



MCTI TABLE 302 GENERAL DIMENSIONS

Size	Metric Size	Overall Length	Thread Length	Square Length	Shank Diameter	Size of Square
4	—	1*7/8	9/16	3/16	.141	.110
5	M3	1*15/16	5/8	3/16	.141	.110
6	M3.5	2	11/16	3/16	.141	.110
8	M4	2*1/8	3/4	1/4	.168	.131
10	M5	2*3/8	7/8	1/4	.194	.152
12	—	2*3/8	15/16	9/32	.220	.165
1/4	M6	2*1/2	1	5/16	.255	.191
5/16	M7	2*23/32	1*1/8	3/8	.318	.238
3/8	M10	2*15/16	1*1/4	7/16	.381	.286
7/16	—	3*5/32	1*7/16	13/32	.323	.242
1/2	M12	3*3/8	1*21/32	7/16	.367	.275
9/16	M14	3*19/32	1*21/32	1/2	.429	.322
5/8	M16	3*13/16	1*13/16	9/16	.480	.360
11/16	M18	4*1/32	1*13/16	5/8	.542	.406
3/4	—	4*1/4	2	11/16	.590	.442
13/16	M20	4*15/32	2	11/16	.652	.489
7/8	M22	4*11/16	2*7/32	3/4	.697	.523
15/16	M24	4*29/32	2*7/32	3/4	.760	.570
1	M25	5*1/8	2*1/2	13/16	.800	.600
1*1/16	M27	5*1/8	2*1/2	7/8	.896	.672
1*1/8	—	5*7/16	2*9/16	7/8	.896	.672
1*3/16	M30	5*7/16	2*9/16	1	1.021	.766
1*1/4	—	5*3/4	2*9/16	1	1.021	.766
1*5/16	M33	5*3/4	2*9/16	1*1/16	1.108	.831
1*3/8	—	6*1/16	3	1*1/16	1.108	.831
1*7/16	M36	6*1/16	3	1*1/8	1.233	.925
1*1/2	—	6*3/8	3	1*1/8	1.233	.925

* Maximum tapping depth = Thread length unless shank diameter is smaller than minor diameter



TAPER PIPE TAPS GENERAL DIMENSIONS

Size	Overall Length	Thread Length	Square Length	Shank Diameter	Size of Square
1/16	2*1/8	11/16	3/8	.3125	.234
1/8(sm)	2*1/8	3/4	3/8	.3125	.234
1/8(Lg)	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



TAP RECOMMENDATIONS

Unified Thread, Machine Screw Size

Size	Threads per Inch		Recommended Tap for Class of Thread				Pitch Diameter Limits for Class of Thread				
	UNC	UNF	Class 2	Class 3	Class 2B	Class 3B	Min. All Class(Basic)	Max Class2	Max Class3	Max Class2B	Max Class3B
0		80	GH1	GH1	GH2	GH1	.0519	.0536	.0532	.0542	.0536
1	64	72	GH1	GH1	GH2	GH1	.0629	.0648	.0643	.0655	.0648
			GH1	GH1	GH2	GH1	.0640	.0658	.0653	.0665	.0659
2	56	64	GH1	GH1	GH2	GH1	.0744	.0764	.0759	.0772	.0765
			GH1	GH1	GH2	GH1	.0759	.0778	.0773	.0786	.0779
3	48	56	GH1	GH1	GH2	GH1	.0855	.0877	.0871	.0885	.0877
			GH1	GH1	GH2	GH1	.0874	.0894	.8890	.0902	.0895
4	40	48	GH2	GH1	GH2	GH2	.0958	.0982	.0975	.0991	.0982
			GH1	GH1	GH2	GH1	.0985	.1007	.1001	.1016	.1008
5	40	44	GH2	GH1	GH2	GH2	.1088	.1112	.1105	.1121	.1113
			GH1	GH1	GH2	GH1	.1102	.1125	.1118	.1134	.1126
6	32	40	GH2	GH1	GH3	GH2	.1177	.1204	.1196	.1214	.1204
			GH2	GH1	GH2	GH2	.1218	.1242	.1235	.1252	.1243
8	32	36	GH2	GH1	GH3	GH2	.1437	.1464	.1456	.1475	.1465
			GH2	GH1	GH2	GH2	.1460	.1485	.1478	.1496	.1487
10	24	32	GH3	GH1	GH3	GH3	.1629	.1662	.1653	.1672	.1661
			GH2	GH1	GH3	GH2	.1697	.1724	.1716	.1736	.1726
12	24	28	GH3	GH1	GH3	GH3	.1889	.1922	.1913	.1933	.1922
			GH3	GH1	GH3	GH3	.1928	.1959	.1950	.1970	.1959

