UTILIS
multidec®
swiss type tools

ENGLISH

multidec®-MILL

UTILIS eagle mill™ | UTILIS wolverine mill™ | UTILIS scorpion mill™

**SOLID CARBIDE END MILLS, DEBURRING TOOLS,
FRONT / BACK DEBURRING TOOLS &
CONCAVE QUARTER RADIUS MILLS**

NOVELTY

future since 1915

UTILIS®
Tooling for High Technology

multidec®-MILL

With multidec®-MILL, UTILIS is providing a new product range consisting of universal milling tools. These tools are characterized by having an excellent price/performance ratio, and are as diverse as their areas of application. The multidec®-MILL product range is continuously being developed and expanded.

Legend

Recommended usage
- ● Preferred application
- ○ Possible application
- – Application not recommended

Availability
- ■ Standard articles
- ■ Standard articles, new in this catalogue

Machining recommendation

1 2 3 4 5 6 Roughing
1 2 3 4 5 6 Finishing

1 unsuitable
6 optimal

Symbols for tool applications

	**Contour milling**
	**Full groove milling**
	**Deburring**
	**Machining direction** Example: Machining in the x and y directions
	**Front / back deburring**
	**Corner radius milling**
	**Trochoidal milling (Dynamic milling)**
	**Helical plunge**
	**With cooling lubricant** Preferably
	**With air cooling** Preferably

Symbols for tool attributes

	**Number of teeth (ZEFP)** Example: five teeth
	**Shank type** Straight shank DIN 6535 (HA)
	Weldon DIN 6535 (HB)
	**Chip breaker**
	**Uneven tooth pitch**
	**Edge reinforcement** Corner radius (RE)
	Corner chamfer (CHW)
	Sharp-edged
	**Cutting length** Example: Drilling depth 3×d_1
	**Dynamic helix angle**
	**Helix angle** Example: Helix angle 40°
	**Point angle** Example: Point angle 90°

Material classification

The information on using multidec®-MILL tools refers to certain materials.
The materials to be machined are categorized in the same color throughout the entire catalog:

Steel
Stainless steel
Cast iron
Non-ferrous metals
Hard materials

Dimensions

All dimensions are in millimeter (mm).

Order designation

To the designation of the selected type of product, the desired cutting material code must be added.

Art. No.	Order designation	Application HMP 700
552000	UMMS 40200 x 020 SHA06 …	■
552001	UMMS 40300 x 020 SHA06 …	■
552002	UMMS 40400 x 020 SHA06 …	■

Example:
UMMS 40300 x 020 SHA06 HMP 700

End mills (UTILIS eagle mill)		DC	APMX	ZEFP	CHW	
UMMS 4… x 020 …		2–20	>2×D	4	0.1–0.3	6
UMMS 4… x 0XS …		2–12	>2×D	4	–	Swiss Type Tooling 8

Trochoidal end mills (UTILIS wolverine mill)		DC	APMX	ZEFP	RE	
UMMTR 5… x 030 …		6–20	>3×D	5	0.2–0.3	10
UMMTR 5… x 040 …		6–20	>4×D	5	02.–0.3	12

Deburring tools (UTILIS scorpion mill)		DC	ZEFP	α	
UMME … x 60° …		1–3 4–16	3 4	60°	14
UMME … x 90° …		1–3 4–16	3 4	90°	16

Front/back deburring tools		DC	ZEFP	
UMMVR 4… x 90° …		2–12	4	18
UMMVRL 4… x 90° …		3–12	4	20

Concave quarter radius mills		DC	DCX	ZEFP	PRFRAD	
UMMVK 4… R…		3–10	4–25	4	0.2–10	22

Front/back concave quarter radius mills		DC	APMX	DCX	ZEFP	PRFRAD	
UMMVKL 4… R…		5–8.4	2–8	6–12	4	0.2–2.5	24

Recommended cutting specifications
Both the cutting speed and the feed are important parameters during cutting, since they influence the machining time and the workpiece quality. All of the parameters which we have specified must be considered as guideline values. These depend on the respective workpiece clamping, tool clamping, machine performance, machine stability and not least the tool itself and much more. Each cutting value recommendation is therefore just a rough guideline. You should therefore not hesitate to contact our application engineers in cases of doubt.

UMMS 40200 x 020 SHA06 HMP 700

- Grade: HMP 700: (AlCr-coated)
- Shank diameter: DCONMS = Ø 6.0
- Shank type: HA shank (smooth shank)
- Cutting length: 020 = >2×D
- Machining diameter: DC = Ø 2.0
- Number of teeth: 4
- Product type

UMME 40600 x 60° SHB06 HMP 700

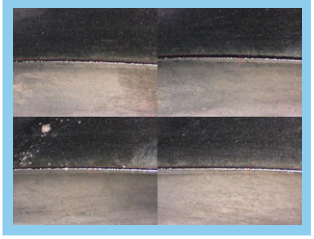
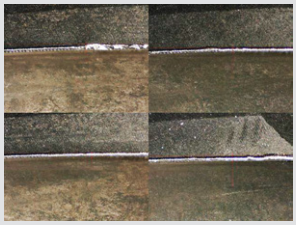
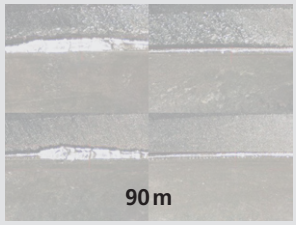
- Grade: HMP 700: (AlCr-coated)
- Shank diameter: DCONMS = Ø 6.0
- Shank type: HB shank (Weldon)
- Point angle: 60°
- Machining diameter: DC = Ø 6.0
- Number of teeth: 4
- Product type

UMMVKL 40740 R030 SHA06 HMP 700

- Grade: HMP 700: (AlCr-coated)
- Shank diameter: DCONMS = Ø 6.0
- Shank type: HA shank (smooth shank)
- Radius: PRFRAD = 0.3
- Machining diameter: DC = Ø 7.4
- Number of teeth: 4
- Product type

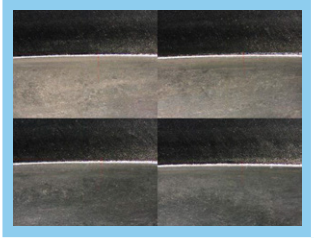
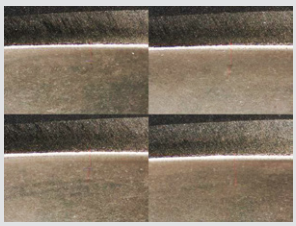
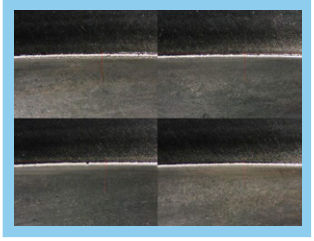
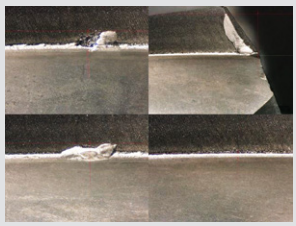
Application Parameters – Cutting distance determination 2×D UMMS 4120…
A milling tool with Ø 12 mm was used for contour milling in order to determine the cutting distance in metres.

