Jongen Werkzeugtechnik GmbH

High-Feed End Mills VHM 419 & VHM 420

Products from Willich → North-Rhine Westphalia → Germany → Europe for Europe and the

The Tool

High-Feed End Mills have been specially designed for machining HPC.
VHM 419 & 420 can achieve up to 1 mm feed rate per tooth, depending on different types and materials.

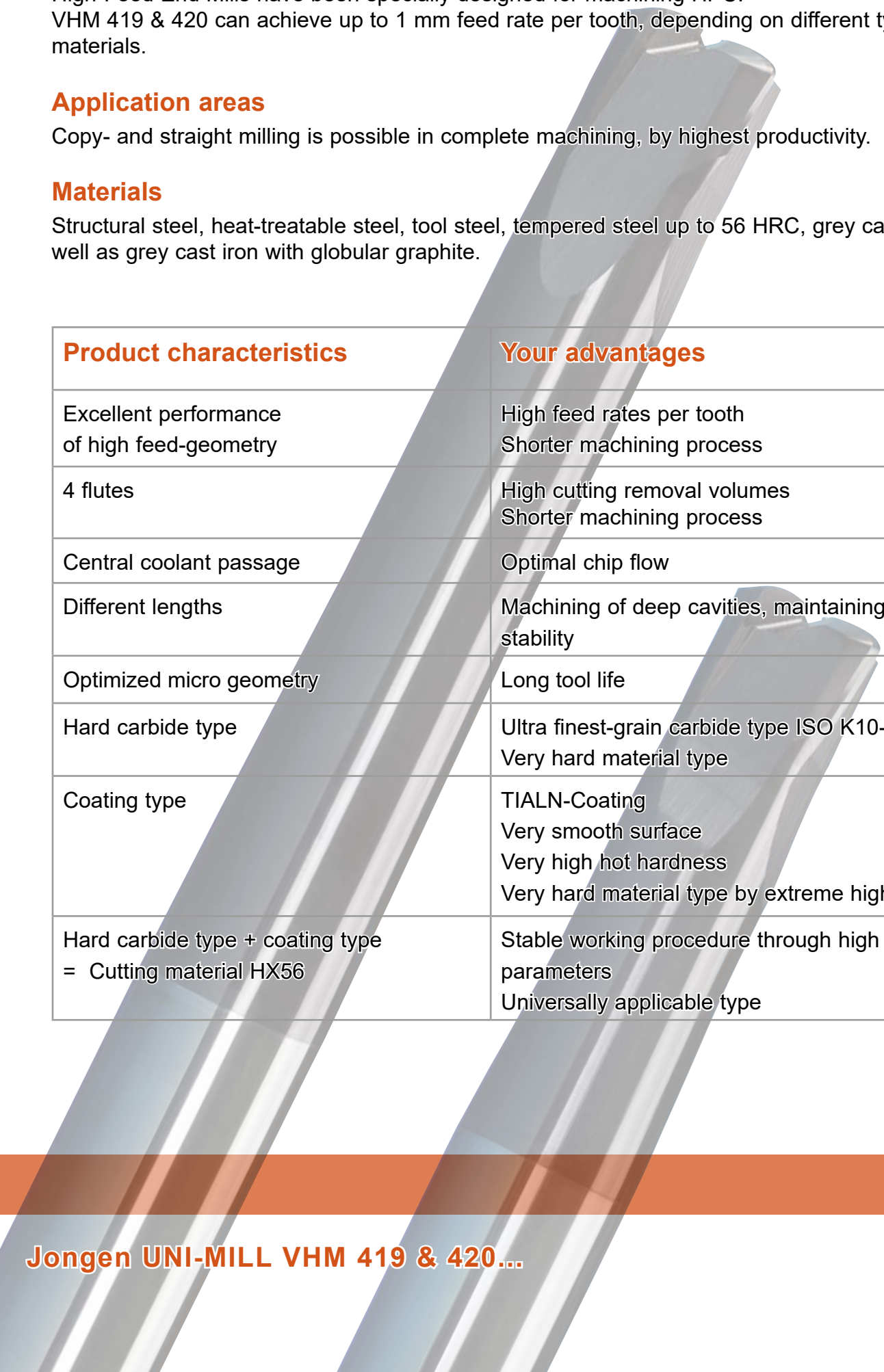
Application areas

Copy- and straight milling is possible in complete machining, by highest productivity.