Unified Thread, Fractional Size

Size	Threads per Inch		Recommended Tap for Class of Thread				Pitch Diameter Limits for Class of Thread				
	UNC	UNF	Class 2	Class 3	Class 2B	Class 3B	Min. All Class(Basic)	Max Class2	Max Class3	Max Class2B	Max Class3B
1/4	20	28	GH3	GH2	GH5	GH3	.2175	.2211	.2201	.2223	.2211
			GH3	GH1	GH4	GH3	.2268	.2299	.2290	.2311	.2300
5/16	18	24	GH3	GH2	GH5	GH3	.2764	.2805	.2794	.2817	.2803
			GH3	GH1	GH4	GH3	.2854	.2887	.2878	.2902	.2890
3/8	16	24	GH3	GH2	GH5	GH3	.3344	.3389	.3376	.3401	.3387
			GH3	GH1	GH4	GH3	.3479	.3512	.3503	.3528	.3516
7/16	14	20	GH5	GH3	GH5	GH3	.3911	.3960	.3947	.3972	.3957
			GH3	GH1	GH5	GH3	.4050	.4086	.4076	.4104	.4091
1/2	13	20	GH5	GH3	GH5	GH3	.4500	.4552	.4537	.4565	.4548
			GH3	GH1	GH5	GH3	.4675	.4711	.4701	.4731	.4717
9/16	12	18	GH5	GH3	GH5	GH3	.5084	.5140	.5124	.5152	.5135
			GH3	GH2	GH5	GH3	.5264	.5305	.5294	.5323	.5308
5/8	11	18	GH5	GH3	GH5	GH3	.5660	.5719	.5702	.5732	.5714
			GH3	GH2	GH5	GH3	.5889	.5930	.5919	.5949	.5934
3/4	10	16	GH5	GH3	GH5	GH3	.6850	.6914	.6895	.6927	.6907
			GH3	GH2	GH5	GH3	.7094	.7139	.7126	.7159	.7143
7/8	9	14	GH6	GH4	GH6	GH4	.8028	.8098	.8077	.8110	.8089
			GH4	GH2	GH6	GH4	.8286	.8335	.8322	.8356	.8339
1	8	12	GH6	GH4	GH6	GH4	.9188	.9264	.9242	.9276	.9254
			GH4	GH2	GH6	GH4	.9459	.9515	.9499	.9535	.9516

The above recommended taps normally produce the class of thread indicated in average materials when used with reasonable care. However, if the tap specified dose not give a satisfactory gage fit in the work, a choice of some other limit tap will be necessary.

TAPS



THREAD LIMITS

Unified Thread, Machine Screw Size - Ground Thread

Size	Thread per Inch			Major Diameter(Inches)			Pitch Diameter Limits(Inches)								
	UNC	UNF	UNS	Basic	Min.	Max.	Basic Pitch Dia.	H1 Limit		H2 Limit		H3 Limit		H7 Limit	
								Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
0	—	80	—	.0600	.0605	.0615	.0519	.0519	.0524	.0524	.0529	—	—	—	—
1	64	—	—	.0730	.0735	.0745	.0629	.0629	.0634	.0634	.0639	—	—	—	—
	—	72	—	.0730	.0735	.0745	.0640	.0640	.0645	.0645	.0650	—	—	—	—
2	56	—	—	.0860	.0865	.0875	.0744	.0744	.0749	.0749	.0754	—	—	—	—
	—	64	—	.0860	.0865	.0875	.0759	—	—	.0764	.0769	—	—	—	—
3	48	—	—	.0990	.0100	.1010	.0855	.0855	.0860	.0860	.0865	—	—	—	—
	—	56	—	.0990	.0995	.1005	.0874	.0874	.0879	.0879	.0884	—	—	—	—
4	—	—	36	.1120	.1135	.1145	.0940	—	—	.0945	.0950	—	—	—	—
	—	40	—	.1120	.1135	.1145	.0958	.0958	.0963	.0963	.0968	—	—	—	—
	—	48	—	.1120	.1130	.1140	.0985	.0985	.0990	.0990	.0995	—	—	—	—
5	40	—	—	.1250	.1265	.1275	.1088	.1088	.1093	.1093	.1098	—	—	—	—
	—	44	—	.1250	.1260	.1270	.1102	—	—	.1107	.1112	—	—	—	—
6	32	—	—	.1380	.1400	.1410	.1177	.1177	.1182	.1182	.1187	.1187	.1192	.1207	.1212
	—	40	—	.1380	.1395	.1405	.1218	.1218	.1223	.1223	.1228	—	—	—	—
8	32	—	—	.1640	.1660	.1670	.1437	.1437	.1442	.1442	.1447	.1447	.1452	.1467	.1472
	—	36	—	.1640	.1655	.1665	.1460	—	—	.1465	.1470	—	—	—	—
10	24	—	—	.1900	.1930	.1940	.1629	.1629	.1634	.1634	.1639	.1639	.1644	.1659	.1664
	—	32	—	.1900	.1920	.1930	.1697	.1697	.1702	.1702	.1707	.1707	.1712	.1727	.1732
12	24	—	—	.2160	.2190	.2200	.1889	—	—	—	—	.1899	.1904	—	—
	—	28	—	.2160	.2185	.2195	.1928	—	—	—	—	.1938	.1943	—	—