Machine model	**Hermle C32U / HSK63**	Cutting speed (v_c)	**160 m/min**
Material No.	**1.7225 / 42CrMo4+QT**	Feed per tooth (f_z)	**0.075 mm/Z**
Operation	**contour milling**	Axial cutting depth (a_p)	**15 mm**
Cooling	**external air blow**	Radial cutting depth (a_e)	**2.4 mm**

After cutting distance of 60 m		After cutting distance of 120 m	
multidec®-MILL	**Competitor**	**multidec®-MILL**	**Competitor**
			

Application Parameters – Cutting distance determination 2×D UMMS 4120…
A milling tool with Ø 12 mm was used for contour milling in order to determine the cutting distance in metres.

Machine model	**Hermle C32U / HSK63**	Cutting speed (v_c)	**85 m/min**
Material No.	**1.4571 / X6CrNiMoTi (V4A)**	Feed per tooth (f_z)	**0.062 mm/Z**
Operation	**contour milling**	Axial cutting depth (a_p)	**12 mm**
Cooling	**external cooling lubricant**	Radial cutting depth (a_e)	**2.4 mm**

After cutting distance of 96 m		After cutting distance of 160 m	
multidec®-MILL	**Competitor**	**multidec®-MILL**	**Competitor**
			

Parameter	Definition
APMX	Maximum machining depth
CHW	Corner chamfer width
DC	Tool diameter
DCONMS	Holding diameter at machine side
DCX	Maximum cutting edge diameter
DN	Clearance diameter

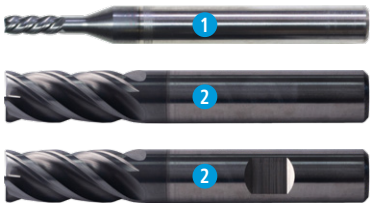
Parameter	Definition
LH	Head length / clearance lenght
OAL	Total length
PRFRAD	Profile radius
RE	Corner radius
ZEFP	Number of cutting edges (teeth) on circumference

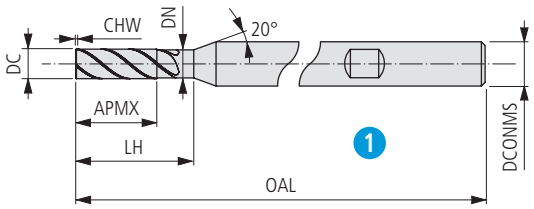
UTILIS eagle mill

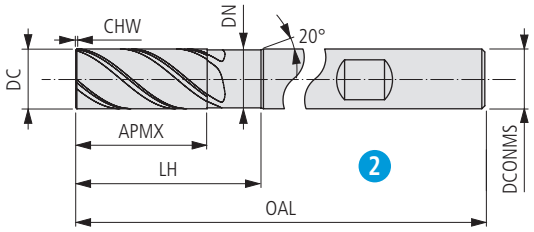
UNI
Uneven tooth pitch
Cut over centre

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing

UTILIS multidec swiss type tools







UMMS 4… x 020 …

Art. No.	Order designation	Application HMP 700	Dimensions DC e8	APMX	DN	CHW	LH	ZEFP	OAL	DCONMS h6	Fig.	Shank
552000	UMMS 40200 x 020 SHA06 …	■	2.0	5.0	1.8	0.1	9.0	4	57.0	6.0	1	HA
552001	UMMS 40300 x 020 SHA06 …	■	3.0	8.0	2.8	0.1	12.0	4	57.0	6.0		
552002	UMMS 40400 x 020 SHA06 …	■	4.0	11.0	3.8	0.1	16.0	4	57.0	6.0		
552003	UMMS 40500 x 020 SHA06 …	■	5.0	13.0	4.8	0.2	19.0	4	57.0	6.0		
552004	UMMS 40600 x 020 SHA06 …	■	6.0	13.0	5.8	0.2	19.0	4	57.0	6.0	2	
552005	UMMS 40800 x 020 SHA08 …	■	8.0	20.0	7.7	0.2	26.0	4	63.0	8.0		
552006	UMMS 41000 x 020 SHA10 …	■	10.0	22.0	9.7	0.2	31.0	4	72.0	10.0		
552007	UMMS 41200 x 020 SHA12 …	■	12.0	26.0	11.6	0.2	38.0	4	83.0	12.0		
552008	UMMS 41600 x 020 SHA16 …	■	16.0	32.0	15.5	0.3	42.0	4	92.0	16.0		
552009	UMMS 42000 x 020 SHA20 …	■	20.0	42.0	19.5	0.3	52.0	4	104.0	20.0		
552010	UMMS 40200 x 020 SHB06 …	■	2.0	5.0	1.8	0.1	9.0	4	57.0	6.0	1	HB
552011	UMMS 40300 x 020 SHB06 …	■	3.0	8.0	2.8	0.1	12.0	4	57.0	6.0		
552012	UMMS 40400 x 020 SHB06 …	■	4.0	11.0	3.8	0.1	16.0	4	57.0	6.0		
552013	UMMS 40500 x 020 SHB06 …	■	5.0	13.0	4.8	0.2	19.0	4	57.0	6.0		
552014	UMMS 40600 x 020 SHB06 …	■	6.0	13.0	5.8	0.2	19.0	4	57.0	6.0	2	
552015	UMMS 40800 x 020 SHB08 …	■	8.0	20.0	7.7	0.2	26.0	4	63.0	8.0		
552016	UMMS 41000 x 020 SHB10 …	■	10.0	22.0	9.7	0.2	31.0	4	72.0	10.0		
552017	UMMS 41200 x 020 SHB12 …	■	12.0	26.0	11.6	0.2	38.0	4	83.0	12.0		
552018	UMMS 41600 x 020 SHB16 …	■	16.0	32.0	15.5	0.3	42.0	4	92.0	16.0		
552019	UMMS 42000 x 020 SHB20 …	■	20.0	42.0	19.5	0.3	52.0	4	104.0	20.0		

