

# Nelco N4000-13 FR-4 High Tg PCB Material

Recommended Drill Series: 100, 150, 430, 460, 480

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	25	120	200	-0.011	200	0.21	126
0.13mm	0.0050	30	120	300	-0.011	300	0.25	157
0.15mm	0.0059	36	120	300	-0.011	400	0.30	185
#96	0.0063	40	120	400	-0.011	400	0.33	198
#95	0.0067	44	120	400	-0.012	400	0.37	210
#94	0.0071	48	120	500	-0.012	400	0.40	223
#93	0.0075	52	120	500	-0.012	400	0.43	236
#92	0.0079	56	120	500	-0.012	700	0.47	248
#91	0.0083	60	120	600	-0.012	700	0.50	261
#90	0.0087	63	120	600	-0.012	700	0.53	273
#89	0.0091	67	120	700	-0.012	700	0.56	286
#88	0.0095	70	120	700	-0.012	700	0.58	298
0.25mm	0.0098	72	120	800	-0.012	800	0.60	308
#87	0.0100	74	120	800	-0.012	800	0.62	314
#86	0.0105	76	120	800	-0.012	800	0.63	330
#85	0.0110	78	120	900	-0.013	800	0.65	345
#84	0.0115	80	120	900	-0.013	800	0.67	361
0.30mm	0.0118	82	120	1000	-0.013	1000	0.68	371
#83	0.0120	85	120	1000	-0.013	1000	0.71	377
#82	0.0125	88	120	1000	-0.013	1000	0.73	393
#81	0.0130	91	120	1000	-0.013	1000	0.76	408
#80	0.0135	93	119	1000	-0.013	1200	0.78	420
0.35mm	0.0138	95	116	1000	-0.013	1200	0.82	420
#79	0.0145	98	111	1000	-0.013	1200	0.88	420
1/64	0.0156	104	103	1000	-0.014	1200	1.01	420
0.40mm	0.0158	106	102	1000	-0.014	1200	1.04	420
#78	0.0160	108	100	1000	-0.014	1200	1.08	420
0.45mm	0.0177	110	91	1000	-0.014	1200	1.21	420
#77	0.0180	112	89	1000	-0.014	1200	1.26	420
0.50mm	0.0197	112	81	1000	-0.015	1200	1.38	420
#76	0.0200	112	80	1000	-0.015	1200	1.40	420
#75	0.0210	110	76	1000	-0.015	1200	1.45	420
0.55mm	0.0217	108	74	1000	-0.015	1200	1.46	420
#74	0.0225	106	71	1000	-0.015	1200	1.49	420
0.60mm	0.0236	105	68	1000	-0.016	1200	1.54	420
#73	0.0240	105	67	1000	-0.016	1200	1.57	420
#72	0.0250	103	64	1000	-0.016	1200	1.61	420
0.65mm	0.0256	102	63	1000	-0.016	1200	1.62	420
#71	0.0260	101	62	1000	-0.016	1200	1.63	420
0.70mm	0.0276	100	58	1000	-0.016	1200	1.72	420
#70	0.0280	100	57	1000	-0.017	1200	1.75	420
#69	0.0292	98	55	1000	-0.017	1200	1.78	420
0.75mm	0.0295	97	54	1000	-0.017	1200	1.80	420
#68	0.0310	95	52	1000	-0.017	1200	1.83	420
1/32	0.0312	95	51	1000	-0.017	1200	1.86	420
0.80mm	0.0315	95	51	1000	-0.017	1200	1.86	420
#67	0.0320	94	50	1000	-0.017	1200	1.88	420
#66	0.0330	93	49	1000	-0.018	1200	1.90	420
0.85mm	0.0335	92	48	1000	-0.018	1200	1.92	420
#65	0.0350	91	46	1000	-0.018	1200	1.98	420