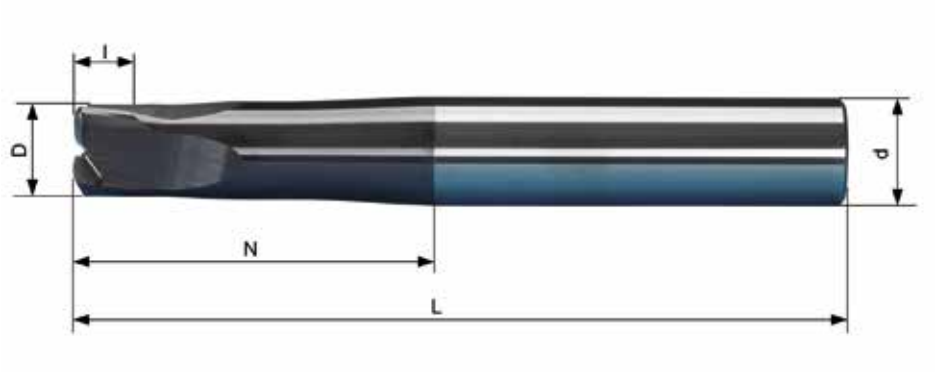
Materials

Structural steel, heat-treatable steel, tool steel, tempered steel up to 56 HRC, grey cast iron, as well as grey cast iron with globular graphite.

Product characteristics	Your advantages
Excellent performance of high feed-geometry	High feed rates per tooth Shorter machining process
4 flutes	High cutting removal volumes Shorter machining process
Central coolant passage	Optimal chip flow
Different lengths	Machining of deep cavities, maintaining very high stability
Optimized micro geometry	Long tool life
Hard carbide type	Ultra finest-grain carbide type ISO K10-K20 Very hard material type
Coating type	TIALN-Coating Very smooth surface Very high hot hardness Very hard material type by extreme high tenacity
Hard carbide type + coating type = Cutting material HX56	Stable working procedure through high cutting parameters Universally applicable type



Technical Data VHM 419

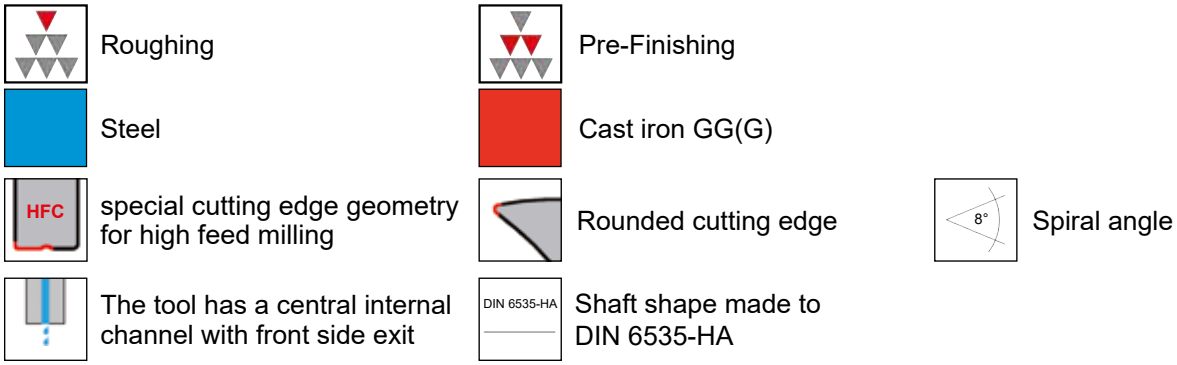


Tolerance ø:

