To minimize tapping problems and lengthen tool life, use the largest drill possible to produce a minor diameter that will result in the lowest percentage of full thread consistent with adequate strength. A minor diameter that provides a 55% to 65% thread is sufficient for most requirements, but in some cases a higher percentage of thread may be necessary to conform with the minor diameter limits of the thread class specified.

TAP DRILL SIZES

Drills generally cut holes larger than their diameters. In the table to the right, the probable percentages of full thread were determined by the average amount oversize the various drills are expected to cut.

SUGGESTED PIPE TAP DRILL SIZES

Tap Size	Pipe Tap Drill Size Taper	Straight†
1/16	D	-
1/8	R	S
1/4	7/16	29/64
3/8	37/64	19/32
1/2	23/32	47/64
3/4	59/64	15/16
1	1-5/32	1-3/16
1-1/4	1-1/2	1-33/64
1-1/2	1-47/64	1-3/4
2	2-7/32	2-7/32
2-1/2	2-5/8	–
3	3-1/4	–

* Sizes given permit direct tapping without reaming the hole, but only give a full thread for the first two or three threads

† For Dryseal Straight Pipe Threads suggested drill sizes are as shown, except; 1/4" pipe, use .444 drill size

TAP/DRILL SELECTION

Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theo. Oversize Mean	Probable Oversize Mean	Probable Hole Size	% of Threads
0-80	56	.0465	83	.0015	.0480	74
	3/64	.0469	81	.0015	.0484	71
1-64	54	.0550	89	.0015	.0565	81
	53	.0595	67	.0015	.0610	59
1-72	53	.0595	75	.0015	.0610	67
	1/16	.0625	58	.0015	.0640	50
5-56	51	.0670	82	.0017	.0687	74
	50	.0700	69	.0017	.0717	62
	49	.0730	56	.0017	.0747	49
2-64	50	.0700	79	.0017	.0717	70
	49	.0730	64	.0017	.0747	56
3-48	48	.0760	85	.0019	.0779	78
	5/64	.0781	77	.0019	.0800	70
	47	.0785	76	.0019	.0801	69
	46	.0810	67	.0019	.0829	60
	45	.0820	61	.0019	.0839	56
3-56	46	.0810	78	.0019	.0829	69
	45	.0820	73	.0019	.0839	65
	44	.0860	56	.0020	.0880	47
4-40	44	.0860	80	.0020	.0880	74
	43	.0890	71	.0020	.0910	65
	42	.0935	57	.0020	.0955	51
	3/32	.0938	56	.0020	.0958	50
4-48	42	.0935	68	.0020	.0955	61
	3/32	.0938	68	.0020	.0958	60
	41	.0960	59	.0020	.0980	52
5-40	40	.0980	83	.0023	.1003	76
	39	.0995	79	.0023	.1018	71
	38	.1015	72	.0023	.1038	65
	37	.1040	65	.0023	.1063	58
5-44	38	.1015	79	.0023	.1038	72
	37	.1040	71	.0023	.1063	63
	36	.1065	63	.0023	.1088	55
6-32	37	.1040	84	.0023	.1063	78
	36	.1065	78	.0023	.1088	72
	7/64	.1094	70	.0026	.1120	64
	35	.1100	69	.0026	.1126	63
	34	.1110	67	.0026	.1136	60
	33	.1130	62	.0026	.1156	55
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
	28	.1405	58	.0029	.1434	51
8-36	29	.1360	78	.0029	.1389	70
	28	.1405	68	.0029	.1434	57
	9/64	.1406	68	.0029	.1435	57
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
	5/32	.1563	62	.0032	.1595	56
	22	.1570	61	.0032	.1602	55
10-32	5/32	.1563	83	.0032	.1595	75
	22	.1570	81	.0032	.1602	73
	21	.1590	76	.0032	.1672	64
	20	.1610	71	.0032	.1642	64
	19	.1660	59	.0032	.1692	51
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
	14	.1820	63	.0035	.1855	56
12-28	16	.1770	84	.0035	.1805	77
	15	.1800	78	.0035	.1835	70
	14	.1820	73	.0038	.1835	66
	13	.1850	67	.0035	.1885	59
	3/16	.1875	61	.0035	.1970	54

Formula: Percentage of Full Thread

Threads Per Inch x Major Dia. of Tap = Drill Dia.
.01299
= Percentage of Full Thread

Example: Determine percentage of full thread for 2" – 12N Tap, using 1.9219" Drill.

