



# HARTNER

Precision Cutting Tools

# NEW

## High performance milling cutters











made of solid carbide

-----  
Preference Range  
-----

2012





Standard	Type	Shank form	Tool material	Surface	d1	Order no.	Discount group	Standard range, page
<b>TF 100 - High performance end mills</b>								
<b>TF 100 U - Milling cutters with unequal flute spacing with centre cutting for materials up to 54 HRC</b>								
			max. 54HRC					
DIN 6527 K	N	HB	Solid carbide	F	6.000 - 20.000	84900	157	5
			max. 54HRC					
DIN 6527 L	N	HA	Solid carbide	F	4.000 - 25.000	84901	157	5
			max. 54HRC					
DIN 6527 L	N	HB	Solid carbide	F	4.000 - 25.000	84902	157	5
<b>Universal end mills</b>								
<b>Slot drills (2-fluted) with centre cutting for common materials up to 1200 N/mm<sup>2</sup></b>								
								
DIN 6527 L	N	HA	Solid carbide	F	2.000 - 12.000	84911	157	6
								
DIN 6527 L	N	HB	Solid carbide	F	2.000 - 20.000	84912	157	6
								
Hartner std.	N	HA	Solid carbide	F	3.000 - 20.000	84913	157	6
<b>Slot drills (2-fluted) with centre cutting for aluminium and Al-alloys</b>								
								
DIN 6527 L	W	HB	Solid carbide	○	3.000 - 20.000	84914	157	7
<b>HP 100 U - mini-slot drills (3-fluted) with centre cutting for common materials up to 1000 N/mm<sup>2</sup></b>								
								
Hartner std.	NH	<math>\lt; \varnothing 2.0 \text{ HA/HB}</math>	Solid carbide	F	1.000 - 10.000	84905	157	8
<b>HP 100 U - Slot drills (3-fluted) with centre cutting for common materials up to 1400 N/mm<sup>2</sup></b>								
								
DIN 6527 L	NH	HA	Solid carbide	F	3.000 - 20.000	84903	157	8
								
DIN 6527 L	NH	HB	Solid carbide	F	3.000 - 20.000	84904	157	8

Application recommendations from page 13.

○ bright

F FIRE



# HARTNER

## Solid carbide milling cutters

Standard	Type	Shank form	Tool material	Surface		d1	Order no.	Discount group	Standard range. page
----------	------	------------	---------------	---------	--	----	-----------	----------------	----------------------

### Universal end mills

**End mills (4-fluted)  
with centre cutting for common materials up to 1200 N/mm<sup>2</sup>**



DIN 6527 L	N	HB	Solid carbide	F		2.000 - 20.000	84915	157	9
------------	---	----	---------------	---	--	----------------	-------	-----	---



Hartner std.	N	HA	Solid carbide	F		3.000 - 20.000	84916	157	9
--------------	---	----	---------------	---	--	----------------	-------	-----	---

**HP 100 U - multi-tooth end mills  
for superfine finishing for common and high tensile materials up to 50 HRC**



< 50HRC

Hartner std.	NH	HA	Solid carbide	F		3.000 - 25.000	84908	157	10
--------------	----	----	---------------	---	--	----------------	-------	-----	----



< 50HRC

Hartner std.	NH	HB	Solid carbide	F		6.000 - 20.000	84909	157	10
--------------	----	----	---------------	---	--	----------------	-------	-----	----



< 50HRC

Hartner std.	NH	HA	Solid carbide	F		6.000 - 20.000	84910	157	10
--------------	----	----	---------------	---	--	----------------	-------	-----	----

### Roughing end mills

**HS 100 U - roughing end mills with fine teeth  
with centre cutting for common materials up to 1200 N/mm<sup>2</sup>**



DIN 6527 L	NRf	HB	Solid carbide	F		6.000 - 20.000	84906	157	11
------------	-----	----	---------------	---	--	----------------	-------	-----	----

**HS 100 H - roughing end mills with fine teeth  
with centre cutting for common and high tensile materials up to 54 HRC**



54HRC

DIN 6527 L	HR	HB	Solid carbide	F		6.000 - 20.000	84907	157	11
------------	----	----	---------------	---	--	----------------	-------	-----	----

### Profile cutters

**Slot drills with ball nose (2-fluted)  
with centre cutting for common materials up to 1200 N/mm<sup>2</sup>**



DIN 6527 L	N	HA	Solid carbide	F		0.500 - 20.000	84917	157	12
------------	---	----	---------------	---	--	----------------	-------	-----	----



DIN 6527 L	N	HB	Solid carbide	F		4.000 - 12.000	84918	157	12
------------	---	----	---------------	---	--	----------------	-------	-----	----