Lead Tolerance

A maximum lead error of plus or minus .0005" in one inch of thread is permitted

Pitch Diameter Limits

- H1 = Basic to basic plus .0005"
- H2 = Basic plus .0005" to basic plus .001"
- H3 = Basic plus .001" to basic plus .0015"
- H7 = Basic plus .003" to basic plus .0035"

Angle Tolerance

20 to 80 threads per inch incl. = 30' plus or minus in 1/2 angle.



THREAD LIMITS

Unified Thread, Fractional Size - Ground Thread

Size	Thread per Inch			Major Diameter (Inches)			Pitch Diameter Limits(Inches)												
	UNC	UNF	UNS	Basic	Min.	Max.	Basic Pitch Dia.	H1 Limit		H2 Limit		H3 Limit		H4 Limit		H5 Limit		H6 Limit	
								Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	20	—	—	.2500	.2540	.2550	.2175	.2175	.2180	.2180	.2185	.2185	.2190	—	—	.2195	.2200	—	—
	—	28	—	.2500	.2525	.2535	.2268	.2268	.2273	.2273	.2278	.2278	.2283	.2283	.2288	—	—	—	—
5/16	18	—	—	.3125	.3170	.3180	.2764	.2764	.2769	.2769	.2774	.2774	.2779	—	—	.2784	.2789	—	—
	—	24	—	.3125	.3155	.3165	.2854	.2854	.2859	.2859	.2864	.2864	.2869	.2869	.2874	—	—	—	—
3/8	16	—	—	.3750	.3800	.3810	.3344	.3344	.3349	.3349	.3354	.3354	.3359	—	—	.3364	.3369	—	—
	—	24	—	.3750	.3780	.3790	.3479	.3479	.3484	.3484	.3489	.3489	.3494	.3494	.3499	—	—	—	—
7/16	14	—	—	.4375	.4435	.4445	.3911	—	—	.3916	.3921	.3921	.3926	—	—	.3931	.3936	—	—
	—	20	—	.4375	.4415	.4425	.4050	—	—	—	—	.4060	.4065	—	—	.4070	.4075	—	—
1/2	13	—	—	.5000	.5065	.5075	.4500	.4500	.4505	.4505	.4510	.4510	.4515	—	—	.4520	.4525	—	—
	—	20	—	.5000	.5040	.5050	.4675	.4675	.4680	.4680	.4685	.4685	.4690	—	—	.4695	.4700	—	—
9/16	12	—	—	.5625	.5690	.5700	.5084	—	—	.5089	.5094	.5094	.5099	—	—	.5104	.5109	—	—
	—	18	—	.5625	.5670	.5680	.5264	—	—	.5269	.5274	.5274	.5279	—	—	.5284	.5289	—	—
5/8	11	—	—	.6250	.6320	.6330	.5660	—	—	.5665	.5670	.5670	.5675	—	—	.5680	.5685	—	—
	—	18	—	.6250	.6295	.6305	.5889	—	—	.5894	.5899	.5899	.5904	—	—	.5909	.5914	—	—
11/16	—	—	11	.6875	.6945	.6955	.6285	—	—	—	—	.6295	.6300	—	—	—	—	—	—
	—	—	16	.6875	.6925	.6935	.6469	—	—	—	—	.6479	.6484	—	—	—	—	—	—
3/4	10	—	—	.7500	.7525	.7590	.6850	.6850	.6855	.6855	.6860	.6860	.6865	—	—	.6870	.6875	—	—
	—	16	—	.7500	.7550	.7560	.7094	.7094	.7099	.7099	.7104	.7104	.7109	—	—	.7114	.7119	—	—
7/8	9	—	—	.8750	.8835	.8850	.8028	—	—	—	—	—	—	.8043	.8048	—	—	.8053	.8058
	—	14	—	.8750	.8810	.8820	.8286	—	—	.8291	.8296	—	—	.8301	.8306	—	—	.8311	.8318
1	8	—	—	1.0000	1.0095	1.0110	.9188	—	—	.9193	.9198	—	—	.9203	.9208	—	—	.9213	.9218
	—	12	—	1.0000	1.0065	1.0075	.9459	—	—	—	—	—	—	.9474	.9479	—	—	—	—
	—	—	14	1.0000	1.0060	1.0070	.9536	—	—	—	—	—	—	.9551	.9556	—	—	—	—

