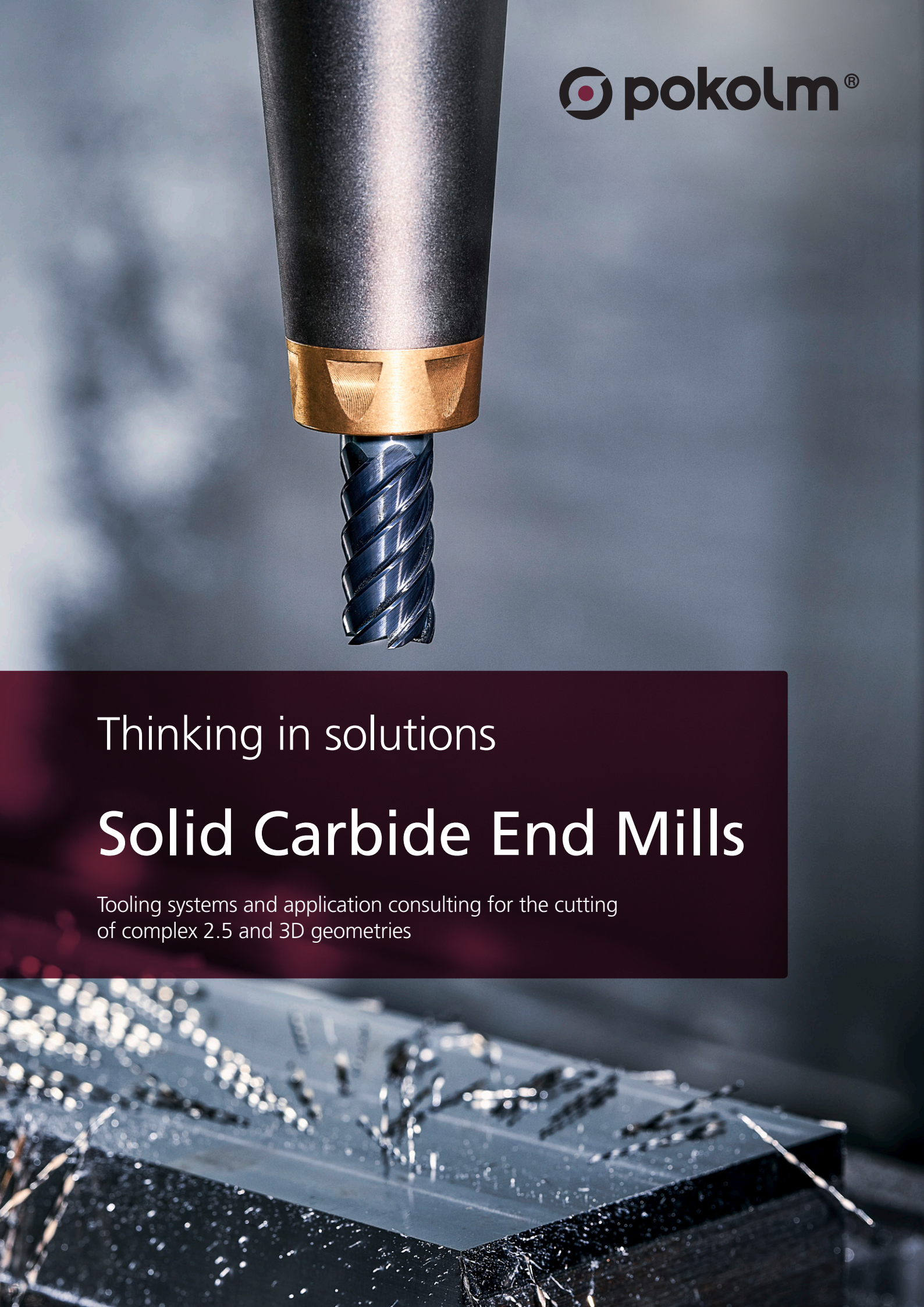


pokolm®

Thinking in solutions

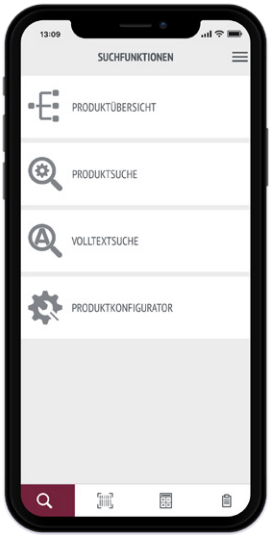
Solid Carbide End Mills

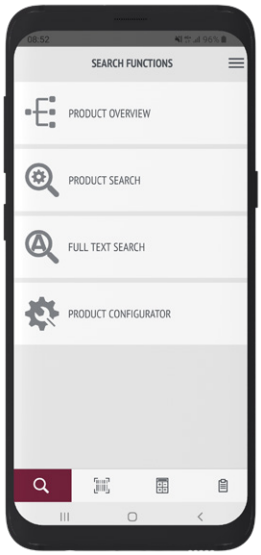
Tooling systems and application consulting for the cutting of complex 2.5 and 3D geometries

Experience the Pokolm Guide

Pokolm offers a wide range of useful functions for milling technology users, streamlined into a single app. Each one of these is a helpful tool facilitating everyday work.

Once the app is installed, all key functions are available even without an internet connection. The Pokolm app is available in both IOS and Android versions.





The Pokolm Guide offers the following functions for you:

- Search function

  Product tree: Targeted selection by milling cutter bodies, solid carbide end mills, and arbors and adapters

  Search function: The product selection can be limited using easy to understand parameter settings for material, processing type, tool, and available machine equipment.

  Full text search: Free text search throughout the entire product range; other products that can be combined with the selected item are also displayed.

  Product configurator: convenient parameter selection based on the machine, processing type, tool, and even geometric data for the processed workpiece delivers all usable combinations of milling cutters, cutting inserts, and mounts that can be used to achieve the desired milling result.

- **Scanner**: the scanner can be used to scan bar codes and QR codes. For instance, scanning the bar code on the packaging of POKOLM cutting inserts will direct you to the relevant cutting material in the product database, which is the fastest way to find detailed cutting data for all material and machining options. Selections will be adopted directly into the cutting data calculator.

- **Memo**: all products can be marked with an asterisk to add a memo to them.

If the user has an internet connection, images and drawings of all tools can be enlarged, and CAM data is available for download in different formats, or to send as an e-mail attachment.

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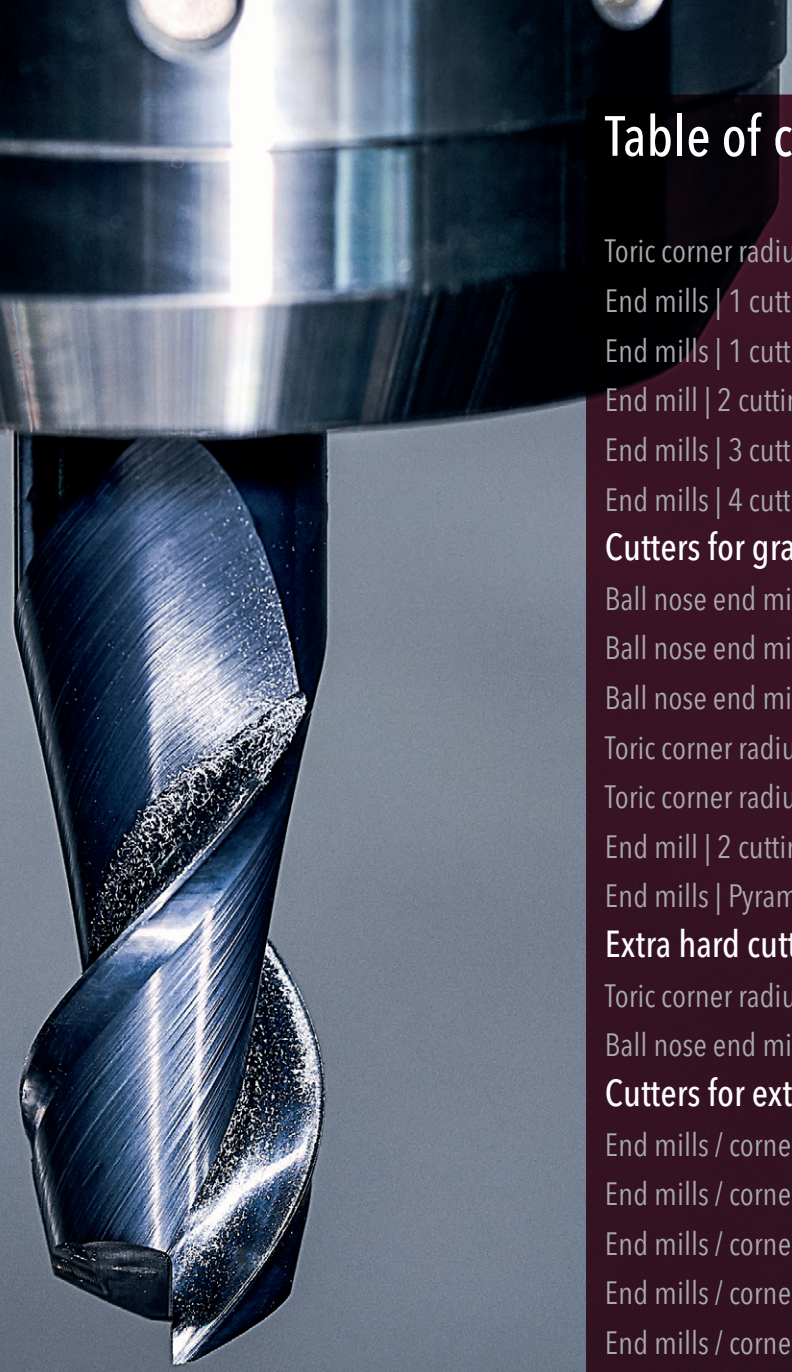

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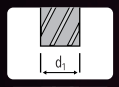
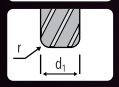
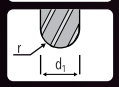
Pictograms



Sharp cutting edge cutter type



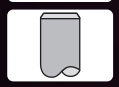
Bull end cutter type

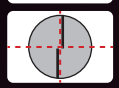


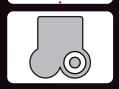
Spherical head cutter type

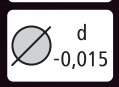

Internal coolant supply


Weldon

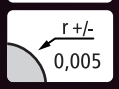

Cylindrical


Center cut

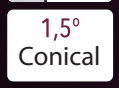

Toric tool



High-precision: d_1= - 0.015



High-precision: r = +/- 0.005



l_3: 1.5° conical to shank

New item


Primary application

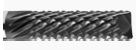

Secondary application


Empty - Primary application - Secondary application

Product overview

Cutters	Page	Tool properties							Material group ISO 513					
		d_1 Diameter	l_2 Cutting edge length	r Radius					P	M	K	H	S	H
Universal steel mills up to 52 HRC														
Ball nose end mills														
NEW 2 cutting edges	12	0.4 - 20	0.6 - 30	-			•	•		-		-	-	
2 cutting edges | conical	15	0.4 - 12	0.6 - 18	-			•	•		-		-	-	
4 cutting edges	17	2 - 20	3 - 50	-			•	•		-		-	-	
4 cutting edges | conical	19	3 - 10	4.5 - 15	-			•	•		-		-	-	
Toric corner radius end mills														
2 cutting edges	21	0.5 - 12	0.8 - 18	0.1 - 5	•			•				-	-	
2 cutting edges | conical	25	2 - 10	3 - 15	0.2 - 2	•			•					-	
3 cutting edges	27	6 - 16	12 - 24	2 - 7	•					-		-	-	-
4 cutting edges	29	2 - 16	3 - 24	0.2 - 2	•			•		-		-	-	
4 cutting edges | conical	32	3 - 10	4.5 - 15	1 - 2	•			•		-		-	-	
End mills														
2 cutting edges	34	0.4 - 20	0.6 - 75	-		•		•						
4 cutting edges	37	1.5 - 20	2.5 - 40	-		•		•						
Steel mills up to 58 HRC														
Ball nose end mills														
NEW 2 cutting edges	40	0.1 - 16	0.1 - 16	-			•	•						
Toric corner radius end mills														
NEW 2 cutting edges	44	0.1 - 12	0.1 - 12	0.02 - 2	•			•				-		
6 and 8 cutting edges	49	6 - 20	12 - 40	1 - 2	•			•		-	-	-	-	
End mills														
4 to 8 cutting edges	50	4 - 20	8 - 60	-		•		•		-		-	-	
Steel mills over 58 HRC														
Ball nose end mills														
2 cutting edges	53	1 - 12	1 - 12	-			•	•		-	-	-	-	
Toric corner radius end mills														
5 cutting edges	55	6 - 16	4.5 - 10.5	2 - 5	•					-	-	-	-	
Steel mills up to 65 HRC														
Ball nose end mills														
NEW 2 cutting edges	57	0.3 - 12	0.3 - 12	-			•	•		-	-	-	-	
Toric corner radius end mills														
NEW 2 cutting edges	61	0.4 - 12	0.4 - 12	0.1 - 2	•			•		-	-	-	-	
NEW 5 cutting edges	66	4 - 12	4.2 - 12.5	0.5 - 2	•			•		-	-	-	-	

Product overview

Cutters	Page	Tool properties							Material group ISO 513					
		d_1 Diameter	l_2 Cutting edge length	r Radius					P	M	K	H	S	H
Microfinishing to 2.5 mm														
Ball nose end mills														
 2 cutting edges	69	0.2 - 2	0.5 - 5	-			•	•						-
For stainless steels and titanium alloys														
Ball nose end mills														
NEW  2 cutting edges	71	0.1 - 16	0.1 - 16	-			•	•	-		-	-		-
NEW  4 cutting edges	73	6 - 20	7 - 30	-			•	•	-		-	-		-
Toric corner radius end mills														
NEW  2 cutting edges	74	0.1 - 12	0.1 - 12	0.02 - 2	•			•	-		-	-		-
 4 cutting edges non-uniform	77	3 - 25	8 - 50	0.2 - 3	•			•	-		-	-		-
End mills														
 4 cutting edges	79	3 - 25	8 - 50	-		•		•	-		-	-		-
NEW  6 cutting edges non-uniform	81	6 - 12	12 - 24	-		•		•	-		-	-		-
End mills Aluminum | copper | plastic end mills														
Ball nose end mills														
 2 cutting edges	83	1 - 20	0.6 - 35	-			•	•	-		-			-
Toric corner radius end mills														
 2 cutting edges	87	0.4 - 20	1 - 28	0.12 - 5	•			•	-		-			-
End mills														
 1 cutting edge for alu. and NF	91	1 - 12	5 - 22	-		•			-	-	-		-	-
 1 c.e. for plastics and alu.	93	1 - 8	5 - 20	-		•			-	-	-		-	-
 2 cutting edges	95	1 - 20	2 - 40	-		•		•	-		-			-
 3 cutting edges for aluminum	98	2 - 16	6 - 32	-		•		•	-		-			-
 4 cutting edges for aluminum	100	6 - 16	8 - 18	0.5 - 2	•			•	-		-			-
End mills | GFC | CFRP														
Ball nose end mills														
 2 cutting edges	102	0.3 - 12	0.3 - 18	-			•	•	-		-		-	-
 3 cutting edges	105	10 - 20	15 - 30	-			•	•	-	-	-		-	-
NEW  Pyramid tooth	106	4 - 16	12 - 36	-			•	•	-	-	-		-	-
Toric corner radius end mills														
NEW  2 cutting edges	107	0.4 - 10	0.6 - 15	0.05 - 1	•			•	-	-	-		-	-
 3 cutting edges	110	3 - 16	4.5 - 60	0.3 - 1	•			•	-	-	-		-	-
End mills														
 2 cutting edges	113	3 - 12	10 - 30	-		•		•	-	-	-		-	-
NEW  Pyramid tooth	114	4 - 12	16 - 30	-		•		•	-	-	-		-	-

Product overview

Cutters	Page	Tool properties							Material group ISO 513					
		d_1 Diameter	l_2 Cutting edge length	r Radius					P	M	K	H	S	H
Extra hard cutting material CVD														
Toric corner radius end mills														
NEW  2 cutting edges	116	2 - 12	2.5 - 9	0.2 - 1	•			•	-	-	-		-	-
Ball nose end mill														
NEW  2 cutting edges	118	2 - 12	2.5 - 9	-			•	•	-	-	-		-	-
Extreme cutting HPC														
End/corner radius end mills														
NEW  3 and 4 cutting edges	120	2 - 20	4 - 62	-		•		•		-		-	-	
NEW  4 cutting edges bull end	123	3 - 20	6 - 62	0.3 - 1	•			•						
 4 cutting edges HPC	126	6 - 20	14 - 50	0.5 - 2	•			•			-			-
 4 cutting edges working depth	128	6 - 20	8 - 22	0.3 - 1	•	•		•		-	-	-	-	
NEW  4 cutting edges HPC | Titanium	130	6 - 20	14 - 42	0.5 - 2	•			•	-	-	-	-		-
Circular radius end mill														
Type K - tapered														
NEW  3 and 4 cutting edges	133	6 - 12	9.58 - 13.5	-				•					-	
Type T - drop shape														
NEW  3 and 4 cutting edges	134	2 - 12	3.19 - 26.66	-				•					-	
High-feed cutters														
High-feed cutters														
 3 cutting edges	136	2 - 16	2 - 16	0.15 - 1.4		•				-		-	-	
 4 cutting edges	138	3 - 16	3 - 16	0.2 - 3		•						-		
 4 cutting edges | internal cooling supply	140	4 - 16	4 - 16	0.3 - 1.4		•						-		
NEW  4 and 6 cutting edges	142	2 - 16	2 - 16	0.18 - 1.47		•				-	-	-	-	

Universal steel mills up to 52 HRC

Ball nose, toric, bull end, and end mills

Properties

- 2 to 4 cutting edges
- conical
- Ball nose end mill
- Toric corner radius end mills
- End mills

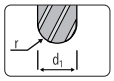
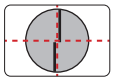
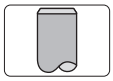
Contents

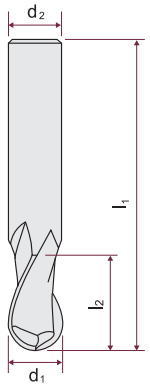
Cutting materials

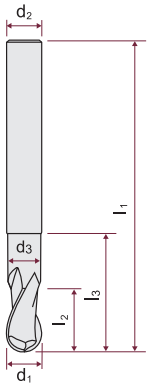
Coating quality	ISO application P	M	K	N	S	H	Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
MGC PVTi	▼	▽	▼	▽	-	▼	0.4 - 20	0.6 - 75	2 - 4	0 - 10
MGC PVCC	▽	-	▼	-	-	-	6 - 12	12 - 24	3	2 - 7

Universal steel mill up to 52 HRC

Ball nose end mill | 2 cutting edges

d_1 0.4 - 20	z 2	r -	γ° 9° λ° 30°	MGC PVTi
				





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short | long | extra long													
NVV 1222 56 0041	0.4	0.6	-	-	50	0.2	4	2	0.8	1.0	1.1	1.2	1.4
NVV 1222 56 0051	0.5	0.8	-	-	50	0.25	4	2	1.1	1.2	1.3	1.4	1.7
NVV 1222 56 0061	0.6	0.9	-	-	50	0.3	4	2	1.2	1.3	1.4	1.6	1.8
NVV 1222 56 0081	0.8	1.2	-	-	50	0.4	4	2	1.5	1.7	1.8	1.9	2.2
NVV 1222 56 011	1	1.5	-	-	50	0.5	4	2	1.8	2.0	2.2	2.3	2.5
NVV 1222 56 0101	1	1.5	-	-	57	0.5	6	2	1.8	2.0	2.2	2.3	2.5
NVV 1232 56 010	1	1.5	-	-	75	0.5	6	2	1.8	2.0	2.2	2.3	2.5
NVV 1222 56 0121	1.2	1.8	-	-	50	0.6	4	2	2.2	2.4	2.5	2.6	2.9
NVV 1222 56 0141 NEW	1.4	2	-	-	50	0.7	4	2	2.4	2.6	2.7	2.9	3.1
NVV 1222 56 0152	1.5	2.2	-	-	50	0.75	4	2	2.6	2.8	3.0	3.1	3.4
NVV 1222 56 0151	1.5	2.2	-	-	57	0.75	6	2	2.6	2.8	3.0	3.1	3.4
NVV 1232 56 015 NEW	1.5	2.3	-	-	75	0.75	6	2	2.7	2.9	3.1	3.2	3.5
NVV 1222 56 0161	1.6	2.4	-	-	50	0.8	4	2	2.8	3.0	3.2	3.3	3.6
NVV 1222 56 0181	1.8	2.7	-	-	50	0.9	4	2	3.1	3.4	3.5	3.7	4.0
NVV 1222 56 0201	2	3	-	-	50	1	4	2	3.5	3.7	3.9	4.0	4.3
NVV 1222 56 021	2	3	-	-	57	1	6	2	3.5	3.7	3.9	4.0	4.3
NVV 1232 56 020	2	3	-	-	75	1	6	2	3.5	3.7	3.9	4.0	4.3
NVV 1222 56 0252 NEW	2.5	4	-	-	50	1.25	4	2	4.5	4.8	5.0	5.2	5.5
NVV 1222 56 025 NEW	2.5	4	-	-	57	1.25	6	2	4.5	4.8	5.0	5.2	5.5
NVV 1232 56 025 NEW	2.5	4	-	-	75	1.25	6	2	4.5	4.8	5.0	5.2	5.5
NVV 1222 56 0301	3	4.5	-	-	50	1.5	4	2	5.1	5.3	5.5	5.7	6.1
NVV 1222 56 030	3	4.5	-	-	57	1.5	6	2	5.1	5.3	5.5	5.7	6.1
NVV 1232 56 030	3	4.5	-	-	75	1.5	6	2	5.1	5.3	5.5	5.7	6.1
NVV 1222 56 0401	4	6	-	-	50	2	4	2	-	-	-	-	-
NVV 1222 56 040	4	6	-	-	57	2	6	2	6.6	6.9	7.2	7.4	7.8
NVV 1232 56 040	4	6	-	-	75	2	6	2	6.6	6.9	7.2	7.4	7.8

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 1222 56 050	5	7.5	-	-	57	2.5	6	2	8.2	8.5	8.8	9.0	9.6
NVV 1232 56 050	5	7.5	-	-	75	2.5	6	2	8.2	8.5	8.8	9.0	9.6
NVV 1232 56 055	5.5	8.5	-	-	75	2.75	6	2	-	-	-	-	-
NVV 1222 56 060	6	9	-	-	57	3	6	2	-	-	-	-	-
NVV 1232 56 060	6	9	-	-	75	3	6	2	-	-	-	-	-
NVV 1132 56 060	6	40	-	-	100	3	6	2	-	-	-	-	-
NVV 1222 56 070 NEW	7	10.5	-	-	63	3.5	8	2	11.3	11.7	12.0	12.3	-
NVV 1232 56 070 NEW	7	10.5	-	-	90	3.5	8	2	-	-	-	-	-
NVV 1222 56 080	8	12	-	-	63	4	8	2	-	-	-	-	-
NVV 1232 56 080	8	12	-	-	90	4	8	2	-	-	-	-	-
NVV 1222 56 090 NEW	9	13	-	-	72	4.5	10	2	13.9	14.3	14.7	15.0	-
NVV 1222 56 100	10	15	-	-	72	5	10	2	-	-	-	-	-
NVV 1232 56 100	10	15	-	-	100	5	10	2	-	-	-	-	-
NVV 1132 56 100	10	45	-	-	100	5	10	2	-	-	-	-	-
NVV 1222 56 120	12	18	-	-	83	6	12	2	-	-	-	-	-
NVV 1132 56 120	12	45	-	-	100	6	12	2	-	-	-	-	-
NVV 1232 56 120	12	18	-	-	110	6	12	2	-	-	-	-	-
NVV 1222 56 140	14	21	-	-	83	7	14	2	-	-	-	-	-
NVV 1222 56 160	16	24	-	-	92	8	16	2	-	-	-	-	-
NVV 1232 56 160	16	24	-	-	140	8	16	2	-	-	-	-	-
NVV 1222 56 180 NEW	18	27	-	-	92	9	18	2	-	-	-	-	-
NVV 1222 56 200	20	30	-	-	104	10	20	2	-	-	-	-	-
NVV 1232 56 200	20	30	-	-	150	10	20	2	-	-	-	-	-
With AT | short | long | extra long													
NVV 1322 56 020	2	3	10	1.9	75	1	6	2	11.2	11.5	11.8	12.1	12.7
NVV 1322 56 030	3	4.5	12	2.9	75	1.5	6	2	13.2	13.6	13.9	14.2	15.0
NVV 1322 56 040	4	6	12	3.8	75	2	6	2	13.4	13.7	14.0	14.3	15.0
NVV 1322 56 050	5	7.5	15	4.8	75	2.5	6	2	16.5	16.8	17.2	-	-
NVV 1322 56 060	6	9	20	5.8	75	3	6	2	-	-	-	-	-
NVV 1322 56 080	8	12	26	7.8	90	4	8	2	-	-	-	-	-
NVV 1322 56 100	10	15	31	9.8	100	5	10	2	-	-	-	-	-
NVV 1322 56 120	12	18	37	11.8	110	6	12	2	-	-	-	-	-
NVV 1322 56 160	16	24	43	15.8	140	8	16	2	-	-	-	-	-

Application data (fz / ap)

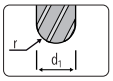
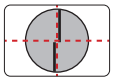
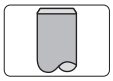
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
0.4 - 0.8	fz (mm) ap (mm)	0.005-0.0125 0.005-0.055	-	0.005-0.02 0.01-0.1	-	-	0.005-0.015 0.005-0.05
1 - 2.5	fz (mm) ap (mm)	0.01-0.025 0.05-0.13	-	0.01-0.04 0.06-0.2	-	-	0.01-0.03 0.04-0.1
3 - 4	fz (mm) ap (mm)	0.04-0.07 0.08-0.4	-	0.04-0.07 0.06-0.4	-	-	0.04-0.07 0.08-0.2
5 - 6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	0.08-0.12 0.12-0.6	-	-	0.08-0.15 0.1-0.3
7 - 8	fz (mm) ap (mm)	0.08-0.15 0.15-0.8	-	0.08-0.15 0.15-0.8	-	-	0.08-0.15 0.15-0.4
9 - 10	fz (mm) ap (mm)	0.08-0.15 0.2-1	-	0.08-0.15 0.3-1	-	-	0.08-0.2 0.2-0.5
12	fz (mm) ap (mm)	0.08-0.15 0.2-1.2	-	0.08-0.15 0.3-1.2	-	-	0.08-0.25 0.2-0.6
14	fz (mm) ap (mm)	0.08-0.15 0.2-1.4	-	0.08-0.15 0.3-1.4	-	-	0.08-0.25 0.2-0.7
16	fz (mm) ap (mm)	0.1-0.25 0.2-1.6	-	0.1-0.25 0.3-1.6	-	-	0.08-0.25 0.2-0.8
18	fz (mm) ap (mm)	0.1-0.25 0.2-1.8	-	0.1-0.25 0.3-1.8	-	-	0.08-0.25 0.2-0.8
20	fz (mm) ap (mm)	0.1-0.25 0.2-2	-	0.1-0.25 0.3-2	-	-	0.08-0.25 0.2-0.8

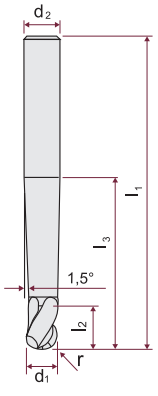
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough Fine	120 **210** 300 200 **250** 300	-	100 **225** 350 180 **290** 400	-	-	80 **140** 200 100 **175** 250

Universal steel mills up to 52 HRC

Ball nose end mills | 2 cutting edges | conical

d_1 0.4 - 12	z 2	r -	γ° 9° λ° 30°	MGC PVTi
			1,5° konisch	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
1.5 degrees conical | reinforced shank													
NVV 1162 56 0041	0.4	0.6	25	-	75	0.2	6	2	-	-	-	-	-
NVV 1162 56 010	1	1.5	25	-	75	0.5	6	2	5.00	9.51	26.14	27.06	28.14
NVV 1162 56 0101	1	1.5	39	-	75	0.5	6	2	5.00	9.51	39.82	41.07	42.38
NVV 1162 56 015	1.5	2.3	25	-	75	0.75	4	2	7.13	13.51	26.32	27.15	28.19
NVV 1162 56 020	2	3	25	-	75	1	6	2	8.50	16.01	26.41	27.20	28.21
NVV 1162 56 021	2	3	50	-	100	1	6	2	8.50	16.01	51.41	52.73	-
NVV 1162 56 025	2.5	4	25	-	75	1.25	6	2	9.88	18.52	26.50	27.25	28.23
NVV 1162 56 030	3	4.5	25	-	75	1.5	6	2	9.75	18.02	26.47	27.23	28.21
NVV 1162 56 031 NEW	3	4.5	50	-	100	1.5	6	2	9.75	18.02	51.47	-	-
NVV 1162 56 040	4	6	25	-	75	2	6	2	12.50	23.03	26.11	26.56	-
NVV 1162 56 0401	4	6	39	-	75	2	6	2	12.50	23.03	40.11	-	-
NVV 1162 56 041	4	6	44	-	100	2	6	2	12.50	23.03	-	-	-
NVV 1162 56 050	5	7.5	25	-	75	2.5	6	2	15.25	25.45	-	-	-
NVV 1162 56 051	5	7.5	50	-	90	2.5	8	2	15.25	25.45	51.21	-	-
NVV 1162 56 060	6	9	35	-	75	3	8	2	18.00	33.05	36.30	-	-
NVV 1162 56 061	6	9	50	-	100	3	10	2	19.51	36.04	51.36	52.01	-
NVV 1162 56 080	8	12	50	-	100	4	10	2	22.01	40.06	-	-	-
NVV 1162 56 081	8	12	90	-	150	4	12	2	23.51	43.06	-	-	-
NVV 1162 56 100	10	15	50	-	110	5	12	2	27.51	50.08	-	-	-
NVV 1162 56 101	10	15	50	-	150	5	12	2	27.51	50.08	-	-	-
NVV 1162 56 121	12	18	90	-	150	6	16	2	31.51	57.09	-	-	-

Application data (fz / ap)

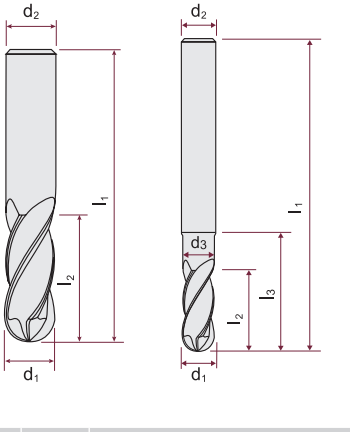
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
0.4	fz (mm)	0.005-0.0125	-	0.005-0.02	-	-	0.005-0.015
	ap (mm)	0.005-0.055		0.01-0.1			0.005-0.05
1 - 2.5	fz (mm)	0.01-0.025	-	0.01-0.04	-	-	0.01-0.03
	ap (mm)	0.05-0.13		0.06-0.2			0.04-0.1
3 - 4	fz (mm)	0.04-0.07	-	0.04-0.07	-	-	0.04-0.07
	ap (mm)	0.08-0.4		0.06-0.4			0.08-0.2
5 - 6	fz (mm)	0.08-0.12	-	0.08-0.12	-	-	0.08-0.15
	ap (mm)	0.1-0.6		0.12-0.6			0.1-0.3
8	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.15
	ap (mm)	0.15-0.8		0.15-0.8			0.15-0.4
10	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.2
	ap (mm)	0.2-1		0.3-1			0.2-0.5
12	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.25
	ap (mm)	0.2-1.2		0.3-1.2			0.2-0.6

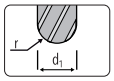
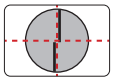
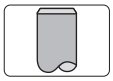
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	-	-	100 **225** 350	-	-	80 **140** 200
	Fine	150 **225** 300		180 **290** 400			100 **175** 250

Universal steel mills up to 52 HRC

Ball nose end mills | 4 cutting edges



d_1 2 - 20	z 4	r -	γ° 9° λ° 30°	MGC PVTi
				

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short | long | extra long													
NVV 1224 56 020	2	3	-	-	57	1	6	4	3.46	3.68	3.87	4.03	4.31
NVV 1224 56 030	3	4.5	-	-	57	1.5	6	4	5.06	5.32	5.52	5.71	6.06
NVV 1224 56 0301	3	6	-	-	57	1.5	6	4	6.67	6.97	7.22	7.44	7.92
NVV 1224 56 040	4	6	-	-	57	2	6	4	6.64	6.93	7.16	7.36	7.80
NVV 1224 56 050	5	7.5	-	-	57	2.5	6	4	8.20	8.52	8.78	9.01	9.55
NVV 1224 56 060	6	9	-	-	57	3	6	4	-	-	-	-	-
NVV 1224 56 0601	6	12	-	-	57	3	6	4	-	-	-	-	-
NVV 1224 56 080	8	12	-	-	63	4	8	4	-	-	-	-	-
NVV 1224 56 100	10	15	-	-	72	5	10	4	-	-	-	-	-
NVV 1224 56 1001	10	20	-	-	72	5	10	4	-	-	-	-	-
NVV 1224 56 120	12	18	-	-	83	6	12	4	-	-	-	-	-
NVV 1224 56 1201	12	24	-	-	83	6	12	4	-	-	-	-	-
NVV 1224 56 160	16	24	-	-	92	8	16	4	-	-	-	-	-
NVV 1134 46 160	16	50	-	-	100	8	16	4	-	-	-	-	-
NVV 1224 56 200	20	30	-	-	104	10	20	4	-	-	-	-	-
with AT | long													
NVV 1324 56 020	2	3	10	1.9	75	1	6	4	11.17	11.51	11.80	12.08	12.71
NVV 1324 56 030	3	4.5	12	2.9	75	1.5	6	4	13.23	13.60	13.91	14.24	14.96
NVV 1324 56 040	4	6	12	3.8	75	2	6	4	13.40	13.72	14.02	14.34	15.04
NVV 1324 56 050	5	7.5	15	4.8	75	2.5	6	4	16.47	16.85	17.22	-	-
NVV 1324 56 060	6	9	20	5.8	75	3	6	4	-	-	-	-	-
NVV 1324 56 061	6	9	20	5.8	100	3	6	4	-	-	-	-	-
NVV 1324 56 080	8	12	26	7.8	90	4	8	4	-	-	-	-	-
NVV 1324 56 100	10	15	31	9.8	100	5	10	4	-	-	-	-	-
NVV 1324 56 120	12	18	37	11.8	110	6	12	4	-	-	-	-	-
NVV 1324 56 160	16	24	43	15.8	110	8	16	4	-	-	-	-	-
NVV 1324 56 200	20	30	53	19.8	150	10	20	4	-	-	-	-	-

Application data (fz / ap)

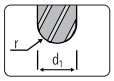
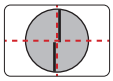
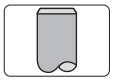
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
2	fz (mm)	0.01-0.025	-	0.01-0.04	-	-	0.01-0.03
	ap (mm)	0.05-0.13		0.06-0.2			0.04-0.1
3 - 4	fz (mm)	0.04-0.07	-	0.04-0.07	-	-	0.04-0.07
	ap (mm)	0.08-0.4		0.06-0.4			0.08-0.2
5 - 6	fz (mm)	0.08-0.12	-	0.08-0.12	-	-	0.08-0.15
	ap (mm)	0.1-0.6		0.12-0.6			0.1-0.3
8	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.15
	ap (mm)	0.15-0.8		0.15-0.8			0.15-0.4
10	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.2
	ap (mm)	0.2-1		0.3-1			0.2-0.5
12	fz (mm)	0.08-0.15	-	0.08-0.15	-	-	0.08-0.25
	ap (mm)	0.2-1.2		0.3-1.2			0.2-0.6
16	fz (mm)	0.1-0.25	-	0.1-0.25	-	-	0.08-0.25
	ap (mm)	0.2-1.6		0.3-1.6			0.2-0.8
20	fz (mm)	0.1-0.25	-	0.1-0.25	-	-	0.08-0.25
	ap (mm)	0.2-2		0.3-2			0.2-0.8

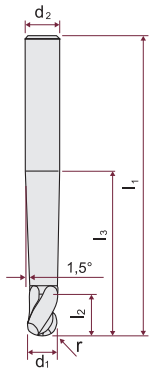
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	100 **225** 350	-	-	80 **140** 200
	Fine	200 **250** 300		180 **290** 400			100 **175** 250

Universal steel mills up to 52 HRC

Ball nose end mills | 4 cutting edges | conical

d_1 3 - 10	z 4	r -	γ° 9° λ° 30°	MGC PVTi
			1,5° konisch	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
1.5 degrees conical | reinforced shank													
NVV 1164 56 030	3	4.5	25	-	75	1.5	6	4	9.75	18.02	26.47	27.23	28.21
NVV 1164 56 031	3	4.5	50	-	100	1.5	6	4	9.75	18.02	51.47	-	-
NVV 1164 56 040	4	6	25	-	75	2	6	4	12.50	23.03	26.11	26.56	-
NVV 1164 56 041	4	6	50	-	100	2	6	4	12.50	23.03	-	-	-
NVV 1164 56 050	5	7.5	25	-	75	2.5	6	4	15.25	25.45	-	-	-
NVV 1164 56 051	5	7.5	50	-	90	2.5	8	4	15.25	25.45	51.21	-	-
NVV 1164 56 060	6	9	35	-	75	3	8	4	18.00	33.05	36.30	-	-
NVV 1164 56 061	6	9	50	-	100	3	10	4	19.51	36.04	51.36	52.01	-
NVV 1164 56 080	8	12	50	-	100	4	10	4	22.01	40.06	-	-	-
NVV 1164 56 081	8	12	90	-	150	4	12	4	23.51	43.06	-	-	-
NVV 1164 56 100	10	15	50	-	110	5	12	4	27.51	50.08	-	-	-
NVV 1164 56 101	10	15	50	-	150	5	12	4	27.51	50.08	-	-	-

Application data (fz / ap)

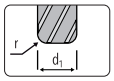
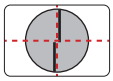
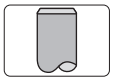
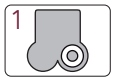
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
3 - 4	fz (mm) ap (mm)	0.04-0.07 0.08-0.4	-	0.04-0.07 0.06-0.4	-	-	0.04-0.07 0.08-0.2
5 - 6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	0.08-0.12 0.12-0.6	-	-	0.08-0.12 0.1-0.3
8	fz (mm) ap (mm)	0.08-0.15 0.15-0.8	-	0.08-0.15 0.15-0.8	-	-	0.08-0.12 0.15-0.4
10	fz (mm) ap (mm)	0.08-0.15 0.2-1	-	0.08-0.15 0.3-1	-	-	0.08-0.12 0.2-0.5

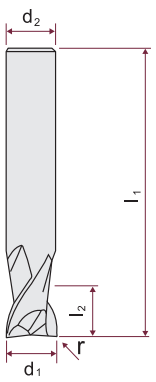
Speed (Vc in m/min)

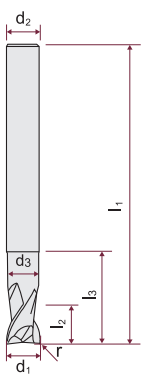
Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough Fine	120 **210** 300 200 **250** 300	-	100 **225** 350 180 **290** 400	-	-	80 **140** 200 100 **175** 250

Universal steel mills up to 52 HRC

Toric corner radius end mills | 2 cutting edges

d_1 0.5 - 12	z 2	r 0.1 - 5	γ° 9° λ° 30°	MGC PVTi
				





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0332 56 00501	0.5	0.8	-	-	50	0.1	4	2	0.74	0.87	0.98	1.09	1.29
NVV 0332 56 01001	1	1.5	-	-	50	0.1	4	2	1.90	2.09	2.25	2.39	2.65
NVV 0332 56 01002	1	1.5	-	-	50	0.2	4	2	1.88	2.07	2.23	2.37	2.62
NVV 0332 56 01502	1.5	2.3	-	-	50	0.2	4	2	2.77	3.00	3.18	3.34	3.63
NVV 0332 56 02002	2	3	-	-	50	0.2	4	2	3.54	3.79	3.99	4.17	4.50
NVV 0332 56 02003	2	3	-	-	50	0.3	4	2	3.53	3.78	3.98	4.15	4.48
NVV 0332 56 020	2	3	-	-	50	0.5	4	2	3.51	3.75	3.95	4.12	4.43
[1]NVV 0172 56 020*	2	3	-	-	57	0.6	6	2	3.50	3.74	3.93	4.10	4.41
NVV 0332 56 03002	3	4.5	-	-	50	0.2	4	2	5.16	5.45	5.69	5.90	6.36
NVV 0332 56 03003	3	4.5	-	-	50	0.3	4	2	5.15	5.44	5.68	5.89	6.34
NVV 0332 56 030	3	4.5	-	-	50	0.5	4	2	5.14	5.42	5.66	5.86	6.29
NVV 0332 56 031	3	4.5	-	-	50	1	4	2	5.10	5.37	5.59	5.78	6.18
NVV 0332 56 0311	3	4.5	-	-	57	1	6	2	5.10	5.37	5.59	5.78	6.18
NVV 0332 56 04002	4	6	-	-	50	0.2	4	2	-	-	-	-	-
NVV 0332 56 040021	4	6	-	-	57	0.2	6	2	6.75	7.09	7.36	7.63	8.23
NVV 0332 56 040	4	6	-	-	50	0.5	4	2	-	-	-	-	-
NVV 0332 56 0401	4	6	-	-	57	0.5	6	2	6.74	7.07	7.33	7.58	8.16
NVV 0332 56 041	4	6	-	-	50	1	4	2	-	-	-	-	-
NVV 0332 56 0411	4	6	-	-	57	1	6	2	6.70	7.02	7.27	7.51	8.04
[1]NVV 0172 56 040*	4	6	-	-	57	1.5	6	2	6.67	6.97	7.22	7.44	7.92
NVV 0332 56 05002	5	7.5	-	-	57	0.2	6	2	8.34	8.71	9.02	9.35	-
NVV 0332 56 050	5	7.5	-	-	57	0.5	6	2	8.32	8.69	8.99	9.31	10.02
NVV 0332 56 051	5	7.5	-	-	57	1	6	2	8.30	8.65	8.94	9.23	9.91
NVV 0332 56 06003	6	9	-	-	57	0.3	6	2	-	-	-	-	-
NVV 0332 56 060	6	9	-	-	57	0.5	6	2	-	-	-	-	-
NVV 0332 56 061	6	9	-	-	57	1	6	2	-	-	-	-	-

* Deviating values: γ°=2°; λ°=30°

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0332 56 062	6	9	-	-	57	1.5	6	2	-	-	-	-	-
[1]NVV 0172 56 060	6	9	-	-	57	2	6	2	-	-	-	-	-
[1]NVV 0172 56 061*	6	9	-	-	57	2.5	6	2	-	-	-	-	-
NVV 0332 56 080	8	12	-	-	63	0.5	8	2	-	-	-	-	-
NVV 0332 56 081	8	12	-	-	63	1	8	2	-	-	-	-	-
NVV 0332 56 082	8	12	-	-	63	1.5	8	2	-	-	-	-	-
NVV 0332 56 083	8	12	-	-	63	2	8	2	-	-	-	-	-
[1]NVV 0172 56 080*	8	12	-	-	63	2.5	8	2	-	-	-	-	-
NVV 0172 56 081 NEW	8	12	-	-	63	3	8	2	-	-	-	-	-
NVV 0332 56 100	10	15	-	-	72	0.5	10	2	-	-	-	-	-
NVV 0332 56 101	10	15	-	-	72	1	10	2	-	-	-	-	-
NVV 0332 56 102	10	15	-	-	72	1.5	10	2	-	-	-	-	-
NVV 0332 56 103	10	15	-	-	72	2	10	2	-	-	-	-	-
[1]NVV 0172 56 100*	10	15	-	-	72	2.5	10	2	-	-	-	-	-
[1]NVV 0172 56 101*	10	15	-	-	72	3	10	2	-	-	-	-	-
[1]NVV 0172 56 103*	10	15	-	-	72	4	10	2	-	-	-	-	-
NVV 0332 56 120	12	18	-	-	83	0.5	12	2	-	-	-	-	-
NVV 0332 56 1206	12	18	-	-	83	0.6	12	2	-	-	-	-	-
NVV 0332 56 121	12	18	-	-	83	1	12	2	-	-	-	-	-
NVV 0332 56 122	12	18	-	-	83	1.5	12	2	-	-	-	-	-
NVV 0332 56 123	12	18	-	-	83	2	12	2	-	-	-	-	-
[1]NVV 0172 56 121*	12	18	-	-	83	3	12	2	-	-	-	-	-
[1]NVV 0172 56 123*	12	18	-	-	83	4	12	2	-	-	-	-	-
[1]NVV 0172 56 124*	12	18	-	-	83	5	12	2	-	-	-	-	-
with AT | short | long													
NVV 0362 56 020	2	3	10	1.9	75	0.5	6	2	11.19	11.54	11.83	12.14	12.79
NVV 0362 56 030	3	4.5	12	2.9	75	0.5	6	2	13.26	13.65	14.00	14.35	15.13
NVV 0362 56 031	3	4.5	12	2.9	75	1	6	2	13.24	13.62	13.95	14.30	15.05
NVV 0362 56 040	4	6	12	3.8	75	0.5	6	2	13.44	13.79	14.14	14.50	15.29
NVV 0362 56 041	4	6	12	3.8	75	1	6	2	13.43	13.77	14.10	14.45	15.21
NVV 0362 56 050	5	7.5	15	4.8	75	0.5	6	2	16.53	16.95	17.37	-	-
NVV 0362 56 051	5	7.5	15	4.8	75	1	6	2	16.52	16.92	17.33	-	-
NVV 0362 56 060	6	9	20	5.8	75	0.5	6	2	-	-	-	-	-
NVV 0362 56 061	6	9	20	5.8	75	1	6	2	-	-	-	-	-
NVV 0362 56 0611	6	9	20	5.8	100	1	6	2	-	-	-	-	-

* Deviating values: γ°=2°; λ°=30°

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0362 56 062	6	9	20	5.8	75	1.5	6	2	-	-	-	-	-
[1]NVV 0182 56 060**	6	9	20	5.8	75	2	6	2	-	-	-	-	-
[1]NVV 0182 56 061**	6	9	20	5.8	75	2.5	6	2	-	-	-	-	-
NVV 0362 56 080	8	12	26	7.8	90	0.5	8	2	-	-	-	-	-
NVV 0362 56 081	8	12	26	7.8	90	1	8	2	-	-	-	-	-
NVV 0362 56 082	8	12	26	7.8	90	1.5	8	2	-	-	-	-	-
NVV 0362 56 083	8	12	26	7.8	90	2	8	2	-	-	-	-	-
[1]NVV 0182 56 080**	8	12	26	7.8	90	2.5	8	2	-	-	-	-	-
[1]NVV 0182 56 081**	8	12	26	7.8	90	3	8	2	-	-	-	-	-
NVV 0362 56 100	10	15	31	9.8	100	0.5	10	2	-	-	-	-	-
NVV 0362 56 101	10	15	31	9.8	100	1	10	2	-	-	-	-	-
NVV 0362 56 102	10	15	31	9.8	100	1.5	10	2	-	-	-	-	-
NVV 0362 56 103	10	15	31	9.8	100	2	10	2	-	-	-	-	-
[1]NVV 0182 56 100**	10	15	31	9.8	100	2.5	10	2	-	-	-	-	-
[1]NVV 0182 56 101**	10	15	31	9.8	100	3	10	2	-	-	-	-	-
[1]NVV 0182 56 103**	10	15	31	9.8	100	4	10	2	-	-	-	-	-
NVV 0362 56 120	12	18	37	11.8	110	0.5	12	2	-	-	-	-	-
NVV 0362 56 121	12	18	37	11.8	110	1	12	2	-	-	-	-	-
NVV 0362 56 122	12	18	37	11.8	110	1.5	12	2	-	-	-	-	-
NVV 0362 56 123	12	18	37	11.8	110	2	12	2	-	-	-	-	-
[1]NVV 0182 56 123**	12	18	37	11.8	110	4	12	2	-	-	-	-	-
[1]NVV 0182 56 124**	12	18	37	11.8	110	5	12	2	-	-	-	-	-

** Deviating values: $\gamma°=1°$; $\lambda°=30°$

Application data (fz / ap)

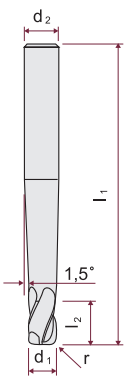
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
0.5	fz (mm)	0.005-0.02	0.005-0.02	0.005-0.02	-	-	0.005-0.015
	ap (mm)	0.005-0.1	0.005-0.08	0.01-0.1			0.005-0.05
1 - 2	fz (mm)	0.01-0.04	0.01-0.04	0.01-0.04	-	-	0.01-0.03
	ap (mm)	0.05-0.2	0.05-0.15	0.06-0.2			0.04-0.1
3 - 4	fz (mm)	0.04-0.07	0.04-0.07	0.04-0.07	-	-	0.04-0.07
	ap (mm)	0.08-0.4	0.08-0.3	0.06-0.4			0.08-0.2
5 - 6	fz (mm)	0.08-0.12	0.08-0.12	0.08-0.12	-	-	0.08-0.15
	ap (mm)	0.1-0.6	0.1-0.4	0.12-0.6			0.1-0.3
8	fz (mm)	0.08-0.115	0.08	0.08-0.15	-	-	0.08-0.15
	ap (mm)	0.15-0.525	0.15	0.15-0.8			0.15-0.4
10	fz (mm)	0.08-0.115	0.08	0.08-0.15	-	-	0.08-0.2
	ap (mm)	0.2-0.65	0.2	0.3-1			0.2-0.5
12	fz (mm)	0.08-0.115	0.08	0.08-0.15	-	-	0.08-0.25
	ap (mm)	0.2-0.75	0.2	0.3-1.2			0.2-0.6

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	100 **225** 350	-	-	80 **140** 200
	Fine	200 **250** 300	70 **110** 150	180 **290** 400			100 **175** 250

