

TAP and DRILL INFORMATION

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 vice to hold it while drilling. Most often you will be drilling by hand with a pin vice, however using a drill press is basically the same. In any case, care must be taken not to break these tiny drills or taps. Apply a drop of lubricant, (metal only - not plastic. 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 your pin vice (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.

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 VICE: 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.

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				
.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				.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				.0650			1.65	.1142			2.90	.1850			13	.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	.2656		17/64		.3504			8.90
.0280		70		.0700			50	.1220			3.10	.1910			11	.2657			6.75	.3543			9.00
.0292				.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				.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				.0768			1.95	.1339			3.40	.2008			5.10	.2770		J		.3661			9.30
.0330				.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				.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				.0810			46	.1417			3.60	.2055			5	.2854			7.25	.3770		V	
.0370				.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				.0846			2.15	.1470			26	.2090			4	.2913			7.40	.3839			9.75
.0390				.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				.0886			2.25	.1496			3.80	.2165			5.50	.2969		19/64		.3898			9.90
.0410				.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				.0925			2.35	.1540			23	.2210			2	.3031			7.70	.3970		X	
.0430				.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					