**Slot drills with ball nose (4-fluted)  
with centre cutting for common materials up to 1200 N/mm<sup>2</sup>**



DIN 6527 L	N	HB	Solid carbide	F		3.000 - 20.000	84919	157	12
------------	---	----	---------------	---	--	----------------	-------	-----	----

○ bright

● FIRE

# NEW

## Milling Cutters

Hartner Technology - Made in Germany

- FIRE multi-layer coating – the best protection against fissures developing
- optimal thermal protection
- DK 460 UF carbide with high toughness and therefore reduced breakage and improved tool life
- precision ground surfaces
- high dimensional accuracy



### TF 100 U

Milling cutters with unequal flute spacing

35°

38°

- roughing and finishing with one tool
- vibration-free operation
- no chatter marks on workpiece
- increased tool life
- higher feed rates



HR

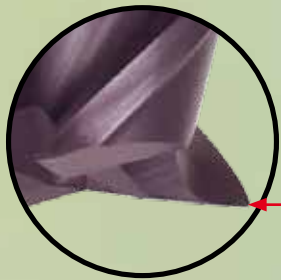


NRf

### HS 100 U + H

Precision roughing end mills

- increased chip volume
- large cutting depths
- small chips, no chip congestion
- finishing with optimal surface qualities
- low power consumption
- low cutting pressure
- ideal for low-drive and non-rigid machines or for unfavourable swarf conditions



### HP 100 U

Large helix angle precision milling cutter

Micro-corner protection and lip-corrected reinforced cutting edge = perfect stability

- quiet operation
- perfect fit slot drilling
- finishing with optimal surface qualities
- highest rigidity thanks to micro-corner protection and corrected reinforced cutting edges
- highest feed rates
- high contour accuracy



### PROFILE CUTTER

Ball nosed end mills

seamless radius area for high form and contour accuracy

- seamless radius area
- radius point grind with constant rake angle and continuous helix
- neck clearance
- high form and contour accuracy
- minimum wear
- high tool life



High wear protection thanks to radius point grind with constant rake angle and continuous helix



## TF 100 U - Milling cutters with unequal flute spacing

with centre cutting  
for materials up to 54 HRC

with centre cutting  
for materials up to 54 HRC

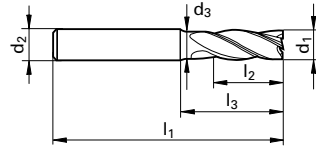
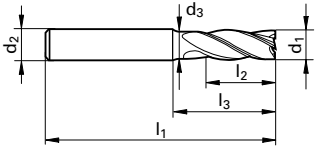
Order no.	84900
Standard	DIN 6527 K
Tool material	Solid carbide
Surface	<b>F</b>
Type	N
Shank form	HB
Helix angle	35°/38°
Discount group	157

Order no.	84901	84902
Standard	DIN 6527 L	
Tool material	Solid carbide	
Surface	<b>F</b>	<b>F</b>
Type	N	
Shank form	HA	HB
Helix angle	35°/38°	
Discount group	157	

max.  
54HRC

max.  
54HRC

max.  
54HRC



d1 h10	d2 h6	d3	l1	l2	l3	Z	Availability
mm	mm	mm	mm	mm	mm		
6	6	5.5	54	10	18	4	●
8	8	7.5	58	12	22	4	●
10	10	9.2	66	14	26	4	●
12	12	11.2	73	16	28	4	●
16	16	15.0	82	22	34	4	●
20	20	19.0	92	26	42	4	●

d1 h10	d2 h6	d3	l1	l2	l3	Z	Availability
mm	mm	mm	mm	mm	mm		
4	6	3.7	57	11	18	4	● ●
5	6	4.7	57	13	18	4	● ●
6	6	5.5	57	13	21	4	● ●
8	8	7.5	63	19	27	4	● ●
10	10	9.2	72	22	32	4	● ●
12	12	11.2	83	26	38	4	● ●
16	16	15.0	92	32	44	4	● ●
20	20	19.0	104	38	54	4	● ●
25	25	23.5	121	45	65	4	● ●



## Slot drills (2-fluted)

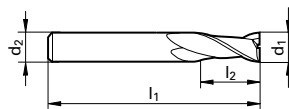
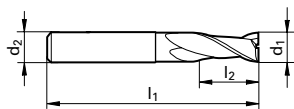
## Slot drills (2-fluted)

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

Order no.	84911	84912
Standard	DIN 6527 L	
Tool material	Solid carbide	
Surface		
Type	N	
Shank form	HA	HB
Helix angle	30°	
Discount group	157	

