

## RO4003® / Thermoset PCB Material

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

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	34	120	100	-0.011	100	0.28	126
0.13mm	0.0050	38	120	100	-0.011	100	0.32	157
0.15mm	0.0059	42	120	150	-0.011	150	0.35	185
#96	0.0063	46	120	150	-0.011	150	0.38	198
#95	0.0067	50	120	200	-0.012	200	0.42	210
#94	0.0071	54	120	200	-0.012	200	0.45	223
#93	0.0075	58	120	250	-0.012	200	0.48	236
#92	0.0079	62	120	250	-0.012	200	0.52	248
#91	0.0083	64	120	250	-0.012	250	0.53	261
#90	0.0087	66	120	300	-0.012	250	0.55	273
#89	0.0091	68	118	300	-0.012	250	0.58	281
#88	0.0095	70	116	300	-0.012	250	0.60	288
0.25mm	0.0098	72	114	300	-0.012	300	0.63	292
#87	0.0100	74	112	300	-0.012	300	0.66	293
#86	0.0105	78	110	300	-0.012	300	0.71	302
#85	0.0110	82	108	400	-0.013	350	0.76	311
#84	0.0115	86	106	400	-0.013	350	0.81	350
0.30mm	0.0118	88	105	400	-0.013	350	0.84	350
#83	0.0120	90	104	400	-0.013	350	0.87	350
#82	0.0125	92	102	400	-0.013	400	0.90	350
#81	0.0130	95	100	400	-0.013	400	0.95	350
#80	0.0135	98	99	400	-0.013	400	0.99	350
0.35mm	0.0138	100	97	400	-0.013	400	1.03	350
#79	0.0145	102	92	400	-0.013	400	1.11	350
1/64	0.0156	106	86	400	-0.014	400	1.23	350
0.40mm	0.0158	108	85	400	-0.014	400	1.27	350
#78	0.0160	110	84	400	-0.014	400	1.31	350
0.45mm	0.0177	116	76	500	-0.014	500	1.53	350
#77	0.0180	118	74	500	-0.014	500	1.59	350
0.50mm	0.0197	126	68	500	-0.015	500	1.85	350
#76	0.0200	128	67	500	-0.015	500	1.91	350
#75	0.0210	130	64	500	-0.015	500	2.03	350
0.55mm	0.0217	132	61	500	-0.015	500	2.16	350
#74	0.0225	136	59	500	-0.015	500	2.31	350
0.60mm	0.0236	140	57	500	-0.016	500	2.46	350
#73	0.0240	142	56	500	-0.016	600	2.54	350
#72	0.0250	148	54	500	-0.016	600	2.74	350
0.65mm	0.0256	148	52	500	-0.016	600	2.85	350
#71	0.0260	148	51	500	-0.016	600	2.90	350
0.70mm	0.0276	144	48	500	-0.016	600	3.00	350
#70	0.0280	144	48	500	-0.017	800	3.00	350
#69	0.0292	138	46	500	-0.017	800	3.00	350
0.75mm	0.0295	135	45	500	-0.017	800	3.00	350
#68	0.0310	129	43	500	-0.017	800	2.50	350
1/32	0.0312	129	43	500	-0.017	800	2.50	350
0.80mm	0.0315	126	42	500	-0.017	800	2.50	350
#67	0.0320	126	42	500	-0.017	800	2.50	350
#66	0.0330	123	41	500	-0.018	1000	2.50	350
0.85mm	0.0335	120	40	500	-0.018	1000	2.50	350
