

Copper-Invar-Copper PCB Material

(and other metal bonded designs)

Recommended Drill Series: 100, 150, 560, 580, 600

Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
0.10mm	0.0040	13	160	100	-0.011	100	0.08	167
0.13mm	0.0050	16	160	150	-0.011	100	0.10	209
0.15mm	0.0059	19	160	200	-0.011	100	0.12	247
#96	0.0063	21	160	200	-0.011	100	0.13	264
#95	0.0067	21	160	200	-0.012	100	0.13	281
#94	0.0071	22	160	300	-0.012	100	0.14	297
#93	0.0075	24	160	300	-0.012	100	0.15	314
#92	0.0079	26	160	400	-0.012	150	0.16	331
#91	0.0083	27	160	400	-0.012	150	0.17	347
#90	0.0087	29	160	500	-0.012	150	0.18	364
#89	0.0091	32	160	500	-0.012	150	0.20	381
#88	0.0095	34	160	500	-0.012	150	0.21	398
0.25mm	0.0098	34	156	500	-0.012	200	0.22	400
#87	0.0100	38	153	500	-0.012	200	0.25	400
#86	0.0105	41	146	600	-0.012	200	0.28	400
#85	0.0110	42	139	600	-0.013	200	0.30	400
#84	0.0115	44	133	700	-0.013	200	0.33	400
0.30mm	0.0118	46	130	700	-0.013	200	0.35	400
#83	0.0120	48	127	800	-0.013	250	0.38	400
#82	0.0125	51	122	800	-0.013	250	0.42	400
#81	0.0130	55	118	800	-0.013	250	0.47	400
#80	0.0135	60	113	800	-0.013	250	0.53	400
0.35mm	0.0138	63	111	800	-0.013	250	0.57	400
#79	0.0145	69	105	800	-0.013	250	0.66	400
1/64	0.0156	72	98	800	-0.014	300	0.73	400
0.40mm	0.0158	73	97	800	-0.014	300	0.75	400
#78	0.0160	75	96	800	-0.014	300	0.78	400
0.45mm	0.0177	79	86	900	-0.014	300	0.92	400
#77	0.0180	80	85	900	-0.014	300	0.94	400
0.50mm	0.0197	80	78	900	-0.015	300	1.03	400
#76	0.0200	82	76	900	-0.015	300	1.08	400
#75	0.0210	84	73	1000	-0.015	400	1.15	400
0.55mm	0.0217	86	70	1000	-0.015	400	1.23	400
#74	0.0225	85	68	1000	-0.015	400	1.25	400
0.60mm	0.0236	84	65	1000	-0.016	400	1.29	400
#73	0.0240	83	64	1000	-0.016	400	1.30	400
#72	0.0250	83	61	1000	-0.016	400	1.36	400
0.65mm	0.0256	82	60	1000	-0.016	400	1.37	400
#71	0.0260	81	59	1000	-0.016	400	1.37	400
0.70mm	0.0276	78	55	1000	-0.016	400	1.42	400
#70	0.0280	77	55	1000	-0.017	400	1.40	400
#69	0.0292	75	52	1000	-0.017	400	1.44	400
0.75mm	0.0295	74	52	1000	-0.017	400	1.42	400
#68	0.0310	72	49	1000	-0.017	400	1.47	400
1/32	0.0312	71	49	1000	-0.017	400	1.45	400
0.80mm	0.0315	71	49	1000	-0.017	400	1.45	400
#67	0.0320	70	48	1000	-0.017	400	1.46	400
#66	0.0330	67	46	1000	-0.018	400	1.46	400
0.85mm	0.0335	67	46	1000	-0.018	400	1.46	400
#65	0.0350	65	44	1000	-0.018	500	1.48	400
0.90mm	0.0354	65	43	1000	-0.018	500	1.51	400
#64	0.0360	63	42	1000	-0.018	500	1.50	400
#63	0.0370	62	41	1000	-0.019	500	1.51	400
0.95mm	0.0374	61	41	1000	-0.019	500	1.49	400
#62	0.0380	60	40	1000	-0.019	500	1.50	400
#61	0.0390	60	39	1000	-0.019	500	1.54	400
1.00mm	0.0394	59	39	1000	-0.019	500	1.51	400
#60	0.0400	59	38	1000	-0.019	500	1.55	400
#59	0.0410	58	37	1000	-0.020	500	1.57	400
1.05mm	0.0413	58	37	1000	-0.020	500	1.57	400
#58	0.0420	57	36	1000	-0.020	500	1.58	400
#57	0.0430	57	36	1000	-0.020	500	1.58	400
1.10mm	0.0433	56	35	1000	-0.020	500	1.60	400
1.15mm	0.0453	55	34	1000	-0.021	500	1.62	400