Cutting specification 7
ISO designation system 5
Legend 2

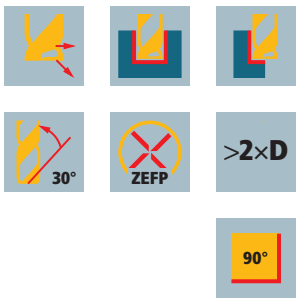
Guideline values				Steel		Stainless steel	Non-ferrous metals	Cast iron
				1  2 				
				⚠ [1] Preferably used for full groove and contour milling [2] Preferably used for trochoidal milling				
Tensile strength (N/mm²)				<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)				185	165	85	360	200
DC (mm)	APMX (mm)	Plunge angle (°)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
2.0	5.0	0.4	 Full groove milling a_p=1×D a_e=1×D	0.010	0.010	–	0.013	0.013
3.0	8.0	0.4		0.013	0.013	–	0.013	0.015
4.0	11.0	0.4		0.013	0.013	–	0.015	0.015
5.0	13.0	0.4		0.020	0.020	–	0.025	0.025
6.0	13.0	0.7		0.030	0.030	–	0.030	0.035
8.0	20.0	0.8		0.040	0.040	–	0.045	0.045
10.0	22.0	1.2		0.045	0.045	–	0.065	0.050
12.0	26.0	1.8		0.050	0.050	–	0.085	0.055
16.0	32.0	2.4		0.055	0.055	–	0.100	0.060
20.0	42.0	3.0		0.065	0.065	–	0.110	0.070
2.0	5.0	0.4	 Contour milling a_p=APMXmax a_e=0.2×D	0.013	0.013	0.010	0.015	0.015
3.0	8.0	0.4		0.015	0.015	0.013	0.015	0.018
4.0	11.0	0.4		0.015	0.015	0.013	0.025	0.018
5.0	13.0	0.4		0.025	0.025	0.020	0.030	0.030
6.0	13.0	0.7		0.035	0.035	0.030	0.050	0.040
8.0	20.0	0.8		0.045	0.045	0.040	0.065	0.050
10.0	22.0	1.2		0.055	0.055	0.045	0.085	0.060
12.0	26.0	1.8		0.065	0.065	0.050	0.100	0.070
16.0	32.0	2.4		0.070	0.070	0.055	0.110	0.075
20.0	42.0	3.0		0.085	0.085	0.065	0.125	0.090
2.0	5.0	0.4	 Trochoidal milling a_p=APMXmax a_e=0.08×D	0.028	0.022	0.020	0.045	0.025
3.0	8.0	0.4		0.040	0.032	0.028	0.064	0.036
4.0	11.0	0.4		0.055	0.044	0.039	0.088	0.050
5.0	13.0	0.4		0.065	0.052	0.046	0.104	0.059
6.0	13.0	0.7		0.085	0.068	0.060	0.136	0.077
8.0	20.0	0.8		0.100	0.080	0.070	0.160	0.090
10.0	22.0	1.2		0.120	0.096	0.084	0.192	0.108
12.0	26.0	1.8		0.140	0.112	0.098	0.224	0.126
16.0	32.0	2.4		0.160	0.128	0.112	0.256	0.144
20.0	42.0	3.0		0.185	0.148	0.130	0.296	0.167

Technical formulas 26

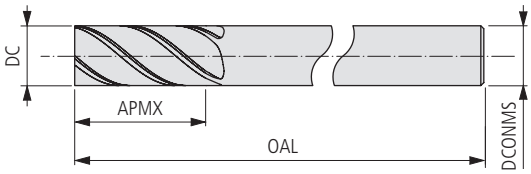
ISO designation system 5
Legend 2

UNI
Cut over centre

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing



HA



UMMS 4… x 0XS …

Art. No.	Order designation	Application HMP 800*	DC h10	APMX	ZEFP	OAL	DCONMS h6	Shank
552126	UMMS 40200 x 0XS SHA06 …	■	2.0	4.0	4	38.0	6.0	HA
552127	UMMS 40300 x 0XS SHA06 …	■	3.0	5.0	4	38.0	6.0	
552128	UMMS 40400 x 0XS SHA06 …	■	4.0	7.0	4	38.0	6.0	
552129	UMMS 40500 x 0XS SHA06 …	■	5.0	8.0	4	38.0	6.0	
552130	UMMS 40600 x 0XS SHA06 …	■	6.0	8.0	4	38.0	6.0	
552131	UMMS 40800 x 0XS SHA08 …	■	8.0	11.0	4	43.0	8.0	
552132	UMMS 41000 x 0XS SHA10 …	■	10.0	13.0	4	50.0	10.0	
552133	UMMS 41200 x 0XS SHA12 …	■	12.0	14.0	4	63.0	12.0	

* HMP 800 = PVD coating (AlCr)

Cutting specification 9
ISO designation system 5
Legend 2

Guideline values			Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)			<800	<1300	<850	<600	<1000
Cutting speeds v_c (m/min)			120	75	40	360	100
DC (mm)	APMX (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
2.0	4.0	Full groove milling a_p=0.5×D a_e=1×D	0.002	0.002	0.002	–	0.002
3.0	5.0		0.004	0.004	0.004	–	0.004
4.0	7.0		0.009	0.009	0.009	–	0.009
5.0	8.0		0.014	0.014	0.014	–	0.014
6.0	8.0		0.018	0.018	0.018	–	0.018
8.0	11.0		0.023	0.023	0.023	–	0.023
10.0	13.0		0.028	0.028	0.028	–	0.028
12.0	14.0		0.035	0.035	0.035	–	0.035
Tensile strength (N/mm²)			<800	<1300	<850	<600	<1000
Cutting speeds v_c (m/min)			150	90	45	360	125
2.0	4.0	Contour milling a_p=1×D a_e=0.2×D	0.002	0.002	0.002	–	0.002
3.0	5.0		0.004	0.004	0.004	–	0.004
4.0	7.0		0.007	0.007	0.007	–	0.007
5.0	8.0		0.012	0.012	0.012	–	0.012
6.0	8.0		0.016	0.016	0.016	–	0.016
8.0	11.0		0.020	0.020	0.020	–	0.020
10.0	13.0		0.025	0.025	0.025	–	0.025
12.0	14.0		0.050	0.050	0.050	–	0.050