#65	0.0350	114	38	500	-0.018	1000	2.50	350
0.90mm	0.0354	114	38	500	-0.018	1000	2.50	350
#64	0.0360	111	37	500	-0.018	1000	2.50	350
#63	0.0370	108	36	500	-0.019	1000	2.50	350
0.95mm	0.0374	108	36	500	-0.019	1000	2.50	350
#62	0.0380	105	35	500	-0.019	1000	2.50	350
#61	0.0390	102	34	500	-0.019	1000	2.50	350
1.00mm	0.0394	102	34	500	-0.019	1000	2.50	350
#60	0.0400	99	33	500	-0.019	1000	2.50	350
#59	0.0410	99	33	500	-0.020	1000	2.50	350
1.05mm	0.0413	96	32	500	-0.020	1000	2.50	350
#58	0.0420	96	32	500	-0.020	1000	2.50	350
#57	0.0430	93	31	500	-0.020	1000	2.50	350
1.10mm	0.0433	93	31	500	-0.020	1000	2.50	350
1.15mm	0.0453	90	30	500	-0.021	1000	2.50	350

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	87	29	500	-0.021	1000	2.50	350
3/64	0.0469	87	29	500	-0.021	1000	2.50	350
1.20mm	0.0472	84	28	500	-0.021	1000	2.50	350
1.25mm	0.0492	81	27	500	-0.021	1000	2.50	350
1.30mm	0.0512	78	26	500	-0.022	1000	2.50	350
#55	0.0520	78	26	500	-0.022	1000	2.50	350
1.35mm	0.0531	75	25	500	-0.022	1000	2.50	350
#54	0.0550	72	24	500	-0.023	1000	2.50	350
1.40mm	0.0551	72	24	500	-0.023	1000	2.50	350
1.45mm	0.0571	69	23	500	-0.023	1000	2.50	350
1.50mm	0.0591	69	23	500	-0.024	1000	2.50	350
#53	0.0595	66	22	500	-0.024	1000	2.50	350
1.55mm	0.0610	66	22	500	-0.024	1000	2.50	350
1/16	0.0625	63	21	500	-0.025	1000	2.50	350
1.60mm	0.0630	63	21	500	-0.025	1000	2.50	350
#52	0.0635	63	21	500	-0.025	1000	2.50	350
1.65mm	0.0650	60	20	500	-0.025	1000	2.50	350
1.70mm	0.0669	60	20	500	-0.026	1000	2.50	350
#51	0.0670	60	20	500	-0.026	1000	2.50	350
1.75mm	0.0689	60	20	500	-0.026	1000	2.50	350
#50	0.0700	57	19	500	-0.026	1000	2.50	350
1.80mm	0.0709	57	19	500	-0.027	800	2.50	350
1.85mm	0.0728	57	19	500	-0.027	800	2.50	362
#49	0.0730	57	19	500	-0.027	800	2.50	363
1.90mm	0.0748	54	18	500	-0.027	800	2.50	352
#48	0.0760	54	18	500	-0.028	800	2.50	358
1.95mm	0.0768	54	18	500	-0.028	800	2.50	362
5/64	0.0781	54	18	500	-0.028	800	2.50	368
#47	0.0785	54	18	500	-0.028	800	2.50	370
2.00mm	0.0787	54	18	500	-0.028	800	2.50	371
2.05mm	0.0807	54	18	500	-0.029	800	2.50	380
#46	0.0810	54	18	500	-0.029	800	2.50	382
#45	0.0820	54	18	500	-0.029	800	2.50	386
2.10mm	0.0827	54	18	500	-0.029	800	2.50	390
2.15mm	0.0846	54	18	500	-0.030	800	2.50	398
#44	0.0860	54	18	500	-0.030	800	2.50	405