Universal steel mills up to 52 HRC

Toric corner radius end mills | 2 cutting edges | conical



d_1 2 - 10	z 2	r 0.2 - 2	γ° 9° λ° 30°	MGC PVTi
			1,5° konisch	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
1.5 degrees conical | reinforced shank													
NVV 0162 56 020	2	3	25	-	75	0.2	6	2	6.65	13.10	26.32	27.17	28.21
NVV 0162 56 0206	2	3	39	-	75	0.2	6	2	-	-	-	-	-
NVV 0162 56 022	2	3	25	-	75	0.5	6	2	6.50	12.51	26.28	27.10	28.18
NVV 0162 56 0221	2	3	39	-	75	0.5	6	2	6.50	12.51	39.97	41.14	-
NVV 0162 56 021	2	3	50	-	100	0.5	6	2	6.50	12.51	51.28	52.68	-
NVV 0162 56 03005	3	4.5	25	-	75	0.5	6	2	8.75	17.00	26.15	26.93	27.92
NVV 0162 56 030	3	4.5	25	-	75	1	6	2	8.50	16.01	26.10	26.88	27.88
NVV 0162 56 0301	3	4.5	39	-	75	1	6	2	8.50	16.01	40.10	41.19	-
NVV 0162 56 031	3	4.5	50	-	100	1	6	2	8.50	16.01	50.87	-	-
NVV 0162 56 04005	4	6	25	-	75	0.5	6	2	11.00	21.50	26.11	26.58	-
NVV 0162 56 040	4	6	25	-	75	1	6	2	10.75	20.51	26.07	26.56	-
NVV 0162 56 041	4	6	44	-	100	1	6	2	10.75	20.51	-	-	-
NVV 0162 56 050	5	7.5	25	-	75	1	6	2	13.75	25.34	-	-	-
NVV 0162 56 051	5	7.5	50	-	90	1	8	2	13.75	26.51	51.21	-	-
NVV 0162 56 060	6	9	35	-	75	1	8	2	16.00	31.01	36.30	-	-
NVV 0162 56 061	6	9	50	-	100	1	10	2	16.00	31.01	51.21	52.00	-
NVV 0162 56 080	8	12	50	-	100	2	10	2	20.00	38.03	-	-	-
NVV 0162 56 081	8	12	90	-	150	2	12	2	20.00	38.03	-	-	-
NVV 0162 56 100	10	15	50	-	110	2	12	2	24.50	47.02	-	-	-
NVV 0162 56 101	10	15	50	-	150	2	12	2	24.50	47.02	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
2	fz (mm)	0.01-0.04	0.01-0.04	0.01-0.04	0.02-0.08	-	0.01-0.03
	ap (mm)	0.05-0.2	0.05-0.15	0.06-0.2	0.1-0.7		0.04-0.1
3 - 4	fz (mm)	0.04-0.07	0.04-0.07	0.04-0.07	0.04-0.1	-	0.04-0.07
	ap (mm)	0.08-0.4	0.08-0.3	0.06-0.4	0.15-1.4		0.08-0.2
5 - 6	fz (mm)	0.08-0.12	0.08-0.12	0.08-0.12	0.06-0.15	-	0.08-0.15
	ap (mm)	0.1-0.6	0.1-0.4	0.12-0.6	0.2-2		0.1-0.3
8	fz (mm)	0.08-0.115	0.08	0.08-0.15	0.08-0.2	-	0.08-0.15
	ap (mm)	0.15-0.525	0.15	0.15-0.8	0.3-2.8		0.15-0.4
10	fz (mm)	0.08-0.115	0.08	0.08-0.15	0.08-0.25	-	0.08-0.2
	ap (mm)	0.2-0.65	0.2	0.3-1	0.4-3.5		0.2-0.5

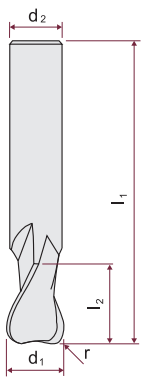
Speed (Vc in m/min)

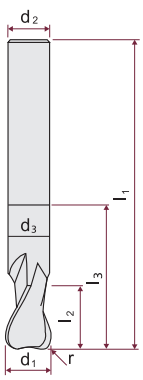
Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	-	-	100 **225** 350	-	-	80 **140** 200
	Fine	150 **225** 300	120 **135** 150	180 **290** 400	300 **450** 600		100 **175** 250

Universal steel mill up to 52 HRC

Toric corner radius end mill | 3 cutting edges

d_1	z	r	γ° 1.5°- 2° λ° 30°	MGC PVCC
6 - 16	3	2 - 7		





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0163 57 060	6	12	-	-	57	2.5	6	3	-	-	-	-	-
NVV 0163 57 080	8	16	-	-	63	3	8	3	-	-	-	-	-
NVV 0163 57 100	10	20	-	-	72	4	10	3	-	-	-	-	-
NVV 0163 57 120	12	24	-	-	83	5	12	3	-	-	-	-	-
NVV 0163 57 160	16	24	-	-	92	7	16	3	-	-	-	-	-
with AT | long													
NVV 0183 57 060	6	12	20	5.8	75	2	6	3	-	-	-	-	-
NVV 0183 57 061	6	12	20	5.8	75	2.5	6	3	-	-	-	-	-
NVV 0183 57 080	8	16	26	7.8	90	2.5	8	3	-	-	-	-	-
NVV 0183 57 081	8	16	26	7.8	90	3	8	3	-	-	-	-	-
NVV 0183 57 100	10	20	31	9.8	100	2.5	10	3	-	-	-	-	-
NVV 0183 57 101	10	20	31	9.8	100	3	10	3	-	-	-	-	-
NVV 0183 57 103	10	20	31	9.8	100	4	10	3	-	-	-	-	-
NVV 0183 57 120	12	24	37	11.8	110	2.5	12	3	-	-	-	-	-
NVV 0183 57 123	12	24	37	11.8	110	4	12	3	-	-	-	-	-
NVV 0183 57 124	12	24	37	11.8	110	5	12	3	-	-	-	-	-

Application data (fz / ap)

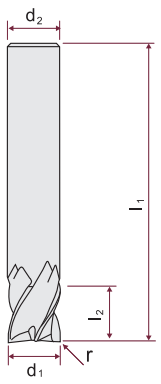
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	0.08-0.1 0.12-0.375	-	-	-
8	fz (mm) ap (mm)	0.08-0.15 0.15-0.8	-	0.08-0.115 0.15-0.525	-	-	-
10	fz (mm) ap (mm)	0.08-0.15 0.2-1	-	0.08-0.115 0.3-0.65	-	-	-
12	fz (mm) ap (mm)	0.08-0.15 0.2-1.2	-	0.08-0.115 0.3-0.75	-	-	-
16	fz (mm) ap (mm)	0.1-0.175 0.2-0.95	-	0.1-0.175 0.3-0.95	-	-	-

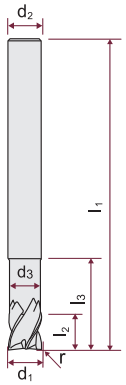
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVCC	Rough Fine	- 150 **250** 350	-	- 150 **275** 400	-	-	-

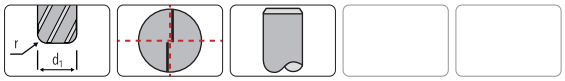
Universal steel mill up to 52 HRC

Toric corner radius end mill | 4 cutting edges





d_1	z	r	γ° 9° λ° 30°	MGC PVTi
2 - 16	4	0.2 - 2		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0334 56 02002	2	3	-	-	50	0.2	4	4	3.54	3.79	3.99	4.17	4.50
NVV 0334 56 020	2	3	-	-	50	0.5	4	4	3.51	3.75	3.95	4.12	4.43
NVV 0334 56 03002	3	4.5	-	-	50	0.2	4	4	5.16	5.45	5.69	5.90	6.36
NVV 0334 56 03003	3	4.5	-	-	50	0.3	4	4	5.15	5.44	5.68	5.89	6.34
NVV 0334 56 030	3	4.5	-	-	50	0.5	4	4	5.14	5.42	5.66	5.86	6.29
NVV 0334 56 03005	3	4.5	-	-	57	0.5	6	4	5.14	5.42	5.66	5.86	6.29
NVV 0334 56 031	3	4.5	-	-	50	1	4	4	5.10	5.37	5.59	5.78	6.18
NVV 0334 56 04002	4	6	-	-	50	0.2	4	4	-	-	-	-	-
NVV 0334 56 040	4	6	-	-	50	0.5	4	4	-	-	-	-	-
NVV 0334 56 041	4	6	-	-	50	1	4	4	-	-	-	-	-
NVV 0334 56 05002	5	7.5	-	-	57	0.2	6	4	8.34	8.71	9.02	9.35	-
NVV 0334 56 050	5	7.5	-	-	57	0.5	6	4	8.32	8.69	8.99	9.31	10.02
NVV 0334 56 051	5	7.5	-	-	57	1	6	4	8.30	8.65	8.94	9.23	9.91
NVV 0334 56 06002	6	9	-	-	57	0.2	6	4	-	-	-	-	-
NVV 0334 56 06003	6	9	-	-	57	0.3	6	4	-	-	-	-	-
NVV 0334 56 060	6	9	-	-	57	0.5	6	4	-	-	-	-	-
NVV 0334 56 061	6	9	-	-	57	1	6	4	-	-	-	-	-
NVV 0334 56 062	6	9	-	-	57	1.5	6	4	-	-	-	-	-
NVV 0334 56 080	8	12	-	-	63	0.5	8	4	-	-	-	-	-
NVV 0334 56 081	8	12	-	-	63	1	8	4	-	-	-	-	-
NVV 0334 56 082	8	12	-	-	63	1.5	8	4	-	-	-	-	-
NVV 0334 56 083	8	12	-	-	63	2	8	4	-	-	-	-	-
NVV 0334 56 100	10	15	-	-	72	0.5	10	4	-	-	-	-	-
NVV 0334 56 101	10	15	-	-	72	1	10	4	-	-	-	-	-
NVV 0334 56 102	10	15	-	-	72	1.5	10	4	-	-	-	-	-
NVV 0334 56 103	10	15	-	-	72	2	10	4	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0334 56 120	12	18	-	-	83	0.5	12	4	-	-	-	-	-
NVV 0334 56 121	12	18	-	-	83	1	12	4	-	-	-	-	-
NVV 0334 56 122	12	18	-	-	83	1.5	12	4	-	-	-	-	-
NVV 0334 56 123	12	18	-	-	83	2	12	4	-	-	-	-	-
NVV 0334 56 163	16	24	-	-	92	2	16	4	-	-	-	-	-
with AT | long													
NVV 0364 56 020	2	3	10	1.9	75	0.5	6	4	11.19	11.54	11.83	12.14	12.79
NVV 0364 56 030	3	4.5	12	2.9	75	0.5	6	4	13.26	13.65	14.00	14.35	15.13
NVV 0364 56 031	3	4.5	12	2.9	75	1	6	4	13.24	13.62	13.95	14.30	15.05
NVV 0364 56 040	4	6	12	3.8	75	0.5	6	4	13.44	13.79	14.14	14.50	15.29
NVV 0364 56 041	4	6	12	3.8	75	1	6	4	13.43	13.77	14.10	14.45	15.21
NVV 0364 56 050	5	7.5	15	4.8	75	0.5	6	4	16.53	16.95	17.37	-	-
NVV 0364 56 051	5	7.5	15	4.8	75	1	6	4	16.52	16.92	17.33	-	-
NVV 0364 56 060	6	9	20	5.8	75	0.5	6	4	-	-	-	-	-
NVV 0364 56 061	6	9	20	5.8	75	1	6	4	-	-	-	-	-
NVV 0364 56 062	6	9	20	5.8	75	1.5	6	4	-	-	-	-	-
NVV 0364 56 080	8	12	26	7.8	90	0.5	8	4	-	-	-	-	-
NVV 0364 56 081	8	12	26	7.8	90	1	8	4	-	-	-	-	-
NVV 0364 56 082	8	12	26	7.8	90	1.5	8	4	-	-	-	-	-
NVV 0364 56 083	8	12	26	7.8	90	2	8	4	-	-	-	-	-
NVV 0364 56 100	10	15	31	9.8	100	0.5	10	4	-	-	-	-	-
NVV 0364 56 101	10	15	31	9.8	100	1	10	4	-	-	-	-	-
NVV 0364 56 102	10	15	31	9.8	100	1.5	10	4	-	-	-	-	-
NVV 0364 56 103	10	15	31	9.8	100	2	10	4	-	-	-	-	-
NVV 0364 56 120	12	18	37	11.8	110	0.5	12	4	-	-	-	-	-
NVV 0364 56 121	12	18	37	11.8	110	1	12	4	-	-	-	-	-
NVV 0364 56 122	12	18	37	11.8	110	1.5	12	4	-	-	-	-	-
NVV 0364 56 123	12	18	37	11.8	110	2	12	4	-	-	-	-	-

Application data (fz / ap)

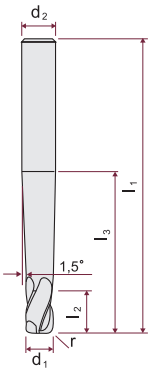
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
2	fz (mm) ap (mm)	0.01-0.04 0.05-0.2	-	0.01-0.04 0.06-0.2	-	-	0.01-0.03 0.04-0.1
3 - 4	fz (mm) ap (mm)	0.04-0.07 0.08-0.4	-	0.04-0.07 0.06-0.4	-	-	0.04-0.07 0.08-0.2
5 - 6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	0.08-0.12 0.12-0.6	-	-	0.08-0.15 0.1-0.3
8	fz (mm) ap (mm)	0.08-0.115 0.15-0.525	-	0.08-0.15 0.15-0.8	-	-	0.08-0.15 0.15-0.4
10	fz (mm) ap (mm)	0.08-0.115 0.2-0.65	-	0.08-0.15 0.3-1	-	-	0.08-0.2 0.2-0.5
12	fz (mm) ap (mm)	0.08-0.115 0.2-0.75	-	0.08-0.15 0.3-1.2	-	-	0.08-0.25 0.2-0.6
16	fz (mm) ap (mm)	0.1-0.175 0.2-0.95	-	0.1-0.25 0.3-1.6	-	-	0.08-0.25 0.2-0.8

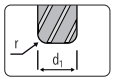
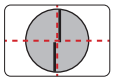
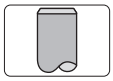
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough Fine	120 **210** 300 200 **250** 300	-	100 **225** 350 180 **290** 400	-	-	80 **140** 200 100 **175** 250

Universal steel mills up to 52 HRC

Toric corner radius end mills | 4 cutting edges | conical



d_1 3 - 10	z 4	r 1 - 2	γ° 9° λ° 30°	MGC PVTi
			1,5° konisch	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
1.5 degrees conical | reinforced shank													
NVV 0164 56 030	3	4.5	25	-	75	1	6	4	8.50	16.01	26.10	26.88	27.88
NVV 0164 56 031	3	4.5	50	-	100	1	6	4	8.50	16.01	50.87	-	-
NVV 0164 56 040	4	6	25	-	75	1	6	4	10.75	20.51	26.07	26.56	-
NVV 0164 56 041	4	6	50	-	100	1	6	4	10.75	20.51	-	-	-
NVV 0164 56 050	5	7.5	25	-	75	1	6	4	13.75	25.34	-	-	-
NVV 0164 56 051	5	7.5	50	-	90	1	8	4	13.75	26.51	51.21	-	-
NVV 0164 56 052	5	6	25	-	75	1.5	6	4	-	-	-	-	-
NVV 0164 56 060	6	9	35	-	75	1	8	4	16.00	31.01	36.30	-	-
NVV 0164 56 061	6	9	50	-	100	1	10	4	16.00	31.01	51.21	52.00	-
NVV 0164 56 080	8	12	50	-	100	2	10	4	20.00	38.03	-	-	-
NVV 0164 56 081	8	12	90	-	150	2	12	4	20.00	38.03	-	-	-
NVV 0164 56 100	10	15	50	-	110	2	12	4	24.50	47.02	-	-	-
NVV 0164 56 101	10	15	50	-	150	2	12	4	24.50	47.02	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
3 - 4	fz (mm) ap (mm)	0.04-0.07 0.08-0.4	-	0.04-0.07 0.06-0.4	-	-	0.04-0.07 0.08-0.2
5 - 6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	0.08-0.12 0.12-0.6	-	-	0.08-0.15 0.1-0.3
8	fz (mm) ap (mm)	0.08-0.115 0.15-0.525	-	0.08-0.15 0.15-0.8	-	-	0.08-0.15 0.15-0.4
10	fz (mm) ap (mm)	0.08-0.115 0.2-0.65	-	0.08-0.15 0.3-1	-	-	0.08-0.2 0.2-0.5

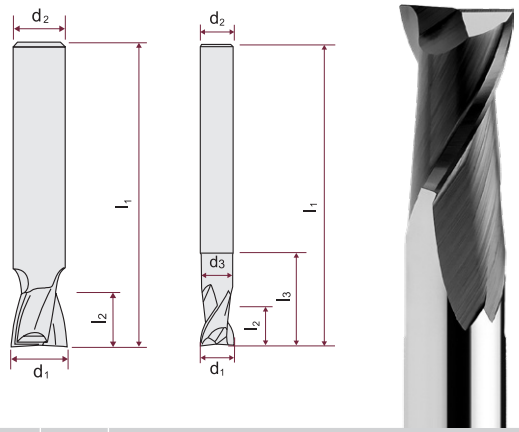
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough Fine	120 **210** 300 200 **250** 300	-	100 **225** 350 180 **290** 400	-	-	80 **140** 200 100 **175** 250

Universal steel mills up to 52 HRC

End mills | 2 cutting edges

d_1	z	r	γ° 9° λ° 30°	MGC PVTi
0.4 - 20	2	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short | extra long													
NVV 0222 56 0041	0.4	0.6	-	-	50	-	4	2	0.88	1.02	1.14	1.26	1.47
NVV 0222 56 0051	0.5	0.75	-	-	50	-	4	2	1.05	1.21	1.34	1.46	1.68
NVV 0222 56 0061	0.6	0.9	-	-	50	-	4	2	1.23	1.39	1.53	1.66	1.89
NVV 0222 56 0081	0.8	1.2	-	-	50	-	4	2	1.60	1.75	1.90	2.04	2.29
NVV 0222 56 0101	1	1.5	-	-	50	-	4	2	1.91	2.10	2.27	2.41	2.67
NVV 0222 56 0152	1.5	2.5	-	-	50	-	4	2	2.74	2.97	3.15	3.32	3.61
NVV 0222 56 0151	1.5	2.5	-	-	57	-	6	2	3.01	3.25	3.44	3.62	3.92
NVV 0222 56 020	2	3	-	-	50	-	4	2	3.55	3.81	4.02	4.20	4.54
NVV 0222 56 022	2	3	-	-	57	-	6	2	3.55	3.81	4.02	4.20	4.54
NVV 0222 56 0251	2.5	4	-	-	50	-	4	2	4.63	4.92	5.15	5.35	5.78
NVV 0222 56 025	2.5	4	-	-	57	-	6	2	4.63	4.92	5.15	5.35	5.78
NVV 0222 56 030	3	4.5	-	-	50	-	4	2	5.17	5.47	5.71	5.93	6.40
NVV 0222 56 031	3	4.5	-	-	57	-	6	2	5.17	5.47	5.71	5.93	6.40
NVV 0132 56 030	3	30	-	-	60	-	3	2	-	-	-	-	-
NVV 0132 56 031	3	30	-	-	75	-	3	2	-	-	-	-	-
NVV 0222 56 041	4	6	-	-	50	-	4	2	-	-	-	-	-
NVV 0222 56 040	4	6	-	-	57	-	6	2	6.76	7.10	7.38	7.65	8.27
NVV 0132 56 040	4	30	-	-	60	-	4	2	-	-	-	-	-
NVV 0132 56 041	4	30	-	-	75	-	4	2	-	-	-	-	-
NVV 0222 56 050	5	7.5	-	-	57	-	6	2	8.35	8.72	9.04	9.38	-
NVV 0132 56 050	5	35	-	-	70	-	5	2	-	-	-	-	-
NVV 0132 56 051	5	40	-	-	100	-	5	2	-	-	-	-	-
NVV 0222 56 060	6	9	-	-	57	-	6	2	-	-	-	-	-
NVV 0132 56 060	6	40	-	-	100	-	6	2	-	-	-	-	-
NVV 0132 56 061	6	50	-	-	150	-	6	2	-	-	-	-	-
NVV 0222 56 080	8	12	-	-	63	-	8	2	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0132 56 080	8	40	-	-	100	-	8	2	-	-	-	-	-
NVV 0132 56 081	8	50	-	-	150	-	8	2	-	-	-	-	-
NVV 0222 56 100	10	15	-	-	72	-	10	2	-	-	-	-	-
NVV 0132 56 100	10	45	-	-	100	-	10	2	-	-	-	-	-
NVV 0132 56 101	10	60	-	-	150	-	10	2	-	-	-	-	-
NVV 0222 56 120	12	18	-	-	83	-	12	2	-	-	-	-	-
NVV 0132 56 120	12	45	-	-	100	-	12	2	-	-	-	-	-
NVV 0132 56 121	12	75	-	-	150	-	12	2	-	-	-	-	-
NVV 0222 56 160	16	24	-	-	92	-	16	2	-	-	-	-	-
NVV 0132 56 160	16	45	-	-	100	-	16	2	-	-	-	-	-
NVV 0132 56 161	16	75	-	-	150	-	16	2	-	-	-	-	-
NVV 0132 56 200	20	40	-	-	100	-	20	2	-	-	-	-	-
NVV 0222 56 200	20	30	-	-	104	-	20	2	-	-	-	-	-
NVV 0132 56 201	20	75	-	-	150	-	20	2	-	-	-	-	-
with AT | long													
NVV 0322 56 020	2	3	10	1.9	75	-	6	2	11.21	11.57	11.87	12.19	12.87
NVV 0322 56 030	3	4.5	12	2.9	75	-	6	2	13.28	13.67	14.03	14.40	15.20
NVV 0322 56 040	4	6	12	3.8	75	-	6	2	13.46	13.82	14.17	14.55	15.36
NVV 0322 56 050	5	7.5	15	4.8	75	-	6	2	16.54	16.97	17.41	-	-
NVV 0322 56 060	6	9	20	5.8	75	-	6	2	-	-	-	-	-
NVV 0322 56 080	8	12	26	7.8	90	-	8	2	-	-	-	-	-
NVV 0322 56 100	10	15	31	9.8	100	-	10	2	-	-	-	-	-
NVV 0322 56 120	12	18	37	11.8	110	-	12	2	-	-	-	-	-
NVV 0322 56 160	16	24	43	15.8	140	-	16	2	-	-	-	-	-
NVV 0322 56 200	20	30	53	19.8	150	-	20	2	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
0.4 - 0.8	fz (mm)	0.005-0.01	0.005-0.01	0.005-0.01	0.005-0.1	0.005-0.01	0.005-0.01
	ap (mm)	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.05
1 - 2.5	fz (mm)	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.03	0.01-0.02	0.01-0.02
	ap (mm)	0.1-0.3	0.2-0.3	0.1-0.3	0.1-0.7	0.2-0.3	0.05-0.2
3 - 4	fz (mm)	0.03-0.05	0.03-0.05	0.03-0.05	0.04-0.09	0.03-0.05	0.02-0.03
	ap (mm)	0.2-0.7	0.2-0.4	0.2-0.7	0.15-1.4	0.2-0.4	0.1-0.2
5 - 6	fz (mm)	0.03-0.05	0.03-0.05	0.03-0.05	0.05-0.1	0.03-0.05	0.03-0.04
	ap (mm)	0.2-1	0.2-0.6	0.2-1	0.15-2	0.2-0.6	0.1-0.3
8	fz (mm)	0.04-0.06	0.04-0.06	0.04-0.06	0.06-0.15	0.04-0.06	0.04-0.05
	ap (mm)	0.2-1.1	0.3-0.7	0.2-1.1	0.15-2.8	0.3-0.7	0.1-0.4
10	fz (mm)	0.05-0.08	0.05-0.08	0.05-0.08	0.08-0.17	0.05-0.08	0.05-0.06
	ap (mm)	0.2-1.3	0.4-0.8	0.2-1.3	0.2-3.5	0.4-0.8	0.1-0.4
12	fz (mm)	0.06-0.1	0.06-0.1	0.06-0.1	0.09-0.2	0.06-0.1	0.06-0.07
	ap (mm)	0.2-1.5	0.5-0.8	0.2-1.5	0.2-4.2	0.5-0.8	0.1-0.4
16	fz (mm)	0.06-0.1	0.06-0.1	0.06-0.1	0.1-0.27	0.06-0.1	0.06-0.07
	ap (mm)	0.2-1.9	0.7-1.1	0.2-1.9	0.2-5.6	0.7-1.1	0.1-0.4
20	fz (mm)	0.07-0.12	0.07-0.12	0.07-0.12	0.12-0.35	0.07-0.12	0.06-0.08
	ap (mm)	0.2-2.1	0.9-1.3	0.2-2.1	0.2-7	0.9-1.3	0.1-0.4

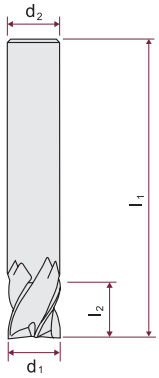
Speed (Vc in m/min)

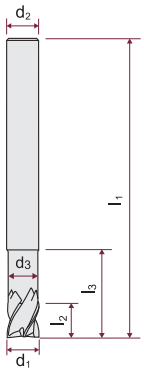
Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	100 **225** 350	-	-	120 **160** 200
	Fine	200 **250** 300	90 **120** 150	180 **290** 400	300 **450** 600	50 **65** 80	100 **175** 250

Universal steel mills up to 52 HRC

End mills | 4 cutting edges

d_1	z	r	γ° 9° λ° 30°	MGC PVTi
1.5 - 20	4	-		





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short | extra long													
NVV 0224 56 015	1.5	2.5	-	-	50	-	4	4	3.01	3.25	3.44	3.62	3.92
NVV 0224 56 021	2	3	-	-	50	-	4	4	3.55	3.81	4.02	4.20	4.54
NVV 0224 56 022	2	3	-	-	57	-	6	4	3.55	3.81	4.02	4.20	4.54
NVV 0224 56 031	3	4.5	-	-	50	-	4	4	5.17	5.47	5.71	5.93	6.40
NVV 0224 56 030	3	4.5	-	-	57	-	6	4	5.17	5.47	5.71	5.93	6.40
NVV 0224 56 040	4	6	-	-	57	-	6	4	6.76	7.10	7.38	7.65	8.27
NVV 0224 56 050	5	7.5	-	-	57	-	6	4	8.35	8.72	9.04	9.38	-
NVV 0224 56 060	6	9	-	-	57	-	6	4	-	-	-	-	-
NVV 0224 56 080	8	12	-	-	63	-	8	4	-	-	-	-	-
NVV 0224 56 100	10	15	-	-	72	-	10	4	-	-	-	-	-
NVV 0224 56 120	12	18	-	-	83	-	12	4	-	-	-	-	-
NVV 0224 56 160	16	24	-	-	92	-	16	4	-	-	-	-	-
NVV 0134 56 200	20	40	-	-	100	-	20	4	-	-	-	-	-
NVV 0224 56 200	20	30	-	-	104	-	20	4	-	-	-	-	-
with AT | long													
NVV 0324 56 020	2	4	10	1.9	75	-	6	4	11.21	11.57	11.87	12.19	12.87
NVV 0324 56 030	3	4.5	12	2.9	75	-	6	4	13.28	13.67	14.03	14.40	15.20
NVV 0324 56 040	4	6	12	3.8	75	-	6	4	13.46	13.82	14.17	14.55	15.36
NVV 0324 56 050	5	7.5	15	4.8	75	-	6	4	16.54	16.97	17.41	-	-
NVV 0324 56 060	6	9	20	5.8	75	-	6	4	-	-	-	-	-
NVV 0324 56 080	8	12	26	7.8	90	-	8	4	-	-	-	-	-
NVV 0324 56 100	10	15	31	9.8	100	-	10	4	-	-	-	-	-
NVV 0324 56 120	12	18	37	11.8	110	-	12	4	-	-	-	-	-
NVV 0324 56 160	16	24	43	15.8	140	-	16	4	-	-	-	-	-
NVV 0324 56 200	20	30	53	19.8	150	-	20	4	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
1.5 - 2	fz (mm)	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.03	0.01-0.02	0.01-0.02
	ap (mm)	0.1-0.3	0.2-0.3	0.1-0.3	0.1-0.7	0.2-0.3	0.05-0.2
3 - 4	fz (mm)	0.03-0.05	0.03-0.05	0.03-0.05	0.04-0.09	0.03-0.05	0.02-0.03
	ap (mm)	0.2-0.7	0.2-0.4	0.2-0.7	0.15-1.4	0.2-0.4	0.1-0.2
5 - 6	fz (mm)	0.03-0.05	0.03-0.05	0.03-0.05	0.05-0.1	0.03-0.05	0.03-0.04
	ap (mm)	0.2-1	0.2-0.6	0.2-1	0.15-2	0.2-0.6	0.1-0.3
8	fz (mm)	0.04-0.06	0.04-0.06	0.04-0.06	0.06-0.15	0.04-0.06	0.04-0.05
	ap (mm)	0.2-1.1	0.3-0.7	0.2-1.1	0.15-2.8	0.3-0.7	0.1-0.4
10	fz (mm)	0.05-0.08	0.05-0.08	0.05-0.08	0.08-0.17	0.05-0.08	0.05-0.06
	ap (mm)	0.2-1.3	0.4-0.8	0.2-1.3	0.2-3.5	0.4-0.8	0.1-0.4
12	fz (mm)	0.06-0.1	0.06-0.1	0.06-0.1	0.09-0.2	0.06-0.1	0.06-0.07
	ap (mm)	0.2-1.5	0.5-0.8	0.2-1.5	0.2-4.2	0.5-0.8	0.1-0.4
16	fz (mm)	0.06-0.1	0.06-0.1	0.06-0.1	0.1-0.27	0.06-0.1	0.06-0.07
	ap (mm)	0.2-1.9	0.7-1.1	0.2-1.9	0.2-5.6	0.7-1.1	0.1-0.4
20	fz (mm)	0.07-0.12	0.07-0.12	0.07-0.12	0.12-0.35	0.07-0.12	0.06-0.08
	ap (mm)	0.2-2.1	0.9-1.3	0.2-2.1	0.2-7	0.9-1.3	0.1-0.4

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	100 **225** 350	-	-	120 **160** 200
	Fine	200 **250** 300	90 **105** 120	180 **290** 400	300 **450** 600	50 **60** 70	100 **175** 250

Steel mills up to 58 HRC

Ball nose, toric, bull end, and end mills

Properties

- 2 to 8 cutting edges
- Ball nose end mill
- Toric corner radius end mills
- End mills

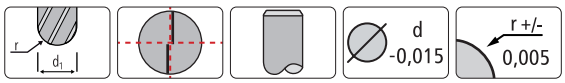
Cutting materials

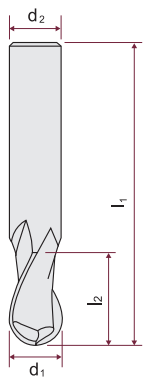
Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
UMGC PVTiH	▼	▼	▼	▼	▼	▼	0.1 - 16	0.1 - 16	2	0.05 - 8
MGC PVTi	▼	-	▼	-	-	▼	0.1 - 20	0.1 - 60	2 - 8	0 - 2

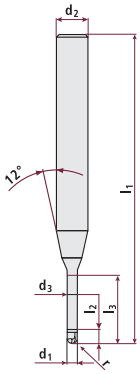
Steel mills up to 58 HRC

Ball nose end mills | 2 cutting edges

d_1	z	r	γ° 4°	UMGCPVTiH
0.1 - 16	2	-	λ° 30°	







Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | high precision													
NVV 1722 85 001	0.1	0.1	-	-	50	0.05	4	2	0.22	0.32	0.41	0.49	0.67
NVV 1722 85 002	0.2	0.2	-	-	50	0.1	4	2	0.35	0.45	0.54	0.63	0.81
NVV 1722 85 003	0.3	0.3	-	-	50	0.15	4	2	0.47	0.57	0.67	0.76	0.95
NVV 1722 85 004	0.4	0.4	-	-	50	0.2	4	2	0.56	0.65	0.74	0.82	0.97
NVV 1722 85 005	0.5	0.5	-	-	50	0.25	4	2	0.67	0.77	0.86	0.94	1.10
NVV 1722 85 006	0.6	0.6	-	-	50	0.3	4	2	0.78	0.89	0.98	1.06	1.22
NVV 1722 85 008	0.8	0.8	-	-	50	0.4	4	2	1.01	1.12	1.21	1.30	1.47
NVV 1722 85 010	1	1	-	-	50	0.5	4	2	1.26	1.34	1.45	1.54	1.72
NVV 1722 85 0101	1	1	-	-	75	0.5	4	2	1.26	1.34	1.45	1.54	1.72
NVV 1722 85 015	1.5	1.5	-	-	50	0.75	4	2	1.77	1.90	2.02	2.12	2.31
NVV 1722 85 0151	1.5	1.5	-	-	75	0.75	4	2	1.77	1.90	2.02	2.12	2.31
NVV 1722 85 020	2	2	-	-	50	1	4	2	2.30	2.45	2.58	2.69	2.89
NVV 1722 85 0201	2	2	-	-	75	1	4	2	2.30	2.45	2.58	2.69	2.89
NVV 1722 85 030	3	3	-	-	57	1.5	6	2	3.36	3.53	3.68	3.80	4.03
NVV 1722 85 0301	3	3	-	-	75	1.5	6	2	3.36	3.53	3.68	3.80	4.03
NVV 1722 85 040	4	4	-	-	57	2	6	2	4.41	4.60	4.76	4.90	5.15
NVV 1722 85 0401	4	4	-	-	75	2	6	2	4.41	4.60	4.76	4.90	5.15
NVV 1722 85 050	5	5	-	-	57	2.5	6	2	5.45	5.67	5.84	5.99	6.25
NVV 1722 85 0501	5	5	-	-	75	2.5	6	2	5.45	5.67	5.84	5.99	6.25
NVV 1722 85 060	6	6	-	-	57	3	6	2	-	-	-	-	-
NVV 1722 85 0601	6	6	-	-	75	3	6	2	-	-	-	-	-
NVV 1722 85 080	8	8	-	-	63	4	8	2	-	-	-	-	-
NVV 1722 85 0801	8	8	-	-	90	4	8	2	-	-	-	-	-
NVV 1722 85 100	10	10	-	-	72	5	10	2	-	-	-	-	-
NVV 1722 85 1001	10	10	-	-	100	5	10	2	-	-	-	-	-
NVV 1722 85 120	12	12	-	-	83	6	12	2	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 1722 85 1201	12	12	-	-	110	6	12	2	-	-	-	-	-
NVV 1722 85 160	16	16	-	-	92	8	16	2	-	-	-	-	-
NVV 1722 85 1601	16	16	-	-	150	8	16	2	-	-	-	-	-
with AT | high precision													
NVV 1192 85 0011 NEW	0.1	0.1	0.3	0.08	50	0.05	4	2	0.70	0.78	0.86	0.94	1.11
NVV 1192 85 0012 NEW	0.1	0.1	0.4	0.08	50	0.05	4	2	0.81	0.90	0.99	1.08	1.25
NVV 1192 85 0021 NEW	0.2	0.2	0.4	0.17	50	0.1	4	2	0.87	0.95	1.03	1.11	1.27
NVV 1192 85 0022 NEW	0.2	0.2	0.6	0.17	50	0.1	4	2	1.09	1.18	1.28	1.37	1.55
NVV 1192 85 0031 NEW	0.3	0.3	0.6	0.27	50	0.15	4	2	1.08	1.17	1.26	1.35	1.53
NVV 1192 85 0032 NEW	0.3	0.3	0.9	0.27	50	0.15	4	2	1.41	1.52	1.63	1.74	1.94
NVV 1192 85 0033	0.3	0.3	1.5	0.27	50	0.15	4	2	2.06	2.21	2.35	2.48	2.71
NVV 1192 85 0041	0.4	0.4	1.5	0.385	50	0.2	4	2	1.92	2.07	2.19	2.30	2.51
NVV 1192 85 0042	0.4	0.4	3	0.385	50	0.2	4	2	3.54	3.74	3.91	4.06	4.32
NVV 1192 85 0043	0.4	0.4	5	0.385	50	0.2	4	2	5.66	5.92	6.13	6.31	6.62
NVV 1192 85 0051	0.5	0.5	3	0.48	50	0.25	4	2	3.56	3.75	3.92	4.06	4.32
NVV 1192 85 0052	0.5	0.5	5	0.48	50	0.25	4	2	5.68	5.93	6.13	6.31	6.62
NVV 1192 85 0053	0.5	0.5	10	0.48	50	0.25	4	2	10.90	11.26	11.53	11.77	12.70
NVV 1192 85 0061	0.6	0.6	3	0.58	50	0.3	4	2	3.55	3.75	3.90	4.05	4.31
NVV 1192 85 0062	0.6	0.6	5	0.58	50	0.3	4	2	5.67	5.92	6.13	6.31	6.62
NVV 1192 85 0063	0.6	0.6	10	0.58	50	0.3	4	2	10.90	11.25	11.53	11.77	12.65
NVV 1192 85 0081	0.8	0.8	3	0.78	50	0.4	4	2	3.55	3.74	3.90	4.04	4.29
NVV 1192 85 0082	0.8	0.8	5	0.78	50	0.4	4	2	5.67	5.92	6.12	6.30	6.60
NVV 1192 85 0083	0.8	0.8	10	0.78	50	0.4	4	2	10.89	11.25	11.52	11.76	12.62
NVV 1192 85 0084 NEW	0.8	0.8	15	0.78	50	0.4	4	2	16.1	16.5	16.8	17.4	19.2
NVV 1192 85 0101	1	1	5	0.98	50	0.5	4	2	5.66	5.91	6.11	6.29	6.59
NVV 1192 85 0102	1	1	10	0.98	50	0.5	4	2	10.89	11.24	11.52	11.75	12.59
NVV 1192 85 0103	1	1	15	0.98	50	0.5	4	2	16.07	16.49	16.82	17.38	19.22
NVV 1192 85 0104 NEW	1	1	20	0.98	75	0.5	4	2	21.2	21.7	22.3	23.4	25.9
NVV 1192 85 0105 NEW	1	1	25	0.98	75	0.5	4	2	26.4	26.9	28.0	29.3	32.5
NVV 1192 85 0151	1.5	1.5	5	1.45	50	0.75	4	2	5.74	5.96	6.14	6.31	6.60
NVV 1192 85 0152	1.5	1.5	10	1.45	50	0.75	4	2	10.95	11.28	11.54	11.76	12.54
NVV 1192 85 0153	1.5	1.5	15	1.45	50	0.75	4	2	16.12	16.52	16.84	17.36	19.18
NVV 1192 85 0154	1.5	1.5	20	1.45	75	0.75	4	2	21.26	21.73	22.28	23.34	-
NVV 1192 85 0155 NEW	1.5	1.5	25	1.45	75	0.75	4	2	26.4	26.9	28.0	29.3	-
NVV 1192 85 0156 NEW	1.5	1.5	30	1.45	75	0.75	4	2	31.5	32.2	33.7	36.5	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 1192 85 0201	2	2	5	1.95	50	1	4	2	5.73	5.94	6.12	6.28	6.56
NVV 1192 85 0202	2	2	10	1.95	50	1	4	2	10.94	11.26	11.52	11.75	12.46
NVV 1192 85 0203	2	2	15	1.95	50	1	4	2	16.11	16.51	16.82	17.31	19.10
NVV 1192 85 0204	2	2	20	1.95	75	1	4	2	21.25	21.72	22.25	23.29	-
NVV 1192 85 0205 NEW	2	2	30	1.95	75	1	4	2	31.5	32.2	33.6	-	-
NVV 1192 85 0206 NEW	2	2	40	1.95	75	1	4	2	41.5	43.1	-	-	-
NVV 1192 85 0302	3	3	10	2.95	57	1.5	6	2	10.92	11.23	11.49	11.71	12.30
NVV 1192 85 0303	3	3	15	2.95	57	1.5	6	2	16.09	16.49	16.80	17.22	18.94
NVV 1192 85 0304	3	3	20	2.95	75	1.5	6	2	21.24	21.70	22.18	23.20	25.57
NVV 1192 85 0305	3	3	25	2.95	75	1.5	6	2	26.37	26.88	27.88	29.18	-
NVV 1192 85 0306 NEW	3	3	30	2.95	75	1.5	6	2	31.5	32.2	33.6	35.2	-
NVV 1192 85 0307 NEW	3	3	40	2.95	75	1.5	6	2	41.7	43.0	45.0	-	-
NVV 1192 85 0402	4	4	10	3.9	57	2	6	2	11.01	11.29	11.52	11.72	12.20
NVV 1192 85 0403	4	4	15	3.9	57	2	6	2	16.17	16.53	16.82	17.17	18.84
NVV 1192 85 0404	4	4	20	3.9	75	2	6	2	21.30	21.73	22.16	23.15	-
NVV 1192 85 0405	4	4	25	3.9	75	2	6	2	26.43	26.91	27.86	29.14	-
NVV 1192 85 0406 NEW	4	4	30	3.9	75	2	6	2	31.5	32.2	33.6	-	-
NVV 1192 85 0407 NEW	4	4	40	3.9	75	2	6	2	41.7	43.0	-	-	-
NVV 1192 85 0502	5	5	10	4.9	57	2.5	6	2	10.99	11.26	11.49	11.69	-
NVV 1192 85 0503	5	5	15	4.9	57	2.5	6	2	16.15	16.51	16.80	-	-
NVV 1192 85 0504	5	5	20	4.9	75	2.5	6	2	21.29	21.71	-	-	-
NVV 1192 85 0505	5	5	25	4.9	75	2.5	6	2	26.42	26.89	-	-	-
NVV 1192 85 0506 NEW	5	5	30	4.9	75	2.5	6	2	31.5	-	-	-	-
NVV 1192 85 0507 NEW	5	5	40	4.9	75	2.5	6	2	41.7	-	-	-	-
NVV 1192 85 0602	6	6	10	5.85	57	3	6	2	-	-	-	-	-
NVV 1192 85 0603	6	6	15	5.85	57	3	6	2	-	-	-	-	-
NVV 1192 85 0604	6	6	20	5.85	75	3	6	2	-	-	-	-	-
NVV 1192 85 0605	6	6	25	5.85	75	3	6	2	-	-	-	-	-
NVV 1192 85 0606 NEW	6	6	30	5.85	75	3	6	2	-	-	-	-	-
NVV 1192 85 0607 NEW	6	6	40	5.85	75	3	6	2	-	-	-	-	-

Application data (fz / ap)

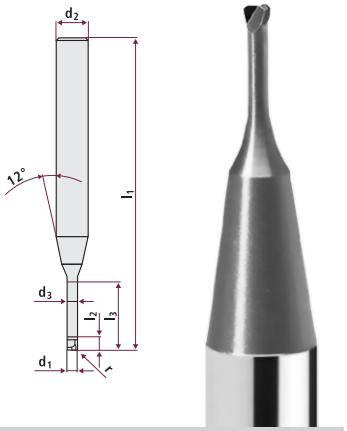
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.1 - 0.8	fz (mm)	0.005-0.02	0.005-0.02	0.005-0.02	0.01-0.03	0.005-0.02	0.005-0.015
	ap (mm)	0.005-0.1	0.005-0.08	0.01-0.1	0.01-0.3	0.005-0.08	0.005-0.05
1 - 2	fz (mm)	0.01-0.04	0.01-0.04	0.01-0.04	0.02-0.08	0.01-0.04	0.01-0.03
	ap (mm)	0.05-0.2	0.05-0.15	0.06-0.2	0.1-0.7	0.05-0.15	0.04-0.1
3 - 4	fz (mm)	0.04-0.07	0.04-0.07	0.04-0.07	0.04-0.1	0.04-0.07	0.04-0.07
	ap (mm)	0.08-0.4	0.08-0.3	0.12-0.4	0.15-1.4	0.08-0.3	0.08-0.2
5 - 6	fz (mm)	0.08-0.12	0.08-0.12	0.08-0.12	0.06-0.15	0.08-0.12	0.08-0.12
	ap (mm)	0.1-0.6	0.1-0.4	0.15-0.6	0.2-2	0.1-0.4	0.1-0.3
8	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.2	0.08-0.15	0.08-0.12
	ap (mm)	0.15-0.8	0.15-0.6	0.25-0.8	0.3-2.8	0.15-0.6	0.15-0.4
10	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.25	0.08-0.15	0.08-0.12
	ap (mm)	0.2-1	0.2-0.7	0.3-1	0.4-3.5	0.2-0.7	0.2-0.5
12	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.3	0.08-0.15	0.08-0.15
	ap (mm)	0.2-1.2	0.2-0.8	0.3-1.2	0.4-4.2	0.2-0.8	0.2-0.6
16	fz (mm)	0.1-0.21	0.1-0.175	0.1-0.21	0.1-0.3	0.1-0.175	0.08-0.165
	ap (mm)	0.4-1.6	0.3-1.2	0.45-1.6	0.4-5.6	0.3-1.2	0.2-0.8

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVTiH	Rough	-	-	-	-	-	-
	Fine	120 **235** 350	70 **100** 150	100 **250** 400	200 **400** 600	30 **55** 80	80 **165** 250

Steel mills up to 58 HRC

Toric corner radius end mills | 2 cutting edges



d_1	z	r	γ° 4° λ° 30°	UMGCPVTiH
0.1 - 12	2	0.02 - 2		

		d -0,015	r +/- 0,005

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | high precision													
NVV 0722 85 001	0.1	0.1	-	-	50	0.02	4	2	0.24	0.33	0.43	0.52	0.69
NVV 0722 85 002	0.2	0.2	-	-	50	0.05	4	2	0.37	0.47	0.57	0.66	0.84
NVV 0722 85 003	0.3	0.3	-	-	50	0.05	4	2	0.50	0.61	0.72	0.82	1.01
NVV 0722 85 004	0.4	0.4	-	-	50	0.1	4	2	0.58	0.69	0.78	0.86	1.02
NVV 0722 85 005	0.5	0.5	-	-	50	0.1	4	2	0.71	0.82	0.91	1.00	1.17
NVV 0722 85 006	0.6	0.6	-	-	50	0.1	4	2	0.83	0.94	1.04	1.14	1.31
NVV 0722 85 008	0.8	0.8	-	-	50	0.1	4	2	1.06	1.19	1.30	1.40	1.59
NVV 0722 85 010	1	1	-	-	50	0.2	4	2	1.27	1.41	1.53	1.63	1.82
NVV 0722 85 0101	1	1	-	-	75	0.2	4	2	1.27	1.41	1.53	1.63	1.82
NVV 0722 85 015	1.5	1.5	-	-	50	0.2	4	2	1.84	2.00	2.14	2.26	2.47
NVV 0722 85 0151	1.5	1.5	-	-	75	0.2	4	2	1.84	2.00	2.14	2.26	2.47
NVV 0722 85 02002	2	2	-	-	50	0.2	4	2	2.39	2.58	2.73	2.86	3.09
NVV 0722 85 02102	2	2	-	-	75	0.2	4	2	2.39	2.58	2.73	2.86	3.09
NVV 0722 85 02005	2	2	-	-	50	0.5	4	2	2.36	2.53	2.67	2.80	3.02
NVV 0722 85 02105	2	2	-	-	75	0.5	4	2	2.36	2.53	2.67	2.80	3.02
NVV 0722 85 03002	3	3	-	-	57	0.2	6	2	3.48	3.70	3.87	4.03	4.29
NVV 0722 85 03102	3	3	-	-	75	0.2	6	2	3.48	3.70	3.87	4.03	4.29
NVV 0722 85 03005	3	3	-	-	57	0.5	6	2	3.45	3.66	3.83	3.98	4.24
NVV 0722 85 03105	3	3	-	-	75	0.5	6	2	3.45	3.66	3.83	3.98	4.24
NVV 0722 85 04002	4	4	-	-	57	0.2	6	2	4.55	4.80	5.00	5.17	5.46
NVV 0722 85 04102	4	4	-	-	75	0.2	6	2	4.55	4.80	5.00	5.17	5.46
NVV 0722 85 04005	4	4	-	-	57	0.5	6	2	4.53	4.77	4.96	5.13	5.41
NVV 0722 85 04105	4	4	-	-	75	0.5	6	2	4.53	4.77	4.96	5.13	5.41
NVV 0722 85 05002	5	5	-	-	57	0.2	6	2	5.61	5.87	6.10	6.29	6.61
NVV 0722 85 05102	5	5	-	-	75	0.2	6	2	5.61	5.87	6.10	6.29	6.61
NVV 0722 85 05005	5	5	-	-	57	0.5	6	2	5.59	5.86	6.07	6.25	6.56