Technical formulas 26

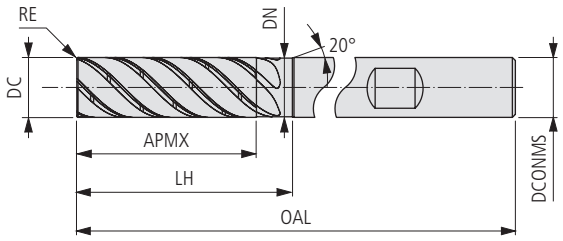
ISO designation system 5
Legend 2

UNI
Uneven tooth pitch
Cut over centre

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing

HA

HB



UMMTR 5… x 030 …

Art. No.	Order designation	Application HMP 700	Dimensions DC e8	APMX	DN	RE	LH	ZEFP	OAL	DCONMS h6	Shank
552020	UMMTR 50600 x 030 SHA06 …	■	6.0	19.0	5.8	0.2	23.0	5	65.0	6.0	
552021	UMMTR 50800 x 030 SHA08 …	■	8.0	25.0	7.8	0.2	29.0	5	70.0	8.0	
552022	UMMTR 51000 x 030 SHA10 …	■	10.0	31.0	9.8	0.2	36.0	5	80.0	10.0	HA
552023	UMMTR 51200 x 030 SHA12 …	■	12.0	37.0	11.8	0.2	42.0	5	93.0	12.0	
552024	UMMTR 51600 x 030 SHA16 …	■	16.0	49.0	15.8	0.3	56.0	5	110.0	16.0	
552025	UMMTR 52000 x 030 SHA20 …	■	20.0	61.0	19.8	0.3	70.0	5	126.0	20.0	
552026	UMMTR 50600 x 030 SHB06 …	■	6.0	19.0	5.8	0.2	23.0	5	65.0	6.0	
552027	UMMTR 50800 x 030 SHB08 …	■	8.0	25.0	7.8	0.2	29.0	5	70.0	8.0	
552028	UMMTR 51000 x 030 SHB10 …	■	10.0	31.0	9.8	0.2	36.0	5	80.0	10.0	HB
552029	UMMTR 51200 x 030 SHB12 …	■	12.0	37.0	11.8	0.2	42.0	5	93.0	12.0	
552030	UMMTR 51600 x 030 SHB16 …	■	16.0	49.0	15.8	0.3	56.0	5	110.0	16.0	
552031	UMMTR 52000 x 030 SHB20 …	■	20.0	61.0	19.8	0.3	70.0	5	126.0	20.0	

Cutting specification 11

ISO designation system 5
Legend 2

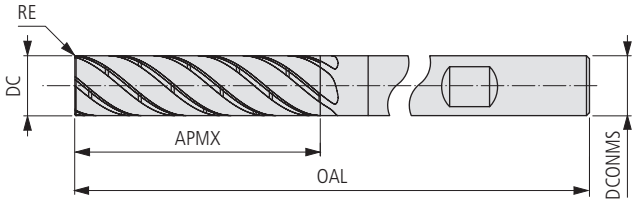
Guideline values				Steel		Stainless steel	Non-ferrous metals	Cast iron
				1  2 				
				⚠ [1] Preferably used for helical milling [2] Preferably used for trochoidal milling				
Tensile strength (N/mm²)				<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)				270	200	135	440	220
DC (mm)	APMX (mm)	Plunge angle (°)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
6.0	19.0	0.7	 Trochoidal milling a_p=APMXmax a_e=0.08×D	0.090	0.072	0.072	0.135	0.081
8.0	25.0	0.9		0.105	0.084	0.084	0.158	0.095
10.0	31.0	0.9		0.120	0.096	0.096	0.180	0.108
12.0	37.0	1.2		0.138	0.110	0.110	0.207	0.124
16.0	49.0	1.2		0.165	0.132	0.132	0.248	0.149
20.0	61.0	1.5		0.192	0.154	0.154	0.288	0.173
6.0	19.0	0.7	 Helical milling	0.049	0.039	0.039	0.073	0.044
8.0	25.0	0.9		0.057	0.046	0.046	0.086	0.051
10.0	31.0	0.9		0.065	0.052	0.052	0.098	0.059
12.0	37.0	1.2		0.075	0.060	0.060	0.112	0.067
16.0	49.0	1.2		0.090	0.072	0.072	0.134	0.081
20.0	61.0	1.5		0.104	0.083	0.083	0.156	0.094

Technical formulas 26

ISO designation system 5
Legend 2

UNI
Uneven tooth pitch
Cut over centre

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing



UMMTR 5… x 040 …

Art. No.	Order designation	Application HMP 700	Dimensions DC e8	APMX	RE	ZEFP	OAL	DCONMS h6			Shank
552032	UMMTR 50600 x 040 SHA06 …	■	6.0	25.0	0.2	5	70.0	6.0			HA
552033	UMMTR 50800 x 040 SHA08 …	■	8.0	33.0	0.2	5	75.0	8.0			
552034	UMMTR 51000 x 040 SHA10 …	■	10.0	41.0	0.2	5	90.0	10.0			
552035	UMMTR 51200 x 040 SHA12 …	■	12.0	49.0	0.2	5	100.0	12.0			
552036	UMMTR 51600 x 040 SHA16 …	■	16.0	65.0	0.3	5	130.0	16.0			
552037	UMMTR 52000 x 040 SHA20 …	■	20.0	81.0	0.3	5	150.0	20.0			
552038	UMMTR 50600 x 040 SHB06 …	■	6.0	25.0	0.2	5	70.0	6.0			HB
552039	UMMTR 50800 x 040 SHB08 …	■	8.0	33.0	0.2	5	75.0	8.0			
552040	UMMTR 51000 x 040 SHB10 …	■	10.0	41.0	0.2	5	90.0	10.0			
552041	UMMTR 51200 x 040 SHB12 …	■	12.0	49.0	0.2	5	100.0	12.0			
552042	UMMTR 51600 x 040 SHB16 …	■	16.0	65.0	0.3	5	130.0	16.0			
552043	UMMTR 52000 x 040 SHB20 …	■	20.0	81.0	0.3	5	150.0	20.0			

