CrazyMill Cool Ball - Type A - Semi-finishing

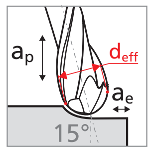
v_c [m/min] | [SFM]
f_z [mm] | [IPT]
d_{eff} [mm] | [inch]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

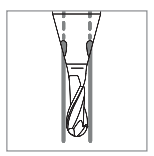
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

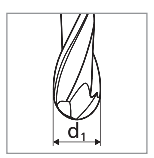
Semi-finishing



- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm | .020")
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm | .020")
- $a_e = 0.1 \times d_1$

Machining angle = 15°





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	Ød1 0.3 mm / .012"			Ød1 0.4 mm / .016"			Ød1 0.5 mm / .020"			Ød1 0.6 mm / .024"			Ød1 0.8 mm / .032"			Ød1 1.0 mm / .039"			Ød1 1.2 mm / .047"			Ød1 1.5 / .059"			Ød1 1.8 mm / .071"			Ød1 2.0 mm / .079"			Ød1 2.5 mm / .098"			Ød1 3.0 mm / .118"			Ød1 4.0 mm / .158"			Ød1 6.0 mm / .236"			Ød1 8.0 mm / .315"		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301 1.0401 1.1191 1.0044 1.0715	C10 C15 C45E/CK45 S275JR 11SMn30	AISI 1010 AISI 1015 AISI 1045 AISI 1020 AISI 1215	55 180	0.29 .011	0.005 .00020	73 240	0.39 .015	0.007 .00028	92 302	0.48 .019	0.010 .00039	100 328	0.60 .024	0.012 .00047	100 328	0.80 .032	0.014 .00055	140 459	1.00 .039	0.015 .00059	140 459	1.20 .047	0.017 .00067	200 656	1.50 .059	0.024 .00094	200 656	1.80 .071	0.026 .00102	220 722	2.00 .079	0.034 .00134	220 722	2.50 .098	0.036 .00142	240 787	3.00 .118	0.048 .00189	260 853	4.00 .158	0.050 .00197	260 853	6.00 .236	0.050 .00197	260 853	8.00 .315	0.050 .00197
	Low alloyed steel Rm > 900 N/mm²	1.5752 1.7131 1.3505 1.7225 1.2842	15NiCr13 16MnCr5 100Cr6 42CrMo4 90MnCrV8	ASTM 3415 AISI 5115 AISI 52100 AISI 4140 AISI O2	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.009 .00035	100 328	0.60 .024	0.011 .00043	100 328	0.80 .032	0.012 .00047	140 459	1.00 .039	0.014 .00055	140 459	1.20 .047	0.016 .00063	200 656	1.50 .059	0.022 .00087	200 656	1.80 .071	0.024 .00094	220 722	2.00 .079	0.032 .00126	220 722	2.50 .098	0.034 .00134	240 787	3.00 .118	0.046 .00181	260 853	4.00 .158	0.048 .00189	260 853	6.00 .236	0.048 .00189	260 853	8.00 .315	0.048 .00189
	High alloyed tool steel Rm<1200N/mm²	1.2379 1.2436 1.3343 1.3355	X153CrMoV12 X210CrW12 HS6-5-2C HS18-0-1	AISI D2 AISI D4/D6 AISI M2 AISI T1	55 180	0.29 .011	**0.004** .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.008 .00031	100 328	0.60 .024	0.009 .00035	100 328	0.80 .032	0.011 .00043	140 459	1.00 .039	0.011 .00043	140 459	1.20 .047	0.013 .00051	200 656	1.50 .059	0.020 .00079	200 656	1.80 .071	0.022 .00087	220 722	2.00 .079	0.030 .00118	220 722	2.50 .098	0.032 .00126	240 787	3.00 .118	0.042 .00165	260 853	4.00 .158	0.044 .00173	260 853	6.00 .236	0.044 .00173	260 853	8.00 .315	0.044 .00173
M	Stainless steel ferritic	1.4016 1.4105	X6Cr17 X6CrMoS17	AISI 430 AISI 430F	55 180	0.29 .011	0.005 .00020	73 240	0.39 .015	0.007 .00028	92 302	0.48 .019	0.010 .00039	100 328	0.60 .024	0.012 .00047	100 328	0.80 .032	0.014 .00055	140 459	1.00 .039	0.016 .00063	140 459	1.20 .047	0.018 .00071	200 656	1.50 .059	0.024 .00094	200 656	1.80 .071	0.026 .00102	220 722	2.00 .079	0.034 .00134	220 722	2.50 .098	0.036 .00142	240 787	3.00 .118	0.046 .00181	260 853	4.00 .158	0.048 .00189	260 853	6.00 .236	0.048 .00189	260 853	8.00 .315	0.048 .00189