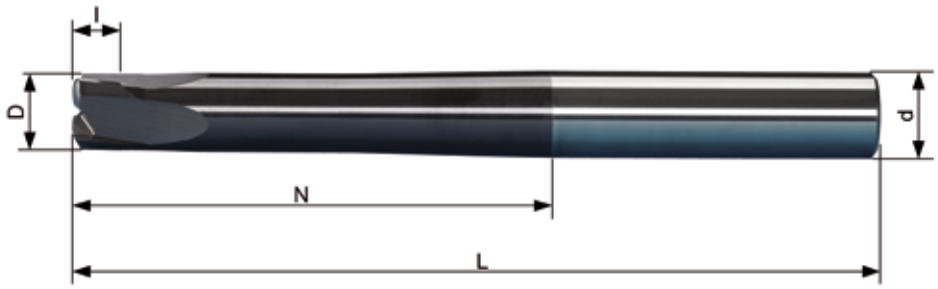
ø 3,0 - 16,0 = $^{-0,05}_{-0,07}$

Order-No.	D	L	l	d	N -0,2				Z	a_p max
					0°	1°	2°	3°		in mm
VHM 419-03 HX56	3	58	1,5	6	10,000	11,920	13,780	16,354	4	0,15
VHM 419-04 HX56	4	58	2,0	6	13,300	15,870	18,340	-	4	0,18
VHM 419-05 HX56	5	58	2,5	6	16,600	19,801	-	-	4	0,23
VHM 419-06 HX56	6	58	3,0	6	20,700	-	-	-	4	0,28
VHM 419-08 HX56	8	64	4,0	8	26,700	-	-	-	4	0,37
VHM 419-10 HX56	10	73	5,0	10	31,800	-	-	-	4	0,46
VHM 419-12 HX56	12	84	6,0	12	37,800	-	-	-	4	0,56
VHM 419-16 HX56	16	93	8,0	16	43,500	-	-	-	4	0,74

Key to symbols



Technical Data VHM 420

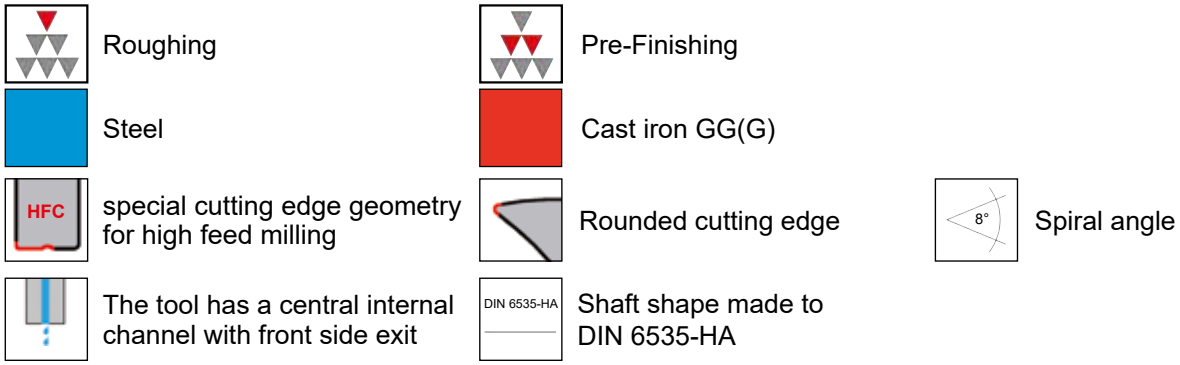


Tolerance ø:

