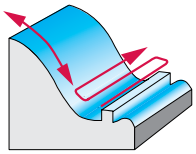
Cutting data for solid carbide ball nose end mills



Product family	λ
H1E0111	10°
H602111	30°

Material group	Overview of the main material groups and code letters			Brinell hardness HB	Tensile strength R_m [N/mm²]	Machining group [1]	Ø 2–16 mm, Z = 2, Uncoated Starting values for cutting speed v_c [m/min] a_e / D_c 1/5	1/20	1/50	VT
P	Unalloyed steel	C ≤ 0,25 %	Annealed	125	430	P1				
		C > 0,25... ≤ 0,55 %	Annealed	190	640	P2				
		C > 0,25... ≤ 0,55 %	Heat-treated	210	710	P3				
		C > 0,55 %	Annealed	190	640	P4				
		C > 0,55 %	Heat-treated	300	1010	P5				
		Free-machining steel (short-chipping)	Annealed	220	750	P6				
	Low-alloy steel	Annealed		175	590	P7				
		Heat-treated		285	960	P8				
		Heat-treated		380	1280	P9				
		Heat-treated		430	1480	P10				
	High-alloy steel and high-alloy tool steel	Annealed		200	680	P11				
		Hardened and tempered		300	1010	P12				
		Hardened and tempered		380	1280	P13				
	Stainless steel	Ferritic/martensitic, annealed		200	680	P14				
		Martensitic, heat-treated		330	1110	P15				
M	Stainless steel	Austenitic, quench hardened		200	680	M1				
		Austenitic, precipitation hardened (PH)		300	1010	M2				
		Austenitic/ferritic, duplex		230	780	M3				
K	Malleable cast iron	Ferritic		200	400	K1				
		Pearlitic		260	700	K2				
	Grey cast iron	Low strength		180	200	K3				
		High strength/austenitic		245	350	K4				
	Cast iron with spheroidal graphite	Ferritic		155	400	K5				
		Pearlitic		265	700	K6				
	CGI			230	400	K7				
N	Wrought aluminium alloys	Not hardenable		30	–	N1	1770	1790	1790	C
		Hardenable, hardened		100	340	N2	1790	1790	1790	C
	Cast aluminium alloys	≤ 12% Si, not hardenable		75	260	N3	440	590	710	C
		≤ 12% Si, hardenable, hardened		90	310	N4	440	590	710	C
		> 12% Si, not hardenable		130	450	N5	180	240	280	C
	Magnesium-based alloys			70	250	N6	440	590	710	C
	Copper and copper alloys (bronze/brass)	Unalloyed, electrolytic copper		100	340	N7	270	350	430	C
		Brass, bronze, red brass		90	310	N8	270	350	430	C
		Copper alloys, short-chipping		110	380	N9	270	350	430	C
		High tensile, Ampco		300	1010	N10				
S	Heat-resistant alloys	Fe-based	Annealed	200	680	S1				
			Hardened	280	940	S2				
		Ni- or Co-based	Annealed	250	840	S3				
			Hardened	350	1180	S4				
			Cast	320	1080	S5				
	Titanium alloys	Pure titanium		200	680	S6				
		α and β alloys, hardened		375	1260	S7				
		β alloys		410	1400	S8				
	Tungsten alloys			300	1010	S9				
	Molybdenum alloys			300	1010	S10				
H	Hardened steel	Hardened and tempered		50 HRC	–	H1				
		Hardened and tempered		55 HRC	–	H2				
		Hardened and tempered		60 HRC	–	H3				
	Hardened cast iron	Hardened and tempered		55 HRC	–	H4				
O	Thermoplastics	Without abrasive fillers				O1				
	Thermosetting plastics	Without abrasive fillers				O2				
	Plastic, glass-fibre reinforced	GFRP				O3				
	Plastic, carbon-fibre reinforced	CFRP				O4				
	Plastic, aramid-fibre reinforced	AFRP				O5				
	Graphitee (technical)			80 Shore		O6				

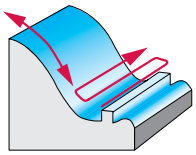
[1] The assignment of the machining groups can be foand in the "General" section of the Technical Compendium.

The specified cutting data represents average standard values. For specific applications, adjustment is recommended.