0.90mm	0.0354	91	45	1000	-0.018	1200	2.02	420
#64	0.0360	91	45	1000	-0.018	1200	2.02	420
#63	0.0370	90	43	1000	-0.019	1200	2.09	420
0.95mm	0.0374	90	43	1000	-0.019	1200	2.09	420
#62	0.0380	90	42	1000	-0.019	1200	2.14	420
#61	0.0390	89	41	1000	-0.019	1200	2.17	420
1.00mm	0.0394	89	41	1000	-0.019	1200	2.17	420
#60	0.0400	89	40	1000	-0.019	1200	2.23	420
#59	0.0410	88	39	1000	-0.020	1200	2.26	420
1.05mm	0.0413	88	39	1000	-0.020	1200	2.26	420
#58	0.0420	88	38	1000	-0.020	1200	2.32	420
#57	0.0430	87	37	1000	-0.020	1200	2.35	420
1.10mm	0.0433	87	37	1000	-0.020	1200	2.35	420
1.15mm	0.0453	86	35	1000	-0.021	1200	2.46	420

Note: This information is based on 120K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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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	86	35	1000	-0.021	1000	2.46	420
3/64	0.0469	85	34	1000	-0.021	1000	2.50	420
1.20mm	0.0472	85	34	1000	-0.021	1000	2.50	420
1.25mm	0.0492	83	33	1000	-0.021	1000	2.50	420
1.30mm	0.0512	78	31	1000	-0.022	1000	2.50	420
#55	0.0520	78	31	1000	-0.022	1000	2.50	420
1.35mm	0.0531	75	30	1000	-0.022	1000	2.50	420
#54	0.0550	73	29	1000	-0.023	1000	2.50	420
1.40mm	0.0551	73	29	1000	-0.023	1000	2.50	420
1.45mm	0.0571	70	28	1000	-0.023	1000	2.50	420
1.50mm	0.0591	68	27	1000	-0.024	1000	2.50	420
#53	0.0595	68	27	1000	-0.024	1000	2.50	420
1.55mm	0.0610	65	26	1000	-0.024	1000	2.50	420
1/16	0.0625	65	26	1000	-0.025	1000	2.50	420
1.60mm	0.0630	63	25	1000	-0.025	1000	2.50	420
#52	0.0635	63	25	1000	-0.025	1000	2.50	420
1.65mm	0.0650	63	25	1000	-0.025	1000	2.50	420
1.70mm	0.0669	60	24	1000	-0.026	1000	2.50	420
#51	0.0670	60	24	1000	-0.026	1000	2.50	420
1.75mm	0.0689	58	23	1000	-0.026	1000	2.50	420
#50	0.0700	58	23	1000	-0.026	1000	2.50	420
1.80mm	0.0709	58	23	1000	-0.027	1000	2.50	420
1.85mm	0.0728	55	22	1000	-0.027	1000	2.50	420
#49	0.0730	55	22	1000	-0.027	1000	2.50	420
1.90mm	0.0748	53	21	1000	-0.027	1000	2.50	420
#48	0.0760	53	21	1000	-0.028	1000	2.50	420
1.95mm	0.0768	53	21	1000	-0.028	1000	2.50	420
5/64	0.0781	53	21	1000	-0.028	1000	2.50	420
#47	0.0785	50	20	1000	-0.028	1000	2.50	420
2.00mm	0.0787	50	20	1000	-0.028	1000	2.50	420
2.05mm	0.0807	50	20	1000	-0.029	1000	2.50	420
#46	0.0810	50	20	1000	-0.029	1000	2.50	420
#45	0.0820	50	20	1000	-0.029	1000	2.50	420
2.10mm	0.0827	50	20	1000	-0.029	1000	2.50	433
2.15mm	0.0846	50	20	1000	-0.030	1000	2.50	443