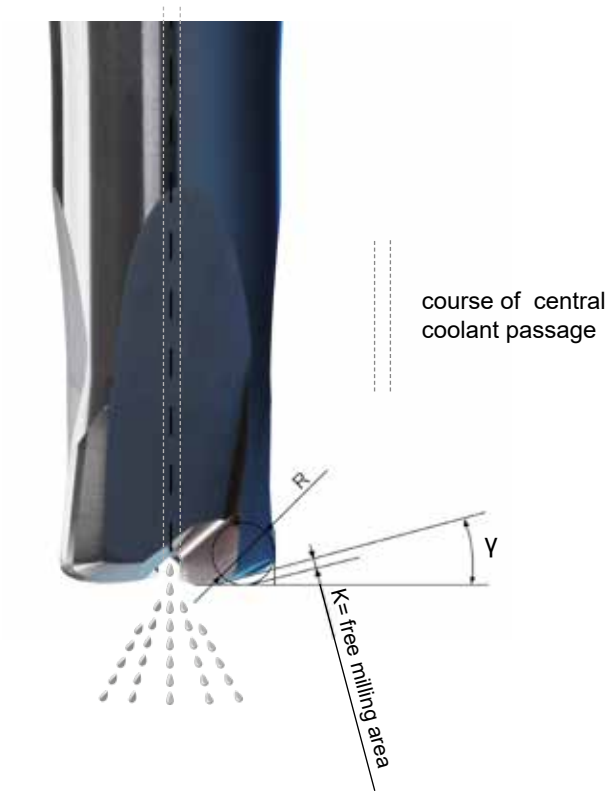
ø 3,0 - 16,0 = $^{-0,05}_{-0,07}$

Order-No.	D	L	l	d	N -0,2				Z	a_p max
					0°	1°	2°	3°		in mm
VHM 420-03 HX56	3	73	1,5	6	19,400	25,030	35,250	-	4	0,15
VHM 420-04 HX56	4	73	2,0	6	24,000	30,140	-	-	4	0,18
VHM 420-05 HX56	5	73	2,5	6	28,800	-	-	-	4	0,23
VHM 420-06 HX56	6	73	3,0	6	35,500	-	-	-	4	0,28
VHM 420-08 HX56	8	84	4,0	8	46,500	-	-	-	4	0,37
VHM 420-10 HX56	10	93	5,0	10	51,600	-	-	-	4	0,46
VHM 420-12 HX56	12	110	6,0	12	63,500	-	-	-	4	0,56
VHM 420-16 HX56	16	140	8,0	16	90,500	-	-	-	4	0,74

Key to symbols

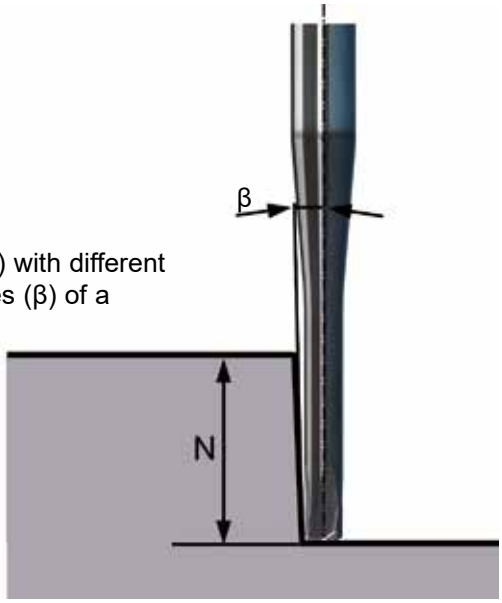


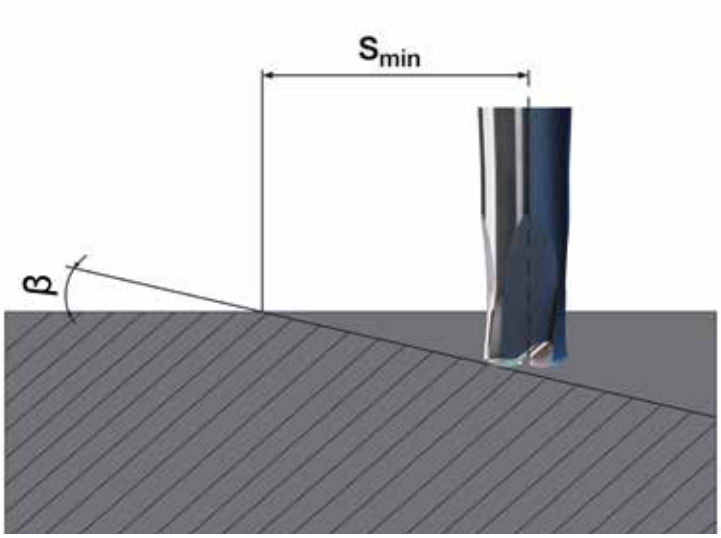
Indications of application:



Diameter of the tool	R	K	γ
3	0,3	0,06	22,756°
4	0,4	0,08	21,011°
5	0,5	0,10	20,908°
6	0,6	0,12	20,838°
8	0,8	0,16	20,750°
10	1,0	0,21	20,696°
12	1,2	0,29	20,660°
16	1,6	0,33	20,615°

working length (N) with different interference angles (β) of a working piece





Diameter of the tool	Angle of immersion α max.	Milling way S_{min}
3	1,0°	8,6
4	1,9°	5,4
5	2,5°	5,3
6	3,1°	5,2
8	1,9°	11,2
10	1,7°	15,5
12	1,1°	29,2
16	1,9°	22,3