	Stainless steel martensitic	1.4034 1.4112	X46Cr13 X90CrMoV18	AISI 420C AISI 440B	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.009 .00035	100 328	0.60 .024	0.010 .00039	100 328	0.80 .032	0.012 .00047	140 459	1.00 .039	0.015 .00059	140 459	1.20 .047	0.017 .00067	200 656	1.50 .059	0.022 .00087	200 656	1.80 .071	0.024 .00094	220 722	2.00 .079	0.032 .00126	220 722	2.50 .098	0.034 .00134	240 787	3.00 .118	0.044 .00173	260 853	4.00 .158	0.046 .00181	260 853	6.00 .236	0.046 .00181	260 853	8.00 .315	0.046 .00181
	Stainless steel martensitic – PH	1.4542 1.4545	X5CrNiCuNb 16-4 X5CrNiCuNb 15-5	AISI 630 ASTM 15-5PH	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.009 .00035	100 328	0.60 .024	0.010 .00039	100 328	0.80 .032	0.012 .00047	140 459	1.00 .039	0.015 .00059	140 459	1.20 .047	0.017 .00067	200 656	1.50 .059	0.022 .00087	200 656	1.80 .071	0.024 .00094	220 722	2.00 .079	0.032 .00126	220 722	2.50 .098	0.034 .00134	240 787	3.00 .118	0.044 .00173	260 853	4.00 .158	0.046 .00181	260 853	6.00 .236	0.046 .00181	260 853	8.00 .315	0.046 .00181
	Stainless steel austenitic	1.4301 1.4435 1.4441 1.4539	X5CrNi 18-10 X2CrNiMo 18-14-3 X2CrNiMo 18-15-3 X1NiCrMoCu25-20-5	AISI 304 AISI 316L AISI 316LM AISI 904L	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.008 .00031	100 328	0.60 .024	0.010 .00039	100 328	0.80 .032	0.011 .00043	140 459	1.00 .039	0.012 .00047	140 459	1.20 .047	0.014 .00055	200 656	1.50 .059	0.016 .00063	200 656	1.80 .071	0.018 .00071	220 722	2.00 .079	0.030 .00118	220 722	2.50 .098	0.032 .00126	240 787	3.00 .118	0.042 .00165	260 853	4.00 .158	0.044 .00173	260 853	6.00 .236	0.044 .00173	260 853	8.00 .315	0.044 .00173
K	Cast iron	0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM60-40-18 ASTM80-60-03	55 180	0.29 .011	0.003 .00012	73 240	0.39 .015	0.005 .00020	92 302	0.48 .019	0.006 .00024	100 328	0.60 .024	0.008 .00030	100 328	0.80 .032	0.009 .00035	120 394	1.00 .039	0.011 .00043	120 394	1.20 .047	0.022 .00087	140 459	1.50 .059	0.024 .00094	140 459	1.80 .071	0.026 .00102	160 525	2.00 .079	0.028 .00110	160 525	2.50 .098	0.036 .00142	180 591	3.00 .118	0.044 .00173	200 656	4.00 .158	0.055 .00217	200 656	6.00 .236	0.055 .00217	200 656	8.00 .315	0.055 .00217
N	Aluminium alloy wrought	3.2315 3.4365	AlMgSi1 AlZnMgCu1.5	ASTM 6351 ASTM 7075	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.012 .00047	100 328	0.60 .024	0.014 .00055	100 328	0.80 .032	0.016 .00063	140 459	1.00 .039	0.018 .00071	140 459	1.20 .047	0.020 .00079	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
	Aluminium alloy cast	3.2163 3.2381	GD-AlSi9Cu3 GD-AlSi10Mg	ASTM A380 UNS A03590	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.012 .00047	100 328	0.60 .024	0.014 .00055	100 328	0.80 .032	0.016 .00063	140 459	1.00 .039	0.018 .00071	140 459	1.20 .047	0.020 .00079	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
	Copper	2.004 2.0065	Cu-OF / CW008A Cu-ETP / CW004A	UNS C10100 UNS C11000	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.014 .00055	100 328	0.60 .024	0.016 .00063	100 328	0.80 .032	0.018 .00071	140 459	1.00 .039	0.020 .00079	140 459	1.20 .047	0.022 .00087	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
	Brass lead free	2.0321 2.036	CuZn37 CW508L CuZn40 CW509L	UNS C27400 UNS C28000	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.014 .00055	100 328	0.60 .024	0.016 .00063	100 328	0.80 .032	0.018 .00071	140 459	1.00 .039	0.020 .00079	140 459	1.20 .047	0.022 .00087	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
	Brass, Bronze Rm < 400 N/mm²	2.0401 2.102	CuZn39Pb3 CuSn6	UNS C38500 UNS C51900	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.014 .00055	100 328	0.60 .024	0.016 .00063	100 328	0.80 .032	0.018 .00071	140 459	1.00 .039	0.020 .00079	140 459	1.20 .047	0.022 .00087	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