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0722 85 05105	5	5	-	-	75	0.5	6	2	5.59	5.86	6.07	6.25	6.56
NVV 0722 85 06002	6	6	-	-	57	0.2	6	2	-	-	-	-	-
NVV 0722 85 06102	6	6	-	-	75	0.2	6	2	-	-	-	-	-
NVV 0722 85 06005	6	6	-	-	57	0.5	6	2	-	-	-	-	-
NVV 0722 85 06105	6	6	-	-	75	0.5	6	2	-	-	-	-	-
NVV 0722 85 06010	6	6	-	-	57	1	6	2	-	-	-	-	-
NVV 0722 85 06110	6	6	-	-	75	1	6	2	-	-	-	-	-
NVV 0722 85 08005	8	8	-	-	63	0.5	8	2	-	-	-	-	-
NVV 0722 85 08105	8	8	-	-	90	0.5	8	2	-	-	-	-	-
NVV 0722 85 08010	8	8	-	-	63	1	8	2	-	-	-	-	-
NVV 0722 85 08110	8	8	-	-	90	1	8	2	-	-	-	-	-
NVV 0722 85 10010	10	10	-	-	72	1	10	2	-	-	-	-	-
NVV 0722 85 10110	10	10	-	-	100	1	10	2	-	-	-	-	-
NVV 0722 85 10015	10	10	-	-	72	1.5	10	2	-	-	-	-	-
NVV 0722 85 10115	10	10	-	-	100	1.5	10	2	-	-	-	-	-
NVV 0722 85 12010	12	12	-	-	83	1	12	2	-	-	-	-	-
NVV 0722 85 12110	12	12	-	-	110	1	12	2	-	-	-	-	-
NVV 0722 85 12020	12	12	-	-	83	2	12	2	-	-	-	-	-
NVV 0722 85 12120	12	12	-	-	110	2	12	2	-	-	-	-	-
with AT | high precision													
NVV 0192 85 0011 NEW	0.1	0.1	0.3	0.08	50	0.02	4	2	0.70	0.78	0.87	0.95	1.12
NVV 0192 85 0012 NEW	0.1	0.1	0.4	0.08	50	0.05	4	2	0.81	0.90	1.00	1.09	1.26
NVV 0192 85 0021 NEW	0.2	0.2	0.4	0.17	50	0.05	4	2	0.87	0.95	1.04	1.12	1.29
NVV 0192 85 0022 NEW	0.2	0.2	0.6	0.17	50	0.05	4	2	1.09	1.19	1.29	1.38	1.57
NVV 0192 85 0031 NEW	0.3	0.3	0.6	0.27	50	0.05	4	2	1.09	1.19	1.29	1.38	1.57
NVV 0192 85 0032 NEW	0.3	0.3	0.9	0.27	50	0.05	4	2	1.42	1.54	1.65	1.76	1.97
NVV 0192 85 0033 NEW	0.3	0.3	1.5	0.27	50	0.05	4	2	1.09	1.19	1.29	1.38	1.57
NVV 0192 85 00411	0.4	0.4	1.5	0.385	50	0.1	4	2	1.93	2.08	2.21	2.32	2.53
NVV 0192 85 00412	0.4	0.4	3	0.385	50	0.1	4	2	3.55	3.75	3.92	4.07	4.34
NVV 0192 85 00413	0.4	0.4	5	0.385	50	0.1	4	2	5.67	5.93	6.14	6.32	6.64
NVV 0192 85 00511	0.5	0.5	1.5	0.48	50	0.1	4	2	1.96	2.10	2.22	2.34	2.54
NVV 0192 85 00512	0.5	0.5	3	0.48	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34
NVV 0192 85 00513	0.5	0.5	5	0.48	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
NVV 0192 85 00514	0.5	0.5	10	0.48	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
NVV 0192 85 00612	0.6	0.6	3	0.58	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0192 85 00613	0.6	0.6	5	0.58	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
NVV 0192 85 00614	0.6	0.6	10	0.58	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
NVV 0192 85 00811	0.8	0.8	3	0.78	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34
NVV 0192 85 00812	0.8	0.8	5	0.78	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
NVV 0192 85 00813	0.8	0.8	10	0.78	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
NVV 0192 85 00814	0.8	0.8	15	0.78	50	0.1	4	2	16.08	16.51	16.84	17.45	19.35
NVV 0192 85 01021	1	1	5	0.98	50	0.2	4	2	5.68	5.93	6.14	6.32	6.63
NVV 0192 85 01022	1	1	10	0.98	50	0.2	4	2	10.90	11.26	11.54	11.77	12.68
NVV 0192 85 01023	1	1	15	0.98	50	0.2	4	2	16.08	16.51	16.84	17.43	19.32
NVV 0192 85 01024	1	1	20	0.98	75	0.2	4	2	21.23	21.71	22.33	23.42	25.95
NVV 0192 85 01521	1.5	1.5	5	1.45	50	0.2	4	2	5.76	6.00	6.19	6.37	6.67
NVV 0192 85 01522	1.5	1.5	10	1.45	50	0.2	4	2	10.97	11.31	11.58	11.81	12.72
NVV 0192 85 01523	1.5	1.5	15	1.45	50	0.2	4	2	16.13	16.55	16.87	17.47	19.35
NVV 0192 85 01524	1.5	1.5	20	1.45	75	0.2	4	2	21.28	21.75	22.36	23.45	-
NVV 0192 85 02021	2	2	5	1.95	50	0.2	4	2	5.76	6.00	6.19	6.37	6.67
NVV 0192 85 02022	2	2	10	1.95	50	0.2	4	2	10.97	11.31	11.58	11.81	12.72
NVV 0192 85 02023	2	2	15	1.95	50	0.2	4	2	16.13	16.55	16.87	17.47	-
NVV 0192 85 02024	2	2	20	1.95	75	0.2	4	2	21.28	21.75	22.36	23.45	-
NVV 0192 85 02025	2	2	25	1.95	75	0.2	4	2	26.40	26.92	28.06	-	-
NVV 0192 85 02026 NEW	2	2	30	1.95	75	0.2	4	2	31.5	32.3	33.8	-	-
NVV 0192 85 02027 NEW	2	2	40	1.95	75	0.2	4	2	41.7	43.2	-	-	-
NVV 0192 85 02051	2	2	5	1.95	50	0.5	4	2	5.75	5.98	6.17	6.33	6.63
NVV 0192 85 02052	2	2	10	1.95	50	0.5	4	2	10.96	11.29	11.56	11.78	12.62
NVV 0192 85 02053	2	2	15	1.95	50	0.5	4	2	16.13	16.53	16.85	17.41	19.26
NVV 0192 85 02054	2	2	20	1.95	75	0.5	4	2	21.27	21.74	22.32	23.39	-
NVV 0192 85 02055	2	2	25	1.95	75	0.5	4	2	26.40	26.91	28.02	-	-
NVV 0192 85 02056 NEW	2	2	30	1.95	75	0.5	4	2	31.5	32.2	33.7	-	-
NVV 0192 85 02057 NEW	2	2	40	1.95	75	0.5	4	2	41.7	43.1	-	-	-
NVV 0192 85 03021	3	3	10	2.95	57	0.2	6	2	10.97	11.31	11.58	11.81	12.72
NVV 0192 85 03022	3	3	15	2.95	57	0.2	6	2	16.13	16.55	16.87	17.47	19.35
NVV 0192 85 03023	3	3	20	2.95	75	0.2	6	2	21.28	21.75	22.36	23.45	25.99
NVV 0192 85 03024	3	3	25	2.95	75	0.2	6	2	26.40	26.92	28.06	29.43	-
NVV 0192 85 03025 NEW	3	3	30	2.95	75	0.2	6	2	31.5	32.3	33.8	35.4	-
NVV 0192 85 03026 NEW	3	3	40	2.95	75	0.2	6	2	41.7	43.2	45.2	-	-
NVV 0192 85 03051	3	3	10	2.95	57	0.5	6	2	10.96	11.29	11.56	11.78	12.62

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0192 85 03052	3	3	15	2.95	57	0.5	6	2	16.13	16.53	16.85	17.41	19.26
NVV 0192 85 03053	3	3	20	2.95	75	0.5	6	2	21.27	21.74	22.32	23.39	25.89
NVV 0192 85 03054	3	3	25	2.95	75	0.5	6	2	26.40	26.91	28.02	29.37	-
NVV 0192 85 03055 NEW	3	3	30	2.95	75	0.5	6	2	31.5	32.2	33.7	35.4	-
NVV 0192 85 03056 NEW	3	3	40	2.95	75	0.5	6	2	41.7	43.1	45.1	-	-
NVV 0192 85 04021	4	4	10	3.9	57	0.2	6	2	11.07	11.38	11.64	11.86	12.77
NVV 0192 85 04022	4	4	15	3.9	57	0.2	6	2	16.22	16.61	16.91	17.52	-
NVV 0192 85 04023	4	4	20	3.9	75	0.2	6	2	21.35	21.80	22.41	23.50	-
NVV 0192 85 04024	4	4	25	3.9	75	0.2	6	2	26.47	26.97	28.11	-	-
NVV 0192 85 04025 NEW	4	4	30	3.9	75	0.2	6	2	31.6	32.3	33.8	-	-
NVV 0192 85 04026 NEW	4	4	40	3.9	75	0.2	6	2	41.8	43.2	-	-	-
NVV 0192 85 04051	4	4	10	3.9	57	0.5	6	2	11.05	11.36	11.62	11.84	12.68
NVV 0192 85 04052	4	4	15	3.9	57	0.5	6	2	16.21	16.59	16.90	17.46	19.31
NVV 0192 85 04053	4	4	20	3.9	75	0.5	6	2	21.34	21.79	22.37	23.44	-
NVV 0192 85 04054	4	4	25	3.9	75	0.5	6	2	26.46	26.96	28.07	-	-
NVV 0192 85 04055 NEW	4	4	30	3.9	75	0.5	6	2	31.6	32.3	33.8	-	-
NVV 0192 85 04056 NEW	4	4	40	3.9	75	0.5	6	2	41.8	43.2	-	-	-
NVV 0192 85 05021	5	5	10	4.9	57	0.2	6	2	11.07	11.38	11.64	11.86	-
NVV 0192 85 05023	5	5	20	4.9	75	0.2	6	2	21.35	21.80	-	-	-
NVV 0192 85 05025 NEW	5	5	30	4.9	75	0.2	6	2	31.6	-	-	-	-
NVV 0192 85 05026 NEW	5	5	40	4.9	75	0.2	6	2	41.8	-	-	-	-
NVV 0192 85 05051	5	5	10	4.9	57	0.5	6	2	11.06	11.36	11.62	11.84	-
NVV 0192 85 05053	5	5	20	4.9	75	0.5	6	2	21.34	21.79	-	-	-
NVV 0192 85 05055 NEW	5	5	30	4.9	75	0.5	6	2	31.6	-	-	-	-
NVV 0192 85 05056 NEW	5	5	40	4.9	75	0.5	6	2	41.8	-	-	-	-
NVV 0192 85 06021	6	6	10	5.85	57	0.2	6	2	-	-	-	-	-
NVV 0192 85 06023	6	6	20	5.85	75	0.2	6	2	-	-	-	-	-
NVV 0192 85 06025 NEW	6	6	30	5.85	75	0.2	6	2	-	-	-	-	-
NVV 0192 85 06026 NEW	6	6	40	5.85	75	0.2	6	2	-	-	-	-	-
NVV 0192 85 06051	6	6	10	5.85	57	0.5	6	2	-	-	-	-	-
NVV 0192 85 06053	6	6	20	5.85	75	0.5	6	2	-	-	-	-	-
NVV 0192 85 06055 NEW	6	6	30	5.85	75	0.5	6	2	-	-	-	-	-
NVV 0192 85 06056 NEW	6	6	40	5.85	75	0.5	6	2	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.1 - 0.8	fz (mm)	0.005-0.02	0.005-0.02	0.005-0.02	-	0.005-0.02	0.005-0.015
	ap (mm)	0.005-0.1	0.005-0.08	0.01-0.1		0.005-0.08	0.005-0.05
1 - 2	fz (mm)	0.01-0.04	0.01-0.04	0.01-0.04	-	0.01-0.04	0.01-0.03
	ap (mm)	0.05-0.2	0.05-0.15	0.06-0.2		0.05-0.15	0.04-0.1
3 - 4	fz (mm)	0.04-0.07	0.04-0.07	0.04-0.07	-	0.04-0.07	0.04-0.07
	ap (mm)	0.08-0.4	0.08-0.3	0.12-0.4		0.08-0.3	0.08-0.2
5 - 6	fz (mm)	0.08-0.12	0.08-0.12	0.08-0.12	-	0.08-0.12	0.08-0.12
	ap (mm)	0.1-0.6	0.1-0.4	0.15-0.6		0.1-0.4	0.1-0.3
8	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	-	0.08-0.15	0.08-0.12
	ap (mm)	0.15-0.8	0.15-0.6	0.25-0.8		0.15-0.6	0.15-0.4
10	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	-	0.08-0.15	0.08-0.12
	ap (mm)	0.2-1	0.2-0.7	0.3-1		0.2-0.7	0.2-0.5
12	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	-	0.08-0.15	0.08-0.15
	ap (mm)	0.2-1.2	0.2-0.8	0.3-1.2		0.2-0.8	0.2-0.6

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVTiH	Rough	-	-	-	-	-	-
	Fine	120 **235** 350	110 **130** 150	100 **250** 400		50 **65** 80	80 **165** 250

Steel mills up to 58 HRC

Toric corner radius end mills | 6 and 8 cutting edges

d_1	z	r	γ° 6° λ° 50°	MGC PVTi
6 - 20	6 - 8	1 - 2		

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0280 56 060	6	12	-	-	57	1	6	6	-	-	-	-	-
NVV 0280 56 080	8	16	-	-	63	1	8	6	-	-	-	-	-
NVV 0280 56 100	10	20	-	-	72	1.5	10	6	-	-	-	-	-
NVV 0280 56 120	12	24	-	-	83	1.5	12	6	-	-	-	-	-
NVV 0280 56 160	16	32	-	-	92	2	16	6	-	-	-	-	-
NVV 0280 56 200	20	40	-	-	104	2	20	8	-	-	-	-	-

Application data (fz / ap)

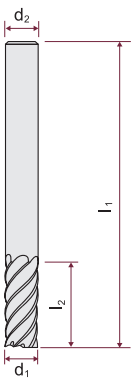
Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
6	fz (mm)	0.03	-	-	-	-	0.02
	ap (mm)	12					12
8	fz (mm)	0.04	-	-	-	-	0.02
	ap (mm)	16					16
10	fz (mm)	0.04	-	-	-	-	0.03
	ap (mm)	20					20
12	fz (mm)	0.05	-	-	-	-	0.03
	ap (mm)	24					24
16	fz (mm)	0.05	-	-	-	-	0.04
	ap (mm)	32					32
20	fz (mm)	0.06	-	-	-	-	0.04
	ap (mm)	40					40

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	-	-	-	-	-	-
	Fine	200 **250** 300					100 **175** 250

Steel mills up to 58 HRC

End mills | 4 to 8 cutting edges



d_1	z	r	γ° 6° λ° 50°	MGC PVTi
5 - 20	4 - 8	-		

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short | long												
NVV 0259 56 040	4	8	-	-	57	-	6	4	8.88	9.26	9.60	9.96	10.76
NVV 0359 56 040	4	12	-	-	57	-	6	4	13.06	13.54	14.03	14.56	15.74
NVV 0259 56 050	5	10	-	-	57	-	6	5	10.97	11.40	11.81	12.26	-
NVV 0359 56 050	5	15	-	-	57	-	6	5	16.18	16.75	17.35	-	-
NVV 0258 56 061	6	12	-	-	57	-	6	6	-	-	-	-	-
NVV 0259 56 060	6	12	-	-	57	-	6	6	-	-	-	-	-
NVV 0359 56 060	6	18	-	-	57	-	6	6	-	-	-	-	-
NVV 0259 56 080	8	16	-	-	63	-	8	6	-	-	-	-	-
NVV 0359 56 080	8	24	-	-	63	-	8	6	-	-	-	-	-
NVV 0258 56 101	10	20	-	-	72	-	10	6	-	-	-	-	-
NVV 0259 56 100	10	20	-	-	72	-	10	6	-	-	-	-	-
NVV 0359 56 100	10	30	-	-	72	-	10	6	-	-	-	-	-
NVV 0258 56 121	12	24	-	-	83	-	12	6	-	-	-	-	-
NVV 0259 56 120	12	24	-	-	83	-	12	6	-	-	-	-	-
NVV 0359 56 120	12	36	-	-	83	-	12	6	-	-	-	-	-
NVV 0359 56 140	14	42	-	-	100	-	14	6	-	-	-	-	-
NVV 0259 56 160	16	32	-	-	92	-	16	6	-	-	-	-	-
NVV 0359 56 160	16	48	-	-	92	-	16	6	-	-	-	-	-
NVV 0259 56 200	20	40	-	-	104	-	20	8	-	-	-	-	-
NVV 0359 56 200	20	60	-	-	125	-	20	8	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
4	fz (mm) ap (mm)	0.03 8	-	0.03 8	-	-	0.01 8
5 - 6	fz (mm) ap (mm)	0.03 10	-	0.03 10	-	-	0.02 10
8	fz (mm) ap (mm)	0.04 16	-	0.04 16	-	-	0.02 16
10	fz (mm) ap (mm)	0.04 20	-	0.04 20	-	-	0.03 20
12	fz (mm) ap (mm)	0.05 24	-	0.05 24	-	-	0.03 24
14	fz (mm) ap (mm)	0.05 42	-	0.05 42	-	-	0.03 42
16	fz (mm) ap (mm)	0.05 32	-	0.05 32	-	-	0.04 32
20	fz (mm) ap (mm)	0.06 40	-	0.06 40	-	-	0.04 40

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVTiH	Rough Fine	- 200 **250** 300	-	- 180 **290** 400	-	-	- 100 **175** 250

Steel mills over 58 HRC

Ball nose and toric corner radius end mills

Properties

- 2 to 5 cutting edges
- Ball nose end mill
- Toric corner radius end mills

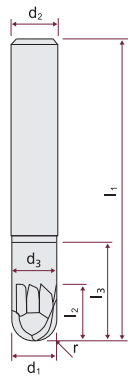
Cutting materials

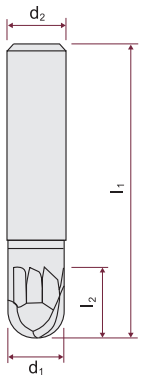
Coating quality	ISO application P	M	K	N	S	H	Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
MGC PVAT	▼	-	-	-	-	▼	1 - 16	1 - 12	2 - 5	0.5 - 6

Steel mills over 58 HRC

Ball nose end mills | 2 cutting edges

d_1	z	r	γ° 0° λ° 15°	MGC PVAT
1 - 12	2	-		





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long													
NVV 1313 59 011	1	1	6	0.95	75	0.5	6	2	6.90	7.18	7.42	7.63	8.04
NVV 1313 59 016	1.5	1.5	8	1.4	75	0.75	6	2	9.10	9.40	9.66	9.90	10.41
NVV 1313 59 021	2	2	10	1.9	75	1	6	2	11.17	11.51	11.80	12.08	12.71
NVV 1313 59 031	3	3	12	2.9	75	1.5	6	2	13.23	13.60	13.91	14.24	14.96
NVV 1313 59 041	4	4	15	3.8	75	2	6	2	16.49	16.87	17.26	17.66	18.55
NVV 1313 59 051	5	5	18	4.8	75	2.5	6	2	19.56	20.00	20.45	-	-
NVV 1313 59 061	6	6	20	5.8	75	3	6	2	-	-	-	-	-
NVV 1313 59 081	8	8	26	7.8	90	4	8	2	-	-	-	-	-
NVV 1313 59 101	10	10	31	9.8	100	5	10	2	-	-	-	-	-
NVV 1313 59 121	12	12	37	11.8	110	6	12	2	-	-	-	-	-
without AT | short | long													
NVV 1312 59 011	1	1	-	-	57	0.5	6	2	1.26	1.40	1.52	1.63	1.84
NVV 1312 59 016	1.5	1.5	-	-	57	0.75	6	2	1.80	1.96	2.09	2.22	2.44
NVV 1312 59 021	2	2	-	-	57	1	6	2	2.34	2.52	2.66	2.79	3.03
NVV 1312 59 031	3	3	-	-	57	1.5	6	2	3.41	3.61	3.77	3.92	4.19
NVV 1312 59 041	4	4	-	-	57	2	6	2	4.46	4.69	4.87	5.03	5.32
NVV 1312 59 051	5	5	-	-	57	2.5	6	2	5.51	5.75	5.95	6.13	6.44
NVV 1312 59 061	6	6	-	-	57	3	6	2	-	-	-	-	-
NVV 1312 59 081	8	8	-	-	63	4	8	2	-	-	-	-	-
NVV 1312 59 101	10	10	-	-	72	5	10	2	-	-	-	-	-
NVV 1312 59 121	12	12	-	-	83	6	12	2	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
1 - 2	fz (mm) ap (mm)	0.01-0.025 0.05-0.13	-	-	-	-	0.01-0.03 0.04-0.1
3 - 4	fz (mm) ap (mm)	0.04-0.07 0.08-0.4	-	-	-	-	0.04-0.07 0.08-0.2
5 - 6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	-	-	-	0.08-0.15 0.1-0.3
8	fz (mm) ap (mm)	0.08-0.15 0.15-0.8	-	-	-	-	0.08-0.15 0.15-0.4
10	fz (mm) ap (mm)	0.08-0.15 0.2-1	-	-	-	-	0.08-0.2 0.2-0.5
12	fz (mm) ap (mm)	0.08-0.15 0.2-1.2	-	-	-	-	0.08-0.25 0.2-0.6

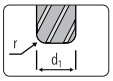
Speed (Vc in m/min)

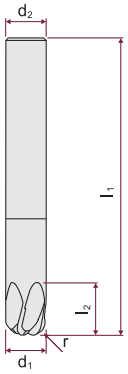
Coating quality	Application	P	M	K	N	S	H
MGC PVAT	Rough Fine	- 120 **235** 350	-	-	-	-	70 **145** 220 100 **175** 250

Steel mills over 58 HRC

Toric corner radius end mills | 5 cutting edges

d_1	z	r	γ° 2° λ° 30°	MGC PVAT
6 - 16	5	2 - 5		





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0275 59 060	6	4.5	-	-	57	2	6	5	-	-	-	-	-
NVV 0275 59 080	8	5.5	-	-	63	2.5	8	5	-	-	-	-	-
NVV 0275 59 101	10	7.5	-	-	72	3	10	5	-	-	-	-	-
NVV 0275 59 100	10	7.5	-	-	72	3.5	10	5	-	-	-	-	-
NVV 0275 59 120	12	9	-	-	83	3.5	12	5	-	-	-	-	-
NVV 0275 59 160	16	10.5	-	-	92	5	16	5	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
6	fz (mm) ap (mm)	0.08-0.12 0.1-0.6	-	-	-	-	0.08-0.1 0.1-0.2
8	fz (mm) ap (mm)	0.08-0.15 0.15-0.8	-	-	-	-	0.08-0.1 0.15-0.275
10	fz (mm) ap (mm)	0.08-0.15 0.2-1	-	-	-	-	0.08-0.1 0.2-0.35
12	fz (mm) ap (mm)	0.08-0.15 0.2-1.2	-	-	-	-	0.08-0.115 0.2-0.4
16	fz (mm) ap (mm)	0.1-0.175 0.2-0.95	-	-	-	-	0.08-0.115 0.2-0.5

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVAT	Rough Fine	- 120 **235** 350	-	-	-	-	80 **150** 220 100 **175** 250

Steel mills up to 65 HRC

Ball nose and toric corner radius end mills

Properties

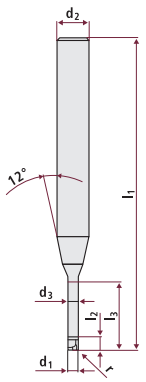
- 2 to 5 cutting edges
- Ball nose end mill
- Toric corner radius end mills

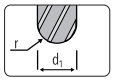
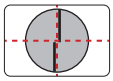
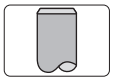
Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
UMGC	▼	-	-	-	-	▼	0.2 - 12	0.2 - 12.5	2 - 5	0.1 - 6

Steel mills up to 65 HRC

Ball nose end mills | 2 cutting edges



d_1 0.3 - 12	z 2	r -	γ° 1.5° λ° 15°	UMGCPVTix
			NEW	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
with AT | short | long													
B2HA-003-015-015-01	0.3	0.3	1.5	0.27	50	0.15	4	2	2.06	2.21	2.35	2.48	2.71
B2HA-004-020-015-01	0.4	0.4	1.5	0.385	50	0.2	4	2	1.92	2.07	2.19	2.30	2.51
B2HA-004-020-030-01	0.4	0.4	3	0.385	50	0.2	4	2	3.54	3.74	3.91	4.06	4.32
B2HA-004-020-050-01	0.4	0.4	5	0.385	50	0.2	4	2	5.66	5.92	6.13	6.31	6.62
B2HA-005-025-030-01	0.5	0.5	3	0.48	50	0.25	4	2	3.56	3.75	3.92	4.06	4.32
B2HA-005-025-050-01	0.5	0.5	5	0.48	50	0.25	4	2	5.68	5.93	6.13	6.31	6.62
B2HA-005-025-100-01	0.5	0.5	10	0.48	50	0.25	4	2	10.90	11.26	11.53	11.77	12.70
B2HA-006-030-030-01	0.6	0.6	3	0.58	50	0.3	4	2	3.55	3.75	3.90	4.05	4.31
B2HA-006-030-050-01	0.6	0.6	5	0.58	50	0.3	4	2	5.67	5.92	6.13	6.31	6.62
B2HA-006-030-100-01	0.6	0.6	10	0.58	50	0.3	4	2	10.90	11.25	11.53	11.77	12.65
B2HA-008-040-030-01	0.8	0.8	3	0.78	50	0.4	4	2	3.55	3.74	3.90	4.04	4.29
B2HA-008-040-050-01	0.8	0.8	5	0.78	50	0.4	4	2	5.67	5.92	6.12	6.30	6.60
B2HA-008-040-100-01	0.8	0.8	10	0.78	50	0.4	4	2	10.89	11.25	11.52	11.76	12.62
B2HA-010-050-050-01	1	1	5	0.98	50	0.5	4	2	5.66	5.91	6.11	6.29	6.59
B2HA-010-050-100-01	1	1	10	0.98	50	0.5	4	2	10.89	11.24	11.52	11.75	12.59
B2HA-010-050-150-01	1	1	15	0.98	50	0.5	4	2	16.07	16.49	16.82	17.38	19.22
B2HA-015-075-050-01	1.5	1.5	5	1.45	50	0.75	4	2	5.74	5.96	6.14	6.31	6.60
B2HA-015-075-100-01	1.5	1.5	10	1.45	50	0.75	4	2	10.95	11.28	11.54	11.76	12.54
B2HA-015-075-150-01	1.5	1.5	15	1.45	50	0.75	4	2	16.12	16.52	16.84	17.36	19.18
B2HA-015-075-200-01	1.5	1.5	20	1.45	75	0.75	4	2	21.26	21.73	22.28	23.34	-
B2HA-020-100-050-01	2	2	5	1.95	50	1	4	2	5.73	5.94	6.12	6.28	6.56
B2HA-020-100-100-01	2	2	10	1.95	50	1	4	2	10.94	11.26	11.52	11.75	12.46
B2HA-020-100-150-01	2	2	15	1.95	50	1	4	2	16.11	16.51	16.82	17.31	19.10
B2HA-020-100-200-01	2	2	20	1.95	75	1	4	2	21.25	21.72	22.25	23.29	-
B2HA-030-150-100-01	3	3	10	2.95	58	1.5	6	2	10.92	11.23	11.49	11.71	12.30
B2HA-030-150-150-01	3	3	15	2.95	58	1.5	6	2	16.09	16.49	16.80	17.22	18.94

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
B2HA-030-150-200-01	3	3	20	2.95	75	1.5	6	2	21.24	21.70	22.18	23.20	25.57
B2HA-030-150-250-01	3	3	25	2.95	75	1.5	6	2	26.37	26.88	27.88	29.18	-
B2HA-040-200-100-01	4	4	10	3.9	58	2	6	2	11.01	11.29	11.52	11.72	12.20
B2HA-040-200-150-01	4	4	15	3.9	58	2	6	2	16.17	16.53	16.82	17.17	18.84
B2HA-040-200-200-01	4	4	20	3.9	75	2	6	2	21.30	21.73	22.16	23.15	-
B2HA-040-200-250-01	4	4	25	3.9	75	2	6	2	26.43	26.91	27.86	29.14	-
B2HA-050-250-100-01	5	5	10	4.9	58	2.5	6	2	10.99	11.26	11.49	11.69	-
B2HA-050-250-150-01	5	5	15	4.9	58	2.5	6	2	16.15	16.51	16.80	-	-
B2HA-050-250-200-01	5	5	20	4.9	75	2.5	6	2	21.29	21.71	-	-	-
B2HA-050-250-250-01	5	5	25	4.9	75	2.5	6	2	26.42	26.89	-	-	-
B2HA-060-300-100-01	6	6	10	5.85	58	3	6	2	-	-	-	-	-
B2HA-060-300-150-01	6	6	15	5.85	58	3	6	2	-	-	-	-	-
B2HA-060-300-200-01	6	6	20	5.85	75	3	6	2	-	-	-	-	-
B2HA-060-300-250-01	6	6	25	5.85	75	3	6	2	-	-	-	-	-
without AT | short | long													
B2HA-002-010-000-01	0.2	0.2	-	-	50	0.1	4	2	0.35	0.45	0.54	0.63	0.81
B2HA-003-015-000-01	0.3	0.3	-	-	50	0.15	4	2	0.47	0.57	0.67	0.76	0.95
B2HA-004-020-000-01	0.4	0.4	-	-	50	0.2	4	2	0.56	0.65	0.74	0.82	0.97
B2HA-005-025-000-01	0.5	0.5	-	-	50	0.25	4	2	0.67	0.77	0.86	0.94	1.10
B2HA-006-030-000-01	0.6	0.6	-	-	50	0.3	4	2	0.78	0.89	0.98	1.06	1.22
B2HA-008-040-000-01	0.8	0.8	-	-	50	0.4	4	2	1.01	1.12	1.21	1.30	1.47
B2HA-010-050-000-01	1	1	-	-	50	0.5	4	2	1.26	1.34	1.45	1.54	1.72
B2HA-010-050-000-02	1	1	-	-	75	0.5	4	2	1.26	1.34	1.45	1.54	1.72
B2HA-015-075-000-01	1.5	1.5	-	-	50	0.75	4	2	1.77	1.90	2.02	2.12	2.31
B2HA-015-075-000-02	1.5	1.5	-	-	75	0.75	4	2	1.77	1.90	2.02	2.12	2.31
B2HA-020-100-000-01	2	2	-	-	50	1	4	2	2.30	2.45	2.58	2.69	2.89
B2HA-020-100-000-02	2	2	-	-	75	1	4	2	2.30	2.45	2.58	2.69	2.89
B2HA-030-150-000-01	3	3	-	-	58	1.5	6	2	3.36	3.53	3.68	3.80	4.03
B2HA-030-150-000-02	3	3	-	-	75	1.5	6	2	3.36	3.53	3.68	3.80	4.03
B2HA-040-200-000-01	4	4	-	-	58	2	6	2	4.41	4.60	4.76	4.90	5.15
B2HA-040-200-000-02	4	4	-	-	75	2	6	2	4.41	4.60	4.76	4.90	5.15
B2HA-050-250-000-01	5	5	-	-	58	2.5	6	2	5.45	5.67	5.84	5.99	6.25
B2HA-050-250-000-02	5	5	-	-	75	2.5	6	2	5.45	5.67	5.84	5.99	6.25
B2HA-060-300-000-01	6	6	-	-	58	3	6	2	-	-	-	-	-
B2HA-060-300-000-02	6	6	-	-	75	3	6	2	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
B2HA-080-400-000-01	8	8	-	-	63	4	8	2	-	-	-	-	-
B2HA-080-400-000-02	8	8	-	-	90	4	8	2	-	-	-	-	-
B2HA-100-500-000-01	10	10	-	-	72	5	10	2	-	-	-	-	-
B2HA-100-500-000-02	10	10	-	-	100	5	10	2	-	-	-	-	-
B2HA-120-600-000-01	12	12	-	-	83	6	12	2	-	-	-	-	-
B2HA-120-600-000-02	12	12	-	-	110	6	12	2	-	-	-	-	-

Application data (fz / ap) and cutting speed (Vc in m/min)

Ball nose end mills - Copy end mills 3D

Hardened materials

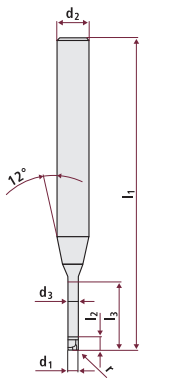
d_1 [mm]	Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
		V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
0.2 - 0.5	Rough	-	-	-	-	-	-	-	-	-
	Medium	-	-	-	-	-	-	-	-	-
	Fine	180 - 250	0.005 - 0.02	0.01 - 0.02	140 - 200	0.005 - 0.015	0.005 - 0.02	40 - 60	0.005 - 0.01	0.01 - 0.02
0.6 - 0.8	Rough	-	-	-	-	-	-	-	-	-
	Medium	-	-	-	-	-	-	-	-	-
	Fine	180 - 250	0.015 - 0.025	0.02 - 0.04	140 - 200	0.01 - 0.02	0.02 - 0.035	40 - 60	0.01 - 0.015	0.015 - 0.03
1.0 - 1.5	Rough	110 - 130	0.025 - 0.035	0.1 - 0.2	90 - 110	0.025 - 0.03	0.1 - 0.15	15 - 20	0.005 - 0.01	0.04 - 0.075
	Medium	120 - 160	0.04 - 0.05	0.05 - 0.15	100 - 120	0.025 - 0.045	0.05 - 0.1	25 - 35	0.02 - 0.025	0.025 - 0.05
	Fine	180 - 250	0.025 - 0.03	0.04 - 0.05	140 - 200	0.02 - 0.025	0.035 - 0.05	40 - 60	0.01 - 0.015	0.02 - 0.03
2.0	Rough	110 - 130	0.035 - 0.06	0.2 - 0.35	90 - 110	0.03 - 0.055	0.15 - 0.35	15 - 20	0.01 - 0.015	0.05 - 0.15
	Medium	120 - 160	0.05 - 0.085	0.1 - 0.25	100 - 120	0.045 - 0.08	0.1 - 0.2	25 - 35	0.03 - 0.04	0.035 - 0.075
	Fine	180 - 250	0.03 - 0.035	0.05 - 0.07	140 - 200	0.025 - 0.03	0.05 - 0.07	40 - 60	0.015 - 0.025	0.025 - 0.04
3.0	Rough	110 - 130	0.05 - 0.07	0.35 - 0.55	90 - 110	0.05 - 0.065	0.3 - 0.55	15 - 20	0.01 - 0.02	0.1 - 0.2
	Medium	120 - 160	0.085 - 0.095	0.25 - 0.35	100 - 120	0.07 - 0.09	0.2 - 0.35	25 - 35	0.035 - 0.05	0.05 - 0.1
	Fine	180 - 250	0.035 - 0.04	0.07 - 0.1	140 - 200	0.03 - 0.035	0.05 - 0.1	40 - 60	0.015 - 0.03	0.03 - 0.05
4.0	Rough	110 - 130	0.07 - 0.85	0.45 - 0.7	90 - 110	0.065 - 0.075	0.4 - 0.7	15 - 20	0.015 - 0.02	0.1 - 0.2
	Medium	120 - 160	0.095 - 0.115	0.35 - 0.5	100 - 120	0.08 - 0.105	0.3 - 0.5	25 - 35	0.04 - 0.05	0.05 - 0.15
	Fine	180 - 250	0.04 - 0.065	0.1 - 0.12	140 - 200	0.035 - 0.065	0.1 - 0.12	40 - 60	0.025 - 0.035	0.04 - 0.06
5.0	Rough	110 - 130	0.08 - 0.09	0.55 - 0.9	90 - 110	0.075 - 0.085	0.5 - 0.9	15 - 20	0.015 - 0.025	0.15 - 0.3
	Medium	120 - 160	0.11 - 0.13	0.45 - 0.6	100 - 120	0.09 - 0.12	0.4 - 0.6	25 - 35	0.045 - 0.06	0.1 - 0.2
	Fine	180 - 250	0.06 - 0.075	0.12 - 0.15	140 - 200	0.04 - 0.07	0.11 - 0.14	40 - 60	0.03 - 0.04	0.05 - 0.08
6.0	Rough	110 - 130	0.085 - 0.1	0.85 - 1.25	90 - 110	0.08 - 0.095	0.8 - 1.25	15 - 20	0.02 - 0.025	0.25 - 0.4
	Medium	120 - 160	0.12 - 0.145	0.5 - 0.7	100 - 120	0.105 - 0.13	0.45 - 0.7	25 - 35	0.05 - 0.07	0.15 - 0.25
	Fine	180 - 250	0.065 - 0.08	0.13 - 0.16	140 - 200	0.06 - 0.075	0.13 - 0.15	40 - 60	0.03 - 0.04	0.065 - 0.08

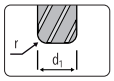
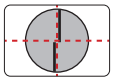
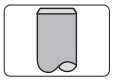
Application data (fz / ap) and cutting speed (Vc in m/min)

Ball nose end mills - Copy end mills 3D										
Hardened materials										
d_1 [mm]	Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
		V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
8.0	Rough	110 - 130	0.095 - 0.115	1.1 - 1.7	90 - 110	0.09 - 0.105	1.1 - 1.7	15 - 20	0.02 - 0.03	0.35 - 0.5
	Medium	120 - 160	0.14 - 0.155	0.65 - 0.95	100 - 120	0.115 - 0.145	0.6 - 0.95	25 - 35	0.065 - 0.08	0.2 - 0.3
	Fine	180 - 250	0.075 - 0.09	0.145 - 0.17	140 - 200	0.07 - 0.085	0.14 - 0.17	40 - 60	0.035 - 0.045	0.07 - 0.09
10.0	Rough	110 - 130	0.11 - 0.135	1.4 - 2.1	90 - 110	0.105 - 0.125	1.4 - 2.1	15 - 20	0.03 - 0.035	0.4 - 0.65
	Medium	120 - 160	0.15 - 0.185	0.8 - 1.2	100 - 120	0.13 - 0.17	0.8 - 1.2	25 - 35	0.07 - 0.085	0.2 - 0.35
	Fine	180 - 250	0.08 - 0.095	0.15 - 0.2	140 - 200	0.075 - 0.09	0.17 - 0.2	40 - 60	0.035 - 0.05	0.08 - 0.1
12.0	Rough	110 - 130	0.13 - 0.14	1.65 - 2.5	90 - 110	0.115 - 0.13	1.6 - 2.5	15 - 20	0.03 - 0.035	0.5 - 0.8
	Medium	120 - 160	0.16 - 0.195	0.95 - 1.45	100 - 120	0.15 - 0.18	0.9 - 1.45	25 - 35	0.075 - 0.09	0.25 - 0.45
	Fine	180 - 250	0.085 - 0.1	0.16 - 0.25	140 - 200	0.08 - 0.095	0.2 - 0.25	40 - 60	0.035 - 0.055	0.09 - 0.15

Steel mills up to 65 HRC

Toric corner radius end mills | 2 cutting edges



d_1 0.4 - 12	z 2	r 0.1 - 2	γ° 1.5° λ° 30°	UMGCPVTix
			NEW	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long													
C2HA-004-010-015-01	0.4	0.4	1.5	0.385	50	0.1	4	2	1.93	2.08	2.21	2.32	2.53
C2HA-004-010-030-01	0.4	0.4	3	0.385	50	0.1	4	2	3.55	3.75	3.92	4.07	4.34
C2HA-004-010-050-01	0.4	0.4	5	0.385	50	0.1	4	2	5.67	5.93	6.14	6.32	6.64
C2HA-005-010-015-01	0.5	0.5	1.5	0.48	50	0.1	4	2	1.96	2.10	2.22	2.34	2.54
C2HA-005-010-030-01	0.5	0.5	3	0.48	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34
C2HA-005-010-050-01	0.5	0.5	5	0.48	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
C2HA-005-010-100-01	0.5	0.5	10	0.48	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
C2HA-006-010-030-01	0.6	0.6	3	0.58	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34
C2HA-006-010-050-01	0.6	0.6	5	0.58	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
C2HA-006-010-100-01	0.6	0.6	10	0.58	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
C2HA-008-010-030-01	0.8	0.8	3	0.78	50	0.1	4	2	3.57	3.77	3.93	4.08	4.34
C2HA-008-010-050-01	0.8	0.8	5	0.78	50	0.1	4	2	5.68	5.94	6.15	6.33	6.64
C2HA-008-010-100-01	0.8	0.8	10	0.78	50	0.1	4	2	10.91	11.26	11.54	11.78	12.71
C2HA-008-010-150-01	0.8	0.8	15	0.78	50	0.1	4	2	16.08	16.51	16.84	17.45	19.35
C2HA-010-020-050-01	1	1	5	0.98	50	0.2	4	2	5.68	5.93	6.14	6.32	6.63
C2HA-010-020-100-01	1	1	10	0.98	50	0.2	4	2	10.90	11.26	11.54	11.77	12.68
C2HA-010-020-150-01	1	1	15	0.98	50	0.2	4	2	16.08	16.51	16.84	17.43	19.32
C2HA-010-020-200-01	1	1	20	0.98	75	0.2	4	2	21.23	21.71	22.33	23.42	25.95
C2HA-015-020-050-01	1.5	1.5	5	1.45	50	0.2	4	2	5.76	6.00	6.19	6.37	6.67
C2HA-015-020-100-01	1.5	1.5	10	1.45	50	0.2	4	2	10.97	11.31	11.58	11.81	12.72
C2HA-015-020-150-01	1.5	1.5	15	1.45	50	0.2	4	2	16.13	16.55	16.87	17.47	19.35
C2HA-015-020-200-01	1.5	1.5	20	1.45	75	0.2	4	2	21.28	21.75	22.36	23.45	-
C2HA-020-020-050-01	2	2	5	1.95	50	0.2	4	2	5.76	6.00	6.19	6.37	6.67
C2HA-020-020-100-01	2	2	10	1.95	50	0.2	4	2	10.97	11.31	11.58	11.81	12.72
C2HA-020-020-150-01	2	2	15	1.95	50	0.2	4	2	16.13	16.55	16.87	17.47	-
C2HA-020-020-200-01	2	2	20	1.95	75	0.2	4	2	21.28	21.75	22.36	23.45	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
C2HA-020-020-250-01	2	2	25	1.95	75	0.2	4	2	26.40	26.92	28.06	-	-
C2HA-020-050-050-01	2	2	5	1.95	50	0.5	4	2	5.75	5.98	6.17	6.33	6.63
C2HA-020-050-100-01	2	2	10	1.95	50	0.5	4	2	10.96	11.29	11.56	11.78	12.62
C2HA-020-050-150-01	2	2	15	1.95	50	0.5	4	2	16.13	16.53	16.85	17.41	19.26
C2HA-020-050-200-01	2	2	20	1.95	75	0.5	4	2	21.27	21.74	22.32	23.39	-
C2HA-020-050-250-01	2	2	25	1.95	75	0.5	4	2	26.40	26.91	28.02	-	-
C2HA-030-020-100-01	3	3	10	2.95	58	0.2	6	2	10.97	11.31	11.58	11.81	12.72
C2HA-030-020-150-01	3	3	15	2.95	58	0.2	6	2	16.13	16.55	16.87	17.47	19.35
C2HA-030-020-200-01	3	3	20	2.95	75	0.2	6	2	21.28	21.75	22.36	23.45	25.99
C2HA-030-020-250-01	3	3	25	2.95	75	0.2	6	2	26.40	26.92	28.06	29.43	-
C2HA-030-050-100-01	3	3	10	2.95	58	0.5	6	2	10.96	11.29	11.56	11.78	12.62
C2HA-030-050-150-01	3	3	15	2.95	58	0.5	6	2	16.13	16.53	16.85	17.41	19.26
C2HA-030-050-200-01	3	3	20	2.95	75	0.5	6	2	21.27	21.74	22.32	23.39	25.89
C2HA-030-050-250-01	3	3	25	2.95	75	0.5	6	2	26.40	26.91	28.02	29.37	-
C2HA-040-020-100-01	4	4	10	3.9	58	0.2	6	2	11.07	11.38	11.64	11.86	12.77
C2HA-040-020-150-01	4	4	15	3.9	58	0.2	6	2	16.22	16.61	16.91	17.52	-
C2HA-040-020-200-01	4	4	20	3.9	75	0.2	6	2	21.35	21.80	22.41	23.50	-
C2HA-040-020-250-01	4	4	25	3.9	75	0.2	6	2	26.47	26.97	28.11	-	-
C2HA-040-050-100-01	4	4	10	3.9	58	0.5	6	2	11.05	11.36	11.62	11.84	12.68
C2HA-040-050-150-01	4	4	15	3.9	58	0.5	6	2	16.21	16.59	16.90	17.46	19.31
C2HA-040-050-200-01	4	4	20	3.9	75	0.5	6	2	21.34	21.79	22.37	23.44	-
C2HA-040-050-250-01	4	4	25	3.9	75	0.5	6	2	26.46	26.96	28.07	-	-
C2HA-050-020-100-01	5	5	10	4.9	58	0.2	6	2	11.07	11.38	11.64	11.86	-
C2HA-050-020-200-01	5	5	20	4.9	75	0.2	6	2	21.35	21.80	-	-	-
C2HA-050-050-100-01	5	5	10	4.9	58	0.5	6	2	11.06	11.36	11.62	11.84	-
C2HA-050-050-200-01	5	5	20	4.9	75	0.5	6	2	21.34	21.79	-	-	-
C2HA-060-020-100-01	6	6	10	5.85	58	0.2	6	2	-	-	-	-	-
C2HA-060-020-200-01	6	6	20	5.85	75	0.2	6	2	-	-	-	-	-
C2HA-060-050-100-01	6	6	10	5.85	58	0.5	6	2	-	-	-	-	-
C2HA-060-050-200-01	6	6	20	5.85	75	0.5	6	2	-	-	-	-	-
without AT | short | long													
C2HA-004-010-000-01	0.4	0.4	-	-	50	0.1	4	2	0.58	0.69	0.78	0.86	1.02
C2HA-005-010-000-01	0.5	0.5	-	-	50	0.1	4	2	0.71	0.82	0.91	1.00	1.17
C2HA-006-010-000-01	0.6	0.6	-	-	50	0.1	4	2	0.83	0.94	1.04	1.14	1.31
C2HA-008-010-000-01	0.8	0.8	-	-	50	0.1	4	2	1.06	1.19	1.30	1.40	1.59

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
C2HA-010-020-000-01	1	1	-	-	50	0.2	4	2	1.27	1.41	1.53	1.63	1.82
C2HA-010-020-000-02	1	1	-	-	75	0.2	4	2	1.27	1.41	1.53	1.63	1.82
C2HA-015-020-000-01	1.5	1.5	-	-	50	0.2	4	2	1.84	2.00	2.14	2.26	2.47
C2HA-015-020-000-02	1.5	1.5	-	-	75	0.2	4	2	1.84	2.00	2.14	2.26	2.47
C2HA-020-020-000-01	2	2	-	-	50	0.2	4	2	2.39	2.58	2.73	2.86	3.09
C2HA-020-020-000-02	2	2	-	-	75	0.2	4	2	2.39	2.58	2.73	2.86	3.09
C2HA-020-050-000-01	2	2	-	-	50	0.5	4	2	2.36	2.53	2.67	2.80	3.02
C2HA-020-050-000-02	2	2	-	-	75	0.5	4	2	2.36	2.53	2.67	2.80	3.02
C2HA-030-020-000-01	3	3	-	-	58	0.2	6	2	3.48	3.70	3.87	4.03	4.29
C2HA-030-020-000-02	3	3	-	-	75	0.2	6	2	3.48	3.70	3.87	4.03	4.29
C2HA-030-050-000-01	3	3	-	-	58	0.5	6	2	3.45	3.66	3.83	3.98	4.24
C2HA-030-050-000-02	3	3	-	-	75	0.5	6	2	3.45	3.66	3.83	3.98	4.24
C2HA-040-020-000-01	4	4	-	-	58	0.2	6	2	4.55	4.80	5.00	5.17	5.46
C2HA-040-020-000-02	4	4	-	-	75	0.2	6	2	4.55	4.80	5.00	5.17	5.46
C2HA-040-050-000-01	4	4	-	-	58	0.5	6	2	4.53	4.77	4.96	5.13	5.41
C2HA-040-050-000-02	4	4	-	-	75	0.5	6	2	4.53	4.77	4.96	5.13	5.41
C2HA-050-020-000-01	5	5	-	-	58	0.2	6	2	5.61	5.87	6.10	6.29	6.61
C2HA-050-020-000-02	5	5	-	-	75	0.2	6	2	5.61	5.87	6.10	6.29	6.61
C2HA-050-050-000-01	5	5	-	-	58	0.5	6	2	5.59	5.86	6.07	6.25	6.56
C2HA-050-050-000-02	5	5	-	-	75	0.5	6	2	5.59	5.86	6.07	6.25	6.56
C2HA-060-020-000-01	6	6	-	-	58	0.2	6	2	-	-	-	-	-
C2HA-060-020-000-02	6	6	-	-	75	0.2	6	2	-	-	-	-	-
C2HA-060-050-000-01	6	6	-	-	58	0.5	6	2	-	-	-	-	-
C2HA-060-050-000-02	6	6	-	-	75	0.5	6	2	-	-	-	-	-
C2HA-060-100-000-01	6	6	-	-	58	1	6	2	-	-	-	-	-
C2HA-060-100-000-02	6	6	-	-	75	1	6	2	-	-	-	-	-
C2HA-080-050-000-01	8	8	-	-	63	0.5	8	2	-	-	-	-	-
C2HA-080-050-000-02	8	8	-	-	90	0.5	8	2	-	-	-	-	-
C2HA-080-100-000-01	8	8	-	-	63	1	8	2	-	-	-	-	-
C2HA-080-100-000-02	8	8	-	-	90	1	8	2	-	-	-	-	-
C2HA-100-100-000-01	10	10	-	-	72	1	10	2	-	-	-	-	-
C2HA-100-100-000-02	10	10	-	-	100	1	10	2	-	-	-	-	-
C2HA-100-150-000-01	10	10	-	-	72	1.5	10	2	-	-	-	-	-
C2HA-100-150-000-02	10	10	-	-	100	1.5	10	2	-	-	-	-	-
C2HA-120-100-000-01	12	12	-	-	83	1	12	2	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
C2HA-120-100-000-02	12	12	-	-	110	1	12	2	-	-	-	-	-
C2HA-120-200-000-01	12	12	-	-	83	2	12	2	-	-	-	-	-
C2HA-120-200-000-02	12	12	-	-	110	2	12	2	-	-	-	-	-

Application data (fz / ap) and cutting speed (Vc in m/min)

