Guide for recommended cutting data – indexable milling

Indexable milling – group 1 (FMA07/11/12, FMD02, EMP09/13)

Material group		Composition / structure / heat treatment		Brinell hardness HB	Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC401 a_e / D 1/1 | 3/4	YBC401 a_e / D 1/5	YBD152 a_e / D 1/1 | 3/4	YBD152 a_e / D 1/5	YBD252 a_e / D 1/1 | 3/4	YBD252 a_e / D 1/5
P	Unalloyed steel	ca. 0,15 % C	annealed	125	1	260	300	225	260				
		ca. 0,45 % C	annealed	190	2	225	255	195	225				
		ca. 0,45 % C	tempered	250	3	210	240	180	210				
		ca. 0,75 % C	annealed	270	4	185	210	160	185				
		ca. 0,75 % C	tempered	300	5	170	195	150	170				
	Low-alloyed steel		annealed	180	6	225	255	195	225				
			tempered	275	7	185	210	160	185				
			tempered	300	8	170	195	150	170				
			tempered	350	9	145	165	125	145				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	115	130				
			hardened ard tempered	325	11	95	105	80	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench harcened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					370	430	320	370
		perlitic (martensitic)		260	17					220	255	190	220
	Cast iron with spheroidal graphite	ferritic		160	18					255	295	220	255
		perlitic		250	19					170	200	145	170
	Malleable cast iron	ferritic		130	20					305	355	265	305
		perlitic		230	21					205	240	175	205
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248
For examples of material for cutting tool groups view page D22.

Recommend feed rate

Indexable milling – group1 (FMA07/11/12, FMD02, EMP09/13)

5

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	Material group	Feed rate per cutting edge [mm]																	
		EMP09			EMP13			EMP13			FMA07			FMA07			FMA11		
		LNKT12			ANGX11			ANGX15			ONHU06			ONHU08			SNEG12		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,25	0,50		0,23			0,25		0,19	0,23		0,19	0,23			0,20	0,23
P	Low-alloyed steel		0,23	0,47		0,22			0,23		0,17	0,22		0,17	0,22			0,19	0,21
P	High-alloyed steel and high-alloyed tool steel		0,22	0,44		0,20			0,22		0,16	0,20		0,16	0,20			0,18	0,20
M	Stainless steel		0,18	0,35														0,14	0,16
K	Grey cast iron		0,28	0,55		0,26			0,28		0,20	0,26		0,20	0,26			0,22	0,25
K	Cast iron with spheroidal graphite		0,25	0,50		0,23			0,25		0,19	0,23		0,19	0,23			0,20	0,23
K	Malleable cast iron		0,25	0,50		0,23			0,25		0,19	0,23		0,19	0,23			0,20	0,23
N	Aluminium wrought alloys					0,20			0,21										
N	Aluminium-Gusslegierungen					0,20			0,21										
N	Copper and copper alloys(bronze/brass)					0,18			0,19										
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

1. Select the appropriate product family/cutting data group.
2. Select the used grade.
3. Determine the immersion.
4. Select the used material and read the cutting speed.
5. Please have a look at the detached feed rate recommendations.
6. Select the used tool, the machining mode and the used material.

Indexable milling – group 1 (FMA07/11/12, FMD02, EMP09/13)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	225	260				
		approx. 0,45 % C	annealed	190	2	225	255	195	225				
		approx. 0,45 % C	tempered	250	3	210	240	180	210				
		approx. 0,75 % C	annealed	270	4	185	210	160	185				
		approx. 0,75 % C	tempered	300	5	170	195	150	170				
	Low-alloyed steel		annealed	180	6	225	255	195	225				
			tempered	275	7	185	210	160	185				
			tempered	300	8	170	195	150	170				
			tempered	350	9	145	165	125	145				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	115	130				
			hardened and tempered	325	11	95	105	80	95				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					370	430	320	370
		perlitic (martensitic)		260	17					220	255	190	220
	Cast iron with spheroidal graphite	ferritic		160	18					255	295	220	255
		perlitic		250	19					170	200	145	170
	Malleable cast iron	ferritic		130	20					305	355	265	305
		perlitic		230	21					205	240	175	205
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

Starting values for cutting speed v_c [m/min]																	
HC (CVD)			HC (PVD)										HW				
YBM253			YBG102		YB9320		YBG205		YBG252		YBG302		YD101		YD201		
a_e / D			a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		
1/1 | 3/4	1/5		1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
260	300		270	315	245	285	235	275	230	265	225	260					
225	255		230	270	210	245	200	235	200	230	195	225					
210	240		220	255	200	230	190	220	185	215	180	210					
185	210		190	225	175	200	165	195	165	190	160	185					
170	195		180	205	160	190	155	180	150	175	150	170					
225	255		230	270	210	245	200	235	200	230	195	225					
185	210		190	225	175	200	165	195	165	190	160	185					
170	195		180	205	160	190	155	180	150	175	150	170					
145	165		150	175	135	160	130	155	130	150	125	145					
130	150		135	160	125	145	120	140	115	135	115	130					
95	105		95	115	90	100	85	100	85	95	80	95					
130	150		135	160	125	145	120	140	115	135	115	130					
110	130		115	135	105	120	100	120	100	115	95	110					
140	160		145	170	130	155	125	150	125	145	120	140					
110	130		115	135	105	120	100	120	100	115	95	110					
			300	345	270	315	260	300	255	295	250	290					
			180	205	160	190	155	180	150	175	150	170					
			205	240	185	215	180	210	175	200	170	195					
			135	160	125	145	120	140	115	135	115	130					
			245	285	225	260	215	250	210	240	205	235					
			165	190	150	175	145	165	140	160	135	160					
													1505	1735	1450	1670	
													1225	1420	1180	1370	
													540	620	515	600	
													435	505	420	485	
													220	255	215	250	
													170	195	160	190	
													210	245	205	235	
													385	445	370	430	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	245	285	210	245				
		approx. 0,45 % C	annealed	190	2	210	245	180	210				
		approx. 0,45 % C	tempered	250	3	200	230	170	200				
		approx. 0,75 % C	annealed	270	4	175	200	150	175				
		approx. 0,75 % C	tempered	300	5	160	190	140	160				
	Low-alloyed steel		annealed	180	6	210	245	180	210				
			tempered	275	7	175	200	150	175				
			tempered	300	8	160	190	140	160				
			tempered	350	9	135	160	120	135				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	125	145	105	125				
			hardened and tempered	325	11	90	100	75	90				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					315	365	270	315
		perlitic (martensitic)		260	17					185	215	160	190
	Cast iron with spheroidal graphite	ferritic		160	18					215	250	185	215
		perlitic		250	19					145	170	125	145
	Malleable cast iron	ferritic		130	20					260	300	225	260
		perlitic		230	21					175	205	150	175
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

