Jongen Werkzeugtechnik

VHM 453 (R) HX74



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

The tools VHM 453 HX74 and VHM 453 R HX74

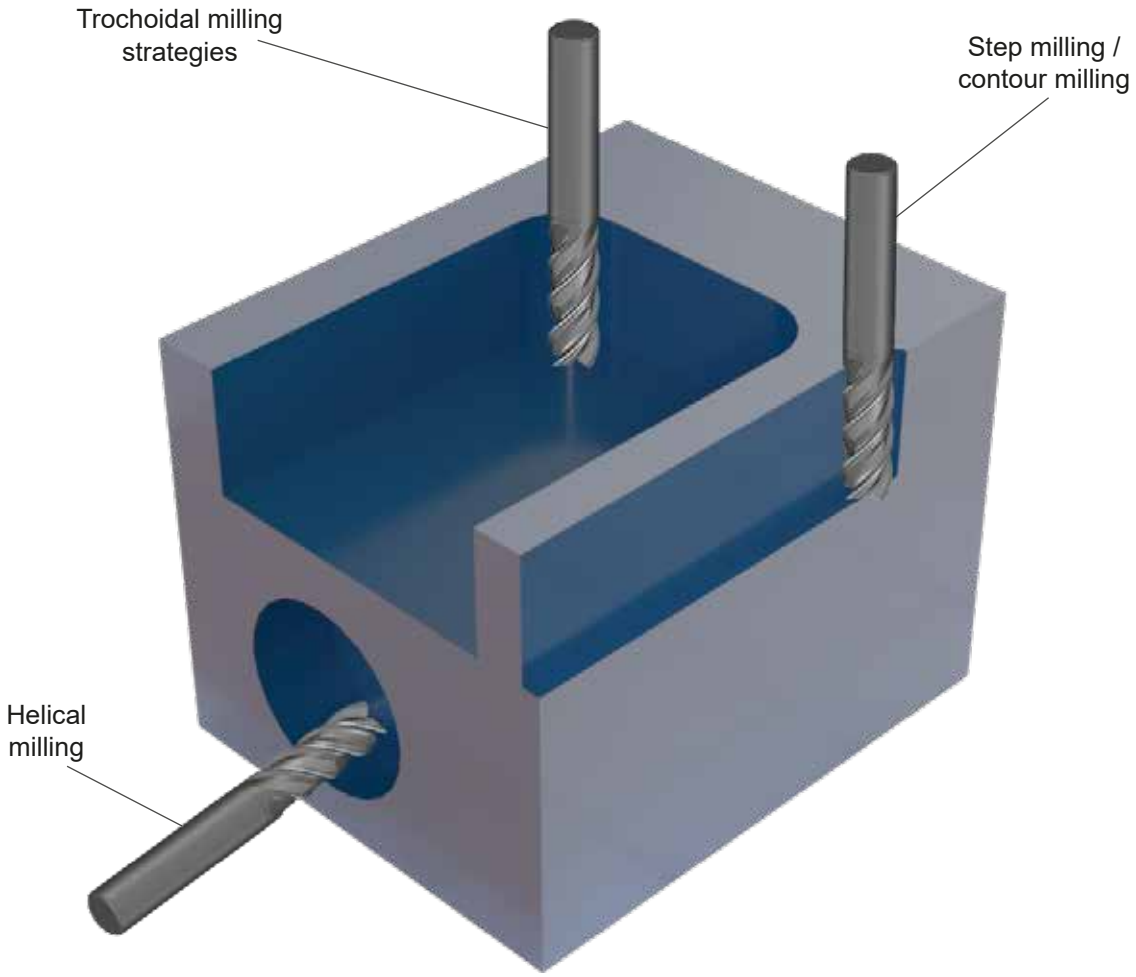
These 4-edged flat-shaped cutters were developed for reliable HSC machining of steel materials in the range of 50 - 70 HRC and the special requirements of the tool and mould making industry.