Lead Tolerance

A maximum lead error of plus or minus .0005" in one inch of thread is permitted

Pitch Diameter Limits

- H1 = Basic to basic plus .0005"
- H2 = Basic plus .0005" to basic plus .001"
- H3 = Basic plus .001" to basic plus .0015"
- H4 = Basic plus .0015" to basic plus .0020"
- H5 = Basic plus .0020" to basic plus .0025"
- H6 = Basic plus .0025" to basic plus .0030"

Angle Tolerance

Threads per Inch	Error in Half Angle
6 to 9 Incl.	25' Plus or Minus
10 to 28 Incl.	30' Plus or Minus



THREAD LIMITS

Metric Thread - Ground Thread

Size	Pitch		Major Diameter(Inches)			Pitch Diameter Limits(Inches)										
	Coarse	Fine	Basic	Min.	Max.	Basic Pitch Dia.	D2 Limit		D3 Limit		D4 Limit		D5 Limit		D6 Limit	
							Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
M2	0.4	—	.078740	.0801	.0811	.068511	.0690	.0696	.0695	.0701	.0700	.0706	—	—	—	—
M2.2	0.45	—	.086614	.0881	.0891	.075107	.0756	.0762	.0761	.0767	.0766	.0772	—	—	—	—
M2.3	0.4	—	.090551	.0919	.0929	.080322	.0808	.0814	.0813	.0819	.0818	.0824	—	—	—	—
M2.6	0.45	—	.102362	.1038	.1048	.090855	.0913	.0919	.0918	.0924	.0923	.0929	—	—	—	—
M3	0.5	—	.118110	.1198	.1208	.105324	.1058	.1064	.1063	.1069	.1068	.1074	.1073	.1079	—	—
	—	0.35	.118110	.1193	.1203	.109160	.1096	.1102	.1101	.1107	.1106	.1112	.1111	.1117	—	—
M3.5	0.6	—	.137795	.1397	.1407	.122452	.1227	.1235	.1232	.1240	.1237	.1245	.1242	.1250	—	—
	—	0.35	.137795	.1389	.1399	.128845	.1293	.1299	.1298	.1304	.1303	.1309	.1308	.1314	—	—
M4	0.7	—	.157480	.1597	.1613	.139580	.1398	.1406	.1403	.1411	.1408	.1416	.1413	.1421	—	—
	—	0.5	.157480	.1591	.1601	.144694	.1451	.1457	.1456	.1462	.1461	.1467	.1466	.1472	—	—
M5	0.8	—	.196850	.1994	.2010	.176393	.1766	.1774	.1771	.1779	.1776	.1784	.1781	.1789	—	—
	—	0.5	.196850	.1985	.1995	.184064	.1845	.1851	.1850	.1856	.1855	.1861	.1861	.1866	—	—
M6	1	—	.236220	.2395	.2411	.210648	.2107	.2117	.2112	.2122	.2117	.2127	.2122	.2132	.2127	.2137
	—	0.75	.236220	.2387	.2403	.217041	.2173	.2181	.2178	.2186	.2183	.2191	.2188	.2196	.2193	.2201
M7	1	—	.275590	.2788	.2804	.250018	.2501	.2511	.2506	.2516	.2511	.2521	.2516	.2526	.2521	.2531
	—	0.75	.275590	.2780	.2796	.256411	.2565	.2575	.2570	.2580	.2575	.2585	.2580	.2590	.2585	.2595
M8	1.25	—	.314960	.3189	.3214	.282995	.2828	.2840	.2833	.2845	.2838	.2850	.2843	.2855	.2848	.2860
	—	1	.314960	.3182	.3198	.289388	.2894	.2904	.2899	.2909	.2904	.2914	.2909	.2919	.2914	.2924
M10	1.5	—	.393700	.3984	.4009	.355343	.3552	.3564	.3557	.3569	.3562	.3574	.3567	.3579	.3572	.3584
	—	1.25	.393700	.3976	.4001	.361735	.3616	.3628	.3621	.3633	.3626	.3638	.3631	.3643	.3636	.3648
	—	1	.393700	.3969	.3985	.368128	.3682	.3692	.3687	.3697	.3692	.3702	.3697	.3707	.3702	.3712
M12	1.75	—	.472440	.4780	.4805	.427690	.4275	.4287	.4280	.4292	.4285	.4297	.4290	.4302	.4295	.4307
	—	1.5	.472440	.4772	.4797	.434083	.4339	.4351	.4344	.4356	.4349	.4361	.4354	.4366	.4359	.4371
	—	1.25	.472440	.4764	.4789	.440475	.4403	.4415	.4408	.4420	.4413	.4425	.4418	.4430	.4423	.4435