#44	0.0860	50	20	1000	-0.030	1000	2.50	450
2.20mm	0.0866	50	20	1000	-0.030	1000	2.50	453
2.25mm	0.0886	50	20	1000	-0.031	1000	2.50	464
#43	0.0890	50	20	1000	-0.031	1000	2.50	466
2.30mm	0.0906	50	20	1000	-0.031	1000	2.50	474
2.35mm	0.0925	50	20	1000	-0.032	1000	2.50	484
#42	0.0935	50	20	1000	-0.032	1000	2.50	489
3/32	0.0938	50	20	1000	-0.032	1000	2.50	491
2.40mm	0.0945	50	20	1000	-0.032	1000	2.50	495
#41	0.0960	50	20	1000	-0.032	1000	2.50	502
2.45mm	0.0965	50	20	1000	-0.033	1000	2.50	505
#40	0.0980	50	20	1000	-0.033	1000	2.50	513
2.50mm	0.0984	50	20	1000	-0.033	1000	2.50	515
#39	0.0995	50	20	1000	-0.033	1000	2.50	521
2.55mm	0.1004	46	20	1000	-0.033	1000	2.30	525
#38	0.1015	46	20	1000	-0.034	1000	2.30	531
2.60mm	0.1024	46	20	1000	-0.034	1000	2.30	536
#37	0.1040	46	20	1000	-0.034	1000	2.30	544
2.65mm	0.1043	46	20	1000	-0.034	1000	2.30	546
2.70mm	0.1063	46	20	1000	-0.035	1000	2.30	556
#36	0.1065	46	20	1000	-0.035	1000	2.30	557
2.75mm	0.1083	46	20	1000	-0.035	1000	2.30	567
7/64	0.1094	46	20	1000	-0.036	1000	2.30	573
#35	0.1100	46	20	1000	-0.036	1000	2.30	576
2.80mm	0.1102	46	20	1000	-0.036	1000	2.30	577
#34	0.1110	46	20	1000	-0.036	1000	2.30	581
2.85mm	0.1122	46	20	1000	-0.036	1000	2.30	587
#33	0.1130	46	20	1000	-0.036	1000	2.30	591
2.90mm	0.1142	46	20	1000	-0.037	1000	2.30	598
#32	0.1160	46	20	1000	-0.037	1000	2.30	607
2.95mm	0.1161	46	20	1000	-0.037	1000	2.30	608
3.00mm	0.1181	46	20	1000	-0.038	1000	2.30	618
#31	0.1200	46	20	1000	-0.038	1000	2.30	628
3.05mm	0.1201	46	20	1000	-0.038	1000	2.30	629
3.10mm	0.1220	46	20	1000	-0.038	1000	2.30	638
3.15mm	0.1240	46	20	1000	-0.039	1000	2.30	649
1/8	0.1250	46	20	1000	-0.039	1000	2.30	654

Note: This information is based on 120K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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	40	20	1000	-0.018	800	2.00	659
3.25mm	0.1280	40	20	1000	-0.018	800	2.00	670
#30	0.1285	40	20	1000	-0.019	800	2.00	672
3.30mm	0.1299	40	20	1000	-0.019	800	2.00	680
3.35mm	0.1319	40	20	1000	-0.019	800	2.00	690
3.40mm	0.1339	40	20	1000	-0.019	800	2.00	701
3.45mm	0.1358	40	20	1000	-0.019	800	2.00	711
#29	0.1360	40	20	1000	-0.019	800	2.00	712
3.50mm	0.1378	35	20	1000	-0.019	800	1.75	721
3.55mm	0.1398	35	20	1000	-0.019	800	1.75	732
#28	0.1405	35	20	1000	-0.019	800	1.75	735
9/64	0.1406	35	20	1000	-0.019	700	1.75	736
3.60mm	0.1417	35	20	1000	-0.019	700	1.75	742