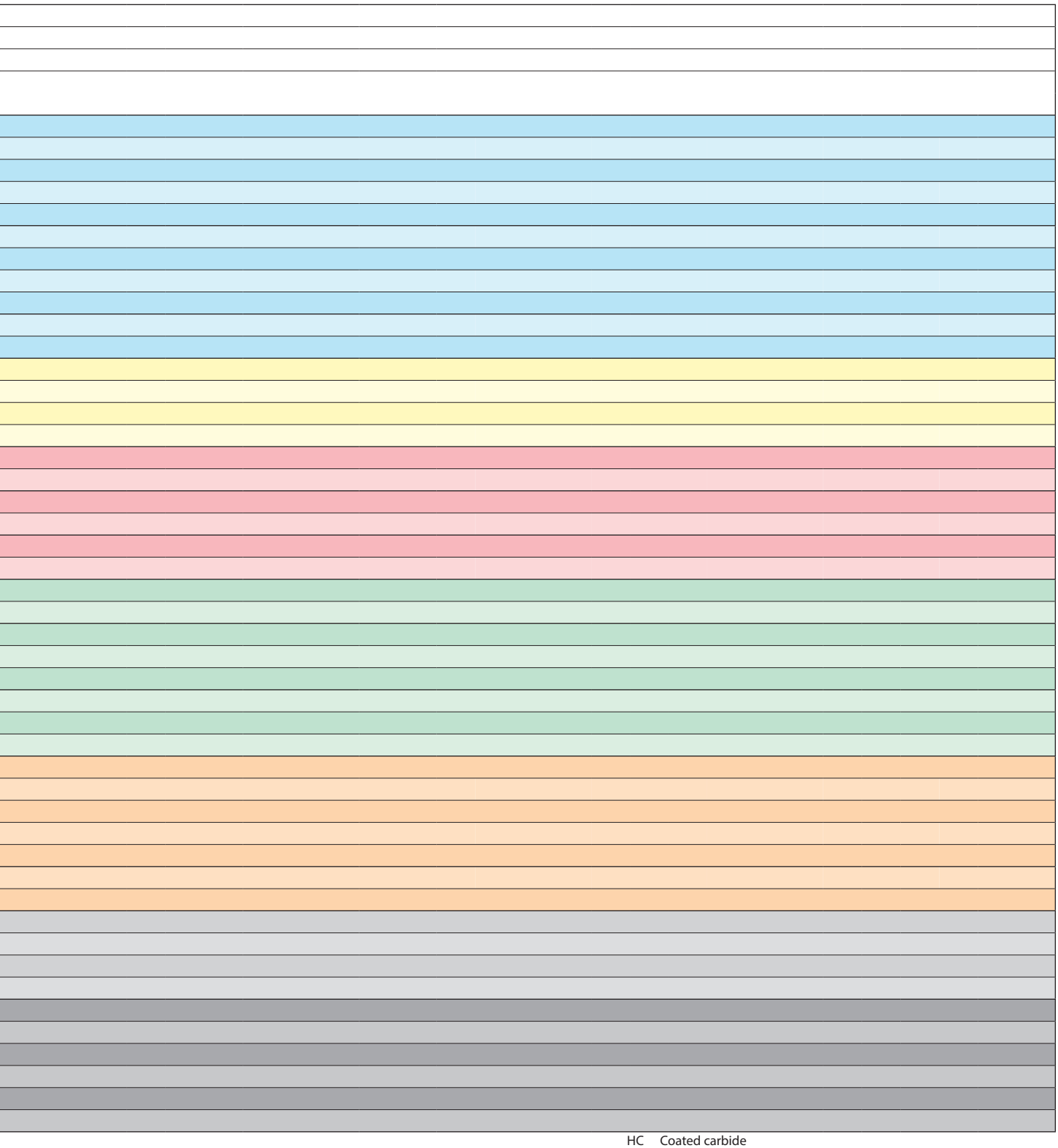
	Starting values for cutting speed v_c [m/min]																					
	HC (CVD)		HC (PVD)														HW				HT	
	YBM253		YBG101		YBG102		YBG152		YB9320		YBG205		YBG252		YBG302		YD101		YD201		YNG151	
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D	
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
	245	285			255	295	240	280	230	265	220	255	215	250	210	245					270	315
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	200	230			205	240	195	225	185	215	180	205	175	200	170	200					220	255
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	210	245			220	255	205	240	200	230	190	220	185	215	180	210					235	270
	175	200			180	210	170	200	165	190	155	180	155	175	150	175					195	220
	160	190			170	195	160	185	150	175	145	170	140	165	140	160					180	210
	135	160			145	165	135	155	130	150	125	145	120	140	120	135					150	180
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					140	160
	90	100			90	105	85	100	85	95	80	90	80	90	75	90					100	110
	125	145			130	150	120	140	115	135	110	130	110	125	105	125					135	160
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
	130	155			140	160	130	150	125	145	120	140	115	135	115	130					145	170
	105	120			110	125	105	120	100	115	95	110	95	105	90	105					115	135
					285	330	265	305	255	295	245	285	240	280	235	275						
					170	195	160	185	150	175	145	170	140	165	140	160						
					195	225	180	210	175	200	165	195	165	190	160	185						
					130	150	120	140	115	135	110	130	110	125	105	125						
					230	270	220	255	210	240	200	230	195	225	190	225						
					155	180	145	170	140	160	135	155	130	150	130	150						
			1505	1735													1205	1390	1040	1200		
			1225	1420													980	1140	850	980		
			540	620													435	500	375	435		
			435	505													350	405	300	350		
			220	255													180	205	155	180		
			170	195													140	160	120	140		
			210	245													170	200	150	170		
			385	445													310	360	265	310		
					75	85	70	80	65	75	65	75	65	75	60	70						
					50	55	50	55	45	50	45	50	45	50	40	45						
					60	70	55	65	55	65	50	55	50	55	50	55						
					35	40	35	40	30	35	30	35	30	35	30	35						
					45	50	45	50	40	45	40	45	40	45	40	45						
					75	85	70	80	65	75	65	75	65	75	60	70						
					75	85	70	80	65	75	65	75	65	75	60	70						

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed vc [m/min]			
						HC_1			
						YNG151C			
						a_e / D			
						1/1 | 3/4	1/5		
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	285	335		
		approx. 0,45 % C	annealed	190	2	250	285		
		approx. 0,45 % C	tempered	250	3	235	270		
		approx. 0,75 % C	annealed	270	4	205	235		
		approx. 0,75 % C	tempered	300	5	190	225		
	Low-alloyed steel		annealed	180	6	250	285		
			tempered	275	7	205	235		
			tempered	300	8	190	225		
			tempered	350	9	160	190		
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	150	170		
			hardened and tempered	325	11	105	120		
M	Stainless steel	ferritic/martensitic	annealed	200	12	145	170		
		martensitic	tempered	240	13	120	145		
		austenitic	quench hardened	180	14	155	180		
		austenitic-ferritic		230	15	120	145		
K	Grey cast iron	perlitic/ferritic		180	16				
		perlitic (martensitic)		260	17				
	Cast iron with spheroidal graphite	ferritic		160	18				
		perlitic		250	19				
	Malleable cast iron	ferritic		130	20				
		perlitic		230	21				
N	Aluminium wrought alloys	cannot be hardened		60	22				
		hardenable	hardened	100	23				
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24				
		≤ 12 % Si, hardenable	hardened	90	25				
		> 12 % Si, cannot be hardened		130	26				
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27				
		CuZn, CuSnZn		90	28				
		CuSn, Pb-free copper, electrolytic copper		100	29				
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30				
			hardened	280	31				
		Ni or Co bass	annealed	250	32				
			hardened	350	33				
			cast	320	34				
	Titanium alloys	pure titanium		R_m 400	35				
		α and β alloys	hardened	R_m 1050	36				
H	Hardened steel		hardened and tempered	55 HRC	37				
			hardened and tempered	60 HRC	38				
	Hard cast iron		cast	400	39				
	Hardened cast iron		hardened and tempered	55 HRC	40				
X	Non-metallic materials	Thermoplasts			41				
		Thermosetting plastics			42				
		Plastic, glass-fibre reinforced GFRP			43				
		Plastic, carbon fibre reinforced CFRP			44				
		Graphite			45				
		Wood			46				

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.



HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 3 (FMR01/02/03/04)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC302 a_e / D 1/20	YBC401 a_e / D 1/1 | 3/4	YBC401 a_e / D 1/5	YBC401 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	390	225	260	340
		approx. 0,45 % C	annealed	190	2	225	255	335	195	225	295
		approx. 0,45 % C	tempered	250	3	210	240	315	180	210	275
		approx. 0,75 % C	annealed	270	4	185	210	275	160	185	245
		approx. 0,75 % C	tempered	300	5	170	195	255	150	170	225
	Low-alloyed steel		annealed	180	6	225	255	335	195	225	295
			tempered	275	7	185	210	275	160	185	245
			tempered	300	8	170	195	255	150	170	225
			tempered	350	9	145	165	215	125	145	190
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	195	115	130	170
			hardened and tempered	325	11	95	105	140	80	95	125
M	Stainless steel	ferritic/martensitic	annealed	200	12						
		martensitic	tempered	240	13						
		austenitic	quench hardened	180	14						
		austenitic-ferritic		230	15						
K	Grey cast iron	perlitic/ferritic		180	16						
		perlitic (martensitic)		260	17						
	Cast iron with spheroidal graphite	ferritic		160	18						
		perlitic		250	19						
	Malleable cast iron	ferritic		130	20						
		perlitic		230	21						
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]																				
	HC (CVD)									HC (PVD)											
	YBD152			YBD252			YBM253			YBG102			YBG152			YB9320			YBG205		
	a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
							260	300	390	270	315	410	255	295	385	245	285	375	235	275	360
							225	255	335	230	270	355	220	255	335	210	245	320	200	235	310
							210	240	315	220	255	335	205	240	315	200	230	300	190	220	290
							185	210	275	190	225	295	180	210	275	175	200	260	165	195	255
							170	195	255	180	205	270	170	195	255	160	190	250	155	180	235
							225	255	335	230	270	355	220	255	335	210	245	320	200	235	310
							185	210	275	190	225	295	180	210	275	175	200	260	165	195	255
							170	195	255	180	205	270	170	195	255	160	190	250	155	180	235
							145	165	215	150	175	230	145	165	215	135	160	210	130	155	205
							130	150	195	135	160	210	130	150	195	125	145	190	120	140	185
							95	105	140	95	115	150	90	105	140	90	100	130	85	100	130
							130	150	195	135	160	205	130	150	195	125	145	190	120	140	180
							110	130	165	115	135	175	110	125	165	105	120	160	100	120	155
							140	160	210	145	170	220	140	160	205	130	155	200	125	150	195
							110	130	165	115	135	175	110	125	165	105	120	160	100	120	155
	345	400	520	300	345	450				300	345	450	285	330	430	270	315	410	260	300	390
	210	245	320	180	205	270				180	205	270	170	195	255	160	190	250	155	180	235
	240	280	365	205	240	315				205	240	315	195	225	295	185	215	280	180	210	275
	160	185	245	135	160	210				135	160	210	130	150	195	125	145	190	120	140	185
	285	330	430	245	285	375				245	285	375	230	270	355	225	260	340	215	250	325
	190	220	290	165	190	250				165	190	250	155	180	235	150	175	230	145	165	215

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 3 (FMR01/02/03/04)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (PVD) YBG212 a_e / D 1/1 | 3/4	YBG212 a_e / D 1/5	YBG212 a_e / D 1/20	YBG252 a_e / D 1/1 | 3/4	YBG252 a_e / D 1/5	YBG252 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	240	280	365	230	265	345
		approx. 0,45 % C	annealed	190	2	205	240	315	200	230	300
		approx. 0,45 % C	tempered	250	3	195	225	295	185	215	280
		approx. 0,75 % C	annealed	270	4	170	200	260	165	190	250
		approx. 0,75 % C	tempered	300	5	160	185	245	150	175	230
	Low-alloyed steel		annealed	180	6	205	240	315	200	230	300
			tempered	275	7	170	200	260	165	190	250
			tempered	300	8	160	185	245	150	175	230
			tempered	350	9	135	155	205	130	150	195
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	140	185	115	135	180
			hardened and tempered	325	11	85	100	130	85	95	125
M	Stainless steel	ferritic/martensitic	annealed	200	12	120	140	185	115	135	175
		martensitic	tempered	240	13	105	120	155	100	115	145
		austenitic	quench hardened	180	14	130	150	195	125	145	185
		austenitic-ferritic		230	15	105	120	155	100	115	145
K	Grey cast iron	perlitic/ferritic		180	16	265	305	400	255	295	385
		perlitic (martensitic)		260	17	160	185	245	150	175	230
	Cast iron with spheroidal graphite	ferritic		160	18	180	210	275	175	200	260
		perlitic		250	19	120	140	185	115	135	180
	Malleable cast iron	ferritic		130	20	220	255	335	210	240	315
		perlitic		230	21	145	170	225	140	160	210
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]							
	HC (PVD)			HW				
	YBG302			YD101		YD201		
	a_e / D			a_e / D		a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
	225	260	340					
	195	225	295					
	180	210	275					
	160	185	245					
	150	170	225					
	195	225	295					
	160	185	245					
	150	170	225					
	125	145	190					
	115	130	170					
	80	95	125					
	115	130	170					
	95	110	145					
	120	140	185					
	95	110	145					
	250	290	380					
	150	170	225					
	170	195	255					
	115	130	170					
	205	235	310					
	135	160	210					
				1505	1735	1450	1670	
				1225	1420	1180	1370	
				540	620	515	600	
				435	505	420	485	
				220	255	215	250	
				170	195	160	190	
				210	245	205	235	
				385	445	370	430	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 4 (BMR01/02/03/04, TMP01,CMZ01,CMA01,CMD01)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC302 a_e / D 1/20	YBC401 a_e / D 1/1 | 3/4	YBC401 a_e / D 1/5	YBC401 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	235	275	360	200	230	300
		approx. 0,45 % C	annealed	190	2	200	235	310	170	200	260
		approx. 0,45 % C	tempered	250	3	190	220	290	160	185	245
		approx. 0,75 % C	annealed	270	4	165	195	255	140	165	215
		approx. 0,75 % C	tempered	300	5	155	180	235	130	150	195
	Low-alloyed steel		annealed	180	6	200	235	310	170	200	260
			tempered	275	7	165	195	255	140	165	215
			tempered	300	8	155	180	235	130	150	195
			tempered	350	9	130	155	205	110	130	170
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	120	140	185	100	115	150
			hardened and tempered	325	11	85	100	130	70	85	115
M	Stainless steel	ferritic/martensitic	annealed	200	12						
		martensitic	tempered	240	13						
		austenitic	quench hardened	180	14						
		austenitic-ferritic		230	15						
K	Grey cast iron	perlitic/ferritic		180	16						
		perlitic (martensitic)		260	17						
	Cast iron with spheroidal graphite	ferritic		160	18						
		perlitic		250	19						
	Malleable cast iron	ferritic		130	20						
		perlitic		230	21						
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]																					
	HC (CVD)									HC (PVD)												
	YBD152			YBD252			YBM253			YBG102			YBG152			YB9320			YBG205		
	a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
							235	275	360	245	285	375	230	265	345	220	255	335	210	245	320
							200	235	310	210	245	320	200	230	300	190	220	290	180	210	275
							190	220	290	200	230	300	185	215	280	180	205	270	170	200	260
							165	195	255	175	200	260	165	190	250	155	180	235	150	175	230
							155	180	235	160	190	250	150	175	230	145	170	225	140	160	210
							200	235	310	210	245	320	200	230	300	190	220	290	180	210	275
							165	195	255	175	200	260	165	190	250	155	180	235	150	175	230
							155	180	235	160	190	250	150	175	230	145	170	225	140	160	210
							130	155	205	135	160	210	130	150	195	125	145	190	120	135	180
							120	140	185	125	145	190	115	135	180	110	130	170	105	125	165
							85	100	130	90	100	130	85	95	125	80	90	120	75	90	120
							120	140	180	125	145	190	115	135	175	110	130	170	105	125	160
							100	120	155	105	120	160	100	115	145	95	110	145	90	105	135
							125	150	195	130	155	200	125	145	185	120	140	180	115	130	170
							100	120	155	105	120	160	100	115	145	95	110	145	90	105	135
	300	345	450	260	300	390				270	315	410	255	295	385	245	285	375	235	275	360
	180	210	275	155	180	235				160	190	250	150	175	230	145	170	225	140	160	210
	210	245	320	180	210	275				185	215	280	175	200	260	165	195	255	160	185	245
	140	165	215	120	140	185				125	145	190	115	135	180	110	130	170	105	125	165
	250	290	380	215	250	325				225	260	340	210	240	315	200	230	300	190	225	295
	170	200	260	145	165	215				150	175	230	140	160	210	135	155	205	130	150	195