	Product family		λ	Product family		λ	Product family		λ	Product family	λ
	H404691	**H4046918**	30°	**H4046928** **H8004028** **H8004128** **H8004728** **MD480 Supreme**	**H8006428** **H80016428** **H8074128** **H8014028** **H8014128**	30°	**H4046988** **MD480 Supreme**	**H8004788**	30°	**H4046919** **H8001119** **H8001919**	30°
	Ø 0,3–3 mm			Ø 0,3–16 mm			Ø 1–12 mm			Ø 0,3–12 mm	
	Z = 2			Z = 2–4			Z = 2			Z = 2–4	
	TAX/uncoated			TAX / WB10TS			TAS / WB10TS			DIA	
	Starting values for cutting speed v_c [m/min]			Starting values for cutting speed v_c [m/min]			Starting values for cutting speed v_c [m/min]			Starting values for cutting speed v_c [m/min]	
	a_e / D_c			a_e / D_c			a_e / D_c			a_e / D_c	
	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT
	260	340	410	A												
	250	330	400	A												
	230	280	340	A												
	230	280	340	A												
	160	200	240	A												
	230	280	340	A												
	230	280	340	A												
	160	200	240	A												
	130	170	200	A												
	110	140	170	A												
	230	280	340	A												
	160	200	240	A												
	110	140	170	A												
	80	100	120	A												
	60	70	90	A												
	1450	1450	1450	C												
	1450	1450	1450	C												
	770	1030	1230	C												
	770	1030	1230	C												
	270	360	430	C												
	880	1180	1420	C												
	550	740	890	C												
	550	740	890	C												
	550	740	890	C												
	90	100	130	C												
					120	140	170	B	160	220	260	B				
					130	140	170	B	160	220	260	B				
					80	80	100	B	160	220	260	B				
					130	140	170	B								
													500	700	800	C

Cutting data for solid carbide ball nose end mills

(continued)



Product family	λ
H1E01118	10°
MC413 Advance MC416 Advance	30°
H8E01118 H8E11118	40°

Material group	Overview of the main material groups and code letters			Brinell hardness HB	Tensile strength R_m [N/mm²]	Machining group [1]	Ø 1–25 mm Z = 2–4 WJ30TF / TAX Starting values for cutting speed v_c [m/min] a_e / D_c 1/5	1/20	1/50	VT
P	Unalloyed steel	C ≤ 0,25 %	Annealed	125	430	P1	230	310	370	A
		C > 0,25... ≤ 0,55 %	Annealed	190	640	P2	220	300	360	A
		C > 0,25... ≤ 0,55 %	Heat-treated	210	710	P3	190	260	310	A
		C > 0,55 %	Annealed	190	640	P4	190	260	310	A
		C > 0,55 %	Heat-treated	300	1010	P5	150	180	220	A
		Free-machining steel (short-chipping)	Annealed	220	750	P6	190	260	310	A
	Low-alloy steel	Annealed		175	590	P7	190	260	310	A
		Heat-treated		285	960	P8	150	180	220	A
		Heat-treated		380	1280	P9	120	150	180	A
		Heat-treated		430	1480	P10	100	130	150	A
	High-alloy steel and high-alloy tool steel	Annealed		200	680	P11	190	260	310	A
		Hardened and tempered		300	1010	P12	150	180	220	A
		Hardened and tempered		380	1280	P13	100	130	150	A
	Stainless steel	Ferritic/martensitic, annealed		200	680	P14	70	90	100	A
		Martensitic, heat-treated		330	1110	P15	50	60	80	A
M	Stainless steel	Austenitic, quench hardened		200	680	M1	80	110	130	B
		Austenitic, precipitation hardened (PH)		300	1010	M2	50	60	80	B
		Austenitic/ferritic, duplex		230	780	M3	70	90	100	B
K	Malleable cast iron	Ferritic		200	400	K1	180	240	290	A
		Pearlitic		260	700	K2	150	190	220	A
	Grey cast iron	Low strength		180	200	K3	180	240	290	A
		High strength/austenitic		245	350	K4	150	200	240	A
	Cast iron with spheroidal graphite	Ferritic		155	400	K5	180	240	290	A
		Pearlitic		265	700	K6	150	190	220	A
	CGI			230	400	K7	130	160	190	A
N	Wrought aluminium alloys	Not hardenable		30	–	N1	1740	1740	1740	C
		Hardenable, hardened		100	340	N2	1740	1740	1740	C
	Cast aluminium alloys	≤ 12% Si, not hardenable		75	260	N3	690	920	1100	C
		≤ 12% Si, hardenable, hardened		90	310	N4	690	920	1100	C
		> 12% Si, not hardenable		130	450	N5	240	320	390	C
	Magnesium-based alloys			70	250	N6	800	1060	1280	C
	Copper and copper alloys (bronze/brass)	Unalloyed, electrolytic copper		100	340	N7	500	660	800	C
		Brass, bronze, red brass		90	310	N8	500	660	800	C
		Copper alloys, short-chipping		110	380	N9	500	660	800	C
		High tensile, Ampco		300	1010	N10	80	90	110	C
S	Heat-resistant alloys	Fe-based	Annealed	200	680	S1	60	90	110	B
			Hardened	280	940	S2	40	50	70	B
		Ni- or Co-based	Annealed	250	840	S3	60	90	110	B
			Hardened	350	1180	S4	40	50	70	B
			Cast	320	1080	S5	40	50	70	B
	Titanium alloys	Pure titanium		200	680	S6	210	300	380	B
		α and β alloys, hardened		375	1260	S7	60	100	130	B
		β alloys		410	1400	S8	60	100	130	B
	Tungsten alloys			300	1010	S9				
	Molybdenum alloys			300	1010	S10				
H	Hardened steel	Hardened and tempered		50 HRC	–	H1				
		Hardened and tempered		55 HRC	–	H2				
		Hardened and tempered		60 HRC	–	H3				
	Hardened cast iron	Hardened and tempered		55 HRC	–	H4				
O	Thermoplastics	Without abrasive fillers				O1				
	Thermosetting plastics	Without abrasive fillers				O2				
	Plastic, glass-fibre reinforced	GFRP				O3				
	Plastic, carbon-fibre reinforced	CFRP				O4				
	Plastic, aramid-fibre reinforced	AFRP				O5				
	Graphitee (technical)			80 Shore		O6				

