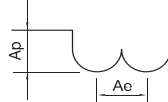


2ERB						Cutting Conditions							
Material		Copper Alloys C1100				Alloy Steels / Pre-hardened Steels NAK80/KP4M				Hardened Steels STAVAX/SKD11			
Hardness						40~ 45HRC				45 ~ 55HRC			
Radius	Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R0.25	1	57,000	1380	0.029	0.054	42,000	830	0.023	0.036	32,000	550	0.018	0.036
	2	57,000	1250	0.028	0.054	42,000	750	0.022	0.036	32,000	500	0.018	0.036
	3	55,000	1010	0.021	0.036	38,000	580	0.017	0.024	31,000	400	0.014	0.024
	4	55,000	1010	0.021	0.036	38,000	580	0.017	0.024	31,000	400	0.014	0.024
	5	48,000	800	0.016	0.018	33,000	480	0.012	0.012	30,000	390	0.009	0.012
	6	38,000	610	0.009	0.018	28,000	400	0.008	0.012	27,000	330	0.005	0.012
	8	36,000	590	0.009	0.018	28,000	400	0.008	0.012	27,000	330	0.005	0.012
	10	36,000	460	0.009	0.018	28,000	400	0.008	0.012	27,000	330	0.005	0.012
	12	24,000	280	0.004	0.010	26,000	280	0.004	0.006	24,000	280	0.002	0.006
	14	16,000	170	0.001	0.006	24,000	200	0.002	0.003	21,000	240	0.001	0.003
R0.3	1	57,000	1670	0.035	0.144	37,000	840	0.027	0.096	27,000	540	0.023	0.096
	2	57,000	1540	0.034	0.144	37,000	770	0.027	0.096	27,000	500	0.021	0.096
	3	57,000	1540	0.034	0.144	37,000	770	0.027	0.096	27,000	500	0.021	0.096
	4	54,000	1130	0.026	0.108	35,000	600	0.020	0.072	26,000	380	0.016	0.072
	5	46,000	960	0.019	0.072	28,000	460	0.016	0.048	26,000	370	0.012	0.048
	6	46,000	960	0.019	0.072	28,000	460	0.016	0.048	26,000	370	0.012	0.048
	8	30,000	570	0.010	0.054	24,000	400	0.009	0.036	23,000	320	0.006	0.036
	10	30,000	490	0.007	0.036	24,000	330	0.006	0.024	23,000	290	0.004	0.024
	12	30,000	490	0.007	0.036	24,000	330	0.006	0.024	23,000	290	0.004	0.024
	14	20,000	300	0.004	0.027	22,000	300	0.004	0.018	20,000	250	0.002	0.018
R0.35	2	56,000	1800	0.050	0.182	35,000	740	0.039	0.108	27,000	500	0.031	0.108
	4	54,500	1500	0.045	0.063	33,000	600	0.035	0.062	26,500	410	0.029	0.096
	6	32,000	800	0.019	0.072	25,000	420	0.020	0.048	22,500	355	0.012	0.048
	10	26,500	540	0.017	0.063	22,500	380	0.014	0.042	21,500	330	0.011	0.042
	12	23,000	420	0.017	0.063	21,500	380	0.012	0.032	21,500	320	0.010	0.042
R0.4	2	55,000	2060	0.063	0.180	33,000	710	0.050	0.120	27,000	500	0.041	0.120
	4	55,000	1860	0.063	0.180	31,000	600	0.050	0.120	27,000	440	0.041	0.120
	6	47,000	1410	0.038	0.108	28,000	570	0.030	0.072	22,000	390	0.024	0.072
	8	34,000	1040	0.027	0.090	21,000	430	0.021	0.060	22,000	390	0.018	0.060
	10	23,000	600	0.027	0.090	21,000	430	0.021	0.060	20,000	370	0.017	0.060
	12	16,000	350	0.027	0.090	19,000	430	0.018	0.040	20,000	350	0.016	0.060
	14	11,000	200	0.027	0.090	19,000	430	0.015	0.027	20,000	330	0.015	0.060