Lead Tolerance

The tap major and pitch diameter conversions have been rounded upward.
 A maximum lead deviation of $\pm 0.013\text{mm}$ within any two threads not further apart than 25mm is permitted.

Angle Tolerance

Pitch(mm)	Deviation in Half Angle
Over 0.25 to 2.5 Incl.	30' Plus or Minus
Over 2.5 to 4.0 Incl.	25' Plus or Minus



THREAD LIMITS

Metric Thread - Ground Thread

Size	Pitch		Major Diameter(Inches)			Pitch Diameter Limits(Inches)								
	Coarse	Fine	Basic	Min.	Max.	Basic Pitch Dia.	D6 Limit		D7 Limit		D8 Limit		D9 Limit	
							Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
M14	2	—	.551180	.5575	.5600	.500037	.5015	.5031	.5020	.5036	.5025	.5041	—	—
	—	1.5	.551180	.5559	.5584	.512823	.5147	.5159	.5152	.5164	.5157	.5169	—	—
	—	1.25	.551180	.5551	.5576	.519215	.5211	.5223	.5216	.5228	.5221	.5233	—	—
M16	2	—	.629920	.6363	.6388	.578777	.5802	.5818	.5807	.5823	.5812	.5828	—	—
	—	1.5	.629920	.6347	.6372	.591563	.5934	.5946	.5939	.5951	.5944	.5956	—	—
M18	2.5	—	.708660	.7166	.7191	.644731	.6462	.6478	.6467	.6483	.6472	.6488	—	—
	—	2	.708660	.7150	.7175	.657517	.6590	.6606	.6595	.6611	.6600	.6616	—	—
	—	1.5	.708660	.7134	.7159	.670303	.6722	.6734	.6727	.6739	.6732	.6744	—	—
M20	2.5	—	.787400	.7953	.7976	.723471	.7249	.7265	.7254	.7270	.7259	.7275	—	—
	—	2	.787400	.7937	.7962	.736257	.7377	.7393	.7382	.7398	.7387	.7403	—	—
	—	1.5	.787400	.7921	.7946	.749043	.7509	.7521	.7514	.7526	.7519	.7531	—	—
	—	1	.787400	.7906	.7922	.761828	.7639	.7649	.7644	.7654	.7649	.7659	—	—
M22	2.5	—	.866140	.8741	.8766	.802211	.8037	.8053	.8042	.8058	.8047	.8063	—	—
	—	2	.866140	.8725	.8750	.814997	.8164	.8180	.8169	.8185	.8174	.8190	—	—
	—	1.5	.866140	.8709	.8734	.827783	.8296	.8308	.8301	.8313	.8306	.8318	—	—
	—	1	.866140	.8694	.8710	.840568	.8426	.8436	.8431	.8441	.8436	.8446	—	—
M24	3	—	.944880	.9544	.9583	.868165	.8696	.8712	.8701	.8717	.8706	.8722	.8711	.8727
	—	2	.944880	.9512	.9537	.893737	.8952	.8968	.8957	.8973	.8962	.8978	—	—
	—	1.5	.944880	.9496	.9521	.906523	.9084	.9096	.9089	.9101	.9094	.9106	—	—
	—	1	.944880	.9481	.9497	.919308	.9214	.9224	.9219	.9229	.9224	.9234	—	—
M27	3	—	1.062990	1.0725	1.0764	.986275	.9873	.9893	.9878	.9898	.9883	.9903	.9888	.9908
	—	2	1.062990	1.0693	1.0718	1.011847	1.0133	1.0149	1.0138	1.0154	1.0143	1.0159	—	—
	—	1.5	1.062990	1.0677	1.0702	1.024633	1.0265	1.0277	1.0270	1.0282	1.0275	1.0287	—	—
	—	1	1.062990	1.0662	1.0678	1.037418	1.0393	1.0405	1.0398	1.0410	1.0403	1.0415	—	—
M28	—	2	1.102360	1.1087	1.1112	1.051217	1.0527	1.0543	1.0532	1.0548	1.0537	1.0553	—	—
	—	1.5	1.102360	1.1071	1.1096	1.064003	1.0659	1.0671	1.0664	1.0676	1.0669	1.0681	—	—
	—	1	1.102360	1.1056	1.1072	1.076788	1.0786	1.0798	1.0791	1.0803	1.0796	1.0808	—	—
M30	3.5	—	1.181100	1.1921	1.1961	1.091599	1.0926	1.0946	1.0931	1.0951	1.0936	1.0956	1.0941	1.0961
	—	3	1.181100	1.1906	1.1945	1.104385	1.1054	1.1074	1.1059	1.1079	1.1064	1.1084	1.1069	1.1089
	—	2	1.181100	1.1874	1.1899	1.129957	1.1314	1.1330	1.1319	1.1335	1.1324	1.1340	—	—
	—	1.5	1.181100	1.1858	1.1883	1.142743	1.1446	1.1458	1.1451	1.1463	1.1456	1.1468	—	—
M33	3.5	—	1.299210	1.3103	1.3142	1.209709	1.2108	1.2128	1.2113	1.2133	1.2118	1.2138	1.2123	1.2143
	—	3	1.299210	1.3088	1.3127	1.222495	1.2235	1.2255	1.2240	1.2260	1.2245	1.2265	1.2250	1.2270
	—	2	1.299210	1.3056	1.3081	1.248067	1.2495	1.2511	1.2500	1.2516	1.2505	1.2521	—	—
	—	1.5	1.299210	1.3040	1.3065	1.260853	1.2627	1.2639	1.2632	1.2644	1.2637	1.2649	—	—