Order no.	84913
Standard	Hartner std.
Tool material	Solid carbide
Surface	
Type	N
Shank form	HA
Helix angle	30°
Discount group	157



d1 h10	d2 h6	l1	l2	Z
mm	mm	mm	mm	
2	6	57	6	2
3	6	57	7	2
4	6	57	8	2
5	6	57	10	2
6	6	57	10	2
8	8	63	16	2
10	10	72	19	2
12	12	83	22	2
16	16	92	26	2
20	20	104	32	2

d1 h10	d2 h6	l1	l2	Z
mm	mm	mm	mm	
3	3	75	20	2
4	4	75	25	2
5	5	75	30	2
6	6	75	30	2
8	8	100	40	2
10	10	100	40	2
12	12	150	45	2
16	16	150	65	2
20	20	150	65	2

Availability

Availability



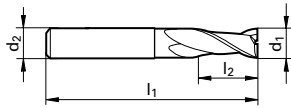




## Slot drills (2-fluted)

with centre cutting  
for aluminium and Al-alloys

Order no.	84914
Standard	DIN 6527 L
Tool material	Solid carbide
Surface	○
Type	W
Shank form	HB
Helix angle	45°
Discount group	157



d1 e8 mm	d2 h6 mm	l1 mm	l2 mm	Z	Availability
3	6	57	7	2	●
4	6	57	8	2	●
5	6	57	10	2	●
6	6	57	10	2	●
8	8	63	16	2	●
10	10	72	19	2	●
12	12	83	22	2	●
16	16	92	26	2	●
20	20	104	32	2	●







## HP 100 U - Slot drills (3-fluted)

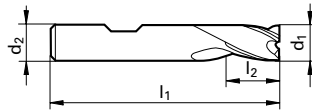
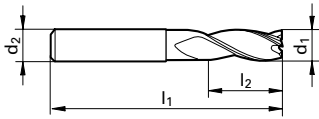
## HP 100 U - mini-slot drills (3-fluted)

with centre cutting  
for materials up to 1400 N/mm<sup>2</sup>

with centre cutting  
for materials up to 1000 N/mm<sup>2</sup>

Order no.	84903	84904
Standard	DIN 6527 L	
Tool material	Solid carbide	
Surface		
Type	NH	
Shank form	HA	HB
Helix angle	45°	
Discount group	157	

Order no.	84905
Standard	Hartner std.
Tool material	Solid carbide
Surface	
Type	NH
Shank form	<Ø2.0 HA/HB
Helix angle	45°
Discount group	157



d1 h10	d2 h6	l1	l2	Z	Availability	
mm	mm	mm	mm			
3.00	6	57	7	3	●	●
3.50	6	57	7	3	●	●
4.00	6	57	8	3	●	●
5.00	6	57	10	3	●	●
6.00	6	57	10	3	●	●
7.00	8	63	13	3	●	●
8.00	8	63	16	3	●	●
10.00	10	72	19	3	●	●
12.00	12	83	22	3	●	●
14.00	14	83	22	3	●	●
16.00	16	92	26	3	●	●
20.00	20	104	32	3	●	●

d1 e8	d2 h6	l1	l2	Z	Availability	
mm	mm	mm	mm			
1.00	3	38	2	3	●	
1.20	3	38	2	3	●	
1.50	3	38	3	3	●	
1.80	3	38	3	3	●	
2.00	6	45	4	3	●	
2.50	6	45	5	3	●	
3.00	6	45	6	3	●	
3.50	6	45	6	3	●	
4.00	6	45	7	3	●	
4.50	6	45	8	3	●	
5.00	6	45	8	3	●	
5.50	6	45	8	3	●	
5.75	6	45	10	3	●	
6.00	6	45	10	3	●	
6.75	8	55	10	3	●	
7.00	8	55	12	3	●	
7.75	8	55	12	3	●	
8.00	8	55	13	3	●	
8.70	10	55	14	3	●	
9.00	10	55	14	3	●	
9.70	10	55	16	3	●	
10.00	10	55	16	3	●	





## End mills (4-fluted)

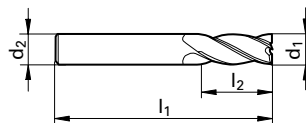
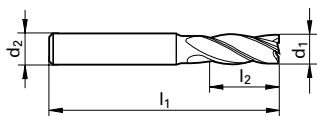
## End mills (4-fluted)

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

Order no.	84915
Standard	DIN 6527 L
Tool material	Solid carbide
Surface	
Type	N
Shank form	HB
Helix angle	30°
Discount group	157