Both solid carbide cutter variants offer a high degree of versatility for step, contour, and trochoidal milling.

The tools of type VHM 453 HX74 with a 90° edge design enable the creation of straight walls right down to the bottom surface of the workpiece.
The VHM 453 R HX75 variant features defined radii that stabilize the transition from the circumference to the front face.

The primary focus was on achieving a balanced combination of high performance and a secure and reliable process execution.

Areas of application

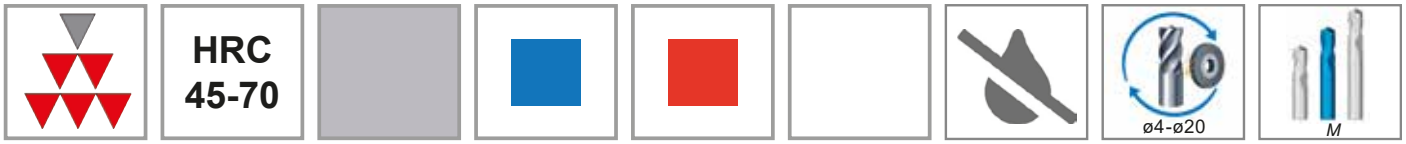


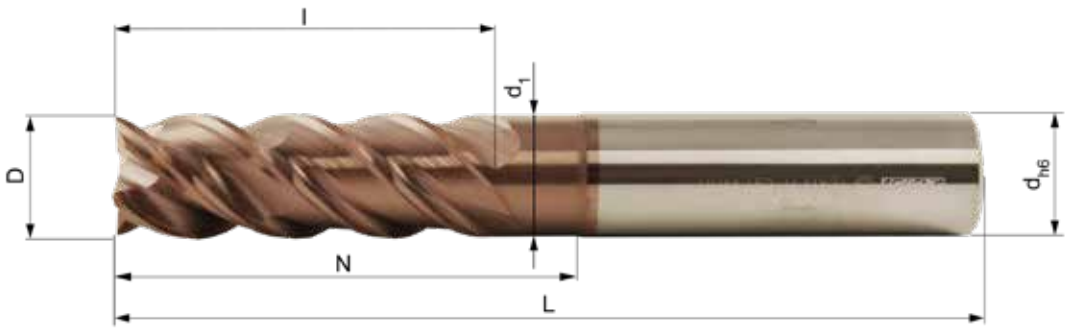
Characteristics

Features	Advantages
High performance cutter	-Max. process reliability with high productivity
VHM 453 HX74: Edge design of the tool 90°	- Creating contours without transition angles or transition radii down to the bottom of the workpiece
VHM 453 R HX74: Edge design of the tool: radius	- Creating contours with a transition radius down to the bottom of the workpiece
Versatile areas of application	- Pre-finishing - Finishing - Steel materials 50-70 HRC
Coupling made to DIN 6535-HA (cylindrical shape h_6)	- Precise tool holding manner → High concentricity
4-edged cutter with particularly stable tool core	- High stability and low displacement with step, contour and trochoidal milling
Larger chip spaces on the front side	- Simple chip removal during helical milling and step milling with high angels of attack
Optimized macro geometry	- Stable cutting wedge - Optimized chip space = High process reliability
Optimized micro geometry	- High layer adhesion - Increased edge stability - Improved surface quality of the cutting edge = High wear resistance and long tool life
The carbide	- The ultra-finest grain grade is specially designed for HSC-machining of tempered steels up to 70 HRC - Grain size of 0.5µm - ISO range K10-K20 - Hardness of 1.930 [HV30] and flexural strength of 4.400 [MPa] for high wear resistance with high flexural strength
The coating	New silicon-doped HiPIMS* coating for economical hard machining, even under extreme conditions. Exceptionally high Si content with a very dense structure for high thermal stability (operating temperature up to 1.100°C). HiPIMS technology ensures very high surface quality and excellent adhesion.
Carbide + Coating = The quality HX74	Areas of application include finish machining and semi finishing of hardened steels (50–70 HRC) and steel materials
Reconditioning of the tools possible from ø 4mm	- High cost-benefit factor