Note: This information is based on **160K RPM** Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

(U.S.) 1.888.848.9266

(International) 001.714.428.3655

Visit us online at KyoceraPrecisionTools.com

Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
#56	0.0465	55	33	1000	-0.021	500	1.67	400
3/64	0.0469	55	33	1000	-0.021	500	1.67	400
1.20mm	0.0472	55	32	1000	-0.021	500	1.72	400
1.25mm	0.0492	54	31	1000	-0.021	500	1.74	400
1.30mm	0.0512	54	30	1000	-0.022	500	1.80	400
#55	0.0520	54	29	1000	-0.022	500	1.86	400
1.35mm	0.0531	53	29	1000	-0.022	500	1.83	400
#54	0.0550	53	28	1000	-0.023	500	1.89	400
1.40mm	0.0551	53	28	1000	-0.023	500	1.89	400
1.45mm	0.0571	52	27	1000	-0.023	500	1.93	400
1.50mm	0.0591	51	26	1000	-0.024	500	1.96	400
#53	0.0595	51	26	1000	-0.024	500	1.96	400
1.55mm	0.0610	50	25	1000	-0.024	500	2.00	400
1/16	0.0625	48	24	1000	-0.025	500	2.00	400
1.60mm	0.0630	48	24	1000	-0.025	500	2.00	400
#52	0.0635	48	24	1000	-0.025	500	2.00	400
1.65mm	0.0650	48	24	1000	-0.025	500	2.00	400
1.70mm	0.0669	46	23	1000	-0.026	500	2.00	400
#51	0.0670	46	23	1000	-0.026	500	2.00	400
1.75mm	0.0689	44	22	1000	-0.026	500	2.00	400
#50	0.0700	44	22	1000	-0.026	500	2.00	400
1.80mm	0.0709	44	22	1000	-0.027	500	2.00	400
1.85mm	0.0728	42	21	1000	-0.027	500	2.00	400
#49	0.0730	42	21	1000	-0.027	500	2.00	400
1.90mm	0.0748	40	20	1000	-0.027	500	2.00	400
#48	0.0760	40	20	1000	-0.028	500	2.00	400
1.95mm	0.0768	40	20	1000	-0.028	500	2.00	400
5/64	0.0781	40	20	1000	-0.028	500	2.00	409
#47	0.0785	40	20	1000	-0.028	500	2.00	411
2.00mm	0.0787	40	20	1000	-0.028	500	2.00	412
2.05mm	0.0807	40	20	1000	-0.029	500	2.00	422
#46	0.0810	40	20	1000	-0.029	500	2.00	424
#45	0.0820	40	20	1000	-0.029	500	2.00	429
2.10mm	0.0827	40	20	1000	-0.029	500	2.00	433
2.15mm	0.0846	40	20	1000	-0.030	500	2.00	443
#44	0.0860	40	20	1000	-0.030	500	2.00	450
2.20mm	0.0866	40	20	1000	-0.030	500	2.00	453
2.25mm	0.0886	40	20	1000	-0.031	500	2.00	464
#43	0.0890	40	20	1000	-0.031	500	2.00	466
2.30mm	0.0906	40	20	1000	-0.031	500	2.00	474
2.35mm	0.0925	40	20	1000	-0.032	500	2.00	484
#42	0.0935	40	20	1000	-0.032	500	2.00	489
3/32	0.0938	40	20	1000	-0.032	500	2.00	491
2.40mm	0.0945	40	20	1000	-0.032	500	2.00	495
#41	0.0960	40	20	1000	-0.032	500	2.00	502
2.45mm	0.0965	40	20	1000	-0.033	500	2.00	505
#40	0.0980	40	20	1000	-0.033	500	2.00	513
2.50mm	0.0984	40	20	1000	-0.033	500	2.00	515
#39	0.0995	40	20	1000	-0.033	500	2.00	521
2.55mm	0.1004	40	20	1000	-0.033	400	2.00	525
#38	0.1015	40	20	1000	-0.034	400	2.00	531
2.60mm	0.1024	40	20	1000	-0.034	400	2.00	536
#37	0.1040	40	20	1000	-0.034	400	2.00	544
2.65mm	0.1043	40	20	1000	-0.034	400	2.00	546
2.70mm	0.1063	40	20	1000	-0.035	400	2.00	556
#36	0.1065	40	20	1000	-0.035	400	2.00	557
2.75mm	0.1083	40	20	1000	-0.035	400	2.00	567
7/64	0.1094	40	20	1000	-0.036	400	2.00	573
#35	0.1100	40	20	1000	-0.036	400	2.00	576
2.80mm	0.1102	40	20	1000	-0.036	400	2.00	577
#34	0.1110	40	20	1000	-0.036	400	2.00	581
2.85mm	0.1122	40	20	1000	-0.036	400	2.00	587
#33	0.1130	40	20	1000	-0.036	400	2.00	591
2.90mm	0.1142	40	20	1000	-0.037	400	2.00	598
#32	0.1160	40	20	1000	-0.037	400	2.00	607
2.95mm	0.1161	40	20	1000	-0.037	400	2.00	608
3.00mm	0.1181	40	20	1000	-0.038	400	2.00	618
#31	0.1200	40	20	1000	-0.038	400	2.00	628
3.05mm	0.1201	40	20	1000	-0.038	400	2.00	629
3.10mm	0.1220	40	20	1000	-0.038	400	2.00	638
3.15mm	0.1240	40	20	1000	-0.039	400	2.00	649
1/8	0.1250	40	20	1000	-0.039	400	2.00	654