Cutting specification 13

ISO designation system 5
Legend 2

Guideline values				Steel		Stainless steel	Non-ferrous metals	Cast iron
				1  2     ⚠ [1] Preferably used for helical milling [2] Preferably used for trochoidal milling			
Tensile strength (N/mm²)				<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)				270	200	135	440	220
DC (mm)	APMX (mm)	Plunge angle (°)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
6.0	25.0	0.7	 Trochoidal milling a_p=APMXmax a_e=0.06×D	0.080	0.064	0.064	0.120	0.072
8.0	33.0	0.9		0.095	0.076	0.076	0.143	0.086
10.0	41.0	0.9		0.110	0.088	0.088	0.165	0.099
12.0	49.0	1.2		0.125	0.100	0.100	0.188	0.113
16.0	65.0	1.2		0.150	0.120	0.120	0.225	0.135
20.0	81.0	1.5		0.170	0.136	0.136	0.255	0.153
6.0	25.0	0.7	 Helical milling	0.038	0.030	0.030	0.057	0.034
8.0	33.0	0.9		0.045	0.036	0.036	0.068	0.041
10.0	41.0	0.9		0.052	0.042	0.042	0.078	0.047
12.0	49.0	1.2		0.059	0.048	0.048	0.089	0.053
16.0	65.0	1.2		0.071	0.057	0.057	0.107	0.064
20.0	81.0	1.5		0.081	0.065	0.065	0.121	0.073

Technical formulas 26

ISO designation system 5
Legend 2

UTILIS scorpion mill

UNI

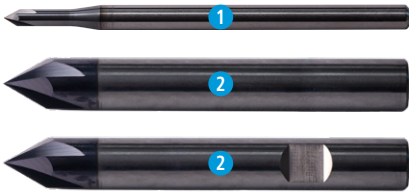
Machining recommendation

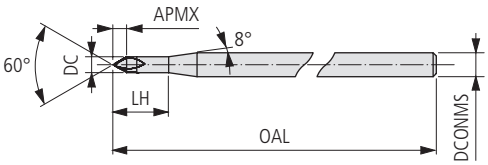
1 2 3 4 5 6 Roughing

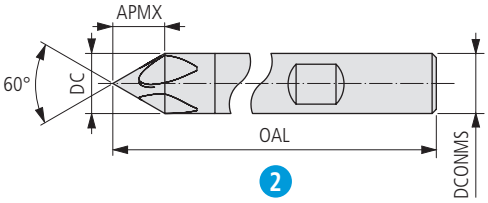
1 2 3 4 5 6 Finishing

60° ZEFP ZEFP

UTILIS multidec swiss type tools







UMME … x 60° …

Art. No.	Order designation	Application HMP 700	Dimensions DC e9	APMX	LH	OAL	ZEFP	DCONMS h6	Fig.		Shank
552044	UMME 30100 x 60° SHA03 …	■	1.0	0.9	5.0	50.0	3	3.0	1		HA
552045	UMME 30200 x 60° SHA03 …	■	2.0	1.9	8.0	50.0	3	3.0			
552046	UMME 30300 x 60° SHA03 …	■	3.0	2.9	–	50.0	3	3.0	2		
552047	UMME 40400 x 60° SHA04 …	■	4.0	3.9	–	50.0	4	4.0			
552048	UMME 40600 x 60° SHA06 …	■	6.0	5.9	–	50.0	4	6.0			
552049	UMME 40800 x 60° SHA08 …	■	8.0	7.9	–	58.0	4	8.0			
552050	UMME 41000 x 60° SHA10 …	■	10.0	9.9	–	66.0	4	10.0			
552051	UMME 41200 x 60° SHA12 …	■	12.0	11.9	–	73.0	4	12.0			
552052	UMME 41600 x 60° SHA16 …	■	16.0	15.8	–	82.0	4	16.0			
552053	UMME 40600 x 60° SHB06 …	■	6.0	5.9	–	50.0	4	6.0	2		HB
552054	UMME 40800 x 60° SHB08 …	■	8.0	7.9	–	58.0	4	8.0			
552055	UMME 41000 x 60° SHB10 …	■	10.0	9.9	–	66.0	4	10.0			
552056	UMME 41200 x 60° SHB12 …	■	12.0	11.9	–	73.0	4	12.0			
552057	UMME 41600 x 60° SHB16 …	■	16.0	15.8	–	82.0	4	16.0			

Cutting specification 15

ISO designation system 5
Legend 2

Guideline values		Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)		<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)		100	65	60	250	90
DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
1.0	Deburring a_p=APMXmax a_e=0.1×D	0.010	0.010	0.008	0.015	0.013
2.0		0.013	0.013	0.010	0.018	0.015
3.0		0.015	0.015	0.012	0.025	0.020
4.0		0.020	0.020	0.015	0.030	0.025
6.0		0.030	0.030	0.022	0.040	0.035
8.0		0.035	0.035	0.028	0.050	0.040
10.0		0.045	0.045	0.035	0.060	0.050
12.0		0.055	0.055	0.045	0.080	0.060
16.0		0.075	0.075	0.055	0.100	0.080