* HiPIMS = **H**igh **P**ower **I**mpulse **M**agnetron **S**puttering

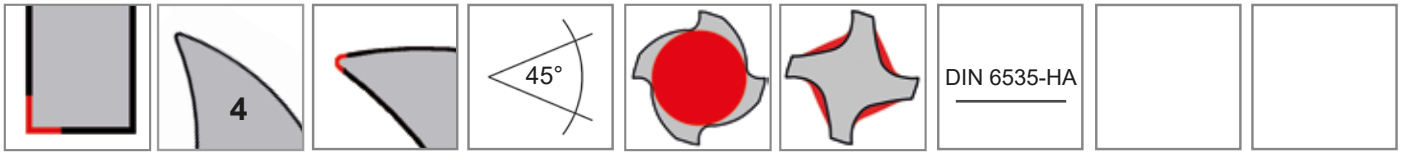
Technical Data VHM 453 HX74





Tolerance D

ø2,0-20,0= $^{-0,02}_{-0,04}$



Order-No.	Article	D	l	N	d_1	d	L	Z
VH453M02A-HX74	**VHM 453-02 HX74**	2	6	6	-	6	58	4
VH453M03A-HX74	**VHM 453-03 HX74**	3	8	8	-	6	58	4
VH453M04A-HX74	**VHM 453-04 HX74**	4	10	10	-	6	58	4
VH453M05A-HX74	**VHM 453-05 HX74**	5	10	20	4,7	6	58	4
VH453M06A-HX74	**VHM 453-06 HX74**	6	14	20	5,7	6	58	4
VH453M07A-HX74	**VHM 453-07 HX74**	7	17	27	6,7	8	64	4
VH453M08A-HX74	**VHM 453-08 HX74**	8	20	27	7,7	8	64	4
VH453M10A-HX74	**VHM 453-10 HX74**	10	23	31	9,7	10	73	4
VH453M12A-HX74	**VHM 453-12 HX74**	12	28	37	11,7	12	84	4
VH453M14A-HX74	**VHM 453-14 HX74**	14	34	47	13,7	14	95	4
VH453M16A-HX74	**VHM 453-16 HX74**	16	42	58	15,7	16	110	4
VH453M20A-HX74	**VHM 453-20 HX74**	20	50	71	19,7	20	125	4

Explanation of symbols


Pre-finishing


Finishing


Dry milling



The reconditioning of these tools is possible in the specified diameters


Hard machining


Steel


Cast iron GG(G)



This tool is designed with a middle-size length


Edge design of the milling cutter: Sharp (90°)