Ball nose end mills - Copy end mills 3D

Hardened materials

d_1 [mm]	Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
		V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
0.2 - 0.5	Rough	-	-	-	-	-	-	-	-	-
	Medium	-	-	-	-	-	-	-	-	-
	Fine	170 - 250	0,015 - 0.02	0.01 - 0.02	160 - 200	0,016 - 0,018	0.01 - 0.02	90 - 160	0,005 - 0.01	0.01 - 0.02
0.6 - 0.8	Rough	-	-	-	-	-	-	-	-	-
	Medium	-	-	-	-	-	-	-	-	-
	Fine	170 - 250	0,015 - 0,025	0.02 - 0.03	160 - 200	0.01 - 0.02	0.02 - 0.03	90 - 160	0,005 - 0.01	0.02 - 0.03
1.0 - 1.5	Rough	150 - 190	0.02 - 0,025	0.2 - 0.5	120 - 160	0,015 - 0.02	0.2 - 0.5	70 - 120	0,005 - 0.01	0.15 - 0.25
	Medium	160 - 220	0,025 - 0,045	0.08 - 0.1	140 - 180	0.02 - 0.04	0.05 - 0.1	80 - 140	0.01 - 0,015	0,035 - 0,045
	Fine	170 - 250	0.02 - 0,025	0.03 - 0.04	160 - 200	0,015 - 0.02	0.03 - 0.04	90 - 160	0,005 - 0.01	0.03 - 0.04
2.0	Rough	150 - 190	0,025 - 0.03	0.3 - 0.6	120 - 160	0.02 - 0,025	0.3 - 0.6	70 - 120	0,005 - 0.01	0.2 - 0.3
	Medium	160 - 220	0,025 - 0,045	0.1 - 0.12	140 - 180	0,025 - 0,045	0.1 - 0.12	80 - 140	0.01 - 0,015	0.04 - 0.05
	Fine	170 - 250	0.02 - 0,025	0,035 - 0.05	160 - 200	0,015 - 0.02	0,035 - 0.05	90 - 160	0,005 - 0.01	0,035 - 0.05
3.0	Rough	150 - 190	0.03 - 0.04	0.3 - 0.6	120 - 160	0.03 - 0,035	0.3 - 0.6	70 - 120	0.01 - 0,015	0.2 - 0.3
	Medium	160 - 220	0.04 - 0,065	0.12 - 0.15	140 - 180	0,035 - 0.06	0.12 - 0.15	80 - 140	0,015 - 0.02	0,045 - 0,055
	Fine	170 - 250	0.02 - 0,025	0.04 - 0.05	160 - 200	0,015 - 0.02	0.04 - 0.05	90 - 160	0.01 - 0,015	0.04 - 0.05
4.0	Rough	150 - 190	0.04 - 0.05	0.3 - 0.6	120 - 160	0,035 - 0,045	0.3 - 0.6	70 - 120	0.01 - 0.02	0.2 - 0.3
	Medium	160 - 220	0,045 - 0.08	0.13 - 0.18	140 - 180	0.04 - 0,075	0.12 - 0.18	80 - 140	0.02 - 0,025	0.05 - 0.06
	Fine	170 - 250	0,025 - 0.03	0.05 - 0,075	160 - 200	0.02 - 0,025	0.05 - 0,075	90 - 160	0.01 - 0,015	0.05 - 0,075
5.0	Rough	150 - 190	0.04 - 0,055	0.3 - 0.6	120 - 160	0,035 - 0.05	0.3 - 0.6	70 - 120	0,015 - 0.02	0.2 - 0.3
	Medium	160 - 220	0.06 - 0,095	0.14 - 0.19	140 - 180	0,045 - 0,085	0.16 - 0.24	80 - 140	0,025 - 0.03	0.06 - 0.08
	Fine	170 - 250	0.03 - 0,035	0,055 - 0.08	160 - 200	0,025 - 0.03	0,055 - 0.08	90 - 160	0,015 - 0.02	0,055 - 0.08
6.0	Rough	150 - 190	0,045 - 0.06	0.3 - 0.6	120 - 160	0.04 - 0,055	0.3 - 0.6	70 - 120	0,015 - 0.02	0.2 - 0.3
	Medium	160 - 220	0.08 - 0.13	0.16 - 0.32	140 - 180	0,075 - 0.12	0.18 - 0.26	80 - 140	0.03 - 0.04	0.07 - 0.09
	Fine	170 - 250	0.03 - 0.04	0.07 - 0.1	160 - 200	0,025 - 0,035	0.07 - 0.1	90 - 160	0,015 - 0.02	0.07 - 0.1

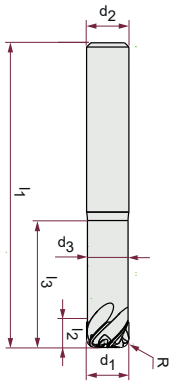
Application data (fz / ap) and cutting speed (Vc in m/min)

Ball nose end mills - Copy end mills 3D										
Hardened materials										
d_1 [mm]	Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
		V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
8.0	Rough	150 - 190	0,055 - 0.07	0.3 - 0.6	120 - 160	0.05 - 0,065	0.3 - 0.6	70 - 120	0.02 - 0,025	0.2 - 0.3
	Medium	160 - 220	0.12 - 0,145	0.18 - 0.3	140 - 180	0.11 - 0,135	0.2 - 0.3	80 - 140	0,035 - 0,045	0.08 - 0.15
	Fine	170 - 250	0,035 - 0,045	0,075 - 0.11	160 - 200	0.03 - 0.04	0,075 - 0.11	90 - 160	0.02 - 0,025	0,075 - 0.11
10.0	Rough	150 - 190	0,065 - 0,095	0.3 - 0.6	120 - 160	0,065 - 0,085	0.3 - 0.6	70 - 120	0,025 - 0,030	0.2 - 0.3
	Medium	160 - 220	0.13 - 0.18	0.2 - 0.36	140 - 180	0,125 - 0.17	0.24 - 0.36	80 - 140	0.04 - 0,055	0.12 - 0.18
	Fine	170 - 250	0.04 - 0.05	0.09 - 0.14	160 - 200	0,035 - 0,045	0.09 - 0.14	90 - 160	0.02 - 0,025	0.09 - 0.14
12.0	Rough	150 - 190	0,085 - 0,115	0.3 - 0.6	120 - 160	0.08 - 0,105	0.3 - 0.6	70 - 120	0,030 - 0.04	0.2 - 0.3
	Medium	160 - 220	0.14 - 0.19	0.26 - 0.39	140 - 180	0,135 - 0.18	0.26 - 0.39	80 - 140	0,045 - 0.06	0.14 - 0.2
	Fine	170 - 250	0,045 - 0,045	0.1 - 0.17	160 - 200	0.04 - 0,045	0.1 - 0.17	90 - 160	0,025 - 0.03	0.1 - 0.17

Steel mills up to 65 HRC

Toric corner radius end mills | 5 cutting edges

d_1	z	r	γ° - λ°	UMGCPVMA
4 - 12	5	0.5 - 2	47°	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long												
C5WX-040-050-120-01	4	4.2	12	3.9	60	0.5	6	5	-	-	-	-	-
C5WX-040-050-200-01	4	4.2	20	3.9	60	0.5	6	5	-	-	-	-	-
C5WX-040-100-120-01	4	4.2	12	3.9	60	1	6	5	-	-	-	-	-
C5WX-040-100-200-01	4	4.2	20	3.9	60	1	6	5	-	-	-	-	-
C5WX-050-050-150-01	5	5.2	15	4.9	60	0.5	6	5	-	-	-	-	-
C5WX-050-050-250-01	5	5.2	25	4.9	60	0.5	6	5	-	-	-	-	-
C5WX-050-100-150-01	5	5.2	15	4.9	60	1	6	5	-	-	-	-	-
C5WX-050-100-250-01	5	5.2	25	4.9	60	1	6	5	-	-	-	-	-
C5WX-060-050-180-01	6	6.3	18	5.9	60	0.5	6	5	-	-	-	-	-
C5WX-060-050-300-01	6	6.3	30	5.9	75	0.5	6	5	-	-	-	-	-
C5WX-060-100-180-01	6	6.3	18	5.9	60	1	6	5	-	-	-	-	-
C5WX-060-100-300-01	6	6.3	30	5.9	75	1	6	5	-	-	-	-	-
C5WX-080-050-240-01	8	8.4	24	7.85	64	0.5	8	5	-	-	-	-	-
C5WX-080-050-400-01	8	8.4	40	7.85	75	0.5	8	5	-	-	-	-	-
C5WX-080-100-240-01	8	8.4	24	7.85	64	1	8	5	-	-	-	-	-
C5WX-080-100-400-01	8	8.4	40	7.85	75	1	8	5	-	-	-	-	-
C5WX-100-100-300-01	10	10.5	30	9.85	75	1	10	5	-	-	-	-	-
C5WX-100-100-500-01	10	10.5	50	9.85	100	1	10	5	-	-	-	-	-
C5WX-100-200-300-01	10	10.5	30	9.85	75	2	10	5	-	-	-	-	-
C5WX-100-200-500-01	10	10.5	50	9.85	100	2	10	5	-	-	-	-	-
C5WX-120-100-360-01	12	12.5	36	11.85	100	1	12	5	-	-	-	-	-
C5WX-120-100-600-01	12	12.5	60	11.85	100	1	12	5	-	-	-	-	-
C5WX-120-200-360-01	12	12.5	36	11.85	100	2	12	5	-	-	-	-	-
C5WX-120-200-600-01	12	12.5	60	11.85	100	2	12	5	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
4	fz (mm) ap (mm)	0.05 0.04-0.48	-	-	-	-	0.02-0.05 0.02-0.04
5 - 6	fz (mm) ap (mm)	0.06-0.08 0.05-0.072	-	-	-	-	0.03-0.08 0.025-0.06
8	fz (mm) ap (mm)	0.09 0.06-0.092	-	-	-	-	0.05-0.09 0.04-0.08
10	fz (mm) ap (mm)	0.11 0.1-0.12	-	-	-	-	0.08-0.11 0.05-0.1
12	fz (mm) ap (mm)	0.13 0.12-0.144	-	-	-	-	0.09-0.13 0.06-0.12

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVMA	Rough Fine	- 180 **240** 300	-	-	-	-	- 80 **150** 220

Cutter for microfinishing up to 2 mm

Ball nose end mills

Properties

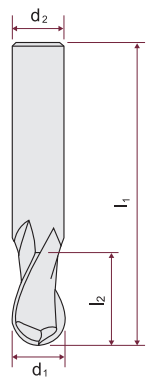
- 2 cutting edges
- Ball nose end mills

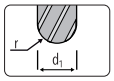
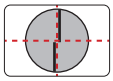
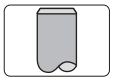
Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
MGC PVTi	▼	▼	▼	▼	▼	-	0.2 - 2	0.5 - 5	2	0.1 - 1

Cutters for microfinishing up to 2.5 mm

Ball nose end mills | 2 cutting edges



d_1 0.2 - 2	z 2	r -	γ° 9° λ° 30°	MGC PVTi
				

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 1142 56 002	0.2	0.5	-	-	39	0.1	3	2	0.7	0.8	0.8	0.8	0.9
NVV 1142 56 003	0.3	1	-	-	39	0.15	3	2	0.8	0.9	0.9	0.9	1.0
NVV 1142 56 004	0.4	1	-	-	39	0.2	3	2	1.4	1.4	1.5	1.5	1.7
NVV 1142 56 005	0.5	1.5	-	-	39	0.25	3	2	1.6	1.6	1.7	1.8	2.0
NVV 1142 56 006	0.6	1.5	-	-	39	0.3	3	2	1.8	1.8	1.9	2.0	2.2
NVV 1142 56 008	0.8	2	-	-	39	0.4	3	2	2.2	2.3	2.4	2.5	2.7
NVV 1142 56 010	1	3	-	-	39	0.5	3	2	2.6	2.7	2.8	2.9	3.2
NVV 1142 56 012	1.2	3.6	-	-	38	0.6	3	2	4.3	4.4	4.6	4.9	5.4
NVV 1142 56 015	1.5	4	-	-	39	0.75	3	2	5.7	5.8	6.0	6.2	6.7
NVV 1142 56 020	2	5	-	-	39	1	3	2	7.2	7.4	7.6	7.9	8.5

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.2 - 0.8	fz (mm)	0.005-0.02	0.005-0.02	0.005-0.02	0.01-0.03	0.005-0.02	-
	ap (mm)	0.005-0.1	0.005-0.08	0.01-0.1	0.01-0.3	0.005-0.08	
1 - 2	fz (mm)	0.01-0.04	0.01-0.04	0.01-0.04	0.02-0.08	0.01-0.04	-
	ap (mm)	0.05-0.2	0.05-0.15	0.06-0.2	0.1-0.7	0.05-0.15	

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	150 **225** 300	-	-	-	-	-
	Fine	200 **250** 300	120 **135** 150	180 **290** 400	300 **450** 600	70 **75** 80	

Cutters for stainless steels | Titanium alloys

Ball nose, toric, bull end, and end mills

Properties

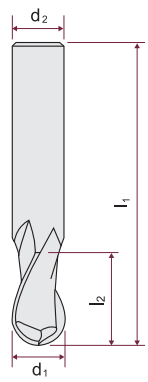
- 2 to 6 cutting edges
- Ball nose end mills
- Toric corner radius end mills
- End mills

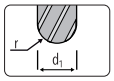
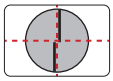
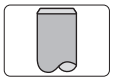
Cutting materials

Coating quality	ISO application P	M	K	N	S	H	Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
MGC VTNB	-	▼	-	-	▼	-	0.1 - 16	0.1 - 30	2 - 6	0 - 10
UMGC PVST	-	▼	-	-	▼	-	3 - 25	8 - 50	4	0 - 3

Cutters for stainless steels | Titanium alloys

Ball nose end mills | 2 cutting edges



d_1 0.1 - 16	z 2	r -	γ° 4° λ° 30°	MGC VTNB
			NEW	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | high precision | short | long												
NVV 1722 81 001	0.1	0.1	-	-	50	0.05	4	2	0.2	0.3	0.4	0.5	0.7
NVV 1722 81 002	0.2	0.2	-	-	50	0.1	4	2	0.4	0.4	0.5	0.6	0.8
NVV 1722 81 003	0.3	0.3	-	-	50	0.15	4	2	0.5	0.6	0.7	0.8	1.0
NVV 1722 81 004	0.4	0.4	-	-	50	0.2	4	2	0.6	0.6	0.7	0.8	1.0
NVV 1722 81 005	0.5	0.5	-	-	50	0.25	4	2	0.7	0.8	0.9	0.9	1.1
NVV 1722 81 006	0.6	0.6	-	-	50	0.3	4	2	0.8	0.9	1.0	1.1	1.2
NVV 1722 81 008	0.8	0.8	-	-	50	0.4	4	2	1.0	1.1	1.2	1.3	1.5
NVV 1722 81 010	1	1	-	-	50	0.5	4	2	1.3	1.3	1.4	1.5	1.7
NVV 1722 81 015	1.5	1.5	-	-	50	0.75	4	2	1.8	1.9	2.0	2.1	2.3
NVV 1722 81 0151	1.5	1.5	-	-	75	0.75	4	2	1.8	1.9	2.0	2.1	2.3
NVV 1722 81 020	2	2	-	-	50	1	4	2	2.3	2.4	2.6	2.7	2.9
NVV 1722 81 0201	2	2	-	-	75	1	4	2	2.3	2.4	2.6	2.7	2.9
NVV 1722 81 0301	3	3	-	-	75	1.5	6	2	3.4	3.5	3.7	3.8	4.0
NVV 1722 81 0401	4	4	-	-	75	2	6	2	4.4	4.6	4.8	4.9	5.2
NVV 1722 81 050	5	5	-	-	57	2.5	6	2	5.4	5.7	5.8	6.0	6.2
NVV 1722 81 0501	5	5	-	-	75	2.5	6	2	5.4	5.7	5.8	6.0	6.2
NVV 1722 81 060	6	6	-	-	57	3	6	2	-	-	-	-	-
NVV 1722 81 0601	6	6	-	-	75	3	6	2	-	-	-	-	-
NVV 1722 81 080	8	8	-	-	63	4	8	2	-	-	-	-	-
NVV 1722 81 0801	8	8	-	-	90	4	8	2	-	-	-	-	-
NVV 1722 81 100	10	10	-	-	72	5	10	2	-	-	-	-	-
NVV 1722 81 1001	10	10	-	-	100	5	10	2	-	-	-	-	-
NVV 1722 81 120	12	12	-	-	83	6	12	2	-	-	-	-	-
NVV 1722 81 1201	12	12	-	-	110	6	12	2	-	-	-	-	-
NVV 1722 81 160	16	16	-	-	92	8	16	2	-	-	-	-	-
NVV 1722 81 1601	16	16	-	-	150	8	16	2	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.8	fz (mm) ap (mm)	-	0.005-0.0125 0.005-0.0425	-	-	0.005 0.005	-
1 - 2	fz (mm) ap (mm)	-	0.01-0.025 0.05-0.1	-	-	0.01 0.05	-
3 - 4	fz (mm) ap (mm)	-	0.04-0.055 0.08-0.19	-	-	0.04 0.08	-
5 - 6	fz (mm) ap (mm)	-	0.08-0.1 0.1-0.25	-	-	0.08 0.1	-
8	fz (mm) ap (mm)	-	0.08-0.115 0.15-0.375	-	-	0.08 0.15	-
10	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.45	-	-	0.08 0.2	-
12	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.5	-	-	0.08 0.2	-
16	fz (mm) ap (mm)	-	0.1-0.175 0.2-0.7	-	-	0.1 0.2	-

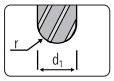
Speed (Vc in m/min)

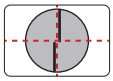
Coating quality	Application	P	M	K	N	S	H
MGC VTNB	Rough Fine	-	- 120 135 150	-	-	- 30 40 50	-

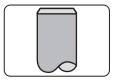
Cutters for stainless steels | Titanium alloys

Ball nose end mills | 4 cutting edges

d_1	z	r	γ° -5° λ° 43°	MGC VTNB
6 - 20	4	-		







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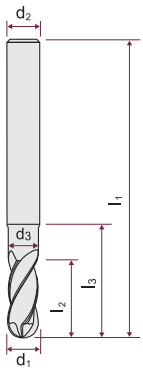


Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | long													
NVV 1524 81 061	6	7	-	-	58	3	6	4	-	-	-	-	-
NVV 1524 81 081	8	9	-	-	64	4	8	4	-	-	-	-	-
NVV 1524 81 101	10	11	-	-	73	5	10	4	-	-	-	-	-
NVV 1524 81 121	12	13	-	-	83	6	12	4	-	-	-	-	-
NVV 1524 81 161	16	24	-	-	93	8	16	4	-	-	-	-	-
NVV 1524 81 200	20	30	53	19.8	104	10	20	4	-	-	-	-	-

Application data (fz / ap)

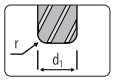
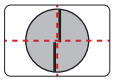
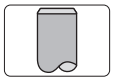
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
6	fz (mm) ap (mm)	-	0.08-0.1 0.1-0.25	-	-	0.08 0.1	-
8	fz (mm) ap (mm)	-	0.08-0.115 0.15-0.375	-	-	0.08 0.15	-
10	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.45	-	-	0.08 0.2	-
12	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.5	-	-	0.08 0.2	-
16	fz (mm) ap (mm)	-	0.1-0.175 0.2-0.7	-	-	0.1 0.2	-
20	fz (mm) ap (mm)	-	0.1-0.175 0.2-0.8	-	-	0.1 0.2	-

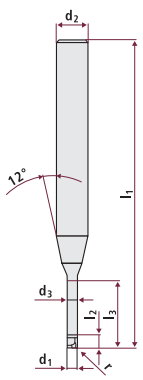
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC VTNB	Rough Fine	-	- 120 **135** 150	-	-	- 30 **40** 50	-

Cutters for stainless steels | Titanium alloys

Toric corner radius end mills | 2 cutting edges

d_1 0.1 - 12	z 2	r 0.02 - 2	γ° 4° λ° 30°	MGC VTNB
			NEW	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | high precision													
NVV 0722 81 001	0.1	0.1	-	-	50	0.02	4	2	0.24	0.33	0.43	0.52	0.69
NVV 0722 81 002	0.2	0.2	-	-	50	0.05	4	2	0.37	0.47	0.57	0.66	0.84
NVV 0722 81 003	0.3	0.3	-	-	50	0.05	4	2	0.50	0.61	0.72	0.82	1.01
NVV 0722 81 004	0.4	0.4	-	-	50	0.1	4	2	0.58	0.69	0.78	0.86	1.02
NVV 0722 81 005	0.5	0.5	-	-	50	0.1	4	2	0.71	0.82	0.91	1.00	1.17
NVV 0722 81 006	0.6	0.6	-	-	50	0.1	4	2	0.83	0.94	1.04	1.14	1.31
NVV 0722 81 008	0.8	0.8	-	-	50	0.1	4	2	1.06	1.19	1.30	1.40	1.59
NVV 0722 81 010	1	1	-	-	50	0.2	4	2	1.27	1.41	1.53	1.63	1.82
NVV 0722 81 0101	1	1	-	-	75	0.2	4	2	1.27	1.41	1.53	1.63	1.82
NVV 0722 81 015	1.5	1.5	-	-	50	0.2	4	2	1.84	2.00	2.14	2.26	2.47
NVV 0722 81 0151	1.5	1.5	-	-	75	0.2	4	2	1.84	2.00	2.14	2.26	2.47
NVV 0722 81 02002	2	2	-	-	50	0.2	4	2	2.39	2.58	2.73	2.86	3.09
NVV 0722 81 02102	2	2	-	-	75	0.2	4	2	2.39	2.58	2.73	2.86	3.09
NVV 0722 81 02005	2	2	-	-	50	0.5	4	2	2.36	2.53	2.67	2.80	3.02
NVV 0722 81 02105	2	2	-	-	75	0.5	4	2	2.36	2.53	2.67	2.80	3.02
NVV 0722 81 03002	3	3	-	-	57	0.2	6	2	3.48	3.70	3.87	4.03	4.29
NVV 0722 81 03102	3	3	-	-	75	0.2	6	2	3.48	3.70	3.87	4.03	4.29
NVV 0722 81 03005	3	3	-	-	57	0.5	6	2	3.45	3.66	3.83	3.98	4.24
NVV 0722 81 03105	3	3	-	-	75	0.5	6	2	3.45	3.66	3.83	3.98	4.24
NVV 0722 81 04002	4	4	-	-	57	0.2	6	2	4.55	4.80	5.00	5.17	5.46
NVV 0722 81 04102	4	4	-	-	75	0.2	6	2	4.55	4.80	5.00	5.17	5.46
NVV 0722 81 04005	4	4	-	-	57	0.5	6	2	4.53	4.77	4.96	5.13	5.41
NVV 0722 81 04105	4	4	-	-	75	0.5	6	2	4.53	4.77	4.96	5.13	5.41
NVV 0722 81 05002	5	5	-	-	57	0.2	6	2	5.61	5.87	6.10	6.29	6.61
NVV 0722 81 05102	5	5	-	-	75	0.2	6	2	5.61	5.87	6.10	6.29	6.61
NVV 0722 81 05005	5	5	-	-	57	0.5	6	2	5.59	5.86	6.07	6.25	6.56

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0722 81 05105	5	5	-	-	75	0.5	6	2	5.59	5.86	6.07	6.25	6.56
NVV 0722 81 06002	6	6	-	-	57	0.2	6	2	-	-	-	-	-
NVV 0722 81 06102	6	6	-	-	75	0.2	6	2	-	-	-	-	-
NVV 0722 81 06005	6	6	-	-	57	0.5	6	2	-	-	-	-	-
NVV 0722 81 06105	6	6	-	-	75	0.5	6	2	-	-	-	-	-
NVV 0722 81 06010	6	6	-	-	57	1	6	2	-	-	-	-	-
NVV 0722 81 06110	6	6	-	-	75	1	6	2	-	-	-	-	-
NVV 0722 81 08005	8	8	-	-	63	0.5	8	2	-	-	-	-	-
NVV 0722 81 08105	8	8	-	-	90	0.5	8	2	-	-	-	-	-
NVV 0722 81 08010	8	8	-	-	63	1	8	2	-	-	-	-	-
NVV 0722 81 08110	8	8	-	-	90	1	8	2	-	-	-	-	-
NVV 0722 81 10010	10	10	-	-	72	1	10	2	-	-	-	-	-
NVV 0722 81 10110	10	10	-	-	100	1	10	2	-	-	-	-	-
NVV 0722 81 10015	10	10	-	-	72	1.5	10	2	-	-	-	-	-
NVV 0722 81 10115	10	10	-	-	100	1.5	10	2	-	-	-	-	-
NVV 0722 81 12010	12	12	-	-	83	1	12	2	-	-	-	-	-
NVV 0722 81 12110	12	12	-	-	110	1	12	2	-	-	-	-	-
NVV 0722 81 12020	12	12	-	-	83	2	12	2	-	-	-	-	-
NVV 0722 81 12120	12	12	-	-	110	2	12	2	-	-	-	-	-

Application data (fz / ap)

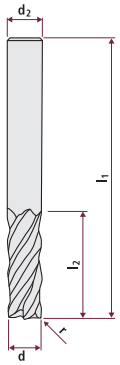
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.1 - 0.8	fz (mm) ap (mm)	-	0.005-0.02 0.005-0.08	-	-	0.005-0.02 0.005-0.08	-
1 - 2	fz (mm) ap (mm)	-	0.01-0.04 0.05-0.15	-	-	0.01-0.04 0.05-0.15	-
3 - 4	fz (mm) ap (mm)	-	0.04-0.07 0.08-0.3	-	-	0.04-0.07 0.08-0.3	-
5 - 6	fz (mm) ap (mm)	-	0.08-0.12 0.1-0.4	-	-	0.08-0.12 0.1-0.4	-
8	fz (mm) ap (mm)	-	0.08-0.15 0.15-0.6	-	-	0.08-0.15 0.15-0.6	-
10	fz (mm) ap (mm)	-	0.08-0.15 0.2-0.7	-	-	0.08-0.15 0.2-0.7	-
12	fz (mm) ap (mm)	-	0.08-0.15 0.2-0.8	-	-	0.08-0.15 0.2-0.8	-

Speed (Vc in m/min)

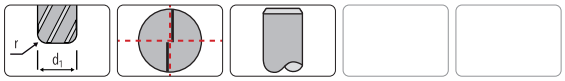
Coating quality	Application	P	M	K	N	S	H
MGC VTNB	Rough Fine	-	- 120 **135** 150	-	-	- 30 **40** 50	-

Cutters for stainless steels | Titanium alloys

Toric corner radius end mills | 4 cutting edges | Uneven cutting pitch



d_1	z	r	γ° 10°	UMGCPVST
3 - 25	4	0.2 - 3	λ° 35° | 37°	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0514 56 030	3	8	-	-	57	0.2	6	4	8.87	9.25	9.58	9.93	10.72
NVV 0514 56 040	4	10	-	-	57	0.3	6	4	10.96	11.38	11.78	12.21	13.18
NVV 0514 56 050	5	12	-	-	57	0.4	6	4	13.05	13.51	13.99	14.50	-
NVV 0514 56 060	6	16	-	-	57	0.5	6	4	-	-	-	-	-
NVV 0514 56 080	8	20	-	-	63	0.5	8	4	-	-	-	-	-
NVV 0514 56 100	10	26	-	-	72	1	10	4	-	-	-	-	-
NVV 0514 56 120	12	30	-	-	83	1	12	4	-	-	-	-	-
NVV 0514 56 160	16	37	-	-	92	2	16	4	-	-	-	-	-
NVV 0514 56 200	20	44	-	-	104	2	20	4	-	-	-	-	-
NVV 0514 56 250	25	50	-	-	104	3	25	4	-	-	-	-	-

Application data (fz / ap)

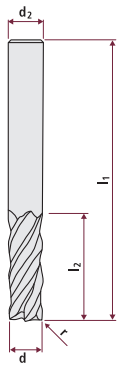
Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
3 - 4	fz (mm) ap (mm)	-	0.025-0.04 3-6	-	-	0.01-0.04 3-6	-
5 - 6	fz (mm) ap (mm)	-	0.045-0.055 6-9	-	-	0.025-0.055 6-9	-
8	fz (mm) ap (mm)	-	0.06-0.075 8-12	-	-	0.04-0.075 8-12	-
10	fz (mm) ap (mm)	-	0.08-0.1 10-15	-	-	0.06-0.1 10-15	-
12	fz (mm) ap (mm)	-	0.1-0.13 12-18	-	-	0.07-0.13 12-18	-
16	fz (mm) ap (mm)	-	0.13-0.15 16-24	-	-	0.09-0.15 16-24	-
20	fz (mm) ap (mm)	-	0.16-0.18 20-30	-	-	0.1-0.18 20-30	-
25	fz (mm) ap (mm)	-	0.16-0.18 25-38	-	-	0.1-0.18 25-38	-
Pocket and slot milling							
3 - 4	fz (mm) ap (mm)	-	0.015-0.02 0.5-1.6	-	-	0.006-0.02 0.5-1.6	-
5 - 6	fz (mm) ap (mm)	-	0.025-0.03 0.5-3	-	-	0.01-0.03 0.5-3	-
8	fz (mm) ap (mm)	-	0.04-0.045 0.5-4	-	-	0.025-0.045 0.5-4	-
10	fz (mm) ap (mm)	-	0.05-0.06 0.5-5	-	-	0.03-0.06 0.5-5	-
12	fz (mm) ap (mm)	-	0.06-0.065 0.5-6	-	-	0.04-0.065 0.5-6	-
16	fz (mm) ap (mm)	-	0.085-0.09 0.5-8	-	-	0.06-0.09 0.5-8	-
20	fz (mm) ap (mm)	-	0.09-0.095 0.5-8	-	-	0.08-0.095 0.5-8	-
25	fz (mm) ap (mm)	-	0.09-0.095 0.5-8	-	-	0.08-0.095 0.5-8	-

Speed (Vc in m/min)

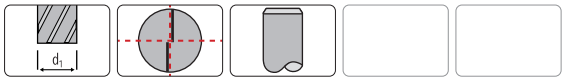
Coating quality	Application	P	M	K	N	S	H
UMGC PVST	Rough Fine	-	40 **60** 80 80 **90** 100	-	-	15 **43** 70 20 **50** 80	-

Cutters for stainless steels | Titanium alloys

End mills | 4 cutting edges | Uneven cutting pitch



d_1	z	r	γ° 10°	UMGCPVST
3 - 25	4	-	λ° 35° | 37°	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0504 56 030	3	8	-	-	57	-	6	4	8.88	9.26	9.60	9.96	10.76
NVV 0504 56 040	4	10	-	-	57	-	6	4	10.97	11.40	11.81	12.26	13.25
NVV 0504 56 050	5	12	-	-	57	-	6	4	13.06	13.54	14.03	-	-
NVV 0504 56 060	6	16	-	-	57	-	6	4	-	-	-	-	-
NVV 0504 56 080	8	20	-	-	63	-	8	4	-	-	-	-	-
NVV 0504 56 100	10	26	-	-	72	-	10	4	-	-	-	-	-
NVV 0504 56 120	12	30	-	-	83	-	12	4	-	-	-	-	-
NVV 0504 56 160	16	37	-	-	92	-	16	4	-	-	-	-	-
NVV 0504 56 200	20	44	-	-	104	-	20	4	-	-	-	-	-
NVV 0504 56 250	25	50	-	-	104	-	25	4	-	-	-	-	-

Application data (fz / ap)

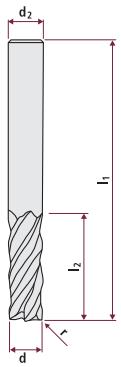
Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
3 - 4	fz (mm) ap (mm)	-	0.025-0.04 3-6	-	-	0.01-0.04 3-6	-
5 - 6	fz (mm) ap (mm)	-	0.045-0.055 6-9	-	-	0.025-0.055 6-9	-
8	fz (mm) ap (mm)	-	0.06-0.075 8-12	-	-	0.04-0.075 8-12	-
10	fz (mm) ap (mm)	-	0.08-0.1 10-15	-	-	0.06-0.1 10-15	-
12	fz (mm) ap (mm)	-	0.1-0.13 12-18	-	-	0.07-0.13 12-18	-
16	fz (mm) ap (mm)	-	0.13-0.15 16-24	-	-	0.09-0.15 16-24	-
20	fz (mm) ap (mm)	-	0.16-0.18 20-30	-	-	0.1-0.18 20-30	-
25	fz (mm) ap (mm)	-	0.16-0.18 25-38	-	-	0.1-0.18 25-38	-
Pocket and slot milling							
3 - 4	fz (mm) ap (mm)	-	0.015-0.02 0.5-1.6	-	-	0.006-0.02 0.5-1.6	-
5 - 6	fz (mm) ap (mm)	-	0.025-0.03 0.5-3	-	-	0.01-0.03 0.5-3	-
8	fz (mm) ap (mm)	-	0.04-0.045 0.5-4	-	-	0.025-0.045 0.5-4	-
10	fz (mm) ap (mm)	-	0.05-0.06 0.5-5	-	-	0.03-0.06 0.5-5	-
12	fz (mm) ap (mm)	-	0.06-0.065 0.5-6	-	-	0.04-0.065 0.5-6	-
16	fz (mm) ap (mm)	-	0.085-0.09 0.5-8	-	-	0.06-0.09 0.5-8	-
20	fz (mm) ap (mm)	-	0.09-0.095 0.5-8	-	-	0.08-0.095 0.5-8	-
25	fz (mm) ap (mm)	-	0.09-0.095 0.5-8	-	-	0.08-0.095 0.5-8	-

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVST	Rough Fine	-	40 **60** 80 80 **90** 100	-	-	15 **43** 70 20 **50** 80	-

Cutters for stainless steels | Titanium alloys

End mills | 6 cutting edges | Uneven cutting pitch



d_1	z	r	γ° 6° λ° 50°	MGC VTNB
6 - 12	6	-	NEW	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0258 81 061	6	12	-	-	57	-	6	6	-	-	-	-	-
NVV 0258 81 081	8	16	-	-	63	-	8	6	-	-	-	-	-
NVV 0258 81 101	10	20	-	-	72	-	10	6	-	-	-	-	-
NVV 0258 81 121	12	24	-	-	83	-	12	6	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
6	fz (mm) ap (mm)	-	0.03 12	-	-	0.03 12	-
8	fz (mm) ap (mm)	-	0.04 16	-	-	0.04 16	-
10	fz (mm) ap (mm)	-	0.04 20	-	-	0.04 20	-
12	fz (mm) ap (mm)	-	0.05 24	-	-	0.05 24	-

Speed (Vc in m/min)

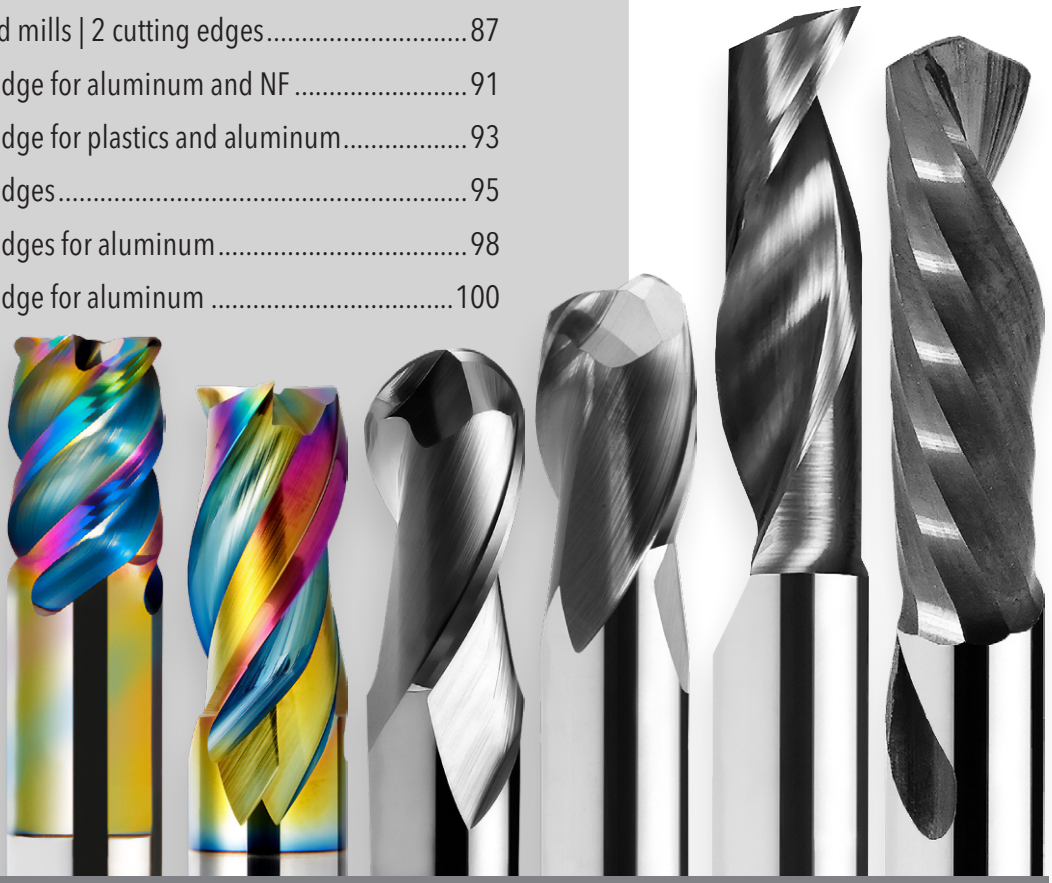
Coating quality	Application	P	M	K	N	S	H
MGC VTNB	Rough Fine	-	- 120 **135** 150	-	-	- 30 **40** 50	-

End mills Aluminum | copper | plastic end mills

Ball nose, toric, bull end, and end mills

Properties

- 2 to 4 cutting edges
- Ball nose end mills
- Toric corner radius end mills
- End mills



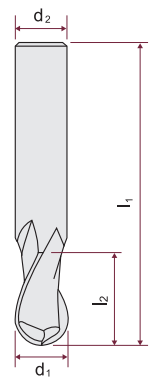
Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
KAC PVAS	-	▼	-	▼		-	0.4 - 20	1 - 40	2 - 4	0 - 10
KAC PVCN	-	-	-	▼		-	0.4 - 20	0.6 - 35	2	0.2 - 10
KAC Polished	-	-	-	▼	-	-	1 - 16	5 - 32	1 - 3	0
MGC PVCS	-	▼	-	▼	▼	-	3 - 16	6 - 32	3	0
UMGC PVCS	-	▼	-	▼	▼	-	6 - 16	8 - 18	4	0.5 - 2

Cutters for Aluminum | copper | plastic cutters

Ball nose end mills | 2 cutting edges

d_1	z	r	γ° 9° λ° 30°	KAC PVAS KAC PVCN
1 - 20	2	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
with AT | short | long														
NVV 1432 47 0101	1	1.5	6	0.95	50	0.5	4	2	6.9	7.2	7.4	7.6	8.0	KAC PVAS
NVV 1432 47 0102	1	1.5	10	0.95	50	0.5	4	2	11.1	11.5	11.8	12.1	12.7	KAC PVAS
NVV 1432 47 0103	1	1.5	15	0.95	50	0.5	4	2	16.3	16.7	17.2	17.6	18.6	KAC PVAS
NVV 1432 47 0104	1	1.5	20	0.95	75	0.5	4	2	21.4	22.0	22.5	23.1	24.4	KAC PVAS
NVV 1432 47 0105	1	1.5	25	0.95	75	0.5	4	2	26.6	27.2	27.9	28.6	-	KAC PVAS
NVV 1432 47 0106	1	1.5	30	0.95	75	0.5	4	2	31.7	32.5	33.3	34.2	-	KAC PVAS
NVV 1432 47 0152	1.5	2.5	10	1.4	50	0.75	4	2	11.2	11.5	11.8	12.1	12.8	KAC PVAS
NVV 1432 47 0153	1.5	2.5	15	1.4	50	0.75	4	2	16.4	16.8	17.2	17.6	18.6	KAC PVAS
NVV 1432 47 0154	1.5	2.5	20	1.4	75	0.75	4	2	21.5	22.0	22.6	23.2	24.4	KAC PVAS
NVV 1432 47 0155	1.5	2.5	25	1.4	75	0.75	4	2	26.6	27.3	28.0	28.7	-	KAC PVAS
NVV 1432 47 0156	1.5	2.5	30	1.4	75	0.75	4	2	31.8	32.5	33.4	34.2	-	KAC PVAS
NVV 1432 47 0212	2	3	10	1.9	50	1	4	2	11.2	11.5	11.8	12.1	12.7	KAC PVAS
NVV 1432 47 0213	2	3	15	1.9	50	1	4	2	16.3	16.8	17.2	17.6	18.6	KAC PVAS
NVV 1432 47 0214	2	3	20	1.9	75	1	4	2	21.5	22.0	22.6	23.2	-	KAC PVAS
NVV 1432 47 02141	2	3	25	1.9	75	1	4	2	26.6	27.3	28.0	28.7	-	KAC PVAS
NVV 1432 47 0215	2	3	30	1.9	75	1	4	2	31.8	32.5	33.4	-	-	KAC PVAS
NVV 1432 47 02151	2	3	35	1.9	75	1	4	2	36.9	37.8	38.7	-	-	KAC PVAS
NVV 1432 47 0253	2.5	4	15	2.4	50	1.25	4	2	16.3	16.8	17.2	17.6	-	KAC PVAS
NVV 1432 47 0254	2.5	4	20	2.4	75	1.25	4	2	21.5	22.0	22.6	-	-	KAC PVAS
NVV 1432 47 02551	2.5	4	35	2.4	75	1.25	4	2	36.9	37.8	-	-	-	KAC PVAS
NVV 1432 47 0302	3	4.5	10	2.9	57	1.5	6	2	11.2	11.5	11.8	12.0	12.6	KAC PVAS
NVV 1432 47 0304	3	4.5	20	2.9	57	1.5	6	2	21.5	22.0	22.5	23.1	24.3	KAC PVAS
NVV 1432 47 0305	3	4.5	30	2.9	75	1.5	6	2	31.7	32.5	33.3	34.2	-	KAC PVAS
NVV 1432 47 0306	3	4.5	40	2.9	75	1.5	6	2	42.0	43.0	44.1	-	-	KAC PVAS
NVV 1432 47 0402	4	6	10	3.8	57	2	6	2	11.3	11.6	11.9	12.1	12.7	KAC PVAS
NVV 1432 47 0404	4	6	20	3.8	57	2	6	2	21.6	22.1	22.6	23.2	-	KAC PVAS

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 1432 47 0405	4	6	30	3.8	75	2	6	2	31.9	32.6	33.4	-	-	KAC PVAS
NVV 1432 47 0406	4	6	40	3.8	75	2	6	2	42.1	43.1	-	-	-	KAC PVAS
NVV 1432 47 0604	6	6	20	5.8	57	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0605	6	6	30	5.8	75	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0606	6	6	40	5.8	75	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0607	6	6	50	5.8	100	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0608	6	6	70	5.8	100	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 08051	8	12	35	7.8	90	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0807	8	12	50	7.8	100	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 0808	8	12	70	7.8	100	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1006	10	15	40	9.8	72	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1007	10	15	50	9.8	100	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1008	10	15	70	9.8	100	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1009	10	15	100	9.8	150	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1206	12	18	40	11.8	83	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1207	12	18	50	11.8	110	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1208	12	18	70	11.8	110	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1209	12	18	100	11.8	150	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 1609	16	24	100	15.8	150	8	16	2	-	-	-	-	-	KAC PVAS
NVV 1432 47 2009	20	30	100	19.8	150	10	20	2	-	-	-	-	-	KAC PVAS
without AT | short | long													
NVV 1462 43 004	0.4	0.6	-	-	50	0.2	4	2	0.8	1.0	1.1	1.2	1.4	KAC PVCN
NVV 1462 43 010	1	1.5	-	-	50	0.5	4	2	1.8	2.0	2.2	2.3	2.5	KAC PVCN
NVV 1412 47 010	1	1.5	-	-	50	0.5	4	2	1.8	2.0	2.2	2.3	2.5	KAC PVAS
NVV 1412 47 015	1.5	2.5	-	-	50	0.75	4	2	2.9	3.2	3.3	3.5	3.8	KAC PVAS
NVV 1462 43 015	1.5	2.5	-	-	57	0.75	6	2	2.9	3.2	3.3	3.5	3.8	KAC PVCN
NVV 1412 47 021	2	3	-	-	50	1	4	2	3.5	3.7	3.9	4.0	4.3	KAC PVAS
NVV 1462 43 020	2	3	-	-	57	1	6	2	3.5	3.7	3.9	4.0	4.3	KAC PVCN
NVV 1412 47 020	2	3	-	-	57	1	6	2	3.5	3.7	3.9	4.0	4.3	KAC PVAS
NVV 1422 47 020	2	4	-	-	75	1	4	2	4.6	4.8	5.0	5.2	5.6	KAC PVAS
NVV 1462 43 025	2.5	4	-	-	57	1.25	6	2	4.5	4.8	5.0	5.2	5.5	KAC PVCN
NVV 1462 43 030	3	4.5	-	-	57	1.5	6	2	5.1	5.3	5.5	5.7	6.1	KAC PVCN
NVV 1412 47 030	3	4.5	-	-	57	1.5	6	2	5.1	5.3	5.5	5.7	6.1	KAC PVAS
NVV 1422 47 030	3	15	-	-	60	1.5	4	2	16.1	16.6	17.2	-	-	KAC PVAS
NVV 1422 47 031	3	15	-	-	75	1.5	4	2	16.1	16.6	17.2	-	-	KAC PVAS

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 1412 47 040	4	6	-	-	57	2	6	2	6.6	6.9	7.2	7.4	7.8	KAC PVAS
NVV 1462 43 040	4	6	-	-	57	2	6	2	6.6	6.9	7.2	7.4	7.8	KAC PVCN
NVV 1422 47 040	4	20	-	-	60	2	4	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 041	4	20	-	-	75	2	4	2	-	-	-	-	-	KAC PVAS
NVV 1412 47 050	5	7.5	-	-	57	2.5	6	2	8.2	8.5	8.8	9.0	9.6	KAC PVAS
NVV 1462 43 050	5	7.5	-	-	57	2.5	6	2	8.2	8.5	8.8	9.0	9.6	KAC PVCN
NVV 1422 47 0501	5	20	-	-	75	2.5	6	2	21.3	21.9	-	-	-	KAC PVAS
NVV 1422 47 0511	5	20	-	-	100	2.5	6	2	21.3	21.9	-	-	-	KAC PVAS
NVV 1412 47 060	6	9	-	-	57	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 060	6	9	-	-	57	3	6	2	-	-	-	-	-	KAC PVCN
NVV 1422 47 060	6	20	-	-	100	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1472 43 061	6	20	-	-	150	3	6	2	-	-	-	-	-	KAC PVCN
NVV 1422 47 061	6	20	-	-	150	3	6	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 080	8	12	-	-	63	4	8	2	-	-	-	-	-	KAC PVCN
NVV 1412 47 080	8	12	-	-	63	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 080	8	25	-	-	100	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 081	8	25	-	-	150	4	8	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 090	9	13.5	-	-	72	4.5	10	2	14.4	14.8	15.2	15.6	-	KAC PVCN
NVV 1412 47 100	10	15	-	-	72	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 100	10	15	-	-	72	5	10	2	-	-	-	-	-	KAC PVCN
NVV 1422 47 100	10	25	-	-	100	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 101	10	25	-	-	150	5	10	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 120	12	18	-	-	83	6	12	2	-	-	-	-	-	KAC PVCN
NVV 1412 47 120	12	18	-	-	83	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 120	12	30	-	-	100	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 121	12	30	-	-	150	6	12	2	-	-	-	-	-	KAC PVAS
NVV 1412 47 160	16	24	-	-	92	8	16	2	-	-	-	-	-	KAC PVAS
NVV 1462 43 160	16	24	-	-	92	8	16	2	-	-	-	-	-	KAC PVCN
NVV 1422 47 160	16	30	-	-	100	8	16	2	-	-	-	-	-	KAC PVAS
NVV 1422 47 161	16	30	-	-	150	8	16	2	-	-	-	-	-	KAC PVAS
NVV 1472 43 161	16	30	-	-	150	8	16	2	-	-	-	-	-	KAC PVCN
NVV 1412 47 200	20	30	-	-	104	10	20	2	-	-	-	-	-	KAC PVAS
NVV 1472 43 201	20	35	-	-	150	10	20	2	-	-	-	-	-	KAC PVCN
NVV 1422 47 201	20	35	-	-	150	10	20	2	-	-	-	-	-	KAC PVAS

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.4	fz (mm) ap (mm)	-	0.005-0.0125 0.005-0.0425	-	0.01-0.03 0.01-0.3	0.005 0.005	-
1 - 2.5	fz (mm) ap (mm)	-	0.01-0.025 0.05-0.1	-	0.02-0.08 0.1-0.7	0.01 0.05	-
3 - 4	fz (mm) ap (mm)	-	0.04-0.055 0.08-0.19	-	0.04-0.1 0.15-1.4	0.04 0.08	-
5 - 6	fz (mm) ap (mm)	-	0.08-0.1 0.1-0.25	-	0.06-0.15 0.2-2	0.08 0.1	-
8	fz (mm) ap (mm)	-	0.08-0.115 0.15-0.375	-	0.08-0.2 0.3-2.8	0.08 0.15	-
9 - 10	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.45	-	0.08-0.25 0.4-3.5	0.08 0.2	-
12	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.5	-	0.1-0.3 0.4-4.2	0.08 0.2	-
16	fz (mm) ap (mm)	-	0.1-0.175 0.2-0.7	-	0.1-0.3 0.4-5.6	0.1 0.2	-
20	fz (mm) ap (mm)	-	0.1-0.175 0.2-0.8	-	0.1-0.35 0.4-7	0.1 0.2	-

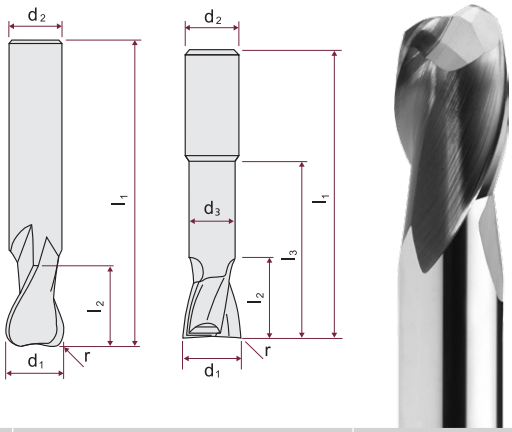
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC PVAS	Rough Fine	-	- 100 **110** 120	-	200 **400** 600 400 **700** 1000	- 50 **55** 60	-
KAC PVCN	Rough Fine	-	-	-	200 **500** 800 200 **600** 1000	- 50 **55** 60	-