2.20mm	0.0866	54	18	500	-0.030	800	2.50	408
2.25mm	0.0886	54	18	500	-0.031	800	2.50	417
#43	0.0890	54	18	500	-0.031	800	2.50	419
2.30mm	0.0906	54	18	500	-0.031	800	2.50	427
2.35mm	0.0925	54	18	500	-0.032	800	2.50	436
#42	0.0935	54	18	500	-0.032	800	2.50	440
3/32	0.0938	54	18	500	-0.032	800	2.50	442
2.40mm	0.0945	54	18	500	-0.032	800	2.50	445
#41	0.0960	54	18	500	-0.032	800	2.50	452
2.45mm	0.0965	54	18	500	-0.033	800	2.50	455
#40	0.0980	54	18	500	-0.033	800	2.50	462
2.50mm	0.0984	54	18	500	-0.033	800	2.50	463
#39	0.0995	54	18	500	-0.033	800	2.50	469
2.55mm	0.1004	54	18	500	-0.033	800	2.50	473
#38	0.1015	54	18	500	-0.034	800	2.50	478
2.60mm	0.1024	54	18	500	-0.034	800	2.50	482
#37	0.1040	54	18	500	-0.034	800	2.50	490
2.65mm	0.1043	54	18	500	-0.034	800	2.50	491
2.70mm	0.1063	54	18	500	-0.035	800	2.50	501
#36	0.1065	54	18	500	-0.035	800	2.50	502
2.75mm	0.1083	54	18	500	-0.035	800	2.50	510
7/64	0.1094	54	18	500	-0.036	800	2.50	515
#35	0.1100	54	18	500	-0.036	800	2.50	518
2.80mm	0.1102	54	18	500	-0.036	800	2.50	519
#34	0.1110	54	18	500	-0.036	800	2.50	523
2.85mm	0.1122	54	18	500	-0.036	800	2.50	528
#33	0.1130	54	18	500	-0.036	800	2.50	532
2.90mm	0.1142	54	18	500	-0.037	800	2.50	538
#32	0.1160	54	18	500	-0.037	800	2.50	546
2.95mm	0.1161	54	18	500	-0.037	800	2.50	547
3.00mm	0.1181	54	18	500	-0.038	800	2.50	556
#31	0.1200	54	18	500	-0.038	800	2.50	565
3.05mm	0.1201	54	18	500	-0.038	800	2.50	566
3.10mm	0.1220	54	18	500	-0.038	800	2.50	575
3.15mm	0.1240	54	18	500	-0.039	800	2.50	584
1/8	0.1250	54	18	500	-0.039	800	2.50	589

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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
3.20mm	0.1260	50	18	500	-0.018	600	2.78	593
3.25mm	0.1280	50	18	500	-0.018	600	2.78	603
#30	0.1285	50	18	500	-0.019	600	2.78	605
3.30mm	0.1299	50	18	500	-0.019	600	2.78	612
3.35mm	0.1319	50	18	500	-0.019	600	2.78	621
3.40mm	0.1339	50	18	500	-0.019	600	2.78	631
3.45mm	0.1358	50	18	500	-0.019	600	2.78	640
#29	0.1360	50	18	500	-0.019	600	2.78	641
3.50mm	0.1378	50	18	500	-0.019	600	2.78	649
3.55mm	0.1398	50	18	500	-0.019	600	2.78	658
#28	0.1405	50	18	500	-0.019	600	2.78	662
9/64	0.1406	50	18	500	-0.019	600	2.78	662
3.60mm	0.1417	50	18	500	-0.019	600	2.78	667
3.65mm	0.1437	50	18	500	-0.020	600	2.78	677