	16	7,600	115	0.027	0.090	16,000	430	0.013	0.018	20,000	310	0.014	0.080
R0.45	4	50,500	1900	0.067	0.190	32,000	685	0.054	0.130	24,500	460	0.043	0.180
R0.5	2	46,000	2000	0.072	0.360	32,000	770	0.057	0.240	22,000	480	0.045	0.240
	3	46,000	2000	0.072	0.360	32,000	770	0.057	0.240	22,000	480	0.045	0.240
	4	46,000	2000	0.071	0.360	32,000	770	0.057	0.240	22,000	480	0.045	0.240
	5	46,000	2000	0.071	0.360	32,000	770	0.057	0.240	22,000	480	0.045	0.240
	6	39,000	1500	0.071	0.180	26,000	760	0.055	0.120	17,600	480	0.035	0.120
	8	39,000	1500	0.043	0.180	26,000	760	0.034	0.120	17,600	480	0.027	0.120
	10	29,000	1110	0.028	0.090	17,600	530	0.024	0.060	16,500	420	0.018	0.060
	12	18,700	660	0.027	0.090	17,600	530	0.024	0.060	16,500	420	0.018	0.060
	14	18,700	640	0.022	0.090	15,400	440	0.018	0.060	14,300	360	0.014	0.060

2ERB						Cutting Conditions							
Material		Copper Alloys C1100				Alloy Steels / Pre-hardened Steels NAK80/KP4M				Hardened Steels STAVAX/SKD11			
Hardness						40~ 45HRC				45 ~ 55HRC			
Radius	Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
	16	18,700	640	0.022	0.090	15,400	440	0.018	0.060	14,300	360	0.014	0.060
	18	18,700	540	0.017	0.090	14,300	440	0.013	0.060	13,200	360	0.009	0.060
	20	18,700	540	0.017	0.054	14,300	360	0.013	0.036	13,200	300	0.009	0.036
	22	18,700	540	0.017	0.054	14,300	360	0.013	0.036	13,200	300	0.009	0.036
	25	18,700	540	0.016	0.052	14,300	360	0.013	0.030	13,200	300	0.009	0.030
R0.6	4	38,000	2000	0.085	0.360	26,000	770	0.068	0.240	18,200	480	0.054	0.240
	6	38,000	2000	0.085	0.360	26,000	770	0.068	0.240	18,200	480	0.054	0.240
	8	32,000	1490	0.084	0.360	21,000	700	0.067	0.240	15,100	440	0.054	0.240
	10	24,000	1080	0.036	0.180	16,400	530	0.027	0.120	15,100	420	0.022	0.120
	12	24,000	1080	0.036	0.180	15,300	530	0.027	0.120	14,100	420	0.022	0.120
	16	15,400	580	0.024	0.144	13,100	460	0.019	0.096	11,900	380	0.016	0.096
	20	15,400	580	0.017	0.090	12,100	380	0.013	0.060	11,000	320	0.009	0.060
	24	15,400	580	0.010	0.060	11,100	320	0.009	0.040	9,800	290	0.007	0.040
R0.7	6	28,000	1470	0.099	0.270	17,600	680	0.076	0.180	13,600	440	0.063	0.180
	8	28,000	1470	0.099	0.270	17,600	680	0.079	0.180	13,600	440	0.063	0.180
	12	19,800	1080	0.042	0.270	13,800	530	0.033	0.180	13,600	420	0.027	0.180
	16	13,200	620	0.033	0.180	13,100	480	0.027	0.120	11,900	390	0.021	0.120
R0.75	3	30,000	2200	0.171	0.324	21,000	1060	0.137	0.216	14,800	880	0.110	0.216
	4	30,000	2200	0.171	0.324	21,000	1060	0.137	0.216	14,800	660	0.110	0.216
	6	30,000	1980	0.147	0.324	21,000	940	0.117	0.216	14,800	580	0.090	0.216
	8	26,000	1500	0.106	0.270	16,300	700	0.084	0.180	12,100	450	0.069	0.180