For aluminum | copper | plastics

Toric corner radius end mills | 2 cutting edges

d_1	z	r	γ° 9° λ° 30°	KAC PVAS KAC PVCN
0.4 - 20	2	0.12 - 5	1	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without AT | short | long														
[1]NVV 0442 47 004	0.4	1	-	-	50	0.12	4	2	1.3	1.5	1.6	1.8	2.0	KAC PVAS
[1]NVV 0442 47 006	0.6	1	-	-	50	0.2	4	2	1.2	1.4	1.5	1.6	1.8	KAC PVAS
[1]NVV 0442 47 008	0.8	1.2	-	-	50	0.25	4	2	1.5	1.7	1.8	2.0	2.2	KAC PVAS
NVV 0462 43 011	1	1	-	-	50	0.2	4	2	1.3	1.5	1.6	1.7	2.0	KAC PVCN
[1]NVV 0442 47 010	1	1.5	-	-	50	0.3	4	2	1.9	2.0	2.2	2.3	2.6	KAC PVAS
NVV 0462 43 0151	1.5	1.5	-	-	50	0.2	4	2	1.9	2.1	2.2	2.4	2.6	KAC PVCN
[1]NVV 0442 47 015	1.5	2.3	-	-	50	0.3	4	2	2.8	3.0	3.2	3.3	3.6	KAC PVAS
NVV 0432 47 021	2	2	-	-	50	0.2	4	2	2.4	2.6	2.8	3.0	3.3	KAC PVAS
NVV 0462 43 021	2	2	-	-	50	0.2	4	2	2.4	2.6	2.8	3.0	3.3	KAC PVCN
NVV 0432 47 02011	2	2	-	-	50	0.5	4	2	2.4	2.6	2.8	2.9	3.2	KAC PVAS
NVV 0462 43 02105	2	2	-	-	50	0.5	4	2	2.4	2.6	2.8	2.9	3.2	KAC PVCN
[1]NVV 0442 47 020	2	3	-	-	50	0.5	4	2	3.5	3.8	4.0	4.1	4.4	KAC PVAS
NVV 0462 43 031	3	3	-	-	50	0.2	4	2	3.5	3.8	4.0	4.2	4.5	KAC PVCN
NVV 0432 47 031	3	3	-	-	50	0.2	4	2	3.5	3.8	4.0	4.2	4.5	KAC PVAS
NVV 0462 43 03105	3	3	-	-	50	0.5	4	2	3.5	3.8	4.0	4.1	4.4	KAC PVCN
NVV 0432 47 03011	3	3	-	-	50	0.5	4	2	3.5	3.8	4.0	4.1	4.4	KAC PVAS
[1]NVV 0442 47 030	3	4	-	-	50	0.5	4	2	4.6	4.9	5.1	5.3	5.7	KAC PVAS
NVV 0432 47 041	4	4	-	-	50	0.2	4	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 041	4	4	-	-	50	0.2	4	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 04011	4	4	-	-	50	0.5	4	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 04105	4	4	-	-	50	0.5	4	2	-	-	-	-	-	KAC PVCN
[1]NVV 0442 47 040	4	6	-	-	50	0.5	4	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 051	5	5	-	-	57	0.2	6	2	5.7	6.0	6.2	6.5	7.0	KAC PVCN
NVV 0462 43 05105	5	5	-	-	57	0.5	6	2	5.7	6.0	6.2	6.4	6.9	KAC PVCN
[1]NVV 0442 47 050	5	7	-	-	57	1	6	2	7.8	8.1	8.4	8.7	9.3	KAC PVAS
NVV 0462 43 06105	6	6	-	-	57	0.5	6	2	-	-	-	-	-	KAC PVCN

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 0462 43 061	6	6	-	-	57	0.7	6	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 06110	6	6	-	-	57	1	6	2	-	-	-	-	-	KAC PVCN
[1]NVV 0442 47 060	6	8	-	-	57	1	6	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 061*	6	20	-	-	80	2.5	6	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 0811	8	8	-	-	63	0.5	8	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 081	8	8	-	-	63	0.7	8	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 0812	8	8	-	-	63	1	8	2	-	-	-	-	-	KAC PVCN
[1]NVV 0442 47 080	8	10	-	-	63	1.5	8	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 081*	8	25	-	-	80	3	8	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 082*	8	25	-	-	120	3	8	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 101	10	10	-	-	72	0.7	10	2	-	-	-	-	-	KAC PVCN
[1]NVV 0442 47 100	10	12	-	-	72	2	10	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 101*	10	28	-	-	80	4	10	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 102*	10	28	-	-	120	4	10	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 121	12	12	-	-	83	0.7	12	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 1213	12	12	-	-	83	1.5	12	2	-	-	-	-	-	KAC PVCN
[1]NVV 0442 47 120	12	15	-	-	83	2.5	12	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 121*	12	28	-	-	80	5	12	2	-	-	-	-	-	KAC PVAS
NVV 0482 40 122*	12	28	-	-	120	5	12	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 161	16	16	-	-	92	0.7	16	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 201	20	20	-	-	104	0.7	20	2	-	-	-	-	-	KAC PVCN
with AT | short | long														
NVV 0462 43 010	1	1	10	0.95	50	0.2	4	2	11.1	11.5	11.8	12.1	12.8	KAC PVCN
NVV 0462 43 015	1.5	1.5	10	1.4	50	0.2	4	2	11.2	11.6	11.9	12.2	12.8	KAC PVCN
NVV 0462 43 020	2	2	10	1.9	50	0.2	4	2	11.2	11.6	11.9	12.2	12.8	KAC PVCN
NVV 0432 47 020	2	2	10	1.9	50	0.2	4	2	11.2	11.6	11.9	12.2	12.8	KAC PVAS
NVV 0462 43 02005	2	2	10	1.9	50	0.5	4	2	11.2	11.5	11.8	12.1	12.8	KAC PVCN
NVV 0432 47 0201	2	2	10	1.9	50	0.5	4	2	11.2	11.5	11.8	12.1	12.8	KAC PVAS
NVV 0462 43 030	3	3	12	2.9	50	0.2	4	2	13.3	13.7	14.0	14.4	-	KAC PVCN
NVV 0432 47 030	3	3	12	2.9	50	0.2	4	2	13.3	13.7	14.0	14.4	-	KAC PVAS
NVV 0462 43 03005	3	3	12	2.9	50	0.5	4	2	13.3	13.6	14.0	14.4	-	KAC PVCN
NVV 0432 47 0301	3	3	12	2.9	50	0.5	4	2	13.3	13.6	14.0	14.4	-	KAC PVAS
NVV 0432 47 040	4	4	15	3.8	50	0.2	4	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 040	4	4	15	3.8	50	0.2	4	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 0401	4	4	15	3.8	50	0.5	4	2	-	-	-	-	-	KAC PVAS

* Deviating values: γ°=1°; λ°=30°

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 0462 43 04005	4	4	15	3.8	50	0.5	4	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 050	5	5	21	4.8	57	0.2	6	2	22.7	23.3	-	-	-	KAC PVAS
NVV 0462 43 050	5	5	21	4.8	57	0.2	6	2	22.7	23.3	-	-	-	KAC PVCN
NVV 0432 47 0501	5	5	21	4.8	57	0.5	6	2	22.7	23.2	-	-	-	KAC PVAS
NVV 0462 43 05005	5	5	21	4.8	57	0.5	6	2	22.7	23.2	-	-	-	KAC PVCN
NVV 0432 47 060	6	6	21	5.8	57	0.2	6	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 0601	6	6	21	5.8	57	0.5	6	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 06005	6	6	21	5.8	57	0.5	6	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 060	6	6	21	5.8	57	0.7	6	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 06010	6	6	21	5.8	57	1	6	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 0612	6	6	21	5.8	57	1	6	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 0613	6	6	30	5.8	75	1	6	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 0801	8	8	27	7.8	63	0.5	8	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 081	8	8	27	7.8	63	0.5	8	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 080	8	8	27	7.8	63	0.7	8	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 0802	8	8	27	7.8	63	1	8	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 080	8	8	30	7.8	63	1	8	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 0805	8	8	50	7.8	90	1	8	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1011	10	10	32	9.8	72	0.5	10	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 100	10	10	32	9.8	72	0.7	10	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 1002	10	10	32	9.8	72	1	10	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 101	10	10	32	9.8	72	1	10	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1014	10	10	40	9.8	100	1	10	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1016	10	10	60	9.8	100	1	10	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 100	10	10	32	9.8	72	1.5	10	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1201	12	12	38	11.8	83	0.5	12	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 120	12	12	38	11.8	83	0.7	12	2	-	-	-	-	-	KAC PVCN
NVV 0462 43 1203	12	12	38	11.8	83	1.5	12	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 120	12	12	38	11.8	83	1.5	12	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1206	12	12	60	11.8	110	1.5	12	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1208	12	12	80	11.8	110	1.5	12	2	-	-	-	-	-	KAC PVAS
NVV 0462 43 160	16	16	44	15.8	92	0.7	16	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 1615	16	16	50	15.8	92	1.5	16	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 1619	16	16	100	15.8	150	1.5	16	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 160	16	16	44	15.8	92	2	16	2	-	-	-	-	-	KAC PVAS

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 0462 43 200	20	20	54	19.8	104	0.7	20	2	-	-	-	-	-	KAC PVCN
NVV 0432 47 2009	20	20	100	19.8	150	1.5	20	2	-	-	-	-	-	KAC PVAS
NVV 0432 47 200	20	20	54	19.8	104	2	20	2	-	-	-	-	-	KAC PVAS

Application data (fz / ap)

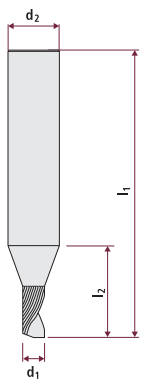
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mill 3D							
0.4 - 0.8	fz (mm) ap (mm)	-	0.005-0.02 0.005-0.08	-	0.01-0.03 0.01-0.3	0.005 0.005	-
1 - 2	fz (mm) ap (mm)	-	0.01-0.04 0.05-0.15	-	0.02-0.08 0.1-0.7	0.01-0.04 0.05-0.15	-
3 - 4	fz (mm) ap (mm)	-	0.04-0.07 0.08-0.3	-	0.04-0.1 0.15-1.4	0.04-0.07 0.08-0.3	-
5 - 6	fz (mm) ap (mm)	-	0.08-0.12 0.1-0.4	-	0.06-0.15 0.2-2	0.08-0.12 0.1-0.4	-
8	fz (mm) ap (mm)	-	0.08-0.15 0.15-0.6	-	0.08-0.2 0.3-2.8	0.08-0.115 0.15-0.375	-
10	fz (mm) ap (mm)	-	0.08-0.15 0.2-0.7	-	0.08-0.25 0.4-3.5	0.08-0.115 0.2-0.45	-
12	fz (mm) ap (mm)	-	0.08-0.15 0.2-0.8	-	0.1-0.3 0.4-4.2	0.08-0.115 0.2-0.5	-
16	fz (mm) ap (mm)	-	0.1 0.2	-	0.1-0.3 0.4-5.6	0.1 0.2	-
20	fz (mm) ap (mm)	-	0.1 0.2	-	0.1-0.35 0.4-7	0.1 0.2	-

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC PVAS	Rough Fine	-	- 100 **110** 120	-	200 **400** 600 400 **700** 1000	- 50 **55** 60	-
KAC PVCN	Rough Fine	-	-	-	200 **500** 800 200 **600** 1000	- 50 **55** 60	-

Cutters for aluminum | copper | plastics

End mills | 1 cutting edge for aluminum and NF



d_1	z	r	γ° - λ°	KAC Polished
1 - 12	1	-	30°	

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0401 40 010	1	5	-	-	38	-	3	1	8.61	8.72	8.83	8.95	9.19
NVV 0401 40 020	2	10	-	-	40	-	3	1	12.56	13.79	14.81	-	-
NVV 0401 40 030	3	10	-	-	38	-	3	1	-	-	-	-	-
NVV 0401 40 040	4	14	-	-	50	-	4	1	-	-	-	-	-
NVV 0401 40 050	5	16	-	-	60	-	6	1	20.76	21.02	-	-	-
NVV 0401 40 060	6	20	-	-	60	-	6	1	-	-	-	-	-
NVV 0401 40 080	8	20	-	-	75	-	8	1	-	-	-	-	-
NVV 0401 40 100	10	22	-	-	64	-	10	1	-	-	-	-	-
NVV 0401 40 120	12	22	-	-	64	-	12	1	-	-	-	-	-

Application data (fz / ap)

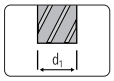
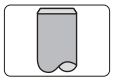
Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
1	fz (mm) ap (mm)	-	-	-	0.005-0.03 0.1-2	-	-
2	fz (mm) ap (mm)	-	-	-	0.005-0.04 0.2-4	-	-
3	fz (mm) ap (mm)	-	-	-	0.01-0.06 0.3-6	-	-
4	fz (mm) ap (mm)	-	-	-	0.01-0.08 0.4-8	-	-
5	fz (mm) ap (mm)	-	-	-	0.01-0.09 0.5-10	-	-
6	fz (mm) ap (mm)	-	-	-	0.015-0.1 0.6-12	-	-
8	fz (mm) ap (mm)	-	-	-	0.02-0.12 0.6-16	-	-
10	fz (mm) ap (mm)	-	-	-	0.025-0.14 1-16	-	-
12	fz (mm) ap (mm)	-	-	-	0.03-0.17 1-18	-	-

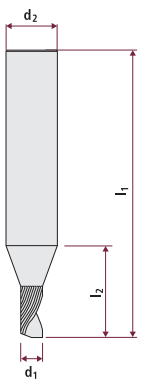
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC polished	Rough Fine	-	-	-	400 **500** 600 800 **900** 1000	-	-

Cutters for aluminum | copper | plastics

End mills | 1 cutting edge for plastics and aluminum

d_1 1 - 8	z 1	r -	γ° - λ° 30°	KAC Polished
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0411 40 010	1	5	-	-	38	-	3	1	8.61	8.72	8.83	8.95	9.19
NVV 0411 40 015	1.5	5	-	-	38	-	3	1	8.61	8.72	8.83	8.95	9.19
NVV 0411 40 020	2	10	-	-	38	-	3	1	13.16	13.33	13.51	13.68	-
NVV 0411 40 030	3	10	-	-	38	-	3	1	-	-	-	-	-
NVV 0411 40 040	4	14	-	-	50	-	4	1	-	-	-	-	-
NVV 0411 40 050	5	16	-	-	60	-	5	1	-	-	-	-	-
NVV 0411 40 060	6	20	-	-	60	-	6	1	-	-	-	-	-
NVV 0411 40 080	8	20	-	-	75	-	8	1	-	-	-	-	-

Application data (fz / ap)

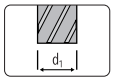
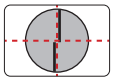
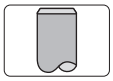
Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
1	fz (mm) ap (mm)	-	-	-	0.005-0.03 0.1-2	-	-
2	fz (mm) ap (mm)	-	-	-	0.005-0.03 0.1-2	-	-
3	fz (mm) ap (mm)	-	-	-	0.005-0.04 0.2-4	-	-
4	fz (mm) ap (mm)	-	-	-	0.01-0.06 0.3-6	-	-
5	fz (mm) ap (mm)	-	-	-	0.01-0.08 0.4-8	-	-
6	fz (mm) ap (mm)	-	-	-	0.01-0.09 0.5-10	-	-
8	fz (mm) ap (mm)	-	-	-	0.015-0.1 0.6-12	-	-
10	fz (mm) ap (mm)	-	-	-	0.02-0.12 0.6-16	-	-
12	fz (mm) ap (mm)	-	-	-	0.03-0.17 1-18	-	-

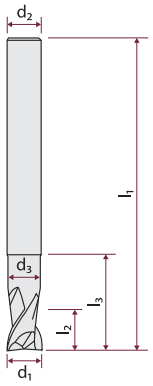
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC polished	Rough Fine	-	-	-	200 **300** 400 350 **425** 500	-	-

Cutters for aluminum | copper | plastics

End mills | 2 cutting edges

d_1 1 - 20	z 2	r -	γ° 16° λ° 45°	KAC PVAS
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short | long													
NVV 0412 47 010	1	2	-	-	50	-	4	2	2.46	2.68	2.86	3.02	3.31
NVV 0412 47 015	1.5	3	-	-	50	-	4	2	3.56	3.81	4.02	4.20	4.52
NVV 0412 47 021	2	4	-	-	50	-	4	2	4.64	4.92	5.15	5.36	5.79
NVV 0412 47 020	2	4	-	-	57	-	6	2	4.64	4.92	5.15	5.36	5.79
NVV 0412 47 030	3	6	-	-	57	-	6	2	9.62	10.31	10.52	10.92	11.80
NVV 0422 47 030	3	15	-	-	60	-	3	2	-	-	-	-	-
NVV 0422 47 031	3	15	-	-	75	-	3	2	-	-	-	-	-
NVV 0412 47 041	4	8	-	-	50	-	4	2	-	-	-	-	-
NVV 0412 47 040	4	8	-	-	57	-	6	2	11.99	12.29	12.74	13.21	14.28
NVV 0422 47 040	4	20	-	-	60	-	4	2	-	-	-	-	-
NVV 0422 47 041	4	20	-	-	75	-	4	2	-	-	-	-	-
NVV 0422 47 042	4	20	-	-	100	-	4	2	-	-	-	-	-
NVV 0412 47 050	5	10	-	-	57	-	6	2	14.60	15.12	15.67	-	-
NVV 0422 47 050	5	20	-	-	70	-	5	2	-	-	-	-	-
NVV 0412 47 060	6	12	-	-	57	-	6	2	-	-	-	-	-
NVV 0422 47 060	6	20	-	-	100	-	6	2	-	-	-	-	-
NVV 0412 47 080	8	16	-	-	63	-	8	2	-	-	-	-	-
NVV 0422 47 080	8	25	-	-	100	-	8	2	-	-	-	-	-
NVV 0412 47 100	10	20	-	-	72	-	10	2	-	-	-	-	-
NVV 0422 47 100	10	25	-	-	100	-	10	2	-	-	-	-	-
NVV 0422 47 101	10	25	-	-	150	-	10	2	-	-	-	-	-
NVV 0412 47 120	12	24	-	-	83	-	12	2	-	-	-	-	-
NVV 0422 47 120	12	30	-	-	100	-	12	2	-	-	-	-	-
NVV 0422 47 121	12	30	-	-	150	-	12	2	-	-	-	-	-
NVV 0412 47 160	16	32	-	-	92	-	16	2	-	-	-	-	-
NVV 0422 47 161	16	30	-	-	150	-	16	2	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0412 47 200	20	40	-	-	104	-	20	2	-	-	-	-	-
NVV 0422 47 201	20	35	-	-	150	-	20	2	-	-	-	-	-
with AT | short | long													
NVV 0412 47 0102	1	2	10	0.95	50	-	4	2	11.10	11.49	11.80	12.11	12.79
NVV 0412 47 0103	1	2	15	0.95	50	-	4	2	16.28	16.75	17.19	17.64	18.63
NVV 0412 47 0152	1.5	3	10	1.4	50	-	4	2	11.10	11.49	11.80	12.11	12.79
NVV 0412 47 0153	1.5	3	15	1.4	50	-	4	2	16.28	16.75	17.19	17.64	18.63
NVV 0412 47 0212	2	4	10	1.9	50	-	4	2	11.10	11.49	11.80	12.11	12.79
NVV 0412 47 0214	2	4	20	1.9	50	-	4	2	21.44	22.01	22.57	23.17	-
NVV 0412 47 0302	3	6	10	2.9	57	-	6	2	10.89	11.34	11.68	11.99	12.66
NVV 0412 47 0304	3	6	20	2.9	57	-	6	2	21.44	22.00	22.46	23.17	24.35
NVV 0412 47 0305	3	6	30	2.9	75	-	6	2	31.59	32.51	33.23	34.23	-
NVV 0412 47 0404	4	8	20	3.8	57	-	6	2	21.56	22.11	22.68	23.28	-
NVV 0412 47 0405	4	8	30	3.8	75	-	6	2	31.81	32.61	33.45	-	-
NVV 0412 47 0406	4	8	40	3.8	75	-	6	2	42.06	43.23	-	-	-
NVV 0412 47 0505	5	10	30	4.8	75	-	6	2	31.81	-	-	-	-
NVV 0412 47 0604	6	12	20	5.8	57	-	6	2	-	-	-	-	-
NVV 0412 47 0605	6	12	30	5.8	75	-	6	2	-	-	-	-	-
NVV 0412 47 0606	6	12	40	5.8	75	-	6	2	-	-	-	-	-
NVV 0412 47 0804	8	16	20	7.8	63	-	8	2	-	-	-	-	-
NVV 0412 47 0805	8	16	40	7.8	90	-	8	2	-	-	-	-	-
NVV 0412 47 0807	8	16	60	7.8	100	-	8	2	-	-	-	-	-
NVV 0412 47 1006	10	20	40	9.8	100	-	10	2	-	-	-	-	-
NVV 0412 47 1008	10	20	60	9.8	100	-	10	2	-	-	-	-	-
NVV 0412 47 1205	12	24	30	11.8	83	-	12	2	-	-	-	-	-
NVV 0412 47 1207	12	24	60	11.8	110	-	12	2	-	-	-	-	-
NVV 0412 47 1208	12	24	80	11.8	110	-	12	2	-	-	-	-	-
NVV 0412 47 1605	16	32	50	15.8	92	-	16	2	-	-	-	-	-
NVV 0412 47 1606	16	32	70	15.8	120	-	16	2	-	-	-	-	-
NVV 0412 47 1607	16	32	100	15.8	150	-	16	2	-	-	-	-	-
NVV 0412 47 1608	16	32	110	15.8	150	-	16	2	-	-	-	-	-
NVV 0412 47 2006	20	40	60	19.8	104	-	20	2	-	-	-	-	-
NVV 0412 47 2008	20	40	100	19.8	150	-	20	2	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
1 - 2	fz (mm) ap (mm)	-	0.01-0.02 0.2-0.3	-	0.01-0.03 0.1-0.7	0.01-0.02 0.2-0.3	-
3 - 4	fz (mm) ap (mm)	-	0.03-0.05 0.2-0.4	-	0.04-0.09 0.15-1.4	0.03-0.05 0.2-0.4	-
5 - 6	fz (mm) ap (mm)	-	0.03-0.05 0.2-0.6	-	0.05-0.1 0.15-2	0.03-0.05 0.2-0.6	-
8	fz (mm) ap (mm)	-	0.04-0.06 0.3-0.7	-	0.06-0.15 0.15-2.8	0.04-0.06 0.3-0.7	-
10	fz (mm) ap (mm)	-	0.05-0.08 0.4-0.8	-	0.08-0.17 0.2-3.5	0.05-0.08 0.4-0.8	-
12	fz (mm) ap (mm)	-	0.06-0.1 0.5-0.8	-	0.09-0.2 0.2-4.2	0.06-0.1 0.5-0.8	-
16	fz (mm) ap (mm)	-	0.06-0.1 0.7-1.1	-	0.1-0.27 0.2-5.6	0.06-0.1 0.7-1.1	-
20	fz (mm) ap (mm)	-	0.07-0.12 0.9-1.3	-	0.12-0.35 0.2-7	0.07-0.12 0.9-1.3	-

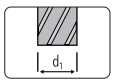
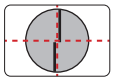
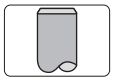
Speed (Vc in m/min)

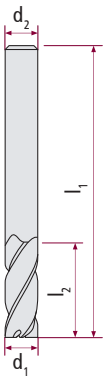
Coating quality	Application	P	M	K	N	S	H
KAC PVAS	Rough Fine	-	- 100 **110** 120	-	200 **400** 600 400 **700** 1000	- 50 **55** 60	-

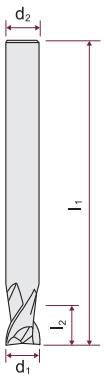
Cutters for aluminum | copper | plastics

End mills | 3 cutting edges for aluminum

d_1	z	r	γ° 9° λ° 35°	MGC PVCN KACPolished
2 - 16	3	-		





Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without AT | short | long														
SVV 0253 45 030	3	6	-	-	50	-	4	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 040	4	8	-	-	50	-	4	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 050	5	10	-	-	57	-	6	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 060	6	12	-	-	57	-	6	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 080	8	16	-	-	63	-	8	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 100	10	20	-	-	72	-	10	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 120	12	24	-	-	83	-	12	3	-	-	-	-	-	MGC PVCS
SVV 0253 45 160	16	32	-	-	92	-	16	3	-	-	-	-	-	MGC PVCS
without AT | long														
NVV 0423 40 0201*	2	8	-	-	38	-	3	3	-	-	-	-	-	KAC polished
NVV 0423 40 040*	4	10	-	-	38	-	4	3	-	-	-	-	-	KAC polished
NVV 0423 40 060*	6	12	-	-	54	-	6	3	-	-	-	-	-	KAC polished
NVV 0423 40 080*	8	16	-	-	60	-	8	3	-	-	-	-	-	KAC polished
NVV 0423 40 100*	10	20	-	-	65	-	10	3	-	-	-	-	-	KAC polished
NVV 0423 40 120*	12	24	-	-	75	-	12	3	-	-	-	-	-	KAC polished
NVV 0423 40 160*	16	32	-	-	88	-	16	3	-	-	-	-	-	KAC polished

* Deviating values: γ°=16°; λ°=30°

Application data (fz / ap)

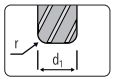
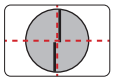
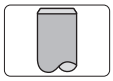
Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
2	fz (mm) ap (mm)	-	0.025-0.4 0.15-0.3	-	0.01-0.03 0.1-0.7	0.01-0.03 0.1-0.15	-
3 - 4	fz (mm) ap (mm)	-	0.03-0.05 0.2-0.4	-	0.04-0.09 0.15-1.4	0.03-0.05 0.2-0.4	-
5 - 6	fz (mm) ap (mm)	-	0.03-0.05 0.2-0.6	-	0.05-0.1 0.15-2	0.03-0.05 0.2-0.6	-
8	fz (mm) ap (mm)	-	0.04-0.06 0.3-0.7	-	0.06-0.15 0.15-2.8	0.04-0.06 0.3-0.7	-
10	fz (mm) ap (mm)	-	0.05-0.08 0.4-0.8	-	0.08-0.17 0.2-3.5	0.05-0.08 0.4-0.8	-
12	fz (mm) ap (mm)	-	0.06-0.1 0.5-0.8	-	0.09-0.2 0.2-4.2	0.06-0.1 0.5-0.8	-
16	fz (mm) ap (mm)	-	0.06-0.1 0.7-1.1	-	0.1-0.27 0.2-5.6	0.06-0.1 0.7-1.1	-

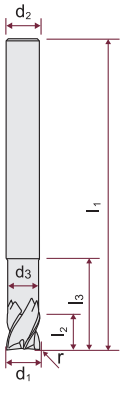
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVCS	Rough Fine	-	- 60 **80** 100	-	200 **400** 600 350 **575** 800	20 **30** 40	-
KAC polished	Rough Fine	-	-	-	200 **400** 600 350 **675** 1000	-	-

Cutters for aluminum | copper | plastics

End mills | 4 cutting edge for aluminum

d_1 6 - 16	z 4	r 0.5 - 2	γ° 8° λ° 50°	UMGCPVCS
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
with AT | short													
NVV 0394 45 06005	6	8	21	5.7	57	0.5	6	4	-	-	-	-	-
NVV 0394 45 06010	6	8	21	5.7	57	1	6	4	-	-	-	-	-
NVV 0394 45 08005	8	10	27	7.6	63	0.5	8	4	-	-	-	-	-
NVV 0394 45 08010	8	10	27	7.6	63	1	8	4	-	-	-	-	-
NVV 0394 45 10005	10	12	32	9.5	72	0.5	10	4	-	-	-	-	-
NVV 0394 45 10010	10	12	32	9.5	72	1	10	4	-	-	-	-	-
[1]NVV 0394 45 12010	12	14	38	11.5	83	1	12	4	-	-	-	-	-
[1]NVV 0394 45 12020	12	14	38	11.5	83	2	12	4	-	-	-	-	-
[1]NVV 0394 45 16010	16	18	44	15.5	92	1	16	4	-	-	-	-	-
[1]NVV 0394 45 16020	16	18	44	15.5	92	2	16	4	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
6	fz (mm) ap (mm)	-	0.05-0.08 1.5-1.8	-	0.05-0.1 0.15-2	0.025-0.05 0.2-1	-
8	fz (mm) ap (mm)	-	0.05-0.08 2-2.5	-	0.06-0.15 0.15-2.8	0.04-0.06 0.3-1	-
10	fz (mm) ap (mm)	-	0.06-0.1 2.5-3	-	0.08-0.17 0.2-3.5	0.05-0.08 0.4-1	-
12	fz (mm) ap (mm)	-	0.07-0.12 3-3.5	-	0.09-0.2 0.2-4.2	0.06-0.1 0.5-1	-
16	fz (mm) ap (mm)	-	0.08-0.12 4-4.5	-	0.1-0.27 0.2-5.6	0.06-0.1 0.5-1.5	-

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVCS	Rough Fine	-	- 70 **95** 120	-	220 **410** 600 400 **700** 1000	 30 **50** 70	-

Cutters for graphite | GFC | CFRP

Ball nose, toric, bull end, and end mills

Properties

- 2 to 3 cutting edges, pyramid tooth
- Ball nose end mills
- Toric corner radius end mills
- End mills

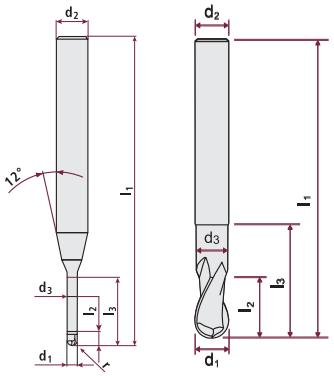
Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
KAC PVDiaG	-	▼	-	▼	-	-	0.3 - 10	0.3 - 15	2 - 4	0.05 - 5
KAC PVDiaN	-	▼	-	▼	-	-	3 - 20	4.5 - 30	2 - 3	0.2 - 10

Cutters for graphite | GFC | CFRP

Ball nose end mills | 2 cutting edges

d_1	z	r	γ° 9° λ° 30°	KACPVDiaG KACPVDiaN
0.3 - 12	2	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
with AT | high precision | short | long														
NVV 1462 49 0031	0.3	0.3	1	0.285	50	0.15	4	2	1.38	1.50	1.60	1.70	1.88	KAC PVDiaG
NVV 1462 49 0041	0.4	0.4	1	0.385	50	0.2	4	2	1.38	1.49	1.59	1.69	1.87	KAC PVDiaG
NVV 1462 49 0051	0.5	0.5	2	0.48	50	0.25	4	2	2.49	2.64	2.78	2.90	3.12	KAC PVDiaG
NVV 1462 49 0061	0.6	0.6	2	0.58	50	0.3	4	2	2.48	2.64	2.77	2.89	3.11	KAC PVDiaG
NVV 1462 49 0081	0.8	0.8	4	0.78	50	0.4	4	2	4.61	4.83	5.02	5.18	5.46	KAC PVDiaG
NVV 1462 49 011	1	1	5	0.98	50	0.5	4	2	5.66	5.91	6.11	6.29	6.59	KAC PVDiaG
NVV 1462 49 0151*	1.5	1.5	10	1.45	50	0.75	4	2	10.95	11.28	11.54	11.76	12.54	KAC PVDiaG
NVV 1462 49 021*	2	2	10	1.95	50	1	4	2	10.94	11.26	11.52	11.75	12.46	KAC PVDiaG
NVV 1462 49 031*	3	3	10	2.95	57	1.5	6	2	10.92	11.23	11.49	11.71	12.30	KAC PVDiaN
NVV 1462 49 0411*	4	4	15	3.9	57	2	6	2	16.17	16.53	16.82	17.17	18.84	KAC PVDiaN
NVV 1462 49 0511*	5	5	20	4.9	57	2.5	6	2	21.29	21.71	-	-	-	KAC PVDiaN
NVV 1462 49 0611*	6	6	20	5.85	57	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1462 49 0614*	6	6	40	5.85	75	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1462 49 0811*	8	8	20	7.85	63	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1462 49 1001*	10	10	20	9.85	72	5	10	2	-	-	-	-	-	KAC PVDiaN
without and with AT | short | long														
SVV 1452 48 00403	0.4	0.6	2.5	0.37	50	0.2	4	2	3.14	3.33	3.50	3.66	3.94	KAC PVDiaG
SVV 1452 48 00404	0.4	0.6	5	0.37	50	0.2	4	2	5.80	6.08	6.31	6.52	6.89	KAC PVDiaG
NVV 1452 48 0050	0.5	0.8	-	-	50	0.25	4	2	1.07	1.21	1.33	1.45	1.66	KAC PVDiaG
SVV 1452 48 00503	0.5	0.8	3.5	0.45	50	0.25	4	2	4.27	4.49	4.68	4.85	5.16	KAC PVDiaG
NVV 1452 48 00510	0.5	0.8	5	0.45	50	0.25	4	2	5.86	6.12	6.35	6.55	6.91	KAC PVDiaG
SVV 1452 48 00504	0.5	0.8	7	0.45	50	0.25	4	2	7.96	8.27	8.54	8.77	9.25	KAC PVDiaG
NVV 1452 48 0052	0.5	0.8	10	0.45	50	0.25	4	2	11.09	11.47	11.78	12.09	12.75	KAC PVDiaG
SVV 1452 48 00603	0.6	0.9	3.5	0.55	50	0.3	4	2	4.16	4.40	4.60	4.78	5.10	KAC PVDiaG
SVV 1452 48 00604	0.6	0.9	7	0.55	50	0.3	4	2	7.87	8.21	8.48	8.72	9.19	KAC PVDiaG
SVV 1452 48 00803	0.8	1.2	5	0.75	50	0.4	4	2	5.85	6.11	6.33	6.53	6.89	KAC PVDiaG

* Deviating values: γ°=4°

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
SVV 1452 48 00804	0.8	1.2	10	0.75	50	0.4	4	2	11.08	11.46	11.77	12.07	12.73	KAC PVDiaG
NVV 1452 48 010	1	1.5	-	-	50	0.5	4	2	1.84	2.01	2.16	2.29	2.53	KAC PVDiaG
NVV 1452 48 01000	1	1.5	5	0.95	50	0.5	4	2	5.84	6.10	6.32	6.52	6.87	KAC PVDiaG
NVV 1452 48 0101	1	1.5	10	0.95	50	0.5	4	2	11.08	11.46	11.76	12.06	12.71	KAC PVDiaG
SVV 1452 48 010112 NEW	1	1.5	12	0.95	50	0.5	4	2	11.08	11.46	11.76	12.06	12.71	KAC PVDiaG
NVV 1452 48 0102	1	1.5	15	0.95	50	0.5	4	2	16.27	16.73	17.15	17.59	18.55	KAC PVDiaG
NVV 1452 48 0103	1	1.5	20	0.95	50	0.5	4	2	21.43	21.98	22.54	23.12	24.39	KAC PVDiaG
NVV 1452 48 01510	1.5	2.3	-	-	50	0.75	4	2	2.71	2.91	3.08	3.23	3.50	KAC PVDiaG
NVV 1452 48 0152	1.5	2.3	10	1.4	50	0.75	4	2	11.18	11.53	11.82	12.11	12.75	KAC PVDiaG
NVV 1452 48 0153	1.5	2.3	25	1.4	75	0.75	4	2	26.64	27.29	27.98	28.70	-	KAC PVDiaG
NVV 1452 48 0200	2	3	-	-	50	1	4	2	3.46	3.68	3.86	4.03	4.31	KAC PVDiaG
NVV 1452 48 0201	2	3	5	1.9	50	1	4	2	5.96	6.18	6.37	6.54	6.87	KAC PVDiaG
NVV 1452 48 0202	2	3	10	1.9	50	1	4	2	11.17	11.51	11.80	12.08	12.71	KAC PVDiaG
NVV 1452 48 0203	2	3	15	1.9	50	1	4	2	16.34	16.78	17.18	17.62	18.55	KAC PVDiaG
NVV 1452 48 0204	2	3	20	1.9	75	1	4	2	21.50	22.03	22.57	23.15	-	KAC PVDiaG
NVV 1452 48 0205	2	3	25	1.9	75	1	4	2	26.63	27.28	27.96	28.68	-	KAC PVDiaG
NVV 1452 48 0301	3	4.5	5	2.9	50	1.5	4	2	5.94	6.14	6.32	6.48	6.79	KAC PVDiaN
NVV 1452 48 0302	3	4.5	10	2.9	50	1.5	4	2	11.15	11.48	11.76	12.03	-	KAC PVDiaN
NVV 1452 48 0303	3	4.5	15	2.9	50	1.5	4	2	16.33	16.75	17.15	-	-	KAC PVDiaN
NVV 1452 48 0304	3	4.5	20	2.9	75	1.5	4	2	21.48	22.00	-	-	-	KAC PVDiaN
NVV 1452 48 0305	3	4.5	25	2.9	75	1.5	4	2	26.62	27.26	-	-	-	KAC PVDiaN
NVV 1452 48 0306	3	4.5	30	2.9	100	1.5	4	2	31.74	-	-	-	-	KAC PVDiaN
NVV 1452 48 0402	4	6	10	3.8	50	2	4	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0403	4	6	15	3.8	50	2	4	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0404	4	6	20	3.8	75	2	4	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0405	4	6	25	3.8	75	2	4	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0406	4	6	45	3.8	100	2	4	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0502	5	7.5	10	4.8	57	2.5	5	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0503	5	7.5	25	4.8	75	2.5	5	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0504	5	7.5	45	4.8	100	2.5	5	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0601	6	9	10	5.8	57	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0603	6	9	15	5.8	57	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0604	6	9	20	5.8	75	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0605	6	9	25	5.8	75	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0606	6	9	30	5.8	75	3	6	2	-	-	-	-	-	KAC PVDiaN

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
NVV 1452 48 0607	6	9	45	5.8	100	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0608	6	9	60	5.8	150	3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0800	8	12	-	-	63	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0801	8	12	20	7.8	63	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 0802	8	12	25	7.8	63	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 081	8	16	45	7.8	100	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 082	8	12	60	7.8	150	4	8	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 1009	10	15	25	9.8	72	5	10	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 1010	10	15	45	9.8	100	5	10	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 1209	12	18	25	11.8	83	6	12	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 1210	12	18	45	11.8	110	6	12	2	-	-	-	-	-	KAC PVDiaN
NVV 1452 48 1220	12	18	60	11.8	150	6	12	2	-	-	-	-	-	KAC PVDiaN

Application data (fz / ap)

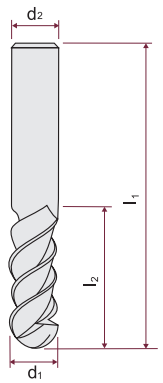
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.3 - 0.8	fz (mm) ap (mm)	-	0.005-0.0125 0.005-0.0425	-	0.01-0.03 0.01-0.3	-	-
1 - 2	fz (mm) ap (mm)	-	0.01-0.025 0.05-0.1	-	0.02-0.08 0.1-0.7	-	-
3 - 4	fz (mm) ap (mm)	-	0.04-0.055 0.08-0.19	-	0.04-0.1 0.15-1.4	-	-
5 - 6	fz (mm) ap (mm)	-	0.08-0.1 0.1-0.25	-	0.06-0.15 0.2-2	-	-
8	fz (mm) ap (mm)	-	0.08-0.115 0.15-0.375	-	0.08-0.2 0.3-2.8	-	-
10	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.45	-	0.08-0.25 0.4-3.5	-	-
12	fz (mm) ap (mm)	-	0.08-0.115 0.2-0.5	-	0.1-0.3 0.4-4.2	-	-

Speed (Vc in m/min)

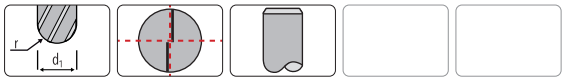
Coating quality	Application	P	M	K	N	S	H
KAC PVDiaG	Rough Fine	-	- 100 **110** 120	-	200 **550** 900 400 **700** 1000	-	-
KAC PVDiaN	Rough Fine	-	- 100 **110** 120	-	200 **400** 600 400 **700** 1000	-	-

Cutters for graphite | GFC | CFRP

Ball nose end mills | 3 cutting edges



d_1	z	r	γ° 9° λ° 30°	KACPVDiaN
10 - 20	3	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long													
NVV 1453 48 1009	10	15	25	9.8	72	5	10	3	-	-	-	-	-
NVV 1453 48 1010	10	15	45	9.8	100	5	10	3	-	-	-	-	-
NVV 1453 48 1020	10	15	60	9.8	150	5	10	3	-	-	-	-	-
NVV 1453 48 1209	12	18	25	11.8	83	6	12	3	-	-	-	-	-
NVV 1453 48 1210	12	18	45	11.8	100	6	12	3	-	-	-	-	-
NVV 1453 48 1220	12	18	60	11.8	150	6	12	3	-	-	-	-	-
NVV 1453 48 1610	16	24	45	15.8	100	8	16	3	-	-	-	-	-
NVV 1453 48 162	16	24	60	15.8	150	8	16	3	-	-	-	-	-
NVV 1453 48 2000	20	30	45	19.8	100	10	20	3	-	-	-	-	-
NVV 1453 48 2010	20	30	60	19.8	150	10	20	3	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
6	fz (mm) ap (mm)	-	-	-	0.08-0.25 0.4-3.5	-	-
8	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-4.2	-	-
10	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-5.6	-	-
12	fz (mm) ap (mm)	-	-	-	0.1-0.35 0.4-7	-	-

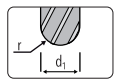
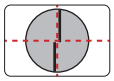
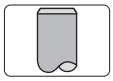
Speed (Vc in m/min)

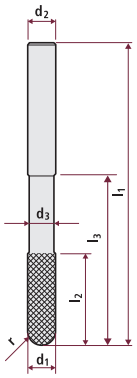
Coating quality	Application	P	M	K	N	S	H
KAC PVDiaN	Rough Fine	-	-	-	200 **400** 600 -	-	-

Cutters for graphite | GFC | CFRP

Ball nose end mills | Pyramid tooth

d_1	z	r	γ° 9° λ° 30°	KACPVDiaN
4 - 16	8 - 20	-		

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short | long													
NVV 1118 48 040	4	12	-	-	57	2	6	8	12.97	13.40	13.82	14.26	15.26
NVV 1118 48 050	5	15	-	-	57	2.5	6	10	16.08	16.58	17.09	-	-
NVV 1118 48 060	6	17	-	-	57	3	6	10	-	-	-	-	-
NVV 1118 48 080	8	20	-	-	63	4	8	12	-	-	-	-	-
NVV 1118 48 100	10	24	-	-	72	5	10	12	-	-	-	-	-
NVV 1118 48 120	12	30	-	-	83	6	12	16	-	-	-	-	-
NVV 1118 48 160	16	36	-	-	92	8	16	20	-	-	-	-	-

Application data (fz / ap)

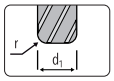
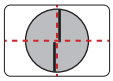
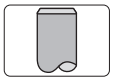
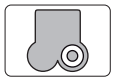
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
4	fz (mm) ap (mm)	-	-	-	0.04-0.1 0.15-1.4	-	-
5 - 6	fz (mm) ap (mm)	-	-	-	0.06-0.15 0.2-2	-	-
8	fz (mm) ap (mm)	-	-	-	0.08-0.2 0.3-2.8	-	-
10	fz (mm) ap (mm)	-	-	-	0.08-0.25 0.4-3.5	-	-
12	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-4.2	-	-
16	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-5.6	-	-

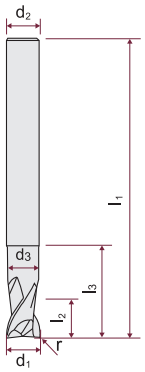
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC PVDiaN	Rough Fine	-	-	-	400 **600** 800 -	-	-

Cutters for graphite | GFC | CFRP

Toric corner radius end mills | 2 cutting edges

d_1 0.4 - 10	z 2	r 0.05 - 1	γ° 9° λ° 30°	KACPVDiaG KACPVDiaN
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without and with AT | short | long														
SVV 0452 48 00403	0.4	0.6	2.5	0.37	50	0.05	4	2	3.2	3.4	3.5	3.7	4.0	KAC PVDiaG
SVV 0452 48 00404	0.4	0.6	5	0.37	50	0.05	4	2	5.8	6.1	6.3	6.5	6.9	KAC PVDiaG
NVV 0452 48 0050 NEW	0.5	0.8	-	-	50	0.05	4	2	1.1	1.2	1.3	1.4	1.6	KAC PVDiaG
SVV 0452 48 00503	0.5	0.8	3.5	0.45	50	0.05	4	2	4.3	4.5	4.7	4.9	5.2	KAC PVDiaG
NVV 0452 48 0051 NEW	0.5	0.8	5	0.45	50	0.05	4	2	5.8	6.0	6.2	6.4	6.7	KAC PVDiaG
SVV 0452 48 00504 NEW	0.5	0.8	7	0.45	50	0.05	4	2	-	-	-	-	-	KAC PVDiaG
NVV 0452 48 0052	0.5	0.8	10	0.45	50	0.05	4	2	11.0	11.3	11.6	11.8	12.8	KAC PVDiaG
SVV 0452 48 00603	0.6	0.9	3.5	0.55	50	0.05	4	2	4.3	4.5	4.7	4.9	5.2	KAC PVDiaG
SVV 0452 48 00604	0.6	0.9	7	0.55	50	0.05	4	2	8.0	8.3	8.6	8.8	9.3	KAC PVDiaG
SVV 0452 48 00803	0.8	1.2	5	0.75	50	0.05	4	2	5.9	6.1	6.4	6.7	7.3	KAC PVDiaG
SVV 0452 48 00804	0.8	1.2	10	0.75	50	0.05	4	2	11.1	11.5	12.0	12.6	13.8	KAC PVDiaG
NVV 0452 48 01000	1	1.5	5	0.95	50	0.1	4	2	5.8	6.0	6.2	6.4	6.7	KAC PVDiaG
NVV 0452 48 01010	1	1.5	10	0.95	50	0.1	4	2	11.0	11.3	11.6	11.8	12.8	KAC PVDiaG
NVV 0452 48 010005 NEW	1	1	5	0.9	57	0.1	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 010010 NEW	1	1	10	0.9	57	0.1	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 010015 NEW	1	1	15	0.9	57	0.1	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 010020 NEW	1	1	20	0.9	57	0.1	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 010025 NEW	1	1	25	0.9	75	0.1	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 01011	1	1.5	20	0.95	75	0.1	4	2	21.3	21.8	22.4	23.5	26.0	KAC PVDiaG
NVV 0452 48 01020	1	1.5	10	0.95	50	0.2	4	2	11.0	11.3	11.6	11.8	12.7	KAC PVDiaG
NVV 0452 48 0102	1	1.5	15	0.95	50	0.2	4	2	16.1	16.6	16.9	17.5	19.4	KAC PVDiaG
SVV 0452 48 0152	1.5	2.3	10	1.4	50	0.1	4	2	11.2	11.6	11.9	12.2	12.9	KAC PVDiaG
NVV 0452 48 015010 NEW	1.5	1.5	10	1.4	57	0.1	6	2	-	-	-	-	-	KAC PVDiaG
NVV 0452 48 015020 NEW	1.5	1.5	20	1.4	57	0.1	6	2	-	-	-	-	-	KAC PVDiaG
NVV 0452 48 015025 NEW	1.5	1.5	25	1.4	75	0.1	6	2	-	-	-	-	-	KAC PVDiaG
NVV 0452 48 0151	1.5	2.3	-	-	50	0.15	4	2	2.7	2.9	3.1	3.2	3.5	KAC PVDiaG

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
NVV 0452 48 0152	1.5	2.3	10	1.4	50	0.15	4	2	11.0	11.4	11.6	11.9	12.8	KAC PVDiaG
NVV 0452 48 01521	1.5	2.3	15	1.4	50	0.15	4	2	16.2	16.6	16.9	17.5	19.4	KAC PVDiaG
SVV 0452 48 01521	1.5	2.3	10	1.4	50	0.2	4	2	11.2	11.6	11.9	12.2	12.8	KAC PVDiaG
NVV 0452 48 01520	1.5	2.3	15	1.4	50	0.2	4	2	16.2	16.6	16.9	17.5	19.4	KAC PVDiaG
SVV 0452 48 0154	1.5	2.3	25	1.4	75	0.2	4	2	26.6	27.3	28.0	28.8	-	KAC PVDiaG
SVV 0452 48 0202	2	3	10	1.9	50	0.1	4	2	11.2	11.6	11.9	12.2	12.9	KAC PVDiaG
NVV 0452 48 0200	2	3	-	-	50	0.2	4	2	3.5	3.7	3.9	4.0	4.3	KAC PVDiaG
NVV 0452 48 0201	2	3	5	1.9	50	0.2	4	2	5.9	6.1	6.3	6.4	6.7	KAC PVDiaG
NVV 0452 48 0202	2	3	10	1.9	50	0.2	4	2	11.1	11.4	11.6	11.9	12.8	KAC PVDiaG
NVV 0452 48 0203	2	3	15	1.9	50	0.2	4	2	16.2	16.6	16.9	17.5	19.4	KAC PVDiaG
NVV 0452 48 02005 NEW	2	2	5	1.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 02010 NEW	2	2	10	1.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 02015 NEW	2	2	15	1.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 02020 NEW	2	2	20	1.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 02030 NEW	2	2	30	1.9	75	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 0204	2	3	20	1.9	75	0.2	4	2	21.4	21.8	22.4	23.5	-	KAC PVDiaG
NVV 0452 48 0205	2	3	25	1.9	75	0.2	4	2	26.5	27.0	28.1	29.5	-	KAC PVDiaG
NVV 0452 48 021	2	3	10	1.9	50	0.3	4	2	11.0	11.4	11.6	11.8	12.7	KAC PVDiaG
NVV 0452 48 0214	2	3	20	1.9	75	0.3	4	2	21.4	21.8	22.4	23.5	-	KAC PVDiaG
NVV 0452 48 03010 NEW	3	3	10	2.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 03015 NEW	3	3	15	2.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 03020 NEW	3	3	20	2.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 03025 NEW	3	3	25	2.9	75	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 03030 NEW	3	3	30	2.9	75	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 0301	3	4.5	15	2.9	75	0.2	4	2	16.4	16.8	17.2	-	-	KAC PVDiaN
NVV 0452 48 04010 NEW	4	4	10	3.8	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0452 48 04020 NEW	4	4	20	3.8	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0454 48 04052 NEW	4	6	25	3.8	75	0.2	4	4	-	-	-	-	-	KAC PVDiaN
NVV 0454 48 08015 NEW	8	12	20	7.8	63	0.5	8	4	-	-	-	-	-	KAC PVDiaN
NVV 0454 48 10021 NEW	10	15	45	9.8	100	1	10	4	-	-	-	-	-	KAC PVDiaN
with AT | high precision | short														
NVV 0442 49 0082 NEW	0.8	0.8	5	0.78	50	0.1	4	2	-	-	-	-	-	KAC PVDiaG
NVV 0442 49 01011 NEW	1	1	5	0.95	50	1	4	2	-	-	-	-	-	KAC PVDiaG
NVV 0442 49 0152 NEW	1.5	1.5	8	1.45	50	0.2	4	2	-	-	-	-	-	KAC PVDiaG
NVV 0442 49 0154 NEW	1.5	1.5	15	1.45	50	0.2	4	2	-	-	-	-	-	KAC PVDiaG

Order no.		d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
										0.5°	1°	1.5°	2°	3°	
NVV 0442 49 0201	NEW	2	2	10	1.95	50	0.2	4	2	-	-	-	-	-	KAC PVDiaG
NVV 0442 49 0301	NEW	3	3	10	2.95	57	0.2	4	2	11.2	11.4	11.7	11.9	13.0	KAC PVDiaN
NVV 0442 49 0401	NEW	4	4	20	3.9	57	0.2	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0442 49 0501	NEW	5	5	20	4.9	57	0.3	6	2	-	-	-	-	-	KAC PVDiaN
NVV 0442 49 0601	NEW	6	6	20	5.85	57	0.5	6	2	-	-	-	-	-	KAC PVDiaN