3.65mm	0.1437	35	20	1000	-0.020	700	1.75	752
#27	0.1440	35	20	1000	-0.020	700	1.75	754
3.70mm	0.1457	35	20	1000	-0.020	700	1.75	762
#26	0.1470	35	20	1000	-0.020	700	1.75	769
3.75mm	0.1476	35	20	1000	-0.020	700	1.75	772
#25	0.1495	35	20	1000	-0.020	700	1.75	782
3.80mm	0.1496	35	20	1000	-0.020	700	1.75	783
3.85mm	0.1516	35	20	1000	-0.020	800	1.75	793
#24	0.1520	35	20	1000	-0.020	600	1.75	795
3.90mm	0.1535	35	20	1000	-0.020	600	1.75	803
#23	0.1540	35	20	1000	-0.020	600	1.75	806
3.95	0.1555	30	20	1000	-0.020	600	1.50	814
5/32	0.1562	30	20	1000	-0.020	600	1.50	817
#22	0.1570	30	20	1000	-0.020	600	1.50	822
4.00mm	0.1575	30	20	1000	-0.020	600	1.50	824
#21	0.1590	30	20	1000	-0.021	600	1.50	832
4.05mm	0.1594	30	20	1000	-0.021	600	1.50	834
#20	0.1610	30	20	1000	-0.021	600	1.50	843
4.10mm	0.1614	30	20	1000	-0.021	600	1.50	845
4.15mm	0.1634	30	20	1000	-0.021	600	1.50	855
4.20mm	0.1654	30	20	1000	-0.021	600	1.50	866
#19	0.1660	30	20	1000	-0.021	600	1.50	869
4.25mm	0.1673	30	20	1000	-0.021	600	1.50	876
4.30mm	0.1693	30	20	1000	-0.021	600	1.50	886
#18	0.1695	30	20	1000	-0.021	600	1.50	887
4.35mm	0.1713	30	20	1000	-0.021	600	1.50	896
11/64	0.1719	30	20	1000	-0.021	600	1.50	900
#17	0.1730	30	20	1000	-0.021	500	1.50	905
4.40mm	0.1732	30	20	1000	-0.021	500	1.50	906
4.45mm	0.1752	30	20	1000	-0.022	500	1.50	917
#16	0.1770	30	20	1000	-0.022	500	1.50	926
4.50mm	0.1772	30	20	1000	-0.022	500	1.50	927
4.55mm	0.1792	30	20	1000	-0.022	500	1.50	938
#15	0.1800	30	20	1000	-0.022	500	1.50	942
4.60mm	0.1811	30	20	1000	-0.022	500	1.50	948
#14	0.1820	30	20	1000	-0.022	500	1.50	952
4.65mm	0.1831	30	20	1000	-0.022	500	1.50	958
#13	0.1850	30	20	1000	-0.022	500	1.50	968
4.70mm	0.1850	30	20	1000	-0.022	500	1.50	968
4.75mm	0.1870	30	20	1000	-0.022	500	1.50	979
3/16	0.1875	30	20	1000	-0.022	500	1.50	981
4.80mm	0.1890	30	20	1000	-0.023	500	1.50	989
#12	0.1890	30	20	1000	-0.023	500	1.50	989
4.85mm	0.1909	30	20	1000	-0.023	500	1.50	999
#11	0.1910	30	20	1000	-0.023	500	1.50	1000
4.90mm	0.1929	30	20	1000	-0.023	500	1.50	1010
#10	0.1935	30	20	1000	-0.023	500	1.50	1013
4.95mm	0.1949	30	20	1000	-0.023	500	1.50	1020
#9	0.1960	30	20	1000	-0.023	400	1.50	1026
5.00mm	0.1968	30	20	1000	-0.023	400	1.50	1030
5.05mm	0.1988	30	20	1000	-0.023	400	1.50	1040
#8	0.1990	30	20	1000	-0.023	400	1.50	1041
5.10mm	0.2008	25	20	1000	-0.023	400	1.25	1051
#7	0.2010	25	20	1000	-0.023	400	1.25	1052