Order no.	84916
Standard	Hartner std.
Tool material	Solid carbide
Surface	
Type	N
Shank form	HA
Helix angle	30°
Discount group	157



d1 h10	d2 h6	l1	l2	Z	Availability
mm	mm	mm	mm		
2	6	57	7	4	●
3	6	57	8	4	●
4	6	57	11	4	●
5	6	57	13	4	●
6	6	57	13	4	●
7	8	63	16	4	●
8	8	63	19	4	●
9	10	72	19	4	●
10	10	72	22	4	●
12	12	83	26	4	●
14	14	83	26	4	●
16	16	92	32	4	●
18	18	92	32	4	●
20	20	104	38	4	●

d1 h10	d2 h6	l1	l2	Z	Availability
mm	mm	mm	mm		
3	3	75	20	4	●
4	4	75	25	4	●
5	5	75	30	4	●
6	6	75	30	4	●
8	8	100	40	4	●
10	10	100	40	4	●
12	12	150	45	4	●
16	16	150	65	4	●
20	20	150	65	4	●



## HP 100 U - multi-tooth end mills

for superfine finishing, for common and high-tensile materials up to < 50 HRC

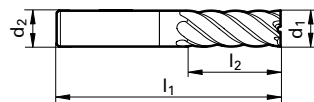
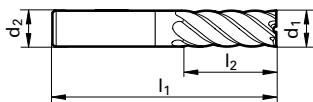
for superfine finishing, for common and high-tensile materials up to < 50 HRC

Order no.	84908	84909
Standard	Hartner std.	
Tool material	Solid carbide	
Surface		
Type	NH	
Shank form	HA	HB
Helix angle	45°	
Discount group	157	

Order no.	84910
Standard	Hartner std.
Tool material	Solid carbide
Surface	
Type	NH
Shank form	HA
Helix angle	45°
Discount group	157

< 50 HRC      < 50 HRC

< 50 HRC



d1 h10	d2 h6	l1	l2	Z
mm	mm	mm	mm	
3	6	57	8	6
4	6	57	11	6
5	6	57	13	6
6	6	57	13	6
8	8	63	19	6
10	10	72	22	6
12	12	83	26	6
16	16	92	32	6
20	20	104	38	8
25	25	121	45	10

d1 h10	d2 h6	l1	l2	Z
mm	mm	mm	mm	
6	6	75	30	6
8	8	100	40	6
10	10	100	40	6
12	12	150	45	6
16	16	150	65	6
20	20	150	65	8

Availability

Availability

●	
●	
●	
●	●
●	●
●	●
●	●
●	●
●	●
●	●

●
●
●
●
●
●





## HS 100 U - roughing end mills with fine teeth

## HS 100 H - roughing end mills with fine teeth

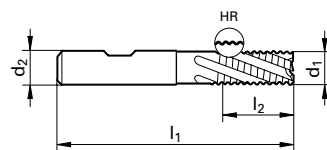
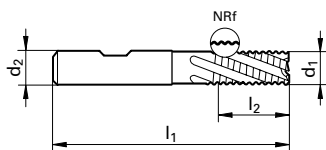
with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

with centre cutting  
for common and high tensile materials up to 54 HRC

Order no.	84906
Standard	DIN 6527 L
Tool material	Solid carbide
Surface	<b>F</b>
Type	NRf
Shank form	HB
Helix angle	30°
Discount group	157

Order no.	84907
Standard	DIN 6527 L
Tool material	Solid carbide
Surface	<b>F</b>
Type	HR
Shank form	HB
Helix angle	20°
Discount group	157

54HRC



d1 h10	d2 h6	l1	l2	Z	Availability
mm	mm	mm	mm		
6	6	57	13	4	●
8	8	63	19	4	●
10	10	72	22	4	●
12	12	83	26	4	●
16	16	92	32	4	●
20	20	104	38	4	●

d1 h10	d2 h6	l1	l2	Z	Availability
mm	mm	mm	mm		
6	6	57	13	4	●
8	8	63	19	4	●
10	10	72	22	4	●
12	12	83	26	4	●
16	16	92	32	4	●
20	20	104	38	4	●



## Slot drills with ball nose (2-fluted)

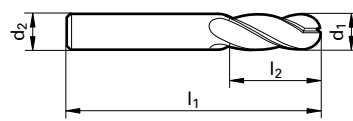
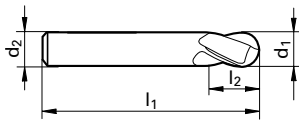
## End mills with ball nose (4-fluted)

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

with centre cutting  
for materials up to 1200 N/mm<sup>2</sup>

Order no.	84917	84918
Standard	DIN 6527 L	
Tool material	Solid carbide	
Surface	F	F
Type	N	
Shank form	HA	HB
Helix angle	30°	
Discount group	157	