Edge design of the milling cutter: Radius



This tool type has throughout 4 cutting edges


Prepared cutting edge



Helix angle


Stable core

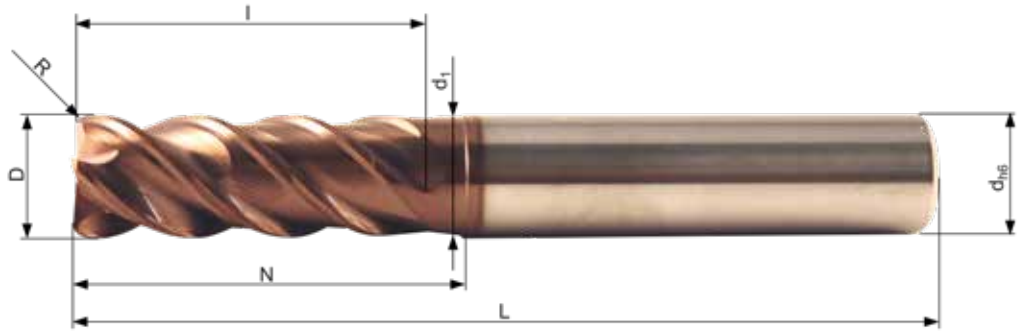

Chip space enlargement



Cylindrical shank

Technical Data VHM 453 R HX74





Tolerance D

ø2,0-12,0= $^{-0,02}_{-0,04}$

Tolerance R= ± 0,01



Order-No.	Article	D	R	l	N	d_1	d	L	Z
VH453M02R02A-HX74	**VHM 453-02 R02 HX74**	2	0,2	6	6	-	6	58	4
VH453M02R05A-HX74	**VHM 453-02 R05 HX74**	2	0,5	6	6	-	6	58	4
VH453M03R02A-HX74	**VHM 453-03 R02 HX74**	3	0,2	8	8	-	6	58	4
VH453M03R05A-HX74	**VHM 453-03 R05 HX74**	3	0,5	8	8	-	6	58	4
VH453M04R02A-HX74	**VHM 453-04 R02 HX74**	4	0,2	10	10	-	6	58	4
VH453M04R05A-HX74	**VHM 453-04 R05 HX74**	4	0,5	10	10	-	6	58	4
VH453M05R02A-HX74	**VHM 453-05 R02 HX74**	5	0,2	10	20	4,7	6	58	4
VH453M05R05A-HX74	**VHM 453-05 R05 HX74**	5	0,5	10	20	4,7	6	58	4
VH453M06R02A-HX74	**VHM 453-06 R02 HX74**	6	0,2	14	20	5,7	6	58	4
VH453M06R05A-HX74	**VHM 453-06 R05 HX74**	6	0,5	14	20	5,7	6	58	4
VH453M06R10A-HX74	**VHM 453-06 R10 HX74**	6	1,0	14	20	5,7	6	58	4
VH453M08R02A-HX74	**VHM 453-08 R02 HX74**	8	0,2	20	27	7,7	8	64	4
VH453M08R05A-HX74	**VHM 453-08 R05 HX74**	8	0,5	20	27	7,7	8	64	4
VH453M08R10A-HX74	**VHM 453-08 R10 HX74**	8	1,0	20	27	7,7	8	64	4
VH453M10R02A-HX74	**VHM 453-10 R02 HX74**	10	0,2	23	31	9,7	10	73	4
VH453M10R05A-HX74	**VHM 453-10 R05 HX74**	10	0,5	23	31	9,7	10	73	4
VH453M10R10A-HX74	**VHM 453-10 R10 HX74**	10	1,0	23	31	9,7	10	73	4
VH453M12R02A-HX74	**VHM 453-12 R02 HX74**	12	0,2	28	37	11,7	12	84	4
VH453M12R05A-HX74	**VHM 453-12 R05 HX74**	12	0,5	28	37	11,7	12	84	4
VH453M12R10A-HX74	**VHM 453-12 R10 HX74**	12	1,0	28	37	11,7	12	84	4