Cutting Data Recommendations VHM 419

	Diameter of the tool	3	4	5	6	8	10	12	16
Material									
Structural steel, carbon steel, unalloyed steel, low alloy steel, cast iron	n (min^{-1})	24.416	18.312	14.650	12.208	9.156	7.325	6.104	4.578
	V_f (mm/min)	39.066	29.299	26.369	24.416	21.975	20.510	19.533	18.312
	V_c (m/min)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)
	F_z (mm)	0,4 (0,3 - 0,45)	0,4 (0,3 - 0,45)	0,45 (0,3 - 0,5)	0,5 (0,35 - 0,55)	0,6 (0,35 - 0,7)	0,7 (0,4 - 0,8)	0,8 (0,6 - 0,9)	1,0 (0,7 - 1,1)
	a_p (mm)	0,1 (0,05 - 0,15)	0,15 (0,1 - 0,2)	0,2 (0,15 - 0,25)	0,25 (0,2 - 0,3)	0,3 (0,25 - 0,35)	0,4 (0,35 - 0,45)	0,5 (0,45 - 0,55)	0,65 (0,6 - 0,7)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel up to 35 HRC	n (min^{-1})	23.355	17.516	14.013	11.677	8.758	7.006	5.839	4.379
	V_f (mm/min)	37.367	28.025	25.223	23.355	21.019	19.618	18.684	17.516
	V_c (m/min)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)
	F_z (mm)	0,4 (0,3 - 0,45)	0,4 (0,3 - 0,45)	0,45 (0,3 - 0,5)	0,5 (0,35 - 0,55)	0,6 (0,35 - 0,7)	0,7 (0,4 - 0,8)	0,8 (0,6 - 0,9)	1,0 (0,7 - 1,1)
	a_p (mm)	0,1 (0,05 - 0,15)	0,15 (0,1 - 0,2)	0,2 (0,15 - 0,25)	0,25 (0,2 - 0,3)	0,3 (0,25 - 0,35)	0,4 (0,35 - 0,45)	0,5 (0,45 - 0,55)	0,65 (0,6 - 0,7)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel 35-45 HRC	n (min^{-1})	19.108	14.331	11.465	9.554	7.166	5.732	4.777	3.583
	V_f (mm/min)	22.930	18.917	16.051	15.287	12.898	11.465	10.510	8.599
	V_c (m/min)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)
	F_z (mm)	0,3 (0,2 - 0,4)	0,33 (0,25 - 0,5)	0,35 (0,25 - 0,5)	0,4 (0,3 - 0,55)	0,45 (0,35 - 0,65)	0,5 (0,4 - 0,7)	0,55 (0,35 - 0,75)	0,6 (0,5 - 0,8)
	a_p (mm)	0,1 (0,05 - 0,15)	0,15 (0,1 - 0,2)	0,2 (0,15 - 0,25)	0,25 (0,2 - 0,3)	0,3 (0,25 - 0,35)	0,4 (0,35 - 0,45)	0,5 (0,45 - 0,55)	0,65 (0,6 - 0,7)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel 45-56 HRC	n (min^{-1})	12.739	9.554	7.643	6.369	4.777	3.822	3.185	2.389
	V_f (mm/min)	10.191	8.790	7.643	7.643	6.688	6.115	5.732	4.777
	V_c (m/min)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)
	F_z (mm)	0,2 (0,1 - 0,3)	0,23 (0,15 - 0,4)	0,25 (0,15 - 0,4)	0,3 (0,2 - 0,45)	0,35 (0,25 - 0,55)	0,4 (0,3 - 0,6)	0,45 (0,35 - 0,65)	0,5 (0,4 - 0,7)
	a_p (mm)	0,08 (0,05 - 0,13)	0,1 (0,05 - 0,15)	0,15 (0,1 - 0,25)	0,2 (0,15 - 0,25)	0,25 (0,2 - 0,3)	0,3 (0,25 - 0,35)	0,32 (0,27 - 0,37)	0,35 (0,3 - 0,4)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16

The above-mentioned data are standard values that may vary depending on processing, type of machine and material grade. For processing use a machine with the highest preciseness and rigidity. Should the available rotation number be lower of that given in the table, reduce feed rate proportionally.

