



Tap Drill Sizes and Pitch Diameter Limits

Tapping Guide

Tap Size	Threads Per Inch			Minor Diameter		Tap Drill Diameter - Cut Taps				
	UNC	UNF	8-Pitch	Min. 2B	Max. 2B	80% Thread	75% Thread	70% Thread	65% Thread	60% Thread
						(in)	(in)	(in)	(in)	(in)
0	-	80	-	0.0465	0.0514	0.0470	0.0478	0.0486	0.0494	0.0503
1	64	-	-	0.0561	0.0623	0.0568	0.0578	0.0588	0.0598	0.0608
	-	72	-	0.0580	0.0635	0.0586	0.0595	0.0604	0.0613	0.0622
2	56	-	-	0.0667	0.0737	0.0674	0.0686	0.0698	0.0709	0.0721
	-	64	-	0.0691	0.0752	0.0698	0.0708	0.0718	0.0728	0.0738
3	48	-	-	0.0764	0.0845	0.0774	0.0787	0.0801	0.0814	0.0828
	-	56	-	0.0797	0.0865	0.0804	0.0816	0.0828	0.0839	0.0851
4	40	-	-	0.0849	0.0939	0.0860	0.0876	0.0893	0.0909	0.0925
	-	48	-	0.0894	0.0968	0.0904	0.0917	0.0931	0.0944	0.0958
5	40	-	-	0.0979	0.1062	0.0990	0.1006	0.1023	0.1039	0.1055
	-	44	-	0.1004	0.1079	0.1014	0.1029	0.1043	0.1058	0.1073
6	32	-	-	0.1040	0.1140	0.1055	0.1076	0.1096	0.1116	0.1136
	-	40	-	0.1110	0.1190	0.1120	0.1136	0.1153	0.1169	0.1185
8	32	-	-	0.1300	0.1390	0.1315	0.1336	0.1356	0.1376	0.1396
	-	36	-	0.1340	0.1420	0.1351	0.1369	0.1387	0.1405	0.1424
10	24	-	-	0.1450	0.1560	0.1467	0.1494	0.1521	0.1548	0.1575
	-	32	-	0.1560	0.1640	0.1575	0.1596	0.1616	0.1636	0.1656
12	24	-	-	0.1710	0.1810	0.1727	0.1754	0.1781	0.1808	0.1835
	-	28	-	0.1770	0.1860	0.1789	0.1812	0.1835	0.1858	0.1882
1/4	20	-	-	0.1960	0.2070	0.1980	0.2013	0.2045	0.2078	0.2110
	-	28	-	0.2110	0.2200	0.2129	0.2152	0.2175	0.2198	0.2222
5/16	18	-	-	0.2520	0.2650	0.2548	0.2584	0.2620	0.2656	0.2692
	-	24	-	0.2670	0.2770	0.2692	0.2719	0.2746	0.2773	0.2800
3/8	16	-	-	0.3070	0.3210	0.3101	0.3141	0.3182	0.3222	0.3263
	-	24	-	0.3300	0.3400	0.3317	0.3344	0.3371	0.3398	0.3425
7/16	14	-	-	0.3600	0.3760	0.3633	0.3679	0.3726	0.3772	0.3818
	-	20	-	0.3830	0.3950	0.3855	0.3888	0.3920	0.3953	0.3985
1/2	13	-	-	0.4170	0.4340	0.4201	0.4251	0.4301	0.4351	0.4400
	-	20	-	0.4460	0.4570	0.4480	0.4513	0.4545	0.4578	0.4610
9/16	12	-	-	0.4720	0.4900	0.4759	0.4813	0.4867	0.4921	0.4976
	-	18	-	0.5020	0.5150	0.5048	0.5084	0.5120	0.5156	0.5192
5/8	11	-	-	0.5270	0.5460	0.5305	0.5364	0.5423	0.5482	0.5541
	-	18	-	0.5650	0.5780	0.5673	0.5709	0.5745	0.5781	0.5817
3/4	10	-	-	0.6420	0.6630	0.6461	0.6526	0.6591	0.6656	0.6721
	-	16	-	0.6820	0.6960	0.6851	0.6891	0.6932	0.6972	0.7013
7/8	9	-	-	0.7550	0.7780	0.7595	0.7668	0.7740	0.7812	0.7884
	-	14	-	0.7980	0.8140	0.8008	0.8054	0.8101	0.8147	0.8193
1	8	-	-	0.8650	0.8900	0.8701	0.8782	0.8863	0.8945	0.9026
	-	12	-	0.9100	0.9280	0.9134	0.9188	0.9242	0.9296	0.9351
1-1/8	7	-	-	0.9700	0.9980	0.9765	0.9858	0.9951	1.0044	1.0137
	-	12	-	1.0350	1.0530	1.0384	1.0438	1.0492	1.0546	1.0601
	-	8	-	0.9900	1.0150	0.9951	1.0032	1.0113	1.0195	1.0276
1-1/4	7	-	-	1.0950	1.1230	1.1015	1.1108	1.1201	1.1294	1.1387
	-	12	-	1.1600	1.1780	1.1634	1.1688	1.1742	1.1796	1.1851
	-	8	-	1.1150	1.1400	1.1201	1.1282	1.1363	1.1445	1.1526
1-3/8	6	-	-	1.1950	1.2250	1.2018	1.2126	1.2235	1.2343	1.2451
	-	12	-	1.2850	1.3030	1.2884	1.2938	1.2992	1.3046	1.3101
	-	8	-	1.2400	1.2650	1.2451	1.2532	1.2613	1.2695	1.2776
1-1/2	6	-	-	1.3200	1.3500	1.3268	1.3376	1.3485	1.3593	1.3701
	-	12	-	1.4100	1.4280	1.4134	1.4188	1.4242	1.4296	1.4351
	-	8	-	1.3650	1.3900	1.3701	1.3782	1.3863	1.3945	1.4026
1-5/8	-	-	8	1.4900	1.5150	1.4951	1.5032	1.5113	1.5195	1.5276
1-3/4	5	-	-	1.5330	1.5670	1.5422	1.5551	1.5681	1.5811	1.5941
	-	8	-	1.6150	1.6400	1.6201	1.6282	1.6363	1.6445	1.6526
1-7/8	-	-	8	1.7400	1.7650	1.7451	1.7532	1.7613	1.7695	1.7776
2	4-1/2	-	-	1.7590	1.7950	1.7691	1.7835	1.7979	1.8124	1.8268
	-	8	-	1.8650	1.8900	1.8701	1.8782	1.8863	1.8945	1.9026
2-1/4	4-1/2	-	-	2.0090	2.0450	2.0191	2.0335	2.0479	2.0624	2.0768
	-	8	-	2.1150	2.1400	2.1201	2.1282	2.1363	2.1445	2.1526
2-1/2	4	-	-	2.2290	2.2670	2.2402	2.2564	2.2727	2.2889	2.3051
	-	8	-	2.3650	2.3900	2.3701	2.3782	2.3863	2.3945	2.4026