Cutting data recommendation for
STEP MILLING & HELICAL MILLING





ap ~ 0,75 x D

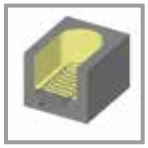
Material	D [mm]	Z	V_c [m/min]	a_p [mm]	min a_e	max a_e	min f_z	f_z	max f_z	n	V_f [mm/min]
Steel / Cast iron 45-55 HRC	2	4	120	1,5	0,079	0,244	0,005	0,010	0,015	19.389	775
	3	4	120	2,3	0,120	0,369	0,007	0,015	0,023	12.861	771
	4	4	120	3,1	0,160	0,493	0,011	0,022	0,033	9.621	846
	5	4	120	3,9	0,200	0,617	0,015	0,030	0,045	7.686	922
	6	4	120	4,7	0,240	0,741	0,019	0,038	0,057	6.398	972
	7	4	120	5,5	0,281	0,865	0,023	0,046	0,069	5.480	1.008
	8	4	120	6,3	0,321	0,989	0,026	0,054	0,082	4.793	1.035
	10	4	120	7,8	0,401	1,237	0,032	0,066	0,100	3.831	1.016
	12	4	120	9,4	0,482	1,485	0,039	0,079	0,119	3.191	1.004
	14	4	120	11,0	0,562	1,733	0,045	0,091	0,137	2.734	995
	16	4	120	12,5	0,643	1,982	0,051	0,104	0,157	2.392	995
	20	4	120	15,7	0,804	2,478	0,063	0,129	0,195	1.913	987
Steel 55-60 HRC	2	4	110	1,5	0,112	0,244	0,006	0,009	0,012	17.774	639
	3	4	110	2,3	0,168	0,369	0,008	0,013	0,018	11.789	613
	4	4	110	3,1	0,225	0,493	0,012	0,019	0,026	8.820	670
	5	4	110	3,9	0,282	0,617	0,016	0,026	0,036	7.045	732
	6	4	110	4,7	0,338	0,741	0,020	0,032	0,044	5.865	750
	7	4	110	5,5	0,395	0,865	0,024	0,039	0,054	5.024	783
	8	4	110	6,3	0,452	0,989	0,029	0,046	0,063	4.393	808
	10	4	110	7,8	0,565	1,237	0,035	0,056	0,077	3.512	791
	12	4	110	9,4	0,679	1,485	0,042	0,067	0,092	2.925	780
	14	4	110	11,0	0,792	1,733	0,048	0,077	0,106	2.506	771
	16	4	110	12,5	0,905	1,982	0,055	0,087	0,119	2.192	762
	20	4	110	15,7	1,132	2,478	0,068	0,108	0,148	1.753	757
Steel 60-70 HRC	2	4	90	1,5	0,179	0,244	0,007	0,008	0,009	14.542	465
	3	4	90	2,3	0,269	0,369	0,009	0,011	0,013	9.646	424
	4	4	90	3,1	0,360	0,493	0,013	0,015	0,017	7.216	432
	5	4	90	3,9	0,451	0,617	0,018	0,021	0,024	5.764	484
	6	4	90	4,7	0,541	0,741	0,022	0,026	0,030	4.799	499
	7	4	90	5,5	0,632	0,865	0,026	0,031	0,036	4.110	509
	8	4	90	6,3	0,723	0,989	0,031	0,037	0,043	3.594	531
	10	4	90	7,8	0,904	1,237	0,038	0,045	0,052	2.873	513
	12	4	90	9,4	1,085	1,485	0,044	0,052	0,060	2.393	500
	14	4	90	11,0	1,267	1,733	0,051	0,060	0,069	2.051	492
	16	4	90	12,5	1,448	1,982	0,057	0,068	0,079	1.794	487
	20	4	90	15,7	1,811	2,478	0,072	0,085	0,098	1.435	487

Helical milling above 55 HRC is not recommended.
Helical milling with ap values above 0.75 x D is not recommended.
Maximum bore diameter = 1.7 x D, minimum bore diameter = 1.4 x D

The a_e min and a_e max values are based on the smallest and largest material related wrap angle, respectively.
The f_z value must be adjusted accordingly within the specified f_z min and f_z max range.