Note: This information is based on 160K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

(U.S.) 1.888.848.9266

(International) 001.714.428.3655

Visit us online at KyoceraPrecisionTools.com

Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
3.20mm	0.1260	30	20	1000	-0.018	250	1.50	659
3.25mm	0.1280	30	20	1000	-0.018	250	1.50	670
#30	0.1285	30	20	1000	-0.019	250	1.50	672
3.30mm	0.1299	30	20	1000	-0.019	250	1.50	680
3.35mm	0.1319	30	20	1000	-0.019	250	1.50	690
3.40mm	0.1339	30	20	1000	-0.019	250	1.50	701
3.45mm	0.1358	30	20	1000	-0.019	250	1.50	711
#29	0.1360	30	20	1000	-0.019	250	1.50	712
3.50mm	0.1378	30	20	1000	-0.019	250	1.50	721
3.55mm	0.1398	30	20	1000	-0.019	250	1.50	732
#28	0.1405	30	20	1000	-0.019	250	1.50	735
9/64	0.1406	30	20	1000	-0.019	250	1.50	736
3.60mm	0.1417	30	20	1000	-0.019	250	1.50	742
3.65mm	0.1437	30	20	1000	-0.020	250	1.50	752
#27	0.1440	30	20	1000	-0.020	250	1.50	754
3.70mm	0.1457	30	20	1000	-0.020	250	1.50	762
#26	0.1470	28	20	1000	-0.020	250	1.40	769
3.75mm	0.1476	28	20	1000	-0.020	250	1.40	772
#25	0.1495	28	20	1000	-0.020	250	1.40	782
3.80mm	0.1496	28	20	1000	-0.020	250	1.40	783
3.85mm	0.1516	28	20	1000	-0.020	250	1.40	793
#24	0.1520	28	20	1000	-0.020	250	1.40	795
3.90mm	0.1535	28	20	1000	-0.020	250	1.40	803
#23	0.1540	28	20	1000	-0.020	250	1.40	806
3.95	0.1555	28	20	1000	-0.020	250	1.40	814
5/32	0.1562	28	20	1000	-0.020	250	1.40	817
#22	0.1570	28	20	1000	-0.020	250	1.40	822
4.00mm	0.1575	28	20	1000	-0.020	250	1.40	824
#21	0.1590	26	20	1000	-0.021	250	1.30	832
4.05mm	0.1594	26	20	1000	-0.021	250	1.30	834
#20	0.1610	26	20	1000	-0.021	250	1.30	843
4.10mm	0.1614	26	20	1000	-0.021	250	1.30	845
4.15mm	0.1634	26	20	1000	-0.021	250	1.30	855
4.20mm	0.1654	26	20	1000	-0.021	250	1.30	866