Order no.	84919
Standard	DIN 6527 L
Tool material	Solid carbide
Surface	F
Type	N
Shank form	HB
Helix angle	30°
Discount group	157



d1 h10	d2 h6	l1	l2	Z	Availability	
mm	mm	mm	mm			
0.50	3	38	1	2	●	
1.00	3	38	2	2	●	
1.50	3	38	3	2	●	
2.00	6	57	6	2	●	
3.00	6	57	7	2	●	
4.00	6	57	8	2	●	●
5.00	6	57	10	2	●	●
6.00	6	57	10	2	●	●
8.00	8	63	16	2	●	●
10.00	10	72	19	2	●	●
12.00	12	83	22	2	●	●
20.00	20	104	32	2	●	●

d1 h10	d2 h6	l1	l2	Z	Availability	
mm	mm	mm	mm			
3.00	6	57	8	4	●	
4.00	6	57	11	4	●	
5.00	6	57	13	4	●	
6.00	6	57	13	4	●	
8.00	8	63	19	4	●	
10.00	10	72	22	4	●	
12.00	12	83	26	4	●	
20.00	20	104	38	4	●	



## TF 100 U - Milling cutters with unequal flute spacing

**fz-corrections:\***  
**ap = 2 x d; fz -30%**

Application	Feed width (ae)	Feed depth (ap)
Slotting*	1 x d	0.5 to 1.0 x d
Roughing*	0.5 to 0.9 x d	0.5 to 1.0 x d
Finishing	0.05 to 0.1 x d	1.0 to 2.0 x d

Material	Hardness	Type of application	Cut v <sub>c</sub>	fz (mm/z) with nom. Ø								
				3	6	8	10	12	16	20	25	
<b>Structural + free-cutting steels, unalloyed heat-treatable + case hardened steels</b> 1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0050, 1.0070, 1.8937 1.0718 11SMnPb30, 1.0736 11SMn37 1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C30E 1.0301 C10, 1.1121 C10E 1.1750 C75W, 1.2076 102Cr6, 1.2307 29CrMoV9	up to 850 N/mm <sup>2</sup>	Slotting	180	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
		Roughing	200	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17	
		Finishing	280	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
<b>Free-cutting steels, unalloyed case hardened steels, nitriding steels</b> 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20 1.0601 C60, 1.1221 C60E 1.7043 38Cr4 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5 1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	850-1200 N/mm <sup>2</sup>	Slotting	160	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
		Roughing	180	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17	
		Finishing	220	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
<b>Alloyed heat-treatable, tool and high speed steels</b> 1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2379 X155CrVMo12-1 1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3 Spring steel = 1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	850-1400 N/mm <sup>2</sup>	Slotting	135	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Roughing	160	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Finishing	200	0.015	0.03	0.04	0.05	0.06	0.07	0.09	0.13	
<b>Hardened steel</b> Tool steel, heat-treatable steel, spring steel, high-speed steel, case hardened steel, etc. Z.B.: 1.2344 X40CrMoV5-1; 1.2767 X45NiCrMo4; 1.2379 X155CrVMo12-1 ;1.2080 X210Cr12 1.3343 S 6-5-2	up to 54 HRC	Slotting	70	0.012	0.025	0.03	0.04	0.045	0.06	0.07	0.1	
		Roughing	110	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
		Finishing	150	0.015	0.03	0.04	0.05	0.06	0.07	0.09	0.13	
	54-60 HRC	Slotting										
		Roughing										
		Finishing	110	0.01	0.015	0.025	0.035	0.042	0.05	0.08	0.09	
<b>Stainless steel</b> 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9 USA = 303, 410, 420F, 430, 430F	up to 750 N/mm <sup>2</sup>	Slotting	120	0.015	0.03	0.04	0.05	0.06	0.07	0.09	0.13	
		Roughing	140	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
		Finishing	180	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
<b>Stainless steel</b> 1.4301 X5CrNi18-10, 1.4303 X5CrNi18-12 1.4310 XCrNi18-8 USA = 304, 304L, 420	750-850 N/mm <sup>2</sup>	Slotting	80	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
		Roughing	120	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Finishing	140	0.015	0.03	0.04	0.05	0.06	0.07	0.09	0.13	
<b>Stainless steel</b> 1.4438 X2CrNiMo18-15-4, 1.4404 X2CrNiMo17-12-2, 1.4571 X6CrNiTi18-10 USA = 310, 316, 316B, 316L, 317	above 850 N/mm <sup>2</sup>	Slotting	70	0.012	0.025	0.03	0.04	0.045	0.06	0.07	0.1	
		Roughing	100	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
		Finishing	120	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
<b>Special alloys (nickel based "Ni")</b> Nimonic, Inconel, Monel, Hastelloy	up to 1.300 N/mm <sup>2</sup>	Slotting	30	0.01	0.015	0.02	0.025	0.03	0.04	0.05	0.06	
		Roughing	35	0.01	0.02	0.03	0.035	0.04	0.055	0.065	0.08	
		Finishing	45	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
<b>Titanium alloys ("Ti")</b> 3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5	up to 1.300 N/mm <sup>2</sup>	Slotting	60	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
		Roughing	90	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Finishing	130	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL-200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	up to 240 HB 30	Slotting	160	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Roughing	180	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17	
		Finishing	220	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL-350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	above 240 HB 30	Slotting	140	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Roughing	160	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Finishing	200	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
<b>Aluminium, Al-wrought alloys, Al-alloys</b> 3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	up to 3% Si	Slotting	500	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Roughing	600	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17	
		Finishing	1000	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
<b>Aluminium-cast alloys</b> 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	above 3% Si	Slotting	230	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Roughing	280	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Finishing	350	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
<b>Magnesium-alloys</b> MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	-	Slotting	180	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Roughing	220	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16	
		Finishing	280	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15	
<b>Non-ferrous metals (copper, short- or long-chipping brass)</b> 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	up to 850 N/mm <sup>2</sup>	Slotting	250	0.015	0.025	0.035	0.045	0.05	0.065	0.08	0.12	
		Roughing	300	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
		Finishing	400	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	



