		.68	.0730	49		.1280		3.25	.1960	9		.2717		6.90	.3594	23/64	
.0312	1/32		.0748		1.90	.1285	30		.1968		5.00	.2720	I		.3622		9.20
.0315		.80	.0760	48		.1299		3.30	.1990	8		.2756		7.00	.3642		9.25
.0320		.67	.0768		1.95	.1339		3.40	.2008		5.10	.2770	J		.3661		9.30
.0330		.66	.0781	5/64		.1360	29		.2010	7		.2795		7.10	.3680	U	
.0335		.85	.0785	47		.1378		3.50	.2031	13/64		.2810	K		.3701		9.40
.0350		.65	.0787		2.00	.1405	28		.2040	6		.2812	9/32		.3740		9.50
.0354		.90	.0807		2.05	.1406	9/64		.2047		5.20	.2835		7.20	.3750	3/8	
.0360		.64	.0810	46		.1417		3.60	.2055	5		.2854		7.25	.3770	V	
.0370		.63	.0820	45		.1440	27		.2067		5.25	.2874		7.30	.3780		9.60
.0374		.95	.0827		2.10	.1457		3.70	.2087		5.30	.2900	L		.3819		9.70
.0380		.62	.0846		2.15	.1470	26		.2090	4		.2913		7.40	.3839		9.75
.0390		.61	.0860	44		.1476		3.75	.2126		5.40	.2950	M		.3858		9.80
.0394		1.00	.0866		2.20	.1495	25		.2130	3		.2953		7.50	.3860	W	
.0400		.60	.0886		2.25	.1496		3.80	.2165		5.50	.2969	19/64		.3898		9.90
.0410		.59	.0890	43		.1520	24		.2188	7/32		.2992		7.60	.3906	25/64	
.0413		1.05	.0906		2.30	.1535		3.90	.2205		5.60	.3020	N		.3937		10.00
.0420		.58	.0925		2.35	.1540	23		.2210	2		.3031		7.70	.3970	X	
.0430		.57	.0935	42		.1562	5/32		.2244		5.70	.3051		7.75			
.0433		1.10	.0938	3/32		.1570	22		.2264		5.75	.3071		7.80			
.0453		1.15	.0945		2.40	.1575		4.00	.2280	1		.3110		7.90			
.0465		.56	.0960	41		.1590	21		.2283		5.80	.3125	5/16				