TAPS



TAP DRILL SIZES - UNIFIED THREAD

Size	Threads Per Inch		Drills for Regular Taps				Drill for Forming Taps
	UNC	UNF	Tap Drill	Inch Equiv.	Probable Hole Size (Inch)	Probable Percent of Thread	Drill for 65%
0		80	3/64	.0469	.0484	71	54 or 1.4mm
1	64	72	53	.0595	.0610	59	51 or 1.7mm
			53	.0595	.0610	67	51 or 1.75mm
2	56		50	.0700	.0717	62	47 or 2.0mm
		64	50	.0700	.0717	70	2.0mm
3	48		47	.0785	.0804	69	2.3mm
		56	45	.0820	.0839	65	2.3mm
4	40		43	.0890	.0910	65	39
		48	42	.0935	.0955	61	37
5	40		38	.1015	.1038	65	33 or 2.9mm
		44	37	.1040	.1063	63	33 or 2.9mm
6	32		36	.1065	.1088	72	3.1mm
		40	33	.1130	.1156	69	1/8 or 3.2mm
8	32		29	.1360	.1389	62	25 or 3.8mm
		36	29	.1360	.1389	70	24
10	24		25	.1495	.1527	69	11/64
		32	21	.1590	.1622	68	16 or .176
12	24		16	.1770	.1805	66	9 or 5.0mm
		28	14	.1820	.1855	66	7 or 5.1mm
1/4	20		7	.2010	.2048	70	5.75mm
		28	3	.2130	.2168	72	A
5/16	18		F	.2570	.2608	72	7.25mm
		24	1	.2720	.2761	67	.293
3/8	16		5/16	.3125	.3169	72	S or 11/32mm
		24	Q	.3320	.3364	71	9.0mm
7/16	14		U	.3680	.3726	70	Y
		20	25/64	.3906	.3952	65	Z or 10.5mm
1/2	13		27/64	.4219	.4266	73	.463
		20	29/64	.4531	.4578	65	.476
9/16	12		31/64	.4844	.4892	68	.521
		18	33/64	.5156	.5204	58	.536
5/8	11		17/32	.5312	.5362	75	37/64
		18	37/64	.5781	.5831	58	.598
3/4	10		21/32	.6562	.6613	68	45/64
		16	11/16	.6875	.6925	71	23/32
7/8	9		49/64	.7656	.7708	72	.823
		14	13/16	.8125	.8177	62	27/32
1	8		7/8	.8750	.8809	73	15/16
		12	59/64	.9219	.9279	67	.963
1*1/8	7		63/64	.9844	.9911	72	
1*1/4	7		1*3/64	1.0469	1.0541	65	
		12	1*7/64	1.1094	—	—	
1*3/8	6		1*11/64	1.1719	—	—	
		16	1*7/32	1.2187	—	—	
1*1/2	6		1*19/64	1.2969	—	—	
		12	1*11/32	1.3437	—	—	
			1*27/64	1.4219	—	—	