2.0000-1.9219 = .0781 ÷ .01299 = 6.012
Threads Per Inch = x 12
Theoretical Percentage of Full Threads = 72.144

Formula: Tap Drill Size

Major Dia. of Tap - .1299 x Percent of Full Thread
Number of threads Per inch
= Drill Size

Example: Determine drill size for 2" – 12N Tap, 70% Full Thread.
Basic Major Diameter of Tap = 2.0000"

.01299 x 70 = .9093 ÷ 12 = .0758"
Theoretical Drill Size = 1.9242"
Nearest Standard Drill Size 1 59/64 = 1.9219"

	*Deep Hole Tapping	Average Commercial	Thin Sheet Stock or Stamping
FREE CUTTING MATERIAL			
Aluminum			
Brass			
Bronze			
Cast Iron	60%-70%	65%-70%	75%-85%
Copper			
Mild Steel			
Tool Steel			
FREE CUTTING MATERIAL			
Cast Steel			
Drop Forging			
Monel Metal	55%-65%	65%-70%	
Nickel Steel			
Stainless Steel			

TAP/DRILL SELECTION

Tap	Tap Drill	Decimal Equiv. of Tap Drill	Theo. Oversize Mean	Probable Oversize Mean	Probable Hole Size	% of Threads
1/4-20	9	.1960	83	.0038	.1998	77
	8	.1990	79	.0039	.2028	73
	7	.2010	75	.0038	.2048	70
	13/64	.2031	72	.0038	.2068	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
	7/32	.2188	67	.0038	.2226	59
	2	.2210	63	.0038	.2248	55
5/16-18	F	.2570	77	.0038	.2608	72
	G	.2610	71	.0041	.2651	66
	17/64	.2656	65	.0041	.2697	59
	H	.2660	64	.0041	.2701	59
5/16-24	H	.2660	86	.0041	.2701	78
	I	.2720	75	.0041	.2761	67
	J	.2770	66	.0041	.2811	58
3/8-16	5/16	.3125	77	.0044	.3169	72
	O	.3160	73	.0044	.3204	68
	P	.3230	64	.0044	.3274	59
3/8-24	21/64	.3281	87	.0044	.3325	79
	Q	.3320	79	.0044	.3364	71
	R	.3390	67	.0044	.3434	58
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	61
7/16-20	W	.3860	79	.0046	.3906	72
	25/64	.3906	72	.0046	.3952	65
	X	.3970	62	.0046	.4016	55
1/2-13	27/64	.4219	78	.0047	.4266	73
	7/16	.4375	63	.0047	.4422	58
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
	33/64	.5156	65	.0048	.5204	58
5/8-11	17/32	.5313	79	.0049	.5362	75
	35/64	.5469	66	.0049	.5618	62
5/8-18	9/16	.5628	87	.0049	.5674	80
	37/64	.5781	65	.0049	.5831	58
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
	29/32	.9063	58	.0059	.9122	54
1-12	29/32	.9063	87	.0059	.9122	81
	59/64	.9219	72	.0060	.9279	67
	15/16	.9375	58	.0060	.9435	52
1-14	59/64	.9219	84	.0060	.9279	78
	15/16	.9375	67	.0060	.9435	61
1-1/8-7	31/21	.9688	84	.0062	.9750	81
	63/64	.9844	76	.0067	.9911	72
	1	1.0000	67	.0070	1.0070	64
	1-1/64	1.0156	59	.0070	1.0226	55
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				
	1-7/64	1.1094				
	1-1/8	1.1250				
1-1/4-12	1-5/32	1.1563				
	1-11/64	1.1719				
1-3/8-6	1-3/16	1.1875				
	1-13/64	1.2031				
	1-7/32	1.2188				
	1-15/64	1.2344				
1-3/8-12	1-9/32	1.2813				
	1-19/64	1.2969				
1-1/2-6	1-5/16	1.3125				
	1-21/64	1.3281				
	1-11/32	1.3438				
	1-23/64	1.3594				
1-1/2-12	1-13/32	1.4063				
	1-27/64	1.4219				

Reaming Recommended