Cutting data recommendation for
STEP MILLING & TROCHOIDAL MILLING STRATEGIES





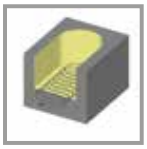
ap ~ 1,5 x D

Material	D [mm]	Z	V_c [m/min]	a_p [mm]	min a_e	max a_e	min f_z	f_z	max f_z	n	V_f [mm/min]
Steel / Cast iron 45-55 HRC	2	4	160	3,1	0,025	0,098	0,008	0,019	0,026	25.853	1.964
	3	4	160	4,7	0,038	0,148	0,012	0,028	0,039	17.148	1.920
	4	4	160	6,2	0,051	0,198	0,018	0,041	0,057	12.829	2.103
	5	4	160	7,8	0,064	0,247	0,025	0,057	0,079	10.247	2.336
	6	4	160	9,4	0,077	0,297	0,031	0,072	0,099	8.531	2.456
	7	4	160	10,9	0,089	0,347	0,038	0,088	0,121	7.307	2.572
	8	4	160	12,5	0,102	0,397	0,045	0,103	0,142	6.390	2.632
	10	4	160	15,7	0,128	0,496	0,055	0,126	0,174	5.108	2.581
	12	4	160	18,8	0,153	0,596	0,065	0,150	0,207	4.255	2.547
	14	4	160	21,9	0,179	0,696	0,075	0,173	0,239	3.646	2.523
	16	4	160	25,1	0,205	0,795	0,086	0,197	0,272	3.189	2.512
	20	4	160	31,4	0,256	0,994	0,107	0,245	0,338	2.550	2.499
Steel 55-60 HRC	2	4	150	3,1	0,041	0,098	0,009	0,016	0,023	24.237	1.551
	3	4	150	4,7	0,061	0,148	0,013	0,022	0,031	16.076	1.414
	4	4	150	6,2	0,082	0,198	0,019	0,033	0,047	12.027	1.587
	5	4	150	7,8	0,102	0,247	0,026	0,045	0,064	9.607	1.729
	6	4	150	9,4	0,123	0,297	0,033	0,057	0,081	7.998	1.823
	7	4	150	10,9	0,144	0,347	0,040	0,069	0,098	6.850	1.890
	8	4	150	12,5	0,164	0,397	0,047	0,081	0,115	5.991	1.941
	10	4	150	15,7	0,205	0,496	0,058	0,099	0,140	4.789	1.896
	12	4	150	18,8	0,246	0,596	0,069	0,117	0,165	3.989	1.866
	14	4	150	21,9	0,288	0,696	0,079	0,135	0,191	3.418	1.845
	16	4	150	25,1	0,329	0,795	0,090	0,154	0,218	2.990	1.841
	20	4	150	31,4	0,411	0,994	0,112	0,191	0,270	2.391	1.826
Steel 60-70 HRC	2	4	135	3,1	0,083	0,098	0,008	0,012	0,013	21.813	1.047
	3	4	135	4,7	0,125	0,148	0,010	0,016	0,018	14.469	926
	4	4	135	6,2	0,167	0,198	0,016	0,024	0,027	10.824	1.039
	5	4	135	7,8	0,210	0,247	0,021	0,032	0,036	8.646	1.106
	6	4	135	9,4	0,252	0,297	0,026	0,040	0,045	7.198	1.151
	7	4	135	10,9	0,294	0,347	0,032	0,049	0,055	6.165	1.208
	8	4	135	12,5	0,336	0,397	0,037	0,057	0,064	5.392	1.229
	10	4	135	15,7	0,420	0,496	0,045	0,069	0,077	4.310	1.189
	12	4	135	18,8	0,505	0,596	0,053	0,081	0,091	3.590	1.163
	14	4	135	21,9	0,589	0,696	0,061	0,093	0,104	3.076	1.144
	16	4	135	25,1	0,673	0,795	0,069	0,106	0,119	2.691	1.140
	20	4	135	31,4	0,842	0,994	0,085	0,131	0,147	2.152	1.127

The a_e min and a_e max values are based on the smallest and largest material related wrap angle, respectively.
The f_z value must be adjusted accordingly within the specified f_z min and f_z max range.