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 4 (BMR01/02/03/04, TMP01,CMZ01,CMA01,CMD01)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (PVD) YBG212 a_e / D 1/1 | 3/4	YBG212 a_e / D 1/5	YBG212 a_e / D 1/20	YBG252 a_e / D 1/1 | 3/4	YBG252 a_e / D 1/5	YBG252 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	215	250	325	205	240	315
		approx. 0,45 % C	annealed	190	2	185	215	280	175	205	270
		approx. 0,45 % C	tempered	250	3	175	200	260	165	195	255
		approx. 0,75 % C	annealed	270	4	155	175	230	145	170	225
		approx. 0,75 % C	tempered	300	5	140	165	215	135	160	210
	Low-alloyed steel		annealed	180	6	185	215	280	175	205	270
			tempered	275	7	155	175	230	145	170	225
			tempered	300	8	140	165	215	135	160	210
			tempered	350	9	120	140	185	115	135	180
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	110	125	165	105	120	160
			hardened and tempered	325	11	80	90	120	75	85	115
M	Stainless steel	ferritic/martensitic	annealed	200	12	110	125	165	105	120	160
		martensitic	tempered	240	13	95	105	140	90	105	135
		austenitic	quench hardened	180	14	115	135	175	110	130	170
		austenitic-ferritic		230	15	95	105	140	90	105	135
K	Grey cast iron	perlitic/ferritic		180	16	240	280	365	230	265	345
		perlitic (martensitic)		260	17	140	165	215	135	160	210
	Cast iron with spheroidal graphite	ferritic		160	18	165	190	250	155	180	235
		perlitic		250	19	110	125	165	105	120	160
	Malleable cast iron	ferritic		130	20	195	225	295	185	220	290
		perlitic		230	21	130	150	195	125	145	190
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]			
	HC (PVD)			
	YBG302			
	a_e / D			
	1/1 | 3/4	1/5	1/20	
	200	230	300	
	170	200	260	
	160	185	245	
	140	165	215	
	130	150	195	
	170	200	260	
	140	165	215	
	130	150	195	
	110	130	170	
	100	115	150	
	70	85	115	
	100	115	150	
	85	100	130	
	110	125	160	
	85	100	130	
	220	255	335	
	130	150	195	
	150	175	230	
	100	115	150	
	180	210	275	
	120	140	185	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 5 (SMP01/03/05)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min]			
						HC (CVD)		HC (PVD)	
						YBC302	YBM253	YBG101	YB9320
						a_e / D 1/4	a_e / D 1/4	a_e / D 1/4	a_e / D 1/4
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	165	180	190	175
		approx. 0,45 % C	annealed	190	2	145	155	165	150
		approx. 0,45 % C	tempered	250	3	135	145	155	140
		approx. 0,75 % C	annealed	270	4	120	130	135	125
		approx. 0,75 % C	tempered	300	5	110	120	125	115
	Low-alloyed steel		annealed	180	6	145	155	165	150
			tempered	275	7	120	130	135	125
			tempered	300	8	110	120	125	115
			tempered	350	9	95	100	105	100
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	85	90	95	90
			hardened and tempered	325	11	60	65	70	65
M	Stainless steel	ferritic/martensitic	annealed	200	12		90	95	90
		martensitic	tempered	240	13		80	80	75
		austenitic	quench hardened	180	14		100	105	95
		austenitic-ferritic		230	15		80	80	75
K	Grey cast iron	perlitic/ferritic		180	16			215	190
		perlitic (martensitic)		260	17			125	115
	Cast iron with spheroidal graphite	ferritic		160	18			145	135
		perlitic		250	19			95	90
	Malleable cast iron	ferritic		130	20			175	160
		perlitic		230	21			115	105
N	Aluminium wrought alloys	cannot be hardened		60	22				
		hardenable	hardened	100	23				
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24				
		≤ 12 % Si, hardenable	hardened	90	25				
		> 12 % Si, cannot be hardened		130	26				
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27				
		CuZn, CuSnZn		90	28				
		CuSn, Pb-free copper, electrolytic copper		100	29				
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30				
			hardened	280	31				
		Ni or Co bass	annealed	250	32				
			hardened	350	33				
			cast	320	34				
	Titanium alloys	pure titanium		R_m 400	35				
		α and β alloys	hardened	R_m 1050	36				
H	Hardened steel		hardened and tempered	55 HRC	37				
			hardened and tempered	60 HRC	38				
	Hard cast iron		cast	400	39				
	Hardened cast iron		hardened and tempered	55 HRC	40				
X	Non-metallic materials	Thermoplasts			41				
		Thermosetting plastics			42				
		Plastic, glass-fibre reinforced GFRP			43				
		Plastic, carbon fibre reinforced CFRP			44				
		Graphite			45				
		Wood			46				

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]		
	HC (PVD)		
	YBG205	YBG302	
	a_e / D	a_e / D	
	1/4	1/4	
	170	160	
	145	140	
	140	130	
	120	115	
	115	105	
	145	140	
	120	115	
	115	105	
	95	90	
	85	80	
	60	60	
	85	80	
	75	70	
	95	85	
	75	70	
	185	175	
	115	105	
	130	120	
	85	80	
	155	145	
	105	100	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 6 (FMD03, FME04, FMP03, HMP01)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min]							
						HC (CVD)							
						YBC302		YBC401		YBD152		YBD252	
						a_e / D		a_e / D		a_e / D		a_e / D	
						1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	200	230	170	200				
		approx. 0,45 % C	annealed	190	2	170	200	145	170				
		approx. 0,45 % C	tempered	250	3	160	185	140	160				
		approx. 0,75 % C	annealed	270	4	140	165	120	140				
		approx. 0,75 % C	tempered	300	5	130	150	115	130				
	Low-alloyed steel		annealed	180	6	170	200	145	170				
			tempered	275	7	140	165	120	140				
			tempered	300	8	130	150	115	130				
			tempered	350	9	110	130	95	110				
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	100	115	85	100				
			hardened and tempered	325	11	70	85	60	70				
M	Stainless steel	ferritic/martensitic	annealed	200	12								
		martensitic	tempered	240	13								
		austenitic	quench hardened	180	14								
		austenitic-ferritic		230	15								
K	Grey cast iron	perlitic/ferritic		180	16					255	295	220	255
		perlitic (martensitic)		260	17					150	175	130	150
	Cast iron with spheroidal graphite	ferritic		160	18					175	205	150	175
		perlitic		250	19					115	135	100	115
	Malleable cast iron	ferritic		130	20					210	245	180	210
		perlitic		230	21					140	165	120	140
N	Aluminium wrought alloys	cannot be hardened		60	22								
		hardenable	hardened	100	23								
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24								
		≤ 12 % Si, hardenable	hardened	90	25								
		> 12 % Si, cannot be hardened		130	26								
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27								
		CuZn, CuSnZn		90	28								
		CuSn, Pb-free copper, electrolytic copper		100	29								
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30								
			hardened	280	31								
		Ni or Co bass	annealed	250	32								
			hardened	350	33								
			cast	320	34								
	Titanium alloys	pure titanium		R_m 400	35								
		α and β alloys	hardened	R_m 1050	36								
H	Hardened steel		hardened and tempered	55 HRC	37								
			hardened and tempered	60 HRC	38								
	Hard cast iron		cast	400	39								
	Hardened cast iron		hardened and tempered	55 HRC	40								
X	Non-metallic materials	Thermoplasts			41								
		Thermosetting plastics			42								
		Plastic, glass-fibre reinforced GFRP			43								
		Plastic, carbon fibre reinforced CFRP			44								
		Graphite			45								
		Wood			46								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