TAPS



TAP DRILL SIZES - METRIC THREAD

Size	Pitch	Recommended Metric Drill				Closest Recommended Inch Drill			
		Tap Drill (mm)	Inch Equiv.	Probable Hole Size (Inch)	Probable Percent of Thread	Tap Drill	Inch Equiv.	Probable Hole Size (Inch)	Probable Percent of Thread
M1.6	0.35	1.25	.0492	.0507	69	—	—	—	—
M1.8	0.35	1.45	.0571	.0586	69	—	—	—	—
M2	0.40	1.6	.0630	.0647	69	52	.0635	.0652	66
M2.2	0.45	1.75	.0689	.0706	70	—	—	—	—
M2.5	0.45	2.05	.0807	.0826	69	46	.0810	.0829	67
M3	0.50	2.5	.0984	.1007	68	40	.0980	.1003	70
M3.5	0.60	2.9	.1142	.1168	68	33	.1130	.1156	72
M4	0.70	3.3	.1299	.1328	69	30	.1285	.1314	73
M4.5	0.75	3.7	.1457	.1486	74	26	.1470	.1502	70
M5	0.80	4.2	.1654	.1686	69	19	.1660	.1692	68
M6	1.00	5.0	.1968	.2006	70	9	.1960	.1998	71
M7	1.00	6.0	.2362	.2400	70	15/64	.2344	.2382	73
M8	1.25	6.7	.2638	.2679	74	17/64	.2656	.2697	71
	1.00	7.0	.2756	.2797	69	J	.2770	.2811	66
M10	1.50	8.5	.3346	.3390	71	Q	.3320	.3364	75
	1.25	8.7	.3425	.3471	73	11/32	.3438	.3483	71
M12	1.75	10.2	.4016	.4063	74	Y	.4040	.4087	71
	1.25	10.8	.4252	.4299	67	27/64	.4219	.4266	72
M14	2.00	12.0	.4724	.4772	72	15/32	.4688	.4736	76
	1.50	12.5	.4921	.4969	71	—	—	—	—
M16	2.00	14.0	.5512	.5561	72	35/64	.5469	.5518	76
	1.50	14.5	.5709	.5758	71	—	—	—	—
M18	2.50	15.5	.6102	.6152	73	39/64	.6094	.6144	74
	1.50	16.5	.6496	.6546	70	—	—	—	—
M20	2.50	17.5	.6890	.6942	73	11/16	.6875	.6925	74
	1.50	18.5	.7283	.7335	70	—	—	—	—
M22	2.50	19.5	.7677	.7729	73	49/64	.7656	.7708	75
	1.50	20.5	.8071	.8123	70	—	—	—	—
M24	3.00	21.0	.8268	.8327	73	53/64	.8281	.8340	72
	2.00	22.0	.8661	.8720	71	—	—	—	—
M27	3.00	24.0	.9449	.9511	73	15/16	.9375	.9435	78
	2.00	25.0	.9843	.9913	70	63/64	.9844	.9914	70
M30	3.00	26.5	1.0433						
	2.00	28.0	1.1024						
M33	3.50	29.5	1.1614						
	2.00	31.0	1.2205						
M36	4.00	32.0	1.2598						
	3.00	33.0	1.2992						
M39	4.00	35.0	1.3780						
	3.00	36.0	1.4173						

Reaming Recommended to the Drill Size Shown

TAPS



CONVERSION TABLE

SURFACE FEET PER MINUTE TO REVOLUTIONS PER MINUTE

Surface 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	4422	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	402	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	486	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	252	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