#27	0.1440	50	18	500	-0.020	600	2.78	678
3.70mm	0.1457	50	18	500	-0.020	600	2.78	686
#26	0.1470	50	18	500	-0.020	600	2.78	692
3.75mm	0.1476	50	18	500	-0.020	600	2.78	695
#25	0.1495	50	18	500	-0.020	600	2.78	704
3.80mm	0.1496	50	18	500	-0.020	600	2.78	705
3.85mm	0.1516	50	18	500	-0.020	600	2.78	714
#24	0.1520	50	18	500	-0.020	400	2.78	716
3.90mm	0.1535	50	18	500	-0.020	400	2.78	723
#23	0.1540	50	18	500	-0.020	400	2.78	725
3.95	0.1555	50	18	500	-0.020	400	2.78	732
5/32	0.1562	50	18	500	-0.020	400	2.78	736
#22	0.1570	50	18	500	-0.020	400	2.78	739
4.00mm	0.1575	50	18	500	-0.020	400	2.78	742
#21	0.1590	40	18	500	-0.021	400	2.22	749
4.05mm	0.1594	40	18	500	-0.021	400	2.22	751
#20	0.1610	40	18	500	-0.021	400	2.22	758
4.10mm	0.1614	40	18	500	-0.021	400	2.22	760
4.15mm	0.1634	40	18	500	-0.021	400	2.22	770
4.20mm	0.1654	40	18	500	-0.021	400	2.22	779
#19	0.1660	40	18	500	-0.021	400	2.22	782
4.25mm	0.1673	40	18	500	-0.021	400	2.22	788
4.30mm	0.1693	40	18	500	-0.021	400	2.22	797
#18	0.1695	40	18	500	-0.021	400	2.22	798
4.35mm	0.1713	40	18	500	-0.021	400	2.22	807
11/64	0.1719	40	18	500	-0.021	400	2.22	810
#17	0.1730	40	18	500	-0.021	300	2.22	815
4.40mm	0.1732	40	18	500	-0.021	300	2.22	816
4.45mm	0.1752	40	18	500	-0.022	300	2.22	825
#16	0.1770	40	18	500	-0.022	300	2.22	834
4.50mm	0.1772	40	18	500	-0.022	300	2.22	835
4.55mm	0.1792	40	18	500	-0.022	300	2.22	844
#15	0.1800	36	18	500	-0.022	300	2.00	848
4.60mm	0.1811	36	18	500	-0.022	300	2.00	853
#14	0.1820	36	18	500	-0.022	300	2.00	857
4.65mm	0.1831	36	18	500	-0.022	300	2.00	862
#13	0.1850	36	18	500	-0.022	300	2.00	871
4.70mm	0.1850	36	18	500	-0.022	300	2.00	871
4.75mm	0.1870	36	18	500	-0.022	300	2.00	881
3/16	0.1875	36	18	500	-0.022	300	2.00	883
4.80mm	0.1890	36	18	500	-0.023	300	2.00	890
#12	0.1890	36	18	500	-0.023	300	2.00	890
4.85mm	0.1909	36	18	500	-0.023	300	2.00	899
#11	0.1910	36	18	500	-0.023	300	2.00	900
4.90mm	0.1929	36	18	500	-0.023	300	2.00	909
#10	0.1935	36	18	500	-0.023	300	2.00	911
4.95mm	0.1949	36	18	500	-0.023	300	2.00	918
#9	0.1960	36	18	500	-0.023	200	2.00	923
5.00mm	0.1968	36	18	500	-0.023	200	2.00	927
5.05mm	0.1988	36	18	500	-0.023	200	2.00	936
#8	0.1990	36	18	500	-0.023	200	2.00	937
5.10mm	0.2008	34	18	500	-0.023	200	1.89	946
#7	0.2010	34	18	500	-0.023	200	1.89	947