## Universal end mills 2-/3-/4-/6-/8-fluted

**fz-corrections:\***  
**ap = 2 x d; fz -30%**

Application	Feed width (ae)	Feed depth (ap)
Slotting*	1 x d	0.5 up to 1.0 x d
Roughing*	0.5 up to 0.9 x d	0.5 up to 1.0 x d
Finishing	0.05 up to 0.1 x d	1.0 up to 2.0 x d

Material	Hardness	Type of application	Cut v <sub>c</sub>	fz (mm/min.)								
				3	6	8	10	12	16	20	25	
<b>Structural + free-cutting steels, unalloyed heat-treatable + case hardened steels</b> 1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0050, 1.0070, 1.8937 1.0718 11SMnPb30, 1.0736 11SMn37 1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C30E 1.0301 C10, 1.1121 C10E 1.1750 C75W, 1.2076 102Cr6, 1.2307 29CrMoV9	up to 850 N/mm <sup>2</sup>	Slotting	125	0.013	0.025	0.032	0.042	0.049	0.063	0.070	0.105	
		Roughing	140	0.014	0.028	0.039	0.049	0.060	0.070	0.084	0.119	
		Finishing	190	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
<b>Free-cutting steels, unalloyed case hardened steels, nitriding steels</b> 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20 1.0601 C60, 1.1221 C60E 1.7043 38Cr4 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5 1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	850-1,200 N/mm <sup>2</sup>	Slotting	110	0.013	0.025	0.032	0.042	0.049	0.063	0.070	0.105	
		Roughing	130	0.014	0.028	0.039	0.049	0.060	0.070	0.084	0.119	
		Finishing	150	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
<b>Alloyed heat-treatable, tool and high speed steels</b> 1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2379 X155CrVMo12-1 1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3 Spring steel = 1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	850-1,400 N/mm <sup>2</sup>	Slotting	95	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
		Roughing	115	0.014	0.028	0.035	0.046	0.056	0.067	0.077	0.112	
		Finishing	140	0.011	0.021	0.028	0.035	0.042	0.049	0.063	0.091	
<b>Hardened steel</b> Tool steel, heat-treatable steel, spring steel, high-speed steel, case hardened steel, etc. Z.B.: 1.2344 X40CrMoV5-1; 1.2767 X45NiCrMo4; 1.2379 X155CrVMo12-1 ;1.2080 X210Cr12 1.3343 S 6-5-2	up to 54 HRC	Slotting	50	0.007	0.015	0.018	0.024	0.027	0.036	0.042	0.060	
		Roughing	75	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
		Finishing	105	0.009	0.018	0.024	0.030	0.036	0.042	0.054	0.078	
	54-60 HRC	Slotting										
		Roughing										
		Finishing										
<b>Stainless steel</b> 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9 USA = 303, 410, 420F, 430, 430F	up to 750 N/mm <sup>2</sup>	Slotting	85	0.009	0.018	0.024	0.030	0.036	0.042	0.054	0.078	
		Roughing	100	0.011	0.021	0.027	0.036	0.042	0.054	0.060	0.090	
		Finishing	125	0.010	0.018	0.024	0.033	0.039	0.048	0.057	0.084	
<b>Stainless steel</b> 1.4301 X5CrNi18-10, 1.4303 X5CrNi18-12 1.4310 XCrNi18-8 USA = 304, 304L, 420	750-850 N/mm <sup>2</sup>	Slotting	55	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