#19	0.1660	26	20	1000	-0.021	250	1.30	869
4.25mm	0.1673	26	20	1000	-0.021	250	1.30	876
4.30mm	0.1693	26	20	1000	-0.021	250	1.30	886
#18	0.1695	26	20	1000	-0.021	250	1.30	887
4.35mm	0.1713	24	20	1000	-0.021	250	1.20	896
11/64	0.1719	24	20	1000	-0.021	250	1.20	900
#17	0.1730	24	20	1000	-0.021	250	1.20	905
4.40mm	0.1732	24	20	1000	-0.021	250	1.20	906
4.45mm	0.1752	24	20	1000	-0.022	250	1.20	917
#16	0.1770	24	20	1000	-0.022	250	1.20	926
4.50mm	0.1772	24	20	1000	-0.022	250	1.20	927
4.55mm	0.1792	24	20	1000	-0.022	250	1.20	938
#15	0.1800	24	20	1000	-0.022	250	1.20	942
4.60mm	0.1811	24	20	1000	-0.022	250	1.20	948
#14	0.1820	24	20	1000	-0.022	250	1.20	952
4.65mm	0.1831	24	20	1000	-0.022	250	1.20	958
#13	0.1850	24	20	1000	-0.022	250	1.20	968
4.70mm	0.1850	24	20	1000	-0.022	250	1.20	968
4.75mm	0.1870	24	20	1000	-0.022	250	1.20	979
3/16	0.1875	24	20	1000	-0.022	250	1.20	981
4.80mm	0.1890	24	20	1000	-0.023	250	1.20	989
#12	0.1890	22	20	1000	-0.023	250	1.10	989
4.85mm	0.1909	22	20	1000	-0.023	250	1.10	999
#11	0.1910	22	20	1000	-0.023	250	1.10	1000
4.90mm	0.1929	22	20	1000	-0.023	250	1.10	1010
#10	0.1935	22	20	1000	-0.023	250	1.10	1013
4.95mm	0.1949	22	20	1000	-0.023	250	1.10	1020
#9	0.1960	22	20	1000	-0.023	250	1.10	1026
5.00mm	0.1968	22	20	1000	-0.023	250	1.10	1030
5.05mm	0.1988	22	20	1000	-0.023	250	1.10	1040
#8	0.1990	22	20	1000	-0.023	250	1.10	1041
5.10mm	0.2008	22	20	1000	-0.023	250	1.10	1051
#7	0.2010	22	20	1000	-0.023	250	1.10	1052
5.15mm	0.2028	22	20	1000	-0.023	250	1.10	1061
13/64	0.2031	22	20	1000	-0.023	250	1.10	1063
#6	0.2040	22	20	1000	-0.024	250	1.10	1068
5.20mm	0.2047	22	20	1000	-0.024	250	1.10	1071
#5	0.2055	22	20	1000	-0.024	250	1.10	1075

Note: This information is based on 160K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