	Bronze Rm < 600 N/mm²	2.0966 2.096	CuAl10Ni5Fe4 CuAl9Mn2	UNS C63000 UNS C63200	55 180	0.29 .011	0.006 .00024	73 240	0.39 .015	0.008 .00031	92 302	0.48 .019	0.012 .00047	100 328	0.60 .024	0.014 .00055	100 328	0.80 .032	0.016 .00063	140 459	1.00 .039	0.018 .00071	140 459	1.20 .047	0.020 .00079	200 656	1.50 .059	0.026 .00102	200 656	1.80 .071	0.028 .00110	220 722	2.00 .079	0.036 .00142	220 722	2.50 .098	0.040 .00157	240 787	3.00 .118	0.058 .00228	260 853	4.00 .158	0.060 .00236	260 853	6.00 .236	0.060 .00236	260 853	8.00 .315	0.060 .00236
S_1	Super alloys	2.4856 2.4668 2.4617 2.4665	 NiMo28 NiCr22Fe18Mo	Inconel 625 Inconel 718 Hastelloy B-2 Hastelloy X	55 180	0.29 .011	0.003 .00012	73 240	0.39 .015	0.004 .00016	92 302	0.48 .019	0.004 .00016	100 328	0.60 .024	0.005 .00020	100 328	0.80 .032	0.006 .00024	120 394	1.00 .039	0.007 .00028	120 394	1.20 .047	0.008 .00031	130 427	1.50 .059	0.009 .00035	130 427	1.80 .071	0.010 .00039	140 459	2.00 .079	0.010 .00039	140 459	2.50 .098	0.012 .00047	150 492	3.00 .118	0.015 .00059	170 558	4.00 .158	0.020 .00079	170 558	6.00 .236	0.020 .00079	170 558	8.00 .315	0.020 .00079
S_2	Titanium pure	3.7035 3.7065	Gr.2 Gr.4	ASTM B348 ASTM B348	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.004 .00016	92 302	0.48 .019	0.008 .00031	100 328	0.60 .024	0.009 .00035	100 328	0.80 .032	0.011 .00043	120 394	1.00 .039	0.016 .00063	120 394	1.20 .047	0.018 .00071	130 427	1.50 .059	0.020 .00079	130 427	1.80 .071	0.022 .00087	140 459	2.00 .079	0.028 .00110	140 459	2.50 .098	0.030 .00118	150 492	3.00 .118	0.042 .00165	170 558	4.00 .158	0.044 .00173	170 558	6.00 .236	0.044 .00173	170 558	8.00 .315	0.044 .00173
	Titanium alloys	3.7165 9.9367	TiAl6V4 TiAl6Nb7	ASTM B348 ASTM F1295	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.004 .00016	92 302	0.48 .019	0.008 .00031	100 328	0.60 .024	0.009 .00035	100 328	0.80 .032	0.011 .00043	120 394	1.00 .039	0.016 .00063	120 394	1.20 .047	0.018 .00071	130 427	1.50 .059	0.020 .00079	130 427	1.80 .071	0.022 .00087	140 459	2.00 .079	0.028 .00110	140 459	2.50 .098	0.030 .00118	150 492	3.00 .118	0.042 .00165	170 558	4.00 .158	0.044 .00173	170 558	6.00 .236	0.044 .00173	170 558	8.00 .315	0.044 .00173
S_3	CrCo alloys	2.4964	CoCr20W15Ni CrCoMo28	Haynes 25 ASTM F1537	55 180	0.29 .011	0.003 .00012	73 240	0.39 .015	0.003 .00012	92 302	0.48 .019	0.005 .00020	100 328	0.60 .024	0.005 .00020	100 328	0.80 .032	0.006 .00024	140 459	1.00 .039	0.007 .00028	140 459	1.20 .047	0.008 .00031	180 591	1.50 .059	0.009 .00035	180 591	1.80 .071	0.010 .00039	200 656	2.00 .079	0.010 .00039	200 656	2.50 .098	0.012 .00047	220 722	3.00 .118	0.015 .00059	240 787	4.00 .158	0.020 .00079	240 787	6.00 .236	0.020 .00079	240 787	8.00 .315	0.020 .00079
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	55 180	0.29 .011	0.004 .00016	73 240	0.39 .015	0.006 .00024	92 302	0.48 .019	0.007 .00028	80 262	0.60 .024	0.008 .00031	80 262	0.80 .032	0.009 .00035	100 328	1.00 .039	0.010 .00039	100 328	1.20 .047	0.012 .00047	140 459	1.50 .059	0.014 .00055	140 459	1.80 .071	0.018 .00071	180 591	2.00 .079	0.020 .00079	180 591	2.50 .098	0.026 .00102	200 656	3.00 .118	0.035 .00138	240 787	4.00 .158	0.040 .00157	240 787	6.00 .236	0.040 .00157	240 787	8.00 .315	0.040 .00157
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2																																														

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