TAPS



TROUBLE SHOOTING GUIDE

Specific Problem	Cause	Solution
Dimensional Accuracy		
Oversize Pitch Diameter	Incorrect Tap	<ol style="list-style-type: none"> 1. Use proper GH limits of taps 2. Use longer chamfered taps
	Chip Packing	<ol style="list-style-type: none"> 1. Use spiral point or spiral fluted taps 2. Reduce number of flutes to provide extra chip room 3. Use larger hole size 4. If tapping a hole, allow deeper hole where applicable or shorten the thread length of the parts 5. Use proper lubricant
	Galling	<ol style="list-style-type: none"> 1. Apply proper surface treatment such as Hardslick or chrome 2. Use proper cutting lubricant 3. Reduce tapping speed 4. Use proper cutting angle in accordance with material being tapped 5. Use large hole size
	Operating Conditions	<ol style="list-style-type: none"> 1. Apply proper tapping speed 2. Correct alignment of tap and drill hole 3. Free cutting either tap or workpiece 4. Use proper tapping speed to avoid torn or rough threads 5. Use lead screw tapper 6. Use proper tapping machine with suitable power 7. Avoid misalignment of the tap and drill hole from loose spindle or worn holder
	Tool Condition	<ol style="list-style-type: none"> 1. Obtain proper indexing angle for the flutes at the cutting edge 2. Grind proper cutting angle and chamfer angle 3. Avoid too narrow a land width 4. Remove burrs from regrinding
Oversize Internal Diameter	Hole Size	<ol style="list-style-type: none"> 1. Use minimum hole size 2. Avoid tapered hole 3. Use proper chamfered taps
	Galling	<ol style="list-style-type: none"> 1. Galling solutions 1 through 4 above can be applied to this specific problem
Undersize Pitch Diameter	Incorrect Tap	<ol style="list-style-type: none"> 1. Use oversize taps 2. Apply proper chamfer angle 3. Increase cutting angle
	Damaged Thread	<ol style="list-style-type: none"> 1. Use proper reversing speed to avoid damaging tapped thread on the way out of the hole
	Left-over Chips	<ol style="list-style-type: none"> 1. Increase cutting performance to avoid any left over chips in the hole 2. Remove left over chips from the hole for gage checking
Undersize Internal Diameter	Hole Size	<ol style="list-style-type: none"> 1. Use maximum drill size

TAPS



TROUBLE SHOOTING GUIDE

Specific Problem	Cause	Solution
Tool Life		
Breakage	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Avoid chip packing in the flutes or the bottom of the hole. Use spiral pointed or spiral fluted taps or fluteless taps. 2. Apply correct surface treatment such as Hardslick or bright
	Excessive Tapping Torque	<ol style="list-style-type: none"> 1. Use larger drill size 2. Try to shorten thread length 3. Increase cutting angle 4. Apply a tap with more thread relief and reduced land width 5. Apply correct surface treatment such as Hardslick
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Avoid misalignment between tap and the hole and tapered hole 3. Use floating type of tapping holder 4. Use tapping holder with torque adjustment 5. Avoid hitting bottom of the hole with tap
	Tool Condition	<ol style="list-style-type: none"> 1. Do not grind the bottom of the flute 2. Avoid too narrow a land width 3. Remove all worn sections when regrinding the flutes 4. Regrind tool more frequently
Chipping	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Reduce cutting angle 2. Use a different kind of high-speed steel tap 3. Reduce hardness of the tap 4. Increase chamfer length 5. Avoid chip packing in the flutes or in the bottom of the hole by using spiral fluted or spiral pointed taps
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Avoid misalignment between tap and hole 3. Avoid sudden return of reverse in blind hole tapping 4. Avoid galling 5. Use larger hole size
Wear	Incorrect Tap Selection	<ol style="list-style-type: none"> 1. Apply specially designed tap for tapping heat treated material 2. Change to a type of high-speed steel tap that contains vanadium 3. Apply special surface treatment such as TiCN or Hardslick 4. Increase chamfer length
	Operating Conditions	<ol style="list-style-type: none"> 1. Reduce tapping speed 2. Apply proper cutting lubricants 3. Avoid work hardened hole 4. Use larger hole size
	Tool Condition	<ol style="list-style-type: none"> 1. Grind proper cutting angle 2. Avoid hardness reduction from grinding process



TROUBLE SHOOTING GUIDE

Specific Problem	Cause	Solution
Surface Finish		
Torn or Rough Thread	Chamfer Too Short	1. Increase chamfer length
	Wrong Cutting Angle	1. Apply proper cutting angle
	Galling	1. Use thread relieved taps 2. Reduce land width 3. Apply surface treatment such as Hardslick or chrome 4. Use proper cutting lubricant 5. Reduce tapping speed 6. Use larger hole size 7. Obtain proper alignment between tap and work
	Chip Packing	1. Use spiral pointed or spiral fluted taps 2. Use larger drill size
Chattering on Tapped Thread	Tool Free Cutting	1. Reduce cutting angle 2. Reduce amount of thread relief
	Tool Condition	1. Avoid too narrow a land width 2. Do not grind the bottom of the flute