Cutting data recommendation for
STEP MILLING & TROCHOIDAL MILLING STRATEGIES





a_p ~ 2,2 x D

Material	D [mm]	Z	V_c [m/min]	a_p [mm]	min a_e	max a_e	min f_z	f_z	max f_z	n	V_f [mm/min]
Steel / Cast iron 45-55 HRC	2	4	180	4,4	0,015	0,048	0,009	0,029	0,045	29.084	3.373
	3	4	180	6,7	0,023	0,073	0,013	0,042	0,065	19.292	3.241
	4	4	180	8,9	0,030	0,098	0,018	0,061	0,095	14.432	3.521
	5	4	180	11,2	0,038	0,122	0,025	0,085	0,132	11.528	3.919
	6	4	180	13,4	0,045	0,147	0,032	0,108	0,168	9.597	4.145
	7	4	180	15,6	0,053	0,172	0,040	0,132	0,205	8.220	4.340
	8	4	180	17,9	0,061	0,196	0,046	0,155	0,241	7.189	4.457
	10	4	180	22,4	0,076	0,245	0,057	0,190	0,295	5.747	4.360
	12	4	180	26,9	0,091	0,295	0,067	0,224	0,349	4.787	4.295
	14	4	180	31,3	0,106	0,344	0,078	0,259	0,403	4.101	4.248
	16	4	180	35,8	0,121	0,393	0,088	0,295	0,459	3.588	4.233
	20	4	180	44,8	0,152	0,491	0,110	0,367	0,570	2.869	4.211
Steel 55-60 HRC	2	4	170	4,4	0,015	0,048	0,012	0,024	0,031	27.468	2.636
	3	4	170	6,7	0,023	0,073	0,017	0,033	0,043	18.220	2.405
	4	4	170	8,9	0,030	0,098	0,024	0,048	0,062	13.630	2.616
	5	4	170	11,2	0,038	0,122	0,033	0,066	0,086	10.888	2.874
	6	4	170	13,4	0,045	0,147	0,042	0,084	0,109	9.064	3.045
	7	4	170	15,6	0,053	0,172	0,051	0,102	0,132	7.764	3.167
	8	4	170	17,9	0,061	0,196	0,060	0,120	0,156	6.790	3.259
	10	4	170	22,4	0,076	0,245	0,073	0,146	0,190	5.428	3.177
	12	4	170	26,9	0,091	0,295	0,087	0,173	0,224	4.521	3.122
	14	4	170	31,3	0,106	0,344	0,100	0,199	0,258	3.873	3.082
	16	4	170	35,8	0,121	0,393	0,113	0,226	0,293	3.388	3.062
	20	4	170	44,8	0,152	0,491	0,141	0,281	0,364	2.710	3.046
Steel 60-70 HRC	2	4	155	4,4	0,023	0,048	0,011	0,017	0,023	25.045	1.703
	3	4	155	6,7	0,034	0,073	0,015	0,023	0,031	16.612	1.528
	4	4	155	8,9	0,046	0,098	0,021	0,033	0,045	12.428	1.640
	5	4	155	11,2	0,058	0,122	0,029	0,045	0,061	9.927	1.786
	6	4	155	13,4	0,069	0,147	0,037	0,057	0,077	8.264	1.884
	7	4	155	15,6	0,081	0,172	0,044	0,069	0,094	7.079	1.953
	8	4	155	17,9	0,092	0,196	0,051	0,080	0,109	6.190	1.980
	10	4	155	22,4	0,115	0,245	0,062	0,097	0,132	4.949	1.926
	12	4	155	26,9	0,139	0,295	0,073	0,115	0,156	4.122	1.890
	14	4	155	31,3	0,162	0,344	0,085	0,132	0,179	3.532	1.864
	16	4	155	35,8	0,185	0,393	0,095	0,149	0,203	3.089	1.841
	20	4	155	44,8	0,231	0,491	0,118	0,185	0,252	2.471	1.828

The a_e min and a_e max values are based on the smallest and largest material related wrap angle, respectively.
The f_z value must be adjusted accordingly within the specified f_z min and f_z max range.

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.

07/26

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