Tap Drill Sizes: Fractional Cut Taps

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.

Suggested Percentage of Full Thread in Tapped Holes

	Material	*Deep Hole Tapping	Average Commercial Work	Thin Sheet Stock or Stamping
Free Cutting	Aluminum, Brass, Bronze, Cast Iron, Copper, Mild Steel, Tool Steel	60% - 70%	65% - 70%	75% - 85%
Hard or Tough Cutting	Cast Steel, Drop Forging, Monel Metal, Nickel Steel, Stainless Steel	55% - 65%	60% - 70%	

* Generally, deeper than 1 1/2 times the hole diameter.

Formula: Tap Drill Size

$$\text{Drill Size} = \text{Tap Major Dia} - \frac{0.01299 \times \% \text{ of Full Thread}}{\# \text{ of Threads Per Inch}}$$

Example: Determine Drill Size for 2"—12N Tap, 70% Full Thread.
 Basic Major Diameter of Tap = 2.0000"
 $0.01299 \times 70 = 0.9093 \div 12 = 0.0758$ "
 Drill Size = 1.9242"

Formula: Percentage of Full Thread

$$\% \text{ of Full Thread} = \text{Threads Per Inch} \times \frac{\text{Tap Major Dia} - \text{Drill Dia}}{0.01299}$$

Example: Determine the % of Full Thread for 2"—12N Tap, using 1.9242" Drill.
 Threads Per Inch = 12
 $2.000 - 1.9242 = 0.0758 \div 0.01299 = 5.835$
 Percentage of Full Threads = 70%