	10	26,000	1500	0.106	0.270	16,300	700	0.084	0.180	12,100	450	0.069	0.180
	12	26,000	1500	0.106	0.270	16,300	700	0.084	0.180	12,100	450	0.069	0.180
	14	18,700	1100	0.045	0.180	12,600	530	0.036	0.120	12,100	440	0.027	0.120
	16	12,100	620	0.036	0.180	12,400	480	0.027	0.120	11,600	390	0.022	0.120
	18	12,100	620	0.036	0.180	12,400	480	0.027	0.120	11,600	390	0.022	0.120
	20	12,100	620	0.019	0.090	12,400	480	0.016	0.060	11,600	390	0.012	0.060
	22	12,100	620	0.019	0.090	12,400	480	0.016	0.060	11,000	390	0.012	0.060
	25	11,000	500	0.019	0.090	12,400	440	0.016	0.060	11,000	390	0.012	0.060
	30	10,700	450	0.019	0.090	10,900	400	0.016	0.060	11,000	390	0.012	0.060
	35	10,700	410	0.019	0.090	9,000	380	0.016	0.060	11,000	390	0.012	0.060
R0.8	6	27,040	2600	0.220	0.580	18,900	1200	0.180	0.390	16,500	760	0.150	0.390
	8	26,000	1970	0.157	0.324	18,900	940	0.126	0.216	13,800	580	0.102	0.216
	12	25,000	1490	0.112	0.180	15,100	700	0.090	0.120	11,500	440	0.072	0.120
	16	17,600	1100	0.046	0.144	12,300	530	0.036	0.096	11,400	440	0.030	0.096
	20	11,000	630	0.036	0.090	11,500	480	0.030	0.060	10,900	400	0.024	0.060
R0.9	6	32,000	2600	0.230	0.210	18,400	1200	0.185	0.320	18,400	738	0.150	0.320
	8	26,000	1950	0.165	0.270	16,300	930	0.132	0.240	13,800	570	0.108	0.240
	12	21,000	1480	0.120	0.270	13,800	700	0.094	0.180	10,300	440	0.077	0.180
	16	15,400	1080	0.048	0.180	10,800	530	0.039	0.120	9,900	420	0.031	0.120
	20	10,500	630	0.039	0.090	10,200	480	0.031	0.060	9,700	400	0.025	0.060

2ERB						Cutting Conditions							
Material		Copper Alloys C1100				Alloy Steels / Pre-hardened Steels NAK80/KP4M				Hardened Steels STAVAX/SKD11			
Hardness						40~ 45HRC				45 ~ 55HRC			
Radius	Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R1	4	22,000	2140	0.232	0.540	18,500	1260	0.185	0.360	13,200	960	0.150	0.360
	6	22,000	2140	0.232	0.540	18,500	1260	0.185	0.360	13,200	960	0.150	0.360
	8	22,000	1920	0.185	0.360	18,500	1120	0.147	0.240	13,200	870	0.120	0.240
	10	22,000	1920	0.185	0.360	18,500	1120	0.147	0.240	13,200	870	0.120	0.240
	12	18,700	1470	0.166	0.360	16,000	990	0.133	0.240	11,700	780	0.107	0.240
	14	18,700	1470	0.166	0.360	16,000	990	0.133	0.240	11,700	780	0.107	0.240
	16	18,700	1470	0.148	0.360	16,000	990	0.118	0.240	11,700	780	0.090	0.240
	18	14,300	1070	0.093	0.180	14,700	580	0.074	0.120	11,600	580	0.061	0.120
	20	14,300	1070	0.093	0.180	14,700	580	0.074	0.120	11,600	580	0.061	0.120
	22	9,500	630	0.074	0.180	10,600	450	0.058	0.120	10,200	450	0.045	0.120
	25	9,500	630	0.074	0.180	10,600	450	0.058	0.120	10,200	450	0.045	0.120
	30	9,500	530	0.033	0.090	10,600	450	0.026	0.060	10,200	380	0.021	0.060