5.15mm	0.2028	34	18	500	-0.023	200	1.89	955
13/64	0.2031	34	18	500	-0.023	200	1.89	957
#6	0.2040	34	18	500	-0.024	200	1.89	961
5.20mm	0.2047	34	18	500	-0.024	200	1.89	964
#5	0.2055	34	18	500	-0.024	200	1.89	968

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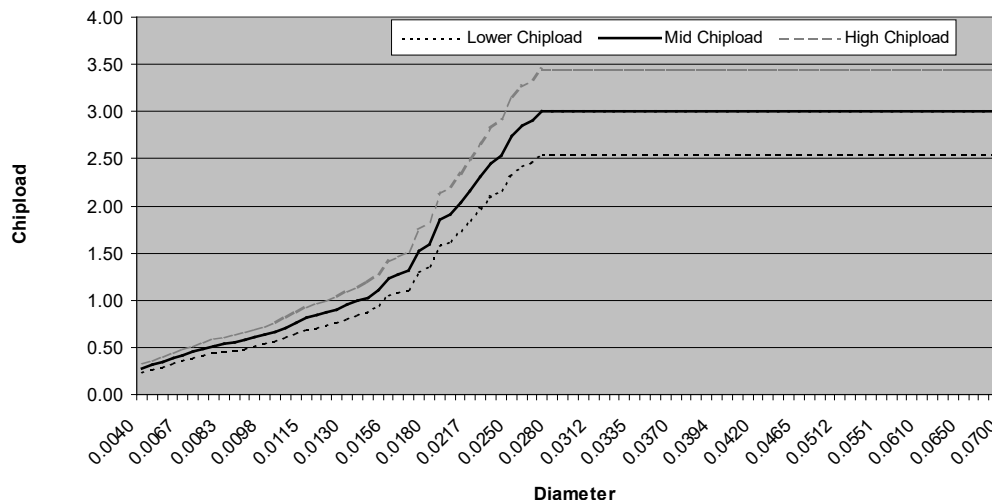
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Drill Size	Diameter (inch)	Feed (inch/min)	Speed (k-rpm)	Retract (inch/min)	Z-Axis Offset (inches)	Max Hits	Chipload (mm/rev)	SFM
5.25mm	0.2067	34	18	500	-0.024	200	1.89	974
5.30mm	0.2087	34	18	500	-0.024	200	1.89	983
#4	0.2090	34	18	500	-0.024	200	1.89	984
5.35mm	0.2106	34	18	500	-0.024	200	1.89	992
5.40mm	0.2126	34	18	500	-0.024	200	1.89	1001
#3	0.2130	34	18	500	-0.024	200	1.89	1003
5.45mm	0.2146	34	18	500	-0.024	200	1.89	1011
5.50mm	0.2165	34	18	500	-0.024	200	1.89	1020
5.55mm	0.2185	34	18	500	-0.024	200	1.89	1029
7/32	0.2188	34	18	500	-0.024	200	1.89	1031
5.60mm	0.2205	32	18	500	-0.025	200	1.78	1039
#2	0.2210	32	18	500	-0.025	200	1.78	1041
5.65mm	0.2224	32	18	500	-0.025	200	1.78	1048
5.70mm	0.2244	32	18	500	-0.025	200	1.78	1057
5.75mm	0.2264	32	18	500	-0.025	200	1.78	1066
#1	0.2280	32	18	500	-0.025	200	1.78	1074
5.80mm	0.2283	32	18	500	-0.025	200	1.78	1075
5.85mm	0.2302	32	18	500	-0.025	200	1.78	1084
5.90mm	0.2323	32	18	500	-0.025	200	1.78	1094
A	0.2340	32	18	500	-0.025	200	1.78	1102
5.95mm	0.2343	32	18	500	-0.026	200	1.78	1104
15/64	0.2344	32	18	500	-0.026	200	1.78	1104
6.00mm	0.2362	30	18	500	-0.026	200	1.67	1113
B	0.2380	30	18	500	-0.026	200	1.67	1121
6.05mm	0.2382	30	18	500	-0.026	200	1.67	1122
6.10mm	0.2402	30	18	500	-0.026	200	1.67	1131
C	0.2420	30	18	500	-0.026	200	1.67	1140
6.15mm	0.2421	30	18	500	-0.026	200	1.67	1140
6.20mm	0.2441	30	18	500	-0.026	200	1.67	1150
D	0.2460	30	18	500	-0.026	200	1.67	1159
6.25mm	0.2461	30	18	500	-0.026	200	1.67	1159
6.30mm	0.2480	30	18	500	-0.026	200	1.67	1168
6.35mm	0.2500	30	18	500	-0.027	200	1.67	1178
6.40mm	0.2520	30	18	500	-0.027	200	1.67	1187
6.50mm	0.2559	30	18	500	-0.027	200	1.67	1205
F	0.2570	30	18	500	-0.027	200	1.67	1210
6.60mm	0.2598	30	18	500	-0.027	200	1.67	1224

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 RO4003® / Thermoset



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