Technical formulas 26

ISO designation system 5
Legend 2

UTILIS scorpion mill

UNI

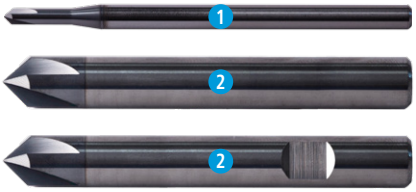
Machining recommendation

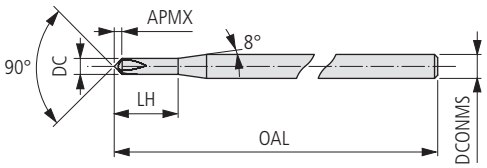
1 2 3 4 5 6 Roughing

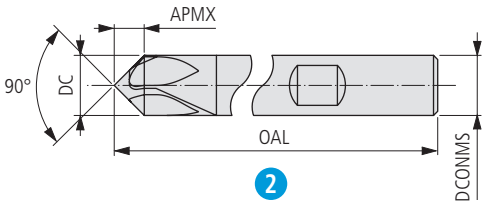
1 2 3 4 5 6 Finishing

90° ZEFP ZEFP

UTILIS multidec swiss type tools







UMME … x 90° …

Art. No.	Order designation	Application HMP 700	Dimensions DC e9	APMX	LH	OAL	ZEFP	DCONMS h6	Fig.		Shank
552058	UMME 30100 x 90° SHA03 …	■	1.0	0.7	5.0	50.0	3	3.0	1		HA
552059	UMME 30200 x 90° SHA03 …	■	2.0	1.4	8.0	50.0	3	3.0			
552060	UMME 30300 x 90° SHA03 …	■	3.0	2.1		50.0	3	3.0	2		
552061	UMME 40400 x 90° SHA04 …	■	4.0	2.8		50.0	4	4.0			
552062	UMME 40600 x 90° SHA06 …	■	6.0	4.2		50.0	4	6.0			
552063	UMME 40800 x 90° SHA08 …	■	8.0	5.6		58.0	4	8.0			
552064	UMME 41000 x 90° SHA10 …	■	10.0	7.0		66.0	4	10.0			
552065	UMME 41200 x 90° SHA12 …	■	12.0	8.5		73.0	4	12.0			
552066	UMME 41600 x 90° SHA16 …	■	16.0	11.2		82.0	4	16.0			
552067	UMME 40600 x 90° SHB06 …	■	6.0	4.2		50.0	4	6.0	2		HB
552068	UMME 40800 x 90° SHB08 …	■	8.0	5.6		58.0	4	8.0			
552069	UMME 41000 x 90° SHB10 …	■	10.0	7.0		66.0	4	10.0			
552070	UMME 41200 x 90° SHB12 …	■	12.0	8.5		73.0	4	12.0			
552071	UMME 41600 x 90° SHB16 …	■	16.0	11.2		82.0	4	16.0			

Cutting specification 17

ISO designation system 5
Legend 2

Guideline values		Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)		<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)		100	65	60	250	90
DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
1.0	Deburring a_p=APMXmax a_e=0.1×D	0.010	0.010	0.013	0.008	0.015
2.0		0.013	0.013	0.015	0.010	0.018
3.0		0.015	0.015	0.020	0.012	0.025
4.0		0.020	0.020	0.025	0.015	0.030
6.0		0.030	0.030	0.022	0.040	0.035
8.0		0.035	0.035	0.028	0.050	0.040
10.0		0.045	0.045	0.035	0.060	0.050
12.0		0.055	0.055	0.045	0.080	0.060
16.0		0.075	0.075	0.055	0.100	0.080

Technical formulas 26

ISO designation system 5
Legend 2

UTILIS scorpion mill

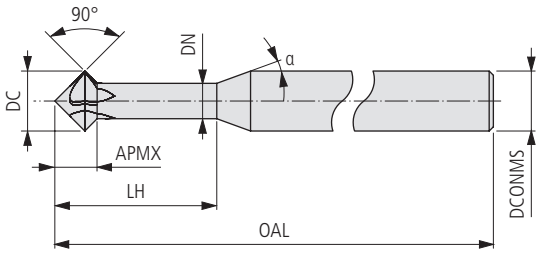
UNI

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing

ZEFP

UTILIS multidec swiss type tools

HA



UMMVR 4… x 90° …

Art. No.	Order designation	Application HMP 700	Dimensions DC	APMX	DN	ZEFP	LH	OAL	DCONMS h6	α	Shank
552072	UMMVR 40200 x 90° SHA04 …	■	2.0	1.5	1.0	4	8.0	50.0	4.0	20°	HA
552073	UMMVR 40300 x 90° SHA04 …	■	3.0	2.0	2.2	4	10.0	50.0	4.0	20°	
552074	UMMVR 40400 x 90° SHA04 …	■	4.0	2.5	2.9	4	10.0	50.0	4.0	20°	
552075	UMMVR 40500 x 90° SHA06 …	■	5.0	3.0	3.9	4	15.0	65.0	6.0	20°	
552076	UMMVR 40600 x 90° SHA06 …	■	6.0	4.0	3.9	4	15.0	65.0	6.0	20°	
552077	UMMVR 40800 x 90° SHA08 …	■	8.0	2.5	5.9	4	20.0	70.0	8.0	30°	
552078	UMMVR 41000 x 90° SHA10 …	■	10.0	4.0	5.9	4	23.0	73.0	10.0	30°	
552079	UMMVR 41200 x 90° SHA12 …	■	12.0	6.0	5.9	4	23.0	73.0	12.0	30°	

Cutting specification 19
ISO designation system 5
Legend 2

Guideline values		Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)		<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)		70	38	30	150	45
DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
2.0	Deburring a_p=0.1×D a_e=0.1×D	0.011	0.010	0.009	0.019	0.012
3.0		0.014	0.013	0.011	0.024	0.015
4.0		0.017	0.015	0.014	0.029	0.019
5.0		0.019	0.017	0.015	0.032	0.021
6.0		0.022	0.020	0.018	0.037	0.024
8.0		0.028	0.025	0.022	0.048	0.031
10.0		0.033	0.030	0.026	0.056	0.036
12.0		0.038	0.034	0.030	0.065	0.042