Application data (fz / ap)

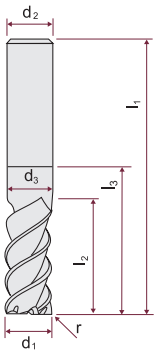
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
0.4 - 0.8	fz (mm) ap (mm)	-	-	-	0.01-0.03 0.01-0.3	-	-
1 - 2	fz (mm) ap (mm)	-	-	-	0.02-0.08 0.1-0.7	-	-
3 - 4	fz (mm) ap (mm)	-	-	-	0.04-0.1 0.15-1.4	-	-
5 - 6	fz (mm) ap (mm)	-	-	-	0.06-0.15 0.2-2	-	-
8	fz (mm) ap (mm)	-	-	-	0.08-0.2 0.3-2.8	-	-
10	fz (mm) ap (mm)	-	-	-	0.08-0.25 0.4-3.5	-	-

Speed (Vc in m/min)

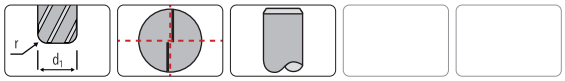
Coating quality	Application	P		K	N	S	H
KAC PVDiaG	Rough Fine	-	-	-	200 **550** 900 400 **700** 1000	-	-
KAC PVDiaN	Rough Fine	-	-	-	200 **400** 600 400 **700** 1000	-	-

Cutters for graphite | GFC | CFRP

Toric corner radius end mills | 3 cutting edges



d_1	z	r	γ° 9° λ° 30°	KACPVDiaN
3 - 16	3	0.3 - 1		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without and with AT | long | short													
NVV 0453 48 0300	3	4.5	-	-	50	0.3	4	3	5.15	5.44	5.68	5.88	6.24
NVV 0453 48 0302	3	4.5	10	2.9	50	0.3	4	3	11.20	11.55	11.85	12.16	-
NVV 0453 48 0303	3	4.5	15	2.9	50	0.3	4	3	16.37	16.81	17.24	-	-
NVV 0453 48 0304	3	4.5	20	2.9	75	0.3	4	3	21.52	22.06	-	-	-
NVV 0453 48 0305	3	4.5	25	2.9	75	0.3	4	3	26.65	27.32	-	-	-
NVV 0453 48 031	3	30	-	-	100	0.3	4	3	-	-	-	-	-
NVV 0453 48 0400	4	6	-	-	50	0.3	4	3	-	-	-	-	-
NVV 0453 48 0402	4	6	10	3.8	50	0.3	4	3	-	-	-	-	-
NVV 0453 48 0403	4	6	15	3.8	50	0.3	4	3	-	-	-	-	-
NVV 0453 48 0404	4	6	20	3.8	75	0.3	4	3	-	-	-	-	-
NVV 0453 48 0405	4	6	25	3.8	75	0.3	4	3	-	-	-	-	-
NVV 0453 48 0406	4	6	45	3.8	100	0.3	4	3	-	-	-	-	-
NVV 0453 48 04020	4	6	10	3.8	50	0.5	4	3	-	-	-	-	-
NVV 0453 48 04001	4	6	-	-	50	1	4	3	-	-	-	-	-
NVV 0453 48 04021	4	6	10	3.8	50	1	4	3	-	-	-	-	-
NVV 0453 48 04031	4	6	15	3.8	50	1	4	3	-	-	-	-	-
NVV 0453 48 04041	4	6	20	3.8	75	1	4	3	-	-	-	-	-
NVV 0453 48 04051	4	6	25	3.8	75	1	4	3	-	-	-	-	-
NVV 0453 48 04061	4	6	45	3.8	100	1	4	3	-	-	-	-	-
NVV 0453 48 0502	5	7.5	10	4.8	57	0.3	5	3	-	-	-	-	-
NVV 0453 48 0503	5	7.5	20	4.8	75	0.3	5	3	-	-	-	-	-
NVV 0453 48 050	5	35	-	-	75	0.3	5	3	-	-	-	-	-
NVV 0453 48 0504	5	7.5	45	4.8	100	0.3	5	3	-	-	-	-	-
NVV 0453 48 051	5	40	-	-	100	0.3	5	3	-	-	-	-	-
NVV 0453 48 067	6	50	-	-	150	0.2	6	3	-	-	-	-	-
NVV 0453 48 0600	6	9	-	-	57	0.3	6	3	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0453 48 0603	6	9	15	5.8	57	0.3	6	3	-	-	-	-	-
NVV 0453 48 0604	6	9	20	5.8	75	0.3	6	3	-	-	-	-	-
NVV 0453 48 0605	6	9	25	5.8	75	0.3	6	3	-	-	-	-	-
NVV 0453 48 0606	6	9	30	5.8	75	0.3	6	3	-	-	-	-	-
NVV 0453 48 0607	6	9	45	5.8	100	0.3	6	3	-	-	-	-	-
NVV 0453 48 0608	6	9	60	5.8	150	0.3	6	3	-	-	-	-	-
NVV 0453 48 060	6	60	-	-	150	0.3	6	3	-	-	-	-	-
NVV 0453 48 06030	6	9	15	5.8	57	0.5	6	3	-	-	-	-	-
SVV 0453 48 06073	6	9	45	5.8	100	0.7	6	3	-	-	-	-	-
NVV 0453 48 06001	6	9	-	-	57	1	6	3	-	-	-	-	-
NVV 0453 48 06031	6	9	15	5.8	57	1	6	3	-	-	-	-	-
NVV 0453 48 06041	6	9	20	5.8	75	1	6	3	-	-	-	-	-
NVV 0453 48 06051	6	9	25	5.8	75	1	6	3	-	-	-	-	-
NVV 0453 48 06061	6	9	30	5.8	75	1	6	3	-	-	-	-	-
NVV 0453 48 06071	6	9	45	5.8	100	1	6	3	-	-	-	-	-
NVV 0453 48 06081	6	9	60	5.8	150	1	6	3	-	-	-	-	-
NVV 0453 48 0800	8	12	-	-	63	0.5	8	3	-	-	-	-	-
NVV 0453 48 0801	8	12	20	7.8	63	0.5	8	3	-	-	-	-	-
NVV 0453 48 0810	8	12	45	7.8	100	0.5	8	3	-	-	-	-	-
NVV 0453 48 0820	8	12	60	7.8	150	0.5	8	3	-	-	-	-	-
NVV 0453 48 08001	8	12	-	-	63	1	8	3	-	-	-	-	-
NVV 0453 48 08011	8	12	20	7.8	63	1	8	3	-	-	-	-	-
NVV 0453 48 083	8	20	-	-	75	1	8	3	-	-	-	-	-
NVV 0453 48 08101	8	12	45	7.8	100	1	8	3	-	-	-	-	-
NVV 0453 48 08201	8	12	60	7.8	150	1	8	3	-	-	-	-	-
NVV 0453 48 1000	10	15	-	-	72	0.5	10	3	-	-	-	-	-
NVV 0453 48 1009	10	15	25	9.8	100	0.5	10	3	-	-	-	-	-
NVV 0453 48 1010	10	15	45	9.8	100	0.5	10	3	-	-	-	-	-
NVV 0453 48 102	10	15	60	9.8	150	0.5	10	3	-	-	-	-	-
SVV 0453 48 10102	10	15	45	9.8	100	0.7	10	3	-	-	-	-	-
NVV 0453 48 1001	10	15	-	-	72	1	10	3	-	-	-	-	-
NVV 0453 48 1002	10	15	25	9.8	100	1	10	3	-	-	-	-	-
NVV 0453 48 1011	10	15	45	9.8	100	1	10	3	-	-	-	-	-
NVV 0453 48 1021	10	15	60	9.8	150	1	10	3	-	-	-	-	-
NVV 0453 48 1200	12	18	-	-	83	0.5	12	3	-	-	-	-	-

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
NVV 0453 48 1209	12	18	25	11.8	83	0.5	12	3	-	-	-	-	-
NVV 0453 48 1210	12	18	45	11.8	100	0.5	12	3	-	-	-	-	-
NVV 0453 48 1220	12	18	60	11.8	150	0.5	12	3	-	-	-	-	-
NVV 0453 48 12091	12	18	25	11.8	83	0.7	12	3	-	-	-	-	-
NVV 0453 48 1201	12	18	-	-	83	1	12	3	-	-	-	-	-
NVV 0453 48 1202	12	18	25	11.8	83	1	12	3	-	-	-	-	-
NVV 0453 48 1211	12	18	45	11.8	100	1	12	3	-	-	-	-	-
NVV 0453 48 1221	12	18	60	11.8	150	1	12	3	-	-	-	-	-
NVV 0453 48 160	16	24	-	-	92	1	16	3	-	-	-	-	-
NVV 0453 48 1610	16	24	45	15.8	100	1	16	3	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
3 - 4	fz (mm) ap (mm)	-	-	-	0.04-0.1 0.15-1.4	-	-
5 - 6	fz (mm) ap (mm)	-	-	-	0.06-0.15 0.2-2	-	-
8	fz (mm) ap (mm)	-	-	-	0.08-0.2 0.3-2.8	-	-
10	fz (mm) ap (mm)	-	-	-	0.08-0.25 0.4-3.5	-	-
12	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-4.2	-	-
16	fz (mm) ap (mm)	-	-	-	0.1-0.3 0.4-5.6	-	-

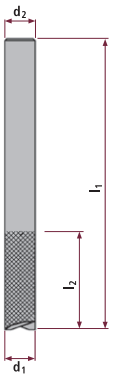
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
KAC PVDiaN	Rough Fine	-	-	-	- 350 **675** 1000	-	-

Cutters for graphite | GFC | CFRP

End mills | 2 cutting edges

d_1	z	r	γ° - λ° -	KACPVDiaN
3 - 12	2	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0108 48 030	3	10	-	-	50	-	3	2	-	-	-	-	-
NVV 0108 48 040	4	10	-	-	50	-	4	2	-	-	-	-	-
NVV 0108 48 060	6	20	-	-	57	-	6	2	-	-	-	-	-
NVV 0108 48 080	8	20	-	-	60	-	8	2	-	-	-	-	-
NVV 0108 48 100	10	25	-	-	70	-	10	2	-	-	-	-	-
NVV 0108 48 120	12	30	-	-	85	-	12	2	-	-	-	-	-

Application data (fz / ap)

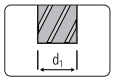
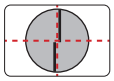
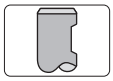
Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
3	fz (mm) ap (mm)	-	-	-	0.02-0.06 10	-	-
4	fz (mm) ap (mm)	-	-	-	0.03-0.09 10	-	-
5	fz (mm) ap (mm)	-	-	-	0.04-0.12 10	-	-
6	fz (mm) ap (mm)	-	-	-	0.05-0.16 20	-	-
8	fz (mm) ap (mm)	-	-	-	0.08-0.25 20	-	-
10	fz (mm) ap (mm)	-	-	-	0.11-0.33 25	-	-
12	fz (mm) ap (mm)	-	-	-	0.15-0.42 30	-	-

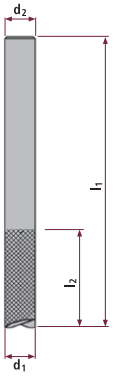
Speed (Vc in m/min)

Coating quality	Grain	P	M	K	N	S	H
KAC PVDiaN	Rough Medium Fine	-	-	-	400 **600** 800	-	-

Cutters for graphite | GFC | CFRP

End mills | Pyramid tooth | 8 to 16 cutting edges

d_1 4 - 12	z 2	r -	γ° - λ° -	KACPVDiaN
			NEW	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0118 48 040	4	16	-	-	50	-	4	8	-	-	-	-	-
NVV 0118 48 050	5	16	-	-	57	-	6	8	16.9	17.3	17.6	-	-
NVV 0118 48 060	6	19	-	-	57	-	6	10	-	-	-	-	-
NVV 0118 48 080	8	25	-	-	63	-	8	12	-	-	-	-	-
NVV 0118 48 100	10	25	-	-	72	-	10	14	-	-	-	-	-
NVV 0118 48 120	12	30	-	-	83	-	12	16	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Copy end mills 3D							
4	fz (mm) ap (mm)	-	-	-	0.007-0.02 10	-	-
5	fz (mm) ap (mm)	-	-	-	0.01-0.03 10	-	-
6	fz (mm) ap (mm)	-	-	-	0.01-0.03 20	-	-
8	fz (mm) ap (mm)	-	-	-	0.01-0.04 20	-	-
10	fz (mm) ap (mm)	-	-	-	0.02-0.05 25	-	-
12	fz (mm) ap (mm)	-	-	-	0.02-0.05 30	-	-

Speed (Vc in m/min)

Coating quality	Grain	P	M	K	N	S	H
KAC PVDiaN	Rough Medium Fine	-	-	-	400 **600** 800	-	-

Extra hard cutting material CVD

Ball nose and toric corner radius end mills

Properties

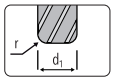
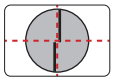
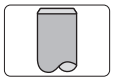
- 2 cutting edges
- Ball nose end mills
- Toric corner radius end mills

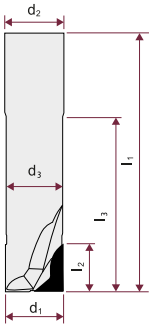
Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
CVD	-	-	-	▼	-	-	2 - 12	2.5 - 9	2	0.2 - 6

Extra hard cutting material CVD

Toric corner radius end mills | CVD | 2 cutting edges

d_1 2 - 12	z 2	r 0.2 - 1	γ° - λ° -	CVD
			NEW	



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT													
C2NC-020-020-100-01	2	2.5	10	1.9	50	0.2	4	2	10.66	11.02	11.41	11.83	12.78
C2NC-030-020-100-01	3	2.5	10	2.8	75	0.2	6	2	10.85	11.22	11.62	12.05	13.01
C2NC-030-050-100-01	3	2.5	10	2.8	75	0.5	6	2	10.84	11.22	11.62	12.01	12.94
C2NC-040-020-200-01	4	2.5	20	3.8	75	0.2	6	2	21.19	21.92	22.70	23.50	-
C2NC-040-050-200-01	4	2.5	20	3.8	75	0.5	6	2	21.18	21.90	22.67	23.50	-
C2NC-060-020-200-01	6	6	20	5.6	100	0.2	6	2	-	-	-	-	-
C2NC-060-050-200-01	6	6	20	5.6	100	0.5	6	2	-	-	-	-	-
C2NC-060-100-200-01	6	6	20	5.6	100	1	6	2	-	-	-	-	-
C2NC-080-020-200-01	8	6	20	7.6	100	0.2	8	2	-	-	-	-	-
C2NC-080-050-200-01	8	6	20	7.6	100	0.5	8	2	-	-	-	-	-
C2NC-080-100-200-01	8	6	20	7.6	100	1	8	2	-	-	-	-	-
C2NC-100-020-300-01	10	8	30	9.6	100	0.2	10	2	-	-	-	-	-
C2NC-100-050-300-01	10	8	30	9.6	100	0.5	10	2	-	-	-	-	-
C2NC-100-100-300-01	10	8	30	9.6	100	1	10	2	-	-	-	-	-
C2NC-120-020-350-01	12	9	35	11.6	107	0.2	12	2	-	-	-	-	-
C2NC-120-050-350-01	12	9	35	11.6	107	0.5	12	2	-	-	-	-	-
C2NC-120-100-350-01	12	9	35	11.6	107	1	12	2	-	-	-	-	-

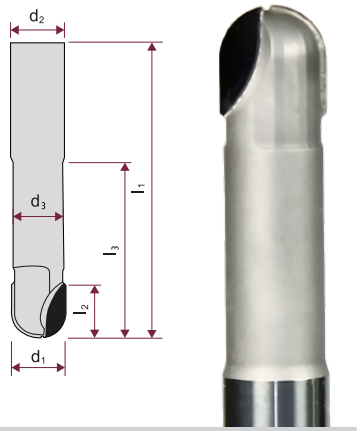
Speed (Vc in m/min) and application data (fz / ap)

Material	V_c (m/min)	a_p x d_1 (mm)	a_e x d_1 (mm)	Feed per tooth f_z							Cooling	Feed direction
				Diameter 2	Diameter 3	Diameter 4	Diameter 6	Diameter 8	Diameter 10	Diameter 12		
AlSi <12% Si	1800	0.6	0.3	0.01	0.02	0.02	0.04	0.06	0.08	0.1	Emulsion / MMS	Climb milling
AlSi >12% Si	800	0.5	0.25	0.01	0.01	0.02	0.03	0.05	0.06	0.08		
Glass ceramic	250	0.2	0.3	0.025	0.035	-	-	-	-	-		
PMMA acrylic	1100	0.5	0.5	0.01	0.015	0.02	0.03	0.05	0.07	0.09	Emulsion advantageous	Climb milling
PF66 – GF30	700	0.5	0.3	0.008	0.01	0.015	0.025	0.04	0.06	0.08		Conventional milling
PEEK – GF30	700	0.5	0.25	0.007	0.008	0.01	0.02	0.03	0.05	0.07		
POM – GF30	800	0.5	0.5	0.008	0.01	0.015	0.025	0.04	0.06	0.08		
PTFE – GF30	700	0.5	0.3	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
CFRP	250	0.4	0.25	0.008	0.01	0.015	0.025	0.04	0.06	0.08	Dry / air - KSS / MMS possible	Climb milling / conventional milling
CFR	500	0.5	0.3	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
AFRP aramid	300	0.45	0.3	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
Zircon	150	0.5	0.4	0.01	0.02	0.02	0.04	0.06	0.08	0.10		Climb milling

Extra hard cutting material CVD

Ball nose end mills | CVD | 2 cutting edges

d_1	z	r	γ° - λ° -	CVD
2 - 12	2	1 - 6		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT													
B2NC-020-100-100-01	2	2.5	10	1.9	50	1	4	2	10.50	10.62	10.72	10.79	10.91
B2NC-020-100-100-02	2	2.5	10	1.9	75	1	6	2	10.50	10.62	10.72	10.79	10.91
B2NC-030-150-100-01	3	2.5	10	2.8	75	1.5	6	2	10.57	10.67	10.75	10.82	10.92
B2NC-040-200-200-01	4	2.5	20	3.8	75	2	6	2	10.57	10.67	10.75	10.82	10.92
B2NC-060-300-200-01	6	6	20	5.6	100	3	6	2	-	-	-	-	-
B2NC-080-400-200-01	8	6	20	7.6	100	4	8	2	-	-	-	-	-
B2NC-100-500-300-01	10	8	30	9.6	100	5	10	2	-	-	-	-	-
B2NC-120-600-350-01	12	9	35	11.6	107	6	12	2	-	-	-	-	-

Speed (Vc in m/min) and application data (fz / ap)

Material	V_c (m/min)	a_p x d_1 (mm)	a_e x d_1 (mm)	Feed per tooth f_z							Cooling	Feed direction
				Diameter 2	Diameter 3	Diameter 4	Diameter 6	Diameter 8	Diameter 10	Diameter 12		
AlSi <12% Si	1800	0.2	0.1	0.01	0.02	0.02	0.04	0.06	0.08	0.1	Emulsion / MMS	Climb milling
AlSi >12% Si	800	0.15	0.1	0.01	0.01	0.02	0.03	0.05	0.06	0.08		
Glass ceramic	250	0.1	0.15	0.025	0.035	-	-	-	-	-		
PMMA acrylic	1100	0.15	0.15	0.01	0.015	0.02	0.03	0.05	0.07	0.09	Emulsion advantageous	Climb milling
PF66 – GF30	700	0.15	0.1	0.008	0.01	0.015	0.025	0.04	0.06	0.08		Conventional milling
PEEK – GF30	700	0.15	0.1	0.007	0.008	0.01	0.02	0.03	0.05	0.07		
POM – GF30	800	0.15	0.15	0.008	0.01	0.015	0.025	0.04	0.06	0.08		
PTFE – GF30	700	0.15	0.1	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
CFRP	250	0.15	0.1	0.008	0.01	0.015	0.025	0.04	0.06	0.08	Dry / air - KSS / MMS possible	Climb milling / conventional milling
CFR	500	0.15	0.1	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
AFRP aramid	300	0.15	0.1	0.01	0.015	0.02	0.03	0.05	0.07	0.09		
Zircon	150	0.15	0.15	0.01	0.02	0.02	0.04	0.06	0.08	0.10		Climb milling

Cutters for extreme cutting | HPC

End mills / corner radius end mills

Properties

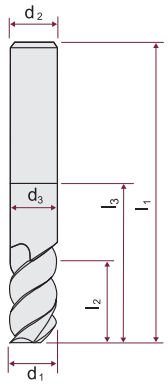
- 3 to 6 cutting edges
- End mills - corner radius end mills

Cutting materials

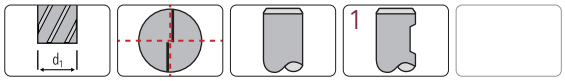
Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
MGC PVTi	▼	-	▼	-	-	▼	2 - 20	4 - 60	3 - 4	0 - 1
UMGC PVTi	▼	▼	▼	▼	▼	-	6 - 16	8 - 18	4	0.5 - 2
UMGC PVCS	▼	▼	-	▼	▼	-	6 - 16	20 - 50	4	0.5 - 2
MGC VTNB	-	-	-	-	▼	-	6 - 20	14 - 42	4 - 6	0 - 2

Cutters for extreme cutting | HPC

End mills / corner radius end mills | 3 and 4 cutting edges



d_1	z	r	γ° -15° λ° 50°	MGC PVTi UMGC PVTi
2 - 20	3 - 4	-		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without AT | short | long														
NVV 0370 56 020	2	4	-	-	57	-	6	3	4.6	4.9	5.2	5.4	5.8	MGC PVTi
NVV 0370 56 025	2.5	5	-	-	57	-	6	3	5.7	6.0	6.3	6.5	7.0	MGC PVTi
NVV 0370 56 030	3	6	-	-	57	-	6	4	6.8	7.1	7.4	7.7	8.3	MGC PVTi
NVV 0370 56 035	3.5	7	-	-	57	-	6	4	7.8	8.2	8.5	8.8	9.5	MGC PVTi
NVV 0370 56 040	4	8	-	-	57	-	6	4	8.9	9.3	9.6	10.0	10.8	MGC PVTi
NVV 0370 56 045	4.5	9	-	-	57	-	6	4	9.9	10.3	10.7	11.1	12.0	MGC PVTi
NVV 0370 56 050	5	10	-	-	57	-	6	4	11.0	11.4	11.8	12.3	-	MGC PVTi
NVV 0294 56 060	6	8	21	5.7	57	-	6	4	-	-	-	-	-	UMGC PVTi
NVV 0370 56 060	6	14	21	5.7	57	-	6	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 061-1 NEW	6	20	25	5.7	65	-	6	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 061	6	18	-	-	75	-	6	4	-	-	-	-	-	MGC PVTi
NVV 0370 56 070	7	14	-	-	63	-	8	4	15.1	15.7	16.2	-	-	MGC PVTi
NVV 0294 56 080	8	10	27	7.6	63	-	8	4	-	-	-	-	-	UMGC PVTi
NVV 0370 56 080	8	18	27	7.6	63	-	8	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 081-1 NEW	8	26	30	7.6	70	-	8	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 081	8	24	-	-	90	-	8	4	-	-	-	-	-	MGC PVTi
NVV 0370 56 090	9	18	-	-	72	-	10	4	19.3	19.9	-	-	-	MGC PVTi
NVV 0294 56 100	10	12	32	9.5	72	-	10	4	-	-	-	-	-	UMGC PVTi
NVV 0370 56 100	10	22	32	9.5	72	-	10	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 101-1 NEW	10	32	40	9.5	82	-	10	4	-	-	-	-	-	MGC PVTi
NVV 0290 56 101	10	30	-	-	100	-	10	4	-	-	-	-	-	MGC PVTi
[1]NVV 0294 56 120	12	14	38	11.5	83	-	12	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0370 56 120	12	26	38	11.5	83	-	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 121-1 NEW	12	38	50	11.5	95	-	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 121	12	36	-	-	110	-	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0294 56 160	16	18	44	15.5	92	-	16	4	-	-	-	-	-	UMGC PVTi

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
[1]NVV 0370 56 160	16	34	44	15.5	92	-	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 161-1 NEW	16	50	62	15.5	110	-	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 161	16	48	-	-	140	-	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0370 56 200	20	42	54	19.5	104	-	20	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 201-1 NEW	20	62	74	19.5	125	-	20	4	-	-	-	-	-	MGC PVTi
[1]NVV 0290 56 201	20	60	-	-	150	-	20	4	-	-	-	-	-	MGC PVTi

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
2 - 2.5	fz (mm) ap (mm)	0.05-0.09 4	-	0.05-0.09 4	-	-	0.03-0.045 4
3 - 4.5	fz (mm) ap (mm)	0.09-0.12 6	-	0.05-0.12 6	-	-	0.07-0.085 6
5 - 6	fz (mm) ap (mm)	0.12-0.18 8	-	0.09-0.18 8	-	-	0.1-0.125 8
7 - 8	fz (mm) ap (mm)	0.12-0.18 10	-	0.12-0.18 10	-	-	0.1-0.125 10
9 - 10	fz (mm) ap (mm)	0.15-0.2 12	-	0.12-0.2 12	-	-	0.12-0.145 12
12	fz (mm) ap (mm)	0.15-0.2 14	-	0.15-0.2 14	-	-	0.12-0.145 14
16	fz (mm) ap (mm)	0.2-0.25 18	-	0.15-0.25 18	-	-	0.17-0.195 18
20	fz (mm) ap (mm)	0.25-0.3 42	-	0.2-0.3 42	-	-	0.2-0.225 42
Pocket and slot milling							
2 - 2.5	fz (mm) ap (mm)	0.02-0.04 1-1.5	-	0.02-0.04 1-1.5	-	-	0.02-0.03 0.04-0.07
3 - 4.5	fz (mm) ap (mm)	0.03-0.06 1.5-2	-	0.03-0.06 1.5-2	-	-	0.03-0.045 0.08-0.14
5 - 6	fz (mm) ap (mm)	0.05-0.08 2.5-3	-	0.05-0.08 2.5-3	-	-	0.05-0.065 0.1-0.2
7 - 8	fz (mm) ap (mm)	0.05-0.08 3.5-4	-	0.05-0.08 3.5-4	-	-	0.05-0.065 0.15-0.275
9 - 10	fz (mm) ap (mm)	0.06-0.1 4.5-5	-	0.06-0.1 4.5-5	-	-	0.06-0.08 0.2-0.35
12	fz (mm) ap (mm)	0.07-0.12 5-6	-	0.07-0.12 5-6	-	-	0.07-0.095 0.2-0.4
16	fz (mm) ap (mm)	0.08-0.12 6-8	-	0.08-0.12 6-8	-	-	0.08-0.1 0.2-0.5
20	fz (mm) ap (mm)	0.08-0.12 6-8	-	0.08-0.12 6-8	-	-	0.08-0.1 0.2-0.5

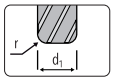
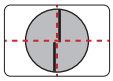
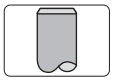
Speed (Vc in m/min)

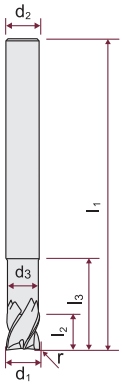
Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough Fine	120 **210** 300 200 **250** 300	-	100 **225** 350 180 **290** 400	-	-	120 **160** 200 100 **175** 250
UMGC PVTi	Rough Fine	120 **185** 250 200 **240** 280	-	100 **225** 350 180 **290** 400	-	-	120 **160** 200 100 **175** 250

Cutters for extreme cutting | HPC

End mills / corner radius end mills | 4 cutting edges with bull end

d_1	z	r	γ° -15° λ° 50°	MGC PVTi UMGCPVTi
3 - 20	4	0.3 - 1		


NVV 0380...


NVV 0390...

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without AT | short														
NVV 0380 56 030	3	6	-	-	57	0.3	6	4	6.8	7.1	7.4	7.6	8.2	MGC PVTi
NVV 0380 56 040	4	8	-	-	57	0.3	6	4	8.9	9.2	9.6	9.9	10.7	MGC PVTi
NVV 0380 56 050	5	10	-	-	57	0.3	6	4	11.0	11.4	11.8	12.2	-	MGC PVTi
NVV 0380 56 060	6	14	21	5.7	57	0.3	6	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 061-1 NEW	6	20	25	5.7	65	0.3	6	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 061	6	18	-	-	75	0.3	6	4	-	-	-	-	-	MGC PVTi
NVV 0380 56 080	8	18	27	7.6	63	0.5	8	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 081-1 NEW	8	26	30	7.6	70	0.5	8	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 081	8	24	-	-	90	0.5	8	4	-	-	-	-	-	MGC PVTi
NVV 0380 56 100	10	22	32	9.5	72	0.5	10	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 101-1 NEW	10	32	40	9.5	82	0.5	10	4	-	-	-	-	-	MGC PVTi
NVV 0390 56 101	10	30	-	-	100	0.5	10	4	-	-	-	-	-	MGC PVTi
[1]NVV 0380 56 120	12	26	38	11.5	83	1	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 121-1 NEW	12	38	50	11.5	95	1	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 121	12	36	-	-	110	1	12	4	-	-	-	-	-	MGC PVTi
[1]NVV 0380 56 160	16	34	44	15.5	92	1	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 161-1 NEW	16	50	62	15.5	110	1	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 161	16	48	-	-	140	1	16	4	-	-	-	-	-	MGC PVTi
[1]NVV 0380 56 200	20	44	54	19.5	104	1	20	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 201-1 NEW	20	62	74	19.5	125	1	20	4	-	-	-	-	-	MGC PVTi
[1]NVV 0390 56 201	20	60	-	-	150	1	20	4	-	-	-	-	-	MGC PVTi

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle					Coating quality
									0.5°	1°	1.5°	2°	3°	
with AT | short														
NVV 0394 56 06005*	6	8	21	5.7	57	0.5	6	4	-	-	-	-	-	UMGC PVTi
NVV 0394 56 06010*	6	8	21	5.7	57	1	6	4	-	-	-	-	-	UMGC PVTi
NVV 0394 56 08005*	8	10	27	7.6	63	0.5	8	4	-	-	-	-	-	UMGC PVTi
NVV 0394 56 08010*	8	10	27	7.6	63	1	8	4	-	-	-	-	-	UMGC PVTi
NVV 0394 56 10005*	10	12	32	9.5	72	0.5	10	4	-	-	-	-	-	UMGC PVTi
NVV 0394 56 10010*	10	12	32	9.5	72	1	10	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0394 56 12010*	12	14	38	11.5	83	1	12	4	-	-	-	-	-	UMGC PVTi

* Deviating values: γ°=8°; λ°=50°

Application data (fz / ap)

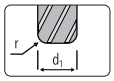
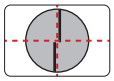
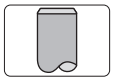
Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
3 - 4	fz (mm)	0.09-0.12	0.01-0.02	0.09-0.12	0.1-0.18	0.01-0.025	0.07-0.1
	ap (mm)	4.5-6	4.5-6	4.5-6	3-4	2-2.5	4.5-6
5 - 6	fz (mm)	0.12-0.18	0.03-0.04	0.12-0.18	0.12-0.2	0.02-0.03	0.1-0.15
	ap (mm)	7.5-9	7.5-9	7.5-9	5-6	2.5-3	7.5-9
8	fz (mm)	0.12-0.18	0.04-0.05	0.12-0.18	0.14-0.2	0.03-0.035	0.1-0.15
	ap (mm)	12	12	12	4-8	4-7.2	12
10	fz (mm)	0.15-0.2	0.06-0.08	0.15-0.2	0.17-0.22	0.035-0.04	0.12-0.17
	ap (mm)	15	15	15	5-10	5-9	15
12	fz (mm)	0.15-0.2	0.08-0.09	0.15-0.2	0.2-0.3	0.04-0.045	0.15-0.18
	ap (mm)	18	18	18	6-12	6-10.8	18
16	fz (mm)	0.2-0.25	0.1-0.13	0.2-0.25	0.25-0.3	0.05-0.06	0.17-0.22
	ap (mm)	24	24	24	8-16	8-14.4	24
20	fz (mm)	0.25-0.3	0.13-0.15	0.25-0.3	0.3-0.4	0.06-0.07	0.2-0.25
	ap (mm)	30	30	30	8-16	8-14.4	30
Pocket and slot milling							
3 - 4	fz (mm)	0.03-0.06	0.01-0.02	0.03-0.12	0.06-0.14	0.01-0.015	0.03-0.06
	ap (mm)	1.5-3.6	1.5-3.6	1.5-3.6	2-2.5	2-2.5	0.08-3.6
5 - 6	fz (mm)	0.05-0.18	0.02-0.04	0.05-0.18	0.08-0.16	0.01-0.02	0.05-0.15
	ap (mm)	2.5-5.4	2.5-5.4	2.5-5.4	2.5-3	2.5-3	0.13-5.4
8	fz (mm)	0.05-0.18	0.04-0.05	0.05-0.18	0.1-0.2	0.02-0.03	0.05-0.15
	ap (mm)	4-7.2	4-7.2	4-7.2	4	4	0.2-7.2
10	fz (mm)	0.06-0.2	0.05-0.06	0.06-0.2	0.12-0.2	0.03-0.035	0.06-0.17
	ap (mm)	5-9	5-9	5-9	5	5	0.25-9
12	fz (mm)	0.07-0.2	0.06-0.08	0.07-0.2	0.14-0.22	0.04-0.045	0.07-0.18
	ap (mm)	6-10.8	6-10.8	6-10.8	6	6	0.3-10.8
16	fz (mm)	0.08-0.25	0.08-0.1	0.08-0.25	0.15-0.25	0.05-0.055	0.08-0.22
	ap (mm)	8-14.4	8-14.4	8-14.4	8	8	0.4-14.4
20	fz (mm)	0.08-0.3	0.01-0.14	0.08-0.3	0.18-0.3	0.06-0.065	0.08-0.25
	ap (mm)	10-18	10-18	10-18	10	10	0.5-18

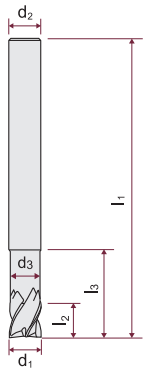
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	100 **225** 350	-	-	120 **160** 200
	Fine	200 **275** 350		180 **290** 400			100 **175** 250
UMGC PVTi	Rough	-	70 **90** 110	-	200 **350** 500	15 **33** 50	-
	Fine		110 **130** 150		400 **500** 600	40 **60** 80	

Cutters for extreme cutting | HPC

End mills / corner radius end mills 4 cutting edges for HPC cutting

d_1 6 - 20	z 4	r 0.5 - 2	γ° 8° λ° 50°	UMGCPVTi UMGCPVCS
			1 	



NVV 0384...

NVV 0484...

Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°	Coating quality
without AT | short														
NVV 0384 56 060	6	14	21	5.7	57	0.5	6	4	-	-	-	-	-	UMGC PVTi
NVV 0384 56 061	6	14	21	5.7	57	1	6	4	-	-	-	-	-	UMGC PVTi
NVV 0384 56 080	8	18	27	7.6	63	0.5	8	4	-	-	-	-	-	UMGC PVTi
NVV 0384 56 081	8	18	27	7.6	63	1	8	4	-	-	-	-	-	UMGC PVTi
NVV 0384 56 100	10	22	32	9.5	72	0.5	10	4	-	-	-	-	-	UMGC PVTi
NVV 0384 56 101	10	22	32	9.5	72	1	10	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 120	12	26	38	11.5	83	1	12	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 121	12	26	38	11.5	83	2	12	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 160	16	34	44	15.5	92	1	16	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 161	16	34	44	15.5	92	2	16	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 200	20	42	54	19.5	104	1	20	4	-	-	-	-	-	UMGC PVTi
[1]NVV 0384 56 201	20	42	54	19.5	104	2	20	4	-	-	-	-	-	UMGC PVTi
without AT | long														
NVV 0484 45 060	6	20	25	5.7	65	0.5	6	4	-	-	-	-	-	UMGC PVCS
NVV 0484 45 061	6	20	25	5.7	65	1	6	4	-	-	-	-	-	UMGC PVCS
NVV 0484 45 080	8	26	30	7.6	70	0.5	8	4	-	-	-	-	-	UMGC PVCS
NVV 0484 45 081	8	26	30	7.6	70	1	8	4	-	-	-	-	-	UMGC PVCS
NVV 0484 45 100	10	32	40	9.5	82	0.5	10	4	-	-	-	-	-	UMGC PVCS
NVV 0484 45 101	10	32	40	9.5	82	1	10	4	-	-	-	-	-	UMGC PVCS
[1]NVV 0484 45 120	12	38	50	11.5	95	1	12	4	-	-	-	-	-	UMGC PVCS
[1]NVV 0484 45 121	12	38	50	11.5	95	2	12	4	-	-	-	-	-	UMGC PVCS
[1]NVV 0484 45 160	16	50	62	15.5	110	1	16	4	-	-	-	-	-	UMGC PVCS
[1]NVV 0484 45 161	16	50	62	15.5	110	2	16	4	-	-	-	-	-	UMGC PVCS

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling							
6	fz (mm)	0.12-0.18	0.12-0.18	-	0.08-0.14	0.03-0.05	-
	ap (mm)	14	14		14	14	
8	fz (mm)	0.12-0.18	0.12-0.18	-	0.12-0.19	0.04-0.055	-
	ap (mm)	18	18		18	18	
10	fz (mm)	0.15-0.2	0.15-0.2	-	0.14-0.22	0.045-0.06	-
	ap (mm)	22	22		22	22	
12	fz (mm)	0.15-0.2	0.15-0.2	-	0.16-0.24	0.05-0.065	-
	ap (mm)	26	26		26	26	
16	fz (mm)	0.2-0.25	0.2-0.25	-	0.2-0.3	0.055-0.075	-
	ap (mm)	34	34		34	34	
20	fz (mm)	0.25-0.3	0.25-0.3	-	0.22-0.35	0.065-0.095	
	ap (mm)	42	42		42	42	
Pocket and slot milling							
6	fz (mm)	0.035-0.08	0.02-0.04	-	0.06-0.1	0.02-0.04	-
	ap (mm)	2.5-4.8	1.2-4.8		0.4-2	3-7.5	
8	fz (mm)	0.045-0.08	0.03-0.05	-	0.08-0.15	0.03-0.05	-
	ap (mm)	3.5-6.4	1.6-6.4		0.4-2.8	4-10	
10	fz (mm)	0.055-0.1	0.04-0.06	-	0.11-0.17	0.035-0.055	-
	ap (mm)	4.5-8	2-8		0.4-3.5	6-12.5	
12	fz (mm)	0.06-0.12	0.045-0.07	-	0.12-0.2	0.04-0.06	-
	ap (mm)	5-9.6	2.4-9.6		0.4-4.2	8-15	
16	fz (mm)	0.075-0.12	0.06-0.085	-	0.13-0.27	0.045-0.065	-
	ap (mm)	6-12.8	3.2-12.8		0.4-5.6	11-20	
20	fz (mm)	0.08-0.15	0.07-0.1	-	0.15-0.30	0.055-0.085	-
	ap (mm)	6-16	4-16		0.5-6.5	15-25	

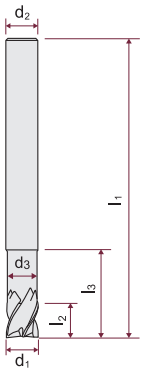
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
UMGC PVTi	Rough	120 **185** 250	70 **90** 110	-	200 **350** 500	15 **33** 50	-
	Fine	200 **240** 280	110 **130** 150		400 **500** 600	40 **60** 80	
UMGC PVCS	Rough	90 **155** 220	50 **75** 100	-	400 **500** 650	15 **33** 50	-
	Fine	170 **210** 250	90 **105** 120		500 **750** 1000	30 **50** 70	

Cutters for extreme cutting | HPC

End mills / corner radius end mills | 4 cutting edges with working depth

d_1 6 - 20	z 4	r 0.3 - 1	γ° -15° λ° 50°	MGC PVTi
1	2			3



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
[1]with AT | chamfer													
NVV 0350 56 060	6	8	21	5.7	57	-	6	4	-	-	-	-	-
NVV 0350 56 080	8	10	27	7.6	63	-	8	4	-	-	-	-	-
NVV 0350 56 100	10	12	32	9.5	72	-	10	4	-	-	-	-	-
[3]NVV 0350 56 120	12	14	38	11.5	83	-	12	4	-	-	-	-	-
[3]NVV 0350 56 160	16	18	44	15.5	92	-	16	4	-	-	-	-	-
[3]NVV 0350 56 200	20	22	54	19.5	104	-	20	4	-	-	-	-	-
[2]with AT | bull end													
NVV 0360 56 060	6	8	21	5.7	57	0.3	6	4	-	-	-	-	-
NVV 0360 56 080	8	10	27	7.6	63	0.5	8	4	-	-	-	-	-
NVV 0360 56 100	10	12	32	9.5	72	0.5	10	4	-	-	-	-	-
NVV 0360 56 120	12	14	38	11.5	83	1	12	4	-	-	-	-	-
NVV 0360 56 160	16	18	44	15.5	92	1	16	4	-	-	-	-	-
[3]NVV 0360 56 200	20	22	54	19.5	104	1	20	4	-	-	-	-	-

Application data (fz / ap)

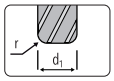
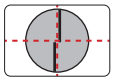
Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
6	fz (mm)	0.035-0.08	0.02-0.04	0.035-0.08	-	-	0.05-0.15
	ap (mm)	2.5-4.8	1.2-4.8	2.5-4.8			0.13-5.4
8	fz (mm)	0.045-0.08	0.03-0.05	0.045-0.08	-	-	0.05-0.15
	ap (mm)	3.5-6.4	1.6-6.4	3.5-6.4			0.2-7.2
10	fz (mm)	0.055-0.1	0.04-0.06	0.055-0.1	-	-	0.06-0.17
	ap (mm)	4.5-8	2-8	4.5-8			0.25-9
12	fz (mm)	0.06-0.12	0.045-0.7	0.06-0.12	-	-	0.07-0.18
	ap (mm)	5-9.6	2.4-9.6	5-9.6			0.3-10.8
16	fz (mm)	0.075-0.12	0.06-0.85	0.075-0.12	-	-	0.08-0.22
	ap (mm)	6-12.8	3.2-12.8	6-12.8			0.4-14.4
20	fz (mm)	0.08-0.15	0.07-0.1	0.08-0.15	-	-	0.08-0.25
	ap (mm)	6-16	4-16	6-16			0.5-18

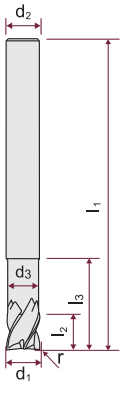
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	120 **210** 300	-	-	-	-	120 **160** 200
	Fine	200 **275** 350					100 **175** 250

Cutters for extreme cutting | HPC

End mills / corner radius end mills | 4 cutting edges | HPC | Titanium | High-temperature resistant

d_1 6 - 20	z 4	r 0.5 - 2	γ° 8° λ° 50°	MGCVTNB
		NEW		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
without AT | short													
NVV 0384 81 060	6	14	21	5.7	57	0.5	6	4	-	-	-	-	-
NVV 0384 81 061	6	14	21	5.7	57	1	6	4	-	-	-	-	-
NVV 0384 81 080	8	18	27	7.6	63	0.5	8	4	-	-	-	-	-
NVV 0384 81 081	8	18	27	7.6	63	1	8	4	-	-	-	-	-
NVV 0384 81 100	10	22	32	9.5	72	0.5	10	4	-	-	-	-	-
NVV 0384 81 101	10	22	32	9.5	72	1	10	4	-	-	-	-	-
NVV 0384 81 120	12	26	38	11.5	83	1	12	4	-	-	-	-	-
NVV 0384 81 121	12	26	38	11.5	83	2	12	4	-	-	-	-	-
NVV 0384 81 160	16	34	44	15.5	92	1	16	4	-	-	-	-	-
NVV 0384 81 161	16	34	44	15.5	92	2	16	4	-	-	-	-	-
NVV 0384 81 200	20	42	54	19.5	104	1	20	4	-	-	-	-	-
NVV 0384 81 201	20	42	54	19.5	104	2	20	4	-	-	-	-	-

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Pocket and slot milling							
6	fz (mm) ap (mm)	-	-	-	-	0.025-0.05 0.2-1	-
8	fz (mm) ap (mm)	-	-	-	-	0.04-0.06 0.3-1	-
10	fz (mm) ap (mm)	-	-	-	-	0.05-0.08 0.4-1	-
12	fz (mm) ap (mm)	-	-	-	-	0.06-0.1 0.5-1	-
16	fz (mm) ap (mm)	-	-	-	-	0.06-0.1 0.5-1.5	-

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC VTNB	Rough Fine	-	-	-	-	- 30 **40** 50	-

Circular radius end mills

Type K - tapered and Type T - drop shaped

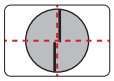
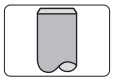
Properties

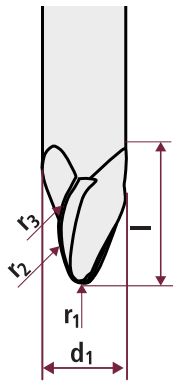
- 3 and 4 cutting edges
- Type K - tapered
- Type T - drop shape

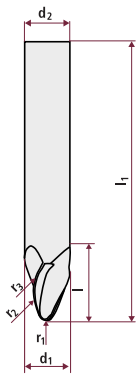
Cutting materials										
Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
MGC PVTi	▼	▼	▼	▼	-	▼	2 - 12	3.2 - 26.7	3 - 4	-

Circular radius end mills

Type K - tapered | 3 and 4 cutting edges

d_1	z	r	γ° 8° λ° 50°	MGC PVTi
6 - 12	3 - 4	-		
		NEW		





Order no.	d_1	l_2	l_3	d_3	l_1	r1	r2	r3	d_2	z
without AT | short										
SVV 1420 56 061	6	9.58	-	-	57	1	250	3	6	3
SVV 1420 56 060	6	9.58	-	-	75	1.5	24	-	6	4
SVV 1420 56 082	8	10.5	-	-	64	1.4	250	4	8	3
SVV 1420 56 100	10	10.73	-	-	73	2	250	5	10	3
SVV 1420 56 120	12	13.5	-	-	84	3	250	6	12	3

Application data (fz / ap)

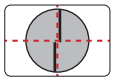
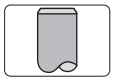
Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling 2D/3D							
6	fz (mm)	0.028-0.045	0.025-0.03	0.05	0.03-0.045	-	0.025-0.03
	ap (mm)	0.05-0.2	0.05-0.2	0.05-0.2	0.05-0.2		0.05-0.2
8	fz (mm)	0.04-0.06	0.035-0.04	0.065	0.05-0.06	-	0.03-0.035
	ap (mm)	0.05-0.2	0.05-0.2	0.05-0.2	0.05-0.2		0.05-0.2
10	fz (mm)	0.045-0.07	0.045-0.05	0.08	0.055-0.07	-	0.045-0.05
	ap (mm)	0.05-0.2	0.05-0.2	0.05-0.2	0.05-0.2		0.05-0.2
12	fz (mm)	0.06-0.085	0.055-0.06	0.1	0.085-0.1	-	0.05-0.055
	ap (mm)	0.05-0.2	0.05-0.2	0.05-0.2	0.05-0.2		0.05-0.2

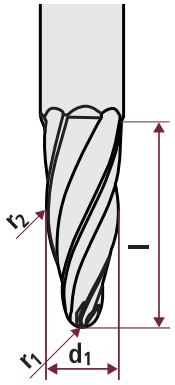
Speed (Vc in m/min)

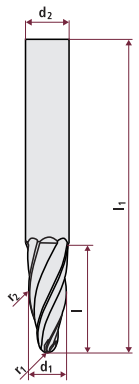
Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	-	-	-	-	-	-
	Fine	200 **275** 350	120 **135** 150	180 **290** 400	400 **500** 600		150 **175** 200

Circular radius end mills

Type T - drop shape | 3 and 4 cutting edges

d_1 2 - 12	z 3 - 4	r -	γ° - λ° -	MGC PVTi
		NEW		





Order no.	d_1	l_2	l_3	d_3	l_1	r1	r2	r3	d_2	z
with and without AT | short										
SVV 1410 56 020	2	3.19	7.5	2	50	0.5	8	-	4	3
SVV 1410 56 030	3	4.75	12	3	57	0.75	12	-	6	3
SVV 1410 56 040	4	6.39	15	4	57	1	16	-	6	3
SVV 1410 56 060	6	20.29	-	-	75	1	95	-	6	3
SVV 1410 56 080	8	17.62	-	-	75	2	64	-	8	3
SVV 1410 56 081	8	23.92	-	-	75	1	90	-	8	3
SVV 1410 56 100	10	24.12	-	-	73	2	85	-	10	4
SVV 1410 56 120	12	26.66	-	-	84	2	80	-	12	4

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Contour milling 2D/3D							
2 - 6	fz (mm)	0.025-0.045	0.02-0.03	0.045-0.05	0.04-0.05	-	0.02-0.03
	ap (mm)	0.05-0.3	0.05-0.3	0.05-0.3	0.05-0.3		0.05-0.3
8 - 12	fz (mm)	0.045-0.07	0.045-0.05	0.07-0.08	0.065-0.08	-	0.04-0.05
	ap (mm)	0.05-0.3	0.05-0.3	0.05-0.3	0.05-0.3		0.05-0.3

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVTi	Rough	-	-	-	-	-	-
	Fine	200 **275** 350	120 **135** 150	180 **290** 400	400 **500** 600		150 **175** 200

High-feed cutters

High-feed cutters

Properties

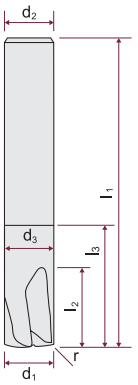
- 3 to 6 cutting edges

Cutting materials

Coating quality	ISO application						Diameter	Cutting edge length l (mm)	Teeth z	Radius r (mm)
	P	M	K	N	S	H				
MGC PVALSA	▼	▼	▼	-	▼	▼	2 - 16	2 - 16	3 - 6	0 - 3

High-feed cutters

High-feed cutters | 3 cutting edges



d_1	z	r *	γ° 5° λ° 5°	MGC PVALSA
2 - 16	3	0.15-1.4		

Order no.	d_1	l_2	l_3	d_3	l_1	r*	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short													
NVV 0373 55 023	2	2	10	1.9	57	0.15*	6	3	11.2	11.6	11.9	12.2	12.8
NVV 0373 55 032	3	3	16	2.9	57	0.2*	6	3	17.4	17.9	18.3	18.6	19.8
NVV 0373 55 042	4	4	18	3.8	57	0.3*	6	3	19.6	20.1	20.6	21.2	-
NVV 0373 55 052	5	5	21	4.8	57	0.4*	6	3	22.7	23.2	-	-	-
NVV 0373 55 062	6	6	21	5.8	57	0.5*	6	3	-	-	-	-	-
NVV 0373 55 082	8	8	27	7.8	63	0.7*	8	3	-	-	-	-	-
NVV 0373 55 102	10	10	32	9.8	72	0.85*	10	3	-	-	-	-	-
NVV 0373 55 122	12	12	38	11.8	83	1*	12	3	-	-	-	-	-
NVV 0373 55 162	16	16	50	15.8	92	1.4*	16	3	-	-	-	-	-

Note: r* = bull end to be programmed

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Roughing 2D/3D							
2	fz (mm)	0.06-0.15	-	0.06-0.15	-	-	0.06-0.15
	ap (mm)	0.1-0.15		0.1-0.15			0.1-0.15
3 - 4	fz (mm)	0.08-0.25	-	0.08-0.25	-	-	0.08-0.25
	ap (mm)	0.1-0.2		0.1-0.2			0.1-0.2
5 - 6	fz (mm)	0.1-0.35	-	0.1-0.35	-	-	0.1-0.35
	ap (mm)	0.1-0.3		0.1-0.3			0.1-0.3
8	fz (mm)	0.1-0.5	-	0.1-0.5	-	-	0.1-0.5
	ap (mm)	0.1-0.3		0.1-0.3			0.1-0.3
10	fz (mm)	0.1-0.7	-	0.1-0.7	-	-	0.1-0.7
	ap (mm)	0.1-0.3		0.1-0.3			0.1-0.3
12	fz (mm)	0.1-0.8	-	0.1-0.8	-	-	0.1-0.8
	ap (mm)	0.1-0.3		0.1-0.3			0.1-0.3
16	fz (mm)	0.1-0.8	-	0.1-0.8	-	-	0.1-0.8
	ap (mm)	0.1-0.4		0.1-0.4			0.1-0.4

Speed (Vc in m/min)

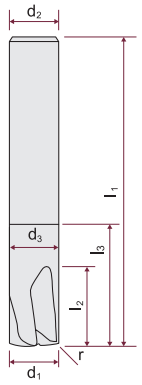
Coating quality	Application	P	M	K	N	S	H
MGC PVALSA	Rough	120 **210** 310	-	100 **225** 350	-	-	80 **140** 200
	Fine	-		-			-

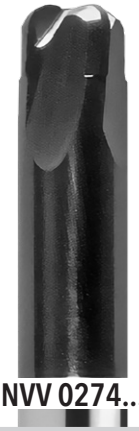
High-feed cutters

High-feed cutters | 4 cutting edges

NVV 0374... with bull end to be programmed
NVV 0274... with real bull end

d_1	z	r *	γ° 5° λ° 5°	MGC PVALSA
3 - 16	4	0.2 - 3		





NVV 0274...