		Roughing	85	0.010	0.018	0.024	0.033	0.039	0.048	0.057	0.084	
		Finishing	100	0.009	0.018	0.024	0.030	0.036	0.042	0.054	0.078	
<b>Stainless steel</b> 1.4438 X2CrNiMo18-15-4, 1.4404 X2CrNiMo17-12-2, 1.4571 X6CrNiTi18-10 USA = 310, 316, 316B, 316L, 317	above 850 N/mm <sup>2</sup>	Slotting	50	0.007	0.015	0.018	0.024	0.027	0.036	0.042	0.060	
		Roughing	70	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
		Finishing	85	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
<b>Special alloys (nickel based "Ni")</b> Nimonic, Inconel, Monel, Hastelloy	up to 1,300 N/mm <sup>2</sup>	Slotting	20	0.006	0.009	0.012	0.015	0.018	0.024	0.030	0.036	
		Roughing	25	0.006	0.012	0.018	0.021	0.024	0.033	0.039	0.048	
		Finishing	30	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
<b>Titanium alloys ("Ti")</b> 3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5	up to 1,300 N/mm <sup>2</sup>	Slotting	40	0.009	0.015	0.021	0.027	0.030	0.039	0.048	0.072	
		Roughing	60	0.010	0.018	0.024	0.033	0.039	0.048	0.057	0.084	
		Finishing	90	0.010	0.018	0.024	0.033	0.039	0.048	0.057	0.084	
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL-200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	up to 240 HB 30	Slotting	115	0.012	0.024	0.030	0.039	0.048	0.057	0.066	0.096	
		Roughing	125	0.012	0.024	0.033	0.042	0.051	0.060	0.072	0.102	
		Finishing	155	0.011	0.021	0.027	0.036	0.042	0.054	0.060	0.090	
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL-350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	above 240 HB 30	Slotting	100	0.010	0.018	0.024	0.033	0.039	0.048	0.057	0.084	
		Roughing	115	0.012	0.024	0.030	0.039	0.048	0.057	0.066	0.096	
		Finishing	140	0.011	0.021	0.027	0.036	0.042	0.054	0.060	0.090	
<b>Aluminium, Al-wrought alloys, Al-alloys</b> 3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	up to 3% Si	Slotting	350	0.014	0.028	0.035	0.046	0.056	0.067	0.077	0.112	
		Roughing	420	0.014	0.028	0.039	0.049	0.060	0.070	0.084	0.119	
		Finishing	700	0.013	0.025	0.032	0.042	0.049	0.063	0.070	0.105	
<b>Aluminium-cast alloys</b> 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	above 3% Si	Slotting	160	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
		Roughing	200	0.014	0.028	0.035	0.046	0.056	0.067	0.077	0.112	
		Finishing	245	0.013	0.025	0.032	0.042	0.049	0.063	0.070	0.105	
<b>Magnesium-alloys</b> MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	-	Slotting	125	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
		Roughing	150	0.014	0.028	0.035	0.046	0.056	0.067	0.077	0.112	
		Finishing	200	0.013	0.025	0.032	0.042	0.049	0.063	0.070	0.105	
<b>Non-ferrous metals (copper, short- or long-chipping brass)</b> 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	up to 850 N/mm <sup>2</sup>	Slotting	175	0.011	0.018	0.025	0.032	0.035	0.046	0.056	0.084	
		Roughing	210	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	
		Finishing	280	0.011	0.021	0.028	0.039	0.046	0.056	0.067	0.098	