Technical formulas 26

ISO designation system 5
Legend 2

UTILIS scorpion mill

UNI

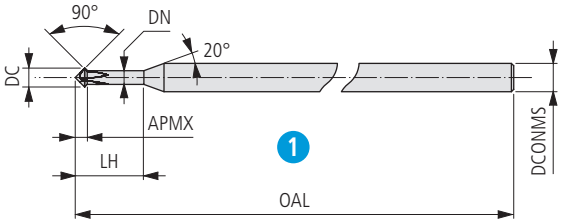
Machining recommendation

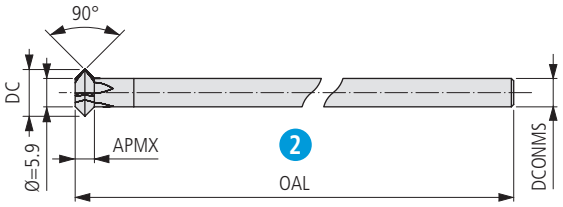
1 2 3 4 5 6 Roughing

1 2 3 4 5 6 Finishing

ZEFP

UTILIS multidec swiss type tools





UMMVRL 4… x 90° …

Art. No.	Order designation	Application HMP 700	DC	APMX	DN	ZEFP	LH	OAL	DCONMS h6	Fig.	Shank
552080	UMMVRL 40300 x 90° SHA04 …	■	3.0	2.0	2.2	4	10.0	75.0	4.0		
552081	UMMVRL 40380 x 90° SHA04 …	■	3.8	2.7	2.9	4	13.0	75.0	4.0		
552082	UMMVRL 40400 x 90° SHA04 …	■	4.0	2.7	2.9	4	13.0	75.0	4.0		
552083	UMMVRL 40480 x 90° SHA05 …	■	4.8	3.0	3.9	4	15.0	75.0	5.0	1	
552084	UMMVRL 40500 x 90° SHA05 …	■	5.0	3.0	3.9	4	15.0	75.0	5.0		
552085	UMMVRL 40580 x 90° SHA06 …	■	5.8	4.0	3.9	4	15.0	100.0	6.0		
552086	UMMVRL 40600 x 90° SHA06 …	■	6.0	4.0	3.9	4	15.0	100.0	6.0		HA
552087	UMMVRL 40780 x 90° SHA06 …	■	7.8	2.0	–	4	–	100.0	6.0		
552088	UMMVRL 40800 x 90° SHA06 …	■	8.0	2.0	–	4	–	100.0	6.0		
552089	UMMVRL 40980 x 90° SHA06 …	■	9.8	4.0	–	4	–	100.0	6.0		
552090	UMMVRL 41000 x 90° SHA06 …	■	10.0	4.0	–	4	–	100.0	6.0	2	
552091	UMMVRL 41180 x 90° SHA06 …	■	11.8	6.0	–	4	–	100.0	6.0		
552092	UMMVRL 41200 x 90° SHA06 …	■	12.0	6.0	–	4	–	100.0	6.0		

Cutting specification 21

ISO designation system 5
Legend 2

Guideline values		Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)		<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)		70	38	30	150	45
DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
3.0	Deburring a_p=0.1×D a_e=0.1×D	0.014	0.013	0.011	0.024	0.015
3.8		0.017	0.015	0.014	0.029	0.019
4.0		0.017	0.015	0.014	0.029	0.019
4.8		0.019	0.017	0.015	0.032	0.021
5.0		0.019	0.017	0.015	0.032	0.021
5.8		0.022	0.020	0.018	0.037	0.024
6.0		0.022	0.020	0.018	0.037	0.024
7.8		0.028	0.025	0.022	0.048	0.031
8.0		0.028	0.025	0.022	0.048	0.031
9.8		0.033	0.030	0.026	0.056	0.036
10.0		0.033	0.030	0.026	0.056	0.036
11.8		0.038	0.034	0.030	0.065	0.042
12.0		0.038	0.034	0.030	0.065	0.042

Technical formulas 26

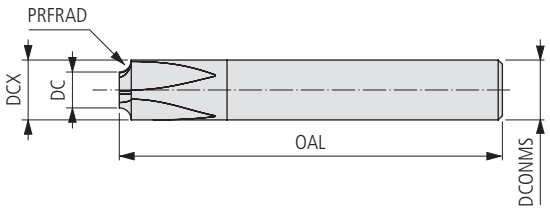
ISO designation system 5
Legend 2

UNI

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing

ZEFP

HA



UMMVK 4… R…

Art. No.	Order designation	Application HMP 700	Dimensions PRFRAD ±0.01	DCX	DC	ZEFP	OAL	DCONMS h6			Shank
552096	UMMVK 40360 R020 SHA04 …	■	0.2	4.0	3.6	4	50.0	4.0			
552095	UMMVK 40340 R030 SHA04 …	■	0.3	4.0	3.4	4	50.0	4.0			
552094	UMMVK 40320 R040 SHA04 …	■	0.4	4.0	3.2	4	50.0	4.0			
552093	UMMVK 40300 R050 SHA04 …	■	0.5	4.0	3.0	4	50.0	4.0			
552099	UMMVK 40480 R060 SHA06 …	■	0.6	6.0	4.8	4	50.0	6.0			
552098	UMMVK 40440 R080 SHA06 …	■	0.8	6.0	4.4	4	50.0	6.0			
552097	UMMVK 40400 R100 SHA06 …	■	1.0	6.0	4.0	4	50.0	6.0			
552100	UMMVK 40500 R150 SHA10 …	■	1.5	10.0	5.0	4	55.0	10.0			
552102	UMMVK 40600 R200 SHA10 …	■	2.0	10.0	6.0	4	66.0	10.0			HA
552104	UMMVK 40700 R250 SHA12 …	■	2.5	12.0	7.0	4	73.0	12.0			
552103	UMMVK 40600 R300 SHA12 …	■	3.0	12.0	6.0	4	73.0	12.0			
552108	UMMVK 40900 R350 SHA16 …	■	3.5	16.0	9.0	4	80.0	16.0			
552106	UMMVK 40800 R400 SHA16 …	■	4.0	16.0	8.0	4	80.0	16.0			
552105	UMMVK 40700 R450 SHA16 …	■	4.5	16.0	7.0	4	80.0	16.0			
552110	UMMVK 41000 R500 SHA20 …	■	5.0	20.0	10.0	4	80.0	20.0			
552107	UMMVK 40800 R600 SHA20 …	■	6.0	20.0	8.0	4	80.0	20.0			
552109	UMMVK 40900 R800 SHA25 …	■	8.0	25.0	9.0	4	100.0	25.0			
552101	UMMVK 40500 R1000 SHA25 …	■	10.0	25.0	5.0	4	100.0	25.0			

Cutting specification 23

ISO designation system 5
Legend 2

Cutting data for UNI concave quarter radius mills

Guideline values				Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)				<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)				155	95	70	450	115
PRFRAD (mm)	DCX (mm)	DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
0.2	4.0	3.6	Corner radius milling	0.022	0.020	0.018	0.037	0.024
0.3	4.0	3.4		0.022	0.020	0.018	0.037	0.024
0.4	4.0	3.2		0.022	0.020	0.018	0.037	0.024
0.5	4.0	3.0		0.022	0.020	0.018	0.037	0.024
0.6	6.0	4.8		0.026	0.023	0.021	0.044	0.029
0.8	6.0	4.4		0.026	0.023	0.021	0.044	0.029
1.0	6.0	4.0		0.026	0.023	0.021	0.044	0.029
1.5	10.0	5.0		0.028	0.025	0.022	0.048	0.031
2.0	10.0	6.0		0.032	0.029	0.026	0.054	0.035
2.5	12.0	7.0		0.035	0.032	0.028	0.060	0.039
3.0	12.0	6.0		0.035	0.032	0.028	0.060	0.039
3.5	16.0	9.0		0.038	0.034	0.030	0.065	0.042
4.0	16.0	8.0		0.038	0.034	0.030	0.065	0.042
4.5	16.0	7.0		0.038	0.034	0.030	0.065	0.042
5.0	20.0	10.0		0.040	0.036	0.032	0.068	0.044
6.0	20.0	8.0		0.040	0.036	0.032	0.068	0.044
8.0	25.0	9.0		0.043	0.039	0.034	0.073	0.047
10.0	25.0	5.0		0.043	0.039	0.034	0.073	0.047