NVV 0374...

Order no.	d_1	l_2	l_3	d_3	l_1	r*	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long | prog. Bull end													
NVV 0374 55 032	3	3	16	2.9	57	0.2*	6	4	17.4	17.9	18.3	18.6	19.8
NVV 0374 55 042	4	4	18	3.8	57	0.3*	6	4	19.6	20.1	20.6	21.2	-
NVV 0374 55 052	5	5	21	4.8	57	0.4*	6	4	22.7	23.2	-	-	-
NVV 0374 55 062	6	6	21	5.8	57	0.5*	6	4	-	-	-	-	-
NVV 0374 55 0622	6	6	64	5.8	100	0.5*	6	4	-	-	-	-	-
NVV 0374 55 082	8	8	27	7.8	63	0.7*	8	4	-	-	-	-	-
NVV 0374 55 0822	8	8	64	7.8	100	0.7*	8	4	-	-	-	-	-
NVV 0374 55 102	10	10	32	9.8	72	0.85*	10	4	-	-	-	-	-
NVV 0374 55 1022	10	10	60	9.8	100	0.85*	10	4	-	-	-	-	-
NVV 0374 55 122	12	12	38	11.8	83	1*	12	4	-	-	-	-	-
NVV 0374 55 1222	12	12	65	11.8	110	1*	12	4	-	-	-	-	-
NVV 0374 55 162	16	16	50	15.8	92	1.4*	16	4	-	-	-	-	-
NVV 0374 55 1622	16	16	65	15.8	150	1.4*	16	4	-	-	-	-	-
with AT | short | defined bull end													
NVV 0274 55 06015	6	6	21	5.8	57	1.5	6	4	-	-	-	-	-
NVV 0274 55 08020	8	8	27	7.8	63	2	8	4	-	-	-	-	-
NVV 0274 55 10020	10	10	32	9.8	72	2	10	4	-	-	-	-	-
NVV 0274 55 12030	12	12	38	11.8	83	3	12	4	-	-	-	-	-

Note: r* = bull end to be programmed

Application data (fz / ap)

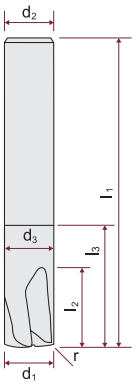
Diameter	Feed depth of cut	P	M	K	N	S	H
Roughing 2D/3D							
3 - 4	fz (mm)	0.08-0.25	0.08-0.25	0.08-0.25	-	0.08-0.25	0.08-0.25
	ap (mm)	0.1-0.2	0.1-0.2	0.1-0.2		0.1-0.2	0.1-0.2
5 - 6	fz (mm)	0.1-0.35	0.1-0.35	0.1-0.35	-	0.1-0.35	0.1-0.35
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
8	fz (mm)	0.1-0.5	0.1-0.4	0.1-0.5	-	0.1-0.5	0.1-0.5
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
10	fz (mm)	0.1-0.7	0.1-0.4	0.1-0.7	-	0.1-0.7	0.1-0.7
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
12	fz (mm)	0.1-0.8	0.1-0.6	0.1-0.8	-	0.1-0.8	0.1-0.8
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
16	fz (mm)	0.1-0.8	0.1-0.6	0.1-0.8	-	0.1-0.8	0.1-0.8
	ap (mm)	0.1-0.4	0.1-0.3	0.1-0.4		0.1-0.4	0.1-0.4

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVALSA	Rough	120 **210** 310	70 **95** 120	100 **225** 350	-	30 **50** 70	80 **140** 200
	Fine	-	-	-		-	-

High-feed cutters

High-feed cutters | 4 cutting edges | with interior cooling



d_1	z	r *	γ° 5° λ° 5°	MGC PVALSA
4 - 16	4	0.3 - 1.4		

Order no.	d_1	l_2	l_3	d_3	l_1	r*	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
with AT | short | long | prog. bull end													
NVV 0474 55 041	4	4	12	3.8	57	0.3*	6	4	13.4	13.8	14.2	14.5	15.3
NVV 0474 55 061	6	6	21	5.8	57	0.5*	6	4	-	-	-	-	-
NVV 0474 55 0611	6	6	64	5.8	100	0.5*	6	4	-	-	-	-	-
NVV 0474 55 081	8	8	27	7.8	63	0.7*	8	4	-	-	-	-	-
NVV 0474 55 0811	8	8	64	7.8	100	0.7*	8	4	-	-	-	-	-
NVV 0474 55 101	10	10	32	9.8	72	0.85*	10	4	-	-	-	-	-
NVV 0474 55 1011	10	10	60	9.8	100	0.85*	10	4	-	-	-	-	-
NVV 0474 55 121	12	12	38	11.8	83	1*	12	4	-	-	-	-	-
NVV 0474 55 1211	12	12	65	11.8	110	1*	12	4	-	-	-	-	-
NVV 0474 55 162	16	16	50	15.8	92	1.4*	16	4	-	-	-	-	-
NVV 0474 55 1621	16	16	65	15.8	150	1.4*	16	4	-	-	-	-	-

Note: r* = bull end to be programmed

Application data (fz / ap)

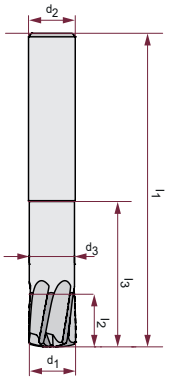
Diameter	Feed depth of cut	P	M	K	N	S	H
Roughing 2D/3D							
3 - 4	fz (mm)	0.08-0.25	0.08-0.25	0.08-0.25	-	0.08-0.25	0.08-0.25
	ap (mm)	0.1-0.2	0.1-0.2	0.1-0.2		0.1-0.2	0.1-0.2
5 - 6	fz (mm)	0.1-0.35	0.1-0.35	0.1-0.35	-	0.1-0.35	0.1-0.35
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
8	fz (mm)	0.1-0.5	0.1-0.4	0.1-0.5	-	0.1-0.5	0.1-0.5
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
10	fz (mm)	0.1-0.7	0.1-0.4	0.1-0.7	-	0.1-0.7	0.1-0.7
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
12	fz (mm)	0.1-0.8	0.1-0.6	0.1-0.8	-	0.1-0.8	0.1-0.8
	ap (mm)	0.1-0.3	0.1-0.3	0.1-0.3		0.1-0.3	0.1-0.3
16	fz (mm)	0.1-0.8	0.1-0.6	0.1-0.8	-	0.1-0.8	0.1-0.8
	ap (mm)	0.1-0.4	0.1-0.3	0.1-0.4		0.1-0.4	0.1-0.4

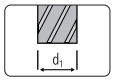
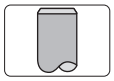
Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
MGC PVALSA	Rough	120 **210** 310	70 **95** 120	100 **225** 350	-	30 **50** 70	80 **140** 200
	Fine	-	-	-		-	-

High-feed cutters

High-feed cutters | 4 and 6 cutting edges



d_1 2 - 16	z 4 - 6	r* 0.18-1.47	γ° - λ° 12°	UMGCPVMT
		NEW		

Order no.	d_1	l_2	l_3	d_3	l_1	r*	d_2	z	Effective usable length at x° draft angle 0.5°	1°	1.5°	2°	3°
with and without AT | short													
C4PX-020-010-060-01	2	2	6	1.9	50	0.18*	4	4	-	-	-	-	-
C4PX-020-010-100-01	2	2	10	1.9	50	0.18*	4	4	-	-	-	-	-
C4PX-020-010-060-02	2	2	6	1.9	60	0.18*	6	4	-	-	-	-	-
C4PX-020-010-100-02	2	2	10	1.9	60	0.18*	6	4	-	-	-	-	-
C4PX-030-015-090-01	3	3	9	2.85	50	0.28*	4	4	-	-	-	-	-
C4PX-030-015-150-01	3	3	15	2.85	50	0.28*	4	4	-	-	-	-	-
C4PX-030-015-090-02	3	3	9	2.85	60	0.28*	6	4	-	-	-	-	-
C4PX-030-015-150-02	3	3	15	2.85	60	0.28*	6	4	-	-	-	-	-
C4PX-040-020-120-01	4	4	12	3.8	60	0.37*	6	4	-	-	-	-	-
C4PX-040-020-200-01	4	4	20	3.8	60	0.37*	6	4	-	-	-	-	-
C4PX-050-025-150-01	5	5	15	4.75	60	0.46*	6	4	-	-	-	-	-
C4PX-050-025-200-01	5	5	20	4.75	60	0.46*	6	4	-	-	-	-	-
C4PX-060-030-180-01	6	6	18	5.7	60	0.55*	6	4	-	-	-	-	-
C4PX-060-030-240-01	6	6	24	5.7	60	0.55*	6	4	-	-	-	-	-
C4PX-080-040-240-01	8	8	24	7.7	64	0.74*	8	4	-	-	-	-	-
C4PX-080-040-320-01	8	8	32	7.7	64	0.74*	8	4	-	-	-	-	-
C4PX-080-040-400-01	8	8	40	7.7	75	0.74*	8	4	-	-	-	-	-
C4PX-100-050-300-01	10	10	30	9.65	75	0.92*	10	4	-	-	-	-	-
C4PX-100-050-400-01	10	10	40	9.65	75	0.92*	10	4	-	-	-	-	-
C4PX-100-050-500-01	10	10	50	9.65	100	0.92*	10	4	-	-	-	-	-
C4PX-120-060-360-01	12	12	36	11.6	75	1.11*	12	4	-	-	-	-	-
C4PX-120-060-480-01	12	12	48	11.6	100	1.11*	12	4	-	-	-	-	-
C4PX-120-060-600-01	12	12	60	11.6	100	1.11*	12	4	-	-	-	-	-
C4PX-160-080-480-01	16	16	48	15.5	100	1.47*	16	4	-	-	-	-	-

Note: r* = bull end to be programmed

Order no.	d_1	l_2	l_3	d_3	l_1	r*	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
C6PX-060-030-180-01	6	6	18	5.7	60	0.55*	6	6	-	-	-	-	-
C6PX-060-030-240-01	6	6	24	5.7	60	0.55*	6	6	-	-	-	-	-
C6PX-080-040-240-01	8	8	24	7.7	64	0.74*	8	6	-	-	-	-	-
C6PX-080-040-320-01	8	8	32	7.7	64	0.74*	8	6	-	-	-	-	-
C6PX-080-040-400-01	8	8	40	7.7	75	0.74*	8	6	-	-	-	-	-
C6PX-100-050-300-01	10	10	30	9.65	75	0.92*	10	6	-	-	-	-	-
C6PX-100-050-400-01	10	10	40	9.65	75	0.92*	10	6	-	-	-	-	-
C6PX-100-050-500-01	10	10	50	9.65	100	0.92*	10	6	-	-	-	-	-
C6PX-120-060-360-01	12	12	36	11.6	75	1.11*	12	6	-	-	-	-	-
C6PX-120-060-480-01	12	12	48	11.6	100	1.11*	12	6	-	-	-	-	-
C6PX-120-060-600-01	12	12	60	11.6	100	1.11*	12	6	-	-	-	-	-
C6PX-160-080-480-01	16	16	48	15.5	100	1.47*	16	6	-	-	-	-	-

Note: r* = bull end to be programmed

Application data (fz / ap)

Diameter	Feed depth of cut	P	M	K	N	S	H
Roughing 2D/3D							
2	fz (mm)	0.06-0.07	-	-	-	-	0.03-0.06
	ap (mm)	0.09-0.1					0.05-0.08
3	fz (mm)	0.09-0.1	-	-	-	-	0.05-0.08
	ap (mm)	0.14-0.15					0.08-0.12
4	fz (mm)	0.13-0.14	-	-	-	-	0.07-0.11
	ap (mm)	0.19-0.2					0.11-0.16
5	fz (mm)	0.16-0.17	-	-	-	-	0.08-0.14
	ap (mm)	0.24-0.25					0.14-0.2
6	fz (mm)	0.19-0.21	-	-	-	-	0.1-0.17
	ap (mm)	0.29-0.3					0.16-0.24
8	fz (mm)	0.26-0.28	-	-	-	-	0.13-0.22
	ap (mm)	0.38-0.4					0.22-0.32
10	fz (mm)	0.32-0.35	-	-	-	-	0.15-0.28
	ap (mm)	0.48-0.5					0.27-0.4
12	fz (mm)	0.39-0.42	-	-	-	-	0.18-0.33
	ap (mm)	0.58-0.6					0.32-0.48
16	fz (mm)	0.51-0.56	-	-	-	-	0.21-0.42
	ap (mm)	0.77-0.8					0.43-0.64

Speed (Vc in m/min)

Coating quality	Application	P	M	K	N	S	H
HP810 coated	Rough	150 **180** 210	-	-	-	-	70 **95** 120
	Fine	-					-

High-frequency spindles

Modern spindle systems for effective milling performance.

Many milling machines – both newer machines and older models – have a relatively low maximum speed. A low maximum speed, of course, delivers advantages in roughing, but is the biggest brake on achieving effective feed rates. Low speeds likewise greatly restrict the advantages of modern CNC applications. The consequence are significantly longer machining times, and a loss of profitable capacity.

Pokolm offers impressive solutions for just this problem: modern spindle systems for effective milling results.

Better surfaces and significant time savings.

The advantages are impressive: higher cutting speeds and utilizing the maximum feed rate – even for the smallest cutters. Surfaces are also improved, with a significant reduction in eroding work. This results in much shorter machining times, and allows users to make full use of the advantages of CNC.

Get the maximum speed from your machines with Pokolm spindles for excellent time savings.

Our current spindle flyer is available here:

https://www.pokolm.de/de/downloads/?did=137

Or scan the QR code

Ask about our spindle service, including:

- Replacement parts
- Repairs
- Inspection
- Maintenance
- Swivel devices
- CNC machine connection

Videos on high-frequency spindles are available at www.youtube.com/c/PokolmKnowHow

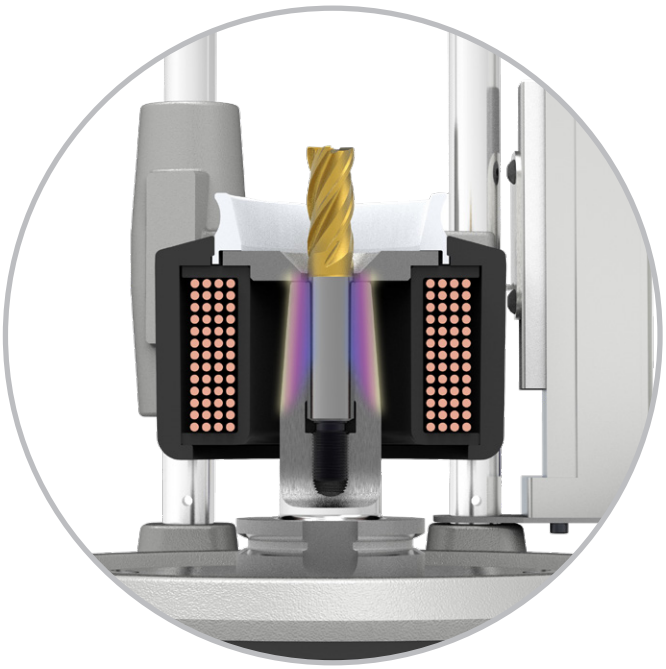
Shrinking technology

First shrink then mill

More and more users are switching to shrinking technology, thanks to the advantages it offers over common clamping methods. The biggest of these is extremely good concentricity, which guarantees the highest precision with significantly longer tool lives. In addition, shrinking technology creates an optimal frictional connection between the tool and arbor, ensuring high torque transmission. The ability to work at maximum speed is the best prerequisite for achieving an ideal surface grade and avoiding expensive utrafine machining processes.

In comparison to traditional tool arbors, shrink fit mounts have a slimmer design, making it possible to use even the smallest tools at the greatest depths, something impossible with a collet chuck.

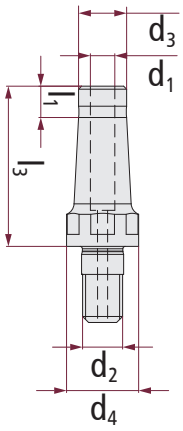
Pokolm offers a comprehensive range of shrinking technology products: a high-quality, well-engineered induction shrinking device, shrink fit arbors for all common machine connections, and the patented Pokolm DuoPlug® connection system.



Videos on shrinking technology are available at www.youtube.com/c/PokolmKnowHow

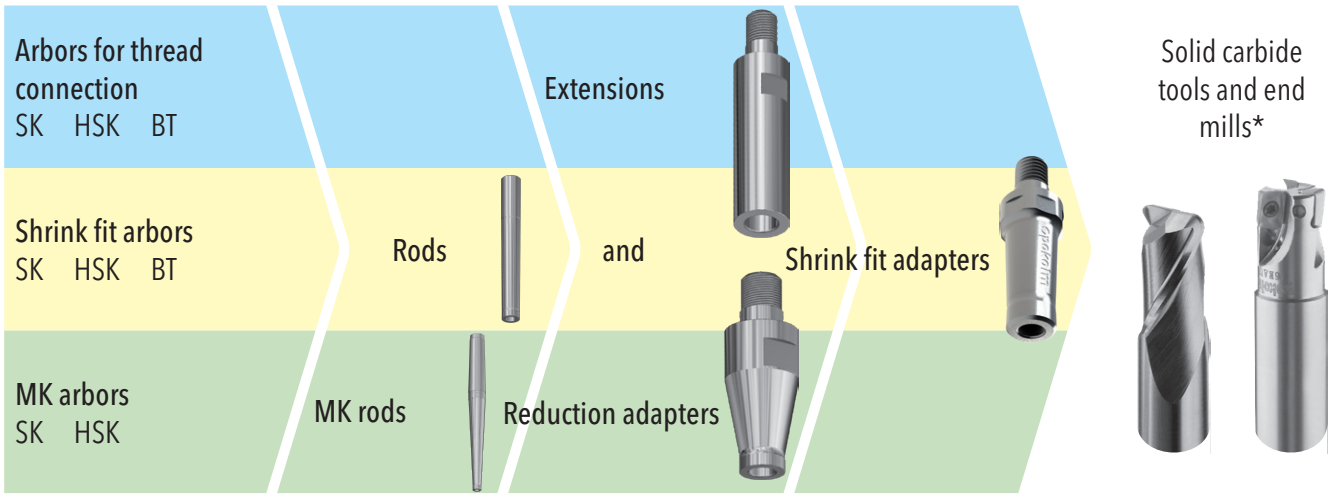
The new threaded shrink fit adapter – an economical connection

- Problem solver for machining cavities, if the right shrink fit arbor is not available.
- Short and streamlined coolant feed inside the design
- Hexagonal contact surfaces – also suitable for using ring wrenches.
- Economical alternative in contrast to additional arbors for threaded arbors with M10, M12, M16 threads
- For shrink gripping of cutters with plain shank diameters 6 mm, 8 mm, 10 mm and 12 mm (shank quality at least h6)



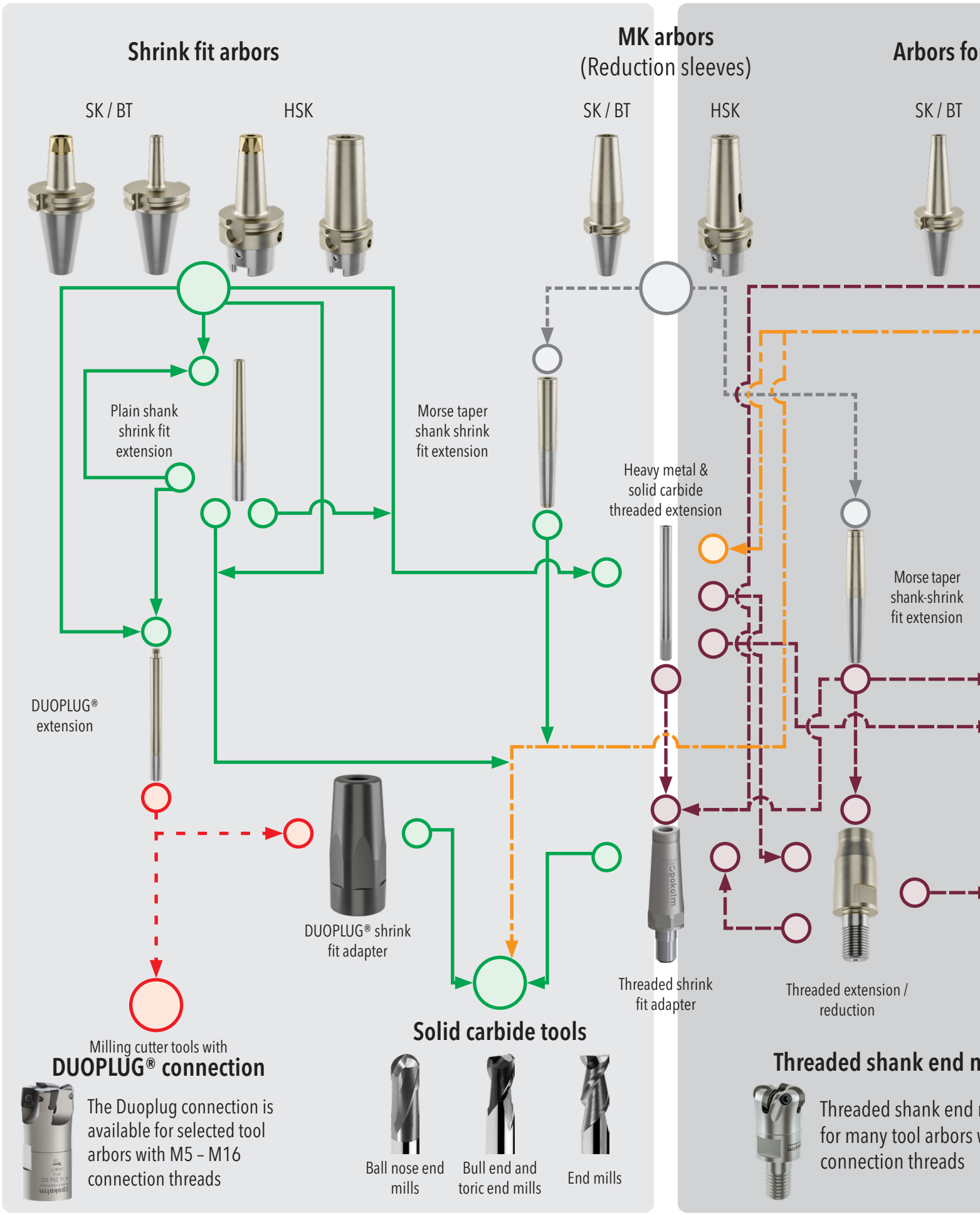
Order no.	d1	l3	A	d3	d4	d2	DIN/shape	l2	l1
Diameter 6 mm									
40 06 10 784 S	6	40	-	12	18	10	-	17	7.8
40 06 12 784 S	6	40	-	12	21	12	-	19	7.8
40 06 16 784 S	6	40	-	12	29	16	-	27	7.8
Diameter 8 mm									
40 08 10 784 S	8	40	-	16	18	10	-	17	7.8
40 08 12 784 S	8	40	-	16	21	12	-	19	7.8
40 08 16 784 S	8	40	-	16	29	16	-	27	7.8
Diameter 10 mm									
60 10 10 784 S	10	60	-	18	18	10	-	17	-
60 10 12 784 S	10	60	-	20	21	12	-	19	7.8
60 10 16 784 S	10	60	-	20	29	16	-	27	7.8
Diameter 12 mm									
60 12 12 784 S	12	60	-	21	21	12	-	19	-
60 12 16 784 S	12	60	-	24	29	16	-	27	7.8

Option to combine with the threaded shrink fit adapter



when using suitable shrinking units, all plain shank tools and extensions can be used.

The Pokolm Tool System



The Duoplug connection is available for selected tool arbors with M5 – M16 connection threads

Threaded shank end
for many tool arbors
connection threads

Shrink fit connection
Morse taper connection
Threaded connection
Shell-type connection
ER collet connection
DUOPLUG® connection

r thread connection

HSK

Threaded extension / reduction

nill

mills are available
with M5 – M16

ER collet arbors

SK / BT

HSK

Cylindrical adapters for threaded shank end mills

End mills*

Arbors for shell type milling cutters

SK / BT

HSK

Flat contact surface

Shell type / threaded adapter

Shell type extension

*when using suitable shrinking units, all plain shank tools and extensions can be used in shrink fit mounts as well.

For further information, please see page 146.

Shell-type milling cutter body

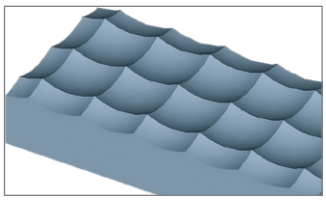
Shell-type milling cutter bodies are available for many tool arbors with a mandrel diameter of 16 - 40 mm

Surface grade

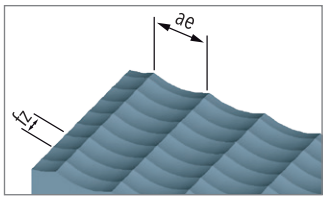
The goal of finishing a workpiece is to avoid or at least minimize the need for manual rework. However, there are many factors that influence the surface properties of a milled component:

- Component geometry, material
- Stability of the set-up and the machine
- Overhang and cutting parameters
- Precision, geometry, and the design of the tool and arbor system

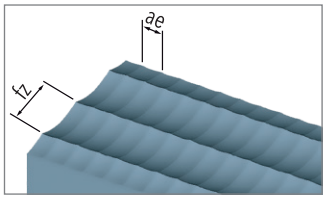
In addition to the points indicated above, the desired surface roughness Rth has a significant impact on both surface grade and machining times in finishing. Specifically selecting cutting parameters to achieve a defined roughness saves valuable time in finishing and ensures competitive machining times.



f_z equal to a_e
(Machining type 1 and 3)



f_z less than a_e
(Machining type 2 and 4)



f_z greater than a_e
(Machining type 5)

Machining example:

Material: 1.2312, SK40 machine
Area to be machined: 150 x 200 mm
Tool: 08 214 with d1 = 8, z = 2
Other : n = 14,000 rpm | VC = 350m/min

	from		results:			
	fz	ae	Vf	Surface roughness [mm]	Total milling length in [mm]	Machining time
Machining type 1	0.08	0.08	2,240	0.0002	375,000	2 hr. 47 min
Machining type 2	0.08	0.16	2,240	0.0008	187,500	1 hr. 24 min.
Machining type 3	0.16	0.16	4,480	0.0008	187,500	42 min.
Machining type 4	0.16	0.32	4,480	0.0032	93,750	21 min.
Machining type 5	0.32	0.16	8,960	0.0008	187,500	21 min.

As a general rule:

"Double the side step or double the feed = half the milling time."

For $f_z = a_e$, then:

- Doubling the values reduces the machining time by three quarters.
- Dividing f_z and a_e by two, in contrast, results in a surface that is four times as smooth.

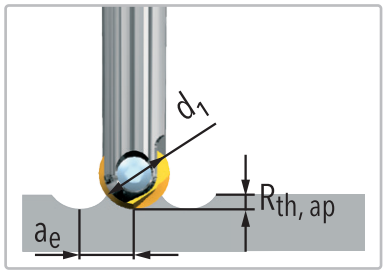
In most cases, selecting $f_z = a_e$ results in a very clean surface that stands out for its symmetrical appearance in both the advance and feed direction.

Terms and dimensions

d_1	Tool diameter in [mm]	d_{eff}	Effective tool diameter in [mm]	r	Tool radius in [mm]
$R_{th,ae}$	Depth of profile in the advance direction in [mm]	$R_{th,fz}$	Depth of profile in the feed direction in [mm]	a_e	Radial engagement (side step) in [mm]
f_z	Feed per tooth in [mm]	ß	Approach angle of the tool axis in [°]	a_p	Axial engagement (depth of cut) in [mm]

List of formulas

1a Calculation of theoretical depth of profile in the advance direction



Formula:

$$R_{th,ap} = \frac{d_1}{2} - \sqrt{\frac{d_1^2 - a_p^2}{4}}$$

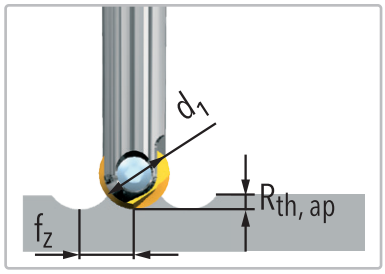
Example:

$d_1 = 12$

$a_p = 0.2$

$$R_{th,0,2} = \frac{12}{2} - \sqrt{\frac{12^2 - 0,2^2}{4}} = 0,000833$$

1b Calculation of theoretical depth of profile in the feed direction



Formula:

$$R_{th,fz} = \frac{d_1}{2} - \sqrt{\frac{d_1^2 - f_z^2}{4}}$$

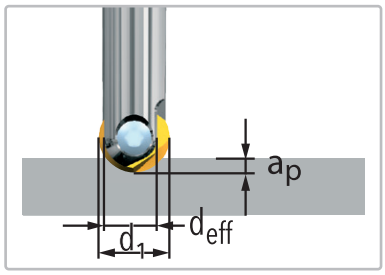
Example:

$d_1 = 12$

$f_z = 0.2$

$$R_{th,0,2} = \frac{12}{2} - \sqrt{\frac{12^2 - 0,2^2}{4}} = 0,000833$$

2a Calculation of the effective cutting edge diameter for spherical tools with a vertical axis



Formula:

$$d_{eff} = 2\sqrt{a_p\,(d_1 - a_p)}$$

Example:

$d_1 = 12$

$a_p = 0.2$

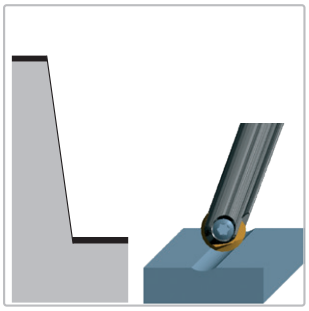
$$d_{eff} = 2\sqrt{0,2 \cdot (12 - 0,2)} = 3,07$$

Skip the calculations:

Effective tool diameter for ball nose end mills depending on the feed depth:

	Tool diameter d_1											
a_p	1	2	3	4	5	6	7	8	10	12	16	20
0.1	0.60	0.87	1.08	1.25	1.40	1.54	1.66	1.78	1.99	2.18	2.52	2.82
0.2	0.80	1.20	1.50	1.74	1.96	2.15	2.33	2.50	2.80	3.07	3.56	3.98
0.3	0.92	1.43	1.80	2.11	2.37	2.62	3.84	3.04	3.41	3.75	4.34	4.86
0.4	0.98	1.60	2.04	2.40	2.71	2.99	3.25	3.49	3.92	4.31	5.00	5.60
0.5	1.00	1.73	2.24	2.65	3.00	3.32	3.61	3.87	4.36	4.80	5.57	6.24

2b Calculation of the effective cutting edge diameter for spherical tools with a tilted axis



Formula:

$$d_{eff} = d_1 \cdot \sin\left(\beta + \arccos\left(1 - \frac{2 \cdot a_p}{d_1}\right)\right)$$

Example:

$d_1 = 12$
$a_p = 0.2$
$\beta = 15°$

Formula applies to positive approach angle

$$d_{eff} = 12 \cdot \sin\left(15 + \arccos\left(1 - \frac{2 \cdot 0{,}2}{12}\right)\right) = 5{,}97$$

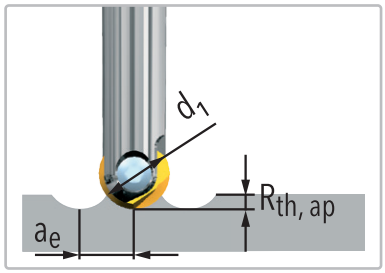
If a spherical tool is set at a tilted axis, the actual material removal will not change in contrast to vertical machining; however, the diameter range of the tool that enters the material will change. This will result in a different calculation for effective tool diameter (= in use).

Skip the calculations:

Effective cutting edge diameter for ball nose end mills depending on the approach angle and feed depth:

		Tool diameter d_1											
ß	a_p	1	2	3	4	5	6	7	8	10	12	16	20
10°	0.1	0.73	1.17	1.55	1.89	2.21	2.52	2.82	3.11	3.66	4.20	5.23	6.22
	0.2	0.89	1.46	1.93	2.34	2.73	3.09	6.44	3.78	4.42	5.04	6.21	7.32
	0.3	0.97	1.65	2.19	2.67	3.10	3.51	3.90	4.28	4.99	5.67	6.95	8.16
	0.4	1.0	1.78	2.39	2.92	3.40	3.85	4.28	4.68	5.46	6.19	7.56	8.85
	0.5	0.98	1.88	2.55	3.13	3.65	4.13	4.59	5.03	5.86	6.63	8.09	9.45
15°	0.1	0.79	1.31	1.77	2.19	2.59	2.99	3036	3.74	4.46	5.16	6.53	7.85
	0.2	0.93	1.57	2.12	2.62	3.08	3.53	3.69	4.38	5.19	5.97	7.47	8.92
	0.3	0.99	1.74	2.36	2.92	3.43	3.92	4.40	4.85	5.73	6.57	8.18	9.72
	0.4	1.00	1.86	2.54	3.15	3.71	4.24	4.74	5.23	6.17	7.06	8.76	10.38
	0.5	0.97	1.92	2.68	3.33	3.93	4.50	5.04	5.55	6.54	7.48	9.26	10.95
20°	0.1	0.84	1.43	1.97	2.47	2.96	3.43	3.89	4.34	5.22	6.09	7.77	9.42
	0.2	0.69	1.67	2.30	2.87	3.41	3.94	4.45	4.95	5.91	6.85	8.68	10.44
	0.3	1.00	1.82	2.51	3.14	3.74	4.30	8.85	5.39	6.42	7.42	9.35	11.20
	0.4	0.99	1.91	2.67	3.35	3.99	4.59	5.17	5.74	6.83	7.88	9.89	11.83
	0.5	0.94	1.97	2.79	3.51	4.19	4.83	5.44	6.03	7.17	8.27	10.36	12.37
25°	0.1	0.88	1.55	2.16	2.74	3.30	3.84	4.38	4.91	5.95	6.96	8.96	10.92
	0.2	0.98	1.76	2.46	3.10	3.72	4.32	4.90	5.48	6.59	7.69	9.82	11.89
	0.3	1.00	1.89	2.65	3.30	4.01	4.65	5.27	5.88	7.06	8.21	10.44	12.61
	0.4	0.97	1.69	2.78	3.53	4.23	4.91	5.57	6.20	7.44	8.64	10.95	13.19
	0.5	0.91	1.99	2.87	3.67	4.41	5.12	5.80	6.47	7.75	9.00	11.39	13.69
30°	0.1	0.92	1.65	2.33	2.98	3.61	4.23	4.84	5.44	6.62	7.79	10.08	12.34
	0.2	0.99	1.84	2.60	3.31	4.00	4.67	5.32	5.96	7.22	8.46	10.88	13.25
	0.3	0.99	1.94	2.76	3.52	4.26	4.96	5.66	6.33	7.65	8.94	11.46	13.91
	0.4	0.95	1.99	2.87	2.68	4.45	5.19	5.91	6.62	7.99	9.33	11.93	14.45
	0.5	0.87	2.00	2.94	3.79	4.60	5.37	6.12	6.85	8.27	9.65	12.32	14.91

2c Calculation of the effective cutting edge diameter for toric tools



Formula:

$$d_{eff} = (d_1 - 2r) + 2\sqrt{a_p\,(2r - a_p)}$$

Example:

$d_1 = 12$
$a_p = 0.2$
$ß = 15°$

Formula applies to positive approach angle

$$d_{eff} = (12 - 2 \cdot 5) + 2\sqrt{0{,}2 \cdot (2 \cdot 5 - 0{,}2)} = 4{,}8$$

Skip the calculations:

Effective cutting edge diameter for toric tools depending on the corner radius and feed depth:

r	a_p	Tool diameter d_1 6	8	10	12	15	16	20	25
2	0.1	3.25	5.25	7.25	9.25	-	13.25	17.25	-
	0.2	3.74	5.74	7.74	9.74	-	13.74	17.74	-
	0.3	4.11	6.11	8.11	10.11	-	14.11	18.11	-
	0.4	4.40	6.40	8.40	10.40	-	14.40	18.40	-
	0.5	4.65	6.65	8.65	10.65	-	14.65	18.65	-
2.5	0.1	2.40	4.40	6.40	8.40	11.40	12.40	16.40	-
	0.2	2.96	4.96	6.96	8.96	11.96	12.96	16.96	-
	0.3	3.37	5.37	7.37	9.37	12.37	13.37	17.37	-
	0.4	3.71	5.71	7.71	9.71	12.71	13.71	17.71	-
	0.5	4.00	6.00	8.00	10.00	13.00	14.00	18.00	-
3	0.1	-	3.54	-	-	-	-	-	-
	0.2	-	4.15	-	-	-	-	-	-
	0.3	-	4.62	-	-	-	-	-	-
	0.4	-	4.99	-	-	-	-	-	-
	0.5	-	5.32	-	-	-	-	-	-
3.5	0.1	-	-	-	6.66	9.66	10.66	14.66	19.66
	0.2	-	-	-	7.33	10.33	11.33	15.33	20.33
	0.3	-	-	-	7.84	10.84	11.84	15.84	20.84
	0.4	-	-	-	8.25	11.25	12.25	16.25	21.25
	0.5	-	-	-	8.61	11.61	12.61	16.51	21.61
4	0.1	-	-	3.78	-	-	-	-	18.78
	0.2	-	-	4.50	-	-	-	-	19.50
	0.3	-	-	5.04	-	-	-	-	20.04
	0.4	-	-	5.49	-	-	-	-	20.49
	0.5	-	-	5.87	-	-	-	-	20.87
5	0.1	-	-	-	3.99	-	-	11.99	16.99
	0.2	-	-	-	4.80	-	-	12.80	17.80
	0.3	-	-	-	5.41	-	-	13.41	18.41
	0.4	-	-	-	5.92	-	-	13.92	18.92
	0.5	-	-	-	6.36	-	-	14.36	19.36
7	0.1	-	-	-	-	-	4.36	-	-
	0.2	-	-	-	-	-	5.32	-	-
	0.3	-	-	-	-	-	6.05	-	-
	0.4	-	-	-	-	-	6.66	-	-
	0.5	-	-	-	-	-	7.20	-	-

Speeds/feed per tooth/depth of cut

For pocket, slot and contour mills (end mills no.0370-0380-0390-0290)

Unalloyed steel / structural steel

Vc = 150 - 250 m/min | Vc = 250 - 350 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.05-0.09	0.05-0.09
3	0.03-0.06	0.09-0.12	0.09-0.12
4	0.03-0.06	0.09-0.12	0.09-0.12
5	0.05-0.08	0.12-0.18	0.12-0.18
6	0.05-0.08	0.12-0.18	0.12-0.18
7	0.05-0.08	0.12-0.18	0.12-0.18
8	0.05-0.08	0.12-0.18	0.12-0.18
9	0.06-0.10	0.15-0.20	0.15-0.20
10	0.06-0.10	0.15-0.20	0.15-0.20
12	0.07-0.12	0.15-0.20	0.15-0.20
16	0.08-0.12	0.20-0.25	0.20-0.25
20	0.08-0.12	0.25-0.30	0.25-0.30

Normal tool steels / cast steel

Vc = 150 - 250 m/min | Vc = 250 - 350 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.05-0.09	0.05-0.09
3	0.03-0.06	0.09-0.12	0.09-0.12
4	0.03-0.06	0.09-0.12	0.09-0.12
5	0.05-0.08	0.12-0.18	0.12-0.18
6	0.05-0.08	0.12-0.18	0.12-0.18
7	0.05-0.08	0.12-0.18	0.12-0.18
8	0.05-0.08	0.12-0.18	0.12-0.18
9	0.06-0.10	0.15-0.20	0.15-0.20
10	0.06-0.10	0.15-0.20	0.15-0.20
12	0.07-0.12	0.15-0.20	0.15-0.20
16	0.08-0.12	0.20-0.25	0.20-0.25
20	0.08-0.12	0.25-0.30	0.25-0.30

Tool steels and cast steel, difficult to machine

Vc = 120 - 170 m/min | Vc = 170 - 250 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.05-0.09	0.05-0.09
3	0.03-0.06	0.09-0.12	0.09-0.12
4	0.03-0.06	0.09-0.12	0.09-0.12
5	0.05-0.08	0.12-0.18	0.12-0.18
6	0.05-0.08	0.12-0.18	0.12-0.18
7	0.05-0.08	0.12-0.18	0.12-0.18
8	0.05-0.08	0.12-0.18	0.12-0.18
9	0.06-0.10	0.15-0.20	0.15-0.20
10	0.06-0.10	0.15-0.20	0.15-0.20
12	0.07-0.12	0.15-0.20	0.15-0.20
16	0.08-0.12	0.20-0.25	0.20-0.25
20	0.08-0.12	0.25-0.30	0.25-0.30

Unalloyed steel / structural steel

Vc = 70 - 110 m/min | Vc = 110 - 150 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.015	0.018	0.015
3	0.015	0.018	0.02
4	0.02	0.023	0.02
5	0.025	0.029	0.025
6	0.03	0.035	0.04
7	0.03	0.035	0.04
8	0.04	0.047	0.054
9	0.045	0.052	0.056
10	0.055	0.064	0.073
12	0.065	0.075	0.085
16	0.085	0.1	0.115
20	0.105	0.14	0.135

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Speeds/feed per tooth/depth of cut

For pocket, slot and contour mills (end mills no.0370-0380-0390-0290)

Cast iron

Vc = 150 - 250 m/min

Vc = 250 - 350 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.05-0.09	0.05-0.09
3	0.03-0.06	0.09-0.12	0.09-0.12
4	0.03-0.06	0.09-0.12	0.09-0.12
5	0.05-0.08	0.12-0.18	0.12-0.18
6	0.05-0.08	0.12-0.18	0.12-0.18
7	0.05-0.08	0.12-0.18	0.12-0.18
8	0.05-0.08	0.12-0.18	0.12-0.18
9	0.06-0.10	0.15-0.20	0.15-0.20
10	0.06-0.10	0.15-0.20	0.15-0.20
12	0.07-0.12	0.15-0.20	0.15-0.20
16	0.08-0.12	0.20-0.25	0.20-0.25
20	0.08-0.12	0.25-0.30	0.25-0.30

Hardened materials up to 48 HRC

Vc = 150 - 250 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.03-0.06	0.03-0.06
3	0.03-0.06	0.07-0.10	0.07-0.10
4	0.03-0.06	0.07-0.10	0.07-0.10
5	0.05-0.08	0.10-0.15	0.10-0.15
6	0.05-0.08	0.10-0.15	0.10-0.15
7	0.05-0.08	0.10-0.15	0.10-0.15
8	0.05-0.08	0.10-0.15	0.10-0.15
9	0.06-0.10	0.12-0.17	0.12-0.17
10	0.06-0.10	0.12-0.17	0.12-0.17
12	0.07-0.12	0.17-0.22	0.17-0.22
16	0.08-0.12	0.17-0.22	0.17-0.22
20	0.08-0.12	0.20-0.25	0.20-0.25

Hardened materials up to 52 HRC

Vc = 120 - 190 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.03-0.06	0.03-0.06
3	0.03-0.06	0.07-0.10	0.07-0.10
4	0.03-0.06	0.07-0.10	0.07-0.10
5	0.05-0.08	0.10-0.15	0.10-0.15
6	0.05-0.08	0.10-0.15	0.10-0.15
7	0.05-0.08	0.10-0.15	0.10-0.15
8	0.05-0.08	0.10-0.15	0.10-0.15
9	0.06-0.10	0.12-0.17	0.12-0.17
10	0.06-0.10	0.12-0.17	0.12-0.17
12	0.07-0.12	0.17-0.22	0.17-0.22
16	0.08-0.12	0.17-0.22	0.17-0.22
20	0.08-0.12	0.20-0.25	0.20-0.25

Hardened materials up to 65 HRC

Vc = 80 - 120 m/min



	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.20×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
2	0.02-0.04	0.03-0.06	0.03-0.06
3	0.03-0.06	0.07-0.10	0.07-0.10
4	0.03-0.06	0.07-0.10	0.07-0.10
5	0.05-0.08	0.10-0.15	0.10-0.15
6	0.05-0.08	0.10-0.15	0.10-0.15
7	0.05-0.08	0.10-0.15	0.10-0.15
8	0.05-0.08	0.10-0.15	0.10-0.15
9	0.06-0.10	0.12-0.17	0.12-0.17
10	0.06-0.10	0.12-0.17	0.12-0.17
12	0.07-0.12	0.17-0.22	0.17-0.22
16	0.08-0.12	0.17-0.22	0.17-0.22
20	0.08-0.12	0.20-0.25	0.20-0.25

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Speeds/feed per tooth/depth of cut

End mills for pocket and slot milling 4Z for HPC machining (0350 – 0360)

Unalloyed steels / structural steels

Vc = 120 - 220 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 0.90×d1 ae ≤ 0.50×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.05-0.08		0.12-0.18
8	0.05-0.08		0.12-0.18
10	0.06-0.10		0.15-0.20
12	0.07-0.12		0.15-0.20
16	0.08-0.12		0.20-0.25
20	0.08-0.12		0.25-0.30

Normal tool steels / cast steels

Vc = 150 - 220 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 0.90×d1 ae ≤ 0.50×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.05-0.08		0.12-0.18
8	0.05-0.08		0.12-0.18
10	0.06-0.10		0.15-0.20
12	0.07-0.12		0.15-0.20
16	0.08-0.12		0.20-0.25
20	0.08-0.12		0.25-0.30

Tool steels and cast steels, difficult to machine

Vc = 120 - 170 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.05-0.08		0.12-0.18
8	0.05-0.08		0.12-0.18
10	0.06-0.10		0.15-0.20
12	0.07-0.12		0.15-0.20
16	0.08-0.12		0.20-0.25
20	0.08-0.12		0.25-0.30

Stainless steels (all types)

Vc = 80 - 120 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.05-0.08		0.10-0.15
8	0.05-0.08		0.10-0.15
10	0.06-0.10		0.12-0.17
12	0.07-0.12		0.17-0.22
16	0.08-0.12		0.27-0.22
20	0.08-0.12		0.20-0.25

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Speeds/feed per tooth/depth of cut

UGT for pocket, slot, and copy end mills (0504 / 0514)

Stainless steels: 1.4301, 1.4541, 1.4307 etc.

Vc = 80 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.50×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
3	0.015	0.018	0.015
4	0.020	0.023	0.020
5	0.025	0.029	0.025
6	0.030	0.035	0.040
8	0.040	0.047	0.054
10	0.055	0.064	0.073
12	0.065	0.075	0.085
16	0.085	0.100	0.115
20	0.105	0.120	0.135
25	0.120	0.140	0.160

Stainless steels: 1.4401, 1.4571, 1.4404 etc.

Vc = 40 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.50×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
3	0.010	0.015	0.018
4	0.013	0.020	0.025
5	0.019	0.025	0.031
6	0.024	0.030	0.036
8	0.034	0.040	0.053
10	0.044	0.055	0.071
12	0.056	0.065	0.077
16	0.071	0.085	0.089
20	0.087	0.950	0.100
25	0.100	0.120	0.140

Stainless steels: 1.4542 etc.

Vc = 25 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.20×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
3	0.004	0.007	0.010
4	0.006	0.010	0.015
5	0.010	0.014	0.020
6	0.015	0.020	0.025
8	0.025	0.030	0.035
10	0.030	0.035	0.040
12	0.040	0.045	0.050
16	0.050	0.060	0.065
20	0.060	0.070	0.075
25	0.070	0.080	0.085

Stainless steels: Inconel 718 etc.