	Starting values for cutting speed v_c [m/min]																
	HC (CVD)		HC (PVD)														
	YBM253		YBG102		YBG152		YB9320		YBG205		YBG212		YBG252		YBG302		
	a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		a_e / D		
	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	1/1 | 3/4	1/5	
	200	230	205	240	195	225	190	220	185	215	185	215	180	210	175	205	
	170	200	175	205	170	195	165	190	160	185	160	185	155	180	150	175	
	160	185	165	195	160	180	155	180	150	175	150	175	145	170	140	165	
	140	165	145	170	140	160	135	155	130	155	130	155	130	150	125	145	
	130	150	135	160	130	150	125	145	125	140	125	140	120	140	115	135	
	170	200	175	205	170	195	165	190	160	185	160	185	155	180	150	175	
	140	165	145	170	140	160	135	155	130	155	130	155	130	150	125	145	
	130	150	135	160	130	150	125	145	125	140	125	140	120	140	115	135	
	110	130	115	135	110	125	105	125	105	120	105	120	100	120	100	115	
	100	115	105	120	100	115	95	110	95	110	95	110	90	105	90	105	
	70	85	75	85	70	80	70	80	65	80	65	80	65	75	65	75	
	100	115	105	120	100	115	95	110	95	110	95	110	90	105	90	105	
	85	100	90	105	85	95	80	95	80	95	80	95	80	90	75	90	
	110	125	110	130	105	120	105	120	100	115	100	115	100	115	95	110	
	85	100	90	105	85	95	80	95	80	95	80	95	80	90	75	90	
			230	265	215	250	210	245	205	240	205	240	200	230	195	225	
			135	160	130	150	125	145	125	140	125	140	120	140	115	135	
			155	180	150	170	145	165	140	165	140	165	135	160	135	155	
			105	120	100	115	95	110	95	110	95	110	90	105	90	105	
			185	220	180	205	175	200	170	195	170	195	165	190	160	185	
			125	145	120	135	115	135	115	130	115	130	110	130	105	125	

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 7 (XMR01, XMP01)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (CVD) YBC302 a_e / D 1/1 | 3/4	YBC302 a_e / D 1/5	YBC302 a_e / D 1/20	YBD152 a_e / D 1/1 | 3/4	YBD152 a_e / D 1/5	YBD152 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	260	300	390			
		approx. 0,45 % C	annealed	190	2	225	255	335			
		approx. 0,45 % C	tempered	250	3	210	240	315			
		approx. 0,75 % C	annealed	270	4	185	210	275			
		approx. 0,75 % C	tempered	300	5	170	195	255			
	Low-alloyed steel		annealed	180	6	225	255	335			
			tempered	275	7	185	210	275			
			tempered	300	8	170	195	255			
			tempered	350	9	145	165	215			
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	130	150	195			
			hardened and tempered	325	11	95	105	140			
M	Stainless steel	ferritic/martensitic	annealed	200	12						
		martensitic	tempered	240	13						
		austenitic	quench hardened	180	14						
		austenitic-ferritic		230	15						
K	Grey cast iron	perlitic/ferritic		180	16				335	390	510
		perlitic (martensitic)		260	17				200	230	300
	Cast iron with spheroidal graphite	ferritic		160	18				225	260	340
		perlitic		250	19				150	175	230
	Malleable cast iron	ferritic		130	20				275	320	420
		perlitic		230	21				185	215	280
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.

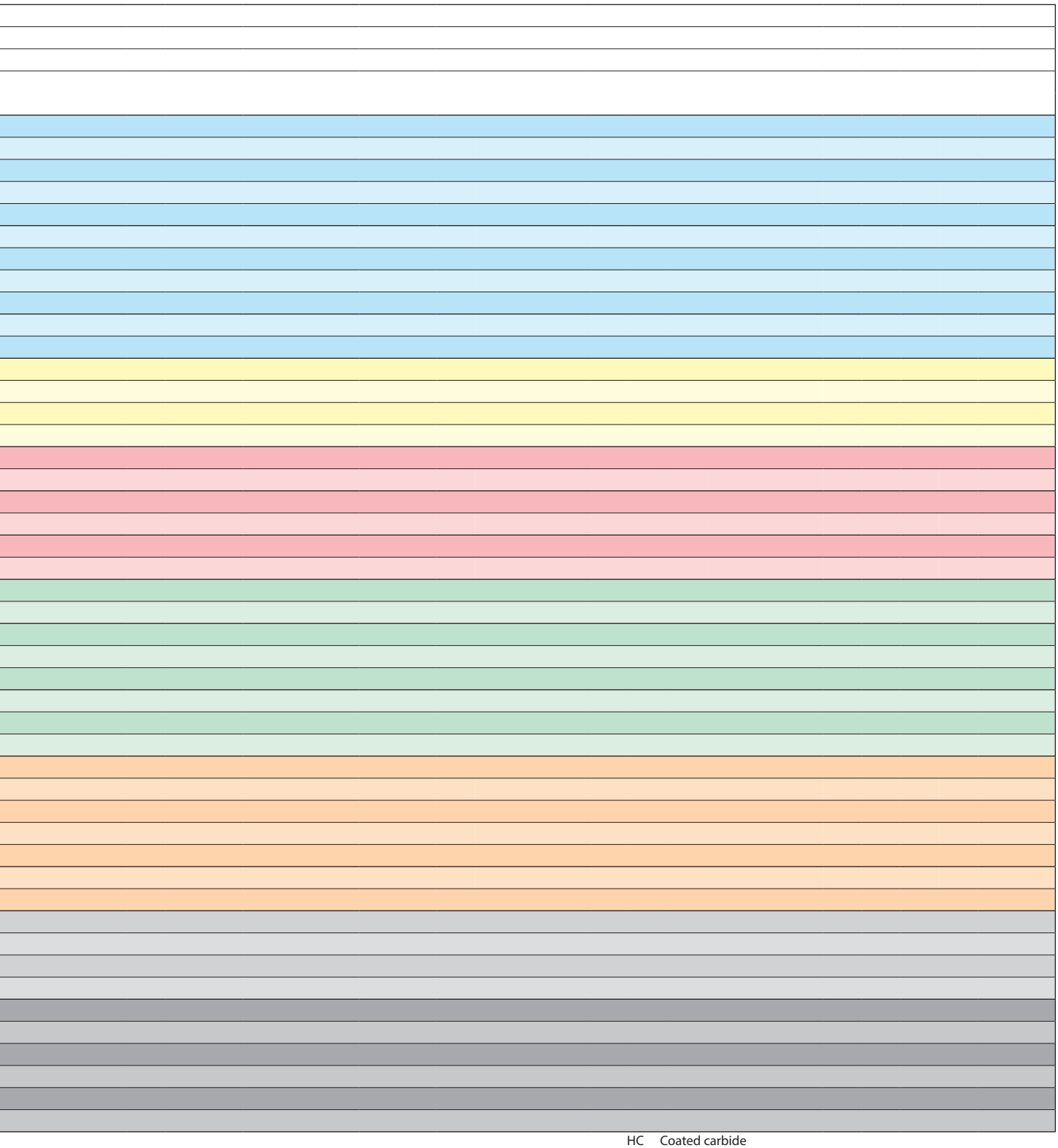
	Starting values for cutting speed v_c [m/min]																				
	HC (CVD)						HC (PVD)														
	YBD252			YBM253			YBG102			YBG152			YB9320			YBG205			YBG212		
	a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D			a_e / D		
	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20	1/1 | 3/4	1/5	1/20
				260	300	390	270	315	410	255	295	385	245	285	375	235	275	360	240	280	365
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				210	240	315	220	255	335	205	240	315	200	230	300	190	220	290	195	225	295
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				225	255	335	230	270	355	220	255	335	210	245	320	200	235	310	205	240	315
				185	210	275	190	225	295	180	210	275	175	200	260	165	195	255	170	200	260
				170	195	255	180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
				145	165	215	150	175	230	145	165	215	135	160	210	130	155	205	135	155	205
				130	150	195	135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
				95	105	140	95	115	150	90	105	140	90	100	130	85	100	130	85	100	130
				130	150	195	135	160	205	130	150	195	125	145	190	120	140	180	120	140	185
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
				140	160	210	145	170	220	140	160	205	130	155	200	125	150	195	130	150	195
				110	130	165	115	135	175	110	125	165	105	120	160	100	120	155	105	120	155
	290	335	440				300	345	450	285	330	430	270	315	410	260	300	390	265	305	400
	170	195	255				180	205	270	170	195	255	160	190	250	155	180	235	160	185	245
	195	225	295				205	240	315	195	225	295	185	215	280	180	210	275	180	210	275
	130	150	195				135	160	210	130	150	195	125	145	190	120	140	185	120	140	185
	235	270	355				245	285	375	230	270	355	225	260	340	215	250	325	220	255	335
	160	180	235				165	190	250	155	180	235	150	175	230	145	165	215	145	170	225

HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Indexable milling – group 7 (XMR01, XMP01)

Material group		Composition / structure / heat treatment		HB	Machining group	Starting values for cutting speed v_c [m/min] HC (PVD) YBG252 a_e / D 1/1 | 3/4	YBG252 a_e / D 1/5	YBG252 a_e / D 1/20	YBG302 a_e / D 1/1 | 3/4	YBG302 a_e / D 1/5	YBG302 a_e / D 1/20
P	Unalloyed steel	approx. 0,15 % C	annealed	125	1	230	265	345	225	260	340
		approx. 0,45 % C	annealed	190	2	200	230	300	195	225	295
		approx. 0,45 % C	tempered	250	3	185	215	280	180	210	275
		approx. 0,75 % C	annealed	270	4	165	190	250	160	185	245
		approx. 0,75 % C	tempered	300	5	150	175	230	150	170	225
	Low-alloyed steel		annealed	180	6	200	230	300	195	225	295
			tempered	275	7	165	190	250	160	185	245
			tempered	300	8	150	175	230	150	170	225
			tempered	350	9	130	150	195	125	145	190
	High-alloyed steel and high-alloyed tool steel		annealed	200	10	115	135	180	115	130	170
			hardened and tempered	325	11	85	95	125	80	95	125
M	Stainless steel	ferritic/martensitic	annealed	200	12	115	135	175	115	130	170
		martensitic	tempered	240	13	100	115	145	95	110	145
		austenitic	quench hardened	180	14	125	145	185	120	140	185
		austenitic-ferritic		230	15	100	115	145	95	110	145
K	Grey cast iron	perlitic/ferritic		180	16	255	295	385	250	290	380
		perlitic (martensitic)		260	17	150	175	230	150	170	225
	Cast iron with spheroidal graphite	ferritic		160	18	175	200	260	170	195	255
		perlitic		250	19	115	135	180	115	130	170
	Malleable cast iron	ferritic		130	20	210	240	315	205	235	310
		perlitic		230	21	140	160	210	135	160	210
N	Aluminium wrought alloys	cannot be hardened		60	22						
		hardenable	hardened	100	23						
	Cast aluminium alloys	≤ 12 % Si, cannot be hardened		75	24						
		≤ 12 % Si, hardenable	hardened	90	25						
		> 12 % Si, cannot be hardened		130	26						
	Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27						
		CuZn, CuSnZn		90	28						
		CuSn, Pb-free copper, electrolytic copper		100	29						
S	Heat-resistant alloys	Fe-based alloys	annealed	200	30						
			hardened	280	31						
		Ni or Co bass	annealed	250	32						
			hardened	350	33						
			cast	320	34						
	Titanium alloys	pure titanium		R_m 400	35						
		α and β alloys	hardened	R_m 1050	36						
H	Hardened steel		hardened and tempered	55 HRC	37						
			hardened and tempered	60 HRC	38						
	Hard cast iron		cast	400	39						
	Hardened cast iron		hardened and tempered	55 HRC	40						
X	Non-metallic materials	Thermoplasts			41						
		Thermosetting plastics			42						
		Plastic, glass-fibre reinforced GFRP			43						
		Plastic, carbon fibre reinforced CFRP			44						
		Graphite			45						
		Wood			46						

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.
Feed rate recommendations on page B248.
For examples of material for cutting tool groups view page D22.



HC Coated carbide
HT Uncoated carbide, main component (TiC) o. (TiN), cermet
HC_1 Coated cermet
HW Uncoated carbide, main component (WC)

Recommended feed rate

Indexable milling – group1 (FMA07/11/12, FMD02, EMP09/13)

Material group		Feed rate per cutting edge [mm]																	
		EMP09			EMP09			EMP13			EMP13			FMA07			FMA07		
		LNKT08/12			LNKT16			ANGX11			ANGX15			ONHU06			ONHU08		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
	Low-alloyed steel		0,23	0,47		0,26	0,51		0,22			0,23		0,17	0,22		0,17	0,22	
	High-alloyed steel and high-alloyed tool steel		0,22	0,44		0,24	0,48		0,20			0,22		0,16	0,20		0,16	0,20	
M	Stainless steel		0,18	0,35		0,19	0,39		0,16			0,18							
K	Grey cast iron		0,28	0,55		0,30	0,61		0,26			0,28		0,20	0,26		0,20	0,26	
	Cast iron with spheroidal graphite		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
	Malleable cast iron		0,25	0,50		0,28	0,55		0,23			0,25		0,19	0,23		0,19	0,23	
N	Aluminum wrought alloys								0,20			0,21							
	Aluminum cast alloys								0,20			0,21							
	Copper and copper alloys (bronze/brass)								0,18			0,19							
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 2 (FMA01/02/03/04, FME01/02, EMP01/02/03/04)

Material group		Feed rate per cutting edge [mm]																	
		FMA01 | FMA02			FMA03			FMA03			FMA04			FMA04			FME02		
		SEET12			SEKN12			SEKN15			OFKT05			OFKR07			SPK*12		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25			0,20	
	Low-alloyed steel	0,14	0,19	0,23		0,17			0,19		0,19	0,23		0,19	0,23			0,19	
	High-alloyed steel and high-alloyed tool steel	0,13	0,18	0,22		0,16			0,18		0,18	0,22		0,18	0,22			0,18	
M	Stainless steel	0,11	0,14	0,18		0,13			0,14		0,14	0,18		0,14	0,18			0,14	
K	Grey cast iron	0,17	0,22	0,28		0,20			0,22		0,22	0,28		0,22	0,28			0,22	
	Cast iron with spheroidal graphite	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25			0,20	
	Malleable cast iron	0,15	0,20	0,25		0,18			0,20		0,20	0,25		0,20	0,25			0,20	
N	Aluminium wrought alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21				
	Aluminum cast alloys	0,13	0,17	0,21							0,17	0,21		0,17	0,21				
	Copper and copper alloys (bronze/brass)	0,11	0,15	0,19							0,15	0,19		0,15	0,19				
S	Heat-resistant alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18				
	Titanium alloys	0,11	0,14	0,18							0,14	0,18		0,14	0,18				
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

	Feed rate per cutting edge [mm]																							
	FMA11			FMA11			FMA11			FMA12			FMD02			FMD02			FMP12			FMP12		
	SNEG12			SNEG15			SNEG19			ONHU08			PNEG11			HNEX09			WNHU06			WNHU08		
	Application																							
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
		0,20	0,23		0,22	0,25			0,29		0,23		0,15	0,20	0,30					0,23			0,25	
		0,19	0,21		0,20	0,24			0,27		0,22		0,14	0,19	0,28					0,22			0,23	
		0,18	0,20		0,19	0,22			0,26		0,20		0,13	0,18	0,26					0,20			0,22	
		0,14	0,16		0,15	0,18			0,20		0,16									0,16			0,18	
		0,22	0,25		0,24	0,28			0,32		0,26		0,17	0,22	0,33	0,17	0,22	0,33		0,26			0,28	
		0,20	0,23		0,22	0,25			0,29		0,23		0,15	0,20	0,30	0,15	0,20	0,30		0,23			0,25	
		0,20	0,23		0,22	0,25			0,29		0,23		0,15	0,20	0,30	0,15	0,20	0,30		0,23			0,25	

F Finishing
M Medium machining
R Roughing

	Feed rate per cutting edge [mm]																					
	FME03			FME03			FMP01			FMP02			EMP01 | EMP02			EMP01 | EMP02			EMP03 | EMP04			
	SPK*12			SPK*15			TPKN22			SEET12			APKT11			APKT16			APKT11			
	Application																					
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	
		0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25	
		0,17			0,19			0,19		0,14	0,19	0,23	0,09	0,14	0,19	0,11	0,16	0,21	0,09	0,19	0,23	
		0,16			0,18			0,18		0,13	0,18	0,22	0,09	0,13	0,18	0,10	0,15	0,20	0,09	0,18	0,22	
		0,13			0,14			0,14		0,11	0,14	0,18	0,07	0,11	0,14	0,08	0,12	0,16	0,07	0,14	0,18	
		0,20			0,22			0,22		0,17	0,22	0,28	0,11	0,17	0,22	0,13	0,19	0,25	0,11	0,22	0,28	
		0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25	
		0,19			0,20			0,20		0,15	0,20	0,25	0,10	0,15	0,20	0,12	0,17	0,23	0,10	0,20	0,25	
										0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20	0,09	0,17	0,21	
										0,13	0,17	0,21	0,09	0,13	0,17	0,10	0,15	0,20	0,09	0,17	0,21	
										0,11	0,15	0,19	0,08	0,11	0,15	0,09	0,13	0,18	0,08	0,15	0,19	

F Finishing
M Medium machining
R Roughing

Recommended feed rate

Indexable milling – group 3 (FMR01/02/03/04) Face milling

Material group		Feed rate per cutting edge [mm]																	
		FMR01			FMR01			FMR02			FMR02			FMR02			FMR03		
		RCKT10			RC*12			RC*12			RCKT16			RCKT20			RDKW07		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Low-alloyed steel		0,19	0,23		0,19	0,23		0,19	0,23		0,21	0,27		0,25	0,31		0,16	
	High-alloyed steel and high-alloyed tool steel		0,18	0,22		0,18	0,22		0,18	0,22		0,20	0,25		0,23	0,29		0,15	
M	Stainless steel		0,14	0,18		0,14	0,18		0,14	0,18		0,16	0,20		0,19	0,23		0,12	
K	Grey cast iron		0,22	0,28		0,22	0,28		0,22	0,28		0,25	0,32		0,29	0,36		0,19	
	Cast iron with spheroidal graphite		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
	Malleable cast iron		0,20	0,25		0,20	0,25		0,20	0,25		0,23	0,29		0,26	0,33		0,17	
N	Aluminum wrought alloys					0,17	0,21		0,17	0,21									
	Aluminum cast alloys					0,17	0,21		0,17	0,21									
	Copper and copper alloys (bronze/brass)					0,15	0,19		0,15	0,19									
S	Heat-resistant alloys																		
	Titanium alloys																		
H	Hardened steel																		
	Hard cast iron																		
	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 3 (FMR01/02/03/04) Circular milling

Material group		Feed rate per cutting edge [mm]							
		FMR01	FMR01	FMR02	FMR02		FMR02		FMR03
		RCKT10	RC*12	RC*12	RCKT16		RCKT20		RDKW07
		Tool diameter [mm]							
		25-32	40-50	50-100	63-125	160-200	80-125	160-250	15
P	Unalloyed steel	0,12	0,16	0,18	0,24	0,32	0,26	0,35	0,07
	Low-alloyed steel	0,11	0,14	0,16	0,21	0,28	0,23	0,31	0,06
	High-alloyed steel and high-alloyed tool steel	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
M	Stainless steel	0,07	0,09	0,10	0,14	0,18	0,15	0,20	0,04
K	Grey cast iron	0,11	0,14	0,16	0,22	0,29	0,23	0,32	0,06
	Cast iron with spheroidal graphite	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
	Malleable cast iron	0,10	0,13	0,14	0,19	0,26	0,21	0,28	0,06
N	Aluminium wrought alloys								
	Aluminum cast alloys								
	Copper and copper alloys (bronze/brass)								
S	Heat-resistant alloys								
	Titanium alloys								
H	Hardened steel								
	Hard cast iron								
	Hardened cast iron								
X	Non-metallic materials								

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

	Feed rate per cutting edge [mm]															
	FMR03			FMR03			FMR04			FMR04			FMR04			
	RDKW08			RD*10			RD*12			RDKW16			RDKW20			
	Application															
	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,2	0,26	0,33	
		0,16			0,19		0,14	0,19	0,23	0,16	0,21	0,27	0,19	0,25	0,31	
		0,15			0,18		0,13	0,18	0,22	0,15	0,20	0,25	0,18	0,23	0,29	
		0,12			0,14		0,11	0,14	0,18	0,12	0,16	0,20	0,14	0,19	0,23	
		0,19			0,22		0,17	0,22	0,28	0,19	0,25	0,32	0,22	0,29	0,36	
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33	
		0,17			0,20		0,15	0,20	0,25	0,17	0,23	0,29	0,20	0,26	0,33	
					0,17		0,13	0,17	0,21							
					0,17		0,13	0,17	0,21							
					0,15		0,11	0,15	0,19							

F Finishing
M Medium machining
R Roughing

	Feed rate per cutting edge [mm]					
	FMR03	FMR03	FMR04	FMR04	FMR04	
	RDKW08	RD*10	RD*12	RDKW16	RDKW20	
	Tool diameter [mm]					
	16-25	32	50-63	80-100	125-160	
	0,07	0,12	0,17	0,24	0,30	
	0,06	0,11	0,15	0,21	0,26	
	0,06	0,10	0,14	0,19	0,24	
	0,04	0,07	0,10	0,14	0,17	
	0,06	0,11	0,15	0,22	0,27	
	0,06	0,10	0,14	0,19	0,24	
	0,06	0,10	0,14	0,19	0,24	
		0,10	0,11			
		0,10	0,11			
		0,10	0,11			

Recommended feed rate

Indexable milling – group 4 (BMR01/02/03/04, TMP01, CMZ01, CMA01, CMD01)

Material group		Feed rate per cutting edge [mm]								
		BMR01	BMR01	BMR01	BMR01	BMR02	BMR02	BMR02	BMR03	BMR03
		ZD*08 / SP*06	ZD*11 / SP*06	ZD*13 / SP*09	ZP*22 / SP*12	ROHX12	ROHX16	ROHX20	-	-
		Tool diameter [mm]								
		20	25	32	40-63	12	16	20	16	20
P	Unalloyed steel	0,14	0,21	0,26	0,32	0,10	0,13	0,14	0,13	0,14
P	Low-alloyed steel	0,10	0,15	0,18	0,22	0,07	0,09	0,10	0,09	0,10
P	High-alloyed steel and high-alloyed tool steel	0,09	0,14	0,17	0,21	0,07	0,08	0,09	0,08	0,09
M	Stainless steel	0,08	0,12	0,14	0,18	0,06	0,07	0,08	0,07	0,08
K	Grey cast iron	0,18	0,27	0,34	0,42	0,13	0,17	0,18	0,17	0,18
K	Cast iron with spheroidal graphite	0,13	0,20	0,25	0,30	0,10	0,12	0,13	0,12	0,13
K	Malleable cast iron	0,14	0,21	0,26	0,32	0,10	0,13	0,14	0,13	0,14
N	Aluminum wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group 5 (SMP01/03/05)

Material group		Feed rate per cutting edge [mm]								
		SMP01	SMP01	SMP01	SMP01	SMP01	SMP03	SMP03	SMP03	SMP05
		XSEQ1202	XSEQ1203	XSEQ12T3	XSEQ1204	XSEQ12T4	MPHT06	MPHT08	MPHT12	QC16
		Tool diameter [mm]								
		63-100	63-100	63-160	63-160	63-160	80-125	125-200	120-200	25-39
P	Unalloyed steel	0,12	0,12	0,13	0,13	0,14	0,14	0,15	0,16	0,08
P	Low-alloyed steel	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,08
P	High-alloyed steel and high-alloyed tool steel	0,10	0,10	0,11	0,11	0,12	0,12	0,13	0,14	0,07
M	Stainless steel	0,10	0,10	0,11	0,11	0,12	0,12	0,13	0,14	0,07
K	Grey cast iron	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,08
K	Cast iron with spheroidal graphite	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,07
K	Malleable cast iron	0,11	0,11	0,12	0,12	0,13	0,13	0,14	0,15	0,07
N	Aluminium wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

	Feed rate per cutting edge [mm]											
	BMR03	BMR03	BMR03	BMR04	BMR04	BMR04	BMR04	BMR04	CMZ01	CMA01	CMD01	
	-	-	-	ZOHX12	ZOHX16	ZOHX20	ZOHX25	ZOHX30	SPMT12	SPMT12	SPMT12	
	Tool diameter [mm]											
	25	30-32	40-50	12	16	20	25	30	12-32	12-32	12-36	
	0,21	0,26	0,30	0,10	0,13	0,14	0,16	0,17	0,23	0,23	0,23	
	0,15	0,18	0,21	0,07	0,09	0,10	0,11	0,12	0,16	0,16	0,16	
	0,14	0,17	0,20	0,07	0,08	0,09	0,10	0,11	0,15	0,15	0,15	
	0,12	0,14	0,17	0,06	0,07	0,08	0,09	0,09	0,13	0,13	0,13	
	0,27	0,34	0,39	0,13	0,17	0,18	0,21	0,22	0,30	0,30	0,30	
	0,20	0,25	0,29	0,10	0,12	0,13	0,15	0,16	0,22	0,22	0,22	
	0,21	0,26	0,30	0,10	0,13	0,14	0,16	0,17	0,23	0,23	0,23	

	Feed rate per cutting edge [mm]	
	SMP05	
	QC22	
	Tool diameter [mm]	
	44	
	0,08	
	0,08	
	0,07	
	0,07	
	0,08	
	0,07	
	0,07	

Recommended feed rate

Indexable milling – group 6 (FMD03, FME04, FMP03, HMP01)

Material group		Feed rate per cutting edge [mm]																	
		FMD03			FMD03			FME04			FMP03			FMP03			FMP03		
		LNKT20			LNKT25			LNKT15			LNKT12			LNKT15			LNKT20		
		Application																	
		F	M	R	F	M	R	F	M	R	F	M	R	F	M	R	F	M	R
P	Unalloyed steel			0,50			0,50			0,45			0,45			0,45			0,50
P	Low-alloyed steel			0,47			0,47			0,42			0,42			0,42			0,47
P	High-alloyed steel and high-alloyed tool steel			0,44			0,44			0,40			0,40			0,40			0,44
M	Stainless steel			0,45			0,45			0,40			0,40			0,40			0,45
K	Grey cast iron			0,55			0,55			0,50			0,50			0,50			0,55
K	Cast iron with spheroidal graphite			0,50			0,50			0,45			0,45			0,45			0,50
K	Malleable cast iron			0,50			0,50			0,45			0,45			0,45			0,50
N	Aluminum wrought alloys																		
N	Aluminum cast alloys																		
N	Copper and copper alloys (bronze/brass)																		
S	Heat-resistant alloys																		
S	Titanium alloys																		
H	Hardened steel																		
H	Hard cast iron																		
H	Hardened cast iron																		
X	Non-metallic materials																		

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

Indexable milling – group7 (XMR01, XMP01)

Material group		Feed rate per cutting edge [mm]								
		XMR01 face milling			XMR01 plunge milling			XMR01 circular milling		
		SDMT/WPGT			SDMT/WPGT			SDMT/WPGT		
		Tool diameter [mm]								
		20-25	30-50	63-160	20-25	30-50	63-160	20-25	30-50	63-160
P	Unalloyed steel	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
P	Low-alloyed steel	0,93	1,12	1,86	0,19	0,23	0,28	0,74	0,89	1,30
P	High-alloyed steel and high-alloyed tool steel	0,70	0,84	1,40	0,18	0,22	0,26	0,70	0,84	1,23
M	Stainless steel	0,50	0,60	1,00	0,14	0,18	0,21	0,56	0,67	0,98
K	Grey cast iron	0,90	1,08	1,80	0,22	0,28	0,33	0,88	1,06	1,54
K	Cast iron with spheroidal graphite	0,90	1,08	1,80	0,20	0,25	0,30	0,80	0,96	1,40
K	Malleable cast iron	1,00	1,20	2,00	0,20	0,25	0,30	0,80	0,96	1,40
N	Aluminium wrought alloys									
N	Aluminum cast alloys									
N	Copper and copper alloys (bronze/brass)									
S	Heat-resistant alloys									
S	Titanium alloys									
H	Hardened steel									
H	Hard cast iron									
H	Hardened cast iron									
X	Non-metallic materials									

Note: The given cutting values are guide values, which were determined under ideal conditions.
The values have to be adapted in individual cases.

	Feed rate per cutting edge [mm]						
	FMP03			HMP01			
	LNKT25			SPMT-APKT			
	Application						
	F	M	R	F	M	R	
			0,55		0,25		
			0,51		0,23		
			0,48		0,22		
			0,47		0,15		
			0,61		0,28		
			0,55		0,25		
			0,55		0,25		

F Finishing
M Medium machining
R Roughing

	Feed rate per cutting edge [mm]							
	XMP01	QCH	QCH	QCH	QCH	QCH	QCH	
	CNE	ZOHX	RD*	APKT	WPGT	SDMT	XPHT	
	Tool diameter [mm]							
	80-400	16-32	15-32	16-40	20-42	20-40	16-32	
	0,20	0,20	0,20	0,15	1,00	1,00	0,20	
	0,20	0,19	0,19	0,14	0,93	0,93	0,19	
	0,20	0,18	0,18	0,13	0,70	0,70	0,18	
	0,20	0,14	0,14	0,11	0,50	0,50	0,14	
	0,20	0,22	0,22	0,17	0,90	0,90	0,22	
	0,20	0,20	0,20	0,15	0,90	0,90	0,20	
	0,20	0,20	0,20	0,15	1,00	1,00	0,20	
				0,13				
				0,13				
				0,11				

Notes