	35	9,500	530	0.026	0.090	10,600	380	0.019	0.060	10,200	380	0.017	0.060
	40	9,500	530	0.026	0.090	10,600	380	0.019	0.060	10,200	380	0.017	0.060
	45	9,500	445	0.011	0.045	10,000	380	0.009	0.030	10,200	320	0.008	0.030
R1.25	8	18,400	2400	0.232	0.360	14,500	1400	0.185	0.240	9,700	1080	0.150	0.240
	10	18,400	2400	0.232	0.360	14,500	1400	0.185	0.240	9,700	1080	0.150	0.240
	16	16,100	1810	0.208	0.360	13,500	1230	0.166	0.240	8,400	980	0.135	0.240
	20	11,500	1330	0.116	0.180	10,200	950	0.093	0.120	8,400	980	0.074	0.120
	25	6,900	770	0.093	0.180	8,400	540	0.074	0.120	8,400	560	0.061	0.120
	30	6,900	770	0.040	0.090	8,400	540	0.033	0.060	8,400	560	0.026	0.060
	35	6,900	770	0.018	0.050	8,400	540	0.015	0.030	8,400	560	0.011	0.030
R1.5	6	15,000	2890	0.278	0.540	12,900	1680	0.222	0.360	9,200	1300	0.180	0.360
	8	15,000	2890	0.278	0.540	12,900	1680	0.222	0.360	9,200	1300	0.180	0.360
	10	15,000	2600	0.278	0.540	12,900	1680	0.222	0.360	9,200	1300	0.180	0.360
	12	15,000	2600	0.278	0.540	12,900	1510	0.222	0.360	9,200	1170	0.180	0.360
	16	12,700	1970	0.290	0.504	11,300	1330	0.166	0.360	8,100	1040	0.135	0.360
	20	12,700	1970	0.290	0.504	11,300	1330	0.166	0.360	8,100	1040	0.135	0.360
	25	10,100	1450	0.139	0.270	8,800	1040	0.111	0.180	8,100	1040	0.090	0.180
	30	10,100	1450	0.139	0.270	8,800	780	0.111	0.180	8,100	780	0.090	0.180
	35	6,600	840	0.073	0.270	7,900	620	0.055	0.180	7,500	650	0.045	0.180
	40	6,600	840	0.073	0.270	7,900	620	0.055	0.180	7,500	520	0.045	0.180
	45	4,500	500	0.040	0.270	6,200	500	0.035	0.100	7,000	450	0.023	0.180
	50	4,300	490	0.040	0.270	6,200	500	0.030	0.090	7,000	350	0.023	0.180
	60	3,700	420	0.034	0.160	5,900	450	0.030	0.080	6,000	300	0.020	0.150
R2	8	11,500	2710	0.370	0.900	9,700	1560	0.297	0.600	6,800	1210	0.241	0.600
	10	11,500	2710	0.370	0.900	9,700	1560	0.297	0.600	6,800	1210	0.241	0.600
	12	11,500	2710	0.390	0.900	9,700	1560	0.297	0.600	6,800	1210	0.241	0.600
	16	11,500	2710	0.390	0.900	9,700	1560	0.297	0.600	6,800	1210	0.241	0.600
	20	11,500	2710	0.390	0.900	9,700	1560	0.297	0.600	6,800	1210	0.241	0.600
	25	10,300	1850	0.279	0.540	8,400	1250	0.223	0.360	6,000	980	0.180	0.360
	30	10,300	1850	0.279	0.540	8,400	1250	0.223	0.360	6,000	980	0.180	0.361
	35	7,500	1360	0.185	0.540	6,600	950	0.148	0.360	6,000	700	0.120	0.360

2ERB						Cutting Conditions							
Material		Copper Alloys C1100				Alloy Steels / Pre-hardened Steels NAK80/KP4M				Hardened Steels STAVAX/SKD11			
Hardness						40~ 45HRC				45 ~ 55HRC			
Radius	Effective Length	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
	40	7,500	1360	0.185	0.540	6,600	950	0.148	0.360	6,000	700	0.120	0.360