Technical formulas 26

ISO designation system 5
Legend 2

UTILIS scorpion mill

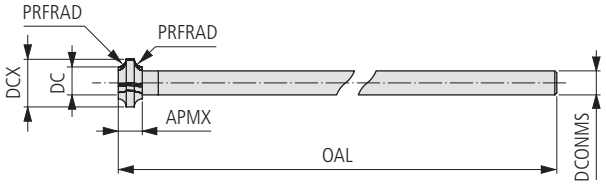
UNI

Machining recommendation	
1 2 3 4 5 6	Roughing
1 2 3 4 5 6	Finishing

ZEFP

UTILIS multidec swiss type tools

HA



UMMVKL 4… R…

Art. No.	Order designation	Application HMP 700	Dimensions PRFRAD ±0.01	DCX	DC	APMX	ZEFP	OAL	DCONMS h6		Shank
552114	UMMVKL 40560 R020 SHA04 …	■	0.2	6.0	5.6	2.0	4	75.0	4.0		
552120	UMMVKL 40760 R020 SHA06 …	■	0.2	8.0	7.6	2.0	4	100.0	6.0		
552113	UMMVKL 40540 R030 SHA04 …	■	0.3	6.0	5.4	2.0	4	75.0	4.0		
552119	UMMVKL 40740 R030 SHA06 …	■	0.3	8.0	7.4	2.0	4	100.0	6.0		
552112	UMMVKL 40520 R040 SHA04 …	■	0.4	6.0	5.2	2.0	4	75.0	4.0		
552118	UMMVKL 40720 R040 SHA06 …	■	0.4	8.0	7.2	2.0	4	100.0	6.0		
552111	UMMVKL 40500 R050 SHA04 …	■	0.5	6.0	5.0	2.0	4	75.0	4.0		
552115	UMMVKL 40700 R050 SHA06 …	■	0.5	8.0	7.0	2.0	4	100.0	6.0		
552124	UMMVKL 40840 R080 SHA06 …	■	0.8	10.0	8.4	4.0	4	100.0	6.0		
552122	UMMVKL 40800 R100 SHA06 …	■	1.0	10.0	8.0	4.0	4	100.0	6.0		
552121	UMMVKL 40760 R120 SHA06 …	■	1.2	10.0	7.6	5.0	4	100.0	6.0		
552116	UMMVKL 40700 R150 SHA06 …	■	1.5	10.0	7.0	5.0	4	100.0	6.0		
552125	UMMVKL 40840 R180 SHA06 …	■	1.8	12.0	8.4	6.0	4	100.0	6.0		
552123	UMMVKL 40800 R200 SHA06 …	■	2.0	12.0	8.0	7.0	4	100.0	6.0		
552117	UMMVKL 40700 R250 SHA06 …	■	2.5	12.0	7.0	8.0	4	100.0	6.0		

HA

Cutting specification 25

ISO designation system 5
Legend 2

Guideline values				Steel		Stainless steel	Non-ferrous metals	Cast iron
Tensile strength (N/mm²)				<850	<1100	<850	<600	<1000
Cutting speeds v_c (m/min)				65	32	27	110	36
PRFRAD (mm)	DCX (mm)	DC (mm)	Application	Feeds f_z (mm/Z)		Feeds f_z (mm/Z)	Feeds f_z (mm/Z)	Feeds f_z (mm/Z)
0.2	6.0	5.6	Corner radius milling	0.011	0.010	0.009	0.019	0.012
0.2	8.0	7.6		0.014	0.013	0.011	0.024	0.015
0.3	6.0	5.4		0.011	0.010	0.009	0.019	0.012
0.3	8.0	7.4		0.014	0.013	0.011	0.024	0.015
0.4	6.0	5.2		0.011	0.010	0.009	0.019	0.012
0.4	8.0	7.2		0.014	0.013	0.011	0.024	0.015
0.5	6.0	5.0		0.011	0.010	0.009	0.019	0.012
0.5	8.0	7.0		0.014	0.013	0.011	0.024	0.015
0.8	10.0	8.4		0.017	0.015	0.014	0.029	0.019
1.0	10.0	8.0		0.017	0.015	0.014	0.029	0.019
1.2	10.0	7.6		0.017	0.015	0.014	0.029	0.019
1.5	10.0	7.0		0.017	0.015	0.014	0.029	0.019
1.8	12.0	8.4		0.019	0.017	0.015	0.032	0.021
2.0	12.0	8.0		0.019	0.017	0.015	0.032	0.021
2.5	12.0	7.0		0.019	0.017	0.015	0.032	0.021

Technical formulas 26

ISO designation system 5
Legend 2

Cutting speed (v_c)

$$v_c = \frac{DC \cdot \pi \cdot n}{1000} \text{ [m/min]}$$

Revolutions per minute (n)

$$n = \frac{v_c \cdot 1000}{DC \cdot \pi} \text{ [min}^{-1}\text{]}$$

Feedrate (v_f)

$$v_f = f_z \cdot ZEFP \cdot n \text{ [mm/min]}$$

Feed per tooth (f_z)

$$f_z = \frac{v_f}{ZEFP \cdot n} \text{ [mm]}$$

Material removal rate (Q)

$$Q = \frac{a_p \cdot a_e \cdot v_f}{1000} \text{ [cm}^3\text{/mm]}$$

Average chip thickness (h_m)

$$h_m = f_z \cdot \frac{\sqrt{a_e}}{DC} \text{ [mm]}$$

Explanation

a_e	Radial depth of cut (mm)
a_p	Axial depth of cut (mm)
f_z	Feed per tooth (mm)
DC	Tool diameter (mm)
n	Rotation speed (min^{-1})
h_m	Average chip thickness (mm)
Q	Material removal rate (cm^3/mm)
v_f	Machining feedrate (mm/min)
v_c	Cutting speed (m/min)
ZEFP	Number of teeth

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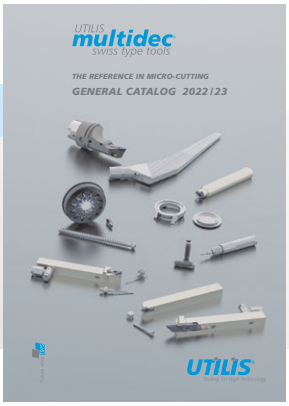

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