Pitch Diameter Limit: Internal Screw Thread Classes and Tap Recommendations

Size	Threads Per Inch		Basic Pitch Diameter	Unified Classes of Thread				American National Classes of Thread			
	UNC	UNF/UNS		All Classes Minimum	CLASS 2B For General Applications		CLASS 3B For Closer Fits		CLASS 2		CLASS 3
			Pitch Diam. Limits Maximum		Rec. Taps	Pitch Diam. Limits Maximum	Rec. Taps	Pitch Diam. Limits Maximum	Rec. Taps	Pitch Diam. Limits Maximum	Rec. Taps
0	—	80	0.0519	0.0542	H2	0.0536	H1	0.0536	H1	0.0532	H1
1	64	—	0.0629	0.0655	H2	0.0648	H1	0.0648	H1	0.0643	H1
1	—	72	0.0640	0.0665	H2	0.0659	H1	0.0658	H1	0.0653	H1
2	56	—	0.0744	0.0772	H2	0.0765	H1	0.0764	H1	0.0759	H1
2	—	64	0.0759	0.0786	H2	0.0779	H1	0.0778	H1	0.0773	H1
3	48	—	0.0855	0.0885	H2	0.0877	H1	0.0877	H1	0.0871	H1
3	—	56	0.0874	0.0902	H2	0.0895	H1	0.0894	H1	0.0889	H1
4	40	—	0.0958	0.0991	H2	0.0982	H2	0.0982	H2	0.0975	H1
4	—	48	0.0985	0.1016	H2	0.1008	H1	0.1007	H1	0.1001	H1
5	40	—	0.1088	0.1121	H2	0.1113	H2	0.1112	H2	0.1105	H1
5	—	44	0.1102	0.1134	H2	0.1126	H1	0.1125	H1	0.1118	H1
6	32	—	0.1177	0.1214	H3	0.1204	H2	0.1204	H2	0.1196	H1
6	—	40	0.1218	0.1252	H2	0.1243	H2	0.1242	H2	0.1235	H1
8	32	—	0.1437	0.1475	H3	0.1465	H2	0.1464	H2	0.1456	H1
8	—	36	0.1460	0.1496	H2	0.1487	H2	0.1485	H2	0.1478	H1
10	24	—	0.1629	0.1672	H3	0.1661	H3	0.1662	H3	0.1653	H1
10	—	32	0.1697	0.1736	H3	0.1726	H2	0.1724	H2	0.1716	H1
12	24	—	0.1889	0.1933	H3	0.1922	H3	0.1922	H3	0.1913	H1
12	—	28	0.1928	0.1970	H3	0.1959	H3	0.1959	H3	0.1950	H1
1/4	20	—	0.2175	0.2224	H5	0.2211	H3	0.2211	H3	0.2201	H2
1/4	—	28	0.2268	0.2311	H4	0.2300	H3	0.2299	H3	0.2290	H1
5/16	18	—	0.2764	0.2817	H5	0.2803	H3	0.2805	H3	0.2794	H2
5/16	—	24	0.2854	0.2902	H4	0.2890	H3	0.2887	H3	0.2878	H1
3/8	16	—	0.3344	0.3401	H5	0.3387	H3	0.3389	H3	0.3376	H2
3/8	—	24	0.3479	0.3528	H4	0.3516	H3	0.3512	H3	0.3503	H1
7/16	14	—	0.3911	0.3972	H5	0.3957	H3	0.3960	H5	0.3947	H3
7/16	—	20	0.4050	0.4104	H5	0.4091	H3	0.4086	H3	0.4076	H1
1/2	13	—	0.4500	0.4565	H5	0.4548	H3	0.4552	H5	0.4537	H3
1/2	—	20	0.4675	0.4731	H5	0.4717	H3	0.4711	H3	0.4701	H1
9/16	12	—	0.5084	0.5152	H5	0.5135	H3	0.5140	H5	0.5124	H3
9/16	—	18	0.5264	0.5323	H5	0.5308	H3	0.5305	H3	0.5294	H2
5/8	11	—	0.5660	0.5732	H5	0.5714	H3	0.5719	H5	0.5702	H3
5/8	—	18	0.5889	0.5949	H5	0.5934	H3	0.5930	H3	0.5919	H2
3/4	10	—	0.6850	0.6927	H5	0.6907	H5	0.6914	H5	0.6895	H3
3/4	—	16	0.7094	0.7159	H5	0.7143	H3	0.7139	H3	0.7126	H2
7/8	9	—	0.8028	0.8110	H6	0.8089	H4	0.8098	H6	0.8077	H4
7/8	—	14	0.8286	0.8356	H6	0.8339	H4	0.8335	H4	0.8322	H2
1	8	—	0.9188	0.9276	H6	0.9254	H4	0.9264	H4	0.9242	H4
1	—	12	0.9459	0.9535	H6	0.9516	H4	0.9515	H4	0.9499	H4
1	—	14	0.9536	0.9609	H6	0.9590	H4	0.9585	H4	0.9572	H4
1-1/8	7	—	1.0322	1.0416	H8	1.0393	H4	1.0407	H4	1.0381	H4
1-1/8	—	12	1.0709	1.0787	H6	1.0768	H4	1.0765	H4	1.0749	H4
1-1/4	7	—	1.1572	1.1668	H8	1.1644	H4	1.1657	H4	1.1631	H4
1-1/4	—	12	1.1959	1.2039	H6	1.2019	H4	1.2015	H4	1.1999	H4
1-3/8	6	—	1.2667	1.2771	H8	1.2745	H4	1.2768	H4	1.2738	H4
1-3/8	—	12	1.3209	1.3291	H6	1.3270	H4	1.3265	H4	1.3249	H4
1-1/2	6	—	1.3917	1.4022	H8	1.3996	H4	1.4018	H4	1.3988	H4
1-1/2	—	12	1.4459	1.4542	H6	1.4522	H4	1.4515	H4	1.4499	H4
1-1/2	—	8	1.4188	1.4283	H7	1.4259	H5	1.4278	H7	1.4251	H5
1-5/8	—	8	1.5438	1.5535	H8	1.5510	H6	1.5531	H7	1.5503	H5
1-3/4	5	—	1.6201	1.6317	H9	1.6288	H7	1.6317	H9	1.6283	H7
1-3/4	—	8	1.6688	1.6786	H8	1.6762	H6	1.6785	H8	1.6756	H5
1-7/8	—	8	1.7938	1.8037	H8	1.8013	H6	1.8038	H8	1.8008	H6
2	4.5	—	1.8557	1.8681	H10	1.8650	H7	1.8684	H10	1.8646	H7
2	—	8	1.9188	1.9289	H8	1.9264	H6	1.9292	H8	1.9261	H6