	45	5,000	780	0.093	0.360	5,900	470	0.074	0.240	5,600	490	0.060	0.240
	50	5,000	780	0.093	0.360	5,900	470	0.074	0.240	5,600	490	0.060	0.240
	55	4,500	640	0.090	0.330	5,200	375	0.068	0.225	5,400	370	0.050	0.251
	60	4,000	500	0.078	0.300	5,000	280	0.062	0.210	5,200	250	0.040	0.180
R2.5	15	9,800	2590	0.406	0.900	7,800	1350	0.324	0.800	5,600	1050	0.252	0.800
	20	9,600	2100	0.406	0.900	7,800	1240	0.324	0.600	5,600	950	0.252	0.600
	25	9,600	2100	0.406	0.900	7,800	1240	0.324	0.600	5,600	950	0.252	0.600
	30	8,200	1320	0.305	0.900	7,800	760	0.243	0.600	4,800	600	0.197	0.600
	40	7,000	830	0.230	0.900	7,800	470	0.200	0.600	4,300	380	0.154	0.600
	45	5,000	520	0.173	0.900	6,800	290	0.165	0.600	3,900	240	0.120	0.600
	50	4,500	330	0.131	0.900	6,800	180	0.135	0.600	3,500	150	0.094	0.600
	60	4,000	300	0.099	0.800	6,800	110	0.112	0.600	3,300	100	0.074	0.600
R3	15	8,000	2530	0.555	1.800	7,400	2088	0.443	1.200	5,200	1300	0.360	1.200
	30	8,000	1810	0.418	1.080	7,400	1875	0.334	0.720	4,600	1170	0.270	0.720
R4	25	9,000	2400	0.600	1.500	7,200	1500	0.500	1.000	5,200	920	0.350	1.000
	30	7,700	1500	0.450	1.200	7,200	925	0.380	0.800	4,500	580	0.300	0.800
R5	30	7,800	1300	0.300	0.900	6,800	900	0.230	0.600	4,600	570	0.190	0.570
	35	7,125	1292	0.176	0.513	6,800	860	0.140	0.340	5,700	665	0.110	0.340
R6	30	7,410	1235	0.285	0.855	6,350	855	0.210	0.570	4,370	541	0.181	0.550
	40	6,800	1100	0.260	0.780	6,350	788	0.200	0.520	4,020	500	0.160	0.500
Depth of cut		• Ap : Axial Depth • Ae : Radial Depth • D : Outside Diameter • n : Speed • Vf : Feed 											

- Use a rigid precise machine and holder.
- Ap(mm): Axial Depth of cut
- Ae(mm): Radial Depth of cut
- If the effective length is long, reduce the RPM and feed in the same proportion.
- If the effective length or overall length of your tool are not show above the table, adjust your parameter with upper or lower diameter of parameter.
- When milling workpiece HRC over 50 hardened steel , reduce 20% of the RPM and feed compared to the same diameter.
- Use this table for your reference. Adjust the parameter depending on your machining geometry, machining purpose and CNC.
- If the table over the maximum RPM and feed of your machine, adjust RPM and feed in the same proportion.
- Use a machine with low vibration and good rigidity (Ø1 or less, the vibration tolerance management should be within 5µm).
- Air blow or oil mist is recommended for smooth chip emission, and wet coolant milling is recommended for copper material.
- The Above condition are only reference. In actual machining conditions adjust these parameters according to the milling shape, machine ability and the operation environment.