5.15mm	0.2028	25	20	1000	-0.023	400	1.25	1061
13/64	0.2031	25	20	1000	-0.023	400	1.25	1063
#6	0.2040	25	20	1000	-0.024	400	1.25	1068
5.20mm	0.2047	25	20	1000	-0.024	400	1.25	1071
#5	0.2055	25	20	1000	-0.024	400	1.25	1075

Note: This information is based on 120K RPM Spindle Capability. Please use maximum spindle speed if listed RPM is unattainable

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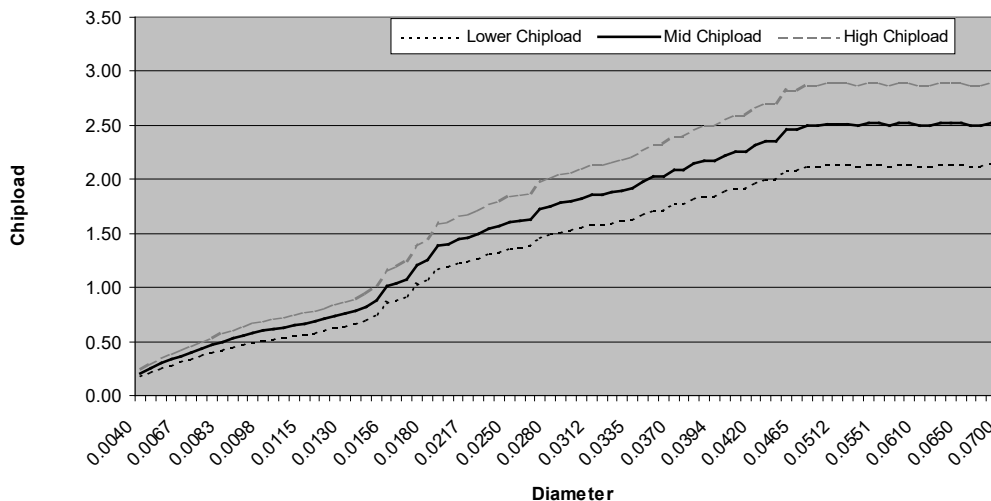
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Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
5.25mm	0.2067	25	20	1000	-0.024	400	1.25	1082
5.30mm	0.2087	25	20	1000	-0.024	400	1.25	1092
#4	0.2090	25	20	1000	-0.024	400	1.25	1094
5.35mm	0.2106	25	20	1000	-0.024	400	1.25	1102
5.40mm	0.2126	25	20	1000	-0.024	400	1.25	1113
#3	0.2130	25	20	1000	-0.024	400	1.25	1115
5.45mm	0.2146	25	20	1000	-0.024	400	1.25	1123
5.50mm	0.2165	25	20	1000	-0.024	300	1.25	1133
5.55mm	0.2185	25	20	1000	-0.024	300	1.25	1143
7/32	0.2188	25	20	1000	-0.024	300	1.25	1145
5.60mm	0.2205	25	20	1000	-0.025	300	1.25	1154
#2	0.2210	25	20	1000	-0.025	300	1.25	1157
5.65mm	0.2224	25	20	1000	-0.025	300	1.25	1164
5.70mm	0.2244	25	20	1000	-0.025	300	1.25	1174
5.75mm	0.2264	25	20	1000	-0.025	300	1.25	1185
#1	0.2280	25	20	1000	-0.025	300	1.25	1193
5.80mm	0.2283	25	20	1000	-0.025	300	1.25	1195
5.85mm	0.2302	25	20	1000	-0.025	300	1.25	1205
5.90mm	0.2323	25	20	1000	-0.025	300	1.25	1216
A	0.2340	25	20	1000	-0.025	300	1.25	1225
5.95mm	0.2343	25	20	1000	-0.026	300	1.25	1226
15/64	0.2344	25	20	1000	-0.026	300	1.25	1227
6.00mm	0.2362	25	20	1000	-0.026	300	1.25	1236
B	0.2380	25	20	1000	-0.026	300	1.25	1246
6.05mm	0.2382	25	20	1000	-0.026	300	1.25	1247
6.10mm	0.2402	25	20	1000	-0.026	300	1.25	1257
C	0.2420	25	20	1000	-0.026	300	1.25	1266
6.15mm	0.2421	25	20	1000	-0.026	300	1.25	1267
6.20mm	0.2441	25	20	1000	-0.026	300	1.25	1277
D	0.2460	25	20	1000	-0.026	300	1.25	1287
6.25mm	0.2461	25	20	1000	-0.026	300	1.25	1288
6.30mm	0.2480	25	20	1000	-0.026	300	1.25	1298
6.35mm	0.2500	25	20	1000	-0.027	300	1.25	1308
6.40mm	0.2520	25	20	1000	-0.027	300	1.25	1319
6.50mm	0.2559	25	20	1000	-0.027	300	1.25	1339
F	0.2570	25	20	1000	-0.027	300	1.25	1345
6.60mm	0.2598	25	20	1000	-0.027	300	1.25	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 Nelco N4000-13 FR-4 High Tg



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