(U.S.) 1.888.848.9266

(International) 001.714.428.3655

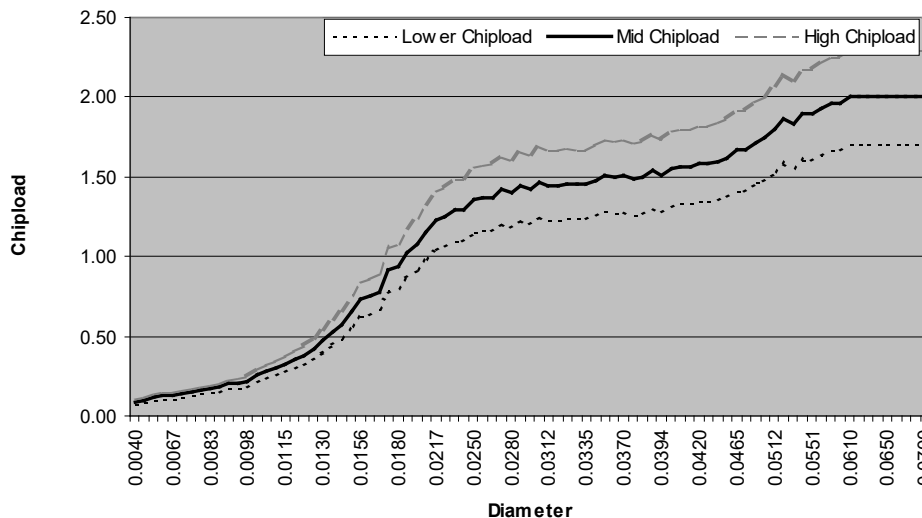
Visit us online at KyoceraPrecisionTools.com

Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
5.25mm	0.2067	22	20	1000	-0.024	250	1.10	1082
5.30mm	0.2087	22	20	1000	-0.024	250	1.10	1092
#4	0.2090	22	20	1000	-0.024	250	1.10	1094
5.35mm	0.2106	22	20	1000	-0.024	250	1.10	1102
5.40mm	0.2126	20	20	1000	-0.024	250	1.00	1113
#3	0.2130	20	20	1000	-0.024	250	1.00	1115
5.45mm	0.2146	20	20	1000	-0.024	250	1.00	1123
5.50mm	0.2165	20	20	1000	-0.024	250	1.00	1133
5.55mm	0.2185	20	20	1000	-0.024	250	1.00	1143
7/32	0.2188	20	20	1000	-0.024	250	1.00	1145
5.60mm	0.2205	20	20	1000	-0.025	250	1.00	1154
#2	0.2210	20	20	1000	-0.025	250	1.00	1157
5.65mm	0.2224	20	20	1000	-0.025	250	1.00	1164
5.70mm	0.2244	20	20	1000	-0.025	250	1.00	1174
5.75mm	0.2264	20	20	1000	-0.025	250	1.00	1185
#1	0.2280	20	20	1000	-0.025	250	1.00	1193
5.80mm	0.2283	20	20	1000	-0.025	250	1.00	1195
5.85mm	0.2302	20	20	1000	-0.025	250	1.00	1205
5.90mm	0.2323	20	20	1000	-0.025	250	1.00	1216
A	0.2340	20	20	1000	-0.025	250	1.00	1225
5.95mm	0.2343	20	20	1000	-0.026	250	1.00	1226
15/64	0.2344	20	20	1000	-0.026	250	1.00	1227
6.00mm	0.2362	20	20	1000	-0.026	250	1.00	1236
B	0.2380	20	20	1000	-0.026	250	1.00	1246
6.05mm	0.2382	20	20	1000	-0.026	250	1.00	1247
6.10mm	0.2402	20	20	1000	-0.026	250	1.00	1257
C	0.2420	20	20	1000	-0.026	250	1.00	1266
6.15mm	0.2421	20	20	1000	-0.026	250	1.00	1267
6.20mm	0.2441	20	20	1000	-0.026	250	1.00	1277
D	0.2460	20	20	1000	-0.026	250	1.00	1287
6.25mm	0.2461	20	20	1000	-0.026	250	1.00	1288
6.30mm	0.2480	20	20	1000	-0.026	250	1.00	1298
6.35mm	0.2500	20	20	1000	-0.027	250	1.00	1308
6.40mm	0.2520	20	20	1000	-0.027	250	1.00	1319
6.50mm	0.2559	20	20	1000	-0.027	250	1.00	1339
F	0.2570	20	20	1000	-0.027	250	1.00	1345
6.60mm	0.2598	20	20	1000	-0.027	250	1.00	1360

In some cases, there may be an opportunity to increase the chipload based on the application's robustness. Variables such as machine technology and condition, stack support materials, and Kyocera design selection may allow the increased throughput with higher chiploads. Multiply the recommended chipload by 1.15 to reach the higher chipload.

If the application is not as robust due to heavy glass, high copper content, tight annular ring requirements, or similar, multiply the recommended chipload by 0.85.

Chiploads for Copper-Invar-Copper



Note: This information is based on 160K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable