

## End mill – NM series

Material group	Composition / structure / heat treatment	Brinell hardness HB	Machining group	Starting values for cutting speed $v_c$ [m/min]							
				NM-2E 5502R402NM NM-4E NM-2EP				NM-2B NM-4BP			
				Slot milling		Shoulder milling					
				$\emptyset$ [mm]	$a_p$ max	$\emptyset$ [mm]	$a_e$ max				
$0 < x < 12$	$0.5 \times D$	$0 < x \leq 20$	$< 0.5 \times D$								
$12 \leq x \leq 20$	$1.0 \times D$										
				KMG309				KMG309			
				$a_e / D$		$a_e / D$		$a_e / D$		$a_e / D$	
				1/1	1/2	1/10	f-group	1/1	1/10	1/20	f-group
P Unalloyed steel	ca. 0,15 % C	annealed	125	1							
	ca. 0,45 % C	annealed	190	2							
	ca. 0,45 % C	tempered	250	3							
	ca. 0,75 % C	annealed	270	4							
	ca. 0,75 % C	tempered	300	5							
P Low-alloyed steel		annealed	180	6							
		tempered	275	7							
		tempered	300	8							
		tempered	350	9							
High-alloyed steel and high-alloyed tool steel		annealed	200	10							
		hardened and tempered	325	11							
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							
K Cast iron with spheroidal graphite	ferritic		160	18							
	perlitic		250	19							
K Malleable cast iron	ferritic		130	20							
	perlitic		230	21							
N Aluminium wrought alloys	cannot be hardened		60	22	920	1100	1200	4	1400	1550	4
	hardenable	hardened	100	23	555	660	720	4	840	930	4
	$\leq 12\% \text{ Si}$ , cannot be hardened		75	24	370	440	480	4	560	620	4
	$\leq 12\% \text{ Si}$ , hardenable	hardened	90	25	460	550	600	4	700	775	4
	$> 12\% \text{ Si}$ , cannot be hardened		130	26	140	165	180	4	210	235	4
N Cast aluminium alloys	$\leq 12\% \text{ Si}$ , cannot be hardened		75	24	370	440	480	4	560	620	4
	$\leq 12\% \text{ Si}$ , hardenable	hardened	90	25	460	550	600	4	700	775	4
	$> 12\% \text{ Si}$ , cannot be hardened		130	26	140	165	180	4	210	235	4
N Copper and copper alloys (bronze/brass)	machining steel, PB> 1%		110	27	280	330	360	4	420	465	4
	CuZn, CuSnZn		90	28	325	385	420	4	490	545	4
	CuSn, Pb-free copper, electrolytic copper		100	29	280	330	360	4	420	465	4
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							
	$\alpha$ and $\beta$ alloys	hardened	$R_m$ 1050	36							
H Hardened steel		hardened and tempered	55 HRC	37							
		hardened and tempered	60 HRC	38							
H Hard cast iron		cast	400	39							
H 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 B444.  
 For examples of material for cutting tool groups view page D22.