[1] The assignment of the machining groups can be foand in the "General" section of the Technical Compendium.

The specified cutting data represents average standard values. For specific applications, adjustment is recommended.

	Product family			λ	Product family			λ	Product family			λ	Product family			λ
	MC430 ConeFit			10° 40°	ME432 Perform			30°	MC482 Advance MD480 Supreme			30°	MC480 Advance MD480 Supreme			30°
	Ø 10–25 mm				Ø 2–20 mm / 1/8–3/4 Inch				Ø 1–16 mm / 1/8–1/2 Inch				Ø 0,4–5 mm			
	Z = 2–4				z = 2-4				Z = 2–4				Z = 2			
	WJ30TP				WJ30ED				WB10TG / WB10TS				WB10TG / WB10TS			
	Starting values for cutting speed v_c [m/min] a_e / D_c				Starting values for cutting speed v_c [m/min] a_e / D_c				Starting values for cutting speed v_c [m/min] a_e / D_c				Starting values for cutting speed v_c [m/min] a_e / D_c			
	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT	1/5	1/20	1/50	VT[2]
	230	310	370	A	173	233	278	A								
	220	300	360	A	165	225	270	A								
	190	260	310	A	143	195	233	A								
	190	260	310	A	143	195	233	A								
	150	180	220	A	113	135	165	A								
	190	260	310	A	143	195	233	A								
	190	260	310	A	143	195	233	A								
	150	180	220	A	113	135	165	A								
	120	150	180	A	90	113	135	A								
	100	130	150	A	75	98	113	A								
	190	260	310	A	143	195	233	A								
	150	180	220	A	113	135	165	A								
	100	130	150	A	75	98	113	A								
	70	90	100	A	53	68	75	A								
	50	60	80	A	38	45	60	A								
	80	110	130	B	60	83	98	B								
	50	60	80	B	38	45	60	B								
	70	90	100	B	53	68	75	B								
	180	240	290	A	135	180	218	A								
	150	190	220	A	113	143	165	A								
	180	240	290	A	135	180	218	A								
	150	200	240	A	113	150	180	A								
	180	240	290	A	135	180	218	A								
	150	190	220	A	113	143	165	A								
	130	160	190	A	98	120	143	A								
	1740	1740	1740	C	1305	1305	1305	C								
	1740	1740	1740	C	1305	1305	1305	C								
	690	920	1100	C	518	690	825	C								
	690	920	1100	C	518	690	825	C								
	240	320	390	C	180	240	293	C								
	800	1060	1280	C	600	795	960	C								
	500	660	800	C	375	495	600	C								
	500	660	800	C	375	495	600	C								
	500	660	800	C	375	495	600	C								
	80	90	110	C	60	68	83	C								
	60	90	110	B	45	68	83	B								
	40	50	70	B	30	38	53	B								
	60	90	110	B	45	68	83	B								
	40	50	70	B	30	38	53	B								
	40	50	70	B	30	38	53	B								
	210	300	380	B	158	225	285	B								
	60	100	130	B	45	75	98	B								
	60	100	130	B	45	75	98	B								
									245	305	260	B	145	255	180	B
									100	125	150	B	100	125	125	B
									100	125	150	B	100	125	125	B
									220	145	320	B	220	255	180	B