ISO Metric Class of Threads				
CLASS 6H For Commercial Threads				
Size mm	Pitch mm	Pitch Dia. Limits (Inch)		Rec. Taps
		Min.	Max.	
M1.6	0.35	0.0541	0.0574	D3
M2	0.4	0.0686	0.0720	D3
M2.5	0.45	0.0870	0.0906	D3
M3	0.5	0.1054	0.1092	D3
M3.5	0.6	0.1225	0.1268	D4
M4	0.7	0.1396	0.1442	D4
M5	0.8	0.1764	0.1812	D4
M6	1.0	0.2107	0.2165	D5
M8	1.25	0.2830	0.2892	D5
M10	1.5	0.3554	0.3624	D6
M12	1.75	0.4277	0.4355	D6
M14	2.0	0.5001	0.5083	D7
M16	2.0	0.5788	0.5871	D7
M20	2.5	0.7235	0.7322	D7
M24	3.0	0.8682	0.8785	D8
M30	3.5	1.0917	1.1026	D9
M36	4.0	1.3151	1.3268	D9
M39	4.0	1.4331	1.4450	D9
M42	4.5	1.5385	1.5509	D10
M42	3.0	1.5768	1.5873	D8
M42	2.0	1.6024	1.6112	D7
M42	1.5	1.6152	1.6231	D6
M45	4.5	1.6566	1.6690	D10
M45	3.0	1.6949	1.7054	D8
M48	5.0	1.7619	1.7751	D10
M48	3.0	1.8130	1.8241	D9
M48	2.0	1.8386	1.8479	D7
M48	1.5	1.8514	1.8598	D6
M56	5.5	2.0641	2.0781	D11

D3 = Basic PD + 0.0009" to Basic PD + 0.0015"
D4 = Basic PD + 0.0012" to Basic PD + 0.0020"
D5 = Basic PD + 0.0015" to Basic PD + 0.0025"
D6 = Basic PD + 0.0018" to Basic PD + 0.0030"
D7 = Basic PD + 0.0019" to Basic PD + 0.0035"
D8 = Basic PD + 0.0024" to Basic PD + 0.0040"
D9 = Basic PD + 0.0025" to Basic PD + 0.0045"

Sizes through 1" Diameter

H1 = Basic PD to Basic PD + 0.0005"
H2 = Basic PD + 0.0005" to Basic PD + 0.0010"
H3 = Basic PD + 0.0010" to Basic PD + 0.0015"
H4 = Basic PD + 0.0015" to Basic PD + 0.0020"
H5 = Basic PD + 0.0020" to Basic PD + 0.0025"
H6 = Basic PD + 0.0025" to Basic PD + 0.0030"

Sizes larger than 1" diameter through 1-1/2" diameter

H4 = Basic PD + 0.0010" to Basic PD + 0.0020"

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