Cutting Data Recommendations VHM 420

	Diameter of the tool/	3	4	5	6	8	10	12	16
Material									
Structural steel, carbon steel, unalloyed steel, low alloy steel, cast iron	n (min^{-1})	24.416	18.312	14.650	12.208	9.156	7.325	6.104	4.578
	V_f (mm/min)	27.346	20.510	18.752	17.091	15.382	14.357	13.673	12.818
	V_c (m/min)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)	230 (190 - 250)
	F_z (mm)	0,28 (0,18 - 0,38)	0,28 (0,18 - 0,38)	0,32 (0,22 - 0,42)	0,35 (0,25 - 0,45)	0,42 (0,32 - 0,52)	0,49 (0,39 - 0,59)	0,56 (0,46 - 0,66)	0,7 (0,6 - 0,8)
	a_p (mm)	0,07 (0,05 - 0,12)	0,1 (0,05 - 0,15)	0,14 (0,09 - 0,19)	0,18 (0,13 - 0,23)	0,21 (0,16 - 0,26)	0,28 (0,23 - 0,32)	0,35 (0,3 - 0,4)	0,46 (0,41 - 0,51)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel up to 35 HRC	n (min^{-1})	23.355	17.516	14.013	11.677	8.758	7.006	5.839	4.379
	V_f (mm/min)	26.157	19.618	17.936	16.348	14.713	13.732	13.079	12.261
	V_c (m/min)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)	220 (150 - 250)
	F_z (mm)	0,28 (0,18 - 0,38)	0,28 (0,18 - 0,38)	0,32 (0,22 - 0,42)	0,35 (0,25 - 0,45)	0,42 (0,32 - 0,52)	0,49 (0,39 - 0,59)	0,56 (0,46 - 0,66)	0,7 (0,6 - 0,8)
	a_p (mm)	0,07 (0,05 - 0,12)	0,11 (0,06 - 0,16)	0,14 (0,09 - 0,19)	0,18 (0,13 - 0,23)	0,21 (0,16 - 0,26)	0,28 (0,23 - 0,33)	0,35 (0,3 - 0,4)	0,46 (0,41 - 0,51)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel 35-45 HRC	n (min^{-1})	19.108	14.331	11.465	9.554	7.166	5.732	4.777	3.583
	V_f (mm/min)	16.051	13.185	11.465	10.701	8.885	8.025	7.452	6.019
	V_c (m/min)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)	180 (150 - 250)
	F_z (mm)	0,21 (0,11 - 0,31)	0,23 (0,13 - 0,33)	0,25 (0,15 - 0,35)	0,28 (0,18 - 0,38)	0,31 (0,21 - 0,41)	0,35 (0,25 - 0,45)	0,39 (0,29 - 0,49)	0,42 (0,32 - 0,52)
	a_p (mm)	0,07 (0,05 - 0,12)	0,11 (0,06 - 0,16)	0,14 (0,09 - 0,19)	0,18 (0,13 - 0,23)	0,21 (0,16 - 0,26)	0,28 (0,23 - 0,33)	0,35 (0,3 - 0,4)	0,46 (0,41 - 0,51)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16
Tool steel 45-56 HRC	n (min^{-1})	12.739	9.554	7.643	6.369	4.777	3.822	3.185	2.389
	V_f (mm/min)	7.134	6.115	5.503	5.350	4.777	4.280	4.076	3.344
	V_c (m/min)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)	120 (80 - 160)
	F_z (mm)	0,14 (0,04 - 0,24)	0,16 (0,06 - 0,26)	0,18 (0,08 - 0,28)	0,21 (0,11 - 0,31)	0,25 (0,15 - 0,35)	0,28 (0,18 - 0,38)	0,32 (0,22 - 0,42)	0,35 (0,25 - 0,45)
	a_p (mm)	0,08 (0,05 - 0,12)	0,1 (0,05 - 0,15)	0,15 (0,1 - 0,2)	0,2 (0,15 - 0,25)	0,25 (0,2 - 0,3)	0,3 (0,25 - 0,35)	0,32 (0,27 - 0,37)	0,35 (0,3 - 0,4)
	a_e (mm)	up to 3	up to 4	up to 5	up to 6	up to 8	up to 10	up to 12	up to 16

The above-mentioned data are standard values that may vary depending on processing, type of machine and material grade. For processing use a machine with the highest preciseness and rigidity. Should the available rotation number be lower of that given in the table, reduce feed rate proportionally.

Notes

The mentioned cutting parameters are standard values that may vary depending on processing, type of machine and material grade.
Errors, omissions and technical modifications are reserved.

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