Vc = 15 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.20×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
3	0.004	0.007	0.010
4	0.006	0.010	0.015
5	0.010	0.014	0.020
6	0.015	0.020	0.025
8	0.025	0.030	0.035
10	0.030	0.035	0.040
12	0.040	0.045	0.050
16	0.050	0.060	0.065
20	0.060	0.070	0.075
25	0.070	0.080	0.850

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Speeds/feed per tooth/depth of cut

HGT for pocket and slot milling (0384)

Unalloyed steels / structural steels

Vc = 100 - 150 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.50×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
6	0.035	0.045	0.040
8	0.045	0.060	0.055
10	0.055	0.070	0.065
12	0.065	0.085	0.080
16	0.075	0.10	0.090
20	0.095	0.12	0.110

Normal tool steels / cast steel

Vc = 80 - 120 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.50×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
6	0.020	0.025	0.025
8	0.030	0.035	0.035
10	0.035	0.045	0.045
12	0.040	0.050	0.050
16	0.060	0.075	0.070
20	0.070	0.080	0.075

Stainless steels: 1.4401, 1.4571. 1.4404 (Cr-Ni-Mo) etc.

Vc = 40 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.50×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
6	0.025	0.025	0.035
8	0.035	0.035	0.050
10	0.045	0.045	0.070
12	0.050	0.050	0.080
16	0.075	0.075	0.090
20	0.080	0.080	0.100

Stainless steels: 1.4301, 1.45471. 1.4307 (Cr-Ni) etc.

Vc = 80 m/min



d1	fz(mm) ap ≤ 0.50×d1 ae ≤ 1.00×d1	fz(mm) ap ≤ 0.90×d1 ae ≤ 0.20×d1	fz(mm) ap ≤ 1.50×d1 ae ≤ 0.10×d1
6	0.025	0.025	0.040
8	0.035	0.035	0.055
10	0.045	0.045	0.075
12	0.050	0.050	0.085
16	0.075	0.075	0.100
20	0.080	0.080	0.125

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Speeds/feed per tooth/depth of cut

HGT for pocket and slot milling (0384)

High-temperature resistant alloys

Vc = 25 m/min

			
	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.020	0.025	0.025
8	0.030	0.035	0.035
10	0.035	0.045	0.045
12	0.040	0.050	0.050
16	0.060	0.075	0.070
20	0.070	0.080	0.075

Exotic materials: Inconel 718 etc

Vc = 15 m/min

			
	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.020	0.025	0.025
8	0.030	0.035	0.035
10	0.035	0.045	0.045
12	0.040	0.050	0.050
16	0.060	0.075	0.070
20	0.070	0.080	0.075

Aluminum

Vc = 300 - 800 m/min

			
	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.040	0.050	0.045
8	0.045	0.055	0.050
10	0.055	0.070	0.065
12	0.080	0.100	0.095
16	0.110	0.135	0.125
20	0.135	0.170	0.160

Copper / brass

Vc = 150 - 300 m/min

			
	ap ≤ 0.50×d1 ae ≤ 1.00×d1	ap ≤ 0.90×d1 ae ≤ 0.50×d1	ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.040	0.050	0.045
8	0.045	0.055	0.050
10	0.055	0.070	0.065
12	0.080	0.100	0.095
16	0.110	0.135	0.125
20	0.135	0.170	0.160

These values are guideline values only. Customer-specific circumstances like output, machine stability, tool overhang, etc. are not taken into consideration. In order to ensure optimal use of our products in your production, please make an appointment with one of our applications engineers.

Speeds/feed per tooth/depth of cut

HGT short version for HPC machining (End mills 0394 – 0294)

High-temperature resistant alloys

Vc = 25 m/min

d1	ap ≤ 0.50×d1 ae ≤ 1.00×d1 fz(mm)	fz(mm)	ap ≤ 0.90×d1 ae ≤ 0.50×d1 fz(mm)
6	0.020		0.025
8	0.030		0.035
10	0.035		0.045
12	0.040		0.050
16	0.060		0.070

Exotic materials: Inconel 718 etc

Vc = 15 m/min

d1	ap ≤ 0.50×d1 ae ≤ 1.00×d1 fz(mm)	fz(mm)	ap ≤ 0.90×d1 ae ≤ 0.50×d1 fz(mm)
6	0.020		0.025
8	0.030		0.035
10	0.035		0.045
12	0.040		0.050
16	0.060		0.070

Stainless steels: 1.4401, 1.4571. 1.4404 (Cr-Ni-Mo) etc.

Vc = 40 m/min

d1	ap ≤ 0.50×d1 ae ≤ 1.00×d1 fz(mm)	fz(mm)	ap ≤ 1.50×d1 ae ≤ 0.10×d1 fz(mm)
6	0.025		0.035
8	0.035		0.050
10	0.045		0.070
12	0.050		0.080
16	0.075		0.090

Stainless steels: 1.4301, 1.45471. 1.4307 (Cr-Ni) etc.

Vc = 80 m/min

d1	ap ≤ 0.50×d1 ae ≤ 1.00×d1 fz(mm)	fz(mm)	ap ≤ 1.50×d1 ae ≤ 0.10×d1 fz(mm)
6	0.025		0.040
8	0.035		0.055
10	0.045		0.075
12	0.050		0.085
16	0.075		0.100

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Speeds/feed per tooth/depth of cut

4 Z for HPC machining (end mills 0394)

Aluminum

Vc = 200 - 450 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.075		0.110
8	0.095		0.135
10	0.115		0.165
12	0.140		0.200
16	0.150		0.245

Copper

Vc = 200 - 450 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.060		0.090
8	0.080		0.110
10	0.100		0.130
12	0.120		0.160
16	0.160		0.195

Plastic

Vc = 200 - 350 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.060		0.090
8	0.075		0.115
10	0.090		0.130
12	0.110		0.160
16	0.120		0.170

High-temperature resistant alloys: 1.4542 etc.

Vc = 15 - 25 m/min

	ap ≤ 0.50×d1 ae ≤ 1.00×d1		ap ≤ 1.50×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
6	0.015		0.020
8	0.025		0.030
10	0.030		0.035
12	0.040		0.045
16	0.050		0.060

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Speeds/feed per tooth/depth of cut

3 Z for HPC machining (end mills 0253 45)

Aluminum

Vc = 200 - 450 m/min

	 ap ≤ 1.00×d1 ae ≤ 1.00×d1	 ap ≤ 0.90×d1 ae ≤ 0.50×d1	 ap ≤ 0.90×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
3	0.035	0.050	0.015
4	0.045	0.065	0.020
5	0.060	0.085	0.025
6	0.075	0.110	0.040
8	0.095	0.135	0.054
10	0.115	0.165	0.073
12	0.140	0.200	0.085
16	0.150	0.245	0.115

Copper

Vc = 200 - 450 m/min

	 ap ≤ 1.00×d1 ae ≤ 1.00×d1	 ap ≤ 0.90×d1 ae ≤ 0.50×d1	 ap ≤ 0.90×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
3	0.030	0.040	0.015
4	0.035	0.050	0.020
5	0.050	0.070	0.025
6	0.060	0.090	0.040
8	0.080	0.110	0.050
10	0.100	0.130	0.073
12	0.120	0.160	0.085
16	0.160	0.195	0.115

Plastic

Vc = 200 - 350 m/min

	 ap ≤ 0.50×d1 ae ≤ 1.00×d1	 ap ≤ 0.50×d1 ae ≤ 0.50×d1	 ap ≤ 0.90×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
3	0.030	0.040	0.010
4	0.035	0.050	0.015
5	0.050	0.070	0.020
6	0.060	0.090	0.025
8	0.075	0.115	0.035
10	0.090	0.130	0.040
12	0.110	0.160	0.050
16	0.120	0.170	0.065

Stainless steels: 1.4301, 1.45471. 1.4307 (Cr-Ni) etc.

Vc = 15 - 25 m/min

	 ap ≤ 0.50×d1 ae ≤ 1.00×d1	 ap ≤ 0.50×d1 ae ≤ 0.50×d1	 ap ≤ 0.90×d1 ae ≤ 0.10×d1
d1	fz(mm)	fz(mm)	fz(mm)
3	0.005	0.007	0.010
4	0.007	0.010	0.015
5	0.010	0.014	0.020
6	0.015	0.020	0.025
8	0.025	0.030	0.035
10	0.030	0.035	0.040
12	0.040	0.045	0.050
16	0.050	0.060	0.065

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Cutting speeds

for solid carbide end mills as guidelines

Machining	Solid carbide PVTi PVAT PVALSA	Solid carbide PVCC	Solid carbide PVAS PVCN	Solid carbide PVDiAN PVDiAG
Steels				
Unalloyed steel/structural steel	150 - 250	-	-	-
	250 - 350	200 - 350	180 - 300	-
Normal tool steels/cast steel	150 - 220	150 - 220	-	-
	220 - 300	220 - 300	150 - 250	-
Tool steels and cast steel, difficult to machine	120 - 170	-	-	-
	170 - 250	150 - 250	100 - 200	-
High-temperature resistant alloys				
High-temperature resistant and heat resistant alloys	30 - 50	-	-	-
	50 - 80	60 - 80	50 - 60	-
Titanium alloys	30 - 50	-	-	-
	50 - 80	60 - 80	50 - 60	-
Stainless steels				
(all types)	70 - 110	-	-	-
	110 - 150	-	100 - 120	-
Cast iron				
Gray cast iron	250 - 300	250 - 300	-	-
	300 - 400	300 - 400	200 - 350	-
Spheroidal graphite cast iron	150 - 200	-	-	-
	200 - 250	180 - 250	150 - 230	-
Hardened cast metal	100 - 160	-	-	-
	160 - 200	150 - 200	120 - 180	-
NF metal and non-metals				
Aluminum	-	400 - 600	400 - 600	400 - 600
	400 - 600	800 - 1000	800 - 1000	800 - 1000
Copper	-	-	400 - 500	-
	300 - 500	450 - 600	500 - 600	800 - 870
Graphite	-	-	200 - 350	870 - 1000
	300 - 500	350 - 500	350 - 500	200 - 350
Plastics	-	-	200 - 350	350 - 500
	350 - 500	350 - 500	350 - 500	-
NF metal and non-metals				
up to 48 HRC	-	-	-	-
	150 - 190	-	-	-
up to 55 HRC	-	-	-	-
	120 - 250	-	-	-
up to 65 HRC	-	-	-	-
	65 - 100	-	-	-

Feed per tooth/depth of cut for copy end mills 3D

Feed per tooth (fz), depth of cut (ap)

		Diameter <1	Diameter 1 - 2	Diameter 3 - 4	Diameter 5 - 6	Diameter 7 - 8
Steels						
Unalloyed steel/structural steel	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.01-0.1	0.06-0.2	0.12-0.4	0.15-0.6	0.25-0.8
Normal tool steels/cast steel	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.01-0.1	0.05-0.15	0.06-0.3	0.15-0.6	0.25-0.8
Tool steels and cast steel, difficult to machine	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.005-0.08	0.05-0.15	0.08-0.3	0.1-0.4	0.15-0.6
High-temperature resistant alloys						
High-temperature resistant and heat resistant alloys	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.005-0.08	0.05-0.15	0.08-0.3	0.1-0.4	0.15-0.6
Titanium alloys	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.005-0.08	0.05-0.15	0.08-0.3	0.1-0.4	0.15-0.6
Stainless steel						
(all types)	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.005-0.08	0.05-0.15	0.08-0.3	0.1-0.4	0.15-0.6
Cast iron						
Gray cast iron	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.005-0.08	0.06-0.2	0.12-0.4	0.15-0.6	0.25-0.8
Spheroidal graphite cast iron	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.01-0.1	0.06-0.2	0.06-0.2	0.12-0.4	0.15-0.6
Hardened cast metal	fz (mm)	0.005-0.02	0.01-0.04	0.04-0.07	0.08-0.12	0.08-0.15
	ap (mm)	0.01-0.1	0.06-0.2	0.12-0.4	0.15-0.5	0.25-0.8
NF metal and non-metals						
Aluminum	fz (mm)	0.01-0.03	0.02-0.08	0.04-0.1	0.06-0.15	0.08-0.2
	ap (mm)	0.03-0.3	0.1-0.7	0.2-1.4	0.3-2.0	0.4-2.8
Copper	fz (mm)	0.01-0.03	0.02-0.08	0.04-0.1	0.06-0.15	0.08-0.2
	ap (mm)	0.01-0.15	0.1-0.35	0.2-0.7	0.3-1.0	0.4-1.3
Graphite	fz (mm)	0.01-0.03	0.02-0.08	0.04-0.1	0.06-0.15	0.08-0.2
	ap (mm)	0.01-0.3	0.1-0.5	0.15-1.0	0.2-1.5	0.3-2.0
Plastics	fz (mm)	0.01-0.03	0.02-0.08	0.04-0.1	0.06-0.15	0.08-0.2
	ap (mm)	0.03-0.15	0.1-0.3	0.15-0.4	0.2-0.5	0.3-0.7
Hardened materials						
up to 48 HRC	fz (mm)	0.005-0.015	0.01-0.03	0.04-0.07	0.08-0.12	0.08-0.12
	ap (mm)	0.005-0.05	0.04-0.1	0.08-0.2	0.1-0.3	0.15-0.4
up to 55 HRC	fz (mm)	0.005-0.015	0.01-0.03	0.04-0.07	0.08-0.12	0.08-0.12
	ap (mm)	0.005-0.05	0.04-0.1	0.08-0.2	0.1-0.3	0.15-0.4
up to 65 HRC	fz (mm)	0.005-0.015	0.01-0.03	0.04-0.07	0.08-0.12	0.08-0.12
	ap (mm)	0.005-0.05	0.04-0.1	0.08-0.2	0.1-0.3	0.15-0.4

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Solid carbide spherical, bull end and toric end mills

		Diameter 9 - 10	Diameter 11 - 12	Diameter 13 - 14	Diameter 15 - 16	Diameter 17 - 18	Diameter 19 - 20
Steels							
Unalloyed steel/structural steel	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.3-1.0	0.3-1.2	0.3-1.4	0.3-1.6	0.3-1.8	0.3-2.0
Normal tool steels/cast steel	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.3-1.0	0.3-1.2	0.3-1.4	0.3-1.6	0.3-1.8	0.3-2.0
Tool steels and cast steel, difficult to machine	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.2-0.7	0.2-0.8	0.2-1.0	0.2-1.2	0.2-1.3	0.2-1.4
High-temperature resistant alloys							
High-temperature resistant and heat resistant alloys	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.2-0.7	0.2-0.8	0.2-1.0	0.2-1.2	0.2-1.3	0.2-1.4
Titanium alloys	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.2-0.7	0.2-0.8	0.2-1.0	0.2-1.2	0.2-1.3	0.2-1.4
Stainless steels							
(all types)	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.2-0.7	0.2-0.8	0.2-1.0	0.2-1.2	0.2-1.3	0.2-1.4
Cast iron							
Gray cast iron	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.3-1.0	0.3-1.2	0.3-1.4	0.3-1.6	0.3-1.8	0.3-2.0
Spheroidal graphite cast iron	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.3-1.0	0.3-1.2	0.3-1.4	0.3-1.6	0.3-1.8	0.3-2.0
Hardened cast metal	fz (mm)	0.08-0.15	0.08-0.15	0.08-0.15	0.1-0.25	0.1-0.25	0.1-0.25
	ap (mm)	0.3-1.0	0.3-1.2	0.3-1.4	0.3-1.6	0.3-1.8	0.3-2.0
NF metal and non-metals							
Aluminum	fz (mm)	0.08-0.25	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.25
	ap (mm)	0.5-3.5	0.5-4.2	0.5-5.0	0.5-5.6	0.5-6.5	0.5-7.0
Copper	fz (mm)	0.08-0.25	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.25
	ap (mm)	0.5-1.7	0.5-2.0	0.5-2.4	0.5-2.7	0.5-3.0	0.5-3.5
Graphite	fz (mm)	0.08-0.25	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.25
	ap (mm)	0.4-2.5	0.4-3.0	0.4-3.5	0.4-4.0	0.4-4.5	0.4-5.0
Plastics	fz (mm)	0.08-0.25	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.25
	ap (mm)	0.4-1.0	0.4-1.2	0.4-1.3	0.4-1.5	0.4-1.7	0.4-2.0
Hardened materials							
up to 48 HRC	fz (mm)	0.08-0.12	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15
	ap (mm)	0.2-0.5	0.2-0.6	0.2-0.7	0.2-0.8	0.2-0.8	0.2-0.8
up to 55 HRC	fz (mm)	0.08-0.12	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15
	ap (mm)	0.2-0.5	0.2-0.6	0.2-0.7	0.2-0.8	0.2-0.8	0.2-0.8
up to 65 HRC	fz (mm)	0.08-0.12	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15	0.08-0.15
	ap (mm)	0.2-0.45	0.2-0.5	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6

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Feed per tooth/depths of cut for solid carbide cutters with multiple flutes

Feed per tooth (fz), Depth of cut (ap) up to 100% of the cutting edge length | 0258 / 0259 / 0359

Side engagement (ae) in unhardened materials: up to 10% of the diameter
Side engagement (ae) in unhardened materials: up to 2% of the diameter

		Diameter 2	Diameter 3 - 4	Diameter 5 - 6	Diameter 7 - 8	Diameter 9 - 10
Steels						
Unalloyed steel/structural steel	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Normal tool steels/cast steel	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Tool steels and cast steel, difficult to machine	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
High-temperature resistant alloys						
High-temperature resistant and heat resistant alloys	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Titanium alloys	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Stainless steels						
(all types)	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Cast iron						
Gray cast iron	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Spheroidal graphite cast iron	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Hardened cast metal	fz (mm)	0.01-0.03	0.03-0.05	0.03-0.05	0.04-0.06	0.04-0.06
Hardened materials						
up to 48 HRC	fz (mm)	0.01-0.02	0.01-0.03	0.02-0.04	0.02-0.04	0.03-0.05
up to 55 HRC	fz (mm)	0.01-0.02	0.01-0.03	0.02-0.04	0.02-0.04	0.03-0.05
up to 65 HRC	fz (mm)	0.01-0.02	0.01-0.03	0.02-0.04	0.02-0.04	0.03-0.05

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Feed per tooth/depth of cut

		Diameter 11 - 12	Diameter 13 - 14	Diameter 15 - 16	Diameter 17 - 18
Steels					
Unalloyed steel/structural steel	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Normal tool steels/cast steel	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Tool steels and cast steel, difficult to machine	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
High-temperature resistant alloys					
High-temperature resistant and heat resistant alloys	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Titanium alloys	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Stainless steels					
(all types)	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Cast iron					
Gray cast iron	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Spheroidal graphite cast iron	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Hardened cast metal	fz (mm)	0.05-0.07	0.05-0.07	0.05-0.07	0.06-0.08
Hardened materials					
up to 48 HRC	fz (mm)	0.03-0.05	0.04-0.06	0.04-0.06	0.04-0.06
up to 55 HRC	fz (mm)	0.03-0.05	0.04-0.06	0.04-0.06	0.04-0.06
up to 65 HRC	fz (mm)	0.03-0.05	0.04-0.06	0.04-0.06	0.04-0.06

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Material overview with comparison table

		M No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
Steel	Unalloyed steel/structural steel	1.0037	St37-2	S235JR	E34-2	37/23 HR	SN 400 B	Fe 360 B FU	1311	AE 235 B	1015
		1.0044	St44-2	S275JR	E28-2	43/25 HR	SN 400 B	Fe 430 B FN	1412	AE 275 B	1020
		1.0050	St50-2G	E295	A50-2	4360	SS 490	Fe 490	1550/2172	A 490	-
		1.0070	St70-2G	E360	A70-2	4360	-	Fe 690	1655	A 690	-
		1.0570	St52-3	S355J2G3	E36-3	50/35 HR	SM490 A;B;C;YA;YB	Fe 510/Fe52B FN/Fe52 CFN	2132/2134	AE 355 D	1024
		1.1141	Ck15	C15E	XC 18	080 M 15	S15C	C16	1370	C15K	1015 / 1017
		1.1191	Ck45	C45E	XC 45	080 M 46	S45C	C45	1672	C45E	1042 / 1045
		1.1730	C45W	C45U	Y3 42 / Y3 48	EN 43 B	-	-	1672	F.114	1045
		1.7131	16MnCr5	16MnCr5	16 MC 5	527 M 17	-	16MnCr5	2173/2511	F.1516	5115 / 5117
	Normal tool steels/cast steel	1.2067	100Cr6	102Cr6	Y100C6	BL 3	SUJ 2	-	-	100Cr6	L3
		1.2162	21MnCr5	21MnCr5	-	-	-	-	-	-	-
		1.2307	29CrMoV9	29CrMoV9	-	-	-	-	-	-	-
		1.2311	40CrMnMo7	35CrMo 8	-	-	-	35CrMo8KU	-	F.5263	P20
		1.2312	40CrMn MoS8-6	-	-	-		-	-	X210CrW12	P20+1
		1.2323	48CrMoV6-7	-	-	-	-	-	-	-	-
		1.2341	6CrMo15-5	5CrMo16	-	-	-	-	-	-	P4
		1.2343	X37CrMoV5-1	X37CrMoV5-1	Z38CDV5	BH 11	SKD 6	X37Cr MoV51KU	X37CrMo V5-1	X37Cr MoV5-1	H11
		1.2344	X40CrMoV5-1	X40CrMoV5-1	Z40CDV5	BH 13	SKD 61	X40CrMo V511KU	2242	X40Cr MoV5-1	H13
		1.2842	90MnCrV8	90MnCrV8	90MV 8	BO 2	-	90 MnCrV 8 KU	-	F.5229	O2
	Tool steels, difficult to machine/cast steel, difficult to machine	1.2080	X210Cr12	X210Cr12	Z200C12	BD 3	SKD 1	-	X210Cr12	X210Cr12	D3
		1.2363	X100CrMoV5	X100CrMoV5	Z100CDV5	BA 2	SKD 12	X205 Cr12KU	2260	X100CrMoV5	A2
		1.2369	81MoCr V42-16	-	-	-	-	X100CrMoV5 1KU	-	-	613
		1.2379	X153CrMoV12	X153CrMoV12	Z 160 CDV 12	BD 2	SKD10/ SKD11	X155CrV Mo121KU	2310	X153CrMoV12	D2
		1.2567	30WCrV17-2	X30WCrV53	-	-	SKD 4	-	-	-	-
		1.2708	54NiCrMoS 6	-	-	-	-	-	-	-	-
		1.2713	55NiCrMoV6	55 NiCrMoV 7	-	-	(SKT4)	-	-	F.520.S	L6

		M No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
Steel	difficulttomachine	1.2738	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	-	-	-	-	-	-	-
		1.2767	45NiCrMo16	45NiCrMo16	-	-	SKT 6	40NiCrMo V16KU	-	-	-
		1.6358	XNiCo Mo18-9-5	-	-	-	-	-	-	-	-
High-temperature resistant alloys	Heat-resistant alloys	1.3401	X120Mn12	-	Z120M12	BW 10	SCMnH 1	G-X120Mn12	2183	F.8251	-
		1.4865	GX40NiCr Si38-19	GX40NiCr Si38-19	GX40NiCr Si38-19	3330 C 11 / 331 C 40	SCH 15	GX40NiCr Si38-19	GX40NiCr Si38-19	GX40NiCr Si38-19	-
		2.4375	NiCu30Al (Monel K-500)	-	(NU30AT)	NA 18	-	-	-	-	Monel K-500
		2.4610	NiMo16Cr16Ti (Almenit 4610)	-	-	NA 45	-	-	-	-	Hastelloy C-4
		2.4619	NiCr22Mo7Cu (Coralloy 4619)	-	-	-	-	-	-	-	Hastelloy G-3
		2.4631	NiCr20TiAl (Nimonic 80A)	Ni-P95-HAT (AECMA)	NC 20 TA	(2HR201; HR401,601)	NCF 80 A	-	-		Nimonic 80 A; HEV 5
		2.4636	NiCo15Cr15Mo AlTi (Dux 4636)	-	-	HR 4	-	-	-	-	Nimonic 115
		2.4648	EL-NiCr19Nb (FoxNibas 70/20)	-	-	-	-	-	-	-	-
		2.4668	NiCr19NbMo (Inconel 718)	NiCr19Fe19 Nb5Mo3	NC19FeNb	NiCr19Fe19 Nb5Mo3	NCF 718	NiCr19Fe19 Nb5Mo3	NiCr19Fe19 Nb5Mo3	NiCr19Fe19 Nb5Mo3	Inconel 718 XEV-I
		2.4856	NiCr22Mo9Nb (Inconel 625)	NiCr22M-O9Nb	NC22FeDNb	NA 43/Na 21	NCF 625	NiCr22M-O9Nb	NiCr22M-O9Nb	NiCr22M-O9Nb	Inconel 625
	Titanium alloys	-	Ti99.5 HB 30-200	-	-	-	-	-	-	-	-
		-	Ti99.6 HB 30-170	-	-	-	-	-	-	-	-
		-	Ti99.7 HB 30-150	-	-	-	-	-	-	-	-
		-	Ti99.8 HB 30-120	-	-	-	-	-	-	-	-
		-	TiAl6V4ELI	-	-	TA11	-	-	-	-	AMS R56401
		-	TiAl5Sn2.5	-	T-A5E	TA14/17	-	-	-	-	AMS 54520
		3.7025	Ti 1	-	-	2 TA 1	-	-	-	-	AMS R50250
		3.7124	TiCu2	-	-	2 TA21-24	-	-	-	-	-
		3.7145	TiAl6Sn2 Zr4Mo-2Si	-	-	-	-	-	-	-	AMS R54620
		3.7165	TiAl6V4	-	T-A6V	TA10-13 / TA28	-	-	-	-	AMS R56400
		3.7175	TiAl6V6Sn2	-	-	-	-	-	-	-	-
		3.7184	TiAl4Mo4Sn2	-	-	-	-	-	-	-	-
		3.7185	TiAl4Mo4Sn2	-	-	TA 45-51; TA57	-	-	-	-	-
		3.7225	Ti 1 Pd	-	-	TP1	-	-	-	-	AMS 52250

Material overview with comparison table

		M No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
Stainless steel	all types	1.2316	X36CrMo17	X38CrMo16	Z38CD16-01	X38CrMo16	-	X38CrMo16	-	F.5267	-
		1.2367	X38CrMoV5-3	X38CrMoV5-3	Z38CDV5-3	X38CrMoV5-3	-	X38CrMoV5-3	X38CrMoV5-3	X38CrMoV5-3	-
		1.3543	X102CrMo17	X108CrMo17	Z100CD17	X108CrMo17	SUS 440C	X105CrMo17	X108CrMo17	F.3425	440 C
		1. 4059	GX22CrNi17	-	Z20CN 17.2M	ANC 2	-	-	-	-	-
		1.4122	GX-35CrMo17	X39CrMo17-1	Z38CD 16.1CI	X39CrMo17-1	-	X39CrMo17-1	X39CrMo17-1	X39CrMo17-1	-
		1.4301	X5CrNi18-10	X5CrNi18-10	Z6CN18.09	304 S 15	SUS 304	X5CrNi1810	2332	F.3504	304
		1.4305	X12CrNiS18-8	X8CrNiS18-9	Z8CNF18-09	303 S 31	SUS 303	X10CrNiS18-9	2346	F.310.C	303
		1.4340	GX-40CrNi27-4	-	-	-	-	G X 35 CrNi 28 05	-	-	-
		1.4401	X5CrNiMo 17-12-2	X5CrNiMo 17-12-2	Z7CND 17-11-02	316 S 33	SUS 316	X5CrNiMo 17 12	2347	F.3534	316
		1.4462	X2CrNiMoN 22-5-3	X2CrNiMoN 22-5-3	Z2CND 22-06-03	318 S 13	SUS 329J3L	X2CrNiMoN 22-5-3	2377	X2CrNiMoN 22-5-3	S31803/ S32205
		1.4541	X10CrNi-Ti18-9	X6CrNi-Ti18-10	Z6CNT 18-10	321 S 31	SUS 321	X6CrNi-Ti18-10	2337	F.3523	321
		1.4551	X10CrNi 18-9	X5CrNiNb 20 10 KE	Z6CNNb 20-10	-	SUS Y 374	-	-	-	-
		1.4571	X10CrNiMo Ti18-10	X6CrNiMo Ti17-12-2	Z6 CNDT 17-12	320 S 31	SUS 316Ti	X6CrNiMo Ti17-12	2350	F.3535	316Ti
		1.4712	X10CrSi6	-	-	-	-	-	-	-	-
		1.4742	X10CrAl18	X10CrSi18	Z10CAS18	430 S 15	SUS 430	X8Cr17	-	F.3113	430
Cast iron	Gray cast iron	0.6010	GG10	EN-GJL-100	Ft10D	GRADE100	FC 10	G10	0110-00	FG 10	N0 20 B
		0.6020	GG20	EN-GJL-200	Ft20D	GRADE200	FC 20	G20	0120-00	FG 20	No 30 B
		0.6030	GG30	EN-GJL-300	Ft30D	GRADE300	FC 30	G30	0130-00	FG 30	No 45 B
		0.6040	GG40	EN-GJL-350	Ft35D	GRADE350	FC 35	G35	0135-00	FG 35	-
	Spheroidal graphite cast iron	0.7040	GGG-40	EN-GJS-400-15	FGS 400-12	SNG 420/12	FCD 400	GS 400/12	07 17-02	FGE 38-17	60-40-18
		0.7050	GGG-50	EN-GJS-500-7	FGS 500-7	SNG 500/7	FCD 500	GS 500/7	07 27-02	FGD 50-7	65-45-12
		0.7060	GGG-60	EN-GJS-600-3	FGS 600-7	SNG 600/3	FCD 600	GS 600/3	07 32-03	FGE 60-2	80-55-06
		0.7070	GGG-70	EN-GJS-700-2U	FGS 700-2	SNG 700/2	FCD 700	GS 700/2	07 37-01	FGS 70-2	100-70-03
		0.7080	GGG-80	E8N-GJS-800-2	FGS 800-2	SNG 800/2	FCD 800	GS 800/2	-	-	120-90-02
	Hardened cast metal	GTS 35-10	EN-GJMB-350-10	MN 35-10	B 340/12	-	-	08 15	-	32510	-
		GTS 45-06	EN-GJMB-450-6	-	P 440/7	-	-	08 52	-	40010	-
		GTS 55-04	EN-GJMB-550-4	MP 50-5	P 510/4	-	-	08 54	-	50005	-
		GTS 65-02	EN-GJMB-650-2	MP 60-3	P 570/3	-	-	08 85	-	70003	-

		M No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
NF metal and non-metals	Aluminum	3.0255	Al99.5	EN-AW-1050A	A59050C	L31/L34/L36	-	-	-	-	1000
		3.1325	AlCuMg1	EN-AW-2017A	-	-	-	-	-	-	-
		3.2163	G-AlSi9Cu3	EN-AC-46200	-	-	-	-	-	-	-
		3.2315	AlMgSi1	EN-AW-6082	-	-	-	-	-	-	-
		3.2383	G-AlSi10Mg	-	-	LM 9	-	-	4253	-	A 360.2
		3.2581	G-AlSi12	EN-AW-2017A	-	LM 6	-	-	4261	-	A 413.2
		3.3535	AlMg3	EN-AW-5754	-	-	-	-	-	-	-
		3.4345	AlZnMgCu0.5	EN-AW-7022	AZ4GU/9051	L 86	-	-	-	-	7050
		3.5105	GMgZn4 SE1Zr1	-	G-Z4TR	MAG 5	-	-	-	-	ZE 41
		3.5812	G-MgAl8Zn1	-	G-A9	MAG 1	-	-	-	-	AZ 81
	Copper	-	CuMn5F36	-	-	-	-	-	-	-	-
		-	CuSi2MnF34	-	-	-	-	-	-	-	-
		-	E-Cu57	-	-	-	-	-	-	-	-
		-	CuZn15	-	CuZn 15	CZ 102	-	-	-	-	C 23000
		-	CuZn30	-	CuZn 30	CZ 106	-	-	-	-	C 26000
		-	CuZn37	-	CuZn 37	CZ 108	-	C2720	-	-	C 27700
		-	CuZn36Pb3	-	-	-	-	-	-	-	-
		-	G-CuZn34Al2	-	U-Z36N 3	HTB 1	-	-	-	-	C 86200
		-	G-CuSn5ZnPb	-	U-E5Pb5Z5	LG 2	-	-	-	-	C 83600
		-	G-CuPb10Sn	-	U-E10Pb10	LB 2	-	-	-	-	C 93700
		-	CuCrZr	-	U-Cr 0.8 Zr	CC 102	-	-	-	-	C 18200
	Graphite	-	ISO-63	-	-	-	-	-	-	-	-
		-	ISO-90	-	-	-	-	-	-	-	-
		-	ISO-93	-	-	-	-	-	-	-	-
		-	ISO-95	-	-	-	-	-	-	-	-
	Plastics	-	Ureol® 5211 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5212 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5213 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5214 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5215 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5216 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5217 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5218 A/B	-	-	-	-	-	-	-	-
		-	Ureol® 5219 A/B	-	-	-	-	-	-	-	-

Material overview with comparison table

		M No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
Hardened materials	up to 48 HRC	1.2311	40CrMnMo7	35CrMo 8	-	-	-	35CrMo 8 KU	-	-	-
		1.2312	40CrMn-MoS8-6	-	-	-	-	-	-	-	-
		1.2323	48CrMoV6-7	-	-	-	-	-	-	-	-
		1.2343	X38CrMoV5-1	X37CrMoV5-1	Z38CDV 5	BH 11	SKD 6	X37CrMo V51 KUa	X37CrMoV5-1	F.520.G	H 11
		1.2344	X40CrMoV51	X40CrMoV5-1	Z40CDV 5	BH 13	SKD 61	X40CrMo V 5 1 1 KU	2242	X40CrMo V 5-1	H 13
		1.2708	54NiCrMoS6	-	-	-	-	-	-	-	-
		1.2842	90MnCrV8	90MnCrV8	90Mv8	BO 2	-	90MnVCr 8 KU	90MnCrV8	F.5229	O 2
	up to 55 HRC	1.2080	X210Cr12	X210Cr12	Z200C12	BD 3	SKD 1	X210Cr12	X210Cr12	F.521	D 3
		1.2323	48CrMoV6-7	-	-	-	-	-	-	-	-
		1.2344	X40CrMoV5-1	X40CrMoV5-1	Z40CDV5	BH 13	SKD 61	X40CrMoV5-1	2242	X40CrMoV5-1	H 13
		1.2363	X100CrMoV51	X100CrMoV5	Z100CDV5	BA 2	SKD 12	X100CrMoV5	2260	X100CrMoV5	A 2
		1.2369	81MoCrV 42-16	-	-	-	-	-	-	-	613
		1.2379	X155CrV-Mo12-1	X153CrMoV12	Z160CDV12	BD 2	SKD 11	X153CrMoV12	2310	X153CrMoV12	D 2
		1.2567	30WCrV17-2	X30WCrV53	-	-	SKD 4	-	-	-	-
		1.2708	54NiCrMoS6	-	-	-	-	-	-	-	-
		1.2713	55NiCrMoV6	55NiCrMoV7	55NCDV7	-	SKT 4	-	-	F.520.S	L 6
		1.2738	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4	40CrMnNi Mo8-6-4
		1.2767	X45NiCrMo4	45NiCrMo16	45NiCrMo16	45NiCrMo16	SKT 6	45NiCrMo16	45NiCrMo16	45NiCrMo16	-
		1.2842	90MnCrV8	90MnCrV8	90MnCrV8	BO 2	-	90MnCrV8	90MnCrV8	90MnCrV8	O 2
	up to 65 HRC	1.2080	X210Cr12	X210Cr12	Z200C12	BD 3	SKD 1	X210Cr12	X210Cr12	X210Cr12	D 3
		1.2363	X100CrMoV5	X100CrMoV5	Z100CDV5	BA 2	SKD 12	X100CrMoV5	2260	X100CrMoV5	A 2
		1.2369	81MoCrV 42-16	-	-	-	-	-	-	-	613
		1.2379	X153CrMoV12	X153CrMoV12	Z160CDV12	BD 2	SKD 10	X153CrMoC12	2310	X153CrMoC12	D 2
		1.2767	45NiCrMo16	45NiCrMo16	45NiCrMo16	45NiCrMo16	SKT 6	45NiCrMo16	45NiCrMo16	45NiCrMo16	-
		1.2842	90MnCrV8	90MnCrV8	90MnCrV8	BO 2	-	90MnCrV8	90MnCrV8	90MnCrV8	O2

Hardness comparison table

Tensile strength, Vickers, Brinell and Rockwell hardness

Tensile strength Rm N/mm2	Vickers hardness HV10	Brinell hardness HB	Rockwell hardness HRC
255	80	76.0	
270	85	80.7	
285	90	85.5	
305	95	90.2	
320	100	95.0	
335	105	99.8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20.3
785	245	233	21.3
800	250	238	22.2
820	255	242	23.1
835	260	247	24.0
850	265	252	24.8
865	270	257	25.6
880	275	261	26.4
900	280	266	27.1
915	285	271	27.8
930	290	276	28.5
950	295	280	29.2
965	300	285	29.8
995	310	295	310
1030	320	304	32.2
1060	330	314	33.3
1095	340	323	34.4

Tensile strength Rm N/mm2	Vickers hardness HV10	Brinell hardness HB	Rockwell hardness HRC
1125	350	333	35.5
1155	360	342	36.6
1190	370	352	37.7
1220	380	361	38.8
1255	390	371	39.8
1290	400	380	40.8
1320	410	390	41.8
1350	420	399	42.7
1385	430	409	43.6
1420	440	418	44.5
1455	450	428	45.3
1485	460	437	46.1
1520	470	447	46.9
1555	480	456*	47.7
1595	490	466*	48.4
1630	500	475*	49.1
1665	510	485*	49.8
1700	520	494*	50.5
1740	530	504*	51.1
1775	540	513*	51.7
1810	550	523*	52.3
1845	560	532*	53.0
1880	570	542*	53.6
1920	580	551*	54.1
1955	590	561*	54.7
1995	600	570*	55.2
2030	610	580*	55.7
2070	620	589*	56.3
2105	630	599*	56.8
2145	640	608*	57.3
2180	650	618*	57.8
	660		58.3
	670		58.8
	680		59.2
	690		59.7
	700		60.1
	720		61.0
	740		61.8
	760		62.5
	780		63.3
	800		64.0
	820		64.7
	840		65.3
	860		65.9
	880		66.4
	900		67.0
	920		67.5
	940		68.0

Coatings and cutting materials

Coating designation		Color	Vickers micro-hardness HV	Operating temperature in degrees	Coating type	Coating thickness in µm
PVTi	TiAlN	blue/gray	3600	up to 850°	PVD	2 to 4
PVAT	TiAlN modified	metallic/golden	3600	up to 1000°	PVD	2 to 4
PVCC	TiAlN + lubrication properties	black	800	up to 850°	PVD	2 to 4
PVCN	CrNi	metallic/silver	1800	up to 700°	PVD	2 to 3
PVAS	Specialized aluminum	light gray	2800	up to 700°	PVD	2 to 3
PVDiaN	Diamond coating	matte/gray	10000	up to 600°	CVD	6 to 8
PVDiaG	Smooth diamond coating	glossy/gray	10000	up to 700°	CVD	4 to 6
PVALSA	TiAlN	blue/gray	3600	up to 950°	PVD	2 to 4
PVTiH	TiAlN Multilayer	purple/brown	3600	up to 1100°	PVD	4 to 5
PVST	ALTiN	blue/gray	3300	up to 950°	PVD	2 to 4
PVCS	CrN-mod	spectral colors	2700	up to 700°	PVD	1 to 1.5
VTNB	ALTiN/Si-N	blue	4000	up to 950°	PVD	1 to 5

Cutting materials	Coatings	P	M	K	N	S	H	
MGC	PVTi PVAT PVCC	▼	▼	▼	▼	▼	▼	Coated ultrafine grain types, for high-speed machining of steel, hardened materials, stainless steel, high temperature-resistant steel and alloyed aluminum, HSC
KAC UKAC	PVCN PVAS PVDiaN PVDiaG		▼	▼		▼		Coated fine grain types, for high-speed machining of cast metal, cast iron, aluminum, plastics, copper, graphite, titanium and titanium alloys, HSC
UMGC	PVTiH PVAT	▼	▼	▼	▼	▼	▼	Coated ultrafine grain types, for high-speed machining of steel, hardened materials, stainless steel, high temperature-resistant steel and HSC

Formulas and example calculations

Calculation of spindle revolutions in [min-1]:*	Calculation of feed per tooth in [mm/tooth]:	Calculation of feed rate in [mm/min]:	Calculation of required machine power in [kW]:
$n = \frac{V_c \cdot 1000}{\pi \cdot D_{c/eff}}$	$V_c = \frac{\pi \cdot D_{c/eff} \cdot n}{1000}$	$V_f = n \cdot z \cdot f_z$	$P = \frac{a_e \cdot a_p \cdot V_f}{P}$
Calculation of cutting speed in [m/min]:*	**Calculation of feed per revolution in [mm/r]:**	**Calculation of machining time in [min]:**	**Calculation of chip volume in [cm³/min]:**
$V_c = \frac{\pi \cdot D_{c/eff} \cdot n}{1000}$	$f_n = z \cdot f_z$ $f_n = \frac{V_f}{n}$	$T = \frac{l_f}{V_f}$	$Q = \frac{a_e \cdot a_p \cdot V_f}{1000}$
* Please note that on flat contours, the effective tool diameter must be used for the calculation (see the surface grade section).			* Please note: This formula is used to calculate machine performance when machining steel.

Definition of terms

a_e	Width of cut in (mm)	l_f	Total milling length in (mm)	T	Machining time in (min)
a_p	Depth of cut in (mm)	f_h	Feed per revolution in (mm/r)	V_c	Cutting speed in (m/min)
D_c	Cutter diameter in (mm)	n	Spindle revolutions in (rpm)	V_f	Feed rate in (mm/min)
D_{eff}	Effective tool diameter	p	(Required) machine power in (kW)	z	Effective number of teeth
f_z	Feed per tooth in (mm/tooth)	Q	Chip volume in (cm^3/min)		

Formulas for calculating the effective tool diameter are available in the surface grade section (page 150).

Example calculation

Cutters:	NVV 1192 85 0602	Calculation of effective cutting edge diameter:
Cutter diameter:	6 mm	$d_{eff} = 2\sqrt{0{,}2 \cdot (6 - 0{,}2)} = 2{,}15$ mm
Effective number of teeth:	2	
Depth of cut (ap):	0.2 mm	Calculation of speed:
Width of cut:	$a_e = f_z$	$n = \frac{100 \cdot 1.000}{\pi \cdot 2{,}15} = 14.805$ U/min
Material to be machined:	1.2343	
Selected cutting speed (Vc): (acc. to cutting parameter table)	100 m/min	Calculation of feed rate:
Selected feed per tooth (fz): (acc. to cutting parameter table)	0.1 mm	Vf = 14.805 · 2 · 0,1 = 2.961 mm/min

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Telephone: Fax: Email:

Desired delivery date: DD / MM / YYYY

We will coordinate the base substrate and coating optimally to your material to be machined. Please mark specialized requirements using the relevant boxes.

Solid carbide

- ☐ KAC
- ☐ CBN
- ☐ UMGC
- ☐ MGC
- ☐ PND
- ☐ Left-hand cutting

Coating

- ☐ PVTi
- ☐ PVDiaN
- ☐ PVST
- ☐ PVAT
- ☐ PVDiaG
- ☐ PVCS
- ☐ PVCC
- ☐ PVALSA
- ☐ VTNB
- ☐ PVCN
- ☐ PVTiH
- ☐ Other:
- ☐ PVAS

Shank type DIN 6535

- ☐ Form HA (straight)
- ☐ Form HB (with side flat)

Material to be machined:

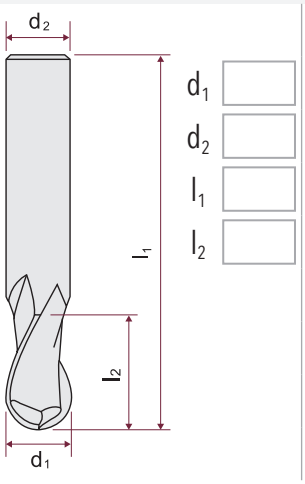
Other information:

- ☐ No. of teeth
- ☐ Straight flute
- ☐ Helical flute

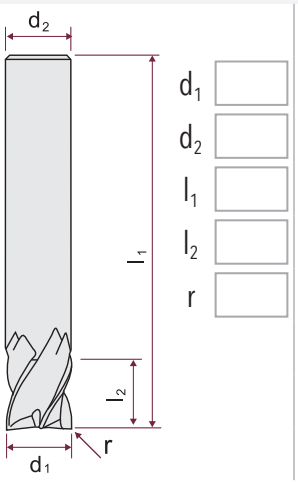
Desired quantity:

Ball nose end mill	Corner radius end mill	Toric end mill	High-feed cutter

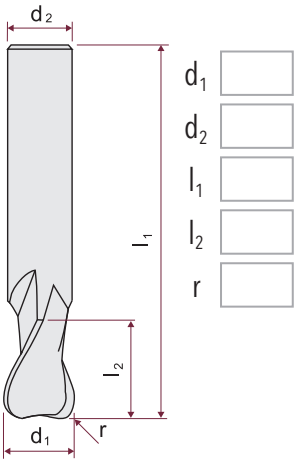
Please enter the desired dimensions:



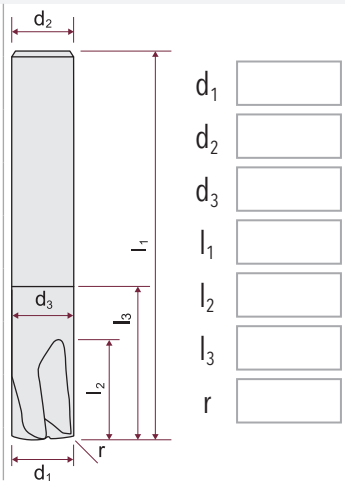
d_1 ☐
d_2 ☐
l_1 ☐
l_2 ☐



d_1 ☐
d_2 ☐
l_1 ☐
l_2 ☐
r ☐



d_1 ☐
d_2 ☐
l_1 ☐
l_2 ☐
r ☐



d_1 ☐
d_2 ☐
d_3 ☐
l_1 ☐
l_2 ☐
l_3 ☐
r ☐

Back office: Sales representative:

Cutting protocol milling

Company:		Workshop no.:		Date: DD / MM / YYYY						
Street:		DIN des.:		Analysis: %						
City:		C	Si	Mn	P	S	Cr	Ni	Mo	V	W
Administrator:										
Machine:	P: kW	N/mm²		HB		HV		HRC		
Type:	n (s): min-1									
Tool arbor:	V_f: mm/min	CNC controller:								

	Test	Current situation	Test 1	Test 2	Test 3
Tool	Machining conditions				
	Manufacturer				
	Cutter type				
	Arbor				
	Overhang				
	Cooling (air/water)				
Cutting material	Cutting material type				
	Manufacturer				
	Cutting material designation				
	Coating				
Cutting data	V_c [m/min]				
	V_f [mm/min]				
	n(s) [min^{-1}]				
	D_c [mm]				
	f_z [mm/tooth]				
	a_p [mm]				
	a_e [mm]				
	T [min]				
Results	Number of runs				
	Tool life [min]				
	Tool life [m]				
	Chip volume [cm³/min]				
	Power consumption [kW]				
	Assessment*	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10

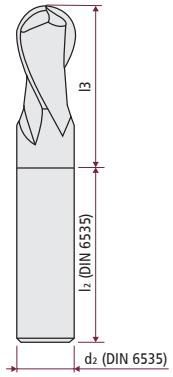
Sketch / comment:

*1 = very poor | 5 = satisfactory | 10 = very good

Quick finder

General tolerances for solid carbide tools			
Tool type	d1	d2	r
FGT	h8	hs	+/- 0.005
CGT	+0 / -0.12	h6	
UGT / HGT	e8	h6	+0.02 / -0.025 / -0.035
Spherical and bull end	f8	h6	f8
Straight end	e8	h6	

Theoretical usable length with solid carbide shanks*:



Shank diameter (DIN 6535) d_2 h_6		2 - 5	6 + 8	10	12 + 14	16 + 18
DIN length of shank (DIN 6535) l_2	+ 2 / - 0	28	36	40	45	48
Shank diameter (DIN 6535) d_2 h_6		20	25	32 + 36		
DIN length of shank (DIN 6535) l2	+ 2 / - 0	50	56	60		

* The usable length is determined from the total length l_1 (see catalog) of the solid carbide cutter/ solid carbide rod minus the DIN shank length (l_2 according to DIN 6535) based on the table above.

Cutter dimensions according to DIN

d_1 = Cutting edge diameter d_2 = Shank diameter d_3 = Working depth diameter (throat) r = Radius

l_1 = Total length l_2 = Cutting edge length l_3 = Working depth z = Number of teeth

Characteristics:


Toric tool


Weldon surface

Note:

CAM files for all solid carbide end mills listed in the catalog are available in the Pokolm product database at:

www.pokolm.de/de/vollhartmetallfraeser

Item number index

Notes

Notes

Notes

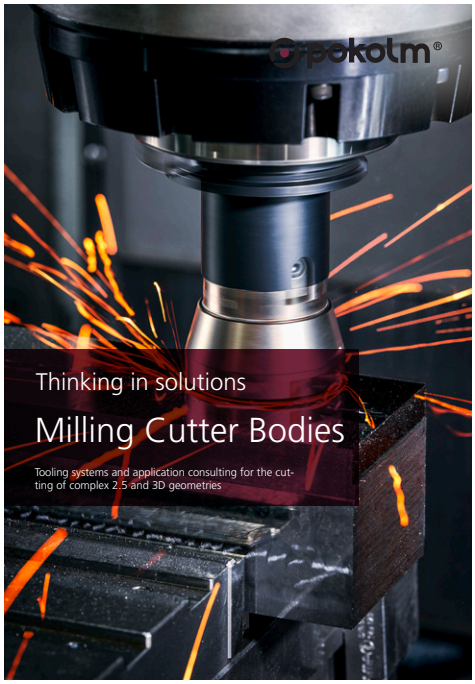
Imprint

We are here for you!

If you have questions or need individual advice, our technical support team will be happy to assist you.

Service Hotline: +49 5247 9361-0

For further information, request our other catalogues:



Milling Cutter Bodies

Arbor and Adapter Systems

FL-345-EN

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