For super-fine finishing with H 100 U v<sub>c</sub> can be increased by +40%.



## HS 100 U and H roughing end mills with knuckle-type teeth

**fz-corrections:\***  
**ap = 2 x d; fz -30%**



Application	Feed width (ae)	Feed depth (ap)
Slotting*	1 x d	0.5 up to 1.0 x d
Roughing*	0.5 up to 0.9 x d	0.5 up to 1.0 x d
Finishing	0.05 up to 0.1 x d	1.0 up to 2.0 x d

Material	Hardness	Type of application	Cut v <sub>c</sub>	fz (mm/min.)								
				3	6	8	10	12	16	20	25	
<b>Structural + free-cutting steels, unalloyed heat-treatable + case hardened steels</b> 1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0050, 1.0070, 1.8937 1.0718 11SMnPb30, 1.0736 11SMn37 1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C30E 1.0301 C10, 1.1121 C10E 1.1750 C75W, 1.2076 102Cr6, 1.2307 29CrMoV9	up to 850 N/mm <sup>2</sup>	Slotting	140	0.010	0.020	0.024	0.032	0.036	0.048	0.056	0.080	
		Roughing	160	0.012	0.020	0.028	0.036	0.040	0.052	0.064	0.096	
		Finishing										
<b>Free-cutting steels, unalloyed case hardened steels, nitriding steels</b> 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20 1.0601 C60, 1.1221 C60E 1.7043 38Cr4 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5 1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	850-1.200 N/mm <sup>2</sup>	Slotting	130	0.010	0.020	0.024	0.032	0.036	0.048	0.056	0.080	
		Roughing	150	0.012	0.020	0.028	0.036	0.040	0.052	0.064	0.096	
		Finishing										
<b>Alloyed heat-treatable, tool and high speed steels</b> 1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2379 X155CrVMo12-1 1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3 Spring steel = 1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	850-1.400 N/mm <sup>2</sup>	Slotting	110	0.008	0.012	0.020	0.024	0.028	0.036	0.048	0.056	
		Roughing	130	0.008	0.016	0.024	0.028	0.032	0.044	0.052	0.064	
		Finishing										
<b>Hardened steel</b> Tool steel, heat-treatable steel, spring steel, high-speed steel, case hardened steel, etc. Z.B.: 1.2344 X40CrMoV5-1; 1.2767 X45NiCrMo4; 1.2379 X155CrVMo12-1 ;1.2080 X210Cr12 1.3343 S 6-5-2	up to 54 HRC	Slotting	55	0.008	0.012	0.016	0.020	0.024	0.032	0.040	0.048	
		Roughing	90	0.010	0.012	0.020	0.024	0.028	0.036	0.048	0.056	
		Finishing										
	54-60 HRC	Slotting										
		Roughing										
		Finishing										
<b>Stainless steel</b> 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9 USA = 303, 410, 420F, 430, 430F	up to 750 N/mm <sup>2</sup>	Slotting	100	0.010	0.020	0.024	0.032	0.036	0.048	0.056	0.080	
		Roughing	115	0.012	0.020	0.028	0.036	0.040	0.052	0.064	0.096	
		Finishing										
<b>Stainless steel</b> 1.4301X5CrNi18-10, 1.4303 X5CrNi18-12 1.4310 XCrNi18-8 USA = 304, 304L, 420	750-850 N/mm <sup>2</sup>	Slotting	65	0.007	0.011	0.018	0.021	0.025	0.032	0.042	0.049	
		Roughing	100	0.008	0.014	0.021	0.025	0.028	0.039	0.046	0.056	
		Finishing										
<b>Stainless steel</b> 1.4438 X2CrNiMo18-15-4, 1.4404 X2CrNiMo17-12-2, 1.4571 X6CrNiTi18-10 USA = 310, 316, 316B, 316L, 317	above 850 N/mm <sup>2</sup>	Slotting	55	0.007	0.011	0.014	0.018	0.021	0.028	0.035	0.042	
		Roughing	80	0.008	0.011	0.018	0.021	0.025	0.032	0.042	0.049	
		Finishing										
<b>Special alloys (nickel based "Ni")</b> Nimonic, Inconel, Monel, Hastelloy	up to 1.300 N/mm <sup>2</sup>	Slotting	25	0.006	0.007	0.011	0.014	0.018	0.025	0.028	0.035	
		Roughing	30	0.007	0.011	0.014	0.018	0.021	0.028	0.035	0.042	
		Finishing										
<b>Titanium alloys ("Ti")</b> 3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5	up to 1.300 N/mm <sup>2</sup>	Slotting	50	0.007	0.011	0.018	0.021	0.025	0.032	0.042	0.049	
		Roughing	70	0.008	0.014	0.021	0.025	0.028	0.039	0.046	0.056	
		Finishing										
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	up to 240 HB 30	Slotting	130	0.011	0.018	0.025	0.032	0.035	0.046	0.056	0.084	
		Roughing	140	0.011	0.021	0.028	0.035	0.042	0.049	0.063	0.091	
		Finishing										
<b>Cast iron, grey cast iron, spheroidal graphite and malleable cast iron</b> 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	above 240 HB 30	Slotting	110	0.008	0.018	0.021	0.028	0.032	0.042	0.049	0.070	
		Roughing	130	0.011	0.018	0.025	0.032	0.035	0.046	0.056	0.084	
		Finishing										

### Hints:

Application recommendations stated in this catalogue are to be considered as guidance values for new or re-ground tools to Hartner specification. Pre-requisites are sufficient machine performance, optimal cooling, optimal tool clamping and the highest possible tool and machine spindle concentricity.

Under deviating conditions the recommended cutting rates must be reduced.

The values may also be adapted to influence the surface quality, the machining volume and the tool life.

Please contact our technical field service for advice!



## Our programme:



FU 500/FN500



Gun Drills



INOX Drills



Multiplex



Micro Precision Drills



Multiplex HPC



TS-Drills



Standard Range



Highlights



TM Vending Machines



Special Drills



Solid Carbide  
High Performance Milling Cutters

## Hartner GmbH

P.O. Box 10 04 27, D-72425 Albstadt

Tel. +49 74 31/1 25-0, Fax +49 74 31/1 25-21 547

[www.hartner.de](http://www.hartner.de)